Result 4.9

Trainings Energy Saving and Renewable Energies

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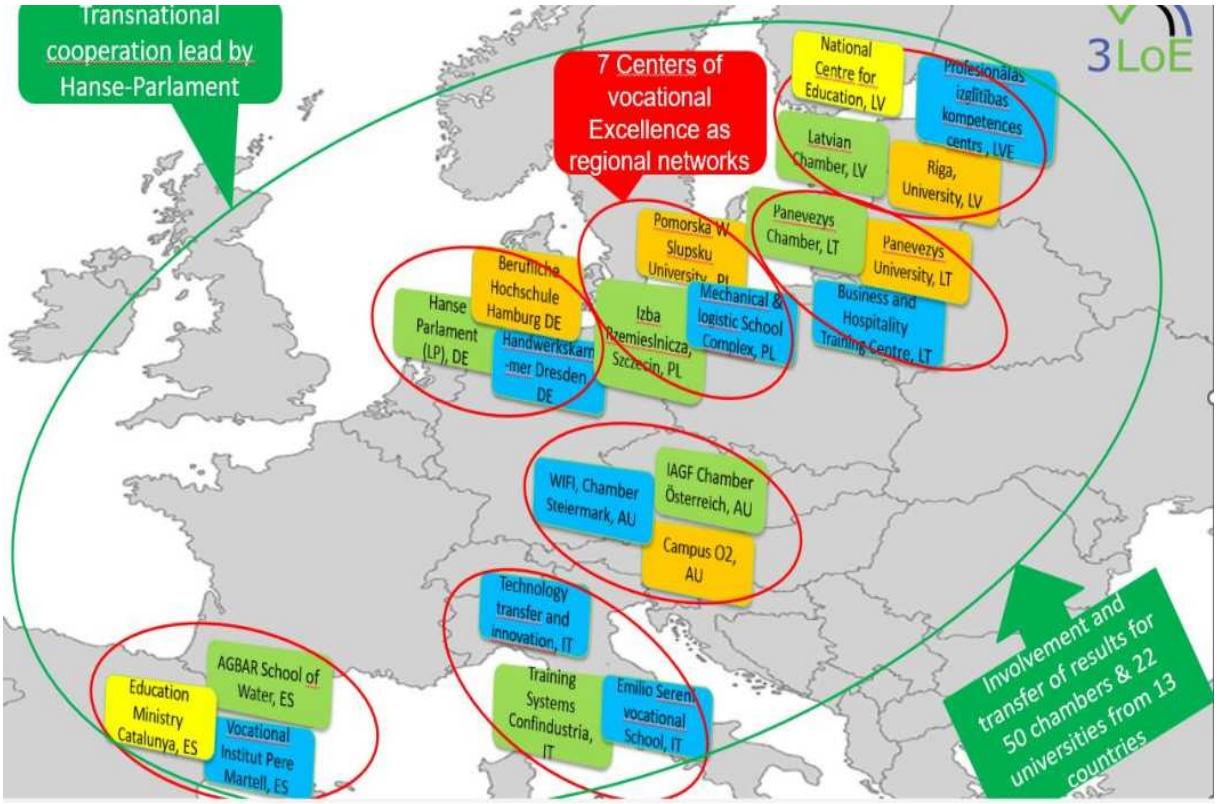

Language

English

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Summary of the Project and Introduction

About the 3LOE Project

Around 99% of all EU businesses are SMEs, creating up to 70% of all jobs. In general, SMEs have good growth prospects for the future and are particularly well equipped to solve environmental problems and to enhance the green economy. However, in most of the project countries, SMEs are confronted with a shortage of skilled workers and young entrepreneurs. This shortage of skilled workers is even more alarming taking into account that due to aging of current entrepreneurs, a large and growing number of companies will have to be handed over to the next generation. Furthermore, young specialists and entrepreneurs often lack the qualifications and skills needed in order to respond to contemporary developments in the fields of energy, climate and environmental protection. The following problems have been identified in SMEs working in the fields of green economy, energy and environmental protection:

- Blatant and growing shortage of skilled workers.
- Large qualification deficits, especially in the Green Economy.
- Loss of attractiveness and low qualification of school-based VET.
- Low rates of further training and insufficient orientation of offers to SME needs.
- Ageing of entrepreneurs and increasing shortage of young people (demographic change).
- Failure of business transfers and low rates of business start-ups.
- Low innovation rates and insufficient productivity.
- Not enough cooperation between universities and SMEs and a lack of teaching geared to SME needs.
- Comparably low internationalization of SMEs and vocational training providers.
- Lack of national level support for SMEs".

To meet these challenges, work-based learning and new paths in vocational training must be provided through cooperation between educational institutions, economic chambers and SMEs. University graduates are often well-qualified in theory, but lack practical knowledge, skills and abilities that are crucial for SMEs. For this reason, VET reforms must also involve higher education, and should implement dual bachelor's degree programs that combine a bachelor's degree with vocational training and on-sight work in companies.

In the 3LOE project, an innovative and complex project structure with 22 project partners from 7 countries as well as 60 associated partners from 13 countries was designed. In each country, centers of vocational excellence (COVEs) in Green Economy will be established, managed and their permanent continuation ensured. A transnational cooperation of the centers will be developed, extended to 60 education stakeholders from 13 countries and operated permanently in an institutionalized form. The centers will offer a wide range of dual education measures in vocational training, further education and higher education, that are being developed, tested and evaluated in the project. These educational measures on EQF levels 3-7 focus on Green Economy, Digitalization and Entrepreneurship. Furthermore, vocational and educational consulting and innovation support for SMEs will be developed and implemented. In total, seven Train-the-Trainer programs will be developed and implemented permanently by the project partners. All results will be transferred to the 60 associated partners together with implementation advice.

The objectives and aimed outcomes of the 3LOE project can be summarized as following:

1. Foundation of a three-level Center in each project country

1.1 Building the "Green Economy" skills alliance for qualifications in SMEs with educational and economic actors from the 7 project countries; development of information and cooperation tools.

1.2 Expansion of the skills alliance to the 60 associated partners from 13 countries, comprising chambers of commerce, SME associations, as well as universities of applied sciences/colleges.

1.3 Development, testing and evaluation of a curriculum and teaching materials for Train the Trainer courses for personnel and center management (vocational schoolteachers, trainers in SMEs and lecturers in further and higher education institutions).

1.4 Evaluation of the construction and operation of the seven centers of Excellence and of the transnational cooperation.

1.5 Development of business and financing plans and ensuring the long-term continuation of the seven centres and transnational cooperation.

1.6 Development, consulting and introduction of political strategy program.

2. Implementation and realization vocational training

2.1 Development and implementation of a tool for vocational and qualification counselling as well as a training for consultants and teachers to use the tool.

2.2 Implementation of the dual system, so that work-based learning is put into practice in the project countries.

Preparation and transfer of curricula and examination regulations for dual vocational training for different professions and implementations in Poland, Lithuania, Latvia and Spain.

Development, test and implementation Trainings for teachers to conduct dual vocational training as well as Training of trainers in SMEs.

2.3 Development political concept for the training and integration of young people with learning difficulties for young people with learning difficulties (EQF level 3).

Development, test and implementation of a dual vocational training "Specialist for Building Insulation".

2.4 Development, testing and evaluation of education programme, teaching materials and examination regulations for the provision of sector-specific qualifications already during the initial vocational training for stronger learners. Implementation in the dual system, so that work-based learning is put into practice in the project countries.

2.5 Development and implementation five-year technician training „Ecologic Solutions in Logistics".

3. Implementation and realization of further vocational training

3.1 Development and implementation of concepts and instruments for the management of continuing vocational training.

3.2 Development, test and implementation of a Train-the-Trainer program for teachers to conduct further training.

3.3 Development and implementation of a concept "SME-fair digitalization" as well as development, test and implementation of two train the trainer programs "Basic and advanced digital skills".

3.4 Transfer and implementation of four further trainings Energy Saving and Renewable Energies.

3.5 Preparation, transfer and implementation of six further trainings in the Green Economy.

3.6 Development, testing and evaluation of different training programs and teaching material for owners, managers and qualified workers of SMEs (EQF level 5 and 6).

The trainings are specifically tailored to SME needs and different qualification levels and combine the transfer of technical, professional and management know-how.
- Training Enterprise and Entrepreneurship in Green Economy
- Training Energy Service Manager
- Trainings vocational Master Carpenter and Electric
- Training Construction Technician
- Training Service Technician
- Training Sustainability in foodservice industry

3.7 Development of regulations for new continuing education occupational profiles with a focus on the green economy.
3.8 Development of an integration programme for the unemployed (EQF level 4) in order to be able to place the unemployed in permanent jobs through further training seminars and a further training qualification.

4. Implementation and realization of higher education

4.1 Preparation and transfer of curricula, evaluation and examination regulations for two existing dual Bachelor degree programmes "Management of Renewable Building Energy Technology" and "Business Administration for SMEs".
4.2 Development and beginning of implementation of new dual Bachelor degree programs
- Business Administration & Sustainable Management of SMEs
- Entrepreneurship and Innovation in Green Economy
- Logistics - Green Supply Chains
- Service technician
- Tutorial "Sustainable management Climate neutrality for companies"

4.3 Development, test and implementation of four study modules (EQF level 6) on SME management in the Green Economy sector, which will be carried out in the dual study system and integrated into existing Bachelor degree programmes.
4.4 Development and implementation of concept for innovation promotion Solutions for manageable R&D tasks of SMEs and conducting manageable R&D projects for SMEs-
4.5 Development, testing and implementation of Training program for university lecturers and SME advisors.

5. Dissemination, transfer and use of the project results

5.1 Development of a concept and summary evaluation of the dissemination results of all partners
5.2Transfer of all educational measures to 60 educational institutions in 13 countries and needs-oriented implementation consultations as well as realization of a bundle of measures for further dissemination of the project results.
5.3 Further dissemination activities such as presentations online, at third-party events, press releases and conferences.
5.4 Book with all results of the project and distribution via book trade.

For each of the three levels of educational measures there will be:

- Target-group-specific educational programs.
- Curricula, teaching materials, etc. developed in a leading role by the educational institutions of the respective level, whereby the educational institutions of the other levels (in particular universities) participate in an advisory and supportive manner.
- Representatives of the participant target groups involved in the development work.

All educational measures will be tested with the respective target groups under different national conditions in the countries, evaluated and completed on the basis of the evaluation results with application notes.
All results will be transferred to the 60 associated partners together with implementation advice.

About the Trainings Energy Saving and Renewable Energies

The outstanding goal of the 3LOE project is that the seven centres of vocational excellence founded in the course of the project dedicate themselves to qualifications in the green economy at a high-quality level. To achieve this goal, a large number of new vocational training measures will be developed at EQF level 3 - 7, practically tested under different national conditions, evaluated, revised on the basis of the evaluation results and finalized and implemented. However, existing educational measures that have proved particularly successful are also processed, transferred to all eight centres of vocational excellence and implemented by them.

In cooperation with the Hamburg Centre for Energy, Water and Environmental Technology, the lead partner has developed and transferred compact training courses on Energy Saving and Renewable Energies specifically for owners, managers and specialists of SMEs.
As part of a project of the Hanse-Parlament, Satakunta University, Finland has developed and practically tested another training. These five trainings have been used very successfully for several years in various Baltic Sea countries by chambers and other vocational training institutions.
In the course of implementing the project, it became necessary to develop and implement further energy training programs in Germany and Poland in line with specific needs.

- Training I Energy Efficiency and Renewable Energies
- Training II Solar Energy – Technology and Applications
- Training III Energy Efficient Construction and Application of Renewable Energies
- Training IV Waste and Wastewater Management and Energy Production
- Training V Energy saving and use of alternative energies
- Training VI Modular Building Owner Energy Training
- Training VII Course of rational media and energy consumption and their production and distribution
- Training VIII Training in energy saving and energy efficiency
- Training IX Rational media and energy consumption and their production and distribution

The concepts and curricula of these trainings were transferred to the eight centres of vocational excellence. During the project period, these trainings were implemented by the COVEs Germany, Lithuania, Latvia, Italy, Poland and Spain.

Training I Energy Efficiency and Renewable Energies

- Curriculum
- Teaching Material (Presentation)
- Implementation Reports

Programm für lebenslanges Lernen

Curriculum to the seminar

"Renewable energies and energy efficiency - overview on market situation and funding schemes"

for small and medium-sized enterprises

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1. Summary of the most important characteristics

1.1 Objective

The objective of this seminar is to give the employees and decision makers in small and medium-sized enterprises (SMEs) an overview of the possibilities of energy saving measures in their enterprises through the adoption of energy-saving measures and /or the use of renewable energies. The seminar provides information and facts about various possibilities, costs and benefits, as well as good examples to enable the participants to assess the implementation of possible measures in the sector-specific enterprises.

1.2 Target groups

Entrepreneurs, executives in companies, start-ups.

1.3 Duration and Timing

The seminar is designed as a full-time course and includes 2 days. The first day includes a presentation and discussion on the basics of both technical and financial terms (6 teaching units). During the second day, applications of good examples are learned and enterprise specific solutions are worked upon by individual participants (8 teaching units).

1.4 Qualifications of lecturers

The seminar should possibly be conducted by teachers who have both a sound knowledge in the field of energy efficiency, renewable energy, technology, costs, benefits and also have country-specific knowledge, in particular the financial framework for the implementation of measures. It is advisable to have at least three lecturers at the seminar. The lecturers should not only be professionally competent but also have experience in the area of education, presentations and discussions. The advantage is of course the guidance of group work and directing the presentation of partial results from working groups.

1.5 Required technical equipment

- System components as visual models (e.g. flat collector, vacuum tube collector, mono-crystalline and polycrystalline solar modules, inverters, energy saving lamps)

In addition:
- Flip chart
- Blackboard
- PC with a beamer
- Internet access for the lecturer's laptop

- Screen

1.6 Methodological and didactic remarks

Depending on the knowledge of the seminar participants, the basic relationships are considered as far as necessary but they can be deepened at any time if requested. In order to give the group work a certain systematics, individual projects should be conducted in four steps:

- Status quo analysis of energy consumption and evaluation
- Selection of possible saving measures
- Implementation of preliminary planning
- Determining the costs and expected energy savings

2. Seminar concept

2.1 General concept

2.1.1 Overview over key topics and contents (based on the content of the master set of slides for the instructor)

Key topics 3 and 5 are implemented by instructors of the respective countries!

Key topic 1: Why should we use renewable energy and energy efficiency measures? 1 TU

Topic 1.1: Increasing energy consumption with decreasing supplies (peak oil)
Topic 1.2: Increasing energy prices
Topic 1.3: Global warming and climate change

Key topic 2: Overview of the use of renewable energy and energy efficiency measures in small and medium-sized enterprises – 2 TU

Topic 2.1: Availability of renewable energies
Topic 2.2: Solar energy use and supply
Topic 2.3: Structure and functions of solar thermal systems
Topic 2.4: Planning and design of solar thermal systems
Topic 2.5: Costs and benefits of solar thermal systems
Topic 2.6: Structure and functions of solar power systems
Topic 2.7: Planning and design of solar power systems
Topic 2.8: Costs and benefits of solar power systems
Topic 2.9: Energy efficiency measures (lighting, heating, cooling, compressed air)

Key topic 3: Market situation, development of renewable energy and energy efficiency in Europe and in Poland - 2 TU

Topic 3.1: Solar thermal market situation in Europe, Germany and Poland
Topic 3.2: Solar power market situation in Europe, Germany and Poland

Key topic 4: EU guidelines and support programmes – 1 TU

Topic 4.1: Guidelines and decisions
Topic 4.2: Support Programmes in Poland

Key topic 5: Good Examples – 4 TU

Topic 5.1: Examples from the field of energy efficiency
Topic 5.2: Examples from the field of renewable energies

Key topic 6: Project Work – 4 TU

Topic 6.1: Status quo of the energy situation (Check lists)
Topic 6.2: Examining the possibility of the solar energy use
Topic 6.3: Planning and design
Topic 6.4: Cost savings estimate and forecast
Topic 6.5: Presentation and discussion

2.2 Learning objectives and methodological and didactic comments on the key topics of the concept

The main learning objective include being able to assess the energy situation of participants' own enterprises and recognise opportunities of energy saving by improving energy efficiency or the application of renewable energies.

Specific learning objectives of the seminar include the following topics:

- Assessment of the global energy situation
- Raising awareness of the need for energy saving measures
- Dimensioning a solar system (solar thermal and solar power)
- Cost / benefit analysis taking funding into account

The learning objectives for each priority topic are described below:

2.2.1 Key topic 1: Why should we use renewable energy and energy efficiency measures?

The participants ...
... recognise the importance of energy saving measures in the light of rising energy prices and decreasing availability of resources of fossil energy.
... get an idea of the real consequences of progressive global warming

2.2.2 Key topic 2: Overview of the application of renewable energies and energy efficiency measures for small and medium-sized enterprises

The participants ...

... learn to assess the solar energy supply and its quality
... know the structure and function of solar thermal and solar power systems
... obtain parameters for the design of solar systems
... can estimate costs and benefits
... learn about various fields of application for energy efficiency measures
... get an idea of the savings potential of energy saving measures

2.2.3 Key topic 3: Market situation and the development for renewable energies and energy efficiency in Europe and in Poland

The participants ...
... get an overview of the European and national market
... recognise the market opportunities of their companies to increase competitiveness through predictable energy costs

2.2.4 Key topic 4: EU guidelines and support Programmes

The participants ...
... recognise the international significance of climate change by reducing energy consumptions
... are informed about state funding programmes and the contact points

2.2.5 Key topic 5: Good examples

The participants ...
... learn by implemented examples from different areas how successful energy efficiency measures and the use of renewable energies can be...

2.2.6 Key topic 6: Project work

The participants ...
... learn to assess the electricity consumption of their enterprise
... are able to find suitable energy-saving measures for their enterprise
... know what costs and energy saving is possible through a targeted action

3. Certificate

The participants receive a certificate upon completion of the seminar, in which the training contents (main topics) are listed and signed by the training centre (Chamber of Crafts) and the Hanseatic Parliament.

Renewable Energies and Energy Efficiency

Co-funded by the
Erasmus+ Programme
of the European Union

Renewable Energies and Energy Efficiency

- **Objective of the Seminar**

  Overview of opportunities for energy saving for small and medium-sized enterprises through measures to increase efficiency and use renewable energy sources (key issue: solar power)

- **Key issues**

  - Environmental protection and climate protection
  - Opportunities to increase efficiency
  - Possible applications of solar technologies
  - Cost/benefit and use
  - Good examples

Renewable Energies and Energy Efficiency

- **Contents - Overview**

First Day (2:00 p.m.-6:30 p.m)

- Importance of renewable energy and energy efficiency
- Overview of the application of renewable energy
- Overview of energy efficiency measures
- Market situation and development of renewable energy and energy efficiency in Poland
- EU directives and support programmes

Second day (9:00 a.m.-5:00 p.m.)
- Good examples from various industries
- Project work and presentation
- Summary and conclusion

Renewable Energies and Energy Efficiency

- **Why should we use renewable energy and energy efficiency measures?**

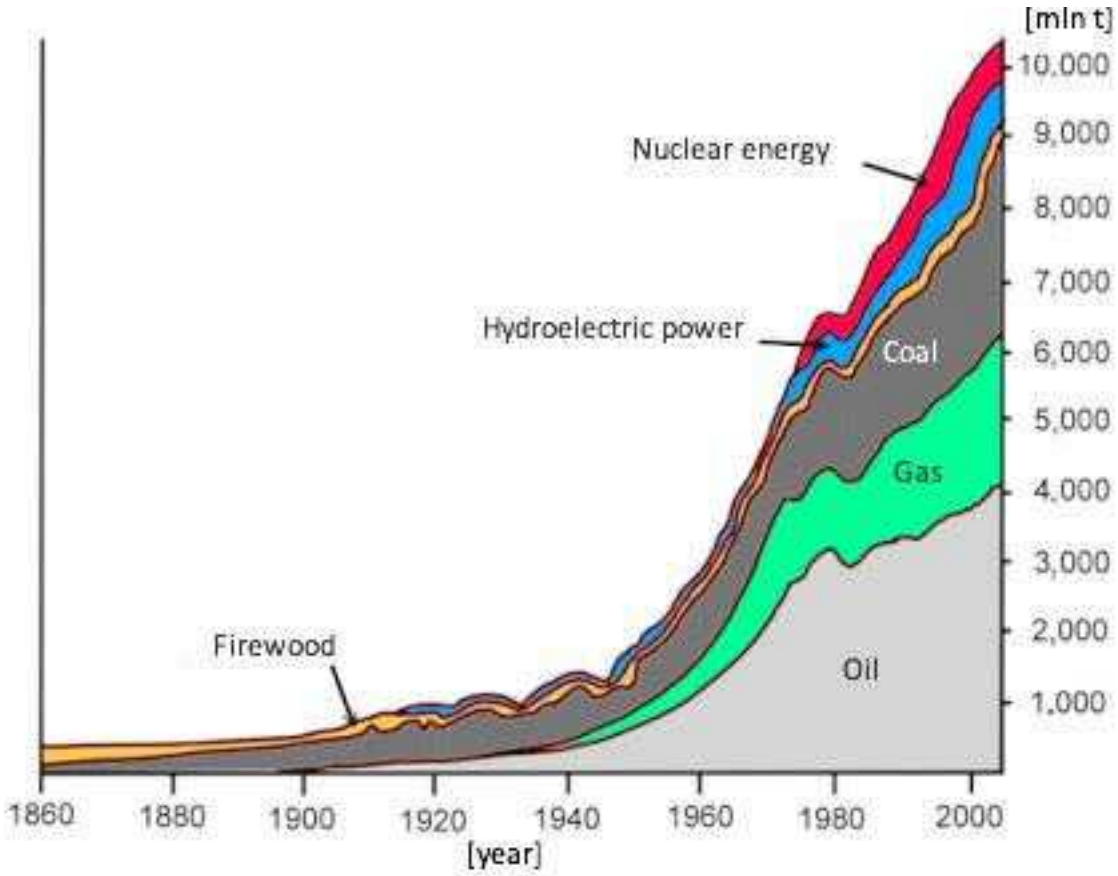
  - Increasing energy consumption while reducing fossil energies (coal, oil, gas, uranium)

  - Rising energy prices

  - Global warming

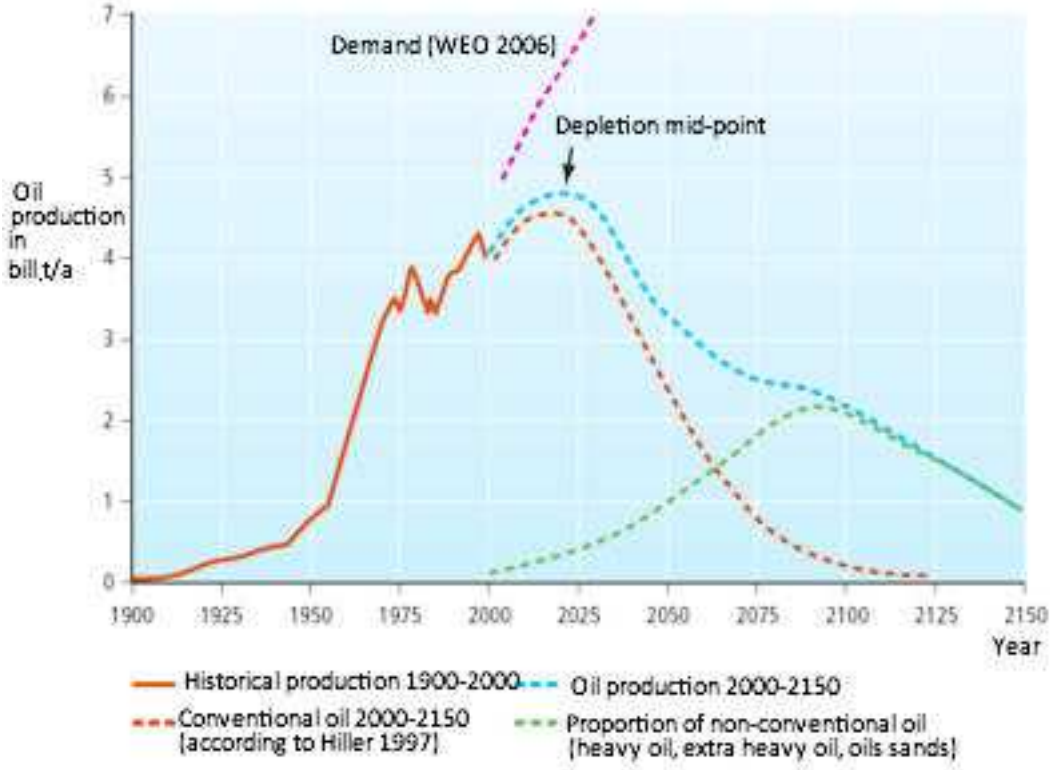
Renewable Energies and Energy Efficiency

Increasing energy consumption



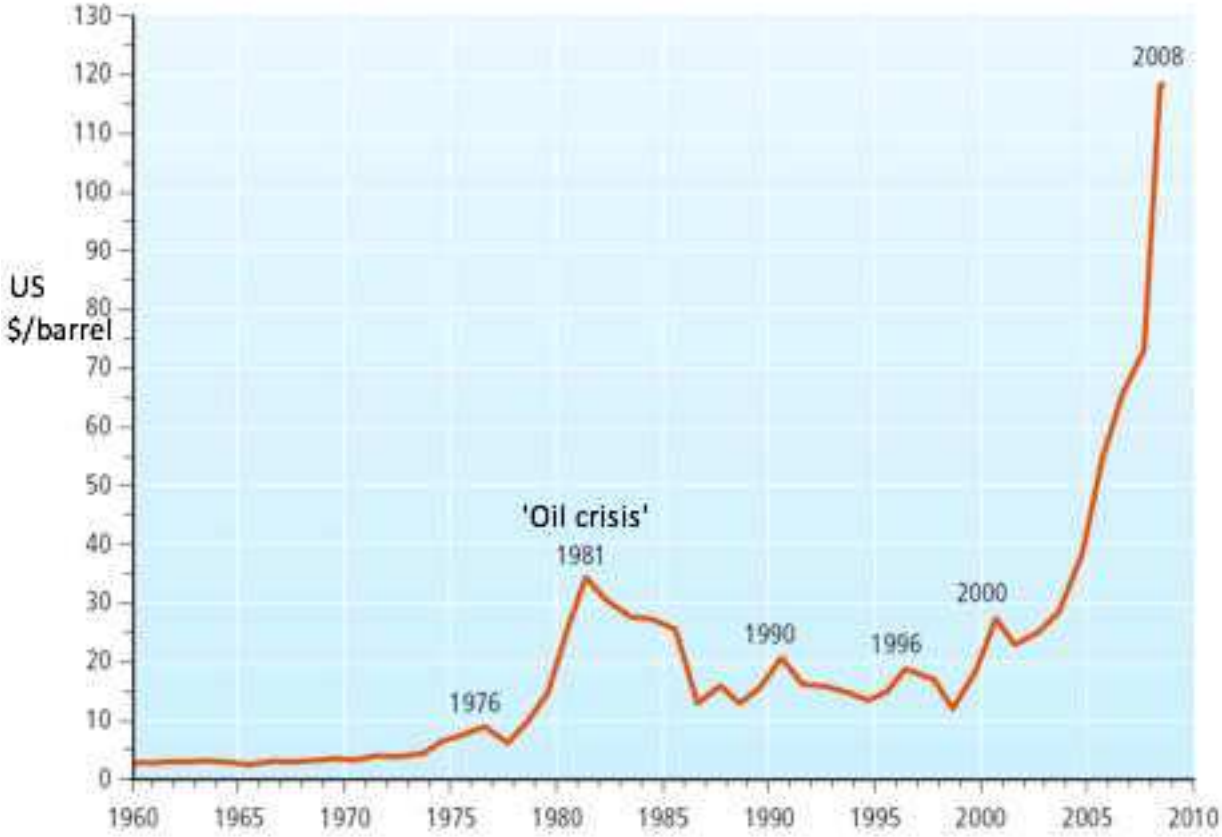
Renewable Energies and Energy Efficiency

Increasing energy demand with declining energy production (oil)



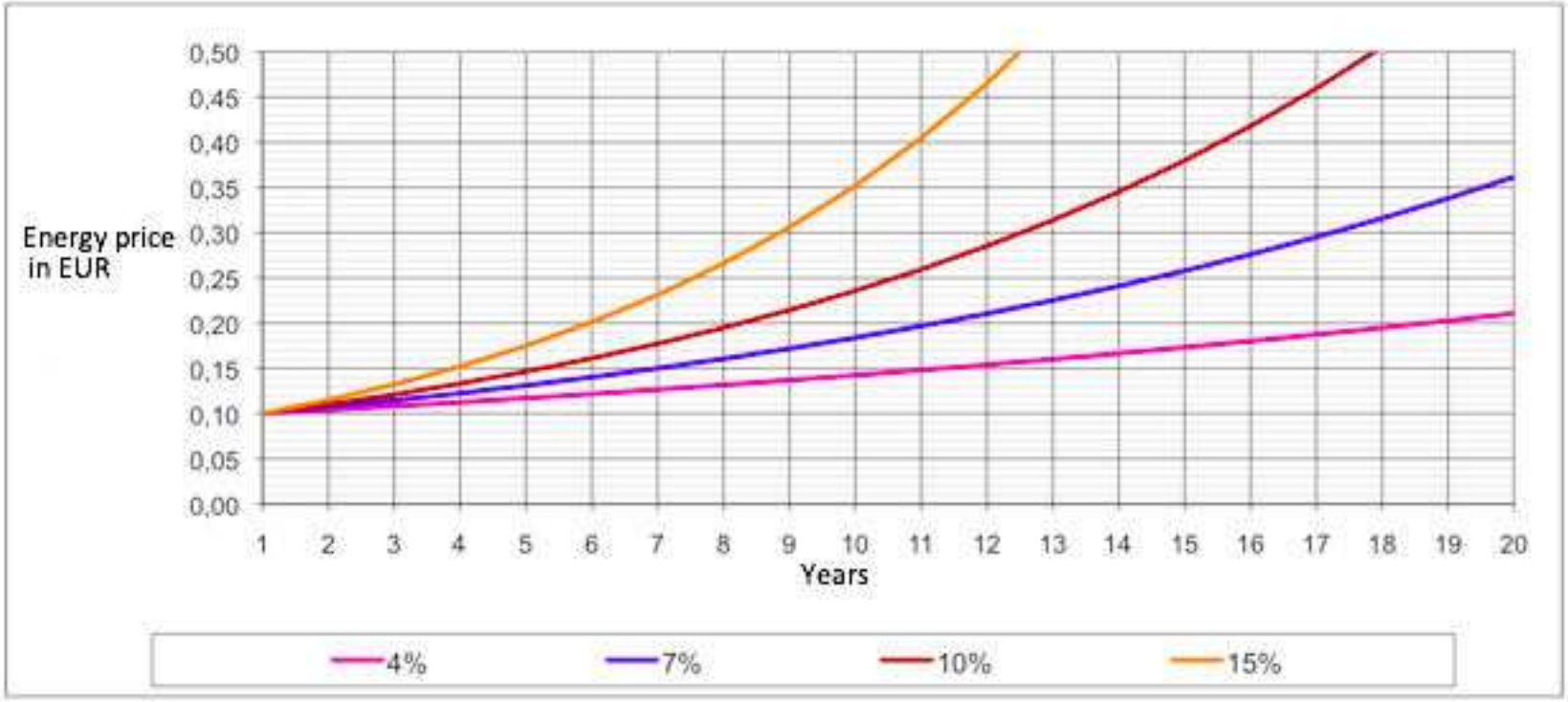
Renewable Energies and Energy Efficiency

Rising energy prices



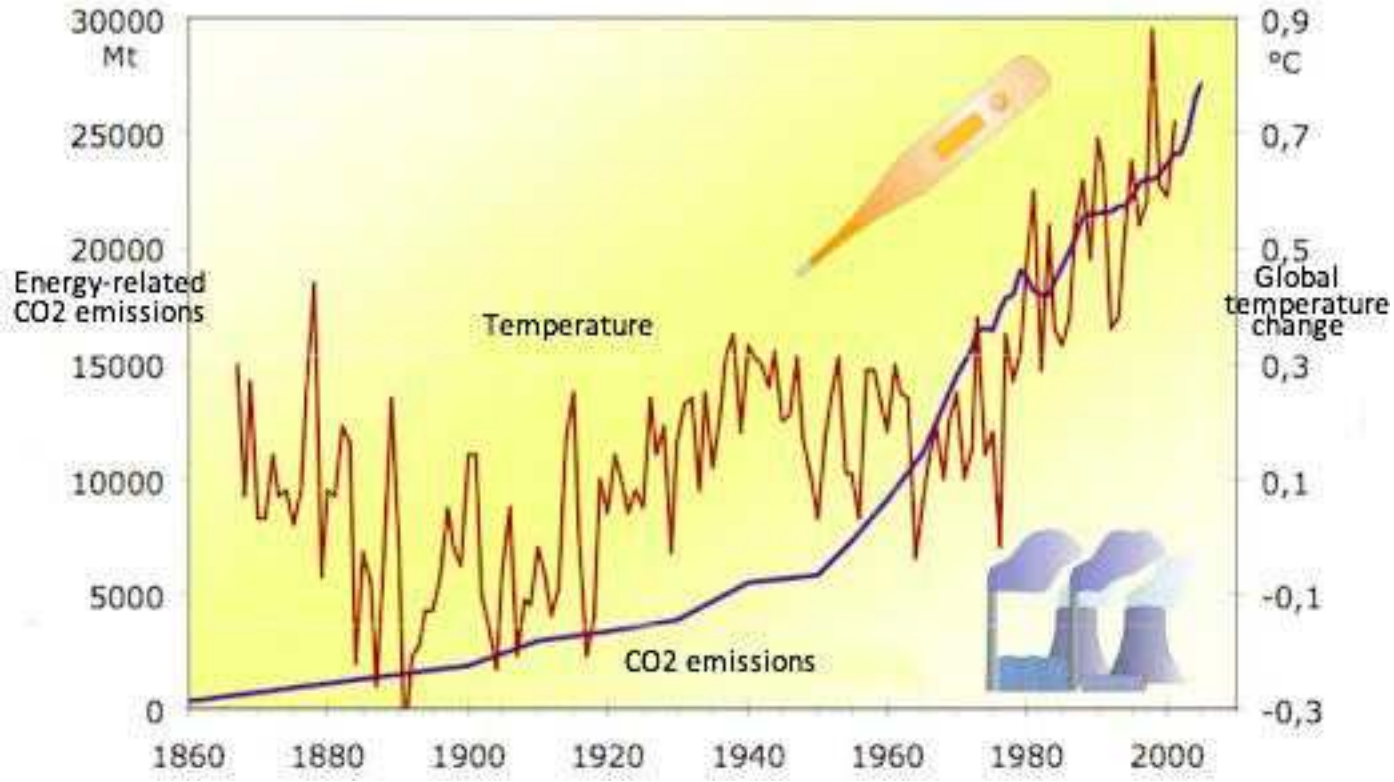
Renewable Energies and Energy Efficiency

Energy costs today - energy costs tomorrow



Renewable Energies and Energy Efficiency

Rising global carbon dioxide emissions



Renewable Energies and Energy Efficiency

Consequences of climate change:

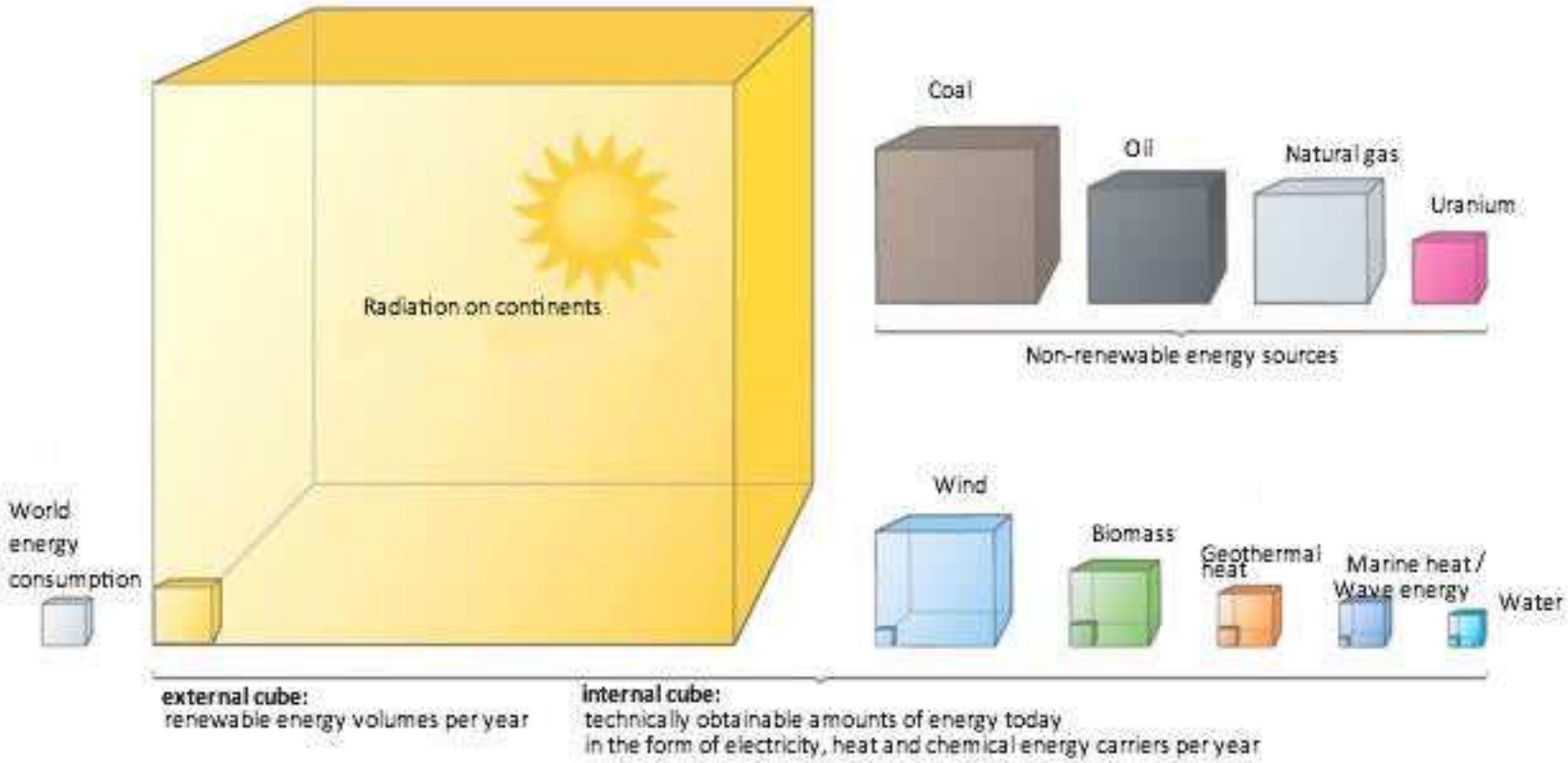
- Warming of the oceans, melting of glaciers the rise in the seal level due to flooding of coastal areas and loss of arable land (more than a third of the world's population lives in coastal areas)
- Shift in vegetation zones: the existential changes in food production dramatic reduction of biodiversity
- Release of huge amounts of CO2 and methane from thawing tundra soils, which increases the greenhouse effect even further
- Mediterranisation of the temperate latitudes: hotter, drier summers, milder but rainy winters. Consequences of water scarcity in summer, floods in winter, high stress on the already heavily damaged forests
- Increase in weather-related damage from storms, floods and droughts with rising economic costs
- Intensification of known climate phenomena (e.g. El Nino: accumulation of torrential rain in otherwise dry areas of South America)

Renewable Energies and Energy Efficiency

Threatened areas during melting of the Greenland ice

Renewable Energies and Energy Efficiency

- **Renewable energy**

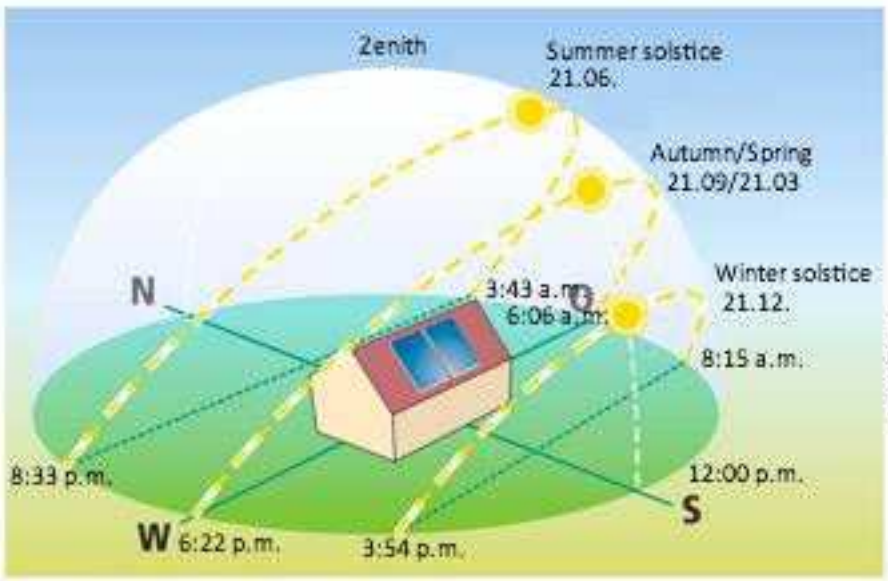


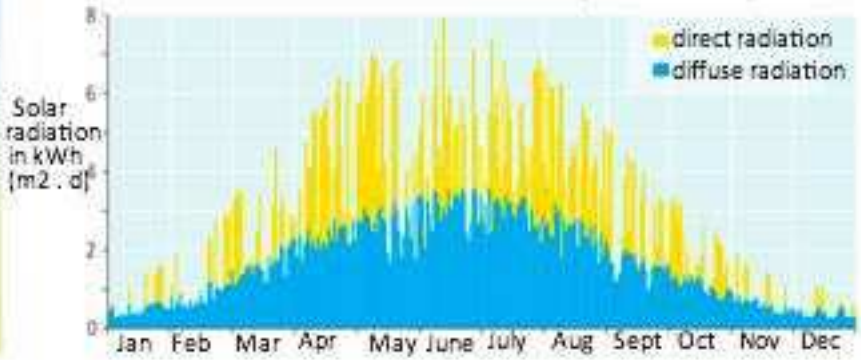
Renewable Energies and Energy Efficiency

- **Use of solar energy**

  Available solar energy

  – astronomically and meteorologically conditioned fluctuations

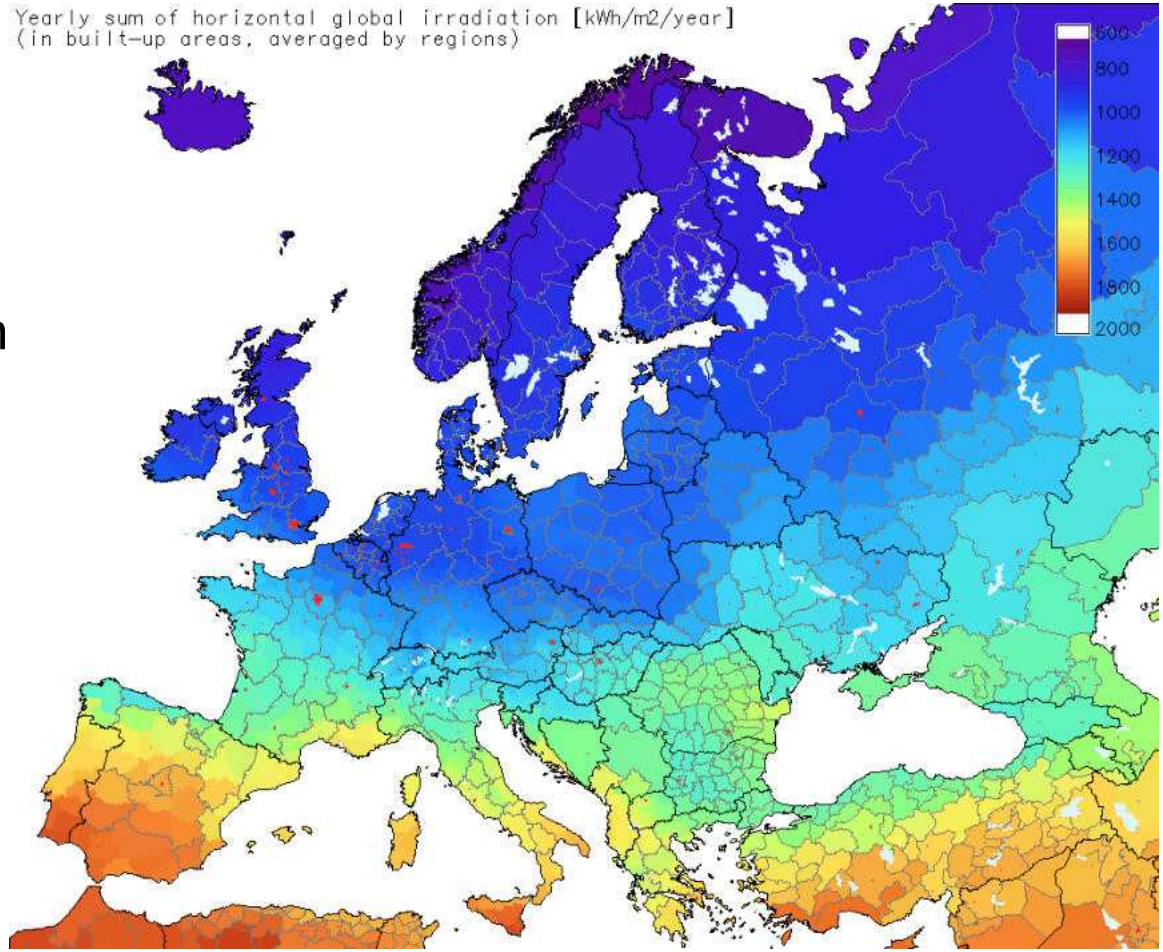




Renewable Energies and Energy Efficiency

- **Solar energy**

Solar energy supply in Europe:
Geographic distribution of the annual totals (kWh/m^2/year)

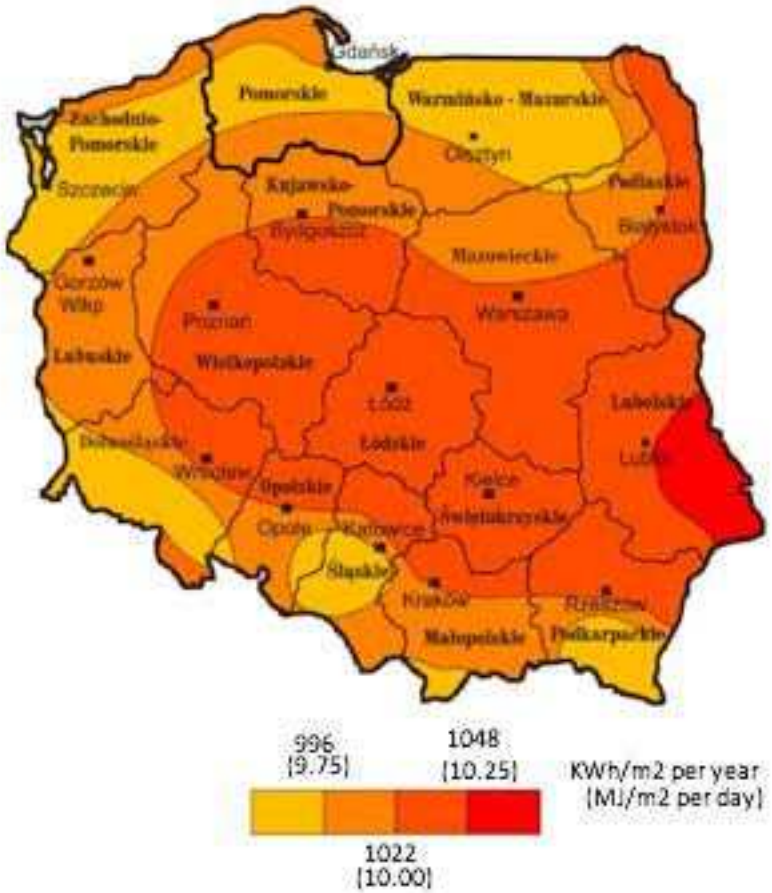


Renewable Energies and Energy Efficiency

- **Solar energy**

  Solar energy supply in Europe:
  Geographic distribution of the annual totals (kWh/m$^{2/}$year)

- **1,000 kWh/m^2** correspond to about **100 litres of fuel oil**



Renewable Energies and Energy Efficiency

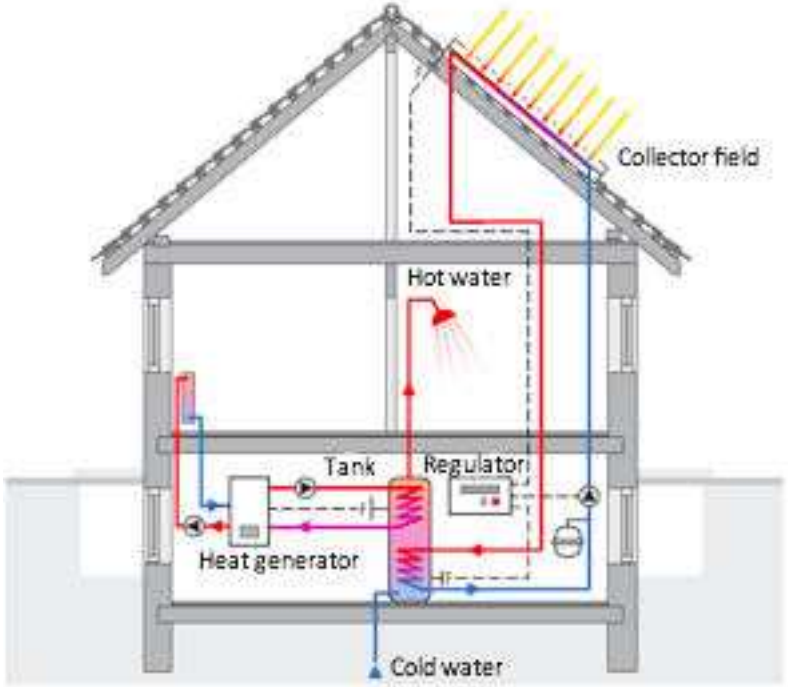
- **Solar energy use**

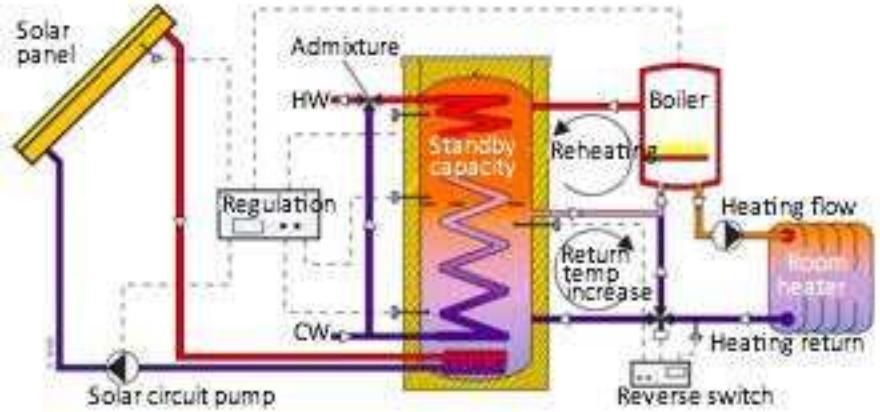
  - Solar thermal systems
  Conversion of sunlight into heat (hot water, heating)

  - Photovoltaic systems
  Conversion of sunlight into electricity (own consumption or power supply oder)

Renewable Energies and Energy Efficiency

- **Solar thermal systems**
  - Structure an functioning

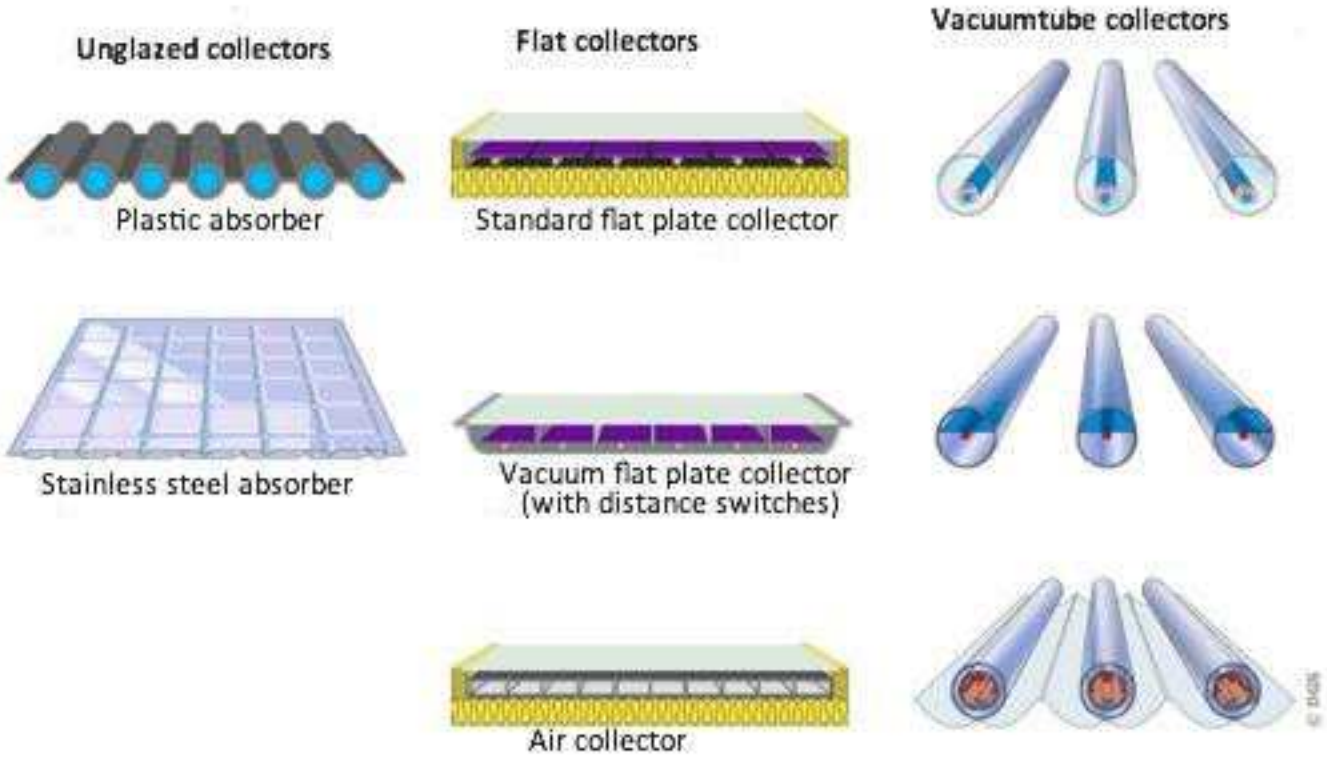




Renewable Energies and Energy Efficiency

- **Solar thermal systems**

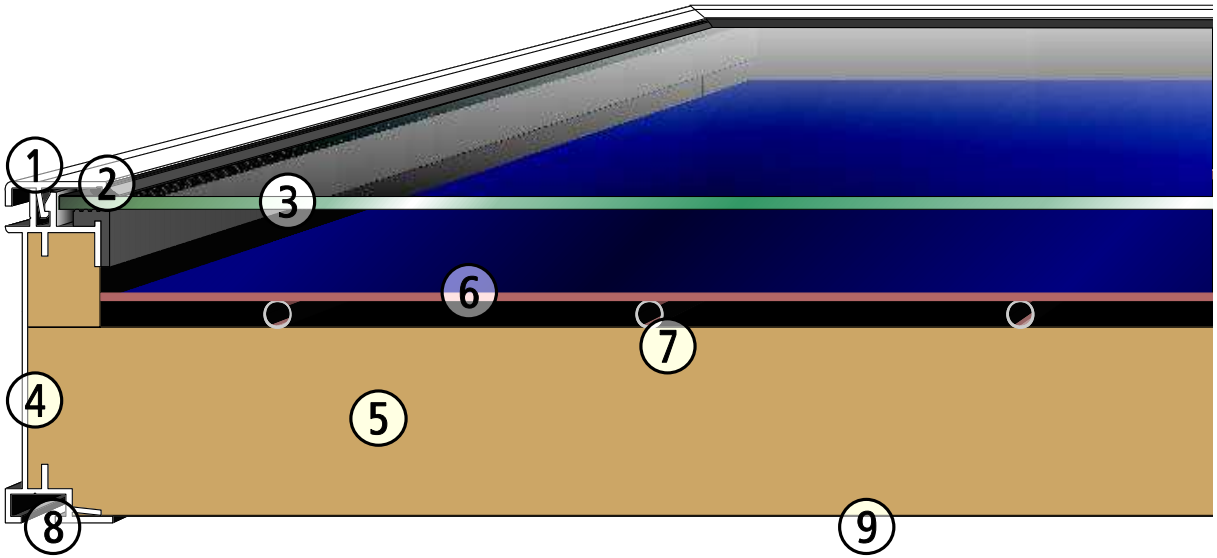
Collector designs



Renewable Energies and Energy Efficiency

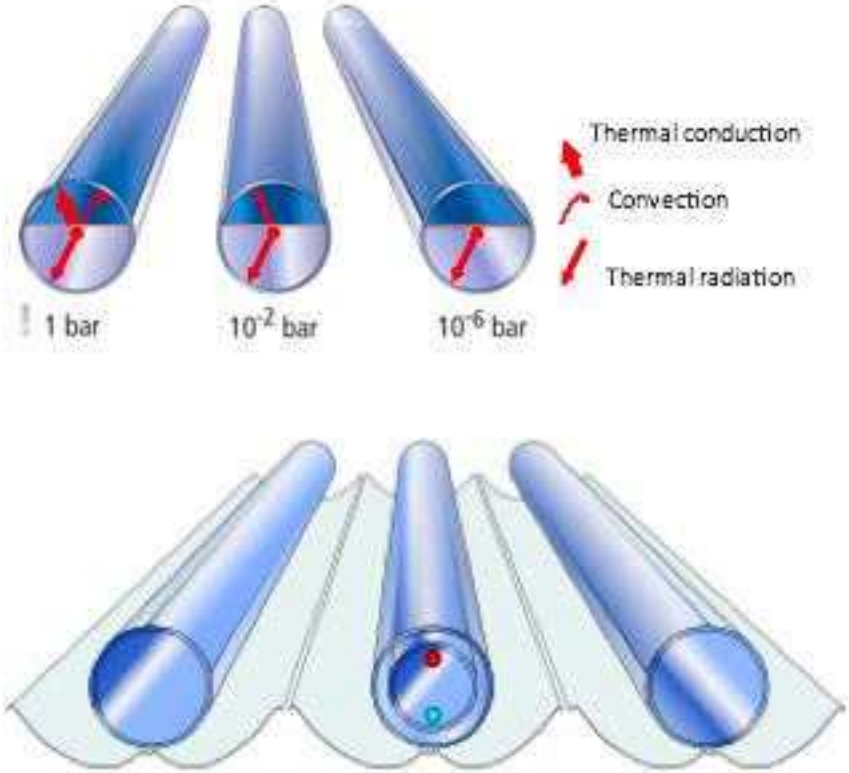
- **Solar thermal systems**
  - Design and functioning

1. Rahmen
2. Dichtung
3. transparente Abdeckung
4. Rahmen Seitenwandprofil
5. Wärmedämmung
6. Vollflächenabsorber
7. Flüssigkeitskanal
8. Befestigungsnut
9. Rückwand

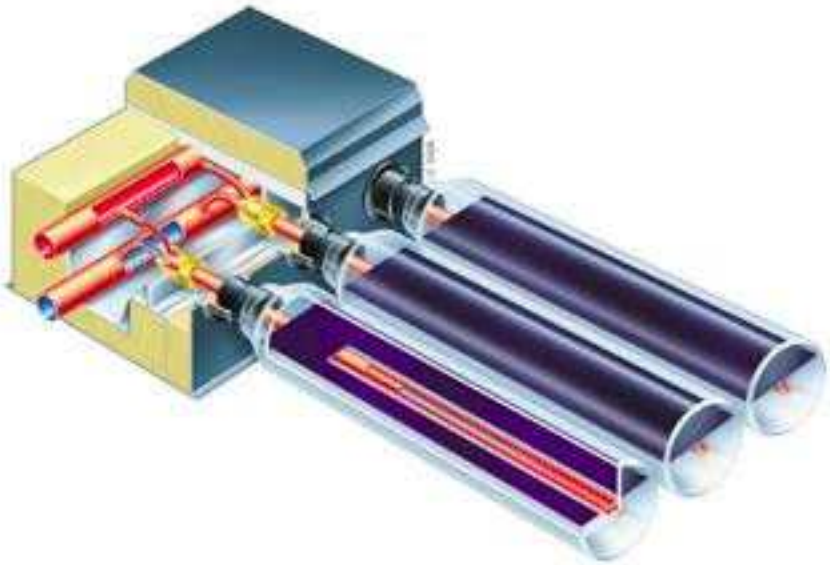


Renewable Energies and Energy Efficiency

- **Solar thermal systems**

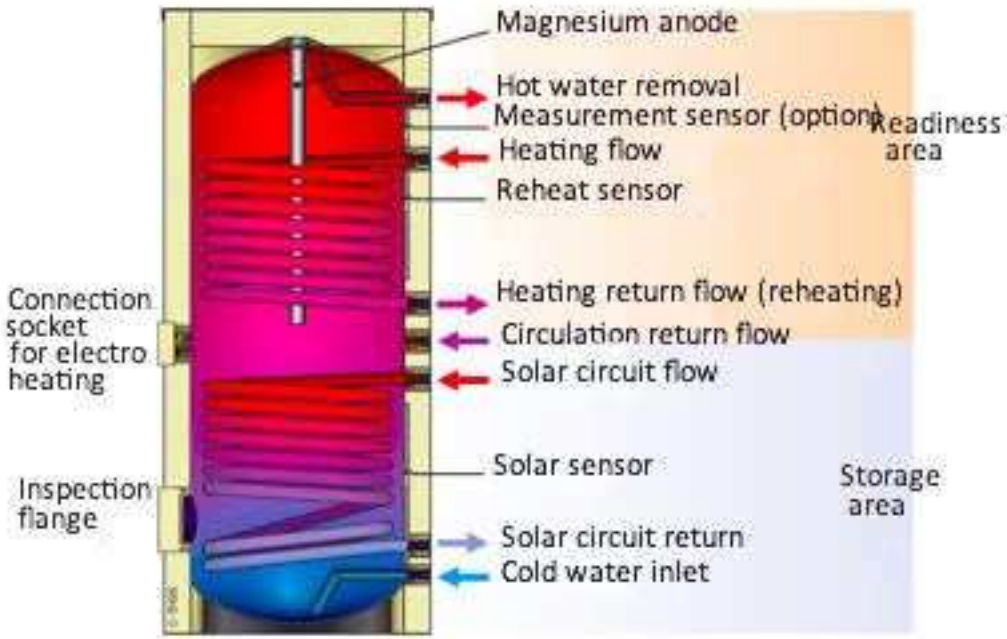


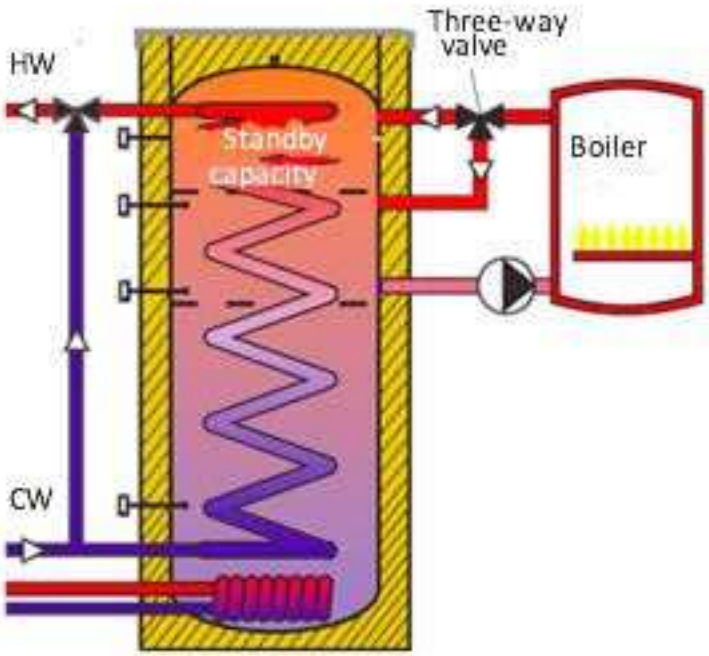
Vacuum tube collectors



Renewable Energies and Energy Efficiency

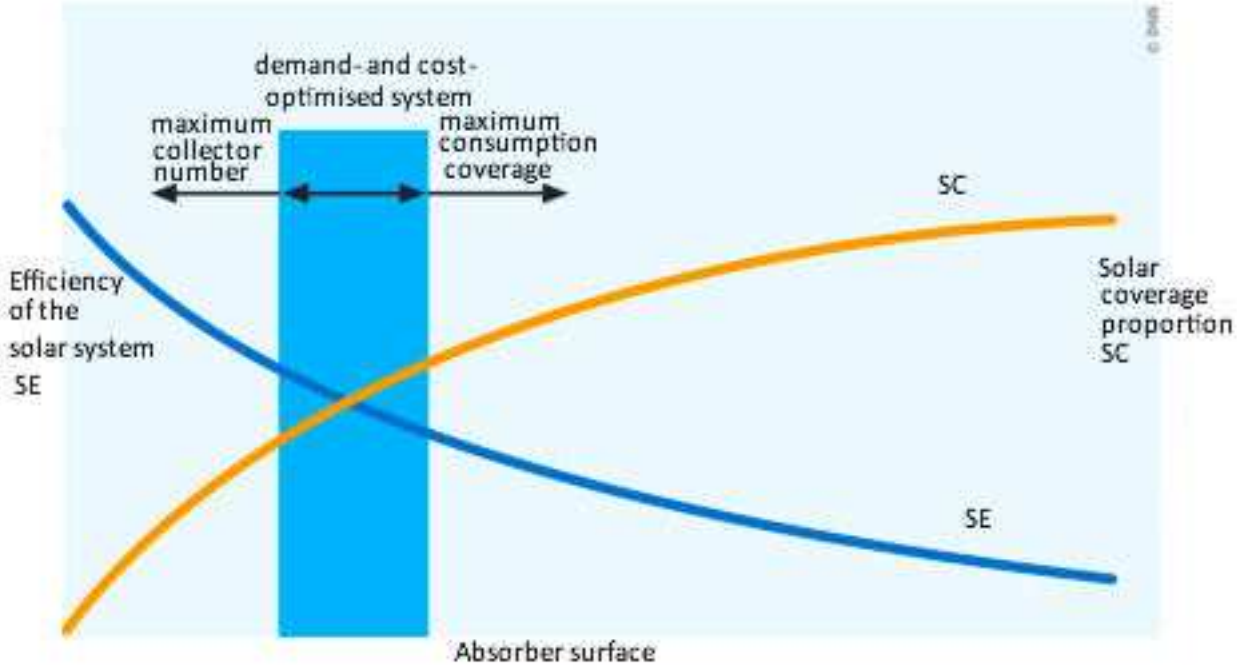
- **Solar thermal systems**
  - Design and functioning





Renewable Energies and Energy Efficiency

- **Solar thermal systems**
  - planning and layout



Layout:
60 litres (60°C) of hot water per m^2 of collector space
Storage:
60 litres per square meter of collector surface

Renewable Energies and Energy Efficiency

- **Solar thermal systems - areas of application**

  - Residential buildings (detached houses/multiple-family houses)
  - Retirement homes
  - Hospitals
  - Accommodation establishments (hotels, guest houses)
  - Campsites
  - Laundries
  - Car washes
  - Breweries
  - Sports facilities
  - ... Facilities with year-round high hot water consumption (at least in the summer half-year)

Renewable Energies and Energy Efficiency

- **Solar thermal systems**
  - Costs and benefits

  Specific investment costs depending on the plant size
  approx. 500 - 1,500 € / square meter of collector surface

  Specific solar circle yield
  350 - 450 kWh/m²year

  Energy savings in the total heat demand depending on the plant size and concept

  approx. 10 - 40 %

  In sunny houses up to 100 %

Renewable Energies and Energy Efficiency

- **Renewable energy costs**

Specific investment costs of solar thermal systems (including installation and VAT)

Small systems (up to 30m^2 of collector surface):

1,000 – 1,500 €/m^2

Medium-sized systems (30-100m^2 of collector surface)

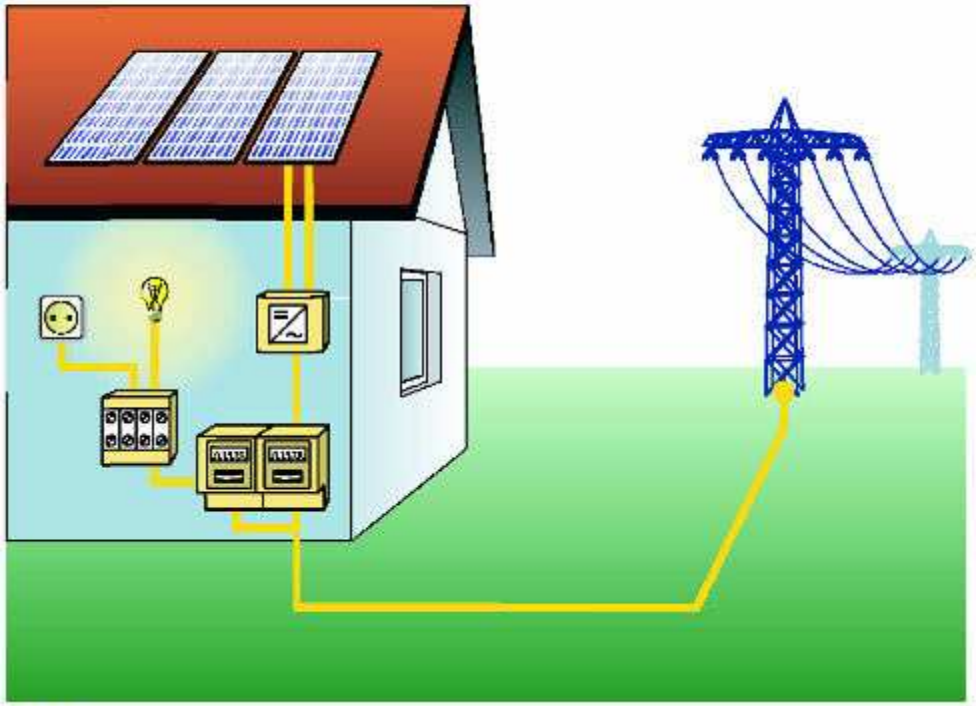
700 – 1,000 €/m^2

Large systems (>>100m^2 of collector surface)

> 700 €/m^2

Renewable Energies and Energy Efficiency

- **Photovoltaic systems**
  - Structure and functioning



Renewable Energies and Energy Efficiency

- **Photovoltaic systems**
  - Structure and functioning

Inverter

Solar collector

Renewable Energies and Energy Efficiency

- **Photovoltaic systems**
  - Structure and functioning

Cell material	Module efficiency	Required module surface for 1 kWp
Monocrystalline	11–16%	7–9 m^2
Polycrystalline (EFG)	10–14%	8–9 m^2
Polycrystalline	8–10%	9–11 m^2
Thin film: copper-indium-diselenide (CIS)	6–8%	11–13 m^2
Thin film: Amorphous	4–7%	16–20 m^2

© www.solarpraxis.de

Renewable Energies and Energy Efficiency

- **Photovoltaic systems**
  - Planning and design

1 kW_p requires approx. 10m^2 surface

1 kW_p generates approx. 800 kWh/year

Requirements:

- Shadow-free area

- Azimuth between southeast and southwest

Renewable Energies and Energy Efficiency

- **Photovoltaic systems**
  - Costs and benefits

1 kW_p costs approx. 2,500 – 3,500 €

1 kW_p generates approx. 800 kWh/year

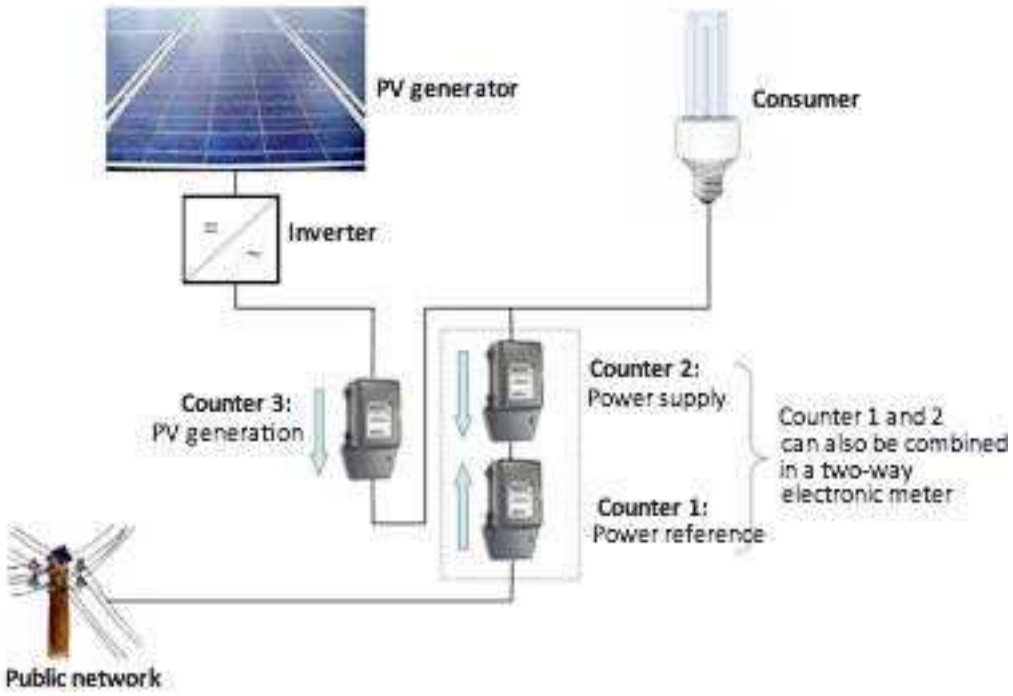
For covering internal use > 30%

In the case of power feed-in tariff (EEG)

Poland: tax reliefs, loans, green certificates

Renewable Energies and Energy Efficiency

- **Photovoltaic systems** – power consumption/excess supply



Renewable Energies and Energy Efficiency

- **Renewable energy sources – development of costs**

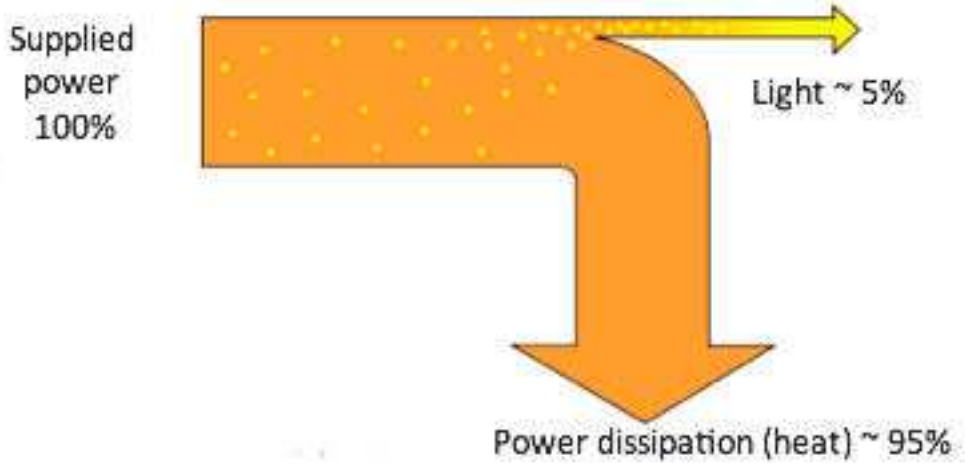
Solar power

Renewable Energies and Energy Efficiency

- **Energy efficiency**

Energy efficiency is a measure of utilisation of input energy

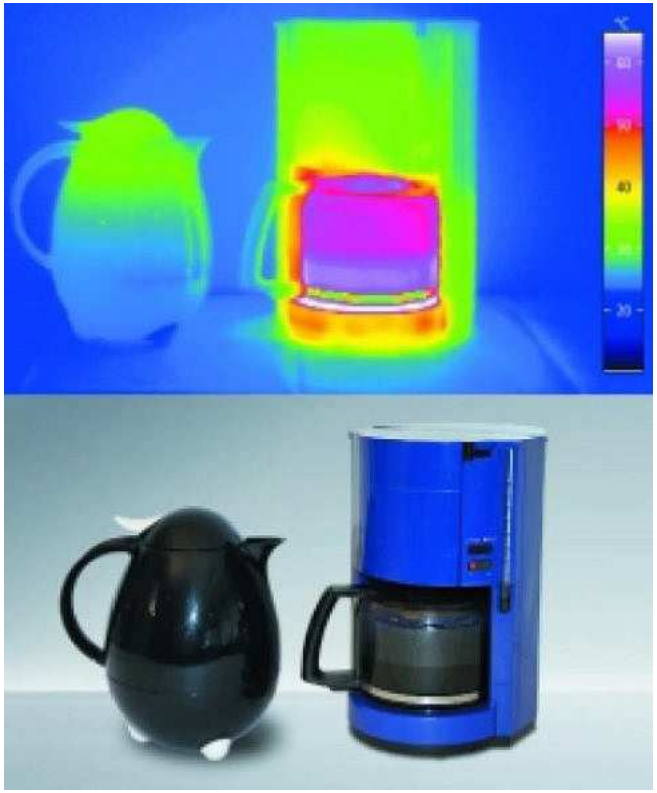
Criteria: efficiency, degree of utilisation, annual working figures…

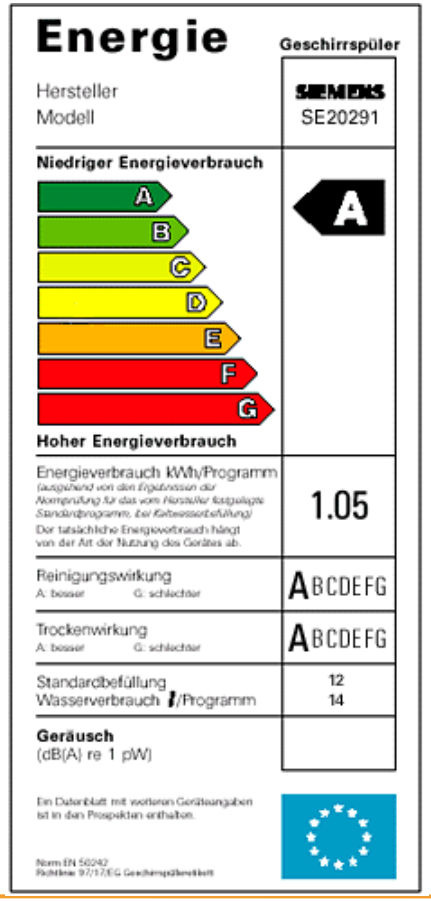


$$n = P_{benefit} / P_{input} \sim 5\%$$

Renewable Energies and Energy Efficiency

- **Energy efficiency**





Energie — Geschirrspüler

Hersteller Modell	SIEMENS SE20291
Niedriger Energieverbrauch A B C D E F G **Hoher Energieverbrauch**	A
Energieverbrauch kWh/Programm (ausgehend von den Ergebnissen der Normprüfung für das vom Hersteller festgelegte Standardprogramm, bei Kaltwasserbefüllung) Der tatsächliche Energieverbrauch hängt von der Art der Nutzung des Gerätes ab.	1.05
Reinigungswirkung A: besser G: schlechter	ABCDEFG
Trockenwirkung A: besser G: schlechter	ABCDEFG
Standardbefüllung Wasserverbrauch l/Programm	12 14
Geräusch (dB(A) re 1 pW)	

Ein Datenblatt mit weiteren Geräteangaben ist in den Prospekten enthalten.

Norm EN 50242
Richtlinie 97/17/EG Geschirrspülerlabel

Renewable Energies and Energy Efficiency

- Energy controlling as a basis for efficiency measures

The aim of controlling power is to limit it by continuous monitoring of appropriate amount of energy consumption

Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

Areas of application:

- Lighting
- Pumps
- Compressed air
- Ventilation / air conditioning / refrigeration
- Central heating / hot water / processing heat

- **Energy efficiency measures**

Lighting:

Up to 80 per cent of the electricity consumption for lighting can be saved by means of the following measures:

- Energy saving lamps (compact fluorescent lamps) instead of incandescent lamps: about 80 percent lower power consumption

- Using metal halide lamps instead of high-pressure mercury lamps: about 50 per cent higher light output and better colour rendering

- Luminaires for fluorescent lamps with conventional ballast should be replaced with those with electronic balast: about 20 per cent less power consumption, longer lamp life and better colour reproduction as well as better colour reproduction

Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

Lighting:

- Using specular louvre luminaires

- In halls: T12 fluorescent lamps should be replaced with T8 or better T5 tubes

- Using timers and motion detectors in areas which are used only temporarily

- Using daylight-dependent control in rooms with daylight:
  5 to 40 per cent lower power consumption

Renewable Energies and Energy Efficiency

- **Energy efficiency measures**
  Exemplary savings in the case of motion detectors

Calculating the potential use of motion detectors				
	Old plant	**Units**	**New plant**	**Units**
Light type	Open fluorescent lamps without motion detectors		Open fluorescent lamps with motion detectors	
Type of ballast	VVG		VVG	
Lamp type	Fluorescent lamp T8		Fluorescent lamp T8	
Number of lamps	10	Piece	10	Piece
Lamp performance	58	W	58	W
System performance per lamp	66	W	66	W
Total installed power	0,66	kW	0,66	kW
Annual operating hours	2550	h/a	765	h/a
Consumption per year	1683	kWh/a	504,9	kWh/a
Electricity savings	1178,1			kWh/a
Average labour cost per kWh	0,19			€/kWh
Energy cost savings	223,8			€/a

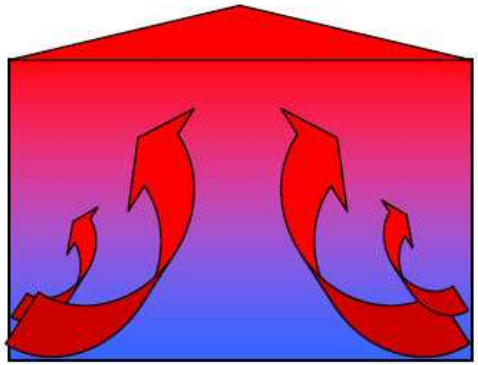
Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

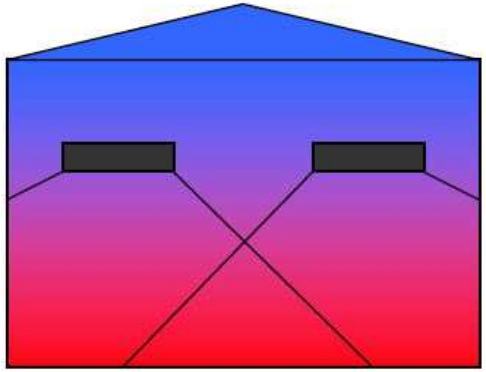
Heating in production facilities:

- Radiant heating instead of air heaters

conventional heating system



radiant heating



Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

Heating of production facilities:

Radiant heaters are economical compared to other heating systems:

- Lower room temperature for the same comfort
- No transmission losses of the heating system
- Shorter warm-up
- No heating cushions under the ceiling
- Heating of possible sub-areas
- Lower energy consumption

Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

Cooling: relevance of the topic

- Costs of refrigeration:	150 – 200 € / MWh
(Costs of heat 80 – 90 € / MWh)	
- Increase of costs in the last 5 years:	5%
- Increase in demand in 10 a:	100%
- Waste heat from refrigeration	230 TWh
- Heating demand	620 TWh
- Hot water demand	120 TWh

- **Energy efficiency measures**

Refrigeration:

In physical terms, there is no cold, there is only heat and less heat => cooling = heat withdrawal

A classification by type of installation and cooling capacity		
Industrial cooling	Process cooling	Large cooling
10-100 kW	10-100 kW	100-1.5 MW
Food	Room cooling system for production, IT equipment, machines	Industry Logistics

- **Energy efficiency measures**

Refrigeration:

To melt 1 kg of ice much more energy is needed than for increasing the temperature of ice e.g. by one 1 K; namely 335kJ (93Wh).

With this energy the temperature of 1 kg of water (335 kJ/4.19 kJ/kg K) = 80 K can be heated!

To evaporate 1kg of water it is necessary to use approx. 2,500 kJ (0.69kWh).

The same amount of energy that evaporates 1 kg of water can heat 6kg to the temperature of 100 °C!

- **Energy efficiency measures**

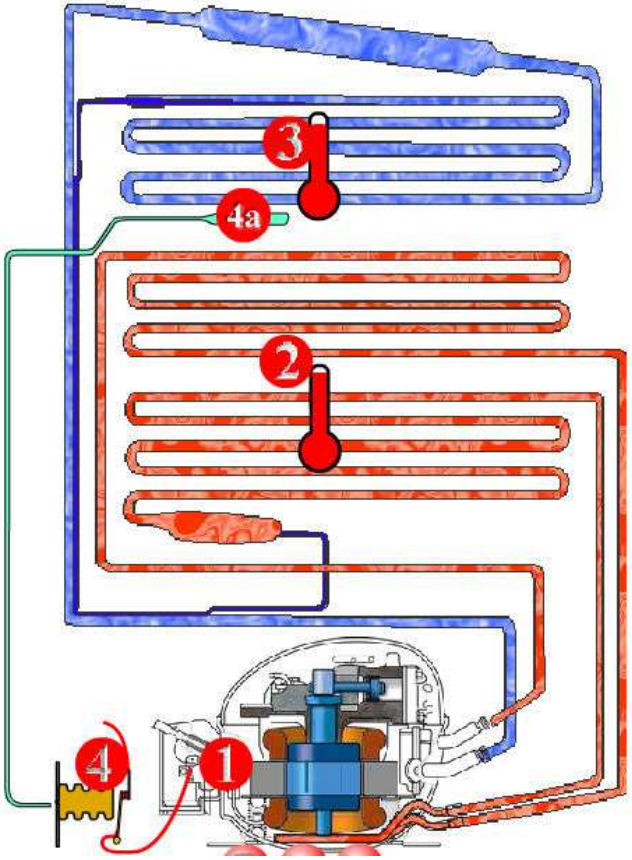
Functioning principle of refrigeration:

❶ Compressor

❷ Condenser

❸ Evaporator

❹ Thermostat



Renewable Energies and Energy Efficiency

- **Energy efficient refrigeration, first steps:**
  → **Size, performance, utility and power consumption**

- Energy efficiency of the compressor
  - ✓Variable-speed drives
- Type and thickness of insulation of the refrigeration chamber
  - ✓Thickness of insulation
- Use of the removed heat
  - ✓Support for potable water heating, space heating

Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

Compressed air:

- Fixing leaks
- Optimum selection of a compressor for w particular end usage (no oversizing)
- Improving technology in compressors, e.g. multi-stage compressors
- Using waste heat for other purposes
- Improve air treatment, e.g. by drying or filtering
- Regular and thorough maintenance and repair
- Improved air flow in the pipe network in order to reduce pressure loss by friction

Renewable Energies and Energy Efficiency

- **Energy efficiency measures**

Compressed air: Use of waste heat

Compressor nominal power kW	Usable heat from heat recovery systems kW (approx.)	Annual oil saving with 4,000 Bh/a) l/a	Annual savings (with 0.50 €/l) €/a
11	9	3.600	1.800
15	12	4.800	2.400
18,5	15	6.000	3.000
22	18	7.200	3.600
30	24	9.600	4.800
37	30	12.000	6.000
45	36	14.400	7.200
55	44	17.600	8.800
75	60	24.000	12.000
90	72	28.800	14.400

Source: Atlas Copco

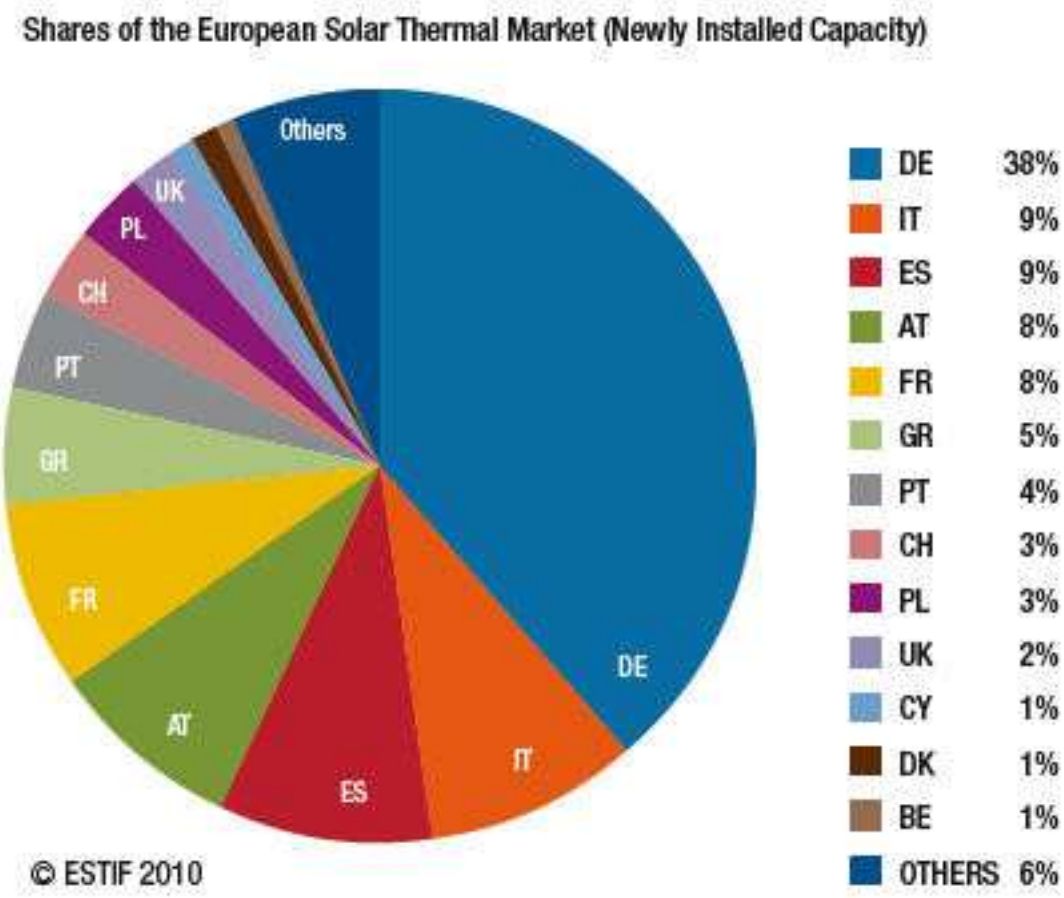
Renewable Energies and Energy Efficiency

- **Renewable energies – market situation**

Solar thermal

Germany
-23.1% ▼
8,896,300
108.5 kW_{th}

Poland
11.2% ▲
356,902
9.4 kW_{th}



Renewable Energies and Energy Efficiency

- **Renewable energies – market situation**

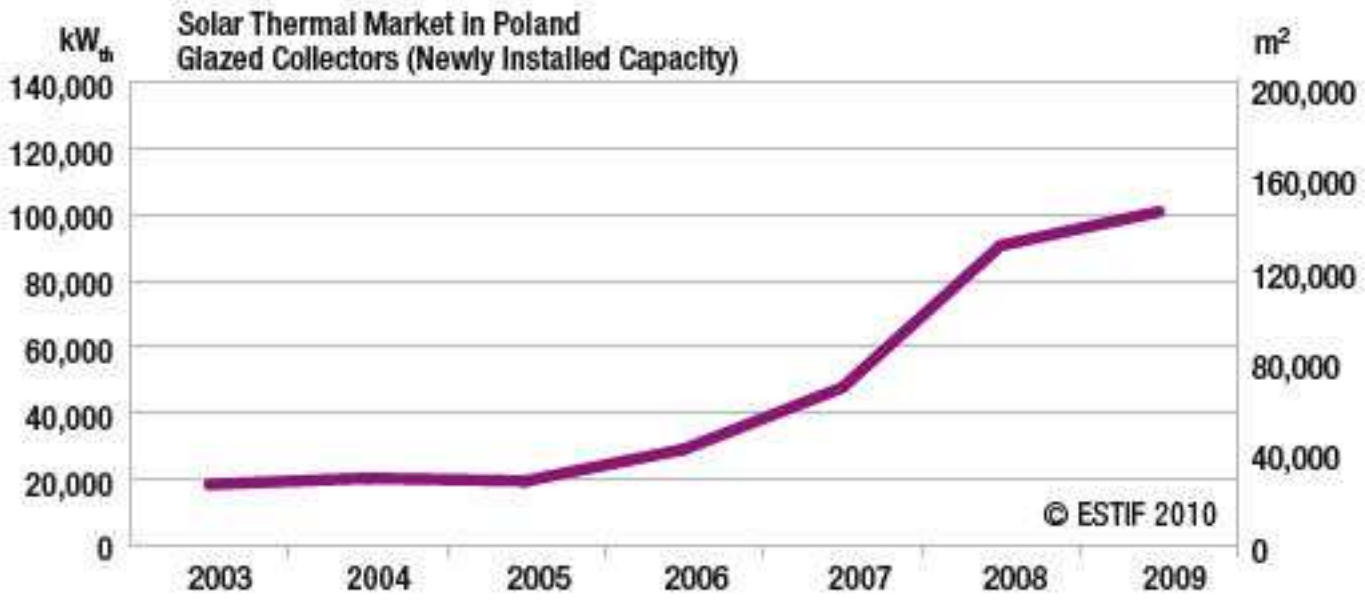
  Solar thermal in Poland

  The Polish solar market has been growing steadily despite the lack of financial support. In 2009 the market showed 101 MW of newly installed capacity (144,000m^2), 11% more in comparison with the previous year, while the market had already doubled in 2008. In 2010 further growth is expected even if projects are delayed through the announcement of a new support program. This new programme will support the implementation of the Polish Action Plan on Renewable Energy and offers a subsidy of up to 45% of investment costs.

Renewable Energies and Energy Efficiency

- **Renewable energies – market situation**

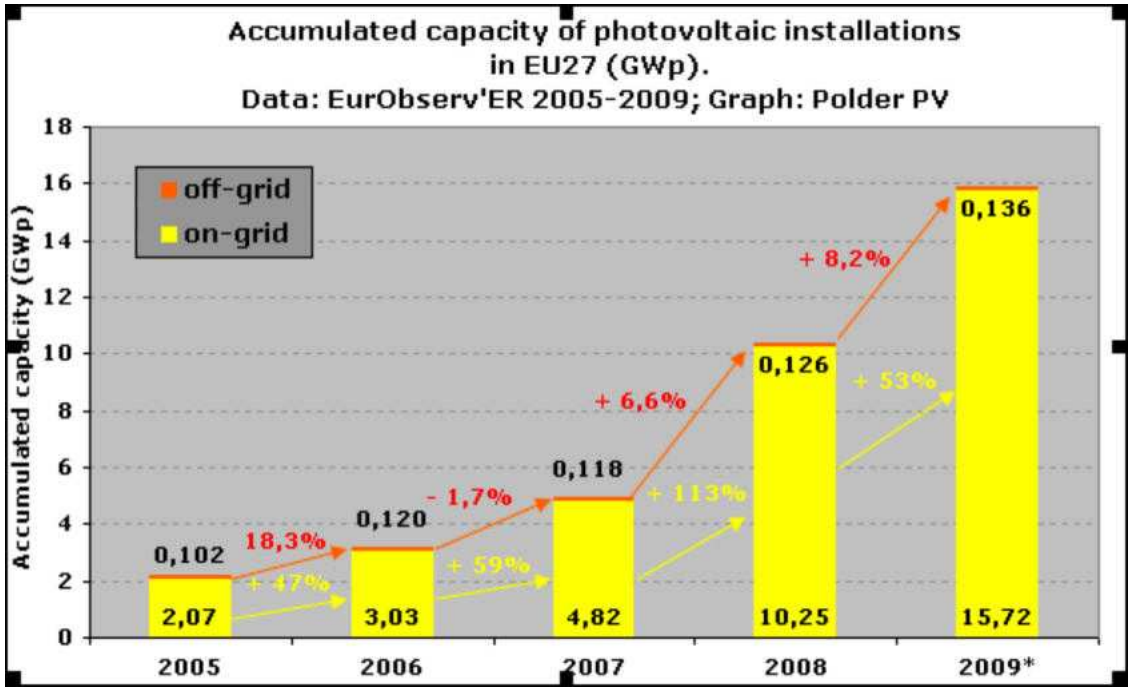
  Solar thermal in Poland



Renewable Energies and Energy Efficiency

- **Renewable energy – market situation**

  Solar power - Europe



Renewable Energies and Energy Efficiency

- **Renewable energy – market situation**

  Solar power - Poland

  Total installed power:

  2007: 0.64 MW_p

  2008: 1.0 MW_p (of which 80% not grid-connected)

Renewable Energies and Energy Efficiency

- **EU – Guidelines and Programmes**

Guidelines/decisions:

Energy efficiency:
Directive 2006/32/EC
Objective: Increase of energy efficiency by 9% till 2016.

Renewable energies:
Directive 2009/28/EC
Objective: Increase of the overall percentage of renewable energy to 20% till 2020. Incl. National Action Plans (Poland: from 7.2 share of final consumption in 2005 to 15% in 2020).

Renewable Energies and Energy Efficiency

- **EU – Support Programmes (direct/indirect)**

  Applying for direct EU funding requires significant time and red tape! This applies to direct funding programmes such as LIFE III, Intelligent Energy for Europe, Marco Polo or Leonardo da Vinci. These projects are created on European added value (consortium with other partners)

  More advantageous are programmes in the case of which national/regional EU funding is available indirectly from the Structural and Cohesion Fund.
  Within this framework there are SME-oriented projects, especially the **European Regional Development Fund** (ERDF). Example in Poland: the sectoral operational programme for increasing competitiveness of companies (7 billion for 2007-2013)

- **EU – Support Programmes (direct/indirect)**

Important internet portals / contacts

- Information on structural funds: www.funduszestrukturalne.gov.pl

- Regional financing institutions in provinces: www.parp.gov.pl

- A special portal on EU aid: www.ue.f.pl

- INTERREG III programme for the Saxon-Polish-Czech border area: www.interreg3a.info

Renewable Energies and Energy Efficiency

- **Poland's Structura Funds Programmes**

  - Operational Programme "Infrastructure and Environment"

  - Operational Programme "Innovative Economy"

  - Operational Programme "Development of the Eastern Poland"

  - Regional Operational Programmes "Subsidies for Companies"

  - Programme for the development of rural areas

Renewable Energies and Energy Efficiency

- **Polish Energy Policy**

  Energy Strategy "Energy Policy of Poland till 2025", 4 January 2005

  Important objectives / measures:

  - Increasing the share of renewable energy to 15% in 2020

  - Maintaining the certificates of origin - "Green Certificates"

Renewable Energies and Energy Efficiency

- **Polish promotion of energy efficiency measures**

  - Name: BOS Energy Efficiency Programme in Buildings
  Financing: global loans
  Subject: saving and efficiency measures in buildings
  Project sponsor: Bank Ochrony Srodowiska S.A (BOS Bank)

  - Name: BOS Boiler Modernisation Programme
  Financing: global loans
  Subject: Replacement of approx. 60 large boilers
  Project sponsor: Bank Ochrony Srodowiska S.A (BOS Bank)

Renewable Energies and Energy Efficiency

- **Good Examples – Example 1 Energy Efficiency / Lighting**

The production halls of **Füssen Automotive PMG** were originally lit by lamps with white painted trapezoidal reflectors equipped with T8 fluorescent lamps. In order to save operating costs and improve the lighting situation in mid 2004 the **lighting system was designed anew**.
- **New lights with reflectors**. Reducing the number of lights and at the same time increasing the light intensity.
- **Equipment of lamps with electronic ballasts** with low power consumption of the overall system (ballast and lamp) compared to the previously installed conventional magnetic ballasts.
- **Daylight-dependent control of lighting**, sometimes supplemented by a motion-dependent dimming. Therefore, only the amount of light is produced which is actually needed .

- **Good Examples – Example 1**

	Old plant	New plant
Number of lights	1.500	900
Installed capacity of each light [W]	144	112
Average illumination intensity [lx]	380	480
Annual power consumption [kWh/a]	1.347.840	377.395
Annual savings of energy costs* [approx. €/a]		**78.000**
Percent of savings		72 %
Further savings (peak load reduction reduced maintenance) [approx. €/a]		10.000
Total annual savings [approx. €/a]		**88.000**
Investment [approx. €/a]		142.000

** with energy price in 2006: 0.08 €/kWh]*

Renewable Energies and Energy Efficiency

- **Good Examples – Example 2 Energy efficiency / compressed air**

In a study of the compressed air system at Edelstahl-Witten-Krefeld GmbH it was found that approximately 28% of produced compressed air is lost through leakage.
With the use of appropriate measures the amount of leakage could be reduced to 23%. This corresponds to a reduction in power by approximately 20% based on a compressed air system.
Measures in detail:
- **Reduction of leakage**
- **Heat recovery**
- **Using variable-speed compressors**

Energy saving per year:
1,386,325 kWh/a

Renewable Energies and Energy Efficiency

- **Good Examples – Example 4 Solar thermal**

During the complete renovation of a hotel a **solar thermal system was installed for water heating**. The 51 m^2 of flat plate collectors heat in total 4,500 litres of buffer storage. This achieves energy saving at the level of 70%. With the investment costs of € 37,000 and funding at the level of € 14,700, the system has paid for itself within eight years.

- **Good Examples – Example 4 Photovoltaic**

In total **109 kWp of photovoltaic systems** were installed on the stables of livestock farming enterprises. This generates approximately 92,000 kWh of solar power annually. With the investment costs at the level of about € 200,000, the cost is refinanced within 10 years owing to the feed-in compensation.

Renewable Energies and Energy Efficiency

- **Group Work**

Checklists
- filling in questionnaires
- evaluation of the energy situation (benchmarking)

Solar energy use (solar thermal or photovoltaic)
- framework conditions (roof surface, etc.)
- assessment of the plant size
- calculation of the expected energy savings
- cost estimate and calculation of the amortisation period

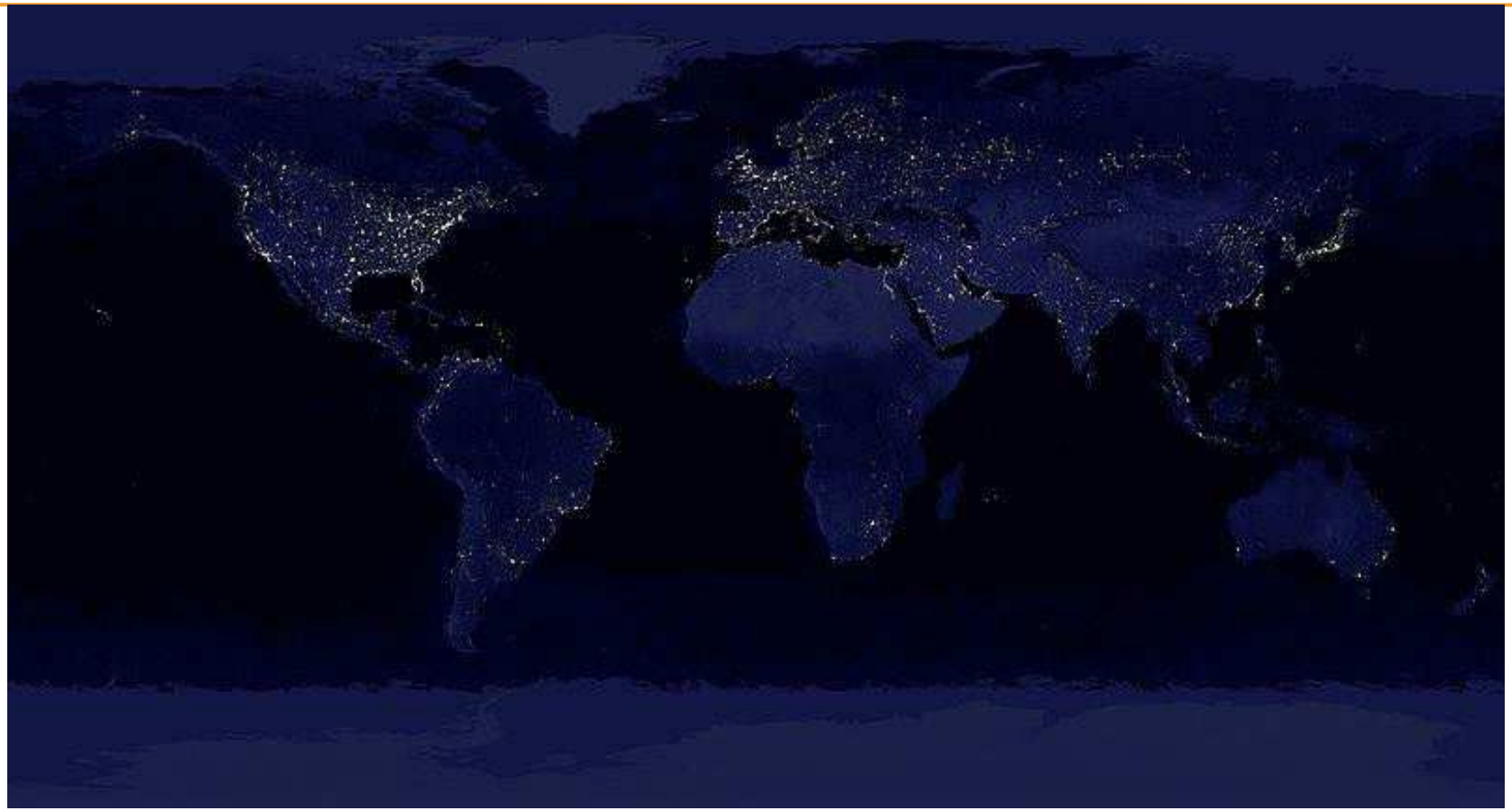
Presentations
- discussions and results

- **Conclusion**

Summary
- Facts
- Important websites

Feedback
- Content?
- Presentation?
- Were the objectives achieved?
- Benefits for your application?
- What was missing?
- Suggestions for improvement

Renewable Energies and Energy Efficiency



Thank you very much for your attention!

PANEVĖŽIO PREKYBOS, PRAMONĖS IR AMATŲ RŪMAI

3LoE

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Work Package 4, Activity A5.1

"Energy Efficiency and Renewable Energies"

Implementation report

Prepared by:

PP 8 Panevezys Chamber of Commerce Industry and Crafts

June, 2022

With the support of the Erasmus+ Programme of the European Union

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Admission and organisation of the training 3

Execution of the training 3

Conclusions 4

Attachment 5

Introduction

Classification within the overall project implementation:
WP4 A5.1

Training title:
"Energy Efficiency and Renewable Energies"

Period of implementation:
April – May 2022

Learning objective

The main learning objective includes being able to assess the energy situation of participants' own enterprises and recognise opportunities of energy savings by improving energy efficiency or the application of renewable energies.

Admission and organisation of the training

Participation in the training was on a voluntary basis. Invitation for companies to participate in the training was disseminated by emails and published in weekly newsletters. A group of participants was formed including business owners, managers and employees of the companies from various sectors (construction, real estate operators, heating and electricity production, transport services, trade, etc.) as well as Panevezys University of Applied Science.
Number of participants: 19. Signed list of participants is attached to this report.
The training was implemented by dividing it into 3 separate seminars on different topics.

Execution of the Training

The training was implemented according to the curriculum ,,Energy Efficiency and Renewable Energies'', prepared by Hanse Parlament**.**
Panevezys Chamber of Commerce, Industry and Crafts carried out the training by dividing it into 3 seminars (4 hours each): 2 face-to-face and 1 online.
Seminar 1 "Use of renewable energy and energy efficiency measures"
The importance of renewable energy and energy efficiency is undeniable and the crucial point for enterprises is to be able to find suitable energy-saving measures. Energy saving is not only about cost reduction but also about climate change therefore the use of renewable energy is a priority not only for companies but for the whole country too.
The subjects discussed during the seminar included:
-Overview of the use of renewable energy;
-Overview of energy efficiency measures that can be applied in areas of lightning, air conditioning, central heating, etc.
-Market situation and development of renewable energy sources in Lithuania.

The training was conducted by Mr. M. Nagevicius, President of Lithuanian Renewable Energy Confederation. He presented the current situation in the country regarding production of solar, wind energy and other resources of renewable energy. At the beginning of 2022 more than half of Lithuania's energy generation was green, and this growth was mainly driven by Lithuanian Solar Energy Association. The aim is to realize the full potential of solar and wind energy in Lithuania and to make it the mainstream energy source.

The participants also learnt about effective ways to apply energy efficiency measures in their companies or at home.

Seminar 2 "Generation and use of solar energy"

This seminar was addressed to SMEs willing to get more detailed information regarding generation and use of solar energy.

The seminar was conducted by Mr. T. Sargautis, he has huge experience in installation of solar power plants and their technical maintenance. He explained to the participants what problems the companies planning to install solar power plants would encounter, what efficiency and losses in the electricity network could be expected. The participants were consulted how to assess electricity consumption of their enterprises and how to estimate the future costs and benefits of solar power systems installed.

Companies that had already installed solar power plants shared their practical experience and actual numbers of network efficiency and the benefits.

The participants also discussed the future of solar energy in general (e.g. is there really enough sunlight in Lithuania for power plants to work efficiently?)

Seminar 3 „Mechanisms of financial support for applying measures of energy efficiency"

The seminar on financial support for using renewable energy was hosted by Mr. L. Bratikas from the Ministry of Energy of Lithuania. This training focused on EU and national legislation, local regulations, goals of sustainable development, implementation of renewable energy production. The lecturer presented information about state funding programmes from EU funds and Lithuanian state budget for the financing period 2021-2027. The aim is that by 2030 one in three housholds would generate their own electricity, thus ensuring energy independence and low electricity bills. Until 2030 the changes would make a significant contribution to increasing energy security and implementing the Green Deal strategy in Lithuania. Under the legislative changes the way for renewable energy investments will be of the highest priorities.

At the end of the seminar the lecturer provided individual consultations for SMEs.

Two of the above seminars were held on face-to-face basis and the third was done online. The seminars included group work and discussions among the participants as well as sharing their best practices.

No certificates of attendance were given at the end of the training.

Conclusions

The topics of the training are very important to all companies of the country in the light of rapid increase of energy prices. The participants were happy they had a possibility to listen to experts of

the energy sector and get their consultations on how to find suitable energy-saving measures for their businesses. They also were able to discuss, exchange ideas and experiences with people from other companies. The participants learnt ways how various measures of energy efficiency could be implemented in real life of SMEs and worked to find solutions suitable for their own companies.
As topics of the training are very important for all the companies, Panevezys CCIC plans to repeat implementation of the training in the future for a larger number of participants in other towns of the region.

Attachments

- Signed participant list.

Final Report

Training
Analysis and tools to manage the energy emergency in the company, an operational path

Prepared by:

With the support of the Erasmus+ Programme of the European Union

With the support of the Erasmus+ Programme of the European Union

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Chapter 1

From energy efficiency to renewable energy for SMEs

In a historical period increasingly marked by the global energy crisis, the need arises to acquire new skills and tools to manage the emergency within companies.

It is precisely in this context that the course co-organized by UniSMART – Fondazione Università di Padova and T2i is inserted. A free and professionalizing three-day course, as part of the European Erasmus+ project "Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy" (3LoE).

The course proposed an in-depth **study to acquire decision-making skills in the face of the challenge of the price emergency and the energy transition**.

By participating in the training course, it was therefore possible to obtain the **analytical skills necessary to evaluate the most appropriate investment and management options for energy supplies in the company**.

Starting from a solid knowledge base of energy policies, the lessons then focused on much more operational skills, in order to offer students concrete tools and action plans that can be immediately spent in companies.

At the end of the course, after verification of actual participation, a certificate of attendance was issued to all participants who have completed at least 70% of the scheduled hours.

Chapter 2

Energy manager

The module presented the figure of the energy manager who conducts qualitative and quantitative evaluations of the final energy withdrawal profiles for companies, public administrations and individuals.

The energy manager performs technical-economic feasibility studies for energy efficiency interventions and self-production from renewable or similar sources, including any subsequent procedure for requesting the planned incentives.

The classroom illustrated how to conduct an **energy diagnosis** with the clustering of energy consumption, the selection of sites to be audited, hints at **ISO 50001 certification** and the deepening of 4 fundamental steps, to be performed in sequential order:

• optimization of energy supply contracts;

• rationalization of energy flows;

• identification of energy-saving technologies;

• recovery of wasted energies.

Finally, technically, the characteristics of an energy audit were illustrated:

• flowchart;

• units of measurement, conversion and adjustment factors;

• final and primary energy consumption (levels A and B);

• final and primary energy consumption (level C);

• operational energy performance indices;

• identification of actions to improve energy efficiency.

Chapter 3

Life Cycle Assessment - LCA in energy systems

The module concerned the analysis of the life cycle (Life Cycle Assessment - LCA) which is an objective method of evaluation and quantification of the potential environmental impacts associated with a product or service, along the entire life cycle.

We have deepened the **ISO/TS 14072:2014 certification** which provides additional requirements and guidelines for an effective application of ISO 14040 and ISO 14044 to organizations. In particular:

- the application of Life Cycle Assessment (LCA) principles and methodologies to organisations;
- the benefits that LCA can bring to organizations through the use of the LCA methodology at the organizational level.

ISO/TS 14072:2014 applies to any organization that has an interest in applying LCA.

The goal is to quantify the global environmental impacts through the definition of a data collection methodology that provides accurate information on the real environmental problems of the activity for:

- build a strategy to curb impacts and generate value for the group;
- monitor the environmental impact of the activity;
- communicating the results to stakeholders (sustainability report).

Product Category Rules (PCR) were presented. They are used as a complement to the general instructions of LCA analysis and ensure that functionally similar products are evaluated in the same way when performing LCA and for product

comparison. PCR should also generate consistent results when evaluating products from the same product category.

The Environmental Product Declaration is a declaration of the environmental impacts of a product, generated throughout its life cycle.

It is a type III environmental label based on the LCA methodology and on specific rules defined for each type of product (PCR).

Each EPD scheme follows the rules of a Program operator who, in turn, operates in accordance with UNI EN ISO 14025.

Conclusions have been drawn on the LCA method which allows:

- analysis, quantification and improvement of environmental performance;
- product eco-design;
- communication;
- competitive advantage;
- access to subsidized credit

Chapter 4

New energy technologies

In the module, **renewable sources and electricity networks** were studied in particular, focusing the reasoning on the increase in photovoltaic production and on the valorisation of photovoltaic production through:

- large-scale pure generation photovoltaic plants already in market-parity;
- association with consumption centres;
- production valorisation contract (PPA);
- energy communities, energy districts and local aggregators;
- integration with building and production contexts;

• supply of services (to the grid), not just energy.

The module then presented the regulatory stability during the life of the plant, the need to shorten the authorization procedures also through an objective assessment of the environmental impact, the due technological evolution and in continuous evolution (reduction of the surfaces required for the same power cost reduction).

The themes of electricity-hydrogen synergies, mobility, the opportunity of the electric car, user-network relationship (aggregations and services), energy communities, collective self-consumption and CERs have not been overlooked.

Chapter 5

Green deal, European and national energy policy

The closing module that took up the concepts presented in the previous modules closed the circle with the illustration of the **Green Deal, European and national energy policy.**

We tried to answer the questions:

- Is there a good connection between the energy sector and the markets?
- Why introduce competition into energy supply?
- The failure of the energy market: goods vs services, security of supply, long-term investments, strategic inputs, ...
- Can public companies be efficient? Are they pursuing an economic goal?

To answer these questions, the evolution of the **energy market in 2022** was analyzed: unforeseen and unpredictable conditions for natural gas, the EU's dependence on imports, the EU's energy dependence on Russia.

We have seen the Italian **energy balance**, coming to deepen the European policy for renewable energy, the EU targets to 2050 on CO2 emissions, the growth of renewable sources in Europe.

Finally, attention has been paid to the **regional and municipal level** of energy policies with a particular focus on **Energy Communities, Renewable Energy Communities (CERs)** and groups of renewable energy self-consumers acting collectively.

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Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Work Package 4, Activity 5.1:

Training I for SMEs: Energy Efficiency and Renewable Energies

Implementation report

Prepared by:

Latvian Chamber of Crafts

February, 2024

Co-funded by the Erasmus+ Programme of the European Union

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Attachments ..... **Fehler! Textmarke nicht definiert.**

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Introduction

Upon joining the 3LoE project, Latvian Chamber of Crafts set out to provide its members with knowledge and skills that are necessary for practical entrepreneurial innovation in the green economy. By implementing the "Energy Efficiency and Renewable Energies" training, prepared by the Hanse Parlament, Latvian Chamber of Crafts aims to guide its participants to recognise the resolve behind renewable energy and energy efficiency measures, fostering a mind-set shift towards considering environmental impacts alongside economic factors.

Through this course, SME employers, employees and self-employed craftsmen can learn how their actions can contribute to mitigating supply decrease and combating global warming and climate change, which preferably leads to a sense of responsibility and motivation to adopt green practices.

Learning about specific energy efficiency measures tailored for SMEs equips entrepreneurs with practical knowledge they can apply directly to their businesses. The course encourages critical thinking and increases problem-solving skills as participants explore how to optimize energy usage within their specific field of craft – whether it be woodworking, carpentry or roofing – potentially identifying unique solutions that suit their situation.

Detailed discussions on various energy efficiency measures offer practical guidance on specific areas where businesses can make impactful changes. Participants can develop analytical skills by evaluating their current energy usage patterns and identifying opportunities for optimization in lighting, heating, cooling, and compressed air systems. Delving into solar energy technologies provides SME employers and self-employed individuals with insights into one of the most accessible and rapidly growing renewable energy sources.

Examining the market situation and trends in renewable energy and energy efficiency provides valuable insights into industry dynamics and potential business opportunities. It encourages participants to think strategically about how they can position their businesses to capitalize on emerging trends and initiatives supporting green technologies. Implementing green practices not only helps the environment but also appeals to eco-conscious consumers. By

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attending this seminar, members of the Latvian Chamber of Crafts can gain insights into how they may differentiate their businesses in the market and gain a competitive edge by doing so.

Understanding EU guidelines and support programs enables SME representatives and self-employed craftsmen to navigate regulatory requirements and access financial incentives for implementing green initiatives. Being informed about energy-saving measures and renewable energy options can help SME employers ensure that their businesses remain compliant with evolving regulations, avoiding potential fines and penalties.

The best practice examples provided in the course offer inspiration and practical guidance for implementing new measures and technologies. It encourages creative thinking and adaptability as participants consider how they can adapt successful strategies to their own businesses or industries.

The inclusion of project work allows participants to apply the knowledge and skills gained throughout the seminar to real-world scenarios. It promotes collaboration, problem-solving, and innovation.

Seminars like these provide opportunities for SME employers and self-employed individuals to network with other like-minded businesses. These connections can lead to collaborations on green initiatives, joint ventures, as well as access to new markets.

Investing in energy-saving measures and renewable energies isn't just about short-term gains; it's about securing the long-term sustainability of the business. By acquiring the knowledge and skills to implement such measures, craftsmen can future-proof their businesses against rising energy costs and environmental uncertainties, which affect every craft group in the chamber.

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Admission and organisation of the training

Latvian Chamber of Crafts disseminated information about the opportunity to participate in the training by phone and e-mail.

The training was implemented by Latvian Chamber of Crafts' member Guntars Upenieks.

The curriculum was prepared by the Hanse Parlament. Minor additions were made, such as information about local market situation, support programs and best practice examples.

The training was attended by 15 participants. All the training participants were Latvian Chamber of Crafts members (self-employed persons or SME representatives).

The training was held over a period of 2 days, as suggested by the Hanse Parlament.

The two day seminar plan can be found below.

"Energy Efficiency and Renewable Energies" curriculum (12 hours)

Day 1

No.	Topic	Hours
1.	Importance of renewable energy and energy efficiency measures. Supply decrease. Global warming and climate change.	1
2.	Solar energy use and supply. Solar thermal systems. Solar power systems.	1,5
3.	Energy efficiency measures. Lighting, heating, cooling, compressed air.	1,5
4.	Market situation, development of renewable energy and energy efficiency in Europe and in Latvia.	0,5
5.	Renewable energy guidelines and support programs in EU and Latvia.	0,5
6.	Discussion.	1
	Total:	6

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Day 2

1.	Best practice examples of energy efficiency and renewable energy.	1
2.	Project work.	7
	Total:	8

Project work included:

- examining the current status of the energy situation in the trainees' enterprises,
- examining and planning the possibility of solar energy use,
- examining and planning the possibility of other renewable energy measures,
- estimating the cost savings said measures could bring,
- presenting findings to the other trainees and the lecturer.

Participants profile and organisation of the training

The training was held from 27 October to 28 October, 2022.

The training was carried out in person.

All of the participants of the Energy Efficiency and Renewable Energies training were members of the Latvian Chamber of Crafts.

All 15 participants were male.

Age of participants:

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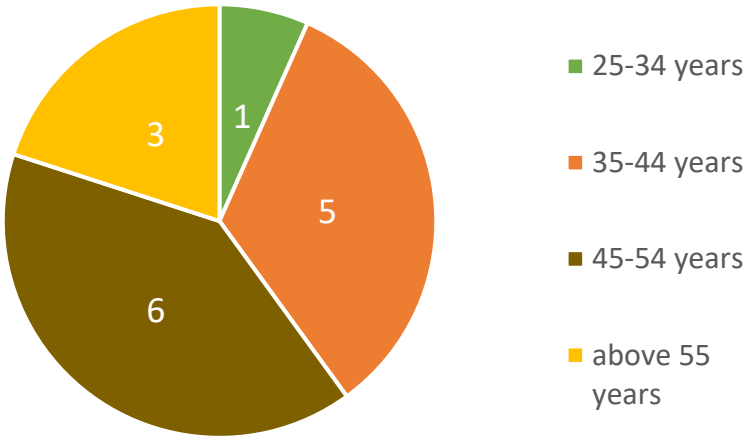
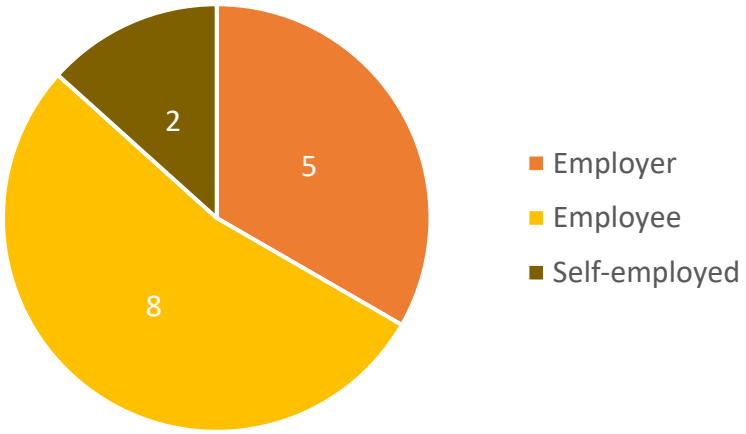


Most training participants came from SMEs. Two participants were self-employed craftsmen:



Following is the variety of crafts groups represented by the participants:

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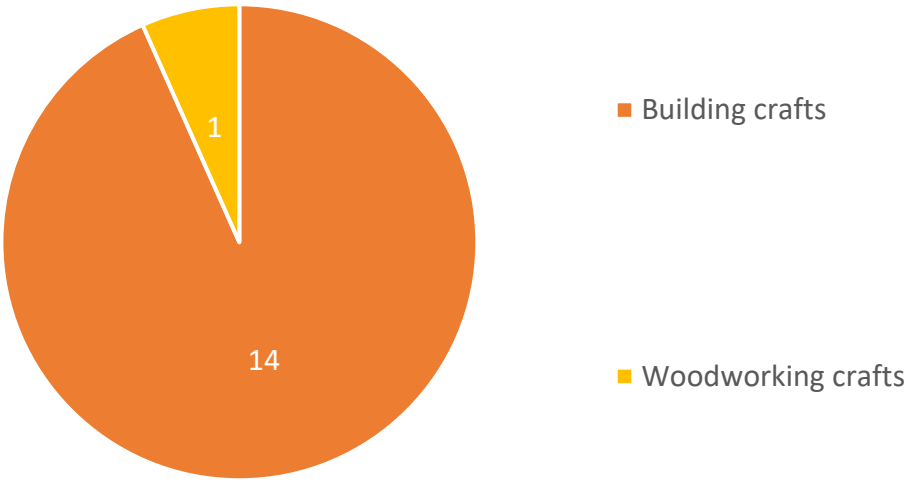
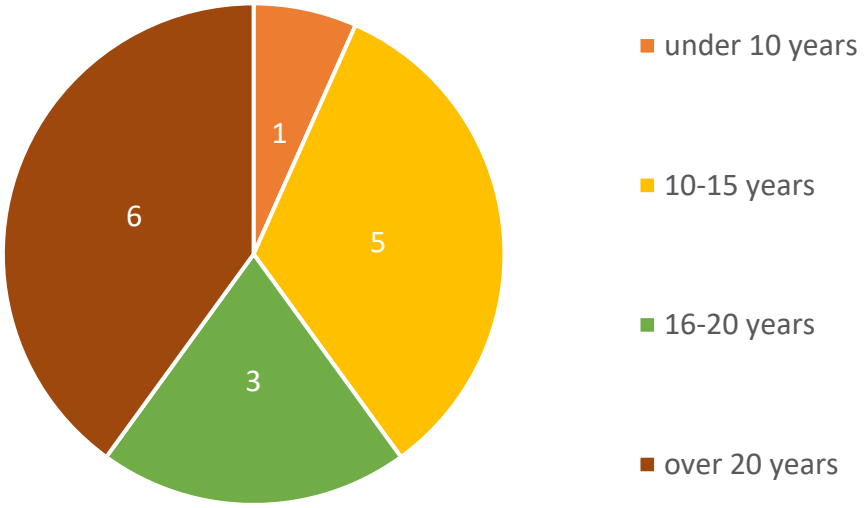


The represented crafts were:

- building crafts group – heating technician, carpenter, tinsmith, roofer, potter,
- woodworking group – woodworkers.

The work experience of the trainees ranged from 7 to 44 years:



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Execution of the Training

Over the span of 12 hours divided into two day seminars (6 and 8 hours), participants delved into the intricacies of renewable energy, energy efficiency measures, and the related opportunities in the landscape of small and medium-sized enterprises.

Day 1: Importance of renewable energy and energy efficiency measures (1 hour)

The training began with an exploration of the purpose behind renewable energy and energy efficiency measures. Participants delved into the global context, understanding the ramifications of supply decrease, global warming, and climate change. Discussions illuminated the urgency of embracing sustainable practices and the pivotal role each participant and their enterprise could play in effecting positive change.

Day 1: Solar energy use and supply (1,5 hour)

The focus then shifted to solar energy as participants delved into the opportunities, benefits and costs of its use. The technical basics of different solar energy systems was explained. Lecturer and participants then discussed the possible areas of application of solar energy. Practical insights and local examples were used to illuminate the path towards embracing solar solutions in SMEs and self-employment ventures.

Day 1: Energy efficiency measures (1,5 hours)

The training continued with participants exploring various measures aimed at optimizing energy usage. From lighting and heating to cooling and compressed air systems, participants dissected different practical strategies and concrete tips for minimizing energy wastage and maximizing efficiency within their operational frameworks – such as energy saving technology, timers and motion detectors, temperature changes. Possible cost benefits were shown to the trainees.

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Day 1: Market situation, development of renewable energy and energy efficiency in Europe and in Latvia. (0,5 hours)

Participants analysed the current market dynamics and possible future trends of renewable energy and energy efficiency sectors in Europe and Latvia. They were introduced to the market situation of solar power in different countries and engaged in discussions to deepen their understanding of opportunities and challenges in these regions.

Day 1: Renewable energy guidelines and support programs in EU and Latvia. (0,5 hours)

This session provided an overview of renewable energy guidelines and support programs implemented by the EU and Latvia. Participants learned about financial incentives, technical assistance, networking opportunities, and practical resources available to stakeholders investing in renewable energy and energy efficiency projects, for example, the help offered for installing solar panels.

Day 1: Discussion (0,5 hours)

The day culminated in a discussion session, providing participants with a platform to voice their insights, queries, and challenges. This session fostered collaboration, further knowledge exchange, and exploration of possible solutions to hurdles specific to different craft industries.

Day 2: Best practice examples of energy efficiency and renewable energy (1 hour)

Day two commenced with a showcase of best practice examples drawn from real-world implementations of energy efficiency and renewable energy initiatives. Participants gleaned insights from successful case studies, dissecting the strategies and methodologies employed to drive tangible results.

Day 2: Project work (7 hours)

The main focus of day two was on the project work, where participants transformed theoretical knowledge into possible solutions for their own enterprises. Divided into groups, participants came up with solutions tailored to their unique craft group contexts, exploring energy efficiency improvements and the integration of solar energy solutions within their

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enterprises. Guided by the lecturer, participants navigated the complexities of assessing the project size, calculating of the expected energy savings and drawing a cost estimate.

Main Findings and Conclusions

By blending theoretical foundations with practical applications, this program empowered participants to embrace sustainability, drive innovation, and find possibilities of improvement within their industries of influence.

One of the highlights of the training was the in-depth analysis of concrete renewable energy solutions. The trainees mentioned that it helped identify new opportunities for their businesses.

Moreover, the sessions on current market situation as well as renewable energy guidelines and support programs in the EU and Latvia was immensely beneficial. Learning about financial incentives, technical assistance, and networking opportunities provided the participants with the tools and resources needed to begin looking for real world solutions for their SMEs.

As for the project work, dividing into groups allowed participants to tailor solutions specifically to their own enterprises and craft group contexts. This personalized approach ensured that the proposed solutions were relevant, feasible, and directly applicable to their unique business needs and challenges.

Collaborating with peers as well as the lecturer facilitated knowledge sharing, brainstorming, and creative thinking. Participants had the opportunity to leverage diverse perspectives, experiences, and expertise, leading to well-rounded solutions that may not have been possible in isolation. The guidance provided by the lecturer was instrumental in navigating the complexities of the project work. From assessing the project size to calculating expected energy savings and drawing cost estimates, participants received expert support and feedback throughout the process, ensuring the accuracy and feasibility of their proposals.

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Training II Solar Energy – Technology and Applications

- Curriculum
- Teaching Material (Presentation)
- Implementation Reports

Seminar curriculum

‘Solar energy – Technology and Applications’

for small and medium-sized enterprises

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1. Summary of the key features

1.1 Target

The aim of this seminar is to give employees and decision-makers in small and medium-sized enterprises (SMEs) an overview of the potential for energy saving measures in their operation through the use of solar technologies, both in heating and electricity.
The seminar provides information and facts about the various possibilities, costs and benefits as well as feasible examples to make it possible for the participants to estimate the implementation of potential measures in companies of various industries.

1.2 Target groups

Electricians, gas and water technicians, roofers, heating engineers (master craftsmen, journeymen, specialists and managers)

1.3 Duration and timing

The seminar is structured as a full-time course and comprises 2 days, a third day is optional.
The first day includes the presentation and discussion of the basics of the solar energy use as well as the technical and financial aspects of solar heating and solar power systems.
It starts at 09.00 and ends at 18.00 (8 teaching units). During the second day, the regional situation with regard to the use of renewable energies and the funding situation is described. This part of the training is presented by a regional representative, e.g. an energy agency. The third day (depending on the interests of the participants) an excursion to an implemented solar project takes place, which, in addition to technical information, gives an insight especially into the experience of the operators in the implementation and operation of the facility.

1.4 Qualification of the lecturer(s)

If possible, the seminar should be run by lecturers who not only have profound knowledge in the field of solar energy use (market, technology, planning, installation, costs, benefits of solar heat and solar power systems), but also possess country-specific knowledge, in particular as to the financial framework conditions for the implementation of measures. It is recommended that at least 3 lecturers are involved in the seminar. The lecturers should not only be competent in the field in question, but also have presentation and discussion experience in the didactic field. Of course, in this regard it is advantageous to lead group work and involve participants in discussions and role-plays.

1.5 Required technical equipment

- System components as material models (e.g. absorber, flat plate collector, Vacuum-tube collector, monocrystalline and polycrystalline solar module, inverter, charge controller)

Additionally:
- Flip chart
- Blackboard
- PC with a projector
- Internet access for the lecturer's laptop
- Canvas

1.6 Methodological-didactic remarks

Depending on the knowledge of the seminar participants, the basic interrelationships will be explained as much as necessary, but can be looked into in more detail at any time, if so desired.

2. Concept of the seminar

2.1 General concept

2.1.1 Overview of main topics and content (based on the contents of the master presentation for the lecturers)

In the framework of the main topics 9 and 10 the markets and support measures will be presented by the lecturers of the respective countries.

Main topic 1: Why use solar energy? – 0,5 AU (academic units)

Topic 1.1: Increasing energy consumption against the backdrop of decreasing resources (peak oil)
Topic 1.2: Rising energy prices
Topic 1.3: Global warming and climate change

Main topic 2: Possible applications of solar energy – construction and operation of solar thermal systems, market situation in Germany – 1,5 AU

Topic 2.1: Use and supply of solar energy
Topic 2.2: The market situation for solar thermal energy in Germany
Topic 2.3: Construction and operation of solar thermal facilities
Topic 2.4: Components of solar thermal facilities
Topic 2.5: Regulation and controlling
Topic 2.6: Solar hot water preparation and supplementary heating

Main topic 3: Planning and dimensioning, assembly examples – 1 AU

Topic 3.1: Design and planning, checklist and rules of thumb
Topic 3.2: Solar fraction and solar usage rate
Topic 3.3: Installation of the collectors, the storage tank and the solar circuit

Topic 3.4: Defects, causes and their elimination

Main topic 4: Costs and benefits, cost-effectiveness – 1 AU

Topic 4.1: Investment costs and energy saving
Topic 4.2: Calculations of cost-effectiveness, payback period

Main topic 5: Large thermal solar systems – 0,5 AU

Topic 5.1: Areas of application of large-scale facilities
Topic 5.2: Systems and planning of large-scale facilities
Topic 5.3: Costs and cost-effectiveness of large-scale plants

Main topic 6: Design and operation of solar power systems – 1 AU

Topic 6.1: Grid-connected systems and stand-alone systems
Topic 6.2: Components of solar power systems, modules, inverters and batteries

Main topic 7: Planning and dimensioning, installation – 1 AU

Topic 7.1: System construction, dimensioning of components
Topic 7.2: Installation, advantages and disadvantages of different installation methods

Main topic 8: Costs and benefits, cost-effectiveness, market and support – 1,5 AU

Topic 8.1: Investment and assembly costs
Topic 8.2: Own consumption and grid feed-in
Topic 8.3: Feed-in tariffs and cost-effectiveness

Main topic 9: Regional market situation – 4 AU

Topic 9.1: Initial situation, energy costs
Topic 9.2: Importance of individual kinds of renewable energy,
solar energy, bioenergy, geothermal energy, wind energy
Topic 9.3: Applications, technical systems and costs
Topic 9.4: Legal framework conditions

Main topic 10: Regional support programmes – 4 AU

Topic 10.1: Existing subsidy and credit programmes for solar heating systems
Topic 10.2: Feed-in tariffs and cost-effectiveness of PV systems
Topic 10.3: Example calculations and implemented good examples

2.2 Learning objectives and methodological-didactic remarks on the main topics of the concept

The main learning objective is to get to know the possibilities of using solar energy, to be able to estimate its potential in one's own company and to find out about the possible funding and support measures.
Specific learning goals of the seminar cover the following topics:

- Estimation of the global energy situation
- Overview of the possibilities and the efficiency of solar technologies
- Knowledge of the components as well as their structure and operation
- Dimensioning of a solar system (solar heat and solar electricity)
- Cost/benefit analysis taking into account subsidies

Below the learning objectives for each main topic will be described:

2.2.1 Main topic 1: Why use solar energy?

The participants…
… recognise the importance of the solar energy against the backdrop of rising energy prices and decreasing availability of fossil fuels.
… gain an idea of the real consequences of progressing global warming

2.2.2 Main topic 2: Possible applications of solar energy – construction and operation of solar thermal systems, market situation

The participants…
… get to know the solar thermal heat market in Germany
… learn to be able to assess the solar energy supply and its value
… get to know the different possible applications of solar energy
… become familiar with the structure and operation of solar thermal systems
… get information as to the components and their task and function

2.2.3 Main topic 3: Planning and dimensioning, assembly examples

The participants…
… know the essential influencing factors of an adapted planning
… get to know the tool for creation of a facility (simulation software)
… experience how the system installation works

2.2.4 Main topic 4: Costs and benefits, cost-effectiveness, examples

The participants…
… are informed about the costs of the solar systems and can calculate the expected energy savings
... get to know the methods of calculating cost-effectiveness and receive an overview of the market situation and existing support programmes , if applicable.

2.2.5 Main topic 5: Large thermal solar systems

The participants…
... get to know possible applications for large thermal solar systems
... experience the essential differences between small and large plants
... get to know the planning process of large solar systems
... know the cost situation in the large plant sector

2.2.6 Main topic 6: Design and operation of solar power systems

The participants…
... get to know the structure and components of solar power systems
… know the effectiveness of solar cells and inverters
… are able to estimate the revenues of a solar power system

2.2.7 Main topic 7: Costs and benefits, cost-effectiveness, market and support

The participants…
... get to know the cost structure of solar power systems (components, assembly)
... are able to calculate the profitability of a solar power system
... know which energy savings are possible through photovoltaics
... get an overview of the PV market situation and existing support programmes, if applicable

2.2.8 Main topic 8: Planning and dimensioning, installation

The participants…
… learn how to design a solar power system (rules of thumb, simulation software)
... know the individual assembly steps (taking shading into account)
... know the maintenance costs of solar power systems

2.2.9 Main topic 9: Regional market situation

The participants…
… get to know the regional market situation
… know the supply and demand situation in individual branches

… know the market players, barriers and good examples

2.2.10 Main topic 10: Regional support programmes

The participants…
… get to know the various national and regional support/funding tools
… know the specific requirements and the effort/expenses involved in making an application
… know good examples and are able to assess the chances of their project being eligible for funding

3. Certificate

At the end of the seminar, participants receive a certificate in which the training contents (main topics) are listed and which is signed by the training centre (Chamber of Crafts) and the Hanseatic Parliament.

Solar Energy – Technologies and Applications

Solar Energy – Technologies and Applications

- **The aim of the seminar**

  Overview of possibilities of solar energy use for small and medium-sized enterprises through the implementation of solar thermal systems and solar power systems

- **Focus areas**

  - Why should solar energy be used?
  - Solar energy supply
  - Possibilities of using solar energy
  - Examples of technologies and applications
  - Costs/funding and benefits
  - Customer service

Solar Energy – Technologies and Applications

- **Contents - Overview**

First day (09:00 a.m. - 6:00 p.m.)

- Why should solar energy be used?
- Implementation possibilities of solar energy
- Construction and functions of solar thermal systems
- Planning and design
- Installation, commissioning and maintenance
- Costs and benefits, economic efficiency

Solar Energy – Technologies and Applications

- **Contents - Overview**

Second day (9:00 a.m.-5:00 p.m.)

- Large solar thermal systems
- Photovoltaic market situation
- Structure and functions of solar power systems
- Costs and benefits
- Economic efficiency
- Customer service

Third day (9:00 a.m.- 1:30 p.m.) - optional
- Excursion to a solar installation

Why should solar energy be used?

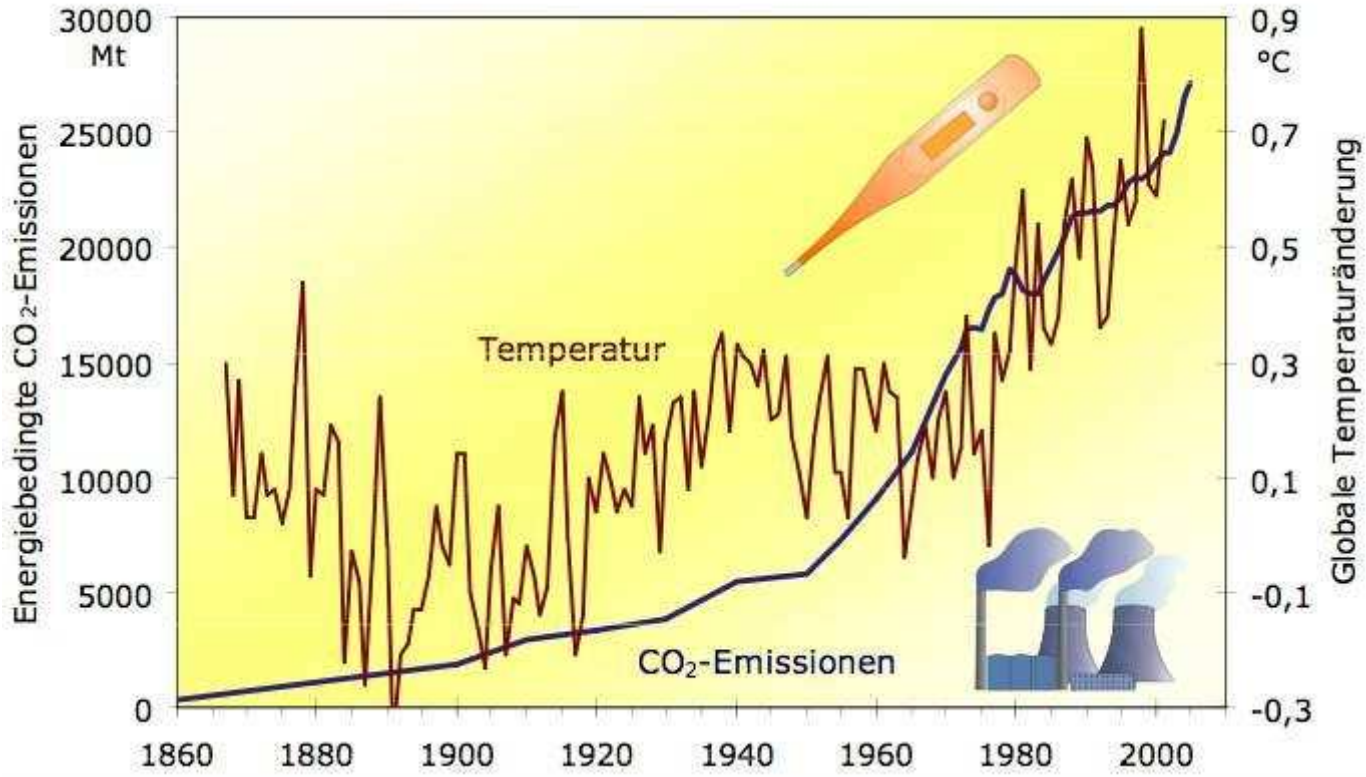
- Rising energy prices
- Scarce resources of fossil energy
- Risk of energy: nuclear power (radiation, waste)
- Competitiveness
- Compliance with stricter regulations, legislation
- Active against global warming, climate change
- Company image

Why should solar energy be used?

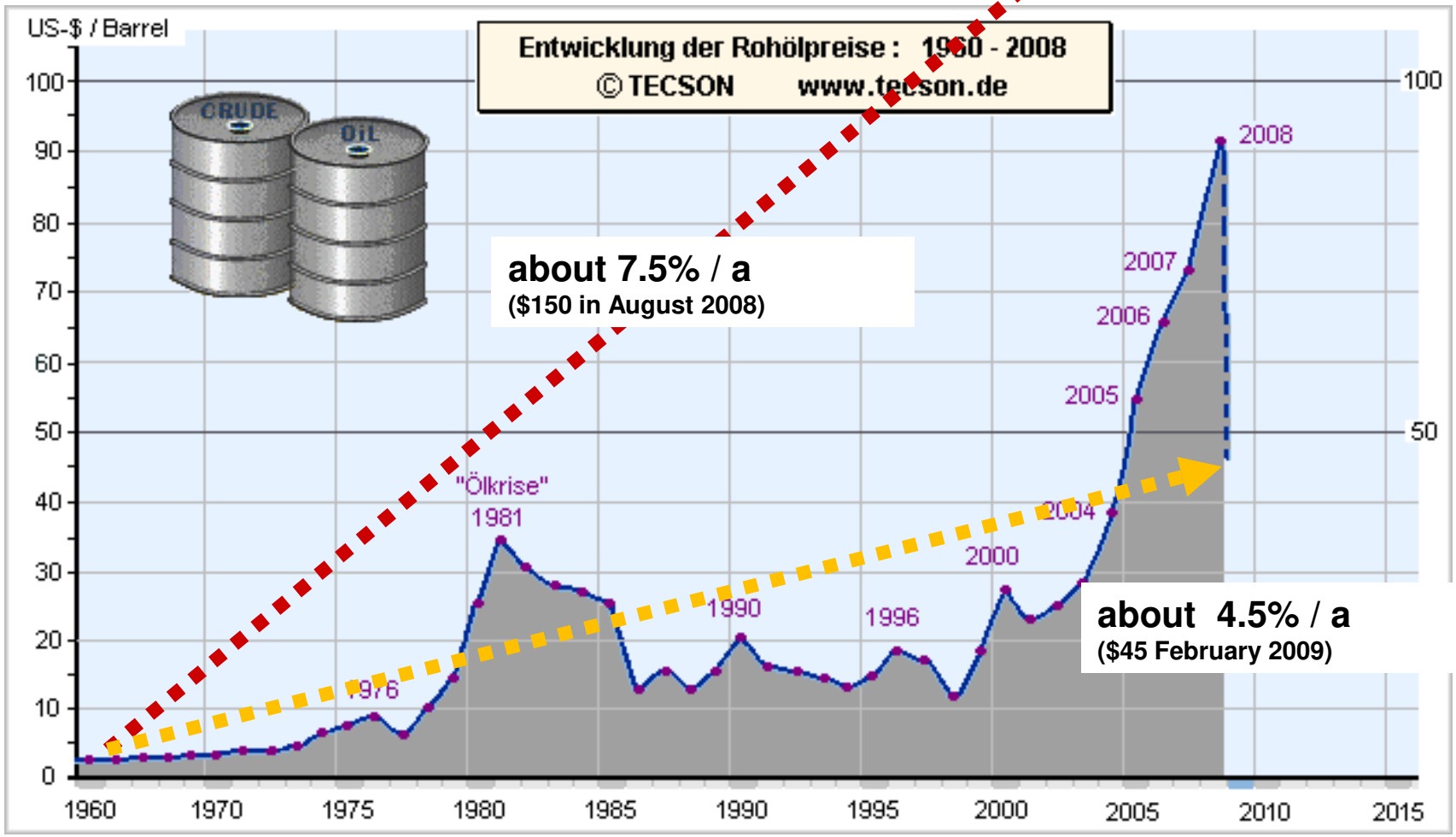
Threatened area in the case of Greenland ice melting
(Increase by 6-7m; all glaciers +Antarctic: by 60-70m)

Why should solar energy be used?

Rising global carbon dioxide emissions



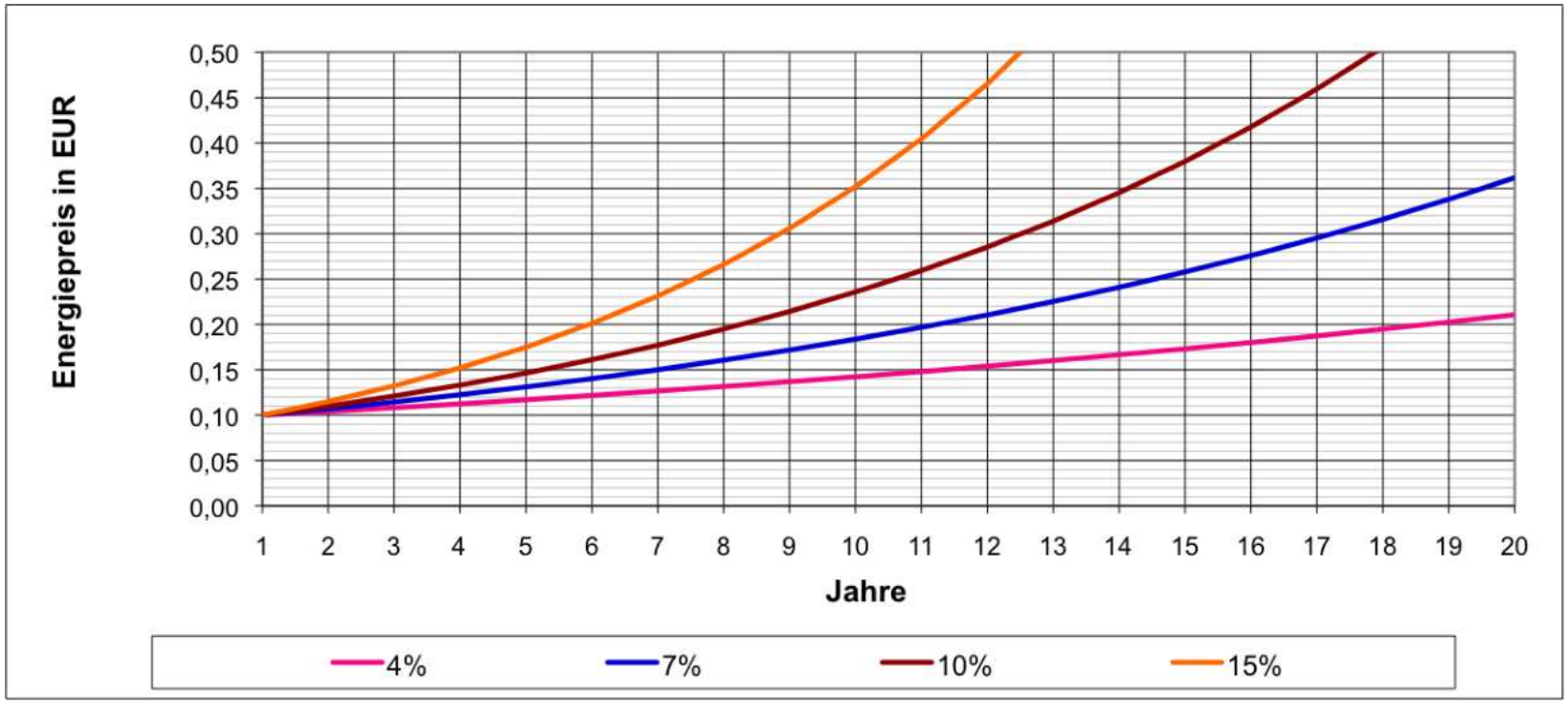
Why should solar energy be used?



Source: tecson, u.a.

Why should solar energy be used?

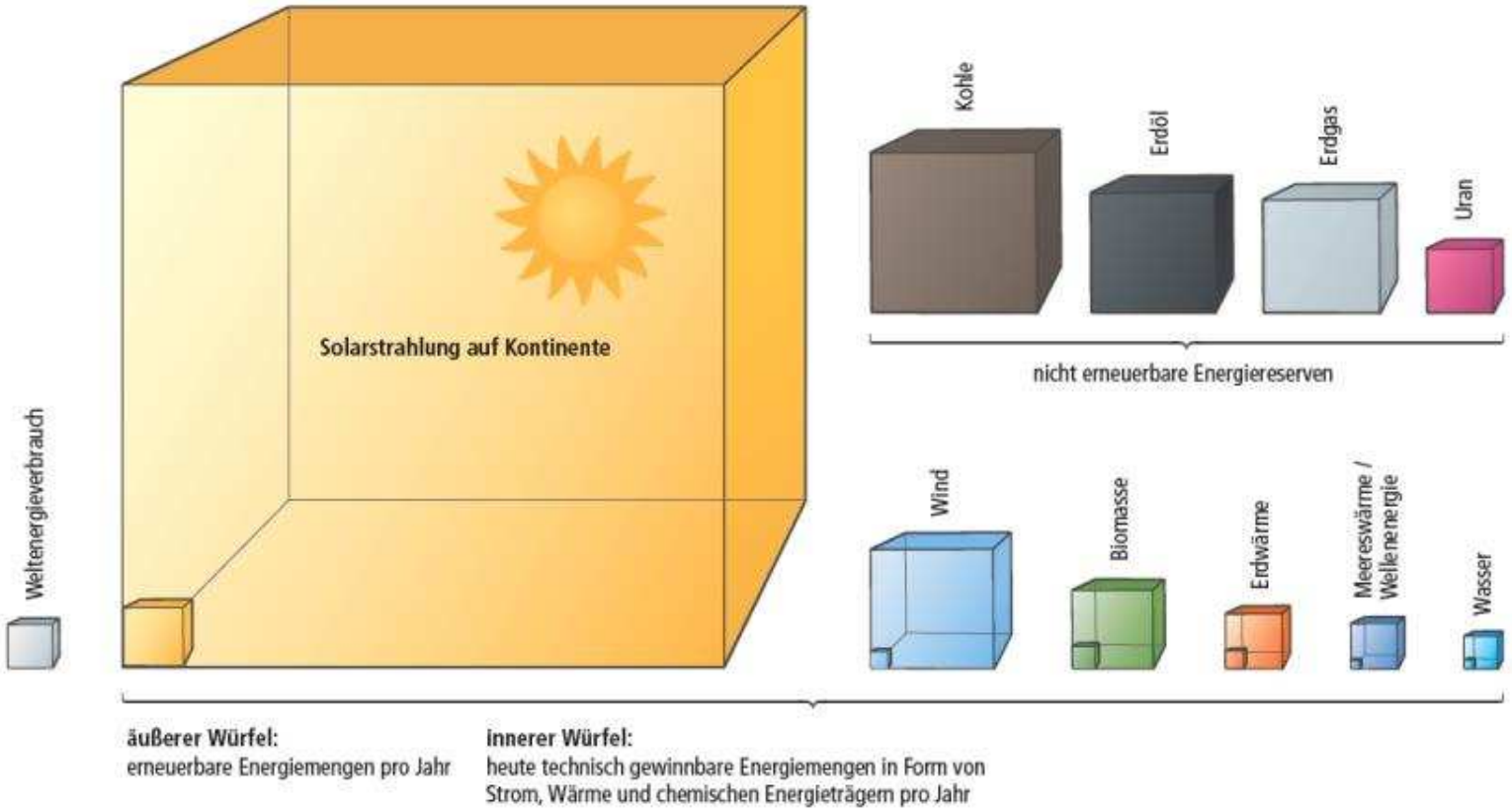
Energy costs today - Energy costs tomorrow



Energy costs increased by 4,7,10, or 15%

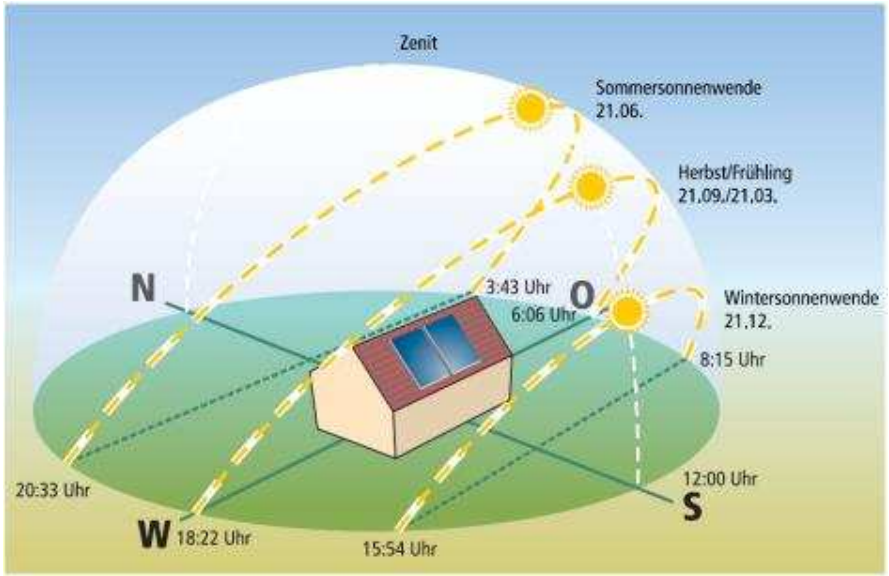
Why should solar energy be used?

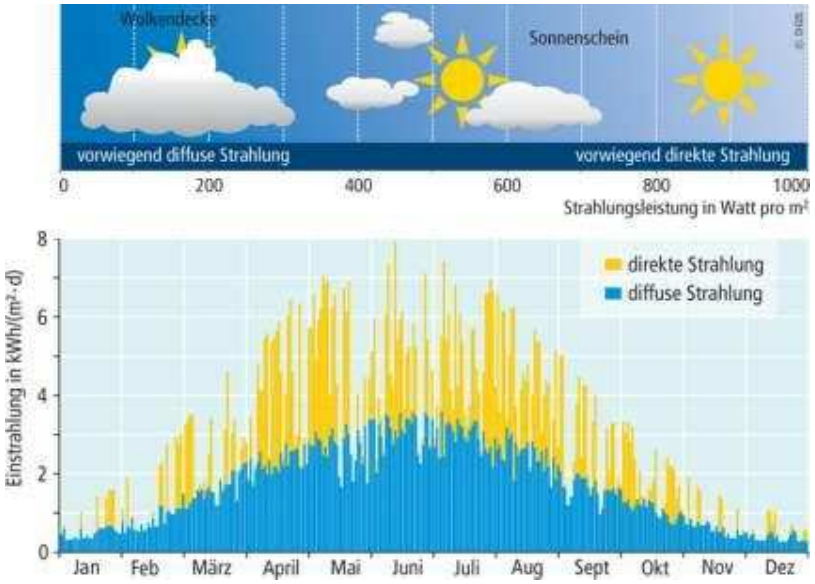
- **Renewable energies: potentials**



Solar Energy Supply

- **Solar energy use**
  Solar energy supply
  – astronomically and meteorologically conditioned variations

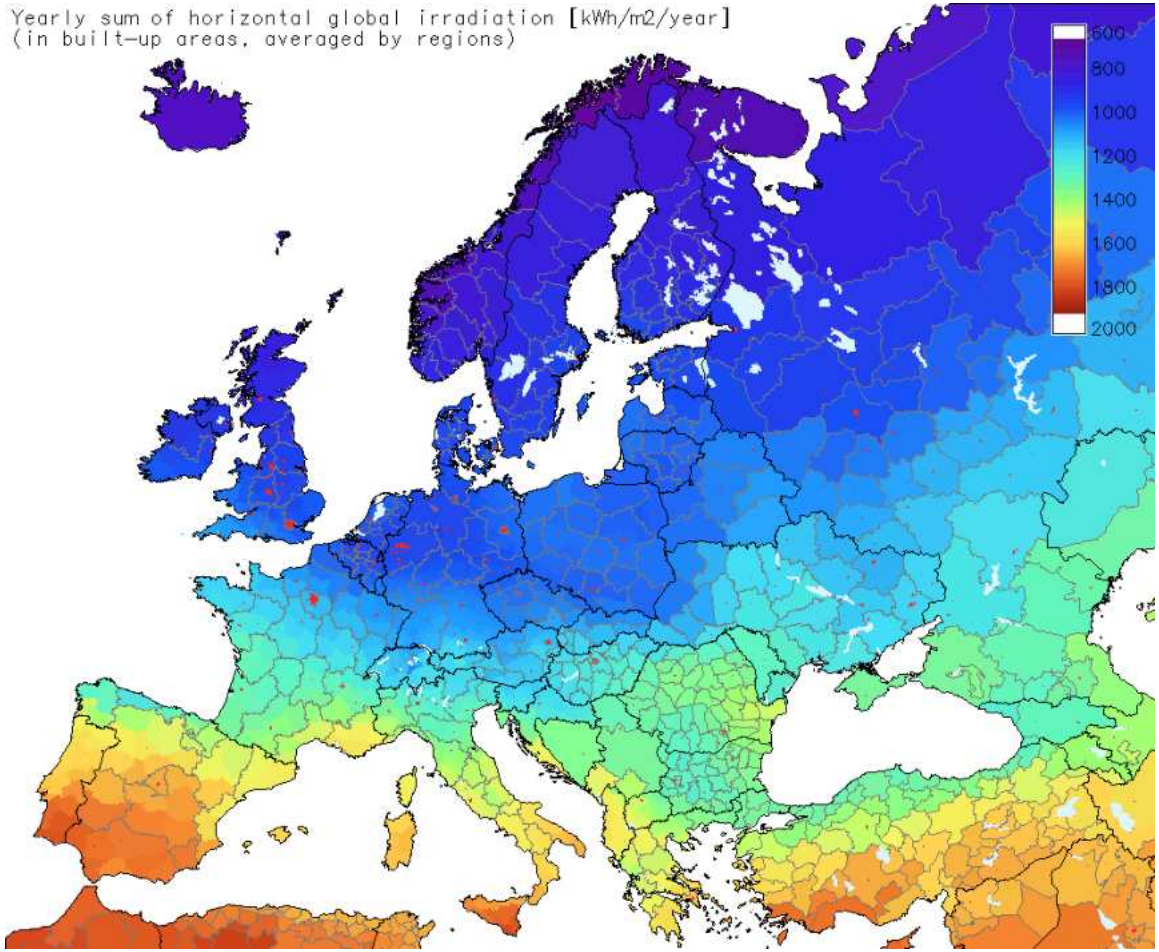




Solar Energy Supply

- **Solar energy**

Solar energy supply in Europe:
Geographical distribution of annual totals
(kWh/m^2 per annum)

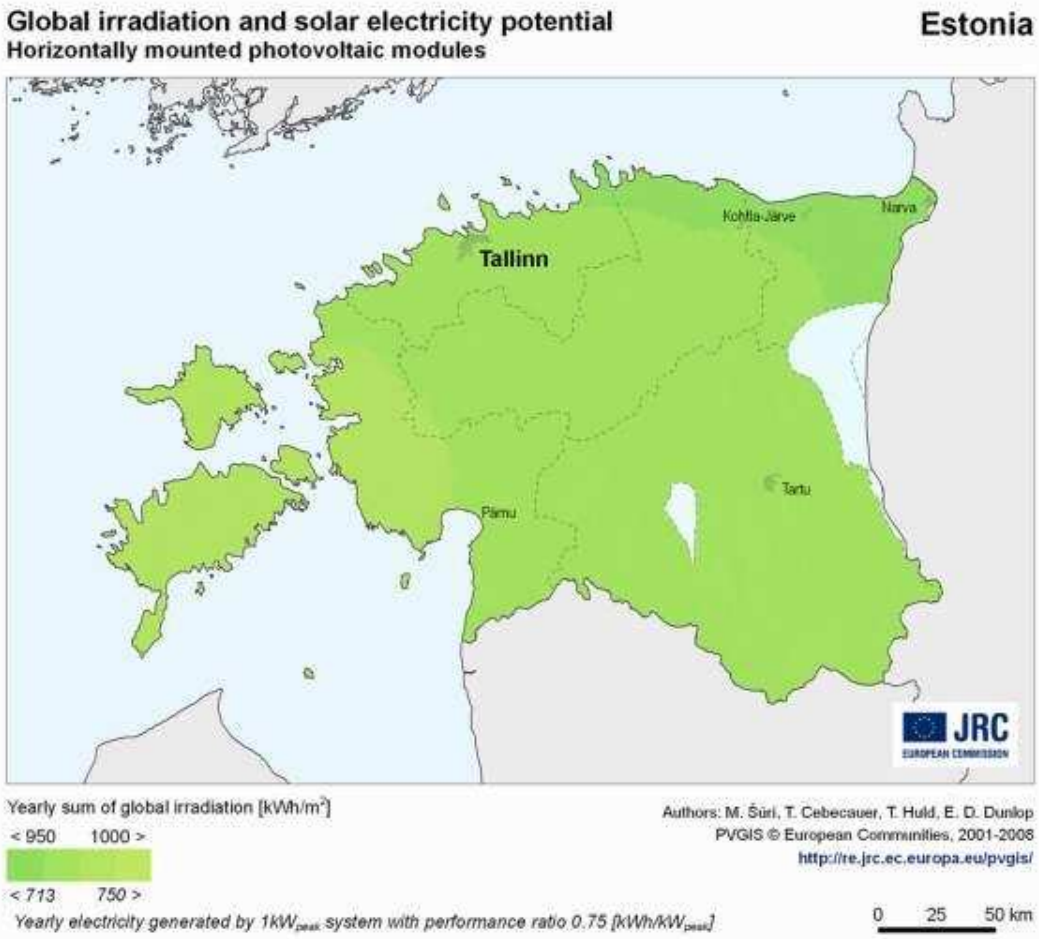


Solar Energy Supply

- **Solar energy**

  Solar energy supply in Estonia:
  Geographical distribution of annual totals
  (kWh/m^2 per annum)

  1,000 kWh/m^2
  correspond to about
  100 liter heating oil



Solar Energy Supply

- **Solar energy supply in Estonia**
  (global radiation)

Tallinn	960 kWh/m^2 per annum
Tartu	969 kWh/m^2 per annum
Vilsandi	1.026 kWh/m^2 per annum

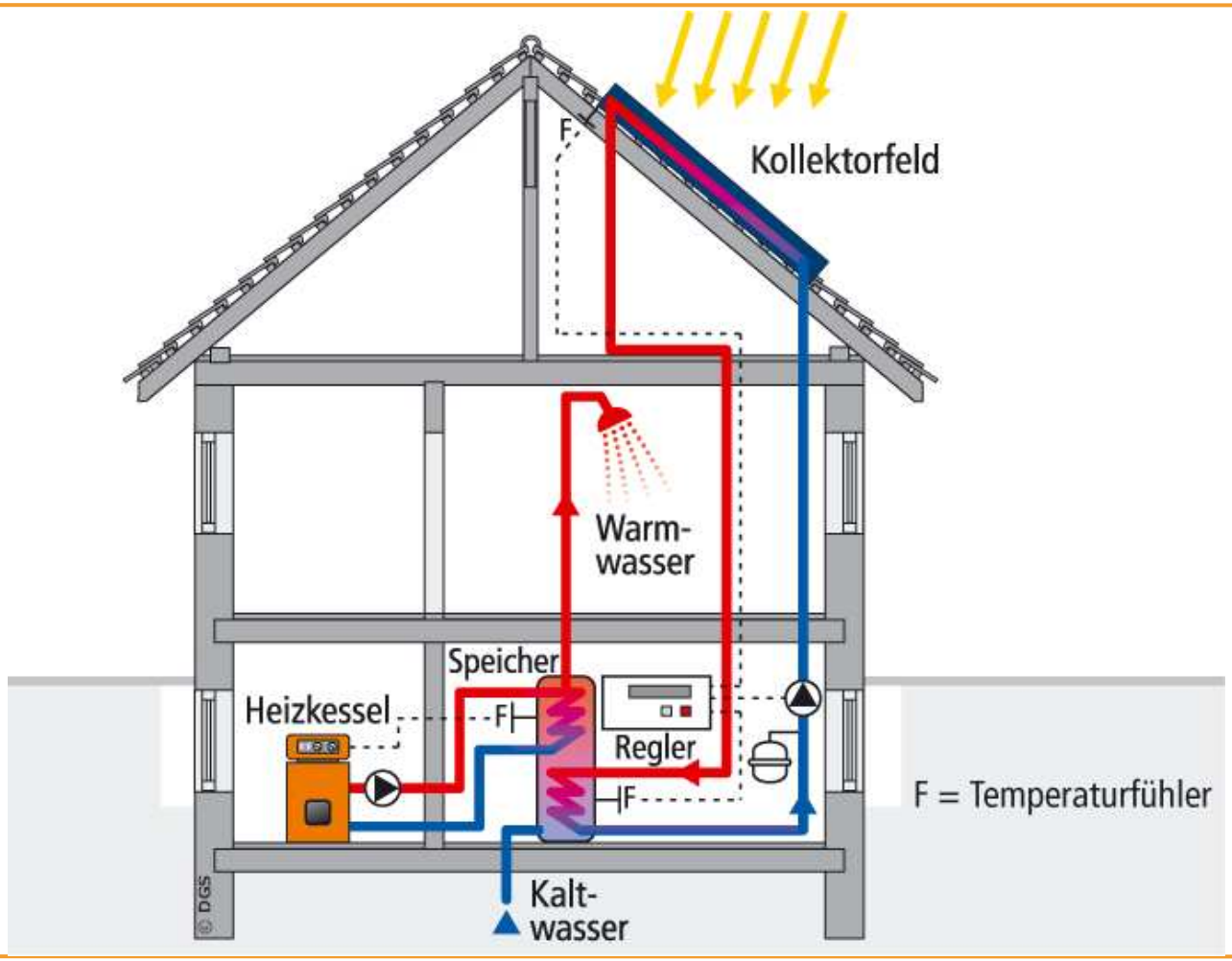
Possibilities of Using Solar Energy

- **Solar energy use**

  - Solar thermal systems (solar thermal installations)
  Conversion of sunlight into heat (hot water, heating)

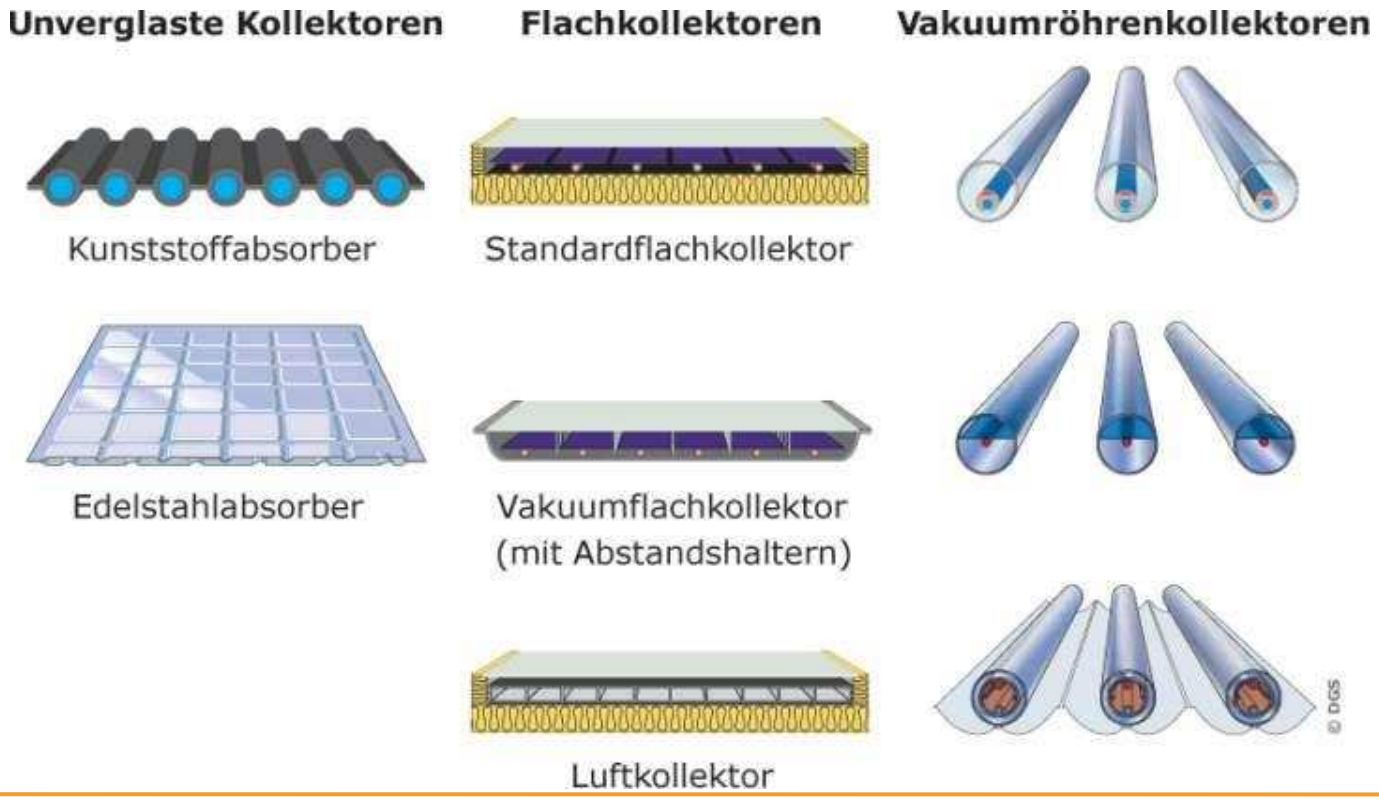
  -Solar power systems (photovoltaic installations)
  Conversion of sunlight into electricity (own consumption and / or Power supply)

Solar Heating – Structure and Function



Solar Heating - Components

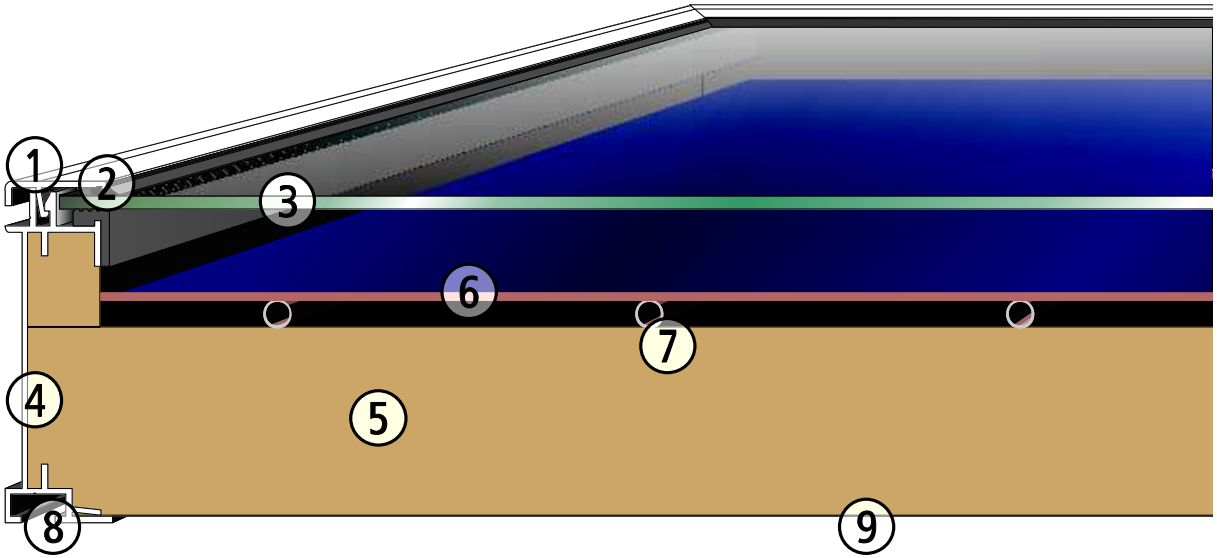
- **Collector designs**



Solar Heating - Components

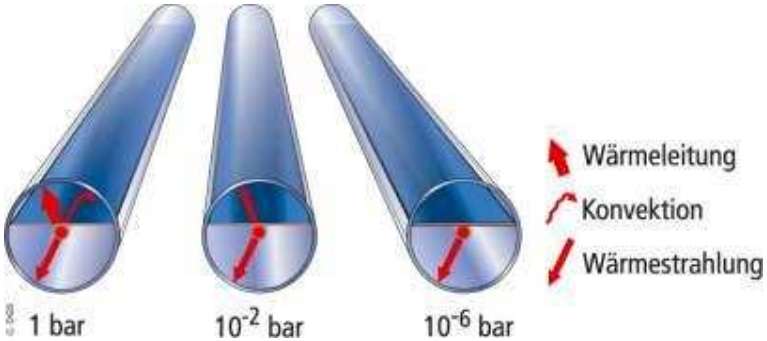
- **Flat collectors**

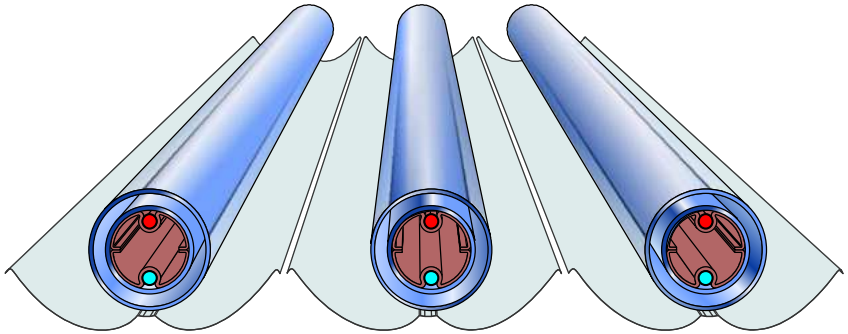
1. Rahmen
2. Dichtung
3. transparente Abdeckung
4. Rahmen Seitenwandprofil
5. Wärmedämmung
6. Vollflächenabsorber
7. Flüssigkeitskanal
8. Befestigungsnut
9. Rückwand

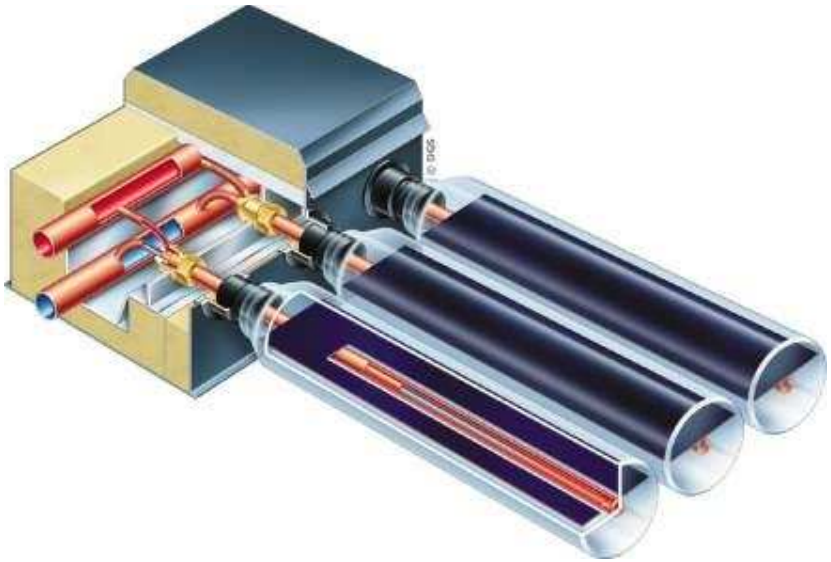


Solar Heating - Components

- **Vaccuum tube collectors**

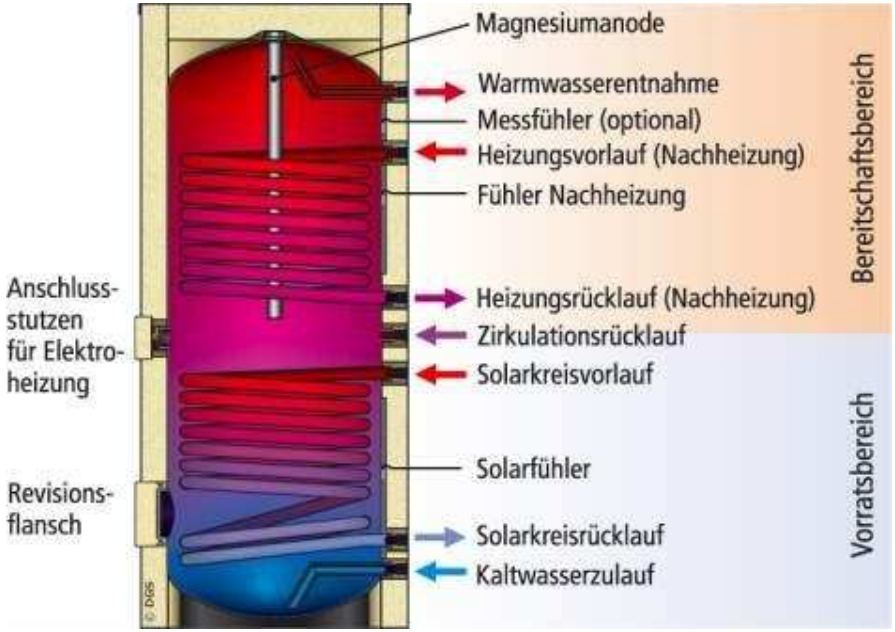


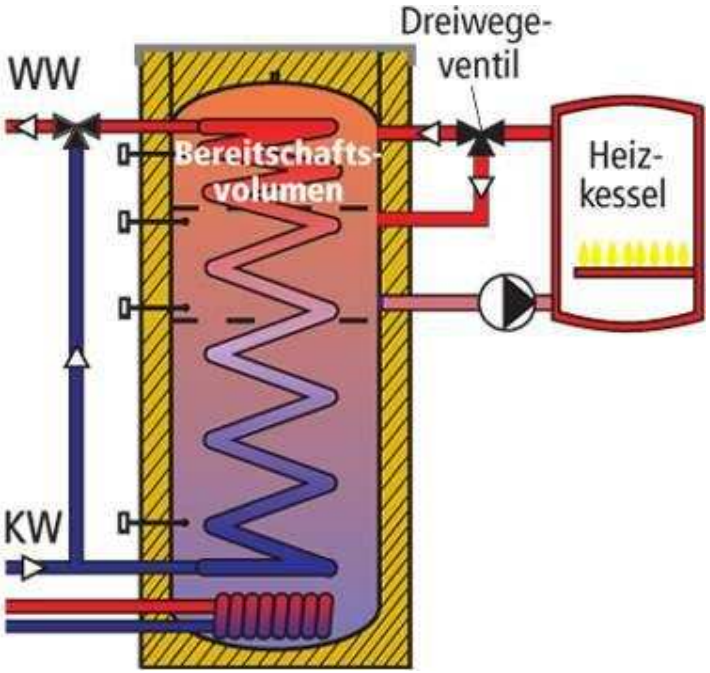




Solar Heating - Components

- **Tank**





Solar Heating - Assembly

(Wagner & Co., Cölbe)

Solar Heating - Assembly

(Wagner & Co., Cölbe)

Solar Heating - Assembly

(Wagner & Co., Cölbe)

Solar Heating – Example of Small Installations

Solar Heating – Example of Medium-Sized Installations

Solar Heating

- **Flat or tube collector?**

Flat collector:

+ good value for money

+ recommended in the case of favourable framework conditions

Tube collector:

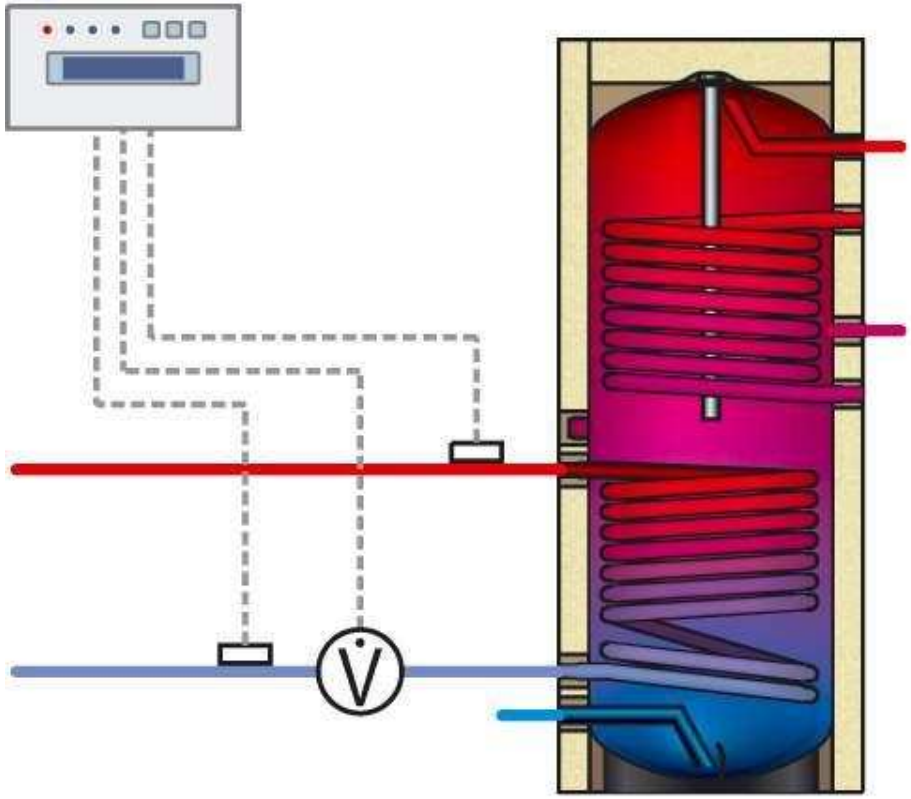
+ 30% less space required

+ flat roof: horizontal mounting possible

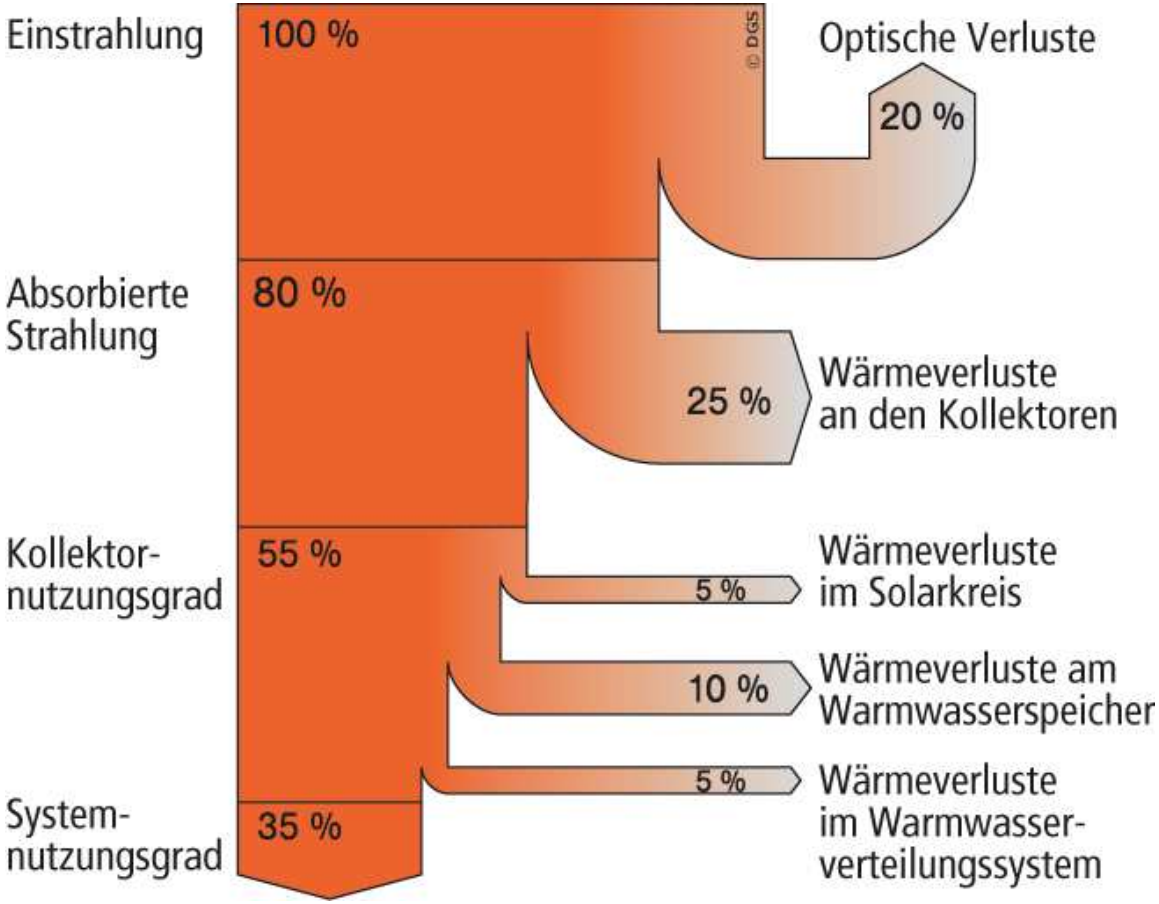
+ unfavourable orientation (rotation possible)

+ high temperatures

Solar Heating - Controlling

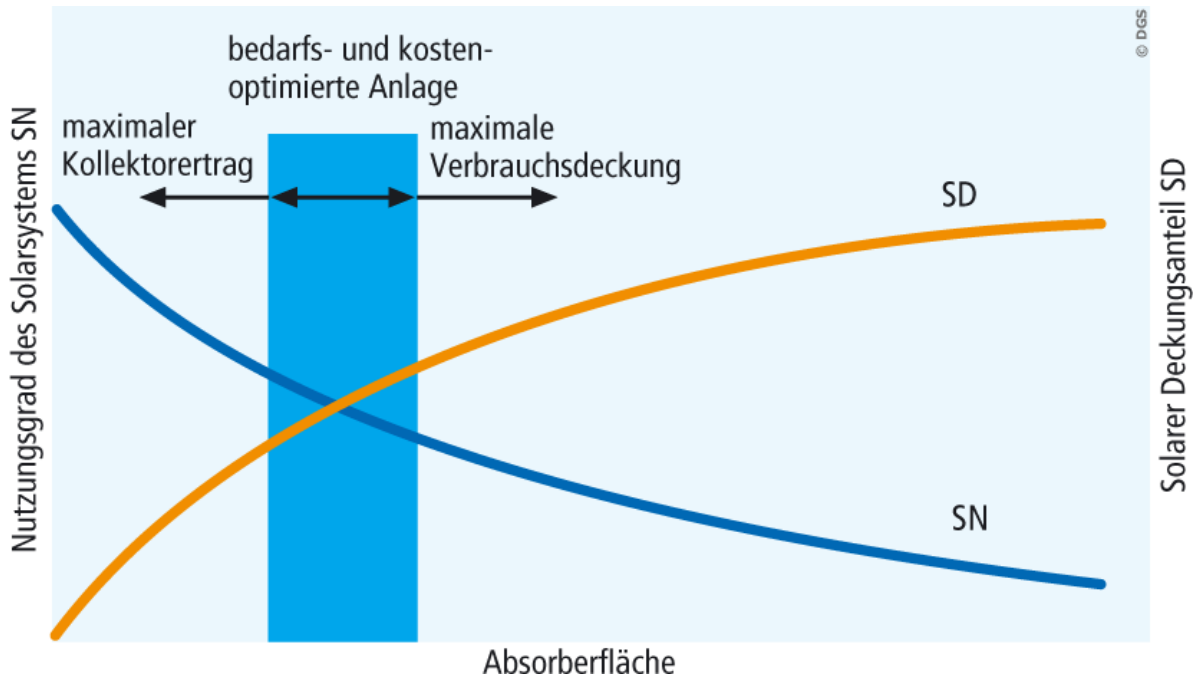


Solar Heating - Balance



Solar Heat - Dimensioning

- **Solar Thermal Systems**
  - Planning and interpretation



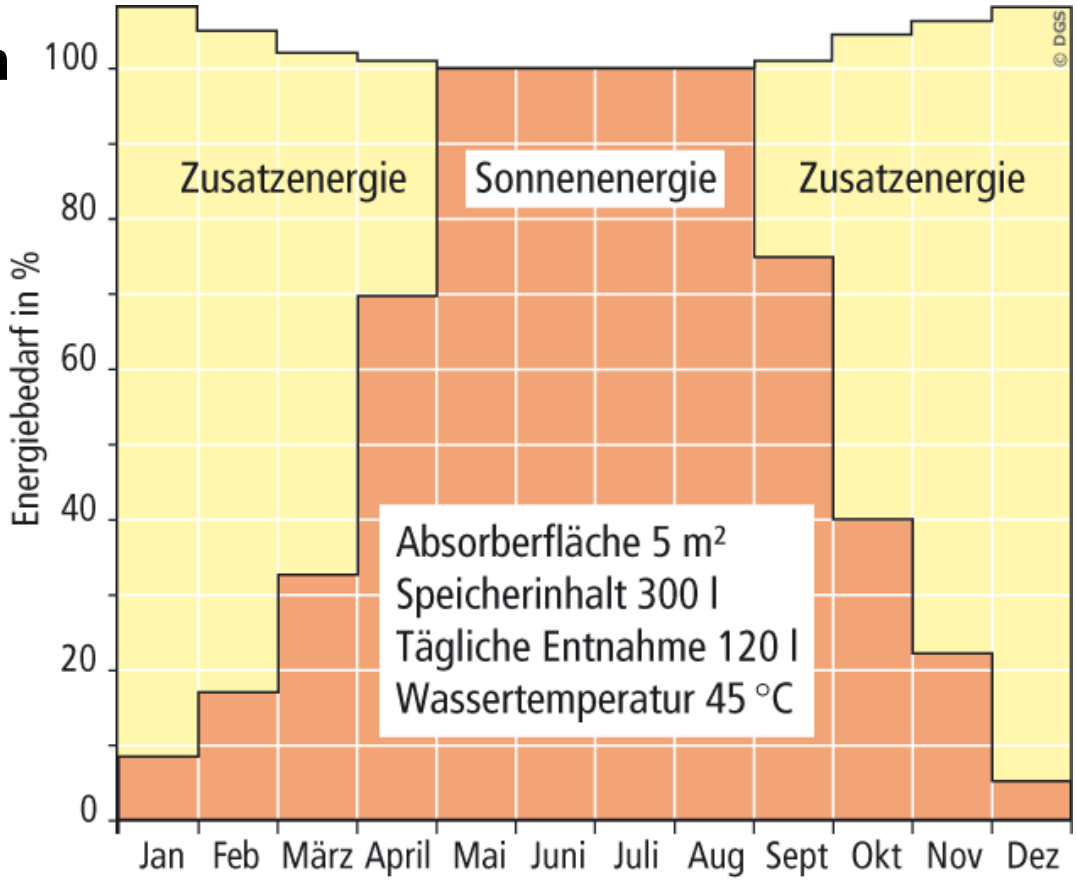
Interpretation:
60 liter (60° C) of hot water per m² of collector surface
Tank:
60 liter per m² of collector surface

Solar Heat - Dimensioning

Solar hot water preparation

- Collector surface:
  about 1-1.5 m² per person [1)]
- Storage capacity:
  about 80 liter per person

1) 1m² for vacuum tube collectors,
1,5m² for flat collectors

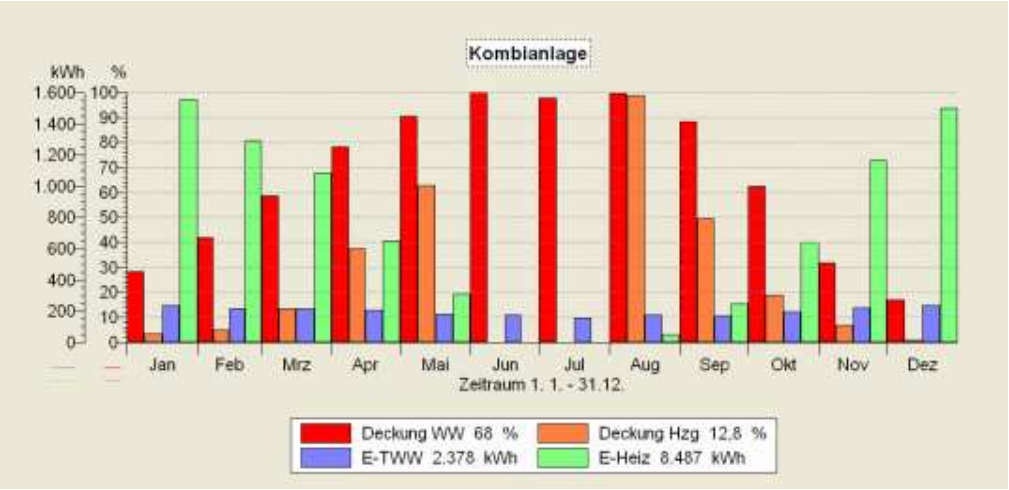


Solar Heat - Dimensioning

Solar heating support:

- Collector surface
  about 2-3 m² per person [1)]

- Storage capacity:
  about 50 liter of storage capacity per m² of collector surface [2)]



1) 2m² for vacuum tube collectors
   3m² for flat collectors
2) 60 L for flat collectors
   80 L for vaccum tube collectors

Solar Heating - Applications

- **Large solar thermal systems**

  - Residential buildings
  - Nursing homes
  - Hospitals
  - Accommodation facilities (hotels, guest houses)
  - Camps
  - Laundries
  - Car washes
  - Breweries
  - Sport facilities
  - ... Systems with high hot water consumption throughout the year (at least in the summer season)

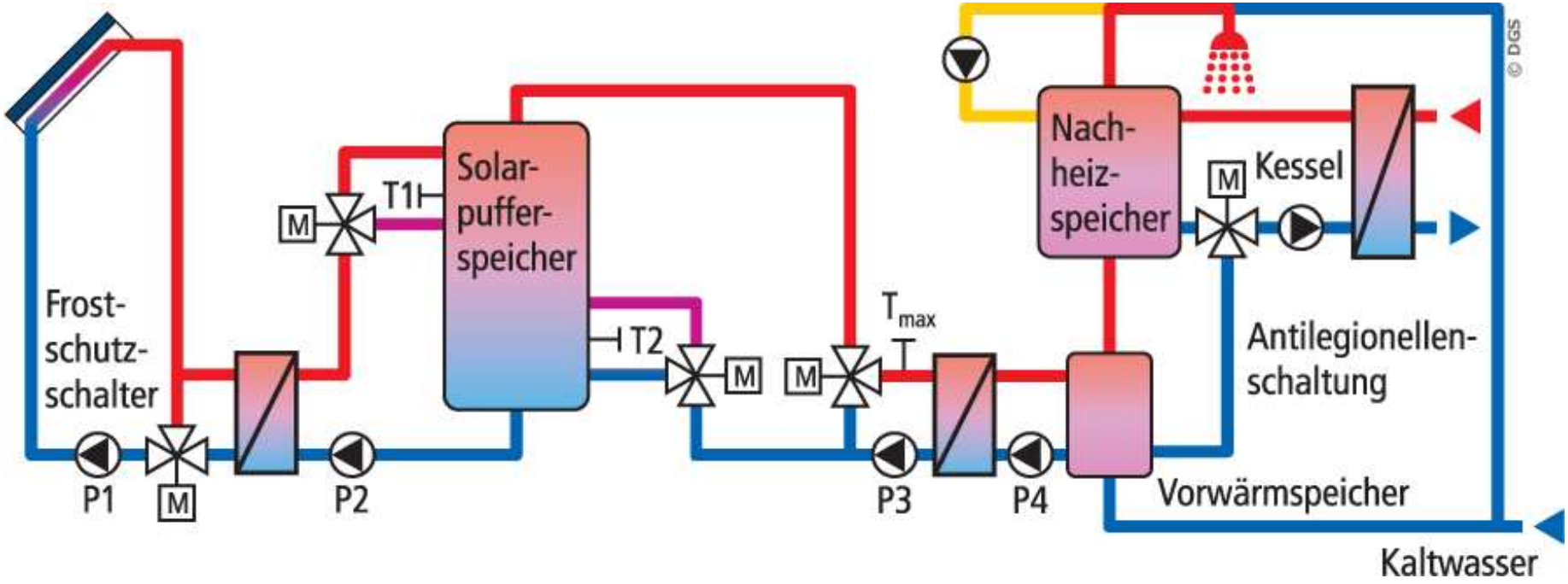
Solar Heating – Example of Large Systems

Solar Heating – Example of Large Systems

Solar Heating – Example of Large Systems

Solar Heating – Large Systems

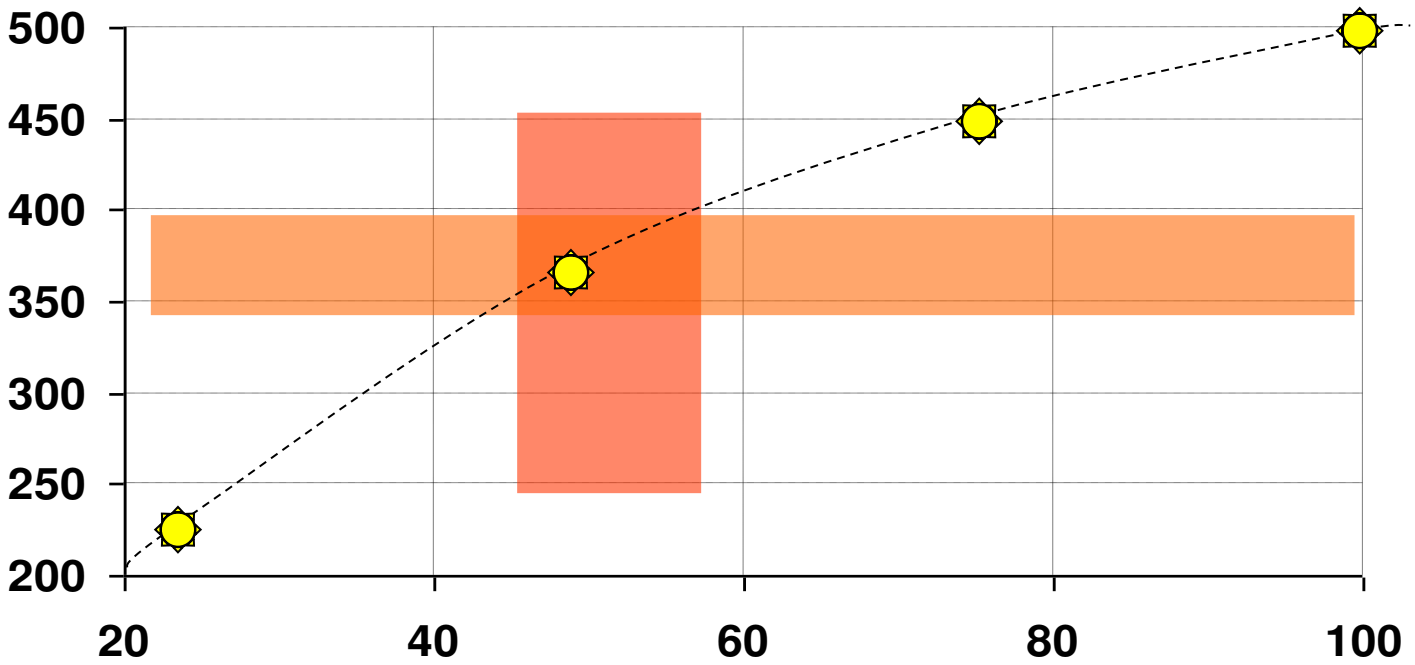
- **Tank discharge principle in the post-heating storage with an additional pre-heating storage**



Solar Heating - Dimensioning

Solar circle yield
[kWh/m²a]

Recommendation:
Load of 45 – 55 [Liter (60° C) /m²]



Load
[Liter/m²]

Solar Heating – Costs and Benefits

- **Costs and benefits**

Specific investment costs depending on the installation size
about **500 - 1.500 € / square meter of collector surface**

(Estonia: about 1,500 / per square meter of collector surface)

Specific solar circle yield
350 - 450 kWh/m²Jahr

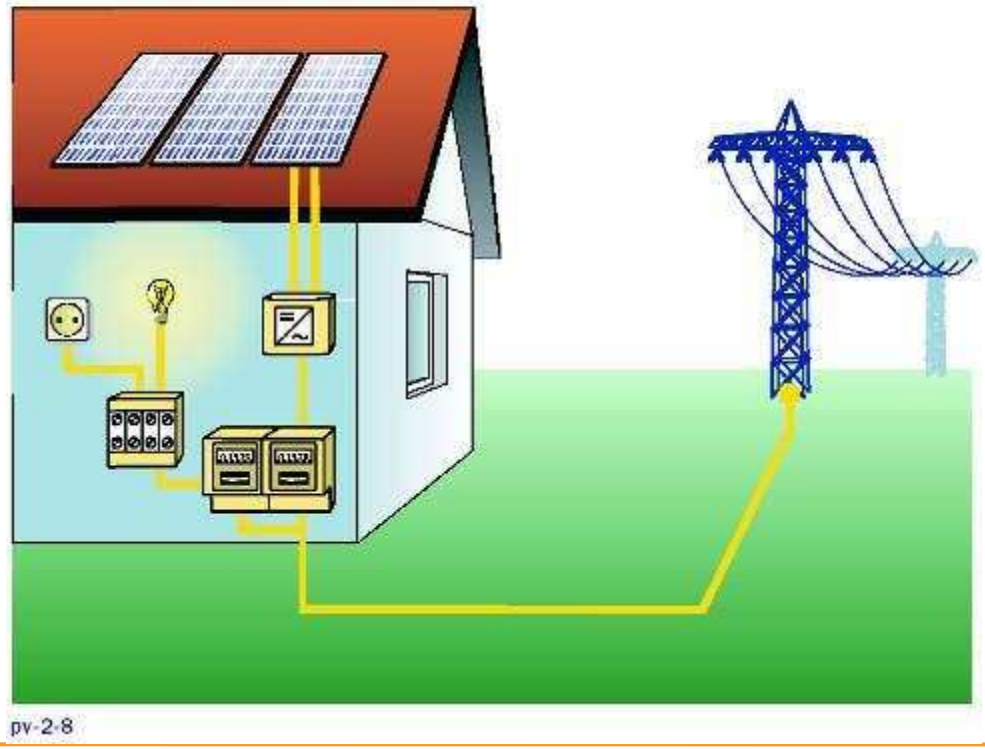
Energy savings in the total heat demand
depending on installation size and concept

about 10 - 40 %

In solar houses up to 100 %

Solar Power

- **Structure and function**



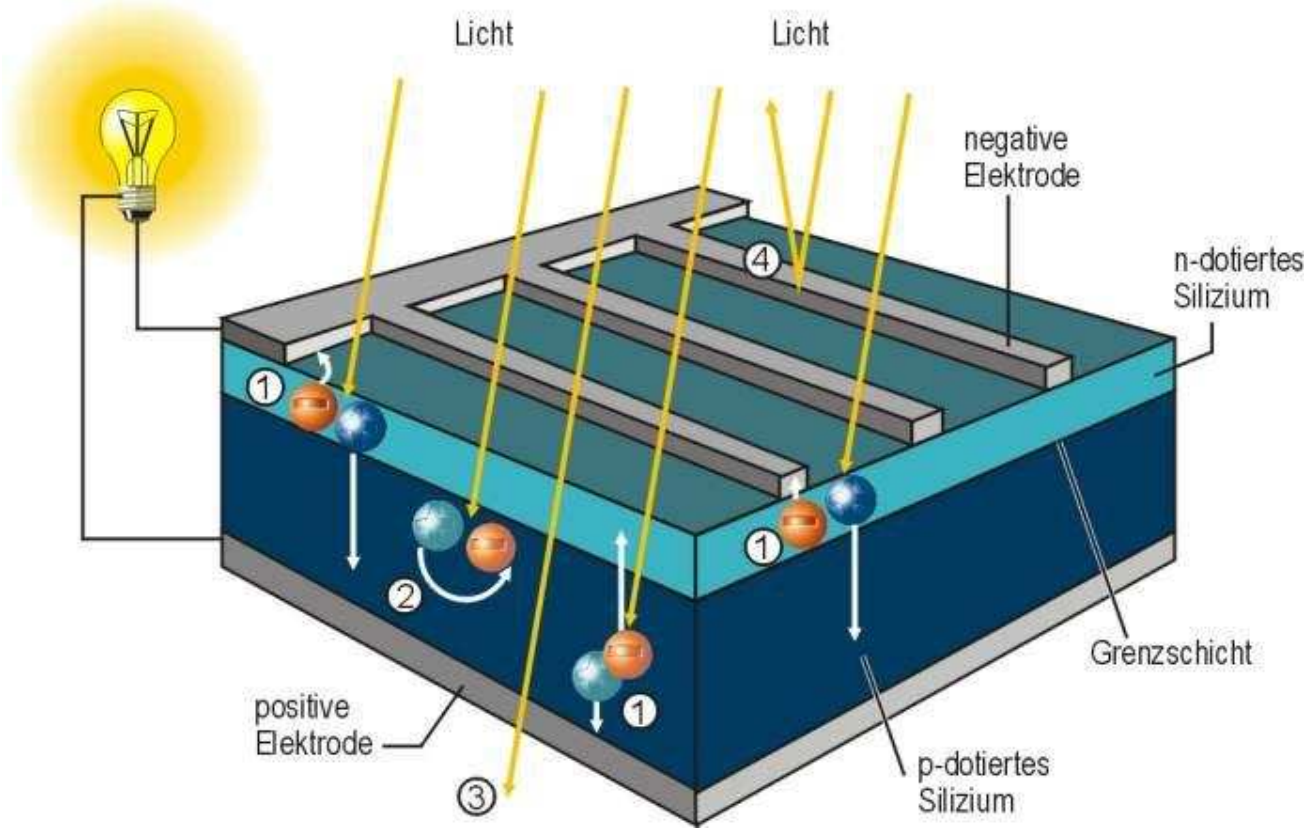
Solar Power – Basics

- **Structure and function of a solar cell**

▪ Charge separation
Recombination

Unused photon energy

Reflection and shadowing through front contacts



Solar Power – Basics

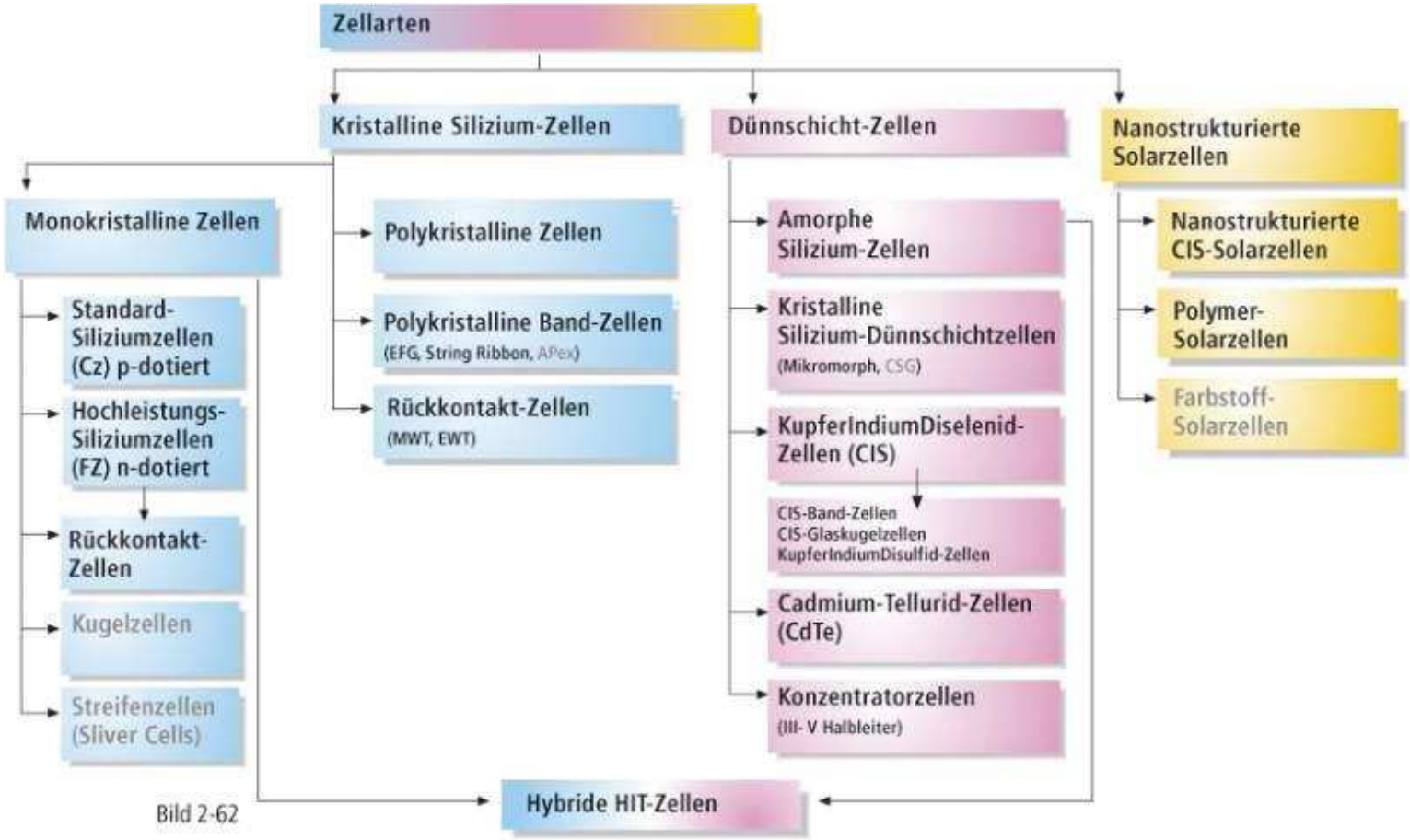
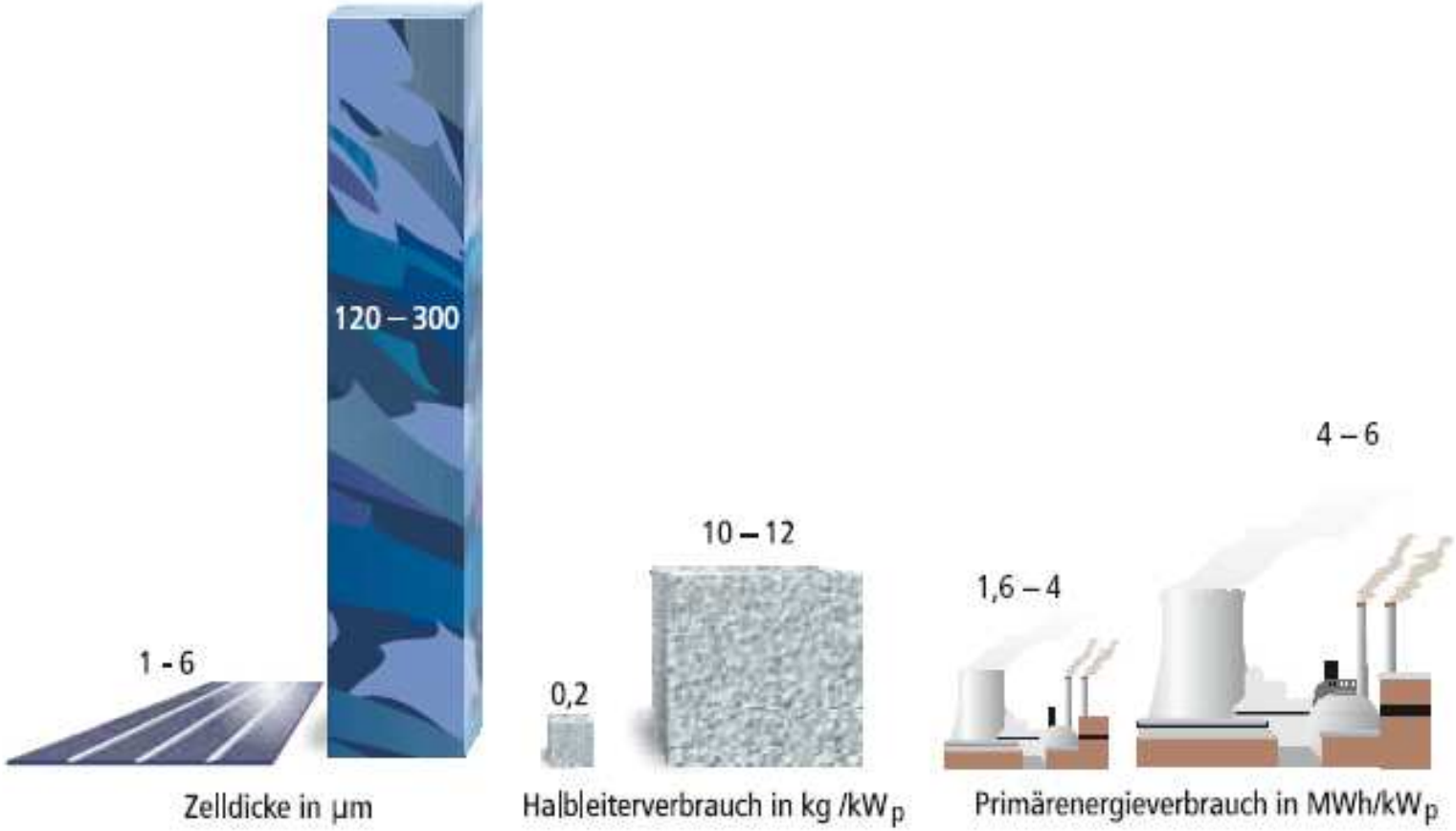
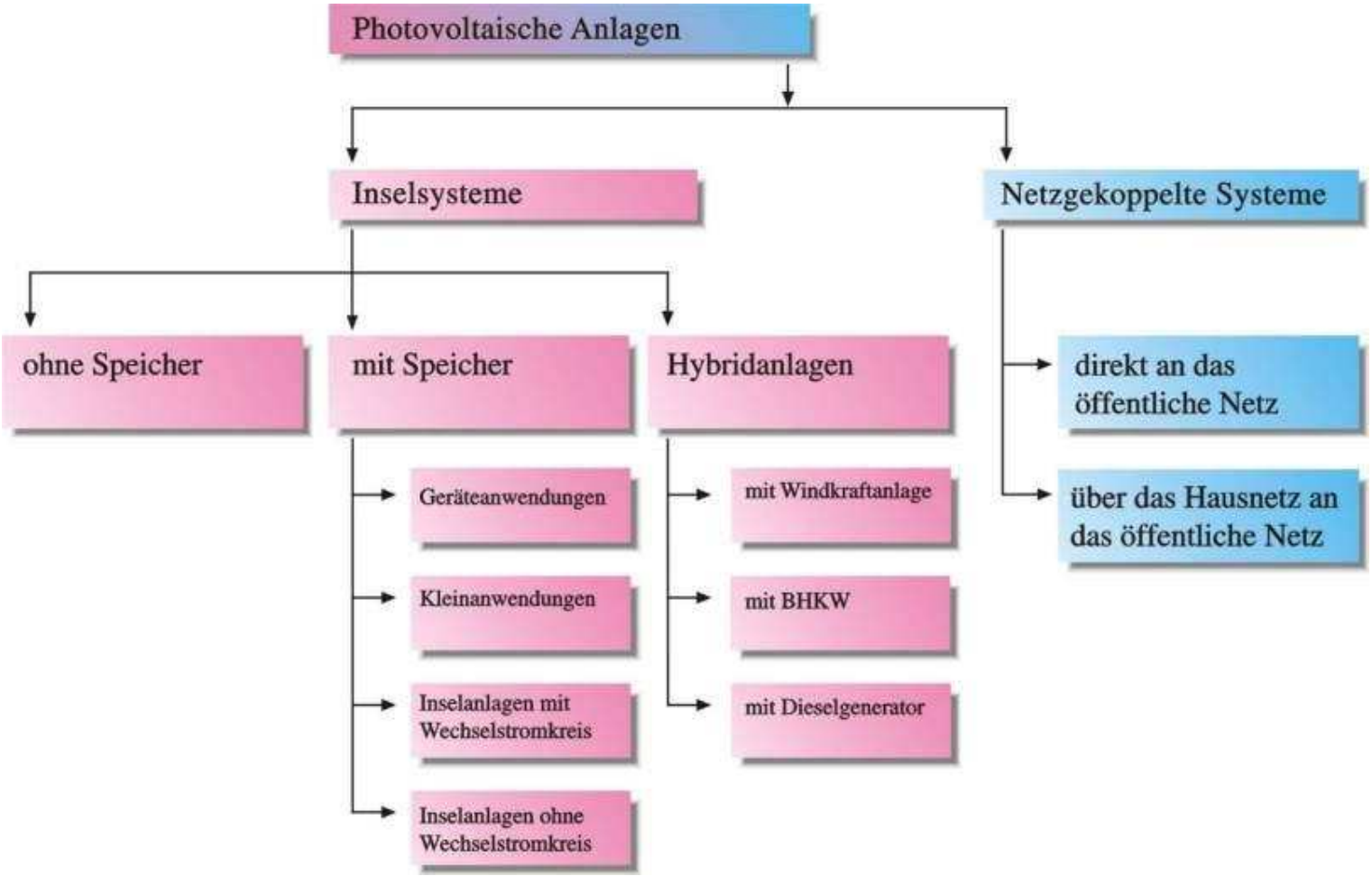


Bild 2-62

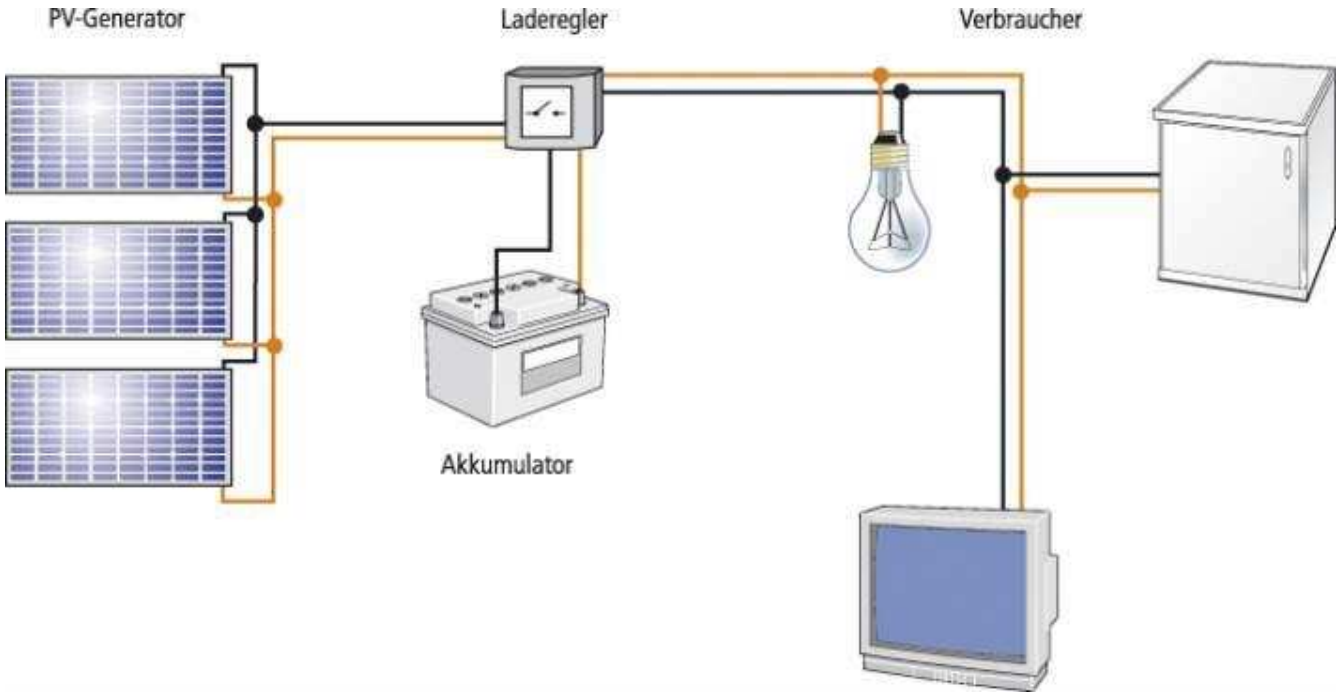
Comparison with thin layer crystalline cells



Solar Power – Installation Engineering



Solar Power – Off-Grid Systems



Solar Power – Grid-connected Installations

PV generator:
in series and parallel-connected PV-modules with a mounting frame

(1) Generator junction box (with protective equipment)

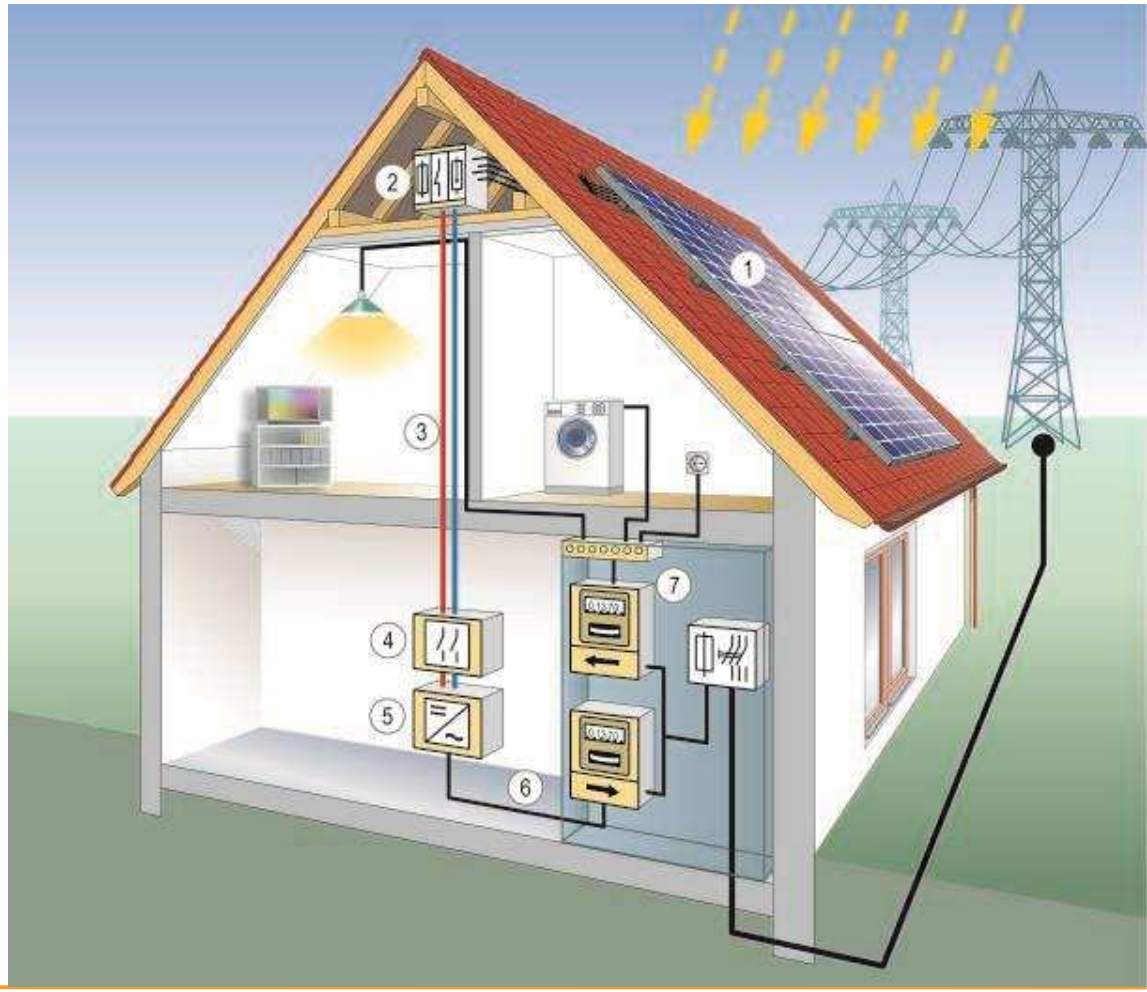
(2) DC wiring

(3) DC main switch

(4) Inverter

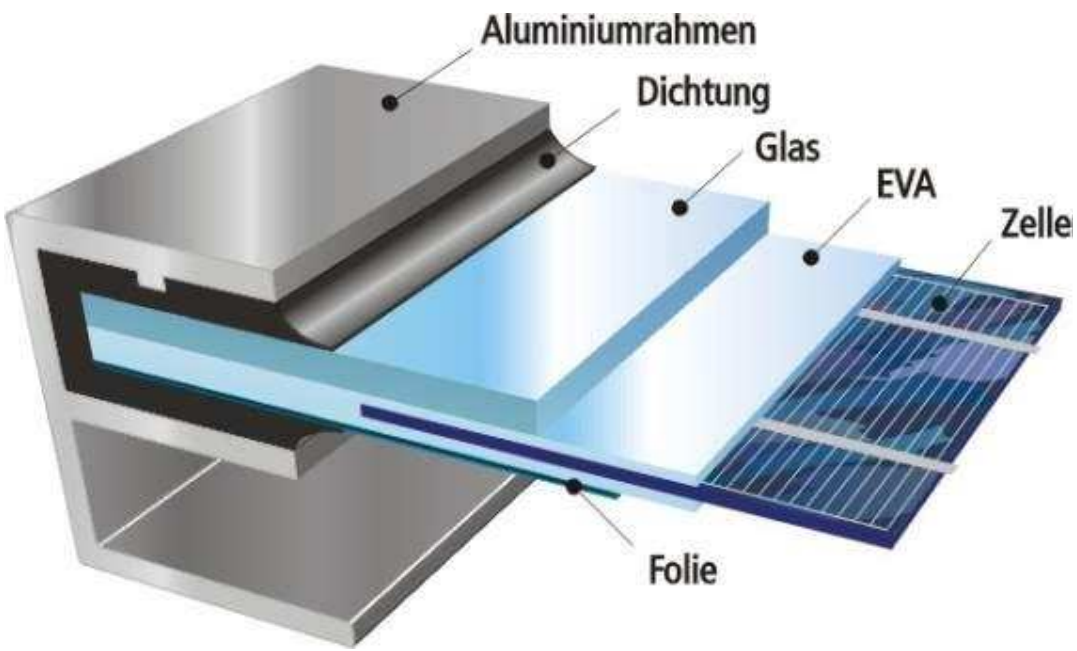
(5) AC wiring

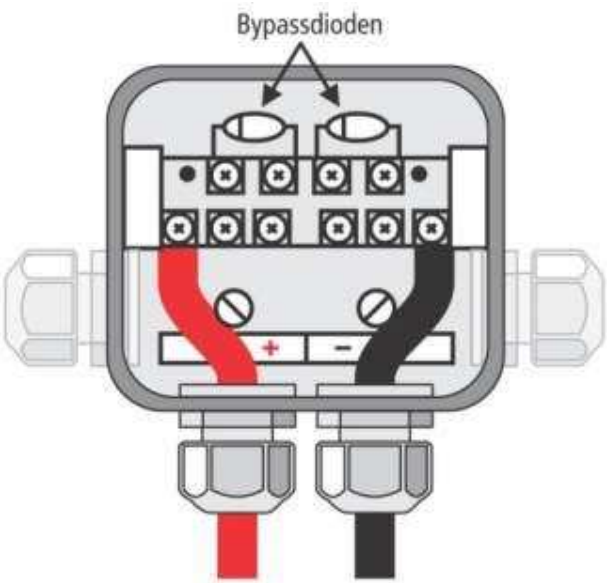
(6) Meter box with circuit distribution, input and output meter and service lines



Solar Power - Components

- **Modular structure**



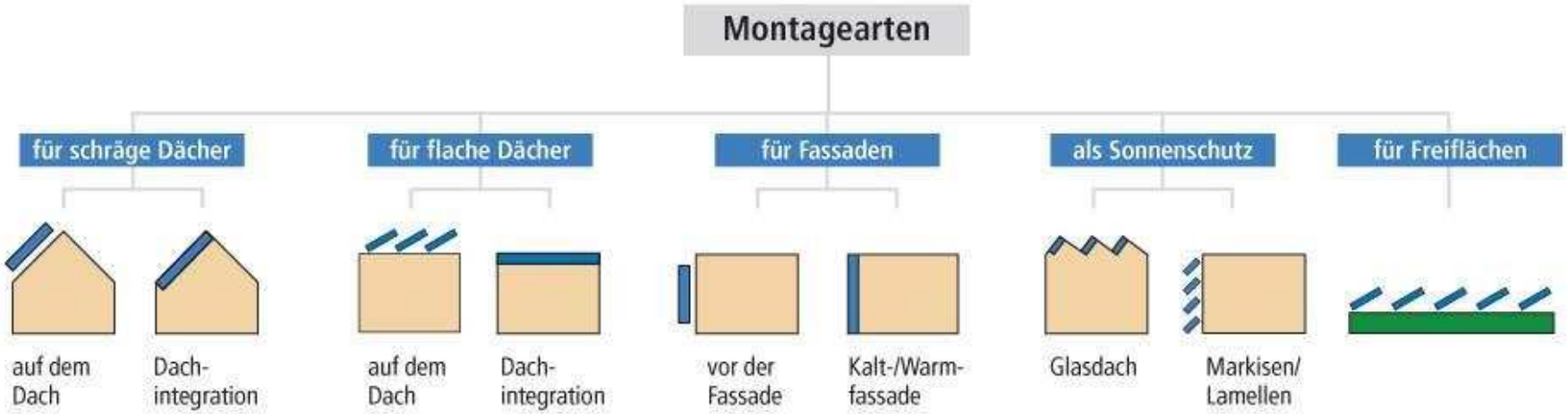


Solar Power - Components

Inverter

Solar panel

Solar Power - Assembly



Space requirements

Cell material	Panel efficiency	Required panel surface for 1 kW_p
Monocrystalline	11–16 %	7–9 m^2
Polycrystalline (EFG)	10–14 %	8–9 m^2
Polycrystalline	8–10 %	9–11 m^2
Thin layer: copper-indium-diselenide (CIS)	6–8 %	11–13 m^2
Thin layer: amorphous	4–7 %	16–20 m^2

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Solar Power - Examples

Solar Power - Examples

Solar Power - Examples

- **Dimensioning**

1 kW_p brequires approximately 10m^2 of space

1 kW_p produces about 800 kWh/year

Requirements:

- lack of shade

- azimuth between Southeast and Southwest

Solar Power

- **Costs**

1 kW_p costs about €2,500 – 3,500

1 kW_p produces about 800 kWh/year

In the case of power consumption

coverage > 30%

In the case of power supply compensation (EEG)

Estonia: tax reliefs,
loans, green certificates

- **Development of costs**

Solar power in Germany

Good Examples: Solar Thermal

- **Example 1 CAMPING SITE**

Places:
400

Collector surface:
30m²

Storage size:
1800 L

Measured savings:
70%

Good Examples: Solar Thermal

- **Example 2 HOTEL**

In the course of a complete renovation of the hotel **solar thermal installation was installed to heat water.** 51 m^2 of flat collectors heat the total of 4,500 liters of buffer store. Thus the energy saving of 70% is achieved annually. With investment costs of 37,000 € and funding of 14.700 €, the installation amortized within 8 years .

Good Examples: Solar Thermal

- **Example 3 MACHINES AND STEEL COMPANY**

Wood chip heating: 100 kW
Solar installations for water heating and heating support,
Collector surface: 80 m^2
Average solar circle yield:
381 kWh / m^2 per annum
Buffer storage: 5,900 l
Thus potential CO_2-reduction:
9.436 kg / year

Good Examples: Solar Thermal

- **Example 4 HOUSING ECONOMICS**

'The Settlement Garden City of Farmsen' was converted into a 'solar village'. By the end of 2009 approximately 1,100 homes received support for renewable heating and hot water. From approximately 1,200 m² of collector surface produces annually approximately 500,000 kWh of energy. Objective: the development of solar energy by the year 2014, approximately 2,000 square meters of collector surface for 1,825 houses (71.5% of housing stock).

Good Examples: Solar Power

- **Example 5 Photovoltaics - INDUSTRY**

Fronius deals since 1992 with solar electronics, in particular with the
Development and production of photovoltaic inverters for grid coupled and autonomous power supply sources.
Currently the largest photovoltaic solar power plant in Austria was built on top of the Fronius company building in Sattledt / Austria: capacity 604 kWp

Good Examples: Solar Power

- **Beispiel 6 Photovoltaics - WORKSHOPS**

ROST Workshops offer services in the area of printing, advertising and fairs.
PV panels on the shed roof
- Installation size:
 101 kWp
- Electricity production:
 64000 kWh/year

Good Examples: Solar Power

- **Example 7 Photovoltaik - AGRICULTURE**

In total **109 kWp of photovoltaic installations** were assembled on the livestock buildings of the farm. This installation produces about 92,000 kWh of solar power annually. With investment costs of about 200,000 € the investment will be refinanced within 10 years through the feed-in compensation (EEG).

Solar Energy - Market

- **Solar heating and solar power in Estonia**

Oil shale is the most important energy source in Estonia.
The share of renewable energy in overall energy consumption in 2008 was 13.5% in Estonia. The organic and wind energy are the primary types here.
Solar energy is used in Estonia to a small extent. The first solar projects (e.g. solar thermal systems for the hospital in Vändra, SOS Children's Village in Keila) are implemented for solar heat production.
Under the electricity market law the solar power costs are reimbursed (Elektrituruseadus) since 1 July 2010 at the level of 5,37 Cent/kWh.

Solar Energy - Promotion

- **EU – Guidelines and support programs**

  Regulations/decisions:

  Renewable energies:
  Directive 2009/28/EC
  Objective: Increasing the total number of renewable energies till 2020 to 20%. Incl. National Action Plans (Estonia: from 18 % in 2005 to 25% in 2020 of final energy consumption share).

EU – Funding (direct/indirect)

Applying for a direct EU funding requires significant amount of time and bureaucracy! This applies to direct EU funding programs such as LIFE III, Intelligent energy for Europe, Marco Polo, Leonardo da Vinci. These projects are created on European added value (a consortium with other partners)

More advantageous are the programs in which national/regional EU funds are available indirectly from the Structural and Cohesion Fund. This framework is suitable for SME projects in particular from the European Regional Development Fund (ERDF). Example in Poland: the Sectoral Operational Programme for increasing the competitiveness of companies (7 billion for 2007-2013)

Solar Energy – Customer Service

- **Various phases of consultations**

  1. Becoming acquainted – building bridges
  2. Questions – identifying the needs
  3. Offering solutions – consolidating and negotiating
  4. Achieving results – completion

- **Conclusion**

Summary
- Facts
- Important websites

Feedback
- Content?
- Presentation?
- Have the goals been achieved?
- Use for own applications?
- What is missing?
- Improvement proposals

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Work Package 4 Second center level
"Continuing vocational training"

Activity A5 Transfer
Trainings Energy Saving and Renewable Energies

Result 4.5 Transfer Trainings Energy Saving and Renewable Energies

Part B

Training II: Solar Energy – Technology and Applications

Implementation report

Prepared by:

Marta Casanova

May, 2023

With the support of the Erasmus+ Programme of the European Union

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Participants profile and organisation of the training (Subheading1) 5

Execution of the Training (Subheading1) 6

Main Findings and Conclusions 7

Attachments 8

Attachment 1: Online platform (moodle)
Attachment 2: List of participants (with assistance rates and assessment results)
Attachment 3: Assistance
Attachment 4: Training's photos
Attachment 5: Satisfaction survey
Attachment 6: Curricula (adapted and translated into catalan by the trainer)

Introduction (Heading 1)

The Introduction should cover the following aspects:

- Contextualisation within the overall project

  The main objective of the seminar is for the participant to know the possibilities of using solar energy, to be able to estimate the energy generation potential, and to know the financing mechanisms.

- How was the testing of the tool carried out, where and when

  The training was 100% face-to-face. The contents of the study plan have been adapted to the current study plan of a Higher Degree in renewable energies but focused on solar energy. The sessions took place in the afternoon during the month of May. The training was given by three trainers so that each of them could offer their knowledge on the subject to be discussed.

- Significance of the tool

  Although most of the students in the course had heard of solar energy, they had no knowledge of it. The goal is to provide students with solar energy knowledge and applications that would enable them to implement energy saving improvements in both their personal and business activities.

- Special features of the implementation

  The curriculum was adapted and translated into Catalan. It was a 100% face-to-face training. Three sessions of 4 hours each were held. The first day and the last day included the presentation and discussion of the fundamentals of using solar energy as well as the technical and financial aspects of solar heating and solar energy systems. Different solar panels and their operation could also be seen in situ. The second day was about our market and support programs.

Admission and organisation of the testing (Subheading1)

- Selection of participants, possible admission requirements

  The selection of the participants has been done between our students due to some of them are workers in different companies. They have to be representatives of SMEs and some experience as a qualified workers/ specialists in solar energy.

- How were the participants approached and won?

  One way to win over participants was to involve them in learning. On the first day the trainer asked them what their doubts were and also what their needs were. During the following sessions, all these issues were dealt with and solved. Another aspect that could be highlighted is that most of the examples and exercises were based on what they could apply at the company.

- Organisation of the implementation (face-to-face or online)

  The contents and exercises have been developed in an online platform (Moodle[1]), but it was done 100% face-to-face.

- Brief notes on counsellors and teachers, their qualifications and experience

  Adolf M. Iglesias is a technical telecommunications engineer with more than 15 years of experience in the automotive electrical distribution sector. He has been working as a vocational teacher in the specialty of Electrotechnical and Automatic System since 2008. Currently, he has been working in the Energy and Water family since 2019, where he has taught uninterruptedly at the Energy CFGS Renewable, of which he is a pedagogical tutor and FCT-Dual tutor.

  Alberto Polanco Piñol, Industrial Engineer. He has been working as a vocational teacher in the renewable energy for 3 years. For years he has worked in different sectors; office of tourist projects, telecommunications company and at the same time teaching in an academy coursing professional certificate.

  Josep Toral Juanpere, Industrial Technical Engineer electrical specialty. More than 12 years of experience as a vocational teacher and 10 years at the Energy CFGS Renewable, of which he is a pedagogical tutor and FCT-Dual tutor.

- Brief notes on accompanying advice, support for participants, etc.

  The trainer explained the participants a lot of different experiences in order to be able to those situations than can be applied in each of the companies where they work.

[1] Please have a look at Attachment 1

Participants profile and organisation of the training (Subheading1)

- Participants by age, gender, educational background, profession, country of origin, etc.

  1 woman and 24 men took the training. They all are, as it can be seen in the chart below, some of them students and some of them, also workers.

- Number of participants (please attach a list of participants with their name, age and gender)

Participant	Company	Training
Aznar i Pla, Vicent Anfós	Institut Pere Martell	Engineer
Biki, Khalid	Student	Intermediate professional training
Boutrisa, Mohamed	Student	Advanced professional training
Cascos Zaragoza, Victor	Student	Advanced professional training
Corrales Gascón, Raúl	Student	Advanced professional training
Depetris del Castillo, Miguel	Student	Advanced professional training
El Bouazati Boulakhrif, Ibrahim	Student	Advanced professional training
Faro Ganado, Arturo	Student	Advanced professional training
Gómez Martínez, Juan Diego	Student	Advanced professional training
González Caballero, Lukas	Student	Intermediate professional training
Khardoune Benamri, Mohamed	Student	Advanced professional training
Lorenzo Camattari, Raquel	Student	Intermediate professional training
Nassimi Mouloudi, Amin	Student	Advanced professional training
Nicolau Gomis, Albert	Student	Advanced professional training
Rafols Diaz, Mario	Student	Intermediate professional training
Ramón Lluch, Rubén	Student	Advanced professional training
Serigne Khadim Diouf	Student	Intermediate professional training
Pardo Pons, Efren	Student	Intermediate professional training
Perea Trinidad, Roberto	Institut Pere Martell	Professor of Advanced Professional Training
Porqueras García, Olaf	Student	Advanced professional training
Quesada Cortés, Frederic	Institut Pere Martell	Engineer
Vargas Diaz, Ezequiel	Student	Intermediate professional training
Vázquez García, Jesús	Institut Pere Martell	Professor of Advanced Professional Training
Vazquez Rodriguez, Abel	Student	Intermediate professional training
Velasco Galdaba, Dario	Student	Advanced professional training

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Execution of the testing (Subheading1)

- Explanations and notes on implementation

  The assessment has been achieved by carrying out dynamic activities in class, carrying out small group exercises using a simulator and, finally, seeing the operation of a solar panel in situ (trained by expert teachers in the field).

- Results

Participant	Assistance[2] (%)	Certificate
Aznar i Pla, Vicent Anfós	80	Competent
Biki, Khalid	80	Competent
Boutrisa, Mohamed	100	Competent
Cascos Zaragoza, Victor	100	Competent
Corrales Gascón, Raúl	100	Competent
Depetris del Castillo, Miguel	100	Competent
El Bouazati Boulakhrif, Ibrahim	100	Competent
Faro Ganado, Arturo	100	Competent
Gómez Martínez, Juan Diego	100	Competent
González Caballero, Lukas	80	Competent
Khardoune Benamri, Mohamed	100	Competent
Lorenzo Camattari, Raquel	100	Competent
Nassimi Mouloudi, Amin	100	Competent
Nicolau Gomis, Albert	100	Competent
Rafols Diaz, Mario	80	Competent
Ramón Lluch, Rubén	100	Competent
Serigne Khadim Diouf	100	Competent
Pardo Pons, Efren	100	Competent
Perea Trinidad, Roberto	100	Competent
Porqueras García, Olaf	100	Competent
Quesada Cortés, Frederic	100	Competent
Vargas Diaz, Ezequiel	100	Competent
Vázquez García, Jesús	100	Competent
Vazquez Rodriguez, Abel	100	Competent
Velasco Galdaba, Dario	100	Competent

[2] Please have a look at Attachment 3

- Observations and feedback from counsellors

  The trainers adapted some of the contents on the curriculum to make them more accessible to the reality of Catalan workers in a Catalan company.

  The trainers comment the subject could only be covered in a very general way and not even the most basic part of the subject could be introduced. Perhaps an extension of the training hours would be necessary, not to deal in depth with the subject of solar energy but to make some basic notions about the subject.

- Strengths of the tool as seen by the participants

  Participants now know how to apply knowledge in the field of solar energy related technologies both personally and professionally.

  Here are the verbatim words of some of the participants:

  "Thank you very much for the training and help. I think it will help us to carry out actions based on solar energy in our day-to-day life".

  "A very interesting training. It has resolved many doubts about what the energy that comes from the Sun is and what applications it has."

- Weaknesses of the tool as seen by the participants

  The participants mention that they have a small base on solar energy, what applications it has and what support programs are there for companies, but if they want to apply it to their company, they will need someone with deep knowledge to complement it. Most do not see themselves as capable of doing it themselves.

Main Findings and Conclusions

- Summary assessment of implementation

  Considering that the full potential of the training could not be developed as time was limited, the overall results are highly valued, both by the participants and the trainer.

- Strengths and advantages of tool

  The training has opened their eyes and has awakened their curiosity in a several aspects of solar energy.

- Hints for future use, suggestions for possible improvements or further developments

  The development of the curriculum should be more flexible so that it could adapt better to the social and working reality of each country.

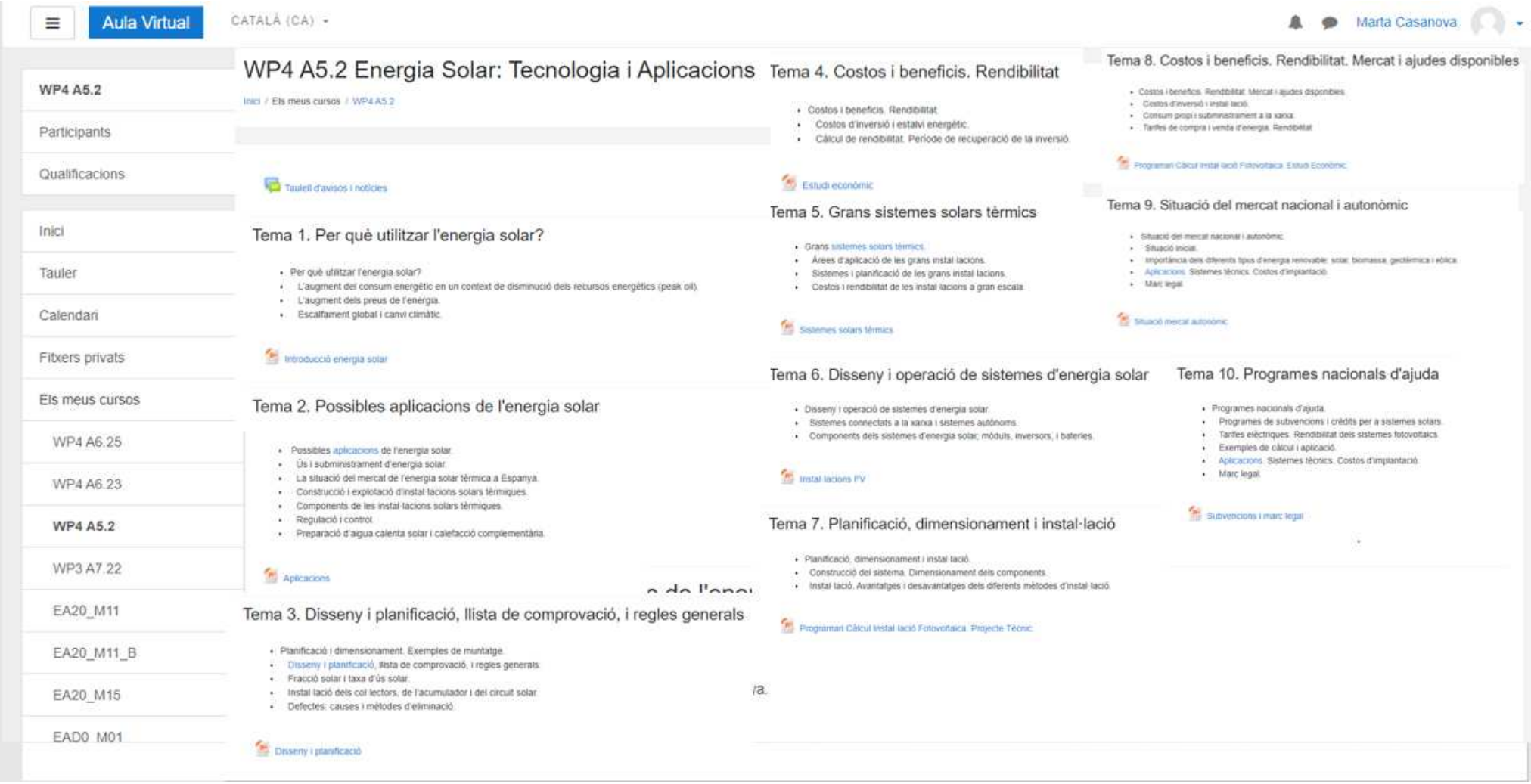
- Will the counselling with the tool be continued by the partner in the future? For which target groups?

  Yes, we hope it will be continued at the same format. It has been adapted to the Catalan need and it would be a pity if it was not used again. Once it has been adapted, the curriculum could be aimed at any professional sector just by changing the examples.

Attachments

- ATTACHMENT 1: ONLINE PLATFORM (Moodle)
- ATTACHMENT 2: LIST OF PARTICIPANTS (with assistance rates and assessment results)
- ATTACHMENT 3: ASSISTANCE
- ATTACHMENT 4: TRAINING'S PHOTOS
- ATTACHMENT 5: SATISFACTION SURVEY
- ATTACHMENT 6: CURRICULA (adapted and translated into Catalan by the trainer)

ATTACHMENT 1: ONLINE PLATFORM (Moodle)



ATTACHMENT 2: LIST OF PARTICIPANTS (with assistance rates and assessment results)

Participant	Company	Training	Assistance[2] (%)	Certificate
Aznar i Pla, Vicent Anfós	Institut Pere Martell	Engineer	80	Competent
Biki, Khalid	Student	Intermediate professional training	80	Competent
Boutrisa, Mohamed	Student	Advanced professional training	100	Competent
Cascos Zaragoza, Victor	Student	Advanced professional training	100	Competent
Corrales Gascón, Raúl	Student	Advanced professional training	100	Competent
Depetris del Castillo, Miguel	Student	Advanced professional training	100	Competent
El Bouazati Boulakhrif, Ibrahim	Student	Advanced professional training	100	Competent
Faro Ganado, Arturo	Student	Advanced professional training	100	Competent
Gómez Martínez, Juan Diego	Student	Advanced professional training	100	Competent
González Caballero, Lukas	Student	Intermediate professional training	80	Competent
Khardoune Benamri, Mohamed	Student	Advanced professional training	100	Competent
Lorenzo Camattari, Raquel	Student	Intermediate professional training	100	Competent
Nassimi Mouloudi, Amin	Student	Advanced professional training	100	Competent
Nicolau Gomis, Albert	Student	Advanced professional training	100	Competent
Rafols Diaz, Mario	Student	Intermediate professional training	80	Competent
Ramón Lluch, Rubén	Student	Advanced professional training	100	Competent
Serigne Khadim Diouf	Student	Intermediate professional training	100	Competent
Pardo Pons, Efren	Student	Intermediate professional training	100	Competent
Perea Trinidad, Roberto	Institut Pere Martell	Professor of Advanced Professional Training	100	Competent
Porqueras García, Olaf	Student	Advanced professional training	100	Competent
Quesada Cortés, Frederic	Institut Pere Martell	Engineer	100	Competent
Vargas Diaz, Ezequiel	Student	Intermediate professional training	100	Competent
Vázquez García, Jesús	Institut Pere Martell	Professor of Advanced Professional Training	100	Competent
Vazquez Rodriguez, Abel	Student	Intermediate professional training	100	Competent
Velasco Galdaba, Dario	Student	Advanced professional training	100	Competent

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ATTACHMENT 3: ASSISTANCE

Generalitat de Catalunya
Departament d'Educació
Direcció General de Formació Professional

CODI I NOM DE L'ACTIVITAT:
WP4 A5.2 ENERGIA SOLAR

Cofinanciado por el programa Erasmus+ de la Unión Europea

DADES DELS ASSISTENTS				SIGNATURA		
ORDRE	INSTITUT/ENTITAT	COGNOMS, NOM	NIF	04/05/2023	11/05/2023	18/05/2023
1	Institut Pere Martell	Arevalo Roig, Josep	48272350L			
2	Institut Pere Martell	Biki, Khalid	Y6251368V			
3	Institut Pere Martell	Boudina, Imad	Y6756815G			
4	Institut Pere Martell	Boutrisa, Mohamed	55224547Y			
5	Institut Pere Martell	Cascos Zaragoza, Víctor	48139447X			
6	Institut Pere Martell	Corrales Gascón, Raúl	49646905W			
7	Institut Pere Martell	Depetris del Castillo, Miguel	39926526K			
8	Institut Pere Martell	El Bouazati Boulakhrif, Ibrahim	55609007K			
9	Institut Pere Martell	El Yaakoubi, Yassin	55010403Z			
10	Institut Pere Martell	Faro Ganado, Arturo	48275779K			
11	Institut Pere Martell	Gómez Martínez, Juan Diego	52169553X			
12	Institut Pere Martell	González Caballero, Lukas	39934468M			
13	Institut Pere Martell	Khardoune Benamri, Mohamed	43326852G			

Institut Pere Martell Sergio Khadiu Jhosef 63467015

ORDRE	DADES DELS ASSISTENTS			SIGNATURA		
	INSTITUT/ENTITAT	COGNOMS, NOM	NIF	04/05/2023	11/05/2023	18/05/2023
14	Institut Pere Martell	Lorenzo Camattari, Raquel	48137771J			
15	Institut Pere Martell	Martinez Luque, Ivan	12406419N			
16	Institut Pere Martell	Mesfin Figueras, Max	55032896Z			
17	Institut Pere Martell	Nassimi Mouloudi, Amin	49874557T			
18	Institut Pere Martell	Nicolau Gomis, Albert	41619439L			
19	Institut Pere Martell	Rafols Diaz, Mario	21756543S			
20	Institut Pere Martell	Ramón Lluch, Rubén	20428201S			
21	Institut Pere Martell	Porqueras Garcia, Olaf	48135529W			
22	Institut Pere Martell	Vargas Diaz, Ezequiel	42335271E			
23	Institut Pere Martell	Vazquez Rodriguez, Abel	41023076T			
24	Institut Pere Martell	Velasco Galdaba, Dario	39938161H			
25	Institut Pere Martell	Quesada Cortés, Frederic	39891106K			
26	Institut Pere Martell	Perea Trinidad, Roberto	39736568C			
27	Institut Pere Martell	Vázquez García, Jesús	76617528C			
28	Institut Pere Martell	~~Antón~~ Aznar i Pla, Vicent	20780533X			
29	Institut Pere Martell	Pardo Pons, Efren	47.621924-Y			

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ATTACHMENT 4: TRAINING'S PHOTOS

Photo1: classroom

Photo 3: classroom

Photo 2: solar panels that the students could touch

Photo4: solar panel inverters

ATTACHMENT 5: SATISFACTION SURVEY

Satisfaction survey - Participant: Solar Energy Course

WP4 A5.2 Solar Energy: Technology and Applications

Please indicate your gender

- ○ Male
- ○ Female
- ○ Not answer

Please indicate your age group

- ○ Under 25 years old
- ○ Between 26 and 35 years old
- ○ Between 36 and 50 years old
- ○ Over 50 years old

Please indicate your place of work

- ○ Education
- ○ Business
- ○ Others

Please indicate which training course you have participated in:

What is your situation?

- ○ Professor/lecturer
- ○ Owner/manager of a business
- ○ Company worker
- ○ Student/apprentice
- ○ Others

Quality score of course materials *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

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Level of satisfaction with the teaching of the classes *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Level of satisfaction of the facilities for the course *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Were the schedule and timing of the training course adequate?*

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Degree of knowledge of the teaching staff who have taught the course *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Assess your level of satisfaction with the course *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

What aspects would you highlight about the course?*

What aspects would you improve on the course?*

Would you recommend the course to someone you know?
Yes-No
If the answer is No, why not?

Other comments

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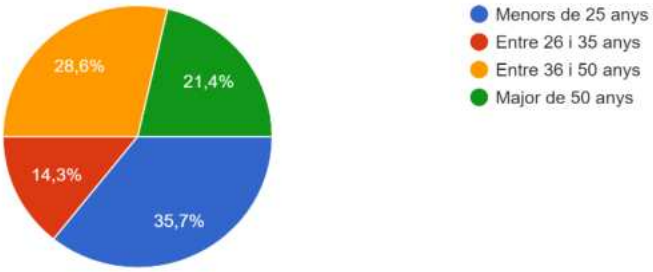
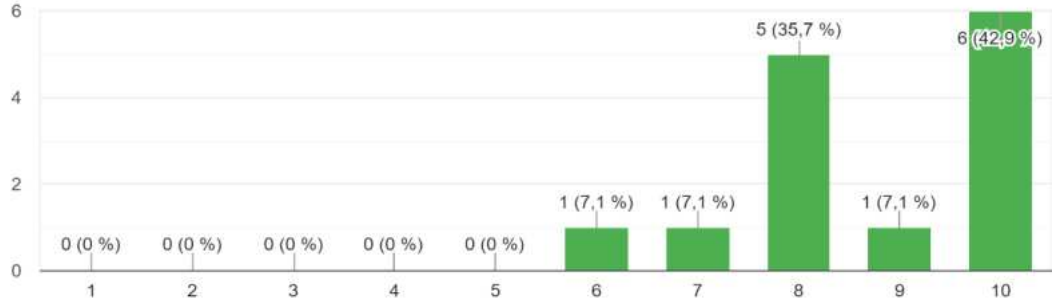
Satisfaction survey Results - Participant: Solar Energy Course

There have been 14 responses (50%)

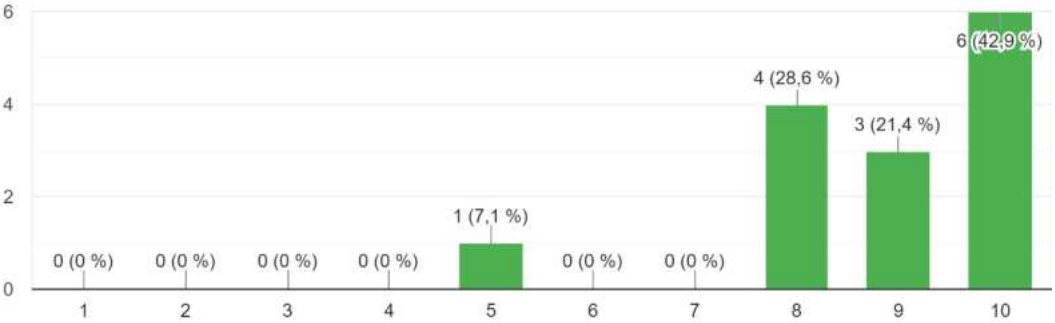
Please indicate your age group



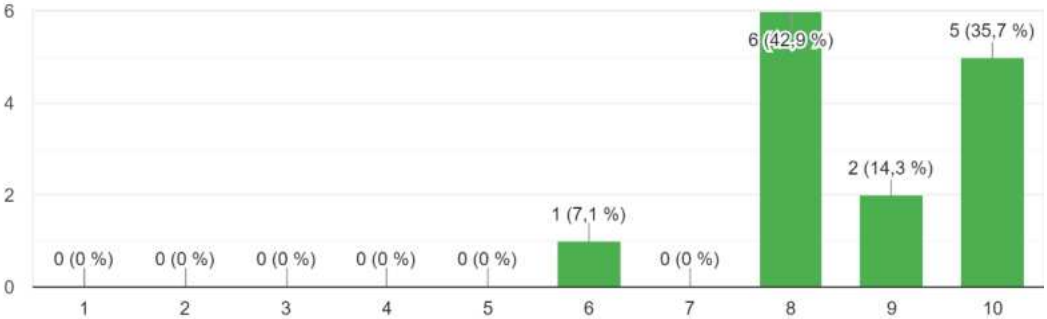
Quality score of course materials



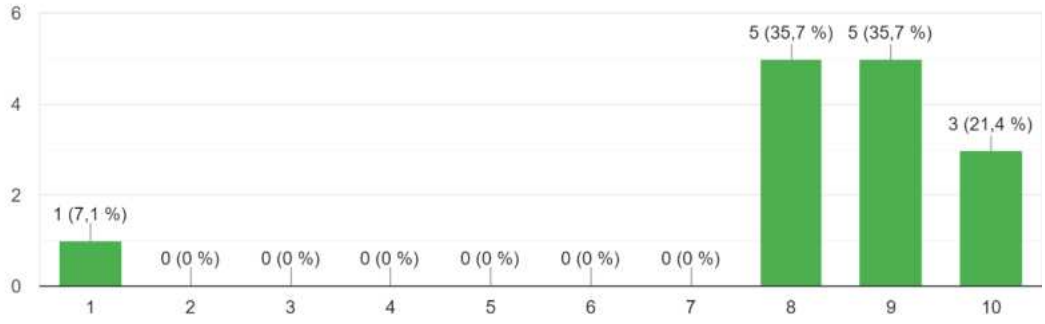
Level of satisfaction with the teaching of the classes



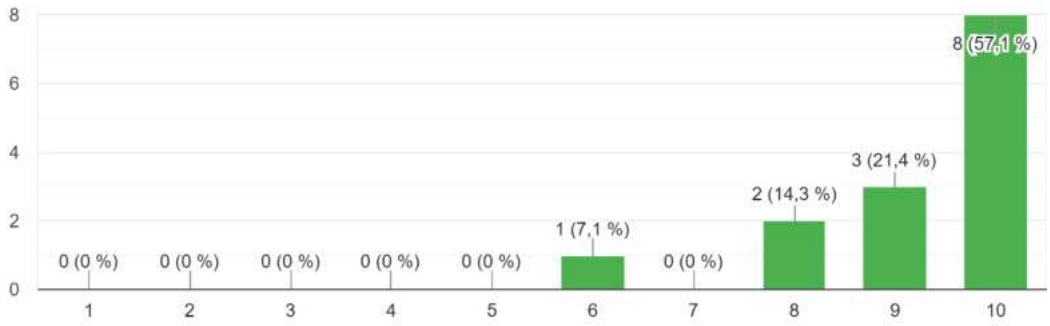
Level of satisfaction of the facilities for the course



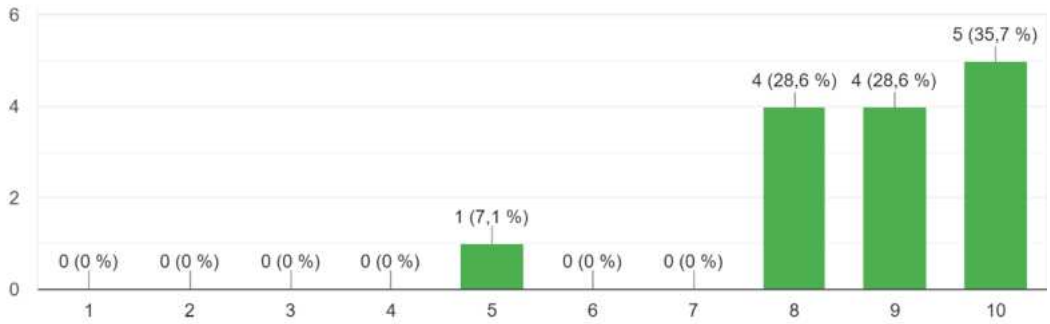
Were the schedule and timing of the training course adequate?



Degree of knowledge of the teaching staff who have taught the course



Assess your level of satisfaction with the course



What aspects would you highlight about the course?

- Good explanation and resolution of doubts.
- Good explanation.
- The quantity and quality of concepts seen in such a short time.
- A good summary of the subject has been made to adapt it to the available time.
- All.
- Thematic.
- Very complete for the few hours that were there.
- The information you provide us is very interesting.
- The topic.

- The closeness of the teachers.
- A very complete course for the short time it took.
- Good explanation.
- Good explanation in such a short time.

What aspects would you improve on the course?

- Nothing.
- More hours, too much knowledge in a very short time.
- The duration could be a little longer.
- More time to practice theory.
- Nothing.
- More practice.
- The duration (a little longer).
- PowerPoints are a little less dense.
- More topics and practices.
- More extensive in workshop class hours.
- It could last one more session.
- More practice and less theory.
- It would take more hours.

Would you recommend the course to someone you know?
Yes-No
If the answer is No, why not?

- Yes.
- Yes.
- Yes.
- Yes.
- yes and I would like to expand the subject with calculation practices and design of thermosolar and photovoltaic installations.
- No, I find that on a practical level it has not brought me anything.
- Yes.

Other comments

- A great opportunity to learn from colleagues.
- As general knowledge, it's good.
- It's great to be able to train with colleagues.
- A really very profitable course. It is appreciated to be able to attend the class of colleagues as a learner.

Satisfaction survey - Lecturer: Solar Energy Course

Please indicate which training course you have taught

Energia Solar: Tecnologia i aplicacions

Please indicate how many years of teaching experience you have

- ○ Less than 2 years
- ○ Between 2 and 5 years
- ○ More than 5 years

Level of satisfaction of the facilities for the course *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

The schedule and timing of the training course were appropriate *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

The content was appropriate *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

The previous knowledge of the students was *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

The motivation of the training students was *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

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The way the content responded to the needs and objectives of the students was *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Assess your level of satisfaction with the course *

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

What aspects would you highlight about the course?*

What aspects would you improve on the course? (for example, some topic was missing or unnecessary)*

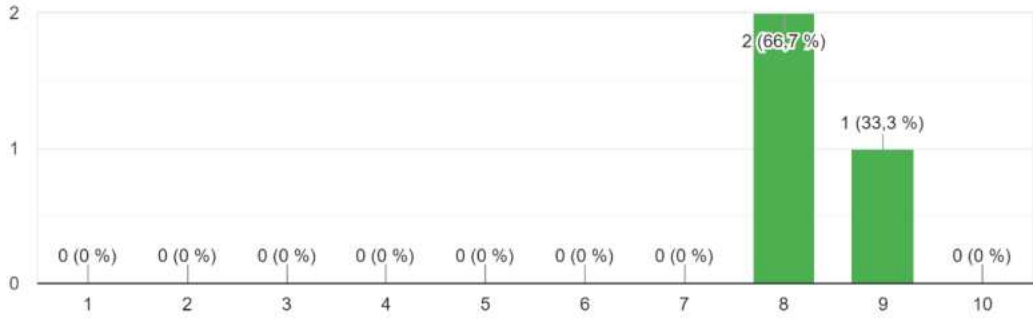
Other comments

Satisfaction survey Results - Lecturer: Solar Energy Course

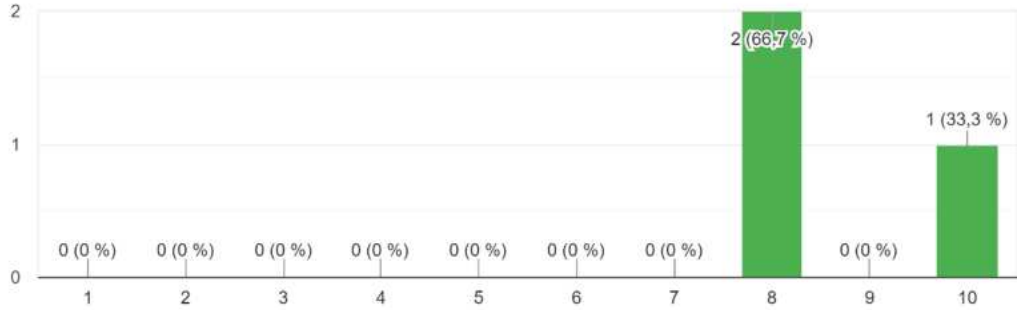
There have been 3 responses (100%)

Please indicate how many years of teaching experience you have

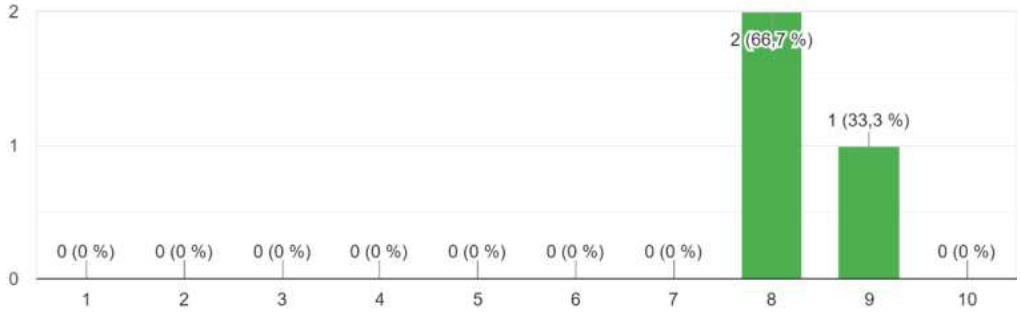
Level of satisfaction of the facilities for the course



Were the schedule and timing of the training course adequate?



The content was appropriate



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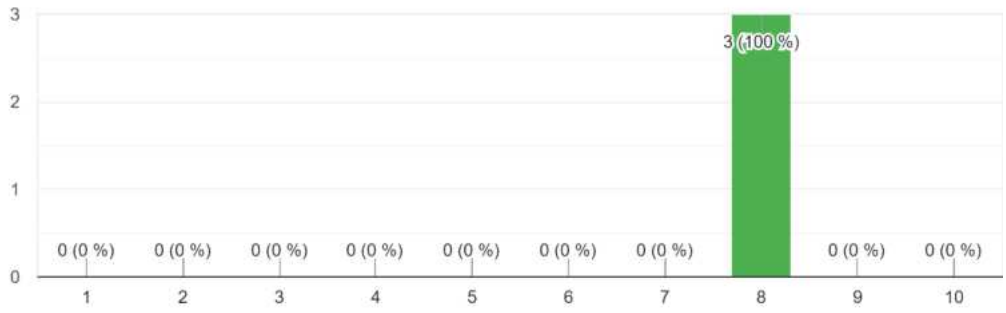
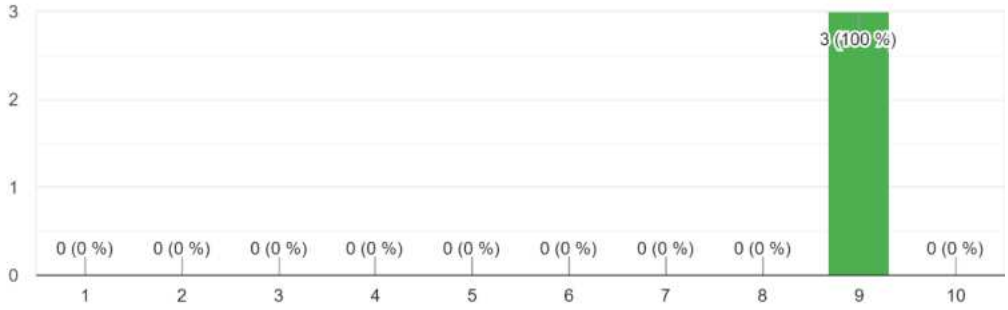
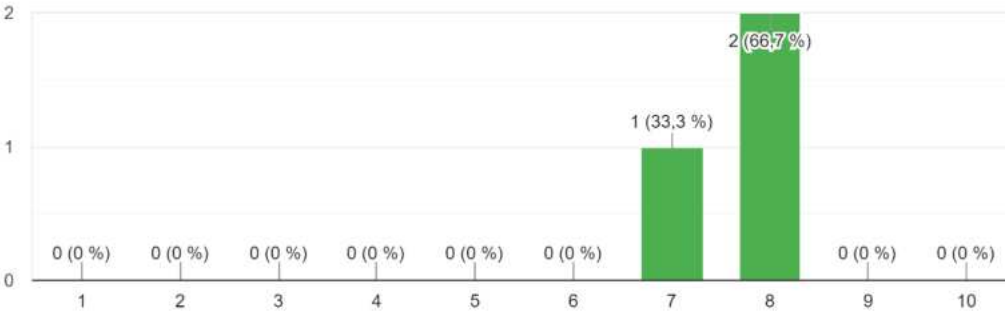
The previous knowledge of the students was



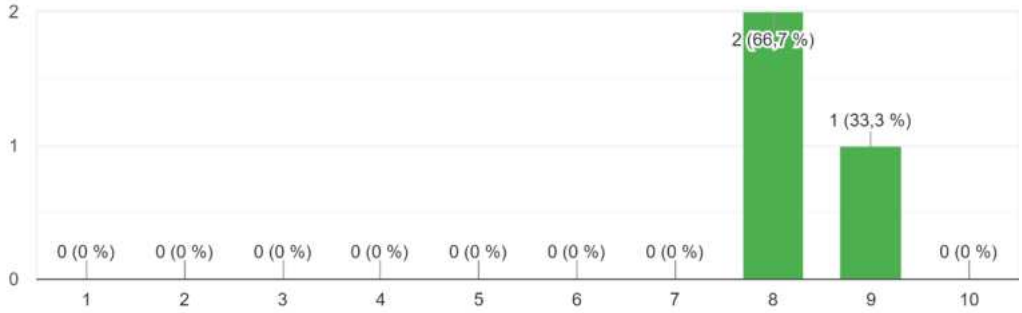
The motivation of the training students was



The way the content responded to the needs and objectives of the students was



Assess your level of satisfaction with the course



What aspects would you highlight about the course?

- All.
- Organization and calendar.
- The students' answer.

What aspects would you improve on the course? (for example, some topic was missing or unnecessary)

- Nothing.
- Water and coffee could have been offered to the participants.
- Maybe a few more hours are needed to consolidate some knowledge.

Other comments

-

ATTACHMENT 6: CURRICULA (adapted and translated into Catalan by the trainer)

Paquet de treball 4 Segon nivell de centre
"Formació professional contínua"

Trasllat activitat A5
Formació Estalvi Energètic i Energies Renovables

Resultat: 4.5 Entrenaments de transferència: estalvi energètic i energies renovables

Títol B

Formació II: Energia Solar – Tecnologia i aplicacions

Contingut

Resum del projecte i introducció
Formació II: Energia Solar – Tecnologia i Aplicacions
Concepte i currículum
Diapositives del professor

Elaborat per:

Parlament hanseàtic

Desembre, 2021

"El suport de la Comissió Europea a la producció d'aquesta publicació no constitueix una aprovació del contingut que reflecteixi només les opinions dels autors, i la Comissió no es fa responsable de l'ús que es pugui fer de la informació continguda en ella"

Co-funded by the Erasmus+ Programme of the European Union

Resum del projecte i introducció

Afrontar els reptes en els camps de l'energia, el clima i la protecció del medi ambient requereix una reorientació integral i innovacions amb visió de futur . Aquestes tasques han de ser dominades per les pimes en el context dels problemes següents:

- Flagrant i creixent escassetat de treballadors qualificats.
- Grans dèficits de qualificació, especialment en l'economia verda.
- Pèrdua d'atractiu i baixa qualificacióde l'FP escolar.
- Baixos índexs de formació complementària i orientació insuficient de les ofertes a les necessitats de les pimes.
- Envelliment dels emprenedors i escassetat creixent de joves (canvi demogràfic).
- Fracàs de les transmissions empresarials i baixes taxesd'art-ups empresarials.
- Baixes taxes d'innovació i productivitat insuficient.
- Una cooperació insuficient entre universitats i pimes i una manca d'ensenyament orientat a les necessitats de les pimes.
- Comparativament baixa internacionalització de pimes i proveïdors de formació professional.

Per afrontar aquests reptes, es dissenya una estructura de projecte innovadora i complexa amb 22 socis del projecte de 7 països, així com 60 socis associats de 13 països. A cada país, s'establiran, gestionaran i garantiran la seva continuïtat permanent als centres d'excel·lència professional (COEs) en Green Econ-omy. Es desenvoluparà una cooperació transnacional dels centres, ampliada a 60 parts interessades en l'educació i operada permanentment de forma institucionalitzada. Els centres oferiran un ampli ventall de mesures d'educació professional en formació professional, educació superior i educació superior, que s'estan desenvolupant, provant i avaluant en el projecte. Aquestes mesures educatives en els nivells 3 - 6 de l'EQF se centren en l'economia verda, la dig-italització i els emprenedors. A més, es desenvoluparà i implementarà consultoria professional i educativa i suport a la innovació per a pimes. En total, set programes Train-the-Trainer seran desenvolupats i implementats permanentment pels socis del projecte. Tots els resultats es transferiran als 60 socis associats juntament amb l'assessorament en implementació.

L'objectiu destacat del projecte 3LOE és que els set centres d'educació professional fundats en el transcurs del projecte es dediquin a qualificacions en economia verda a un nivell d'alta qualitat. Per assolir aquest objectiu, es desenvoluparan un gran nombre de noves mesures de formació professional en els nivells 3 - 7 de l'EQF, provades pràcticament sota diferents condicions nacionals, avaluades, revisades sobre la base dels resultats de l'avaluació i finalitzades i implementades. No obstant això, també es tramiten les mesures educatives existents que han resultat especialment reeixides, es traslladen als set centres d'excel·lència professional i s'implementen per ells.

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En cooperació amb el Centre d'Hamburg per a l'Energia, l'Aigua i la Tecnologia Ambiental, el soci principal ha desenvolupat quatre cursos de formació compacta sobre estalvi energètic i energies renovables específicament per a propietaris, gestors i especialistes de pimes. Com a part d'un projecte del Hanse-Parlament, la Universitat de Satakunta, Finlàndia, ha desenvolupat i provat pràcticament una altra formació. Aquestes formacions hanestat utilitzades amb molt d'èxit durant diversos anys en diversos països del Mar Bàltic per cambres i altres institucions de formació professional.

- Formació I per a PIMES: Eficiència Energètica i Energies Renovables
- Formació II per a PIMES: Energia Solar – Tecnologia i Aplicacions
- Formació III per a PIMES: Construcció Energètica Eficient i Aplicació d'Energies Renovables
- Formació IV per a pimes: Gestió de Residus i Aigües Residuals i Producció Energètica
- Formació V: Estalvi energètic i ús d'energies alternatives

Els conceptes i currículums d'aquestes formacions es van transferir als set centres d'excel·lència professional. Durant el període del projecte, aquestes formacions seran desenvolupades per vuit socis d'Alemanya, Lituània, Letònia, Itàlia i Espanya.

Com a part B del resultat 4.4 "Formacions d'estalvi energètic i energies renovables", a continuació s'enumeren les diapositives curriculars i lliçons per a la formació II per a pimes "Formació II: Energia Solar – Tecnologia i Aplicacions".

Co-funded by the Erasmus+ Programme of the European Union

Pla d'estudis del seminari

'Energia solar – Tecnologia i aplicacions'

per a petites i mitjanes empreses

Co-funded by the Erasmus+ Programme of the European Union

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1.3 Durada i temporalització 3

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..... d
e suport 8

3. Certificat 8

1. Resum de les característiques clau

1.1 Objectiu

L'objectiu d'aquest seminari és donar als empleats i responsables de la presa de decisions de les petites i mitjanes empreses (PIME) una visió general del potencial de les mesures d'estalvi energètic en el seu funcionament mitjançant l'ús de tecnologies solars, tant en calefacció com en electricitat.

El seminari proporciona informació i dades sobre les diverses possibilitats, costos i beneficis, així com exemples factibles per fer possible als participants estimar la implementació de possibles mesures en empreses de diversos sectors.

1.2 Grups destinataris

Electricistes, tècnics de gas i aigua, teuladors, enginyers de calefacció (mestres artesans, viatgers, especialistes i gestors)

1.3 Durada i temporalització

El seminari s'estructura com un curs a temps complet i consta de 2 dies, un tercer dia és opcional. El primer dia inclou la presentació i discussió delsconceptes bàsics de l'ús de l'energia solar, així com els aspectes tècnics i financers dels sistemes de calefacció solar i energia solar.

Comença a les 09.00 hores i acaba a les 18.00 hores (8 unitats didàctiques). Durant la segona jornada es descriu la situació regional pel que fa al'ús de les energies renovables i la situació del finançament. Aquesta part de la formació la presenta un representant regional, per exemple, una agència energètica. El tercer dia (en funció dels interessos dels participants) es realitza una excursió a un projecte solar implementat que, a més d'informació tècnica, dóna una visió especialment de l'experiència dels operaris en la implementació i operació de la instal·lació.

1.4 Titulació del/s professor/s

Si és possible, el seminari ha de ser dirigit per professors que no només tinguin coneixements profunds en el camp de l'ús de l'energia solar (mercat, tecnologia, planificació, instal·lació, costos, beneficis de la calor solar i els sistemes d'energia solar), sinó que també tinguin coneixements específics de cada país, en particular pel que fa a les condicions del marc financer per a la implementació de mesures. Es recomana la participació d'un mínim de 3 professors en el seminari. El professorat no només ha de ser competent en l'àmbit en qüestió, sinó que també ha de tenir exposició i discussió en l'àmbitdidàctic. Per descomptat, en aquest sentit és avantatjós liderar el treball en grup i involucrar els participants en discussions i jocs de rol.

1.5 Equipament tècnic necessari

- Components del sistema com a models de materials (per exemple, absorbidor, col·lector de plaques planes, col·lector de tubs de buit, mòdul solar monocristal·lí i policristal·lí, inversor, controlador de càrrega)

A més:
- Flip chart
- Pissarra
- PC amb projector
- Accés a Internet per al portàtil del professor
- Lona

1.6 Observacions metodològiques-didàctiques

Depenent dels coneixements dels participants al seminari, les interrelacions bàsiques s'explicaran tant com sigui necessari, però es poden examinar amb més detall en qualsevol moment, si així es desitja.

2. Concepte del seminari

2.1 Concepte general

2.1.1 Visió general dels principals temes i continguts (a partir dels continguts de la presentació del màster per als professors)

En el marc dels temes 9 i 10 es presentaran els mercats i les mesures de suport per part dels professors delsrespectius països.

Tema principal 1: Per què utilitzar l'energia solar? – 0,5 UA (unitats acadèmiques)

Tema 1.1: Augment del consum d'energia en un context de disminució de recursos (pic del petroli)
Tema 1.2: L'encariment de l'energia
Tema 1.3: Escalfament global i canvi climàtic

Tema principal 2: Possibles aplicacions de l'energia solar – construcció i operació de sistemes solars tèrmics, situació del mercat a Alemanya – 1,5 UA

Tema 2.1: Ús i subministrament d'energia solar
Tema 2.2: La situació del mercat de l'energia solar tèrmica a Alemanya
Tema 2.3: Construcció i operació d'instal·lacions solars tèrmiques
Tema 2.4: Components de les instal·lacions solars tèrmiques
Tema 2.5: Regulació i control
Tema 2.6: Preparació d'aigua calenta solar i calefacció complementària

Topic 3: Planificació i dimensionament, exemples de muntatge – 1 UA

Tema 3.1: Disseny i planificació, llista de comprovació i regles del polze
Tema 3.2: Fracció solar i taxa d'ús solar
Tema 3.3: Instal·lació dels col·lectors, el tanc d'emmagatzematge i el circuit solar

Tema 3.4: Defectes, causes i la seva eliminació

Tema principal 4: Costos i beneficis, cost-efectivitat – 1 UA

Tema 4.1: Costos d'inversió i estalvi energètic
Tema 4.2: Càlculs de cost-efectivitat, període d'amortització

Tema principal 5: Grans sistemes solars tèrmics – 0,5 UA

Tema 5.1: Àmbits d'aplicació de grans instal·lacions
Tema 5.2: Sistemes i planificació de grans instal·lacions
Tema 5.3: Costos i cost-efectivitat de les plantes a gran escala

Tema principal 6: Disseny i operació de sistemes d'energia solar – 1 UA

Tema 6.1: Sistemes connectats a xarxa i sistemes autònoms
Tema 6.2: Components de sistemes d'energia solar, mòduls, inversors i bateries

Tema principal 7: Planificació i dimensionament, instal·lació – 1 UA

Tema 7.1:Construcció de sistemes tem, dimensionament de components
Tema 7.2: Instal·lació, avantatges i desavantatges dels diferents mètodes d'instal·lació

Tema principal 8: Costos i beneficis, rendibilitat, mercat i suport - 1,5 UA

Tema 8.1: Costos d'inversió i muntatges
Tema 8.2: Consum propi i alimentació a la xarxa
Tema 8.3: Tarifes d'alimentació i rendibilitat

Tema 9: Situació del mercat regional - 4 UA

Tema 9.1: Situació inicial, costos energètics
Tema 9.2: Importància dels tipus individuals d'energia renovable,
energia solar, bioenergia, energia geotèrmica, energia eòlica
Tema 9.3: Aplicacions, sistemes tècnics i costos
Tema 9.4: Condicions del marc legal

Tema principal 10: Programes regionals de suport – 4 UA

Tema 10.1: Programes de subvencions i crèdits existentsper a sistemes de calefacció solar
Tema 10.2: Tarifes d'alimentació i cost-efectivitat dels sistemes fotovoltaics
Tema 10.3: Càlculs d'exemple i bons exemples implementats

2.2 Objectius d'aprenentatge i observacions metodològiques-didàctiques sobre els temes principals del concepte

El principal objectiu d'aprenentatge és conèixer les possibilitats d'ús de l'energia solar, poder estimar el seu potencial en la pròpia empresa i conèixer les possibles mesures de finançament i suport.
Els objectius específics d'aprenentatge del seminari cobreixen els següents temes:

- Estimació de la situació energètica mundial
- Visió general de les possibilitats i l'eficiència de les tecnologies solars
- Coneixement dels components, així com de la seva estructuraciói funcionament
- Dimensionament d'un sistema solar (calor solar i electricitat solar)
- Anàlisi cost/benefici tenint en compte les subvencions

A continuació es descriuen els objectius d'aprenentatge per a cada tema principal:

2.2.1 Tema principal 1: Per què utilitzar l'energia solar?

Els participants...
... Reconèixer la importància de l'energia solar en un context d'augment dels preus de l'energia i la disminució de la disponibilitat de combustibles fòssils.
... Fer-se una idea de les conseqüències reals de l'avanç de l'escalfament global

2.2.2 Tema principal 2: Possibles aplicacions de l'energia solar – construcció i operació de sistemes solars tèrmics, situació del mercat

Els participants...
... coneix el mercat de la calor solar tèrmica a Alemanya
... Aprendre a ser capaç de valorar el subministrament d'energia solar i el seu valor
... Coneix lesdiferents aplicacions possibles de l'energia solar
... Familiaritzar-se amb l'estructura i el funcionament dels sistemes solars tèrmics
... obtenir informació sobre els components i la seva tasca i funció

2.2.3 Tema principal 3: Planificació i dimensionament, exemples de muntatge

Els participants...
... Conèixer els factors essencials que influeixen en una planificació adaptada
... Conèixer l'eina de creació d'una instal·lació (programari de simulació)
... Experimenteu com funciona la instal·lació del sistema

2.2.4 Tema principal 4: Costos i beneficis, rendibilitat, exemples

Els participants...
... estan informats sobre els costos dels sistemes solars i poden calcular l'estalvi energètic esperat
... Conèixer els mètodes de càlcul cost-efectivitat i rebre una visió general de la situació del mercat i dels programes de suport existents, si escau.

2.2.5 Tema principal 5: Grans sistemes solars tèrmics

Els participants...
... Conèixer possibles aplicacions dels grans sistemes solars tèrmics
... Experimenta les diferències essencials entre plantes petites i grans
... Coneix el procés de planificació de grans sistemes solars
... Conèixer la situació de costos en el sector de les grans plantes

2.2.6 Tema principal 6: Disseny i operació de sistemes d'energia solar

Els participants...
... Coneix l'estructura i components dels sistemes d'energia solar
... Conèixer l'eficàcia de les cèl·lules solars i inversors
... són capaços d'estimar els ingressos d'un sistema d'energia solar

2.2.7 Tema principal 7: Costos i beneficis, rendibilitat, mercat i suport

Els participants...
... Conèixer l'estructura de costos dels sistemes d'energia solar (components, muntatge)
... són capaços de calcular la rendibilitat d'un sistema d'energia solar
... Coneix quins estalvis energètics són possibles a través dela H fotovoltaica
... obtenir una visió general de la situació del mercat fotovoltaic i dels programes de suport existents, si escau

2.2.8 Tema principal 8: Planificació i dimensionament, instal·lació

Els participants...
... Aprendre a dissenyar un sistema d'energia solar (regles del polze,programari d'ions simulats)
... Conèixer els passos de muntatge individuals (tenint en compte l'ombrejat)
... Conèixer els costos de manteniment dels sistemes d'energia solar

2.2.9 Tema principal 9: Situació del mercat regional

Els participants...
... Coneix la situació del mercat regional
... Conèixer la situació de l'oferta i la demanda en cada branca

... Conèixer els actors del mercat, barreres i bons exemples

2.2.10 Tema principal 10: Programes regionals de suport

Els participants...
... Coneix les diferents eines de suport/finançament nacionals i regionals
... Conèixer els requisits específics i l'esforç/despesa que suposa fer una sol·licitud
... Coneix bons exemples i és capaç d'avaluar les possibilitats que el seu projecte sigui elegible per al finançament

3. Certificat

Al final del seminari, els participants reben un certificat en el qual s'enumeren els continguts formatius (temes principals) i que signen el centre de formació (Cambra d'Artesania) i el Parlament Hanseàtic.

Energia Solar – Tecnologies i Aplicacions

Energia Solar – Tecnologies i Aplicacions

- **L'objectiu del seminari**

  Visió general de les possibilitats d'aprofitament de l'energia solar per a petites i mitjanes empreses mitjançant la implementació de sistemes d'energia solar tèrmica i sistemes d'energia solar

- **Àrees d'enfocament**

  - Per què s'ha d'aprofitar l'energia solar?
  - Subministrament d'energia solar
  - Possibilitats d'utilització de l'energia solar
  - Exemples de tecnologies i aplicacions
  - Costos/finançament i beneficis
  - Atenció al client

Continguts - Informació general

Primer dia (15:30h - 18:00h)

- Per què s'ha d'aprofitar l'energia solar?
- Possibilitats d'implementació de l'energia solar
- Construcció i funcions dels sistemes solars tèrmics
- Planificació i disseny
- Instal·lació, posada en marxa i manteniment
- Costos i beneficis, eficiència econòmica

Continguts - Informació general

Segon dia (9:00-17:00h)

- Grans sistemes solars tèrmics
- Situació del mercat fotovoltaic
- Estructura i funcions dels sistemes d'energia solar
- Costos i beneficis
- Eficiència econòmica
- Atenció al client

Tercer dia (9:00h – 13:30h) - opcional -
Excursió a una instal·lació solar

Per què s'ha d'aprofitar l'energia solar?

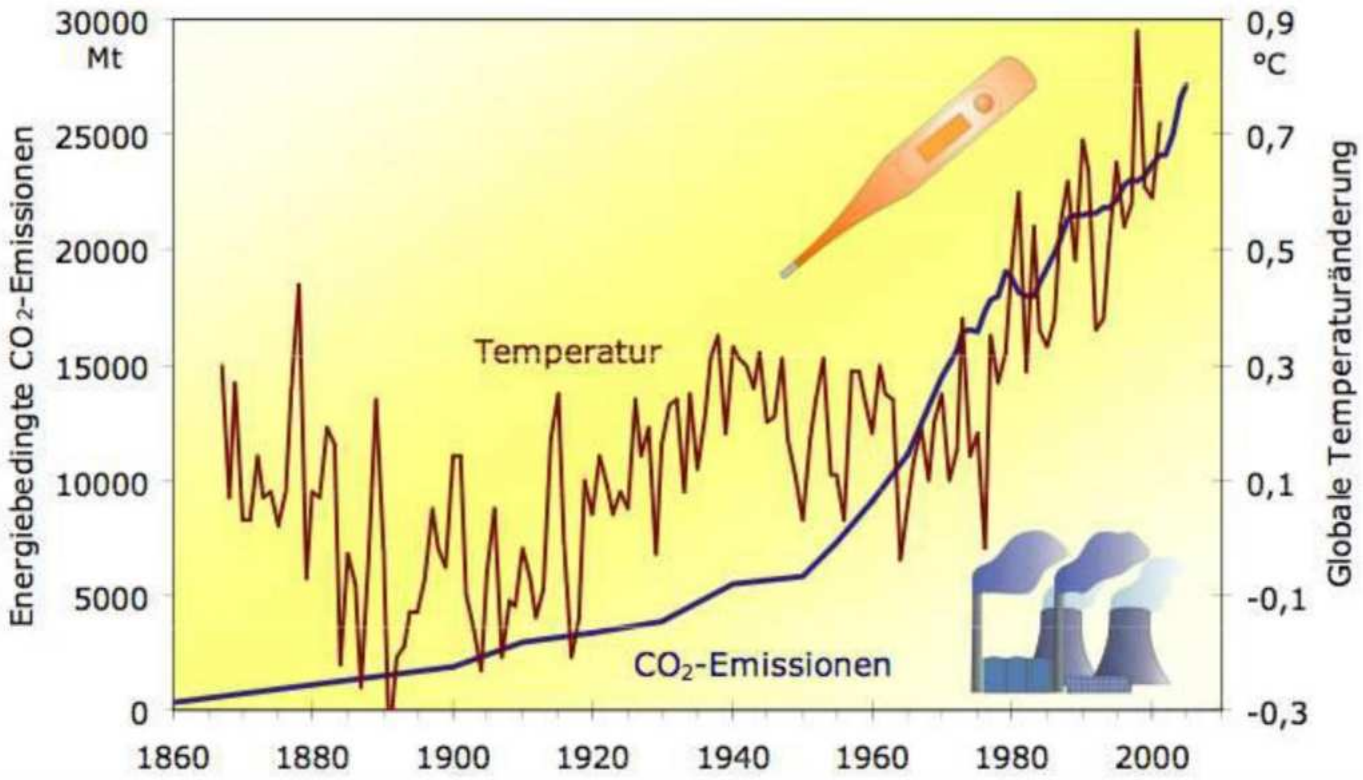
- Encariment de l'energia
- Escassos recursos d'energia fòssil
- Risc d'energia: energia nuclear (radiació, residus)
- Competitivitat
- Compliment de normatives més estrictes, legislació
- Actiu contra l'escalfament global, canvi climàtic
- Imatge de l'empresa

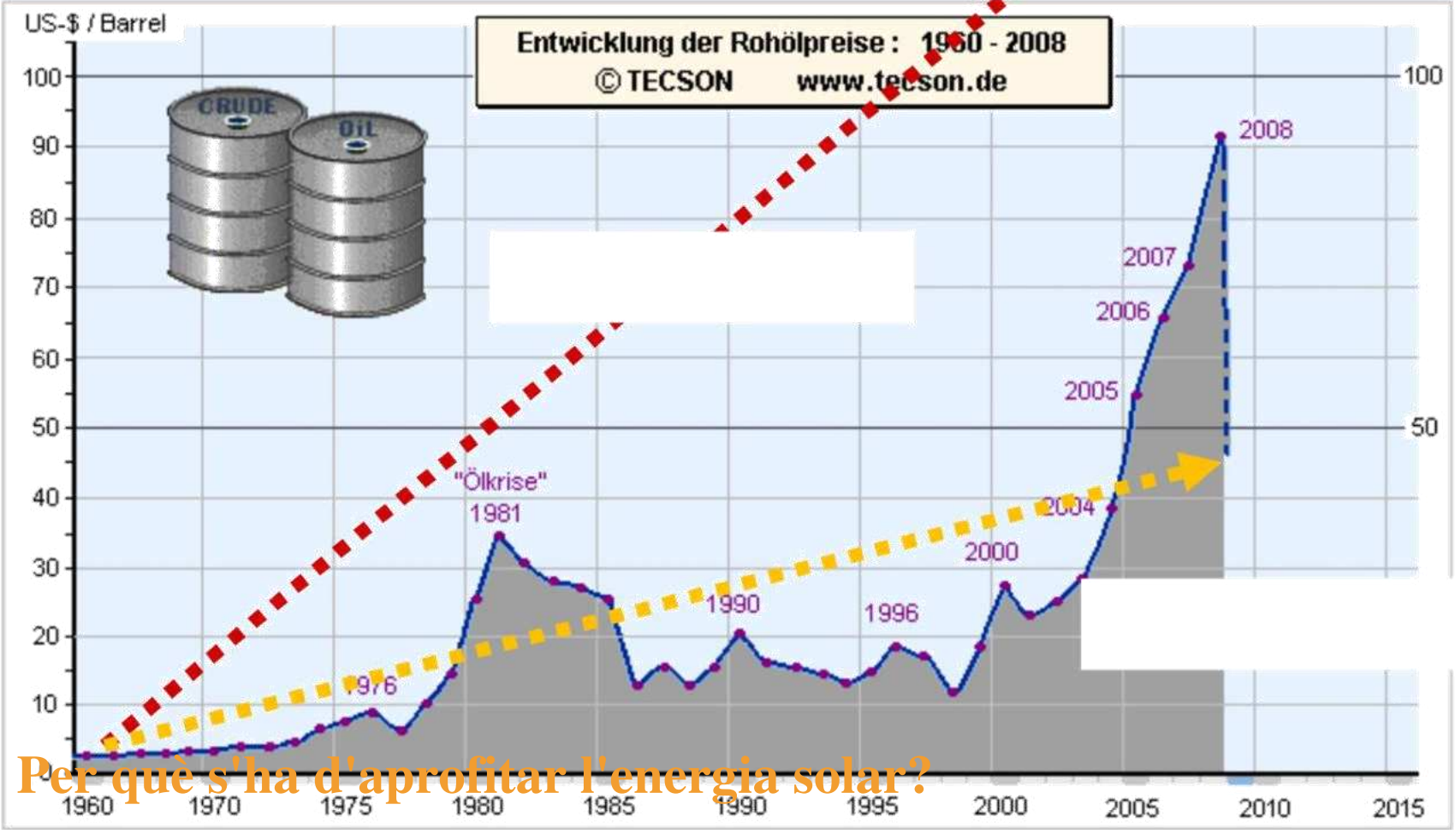
Per què s'ha d'aprofitar l'energia solar?

Àrea amenaçada en cas de fusió del gel de Groenlàndia
(Augment de 6-7m; totes les glaceres +Antàrtida: 60-70m)

Per què s'ha d'aprofitar l'energia solar?

Augment de les emissions globals de diòxid de carboni





Per què s'ha d'aprofitar l'energia solar?

Mitjana
Energiepreissteigerung
al voltant del 7,5% / a
($150 a l'agostde2008) .7% per anno

al voltant del 4,5% / a
(45 $ febrer 2009)

Estat
s Units

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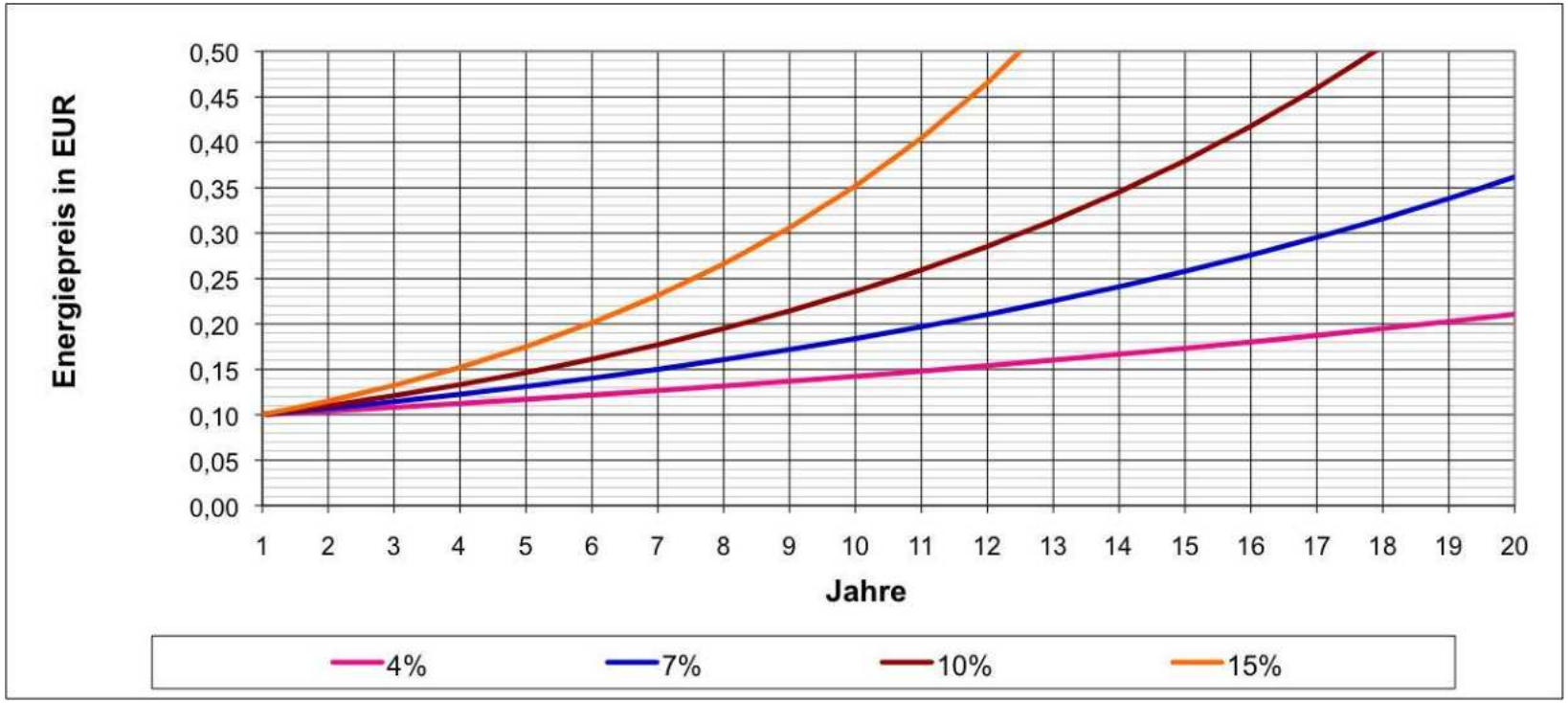
rència:
8

Per què s'ha d'aprofitar l'energia solar?

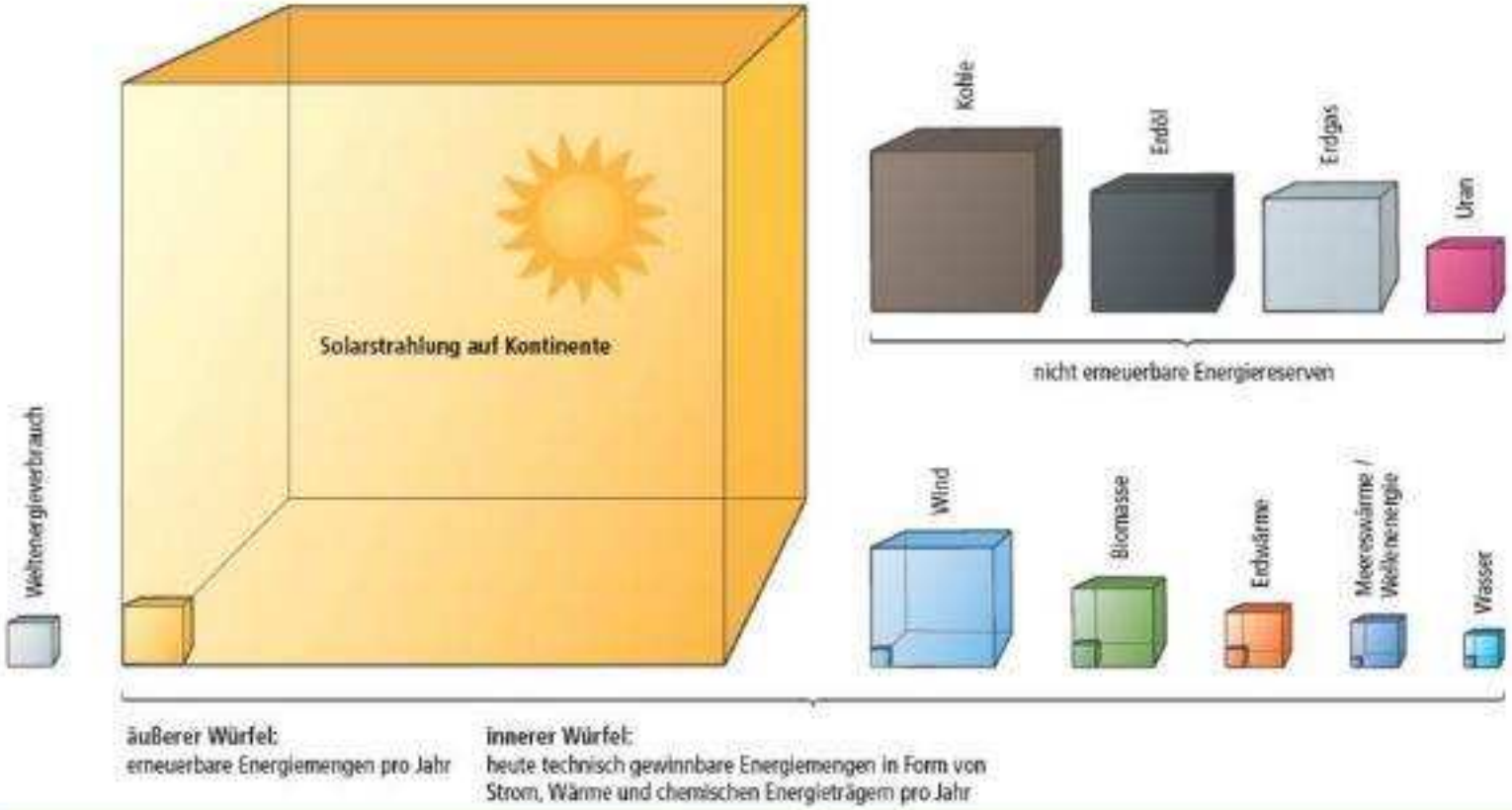
Costos energètics avui - Costos energètics demà



Els costos energètics van augmentar un 4,7,10, o un 15%

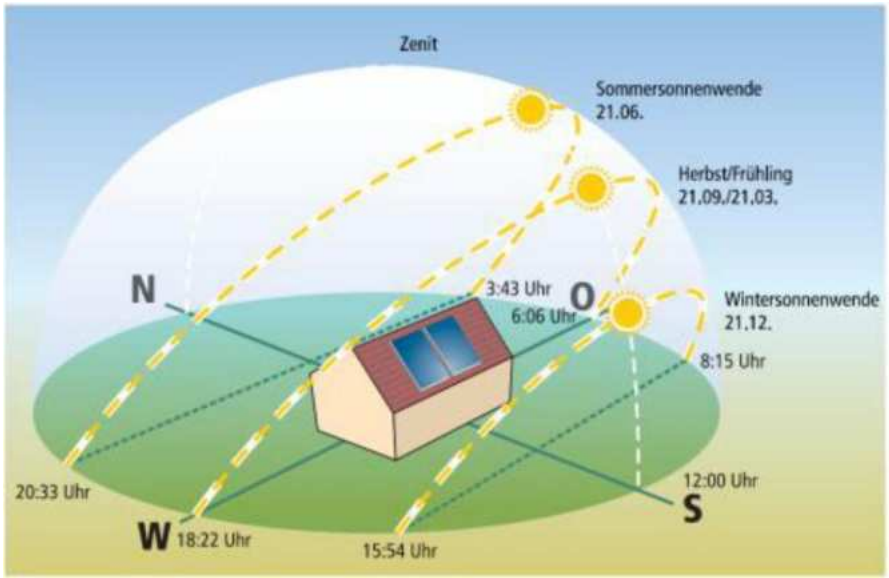
Per què s'ha d'aprofitar l'energia solar?

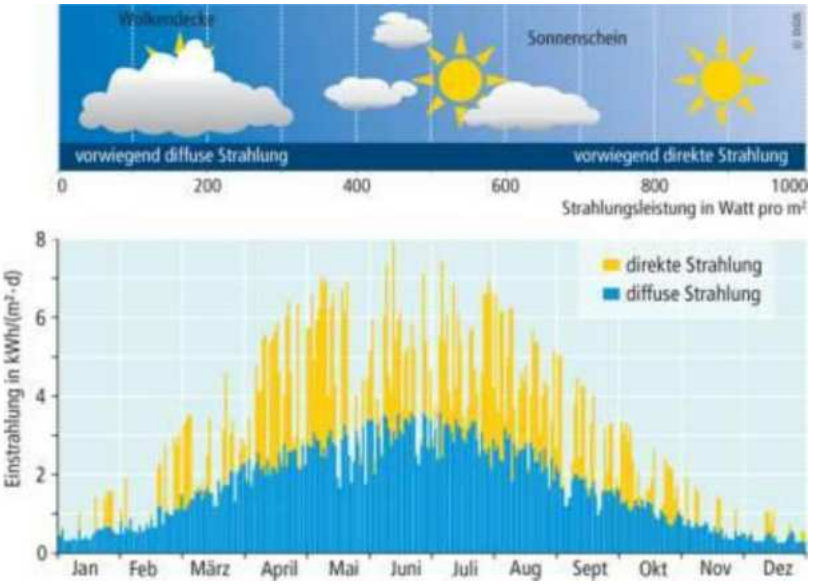
Energies renovables: potencialitats



Subministrament d'energia solar

- **Aprofitament de l'energia solar Subministrament d'energia solar**
  – Variacions astronòmiques i meteorològicament condicionades



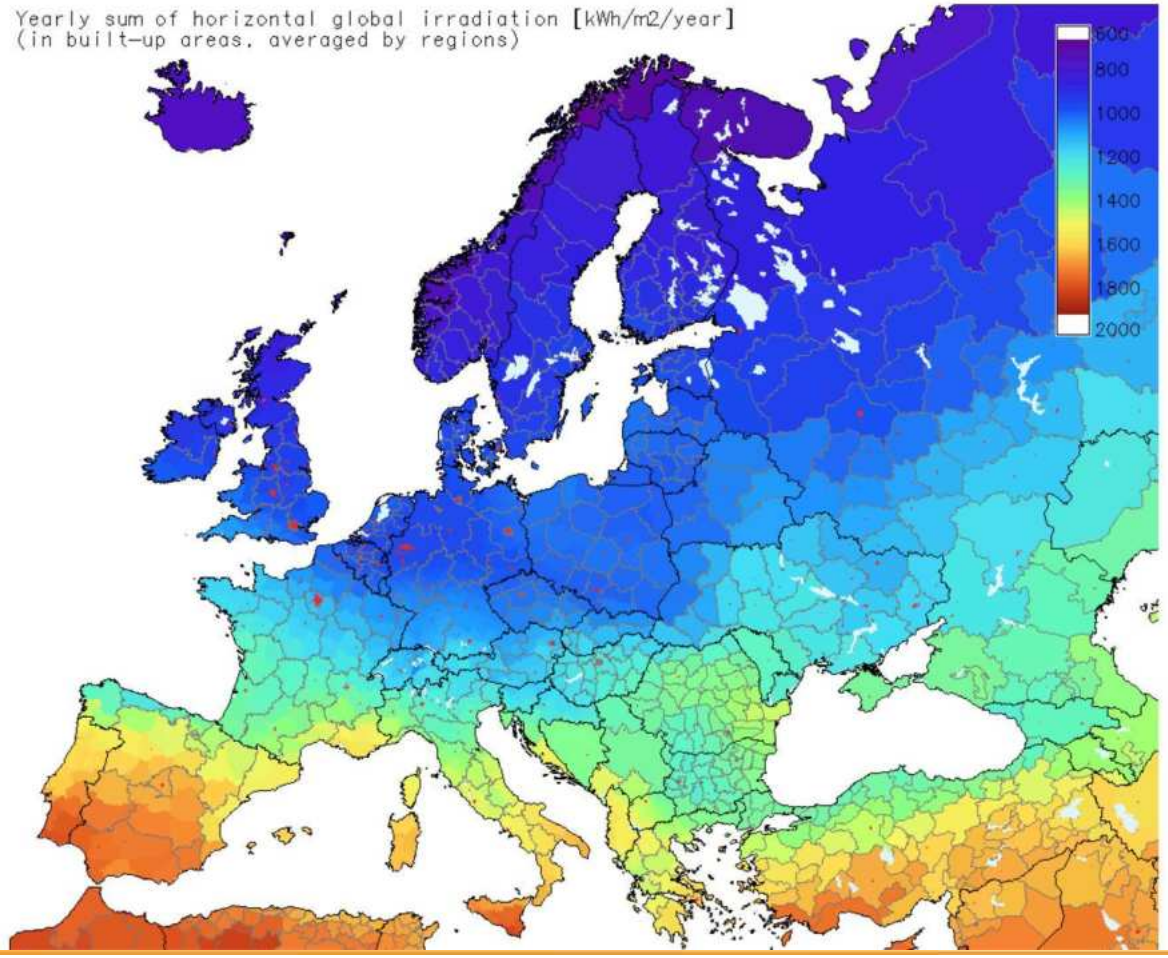


Subministrament d'energia solar

Energia solar

Subministrament d'energia solar a Europa: Distribució geogràfica dels totals anuals

(kWh/m^2 anuals)



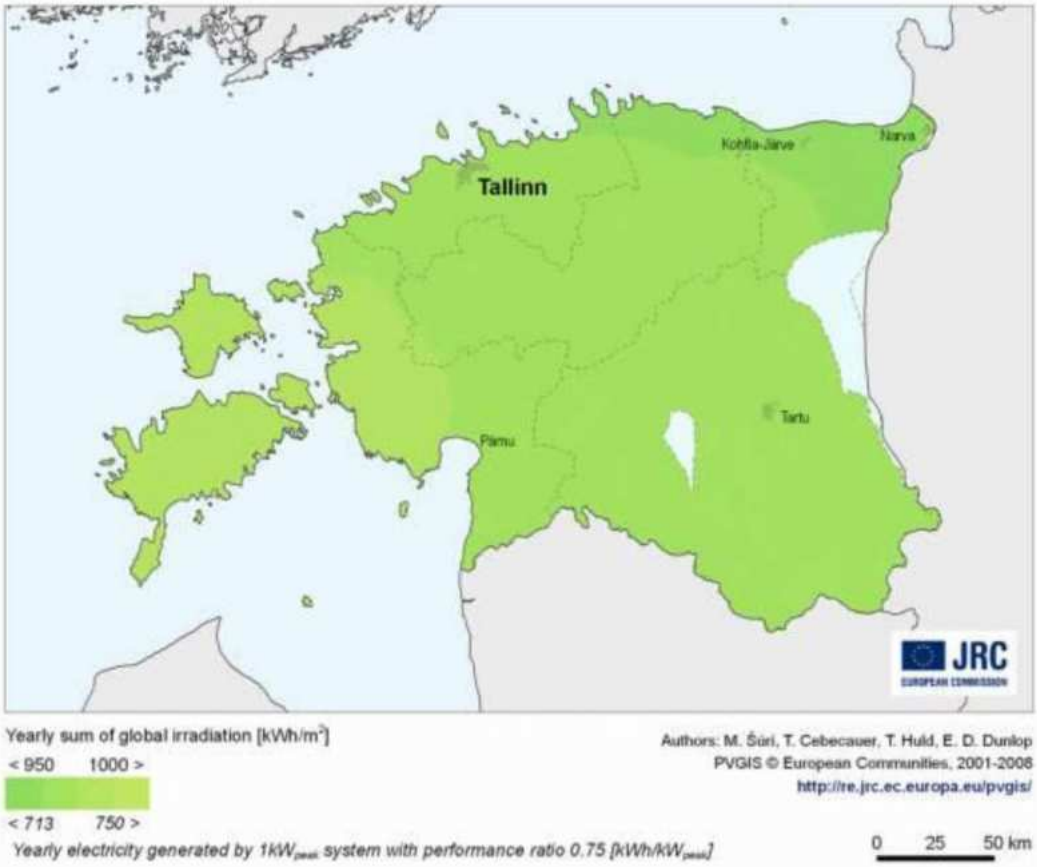
Subministrament d'energia solar

Energia solar

Subministrament d'energia solar a Estònia: distribució geogràfica dels totals anuals

(kWh/m^2 anuals)

1.000 kWh/m^2 corresponen a uns **100 litres de gasoil de calefacció**



- **Subministrament d'energia solar a Estònia** (radiació global)

Tallinn	960 kWh/m2	per any
Tartu	969 kWh/m2	per any
Vilsandi	1.026 kWh/m2	per any

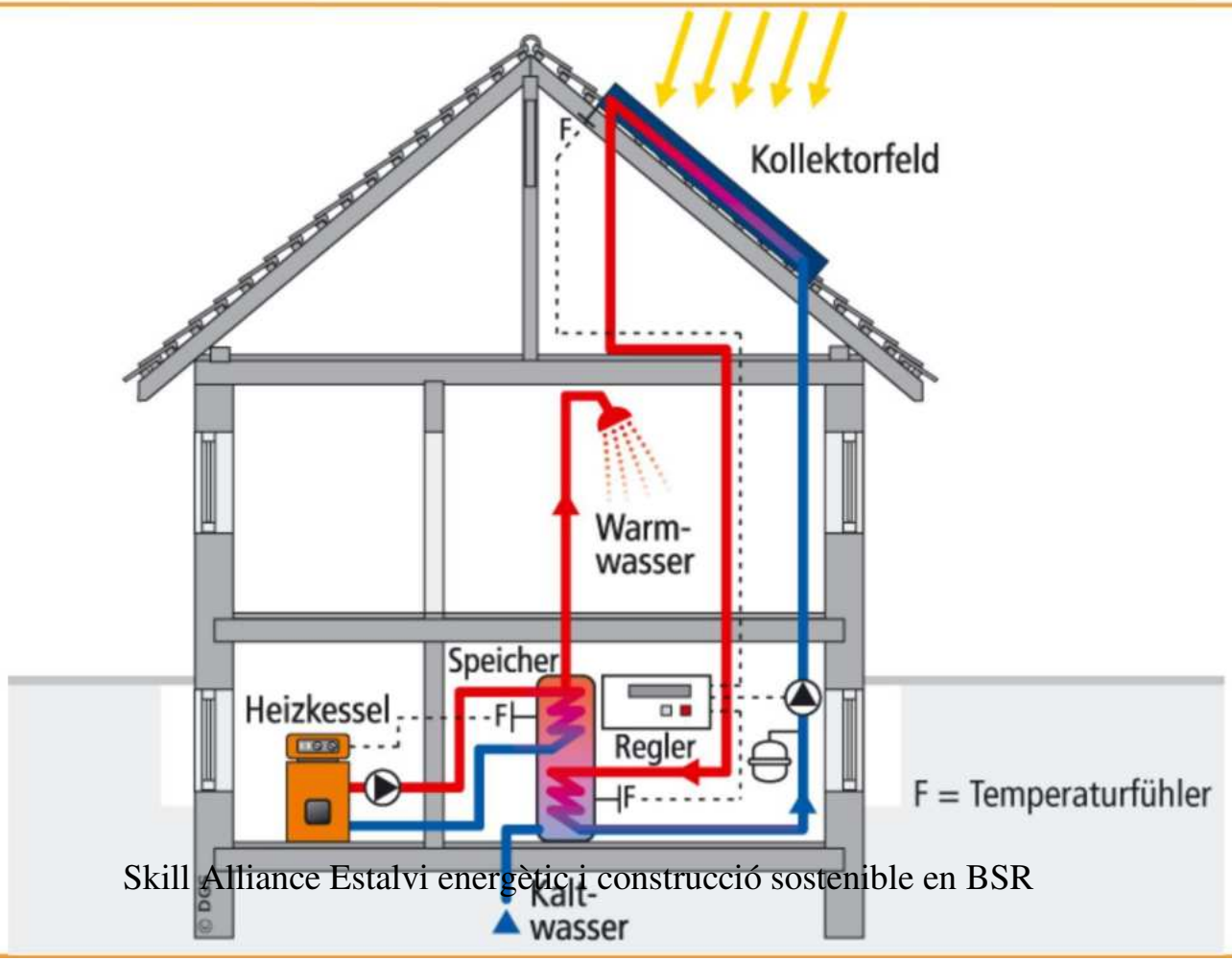
Possibilitats d'ús de l'energia solar

- **Aprofitament de l'energia solar**

  - **Sistemes solars tèrmics (instal·lacions solars tèrmiques)**
  Conversió de la llum solar en calor (aigua calenta, calefacció)

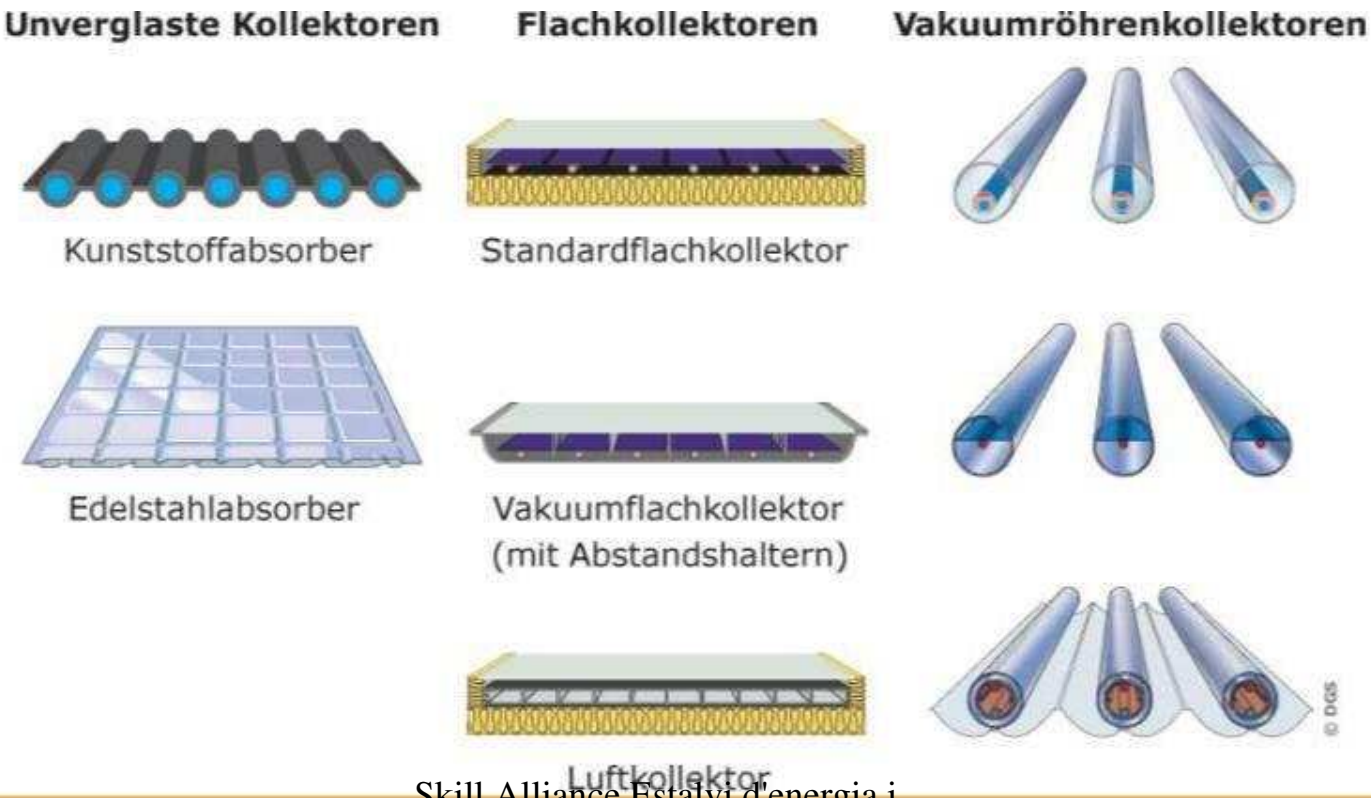
  - **Sistemes d'energia solar (instal·lacions fotovoltaiques)**
  Conversió de llum solar en electricitat (consum propi i/o font d'alimentació)

Calefacció solar: estructura i funció



Calefacció Solar - Components

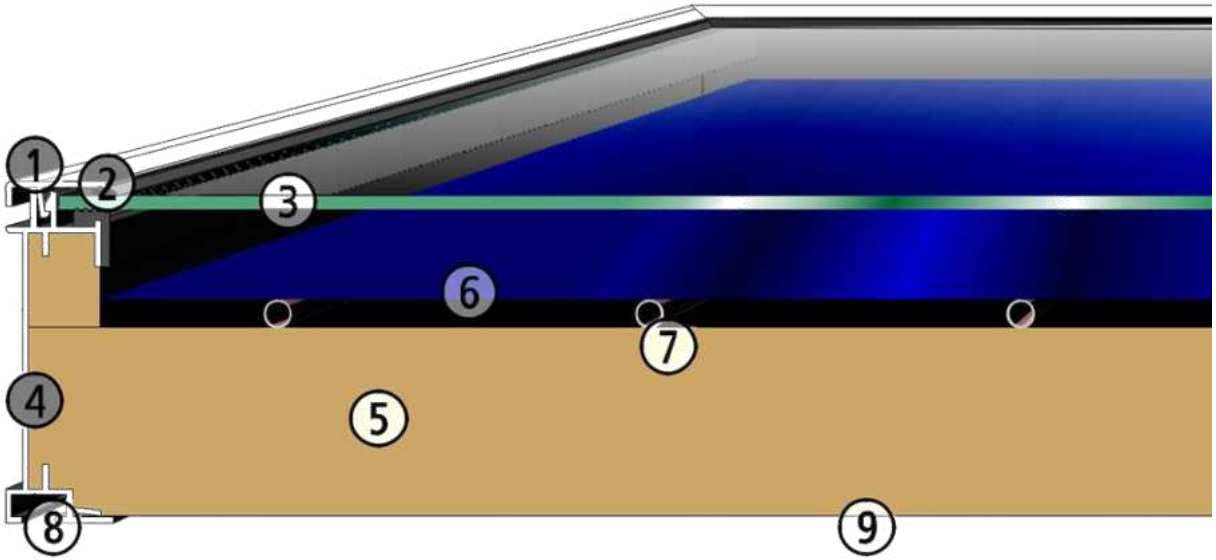
- **Dissenys de col·leccionista**



Calefacció Solar - Components

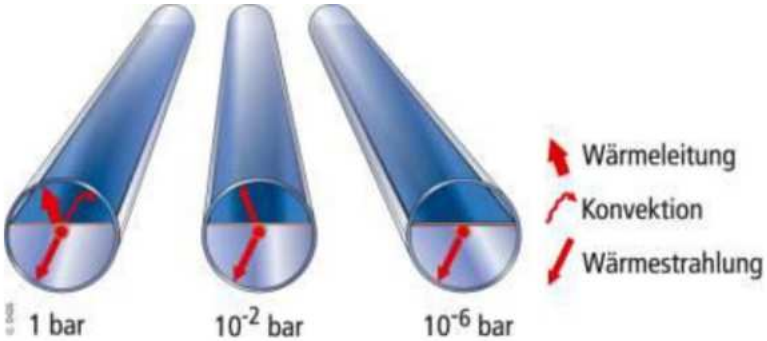
- **Col·lectors plans**

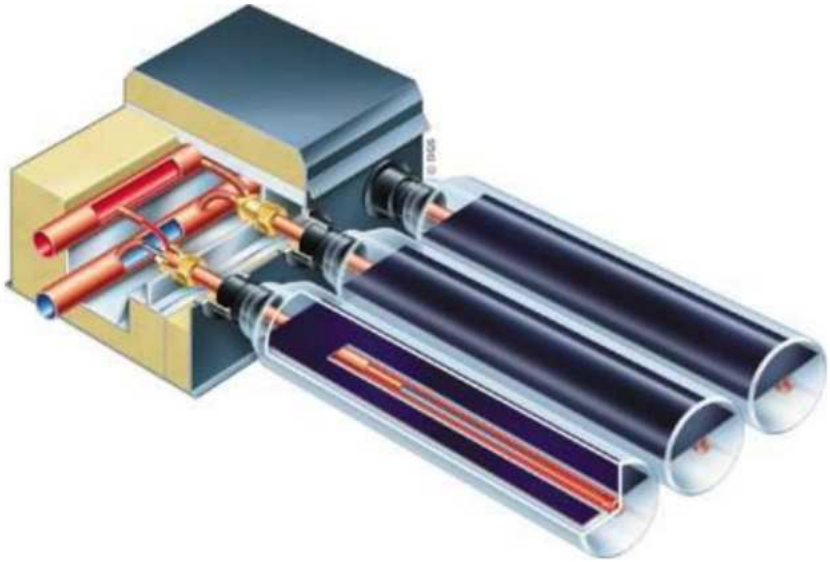
1. Rahmen
2. Dichtung
3. transparente Abdeckung
4. Rahmen Seitenwandprofi
5. Wärmedämmung
6. Vo f ächenabsorber
7. F üssigkeitskana
8. Befestigungsnut
9. Rückwand

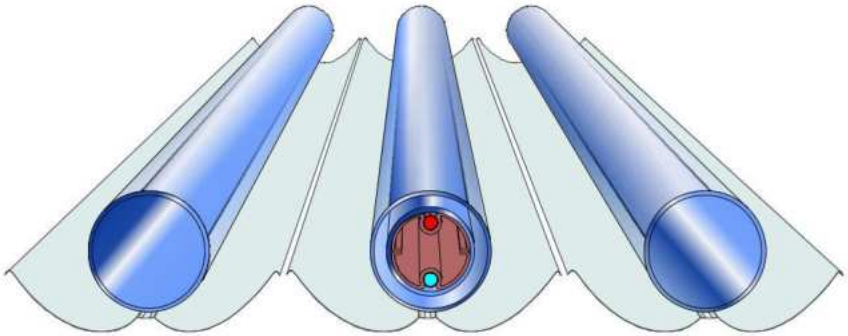


Calefacció Solar - Components

- **Col·lectors de tubs de buit**

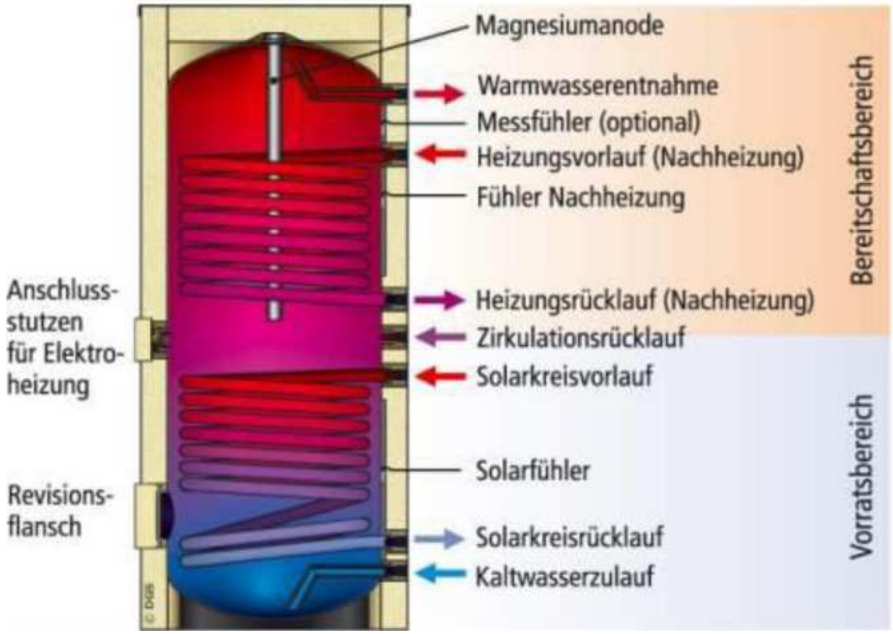


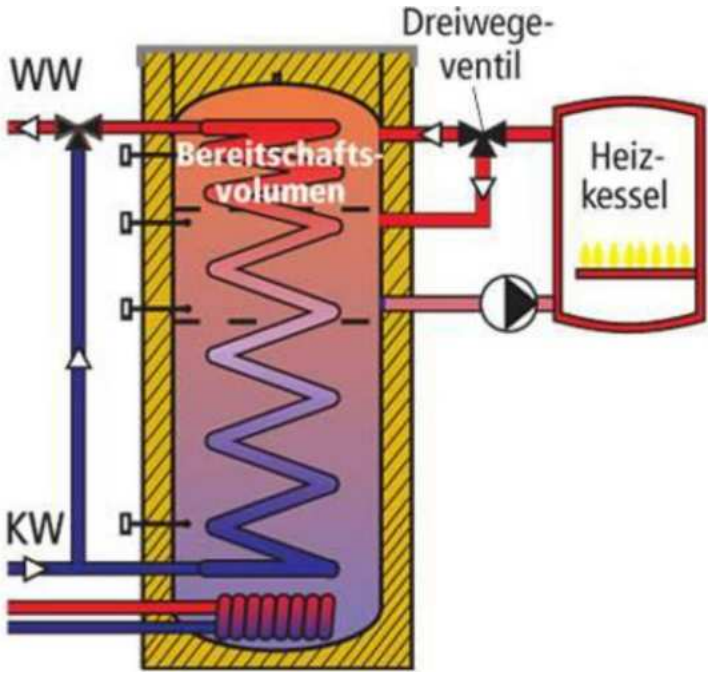




Calefacció Solar - Components

- **Tanc**





Calefacció Solar - Muntatge

(Wagner i companyia, Cölbe)

Calefacció Solar - Muntatge

Wagner i companyia, Cölbe)

Calefacció Solar - Muntatge

(Wagner i companyia, Colbe)

Calefacció solar : exemple de petites instal·lacions

Calefacció solar: exemple d'instal·lacions mitjanes

Calefacció Solar

- **Col·lector pla o de tub?**

Col·leccionista de pisos:

+ Bona relació qualitat-preu

+ recomanat en cas de condicions marc favorables

Col·lector de tubs:

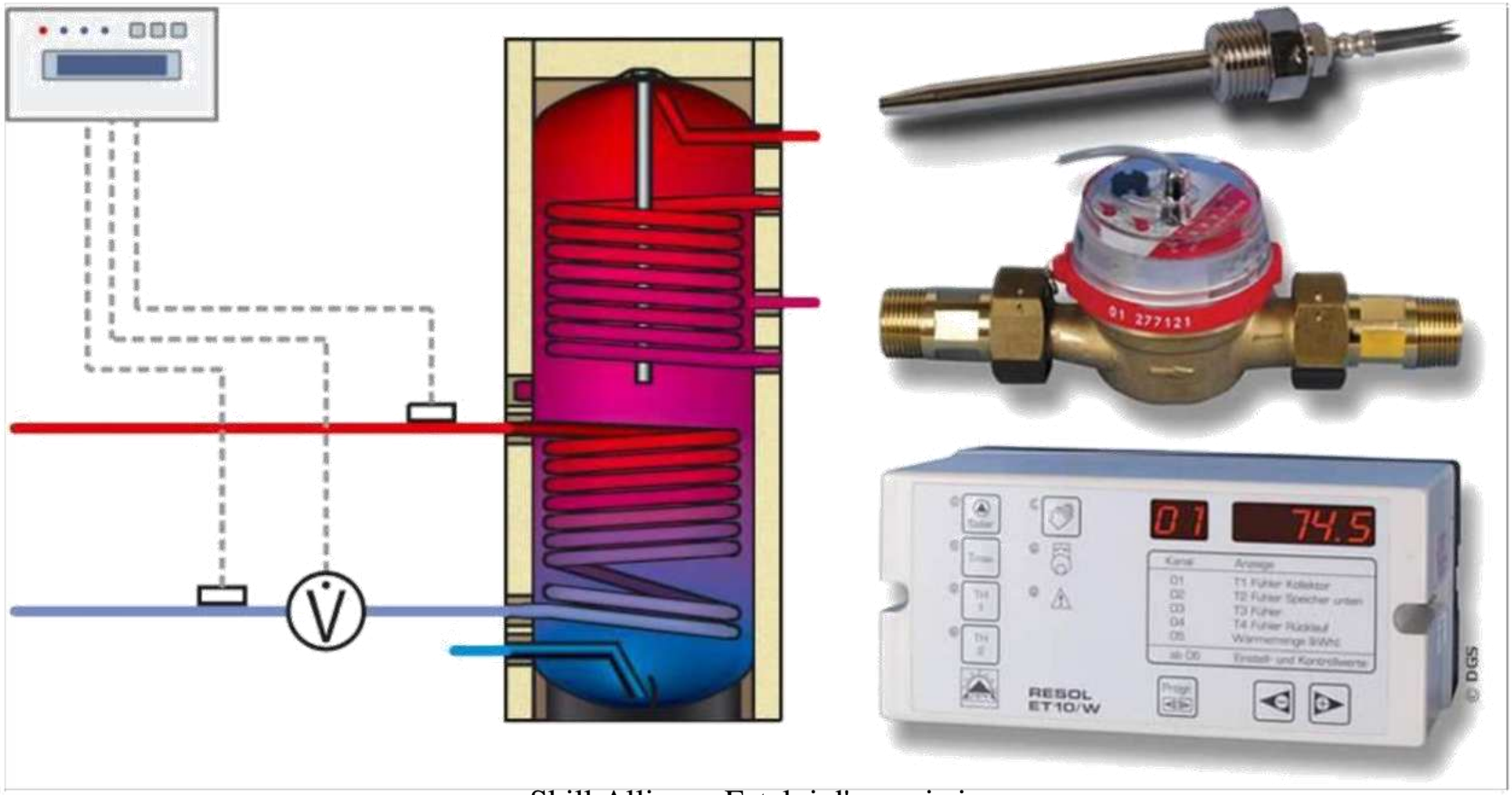
+ 30% menys d'espai requerit

+ Coberta plana: possible muntatge horitzontal

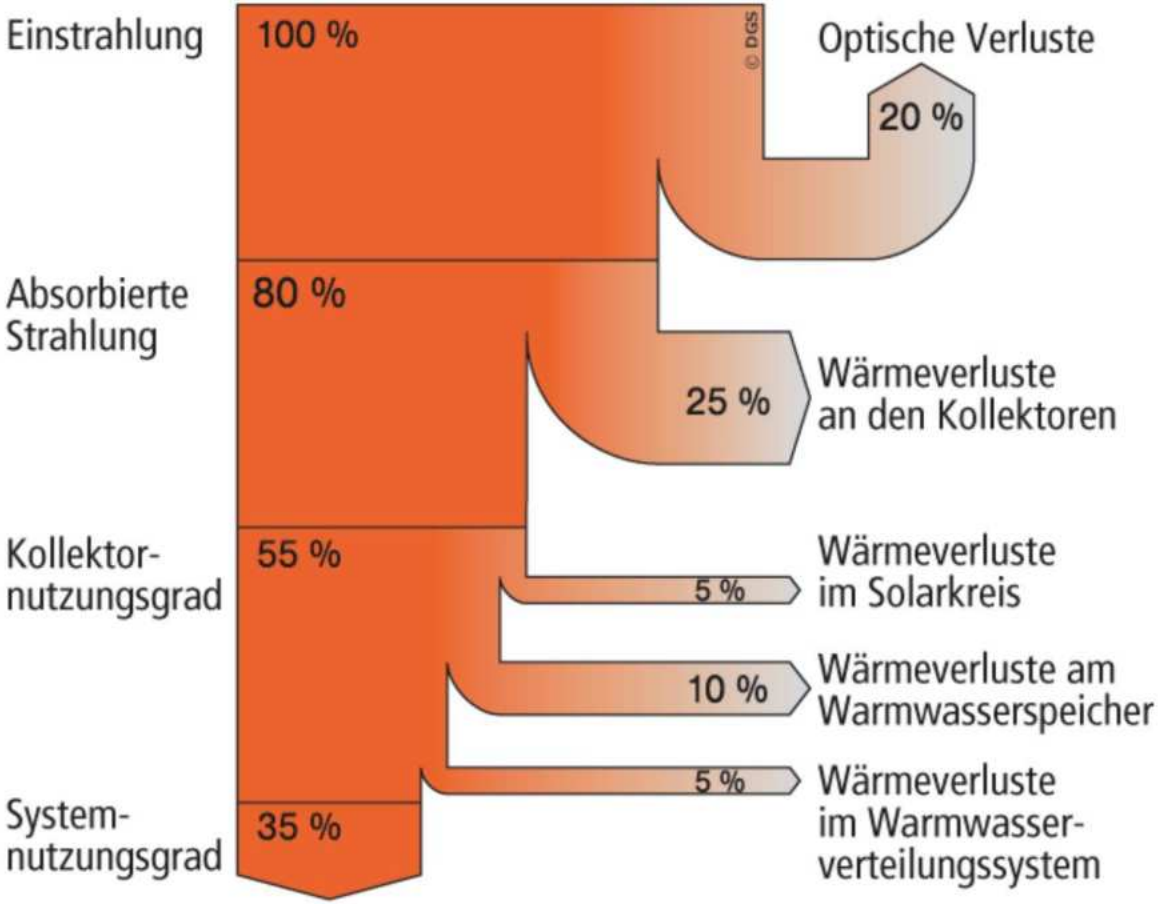
+ Orientació desfavorable (possibilitat de rotació)

+ altes temperatures

Calefacció Solar - Control

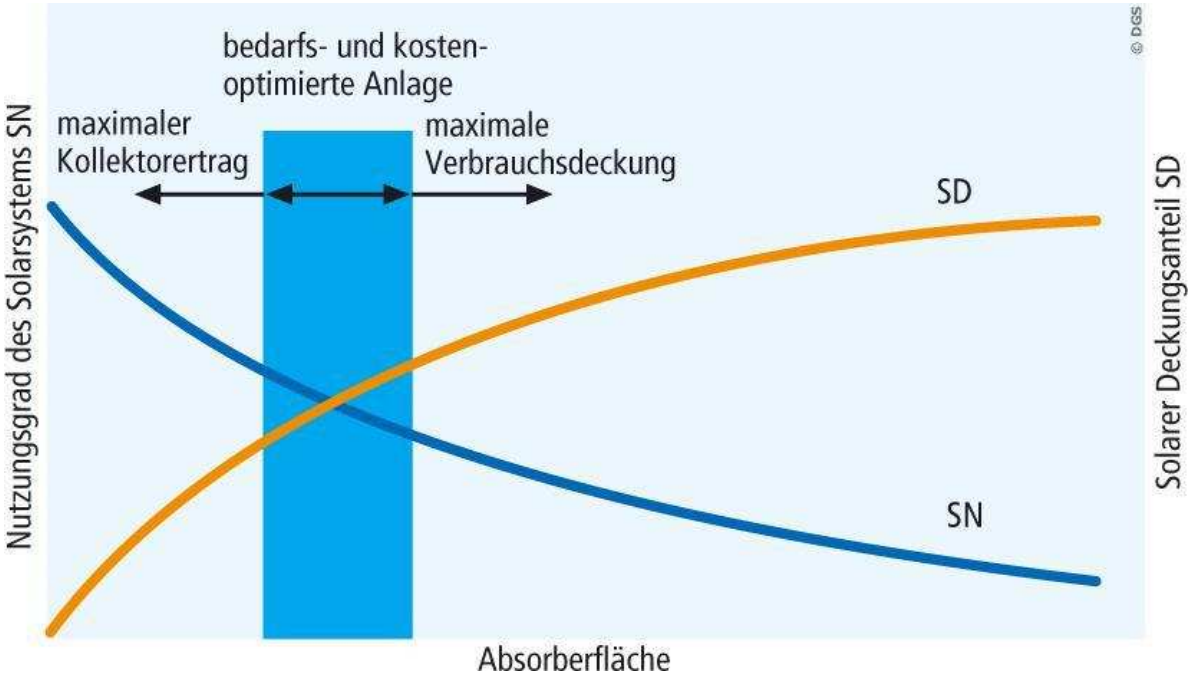


Calefacció Solar - Balanç



Sistemes Solars Tèrmics

- Planificació i interpretació



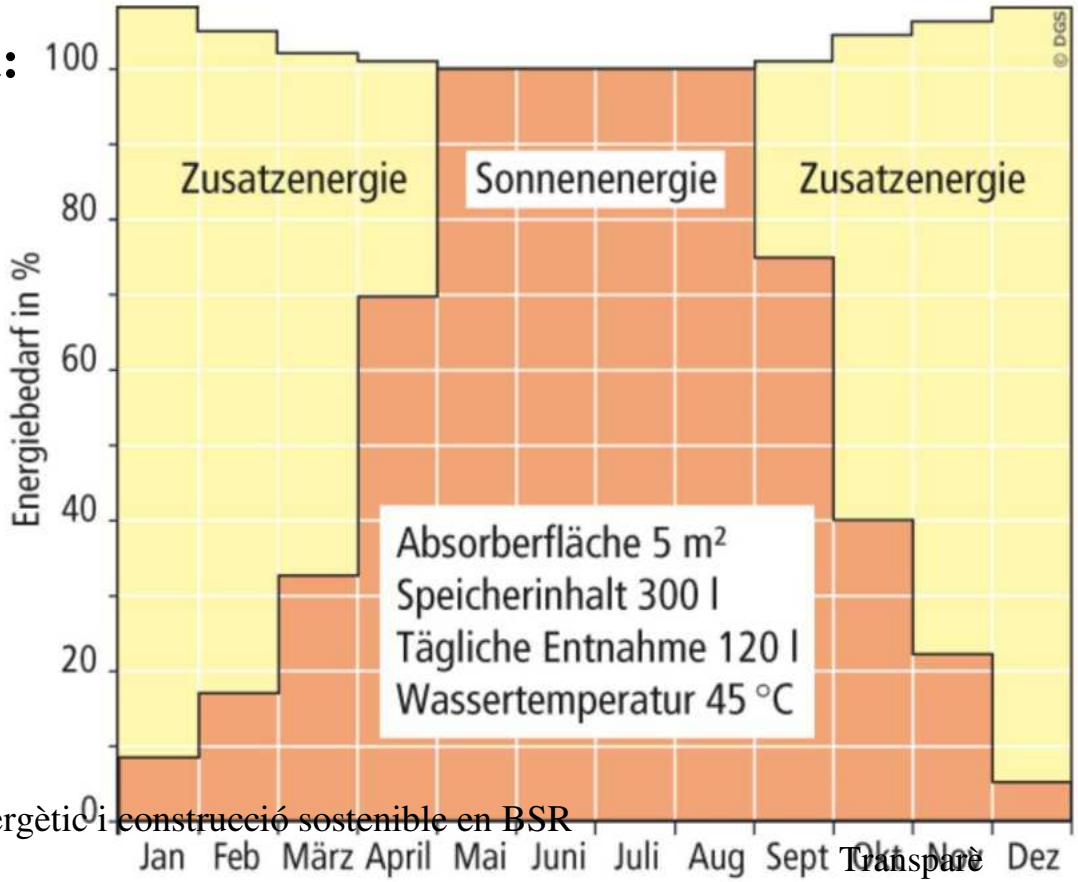
Interpretació:
60 litres (60 °C) d'aigua calenta per m² de superfície del col·lector
Dipòsit:

60 litres per m² de superfície de captador

Calor Solar - Dimensionament

Preparació solar d'aigua calenta:

- Superfície del col·lector:
  uns 1-1,5 m² per persona 1)
- Capacitat d'emmagatzematge:
  uns 80 litres per persona

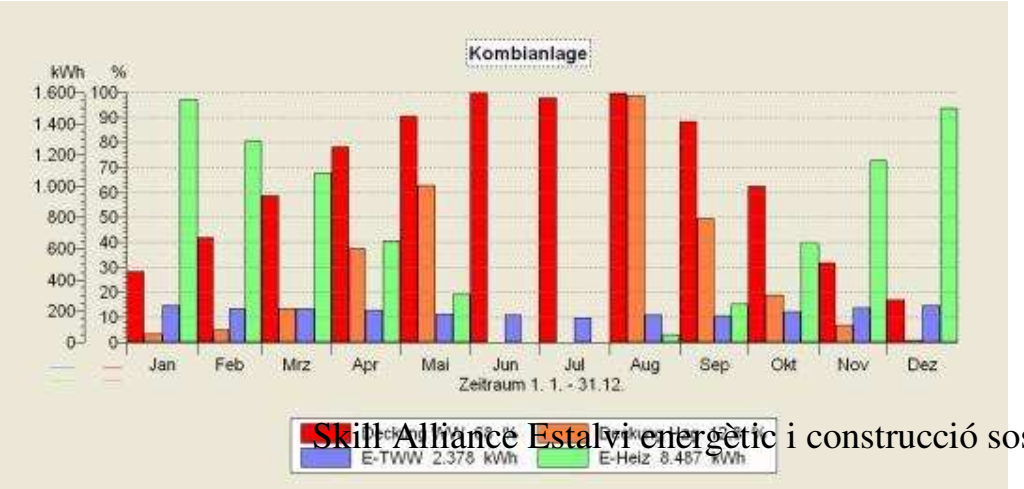


1) 1m^2 per a col·lectors de tubs de buit,
1,5m2 per a col·lectors plans

Calor Solar - Dimensionament

Suport a la calefacció solar :

- Superfície del col·lector
  uns 2-3 m² per persona [1)]
- Capacitat d'emmagatzematge:
  uns 50 litres de capacitat d'emmagatzematge per m² de superfície de captador [2)]



1) 2m^2 per a col·lectors de tubs de buit
3m2 per a col·lectors plans
2) 60 L per a col·lectors plans
80 L per a col·lectors de tubs de buit

Grans sistemes solars tèrmics

- Edificis residencials
- Residències geriàtriques
- Hospitals
- Instal·lacions de l'allotjament (hotels, pensions)
- Colònies
- Bugaderies
- Rentat de cotxes
- Cerveseries
- Instal·lacions esportives
- ... Sistemes amb un elevat consum d'aigua calenta durant tot l'any (almenys en temporada d'estiu)

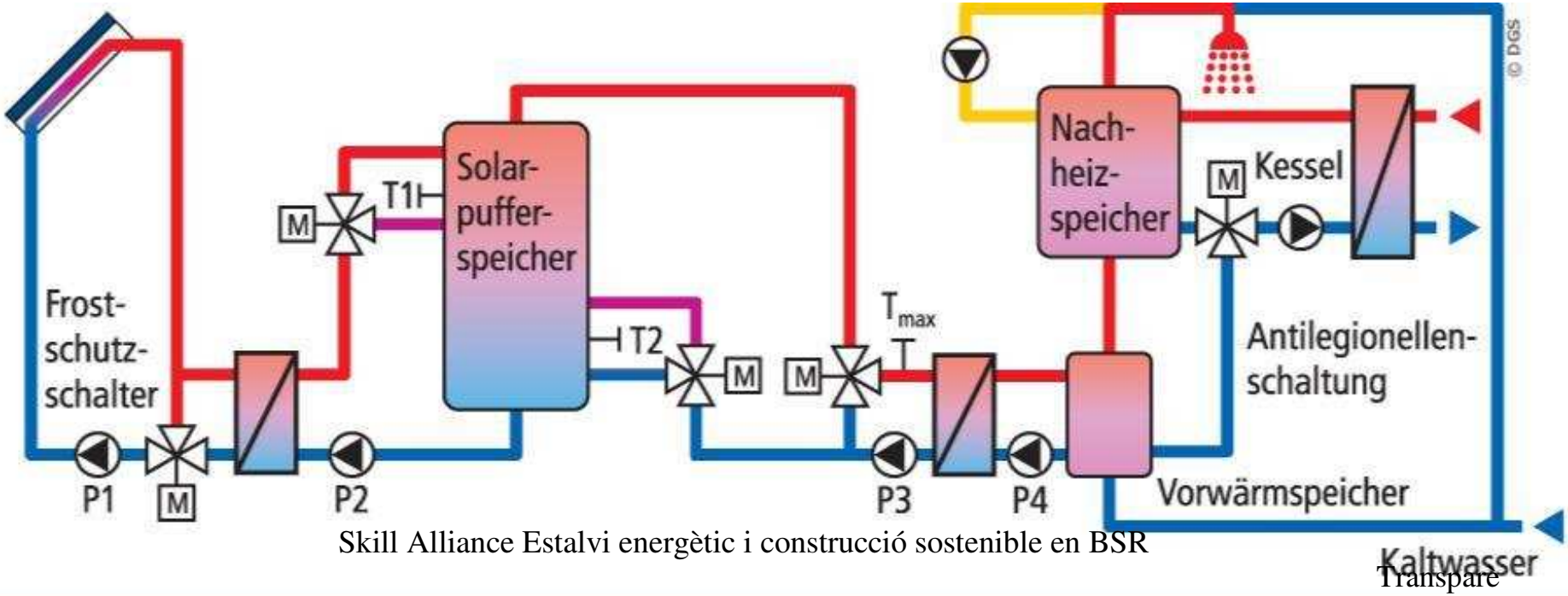
Calefacció solar - Exemple de grans sistemes

Calefacció solar - Exemple de grans sistemes

Calefacció solar - Exemple de grans sistemes

Calefacció Solar – Grans Sistemes

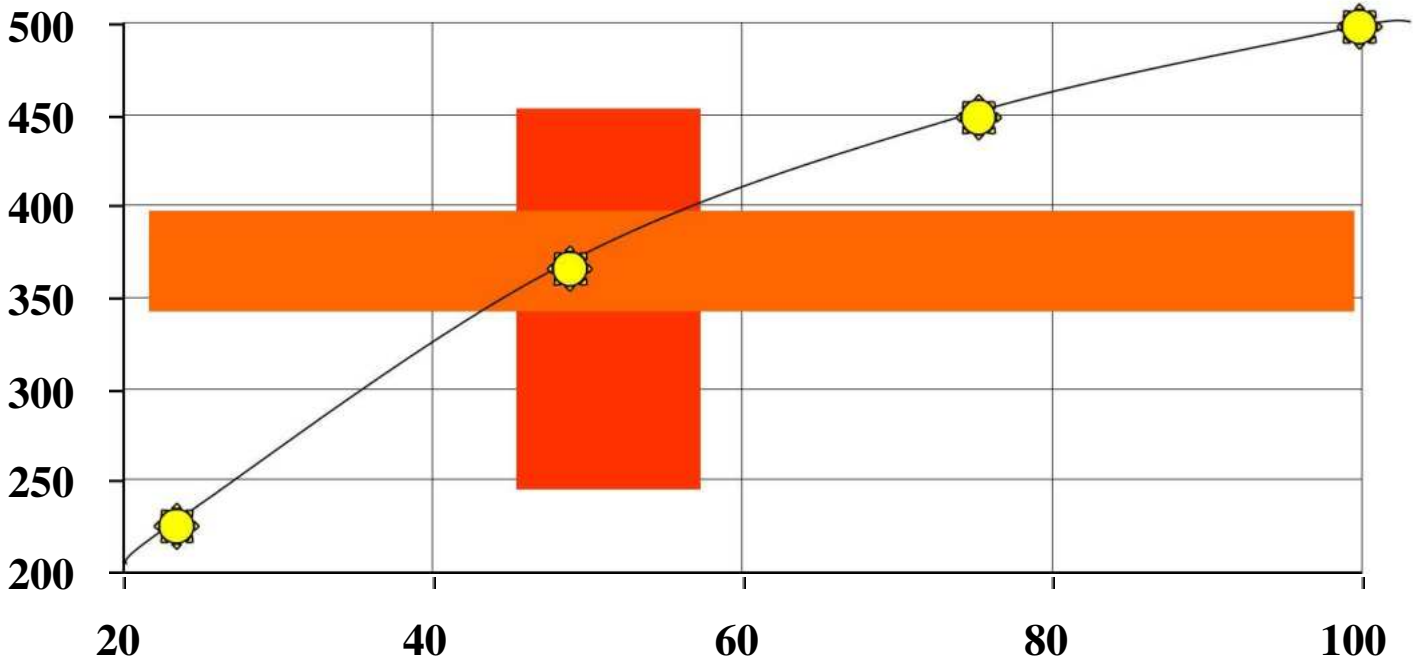
- **Principi de descàrrega del tanc a l'emmagatzematge de postescalfament amb un emmagatzematge addicional de preescalfament**



Calefacció Solar - Dimensionament

Rendiment del cercle solar [kWh/m²a]

Recomanació:
Càrrega de 45 – 55 [Litre (60 °C) /m²]



Càrrega [litre/m²]

Calefacció solar - Costos i beneficis

- **Costos i beneficis**

Costos específics d'inversió en funció de la mida de la instal·lació
uns 500 - **1.500 €/metre quadrat de superfície de captador**

(Estònia: uns 1.500 / per metre quadrat de superfície del col·lector)

Rendiment específic del cercle solar
350 - 450 kWh/m^{2}anys

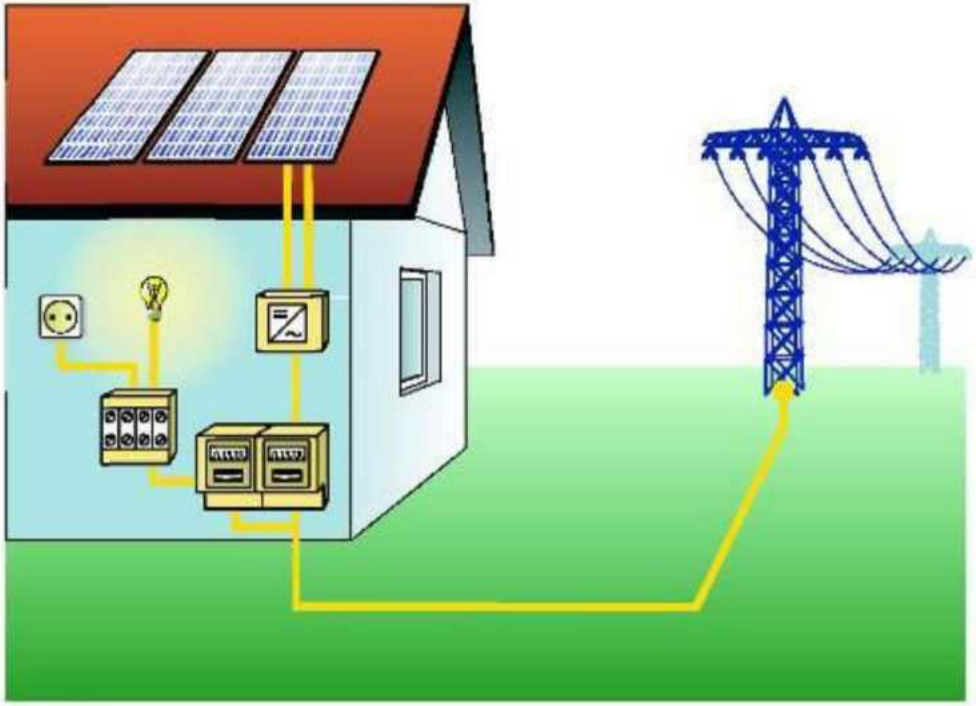
Estalvi energètic en la demanda total de calor
depenent de la mida i concepte de la
instal·lació

al voltant del 10 - 40 %

En cases solars fins al 100%

Energia solar

- **Estructura i funció**



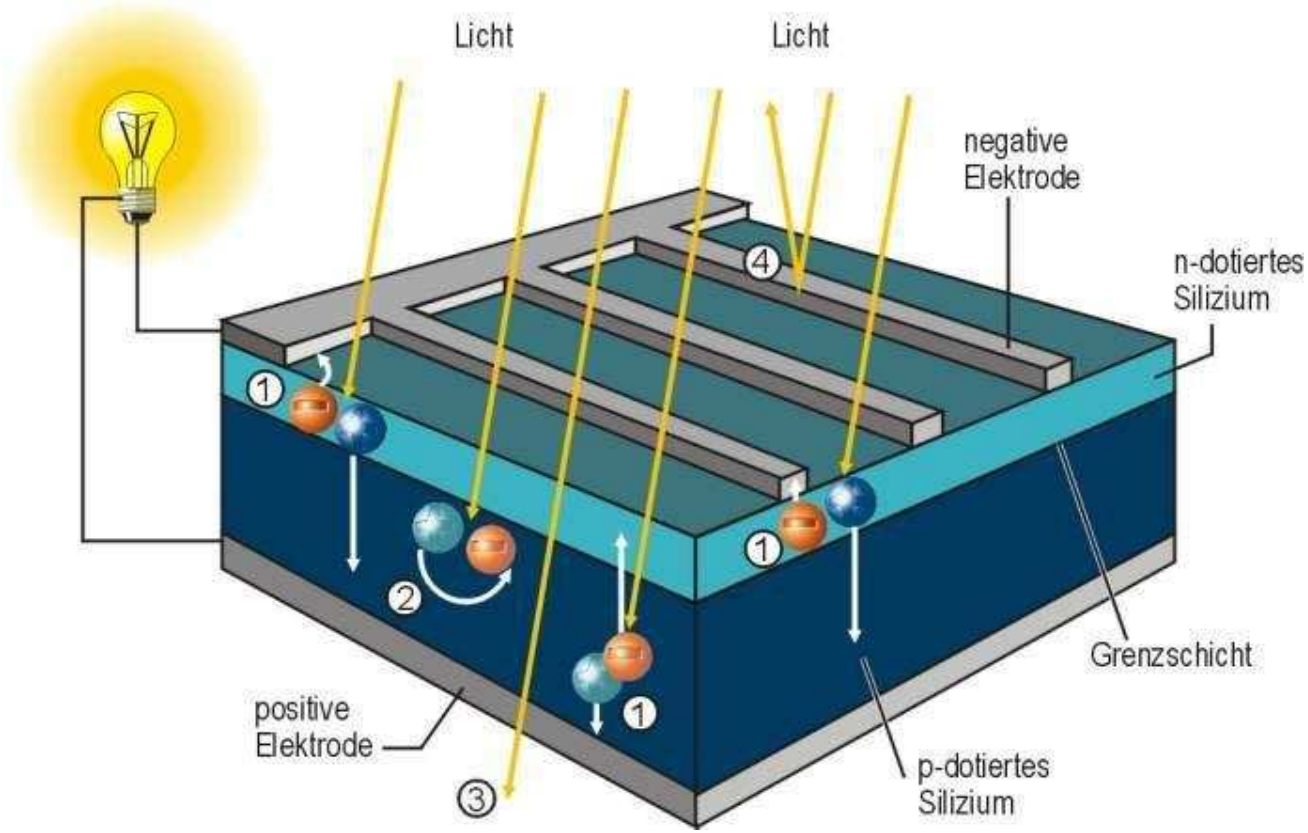
- **Estructura i funció d'una cèl·lula solar**

Separació de càrregues

Recombinació

Energia del fotó no utilitzada

Reflexió i ombreig a través de contactes frontals



Energia solar - Conceptes bàsics

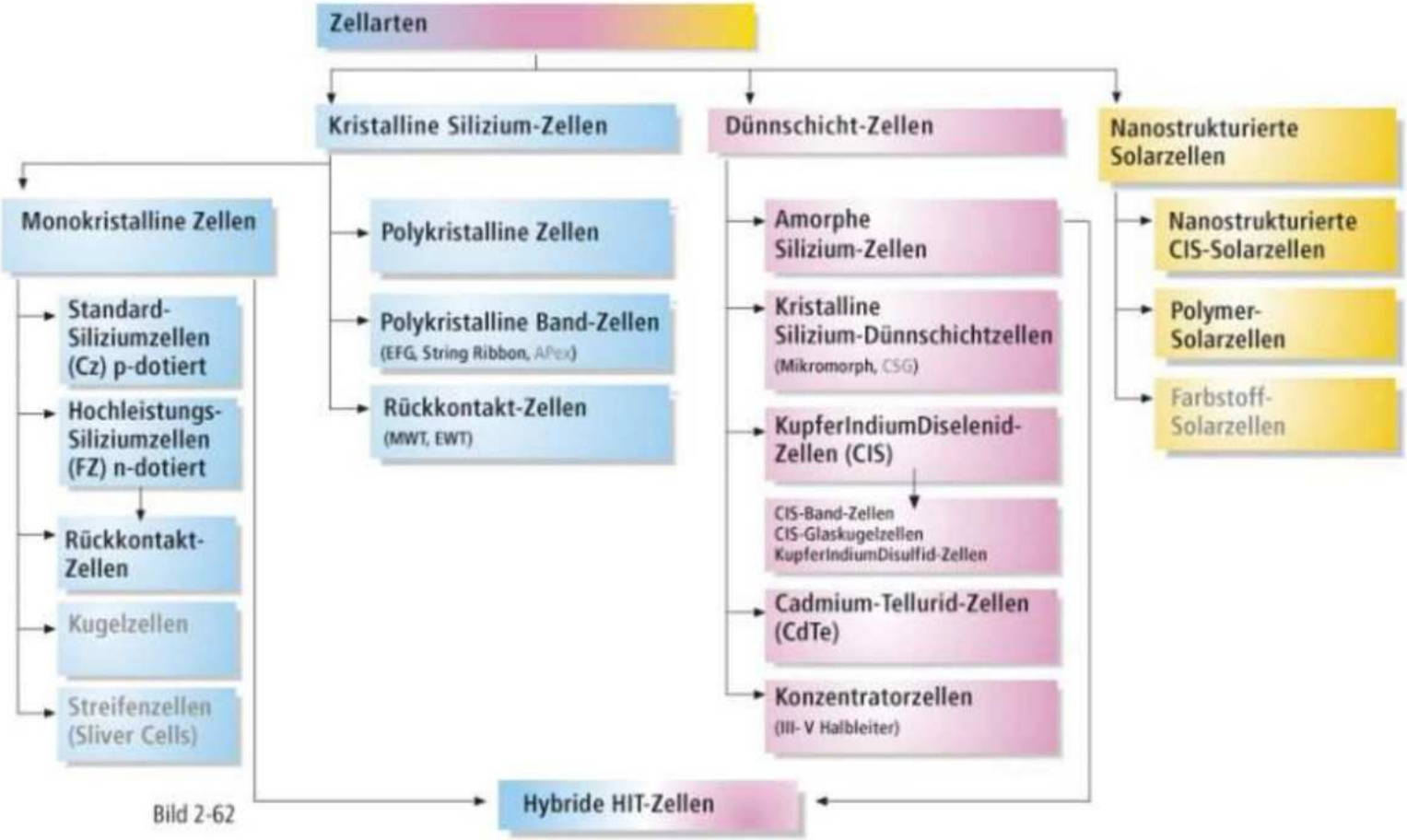
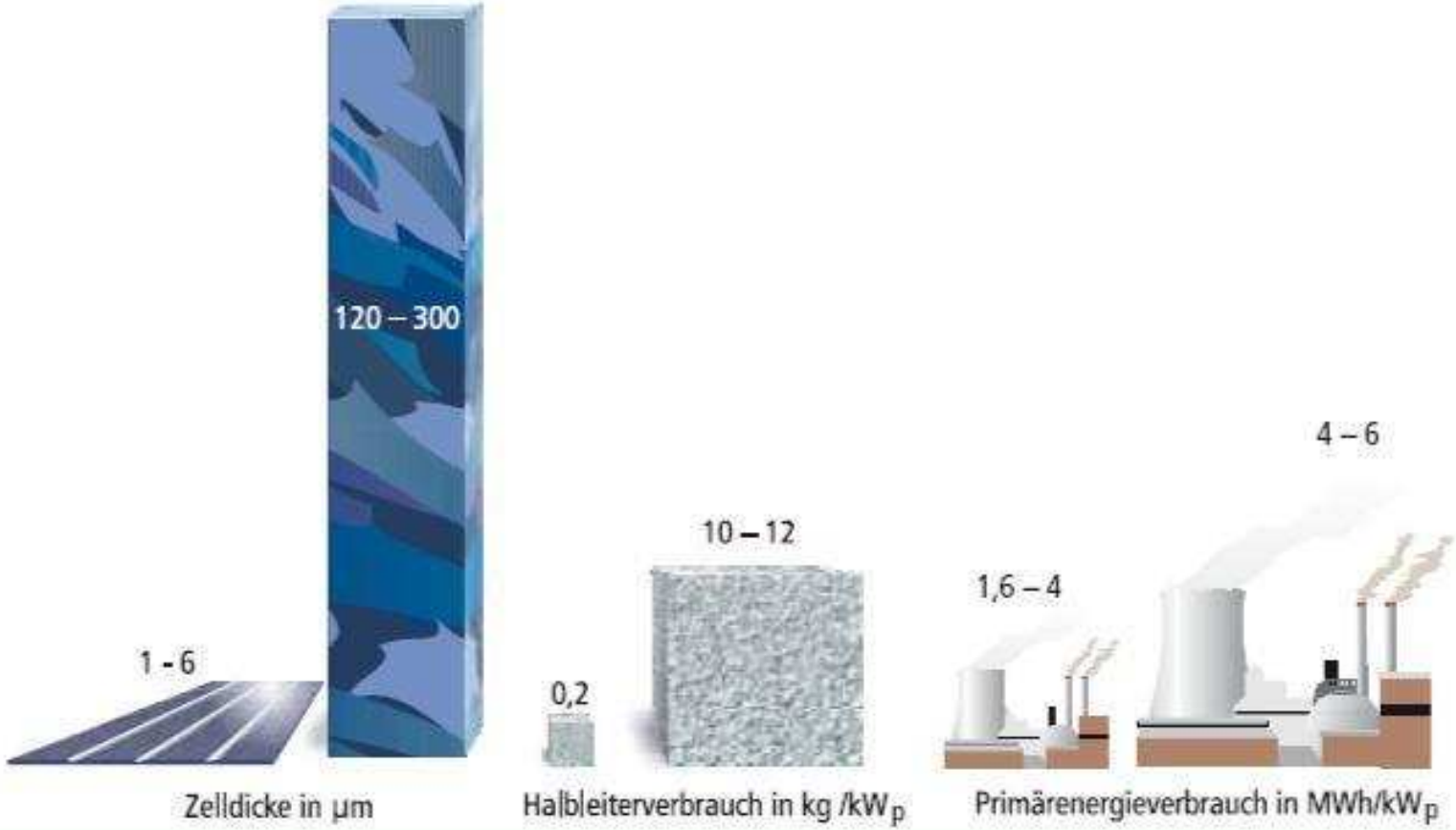
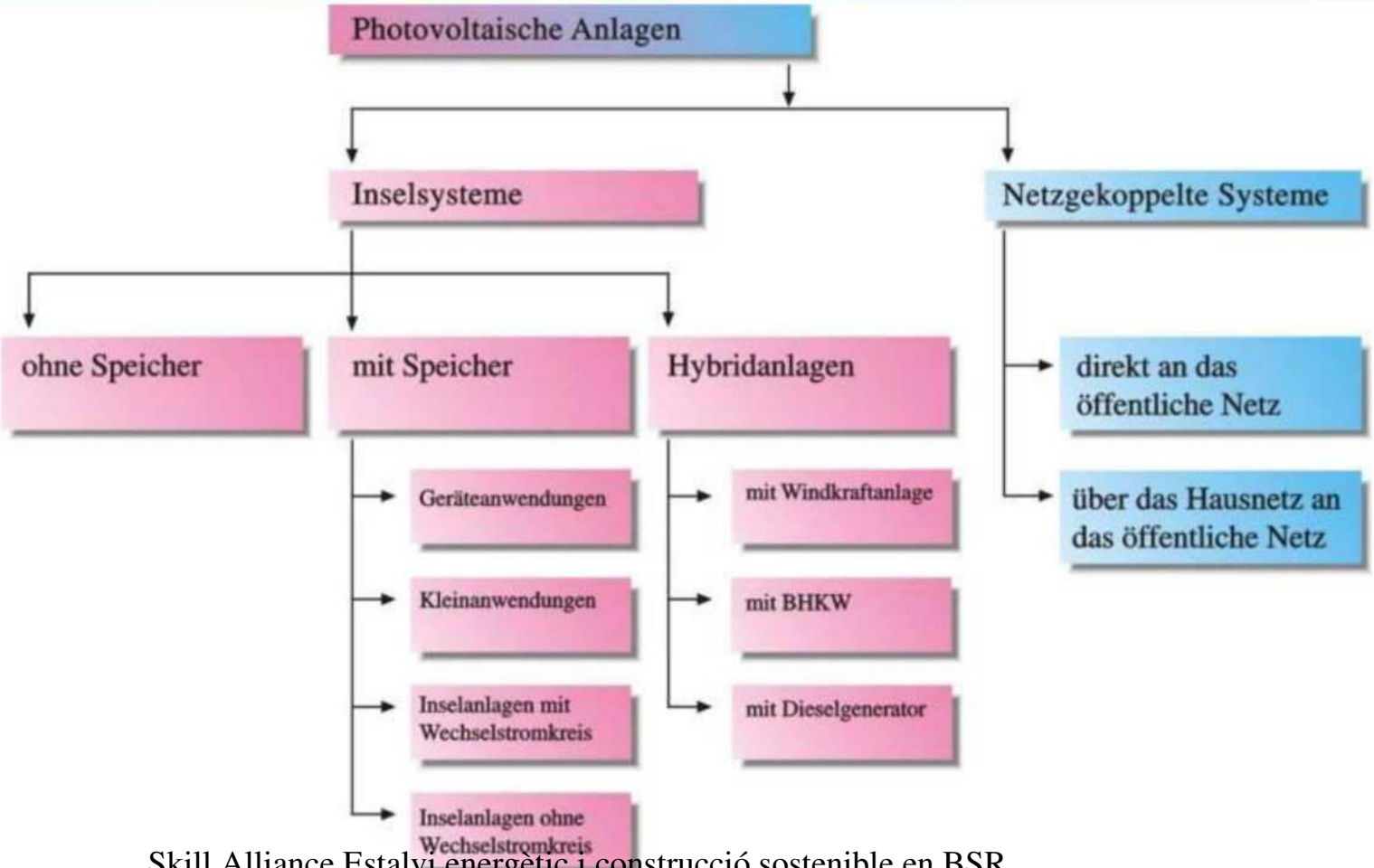


Bild 2-62

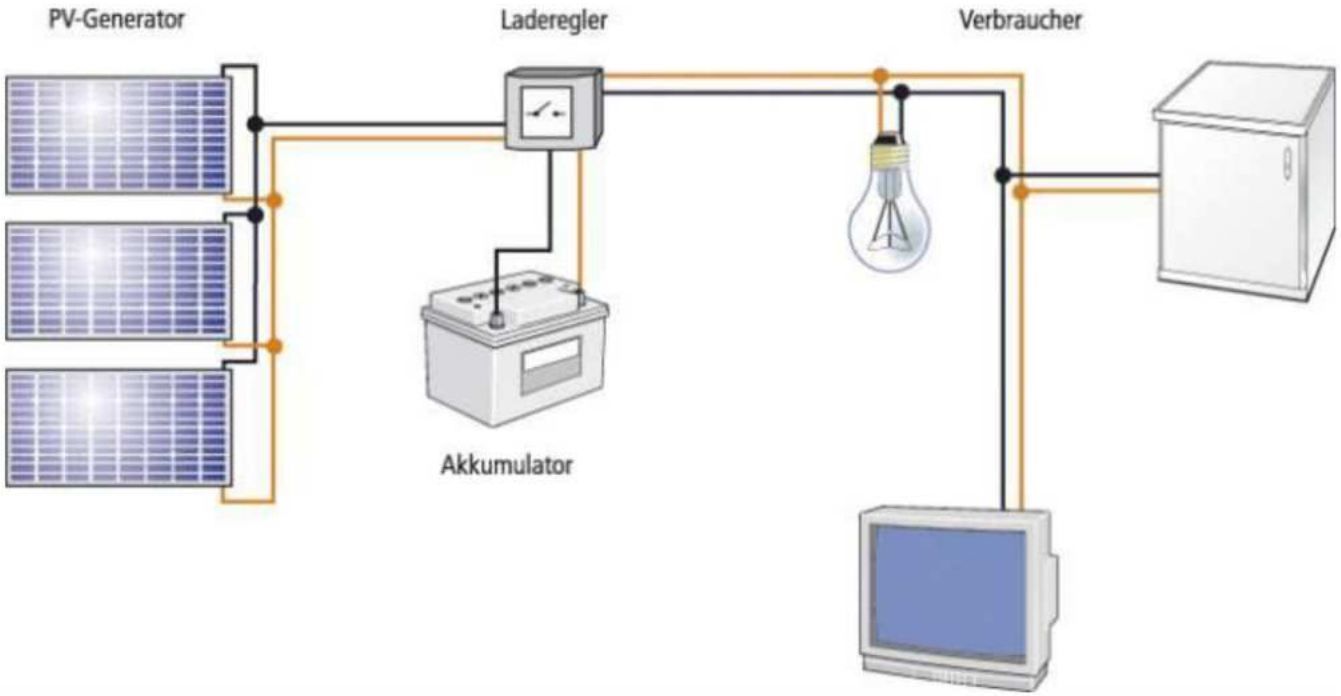
Comparació amb cèl·lules cristal·lines de capa fina



Energia Solar – Enginyeria d'Instal·lacions



Energia solar – Sistemes fora de la xarxa



Energia solar – Instal·lacions connectades a xarxa

Generador fotovoltaic:
en sèrie i mòduls fotovoltaics connectats en paral·lel amb bastidor de muntatge

(1) Caixa de connexions generador (amb equip de protecció)

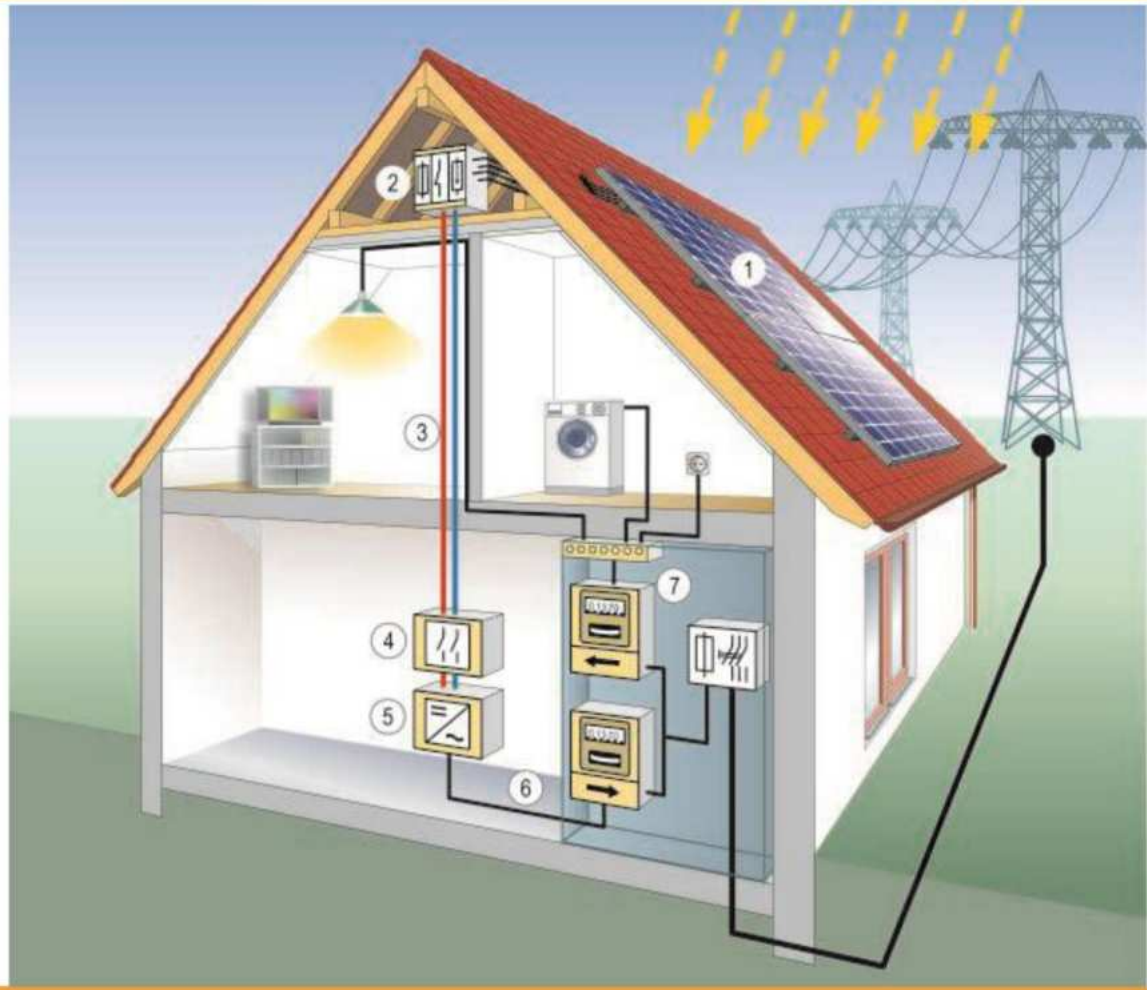
(2) Cablejat DC

(3) Interruptor principal DC

(4) Invers

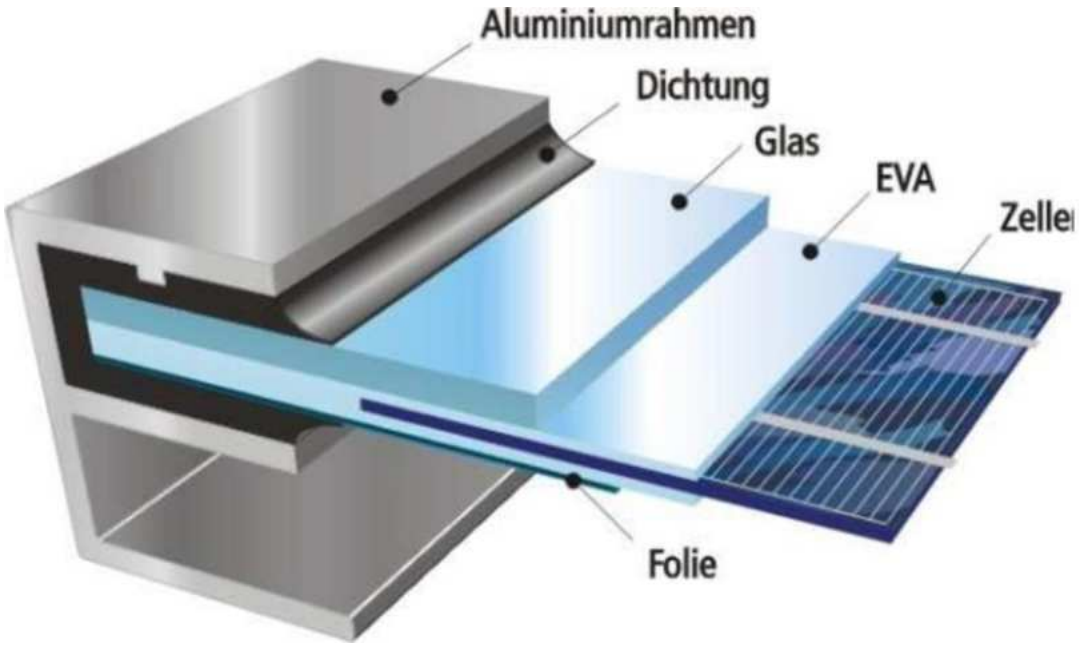
(5) Cablejat AC

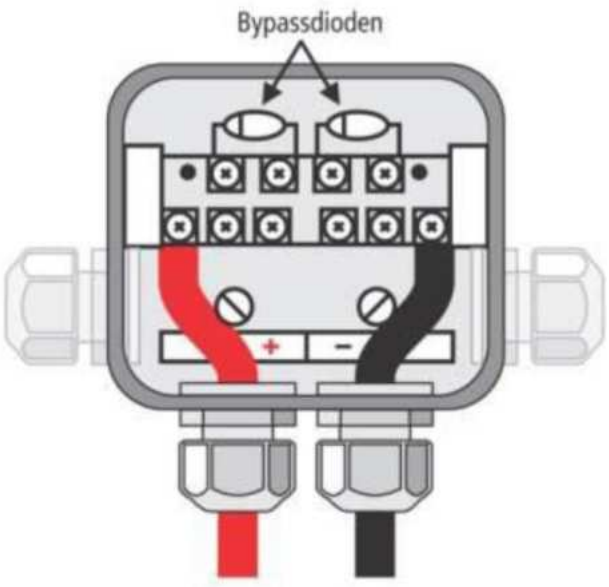
(6) Caixa de comptadors amb distribució del circuit, entrada i sortida de comptadors i línies de servei



Energia Solar - Components

- **Estructura** modular



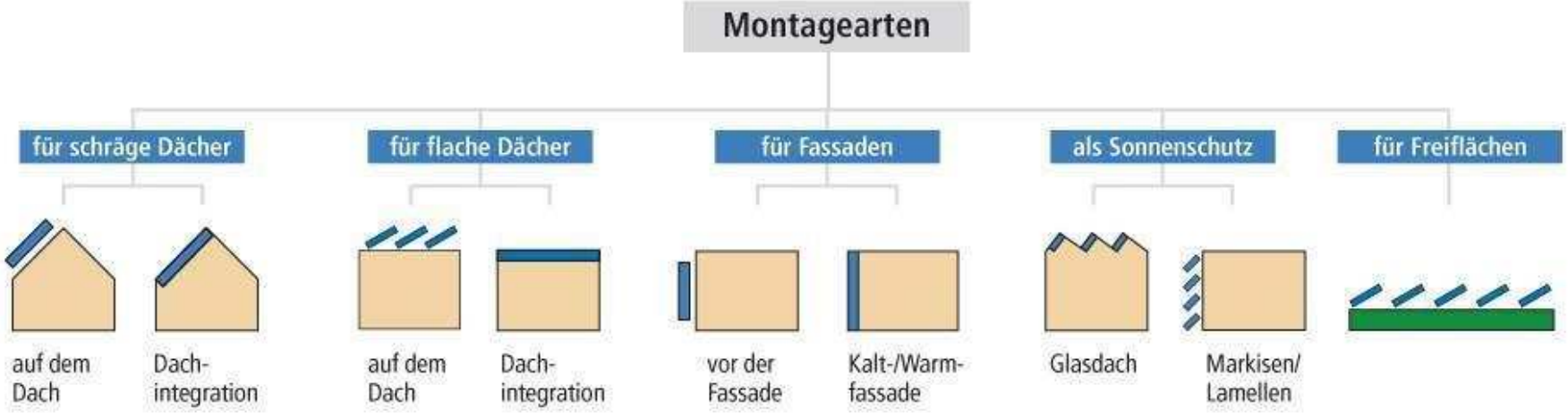


Energia Solar - Components

Invers

Panell solar

Energia Solar - Muntatge

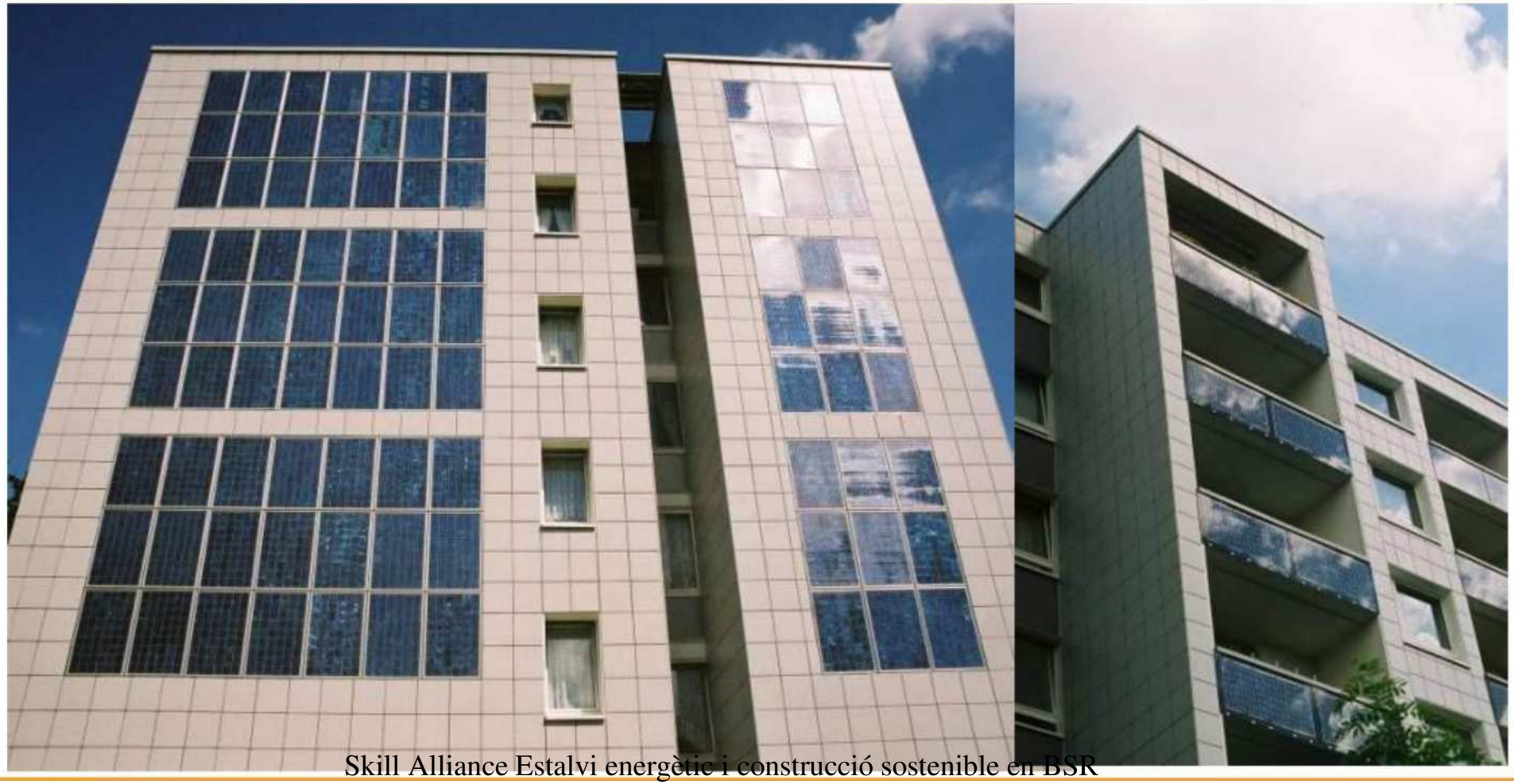


Requisits d'espai

Material cel·lular Eficiència del panell	Superfície del panell necessària per a 1 kW p	
Monocristal·lí	11–16 %	7–9 m^2
Policristal·lí (EFG)	10–14 %	8–9 m^2
Policristal·lí	8–10 %	9–11 m^2
Capa fina: coure-indi-diselenur (CIS)	6–8 %	11–13 m^2
Capa fina: amorf	4–7 %	16–20 m^2

Energia Solar - Exemples

Energia Solar - Exemples



Energia Solar - Exemples

Dimensionament

1 kW_p requereix aproximadament 10 m2 d'espai

1 kW_p produeix uns 800 kWh/any

Requisits:

- manca d'ombra

- azimut entre sud-est i sud-oest

Energia solar

- **Costos**

1 kW_p costa uns 2.500 € – 3.500 €

1 kW_p produeix uns 800 kWh/any En el cas del consum elèctric la cobertura > 30%

En el cas de compensació d'alimentació elèctrica (EEG)

Estònia: avantatges fiscals,
préstecs, certificats verds

- **Desenvolupament de costos**

Energia solar
dins
Alemanya

Bons exemples: Solar Tèrmica

Exemple 1 CÀMPING

Llocs:
400

Superfície del col·lector:
30m²

Mida d'emmagatzematge:
1800 L

Estalvi mesurat:
70%

Bons exemples: Solar Tèrmica

Exemple 2 HOTEL

En el transcurs d'una renovació integral de l'hotel **es va instal·lar la instal·lació solar tèrmica per escalfar aigua.** 51 m2 de col·lectors plans escalfen el total de 4.500 litres de magatzem tampó. D'aquesta manera s'aconsegueix anualment l'estalvi energètic del 70%. Amb unes despeses d'inversió de 37.000 € i un finançament de 14.700 €, la instal·lació es va amortitzaren un termini de 8 anys.

Exemple 3 EMPRESA DE MÀQUINES I ACER

Calefacció estella : 100 kW
Instal·lacions solars de suport a l'escalfament i la calefacció d'aigua,
Superfície del col·lector: 80^{m2}
Rendiment mitjà del cercle solar: 381 kWh / m 2 anuals
Emmagatzematge amortidor: 5.900 l Així, potencial de reducció de CO_2: 9.436 kg/any

Bons exemples: Solar Tèrmica

Exemple 4 ECONOMIA DE L'HABITATGE

'The Settlement Garden City of Farmsen' es va convertir en un 'poble solar'. A finals de 2009, aproximadament 1.100 llars van rebre ajudes per a calefacció renovable i aigua calenta. A partir d'aproximadament 1.200 m² de superfície captadora es produeixen anualment aproximadament 500.000 kWh d'energia. Objectiu: el desenvolupament de l'energia solar per a l'any 2014, d'aproximadament 2.000 metres quadrats de superfície captadora per a 1.825 habitatges (el 71,5% del parc d'habitatges).

Bons exemples: l'energia solar

Exemple 5 Fotovoltaica - INDÚSTRIA

Fronius s'ocupa des de 1992 de l'electrònica solar, en particular de la
Desenvolupament i producció d'inversors fotovoltaics per a fonts d'alimentació acoblades a xarxa i autònomes. Actualment la planta d'energia solar fotovoltaica més gran d'Àustria es va construir a la part superior de l'edifici de la companyia Fronius a Sattledt / Àustria: capacitat 604 kWp

Bons exemples: l'energia solar

Exemple 6 Fotovoltaica - TALLERS

Oferta tallers ROST
serveis en l'àmbit de la impressió, publicitat i fires.
Panells fotovoltaics a la coberta de la coberta
- Mida de la instal·lació: 101 kWp
- Producció elèctrica: 64000 kWh/any

Bons exemples: l'energia solar

Exemple 7 Fotovoltaik - AGRICULTURA

En total es van muntar **109 kWp d'instal·lacions fotovoltaiques** a les edificacions ramaderes de la finca. Aquesta instal·lació produeix uns 92.000 kWh anuals d'energia solar. Amb uns costos d'inversió d'uns 200.000 €, la inversió es refinançarà en un termini de 10 anys a través de la compensació d'alimentació (EEG).

Calefacció solar i energia solar a Estònia

El petroli d'esquist és la font d'energia més important d'Estònia.
La proporció d'energia renovable en el consum total d'energia el 2008 va ser del 13,5% a Estònia. L'energia orgànica i eòlica són els tipus primaris aquí.
L'energia solar s'utilitza a Estònia en petita mesura. Els primers projectes solars (per exemple, sistemes solars tèrmics per a l'hospital de Vändra, SOS Children's Village a Keila) s'implementen per a la producció de calor solar.
Segons la llei del mercat elèctric, els costos d'energia solar es reemborsen (Elektrituruseadus) des de l'1 de juliol de 2010 al nivell de 5,37 cèntims / kWh.

- **UE – Directrius i programes de suport**
  Regulacions/decisions:

  Energies renovables:
  Directiva 2009/28/CE
  Objectiu: Augmentar el nombre total d'energies renovables fins al 2020 fins al 20%. Incl. Plans d'Acció Nacionals (Estònia: del 18 % el 2005 al 25% el 2020 de la quota final d'energia consumption).

UE – Finançament (directe/indirecte)

Sol·licitar un finançament directe de la UE requereix una quantitat significativa de temps i burocràcia. Això s'aplica als programes directes de finançament de la UE com LIFE III, Energia intel·ligent per a Europa, Marco Polo, Leonardo da Vinci. Aquests projectes es creen sobre valor afegit europeu (un consorci ambels seus socis)

Més avantatjosos són els programes en què els fons nacionals / regionals de la UE estan disponibles indirectament del Fons Estructural i de Cohesió. Aquest marc és adequat per a projectes de PIME, en particular procedents del Fons Europeu de Desenvolupament Regional (FEDER). Exemple a Polònia: el Programa Operatiu Sectorial per augmentar la competitivitat de les empreses (7.000 milions per al període 2007-2013)

Diverses fases de les consultes

1. Conèixer-se: construir ponts
2. Preguntes – identificant les necessitats
3. Oferir solucions – consolidar i negociar
4. Assoliment de resultats – finalització

- **Resum de la conclusió**
  - Fets
  - Webs importants

  Retroalimentació
  - Contingut?
  - Presentació?
  - S'han assolit els objectius?
  - Ús per a aplicacions pròpies?
  - Què falta?
  - Propostes de millora

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Training II for SMEs: Solar Energy – Technology and Applications

Implementation report

Prepared by:

Latvian Chamber of Crafts

February, 2024

Co-funded by the Erasmus+ Programme of the European Union

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Attachments ..... **Fehler! Textmarke nicht definiert.**

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Introduction

The Latvian Chamber of Crafts aims to foster the professional growth and development of crafts masters - SME employers and employees, as well as self-employed individuals across Latvia. As the global energy landscape evolves, the importance of adopting sustainable and cost-effective energy solutions becomes increasingly crucial. This training course, focusing on the potential of solar technologies for energy saving measures, is an invaluable resource for members of the Chamber. It aims to provide comprehensive insights into the utilization of solar energy for both heating and electricity, equipping participants with the knowledge needed to make informed decisions that can significantly enhance their operations. For Latvian Chamber of Crafts' SMEs and craft businesses, the shift towards renewable energy sources such as solar power represents a strategic move towards sustainability, economic efficiency, and environmental responsibility.

The course provides participants with the knowledge on how to implement solar technologies that can lead to substantial energy savings. By reducing dependency on traditional energy sources, businesses can lower operational costs, thereby increasing profitability. Understanding the cost-effectiveness and payback periods of these technologies can enable participants to make sound investments in solar systems.

With global warming and climate change posing significant challenges, adopting solar energy solutions aligns with broader environmental goals. The course educates participants on how solar energy can contribute to promoting a greener and more sustainable business model that complies with environmental regulations and enhances corporate social responsibility.

Knowledge of the advancements in solar thermal and photovoltaic systems, including construction, operation, and maintenance, is crucial for understanding the renewable energy landscape. The course covers aspects of system design, installation, and troubleshooting, ensuring that participants understand the technical demands of solar energy projects. By learning to design and dimension solar systems tailored to specific business needs, participants can strategically plan the integration of solar energy into their operations. The theoretical knowledge of these systems is supplemented by real-world examples to provide insight and certainty that these measures can be implemented by businesses similar to those of the participants'.

Finally, understanding the various support programmes available, as well as the market conditions for solar energy in Latvia and regionally, enable participants to maximize financial benefits.

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In conclusion, this seminar is a great educational addition for the Latvian Chamber of Crafts and its members. By participating, SME employers, employees, and self-employed individuals gain valuable skills and insights that will guide them towards a more efficient, sustainable, and profitable future.

Admission and organisation of the training

Latvian Chamber of Crafts disseminated information about the chance to participate in the training by phone and e-mail.

The training was implemented by Latvian Chamber of Crafts' member Ingars Kolčs.

The curriculum was prepared by the Hanse Parlament. Minor additions were made, such as information about local technology installation specifics, regional market situation and support programs.

The training was attended by 15 participants. All the training participants were Latvian Chamber of Crafts members (self-employed persons or SME representatives).

The training was held over a period of 2 days, as suggested by the Hanse Parlament.

The two day seminar plan can be found below.

"Solar Energy – technology and applications" curriculum (16 hours)

Day 1

No.	Topic	Hours
1.	Purpose of implementing solar energy measures.	1
2.	Market situation and possible application of solar thermal energy.	1,5
3.	Solar thermal system functionality and components.	1,5
4.	Solar thermal system planning and design	1
5.	Installation and assembly examples of solar thermal systems	1
6.	Maintenance, defects, causes and elimination.	1
7.	Costs and benefits, cost-effectiveness calculation.	1
	Total:	8

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Day 2

No.	Topic	Hours
1.	Large solar thermal systems.	1
2.	Photovoltaic market situation.	1
3.	Structure and functionality of solar power systems.	1
4.	Planning and dimensioning, and installation of solar power systems.	1
5.	Costs and benefits.	1
6.	Regional market situation and examples.	1,5
7.	EU and regional support programmes.	1,5
	Total:	8

Participants profile and organisation of the training

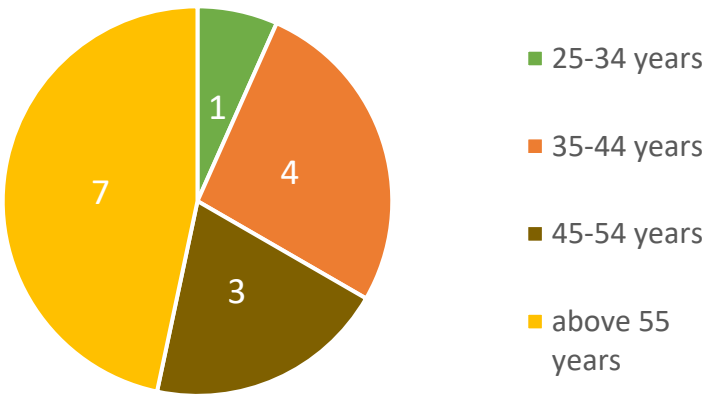
The training was held from 1 December to 2 December, 2022.

The training was carried out in person.

All of the participants of the Solar Energy – Technology and Applications training were members of the Latvian Chamber of Crafts.

All 15 participants were male.

Age of participants:



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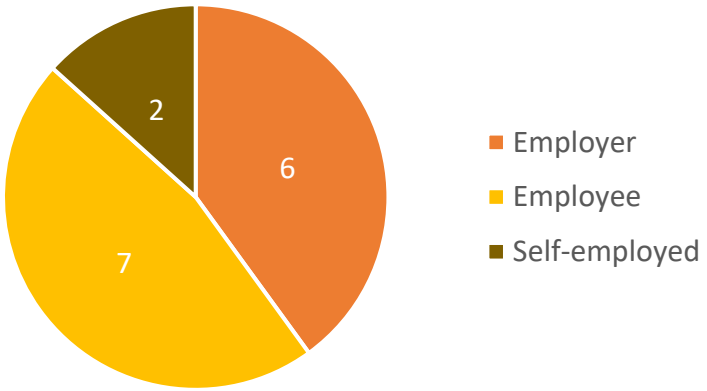
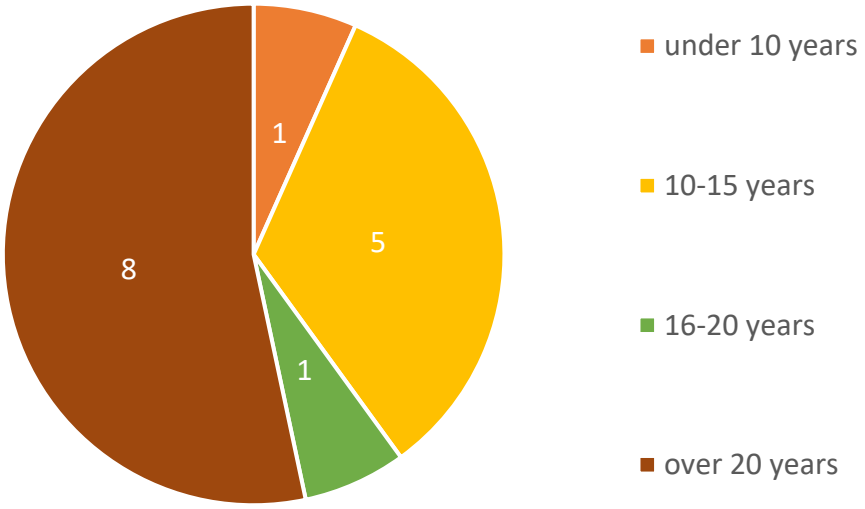
Most training participants came from SMEs. Two participants were self-employed craftsmen:



All of the participants came from the building crafts group.

The represented crafts were carpenter, tinsmith, roofer.

The work experience of the trainees ranged from 7 to 44 years:



Execution of the Training

The training consisted of two day seminars (8 and 8 hours). The training plan ensured that participants would receive a thorough and practical understanding of solar energy technologies and their application, enabling the trainees to make well-informed decisions for their businesses in the future.

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Day 1

Purpose of implementing solar energy measures (2 hour)

This session introduces the rationale behind adopting solar energy. It covers the global energy landscape, highlighting increasing consumption, diminishing resources, rising energy prices, and the impacts of global warming and climate change. This lays the foundation for the rest of the seminar and involves time for students to discuss the mentioned themes.

Market situation and possible application of solar thermal energy (1.5 hours)

A detailed examination of the current market for solar thermal energy, particularly in Latvia, and the various applications in both residential and commercial settings. Participants are equipped with knowledge about the market trends and potential applications of solar thermal energy, enabling them to identify opportunities within their own operations.

Solar thermal system functionality and components (1.5 hours)

Construction and operation of solar thermal systems. Trainees gain a more technical understanding of how solar thermal systems work and the essential components involved, laying the groundwork for system design and installation.

Solar thermal system planning and design (1 hour)

Focus on the design and planning aspects of solar thermal systems, including rules of thumb for effective planning. Providing participants with tools and guidelines to plan and design efficient solar thermal systems.

Installation and assembly examples of solar thermal systems (1 hour)

Examples of the installation and assembly of solar thermal systems, including real-world case studies.

Maintenance, defects, causes, and elimination (1 hour)

Covers defects in solar thermal systems, their causes, and how to address them through regular maintenance and troubleshooting. Equips participants with theoretical skills to maintain and troubleshoot solar thermal systems, ensuring long-term efficiency and reliability.

Costs and benefits, cost-effectiveness calculation (1 hour)

Discusses the financial aspects of solar thermal systems, including investment costs, energy savings, and methods to calculate cost-effectiveness and payback periods.

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Participants learn to evaluate the financial viability of solar thermal projects, helping them make informed investment decisions relevant to their own enterprises.

Day 2

Large solar thermal systems (1 hour)

Explores the application, planning, and cost-effectiveness of large-scale solar thermal facilities. Participants learn the specific considerations and benefits of implementing large solar thermal systems.

Photovoltaic market situation (1 hour)

Provides an overview of the current market for photovoltaic systems, highlighting trends, demand, and regulatory factors. Helps participants identify strategic opportunities.

Structure and functionality of solar power systems (1 hour)

Covers the components and functionality of solar power systems. Participants gain a comprehensive understanding of solar power systems and their components.

Planning and dimensioning, and installation of solar power systems (1 hour)

Focuses on the planning, understanding dimensions and installation of solar power systems, with practical guidelines.

Costs and benefits (1 hour)

Discusses the financial aspects of solar power systems, including investment costs, energy savings, and cost-effectiveness. Equips participants with the skills to evaluate the financial viability of solar power projects for their own enterprises.

Regional market situation and examples (1.5 hours)

Examines the regional market for solar power systems and renewable energy. Participants are informed about the supply and demand situation of different fields and encouraged to share their opinion and experience in their own field. Issues in the renewable energy landscape of Latvia are noted.

EU and Regional Support Programmes (1.5 hours)

Provides information on existing subsidy and credit programmes, tariffs, and examples of successful implementations. Participants learn about available financial support mechanisms and how to leverage them for their situation.

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Main Findings and Conclusions

Participants appreciated the course's breadth, noting that it covered everything from the basics of why solar energy is crucial to planning and installation of both solar thermal and solar power systems. The real-world examples and case studies were particularly valued, as they provided practical insights into how solar technologies can be implemented in various craft-related contexts.

Many participants noted that the course was their first introduction to solar system components, functionality, and maintenance.

The time dedicated to costs, benefits, and financial analysis was highlighted as crucial for making informed decisions as well as the discussion on the regional market situation and support programs.

Participants valued the opportunity to network with other craftsmen from both SME and self-employment sector, fostering conversation and comparison between the specifics of implementing renewable energy measures in different fields.

This training was seen as an important step towards implementing more sustainability-related themes in the trainings of the Chamber. Latvian Chamber of Crafts sees the possibility to continue implementing this kind of training program in the future, offering it to members of the chamber who are working in small and medium enterprises. It could be offered as either a two day seminar or part of a larger renewable energy training course. The addition of such a training has the potential to future-proof crafts businesses against rising energy costs.

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Training III Energy Efficient Construction and Application of Renewable Energies

- Curriculum
- Teaching Material (Presentation)
- Implementation Report

Curriculum for the Seminar

"Energy Efficient Construction and Application of Renewable Energies"

for Small and Medium-Sized Enterprises

Co-funded by the
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1. Introduction

Energy saving is a MUST for each country and every community. For new buildings, efforts are made through the statutory requirements to improve the construction standards relating to energy. In particular, retrofitting should be applied in the existing buildings, and thus also the application of renewable energies.
This Seminar is addressed to small and medium-sized enterprises which would like to get an overview of

- energy-efficient modernisation of buildings

and

- the use of renewable energies.

1.1 Target group

Managers and decision makers from small and medium-sized enterprises (SMEs)

1.2 Instructors

The Seminar has two technical focal points which should be covered by the instructors in terms of content with sound knowledge in theory and practice. This includes adequate knowledge of the relevant country-specific designs and requirements. In addition, there are methodological skills which are required, such as delivering presentations, working in groups and conducting discussions. Working on the topic "Optimised Construction and Calculation of our Model House" is supported by the energy advisory programme EVA 2010. The instructor should have already worked with this programme or familiarised themselves with it. Since the programme is available only in German, students do not have to enter much data. Therefore, a data set entitled "Project Brest" has been provided.
Additionally, an instructor should be provided for this Seminar who knows the market situation of the country, can inform the participants about the legal framework and can possibly report on the existing financial support measures.

1.3 Duration

The Seminar is divided into 21 teaching units (45 minutes each) and can be carried out in two days. As a further variant, the course will be conducted in three modules which include 6 / 8 / 7 teaching units.

1.4 Implementation

1.4.1 Technical Equipment

The correct implementation of the Seminar requires

- Instructor's PC with a beamer
- Stable Internet connection
- Blackboard
- Flip chart

Group work requires the availability of a computer for each participant group (every 4 participants). Moreover, it is also helpful if the students have a calculator.

1.4.2 Methodological Remarks

Das Seminar is to be understood as an overview of information, which presents the relationship between energy efficient construction / modernisation and the application of renewable energies. The focus is on information exchange and reflection whether the applications presented here could be adopted as market opportunities, both for application in the participants' own countries and other European countries. Therefore, the time data is to be understood as reference values and should depend on the interest of each participant group.

2. Seminar Concept

Introduction

The Seminar begins with an overview of the teaching units, getting to know each other and getting the motivation to participate in the Seminar.

2.1 Teaching Unit 1

Teaching Unit 1: Availability of Fuels, Projections and Overview / Energy Saving Measures

Slide set: Teaching Unit 1/ 30 slides

Topics

Key topic 1.1: Fossil Fuels and their Development (Slides 1- 6)
Key topic 1.2: Greenhouse Effect and Consequences of Global Warming (Slides 7 - 15)
Key topic 1.3: Energy Saving, Efficient Energy Use,
Economic Application of Renewable Energies
Legal Framework of the EU (Slides 16 - 30)

Learning Objectives for Teaching Unit 1

The Participants
...are informed on the state of the world's energy consumption and the finiteness of fossil resources
...get an overview of the effects of combustion and its impact on the Earth system
... get an overview of the economics of various measures
...are provided with ideas in their own field (private / business) how to save energy, use it more efficiently and to consider renewable energies.

Form of Instruction

Lecture on the basis of the set of slides, discussion on the basis of the presented contents

Duration

2 teaching units, including the introduction (90 minutes)

2.2 Teaching Unit 2

Teaching Unit 2: Insulation Standards in the EU and Different Insulating Materials

Slide set: Insulating Materials / 31 Slides

Topics

Key topic 2.1: Energy Consumption in the Household (Slides 31- 35)
Key topic 2.2: Digression on Physics (Slides 36 - 39)
Key topic 2.3: Insulating Materials and their Properties (Slides 40 - 52)
Key topic 2.4: Application Examples of Various Insulating Materials (Slides 53 - 61)

Learning Objectives for Teaching Unit 2

The Participants
...should recognise which consumers are significant to energy consumption in the household
...are taught how the insulating effect of a material is obtained and how it can be measured in order to be able to undertake classification.

Form of Instruction

Lecture on the basis of the set of slides, discussion of the presented contents, description of real product examples, clarification of application examples

Duration

4 teaching units (180 minutes)

2.3 Teaching Unit 3

Teaching Unit 3: Determining the Final Energy Demand on the Basis of a Model House

Slide set: Determining the Final Energy Demand/ 21 Slides

Topics

Key topic 3.1: Energy Demand of Existing / Renovated Buildings (Slides 62)
Key topic 3.2: Model House Building Envelope (Slides 63 - 65)
Key topic 3.3: Calculation of the U-Value (Slides 66 - 70)
Key topic 3.4: Model House Energy Losses (Slides 71 - 78)
Key topic 3.5: Model House Emissions (Slides 18 - 82)

Learning Objectives for Teaching Unit 3

The Participants
...should recognise which savings potential is available in an average building from the 1960s and a building renovated according to the energy saving regulations / construction policy
...should recognise how the U-value is composed and how it affects the energy balance
...learn to assess what emissions are created with different insulation standards, and how they are changing.

Form of Instruction

Lecture on the basis of the available set of slides and the accompanying calculation in the Energy Consulting Programme EVA 2010. This programme is available as a 30-day trial version and the Model House Brest is provided as a project, also with the presented variants. Discussion on the presented content. Participants can create their own variants.

Note

The Programme EVA 2010 (German) can be downloaded as a 30-day trial version, from the Leuchter company in the download area from www.leuchter.de. The programme is in accordance with DIN 18599 for residential and non-residential buildings (in the programme it is possible to select the German and the English version)

Duration

2 teaching units (90 minutes)

2.4 Teaching Unit 4.1

Teaching Unit 4.1: Optimised Construction in the Planning

Slide set: Optimised Construction in the Planning, Building Envelope/ 25 Slides

Topics

Key topic 4.1.1: Identification of Weak Points by means of Thermography (Slides 83 -89)
Key topic 4.1.2: Identification of Weak Points with the Blower Door Test (Slides 90 - 99)
Key topic 4.1.3: Typical Thermal Bridges (Slides 92 - 94)
Key topic 4.1.4: Wind Density Level (Slides 95)
Key topic 4.1.5: Optimised Insulation (Slides 96 - 107)

Learning Objectives for Teaching Unit 4.1

The Participants
…should learn the possible applications of thermography.
...should learn the application possibilities of the Blower Door measurement oft finding leaks in the building envelope as well as quality assurance.
…learn to recognise what typical thermal bridges are present in a building.
…should understand why the air density envelope is important and where it is places.
…learn about the application of optimised insulation.

Form of Instruction

Lecture based on the set of slides and the discussion go the applicability of the presented techniques of quality assurance. Alternatively, you can work with the worksheets to determine the U-values.

Duration

2 teaching units (90 minutes)

2.5 Teaching Unit 4.2

Teaching Unit 4.2: Optimised Construction, Heating Technology

Slide set: Teaching Unit 4.2 Optimised Construction / 18 slides

Topics

Key topic 4.2.1: Overview of Conventional Heating Systems (Slides 108)
Key topic 4.2.2: Condensing boilers (Slides 109 - 111)
Key topic 4.2.3: Water Heating (Slides 112 - 115)
Key topic 4.2.4: Control Technology – Thermostats, Pumps, Hydraulic Balancing (Slides 116 - 119)
Key topic 4.2.5: Heating Surfaces (Slides 120 - 122)
Key topic 4.2.6: Ventilation Systems (Slides 123 - 125)

Learning Objectives for Teaching Unit 4.2

The Participants
…should understand the available, conventional heating and control technology.
...should understand why an efficient ventilation system is important in an efficient house and how it can be installed.

Form of Instruction

Lecture based on the set of slides and the discussion go the applicability of the presented techniques.

Duration

2 teaching units (90 minutes)

2.6 Teaching Unit 5

Teaching Unit 5: Overview of the Various Forms of Renewable Energies and their Technical Implementation

Slide set 5 / 45 Slides

Topics

Key topic 5.1: Definition and Classification of Renewable Energies (Slides 126-130)
Key topic 5.2: Solar Energy (Slides 131 - 145)
Key topic 5.3: Biomass (Slides 146 - 151)
Key topic 5.4: Biogas and Biofuels (Slides 152 - 155)
Key topic 5.5: Heat Pumps (Slides 156 - 161)
Key topic 5.7: Cogeneration Plants (Slides 162 - 165)
Key topic 5.8: Wind Energy, Hydroelectric Power (Slides 166 - 167)
Key topic 5.9: Market Opportunities for Renewable Energies (Slides 168 - 170)

Learning Objectives for Teaching Unit 5

The Participants
….recognise the diversity of products and application areas of renewable energies

… examine to what extent the application is available in their country

....consider what it takes to provide applications on your own

Form of Instruction

Lecture on the basis of the set of slides and a discussion of the presented contents on the basis of guiding questions and query cards

- What is the situation in your own country / environment?
- What needs to be established in order to implement renewable energies?
- Where do the participants see which technological possibilities?

Duration

3 teaching units (135 minutes)

2.7 Teaching Unit 6

Teaching Unit 6: Situation in the Country

Here the instructor should provide knowledge concerning the respective country.

Topics

Key topic 6.1: Market Situation on Site
Key topic 6.2: Legal Framework
Key topic 6.3: Funding

Learning Objectives for Teaching Unit 6

The Participants
....learn the latest information on the situation in their own country

Duration

1-2 teaching units (45 – 90 minutes)

2.8 Teaching Unit 7

Teaching Unit 7: Presentation of a Near-Zero Energy House and Application of Renewable Energies

Slide set: Near-Zero Energy House/ 15 Slides

Topics

Key topic 7.1: Considerations to the Overall Concept (Slides 171 - 172)
Key topic 7.2: Optimisation of the Components / Comparison of Variants (Slides 173 - 177)
Key topic 7.3: Presentation of a Near-Zero Energy House d (slides 178)
Key topic 7.4: Energy Savings in Comparison (slides 179 - 182)
Key topic 7.5: Emissions (slides 183 - 186)

Learning Objectives for Teaching Unit 7

The Participants
....recognise in group work, what influence a new insulation standard has on the energy balance.
... recognise in group work, what influence heat preparation has on the energy balance.

…. recognise in group work, how the pollutant emissions change according to the variants.

Form of Instruction

Lecture based on the set of slides. Creation of predefined variants with the EVA 2010 Programme in group work.

Tasks in group work (about 4 persons in each group)
How the respective variant changes

the final energy demand?

1. the primary energy demand?
2. the pollution emission levels?

- Group 1: Variant "Roof Insulation + Condensing + Solar"
- Group 2: Variant "No Insulation + Geothermal Heat"
- Group 3: Variant "Combined Variants + Geothermal Heat"
- Group 4: Variant "Exterior Wall Insulation + Roof Insulation"

Duration

2 teaching units (90 minutes)

2.9 Teaching Unit 8

Teaching Unit 8: Project presentation

Form of Instruction

Presentation of the results from working groups on a flip chart.

Tasks in group work (about 4 persons in each group)
How the respective variant changes

1. the final energy demand?
2. the primary energy demand?
3. the pollution emission levels?

- Group 1: Variant "Roof Insulation + Condensing + Solar"
- Group 2: Variant "No Insulation + Geothermal Heat"
- Group 3: Variant "Combined Variants + Geothermal Heat"
- Group 4: Variant "Exterior Wall Insulation + Roof Insulation"

Learning Objectives for Teaching Unit 8

The Participants should be able to evaluate different solutions with their advantages and disadvantages.

Duration

1 teaching unit (45 minutes) in total for all 4 groups.

2.10 Teaching Unit 9

Teaching Unit 9: Summary and Conclusion

Form of Instruction

- Providing the teaching units in flip chart 1 and presentation of a summarising overview.
- Clarification of the remaining questions from the participants – What was missing?; How can we implement the contents as a professional perspective?
- Flip chart 2 – revealing the opinion section
- Participants stick 3 points on the flip chart with the question: "What did I like the most?"
- Participants stick 1 point in the opinion section with the question "How did I like the"?

Duration

1 teaching unit (45 minutes)

3. Certificate

The participants receive a certificate upon completion of the seminar, in which the training contents (key topics) are listed and signed by the training centre (Chamber of Crafts) and the Hanseatic Parliament.

Solar Energy – Technologies and Applications

Co-funded by the
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Solar Energy – Technologies and Applications

- **The aim of the seminar**

  Overview of possibilities of solar energy use for small and medium-sized enterprises through the implementation of solar thermal systems and solar power systems

- **Focus areas**

  - Why should solar energy be used?
  - Solar energy supply
  - Possibilities of using solar energy
  - Examples of technologies and applications
  - Costs/funding and benefits
  - Customer service

Solar Energy – Technologies and Applications

- **Contents - Overview**

First day (09:00 a.m. - 6:00 p.m.)

- Why should solar energy be used?
- Implementation possibilities of solar energy
- Construction and functions of solar thermal systems
- Planning and design
- Installation, commissioning and maintenance
- Costs and benefits, economic efficiency

Solar Energy – Technologies and Applications

- **Contents - Overview**

Second day (9:00 a.m.-5:00 p.m.)

- Large solar thermal systems
- Photovoltaic market situation
- Structure and functions of solar power systems
- Costs and benefits
- Economic efficiency
- Customer service

Third day (9:00 a.m.- 1:30 p.m.) - optional
- Excursion to a solar installation

Why should solar energy be used?

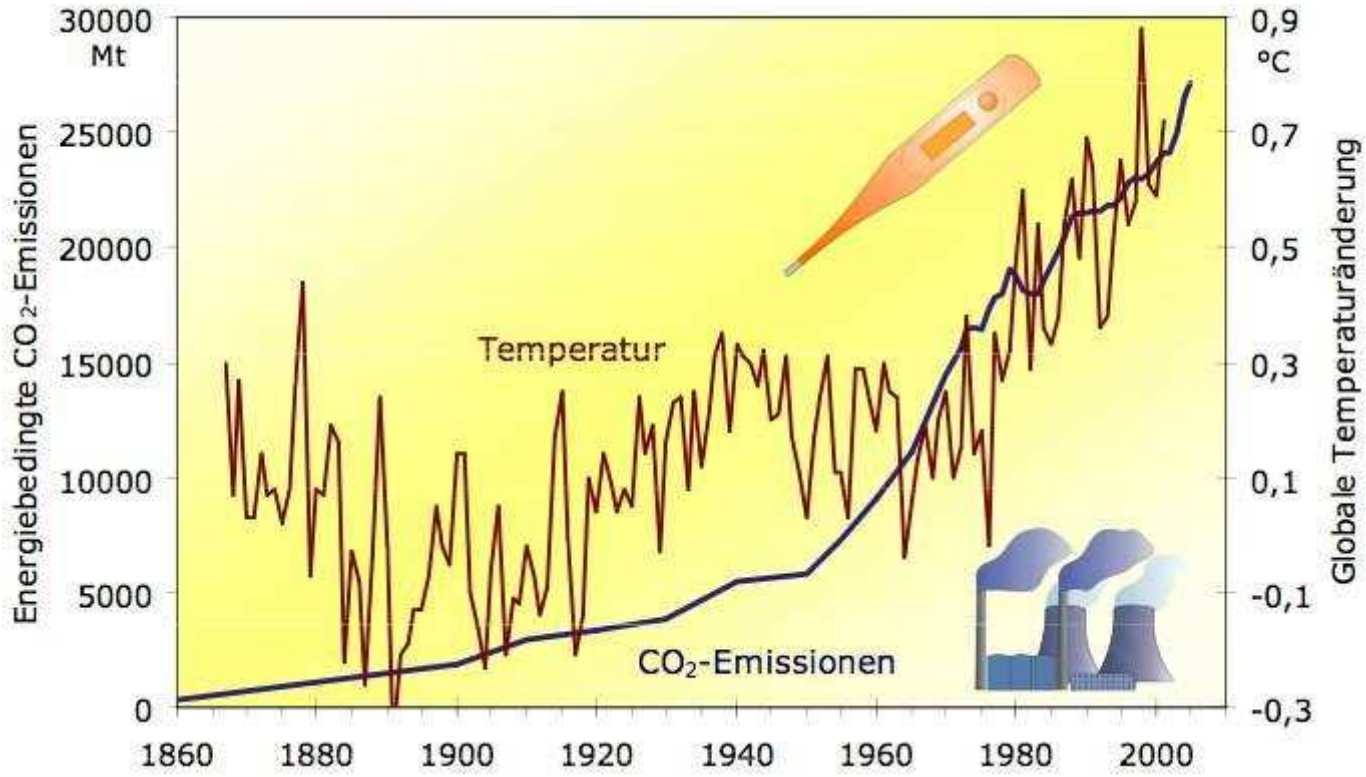
- Rising energy prices
- Scarce resources of fossil energy
- Risk of energy: nuclear power (radiation, waste)
- Competitiveness
- Compliance with stricter regulations, legislation
- Active against global warming, climate change
- Company image

Why should solar energy be used?

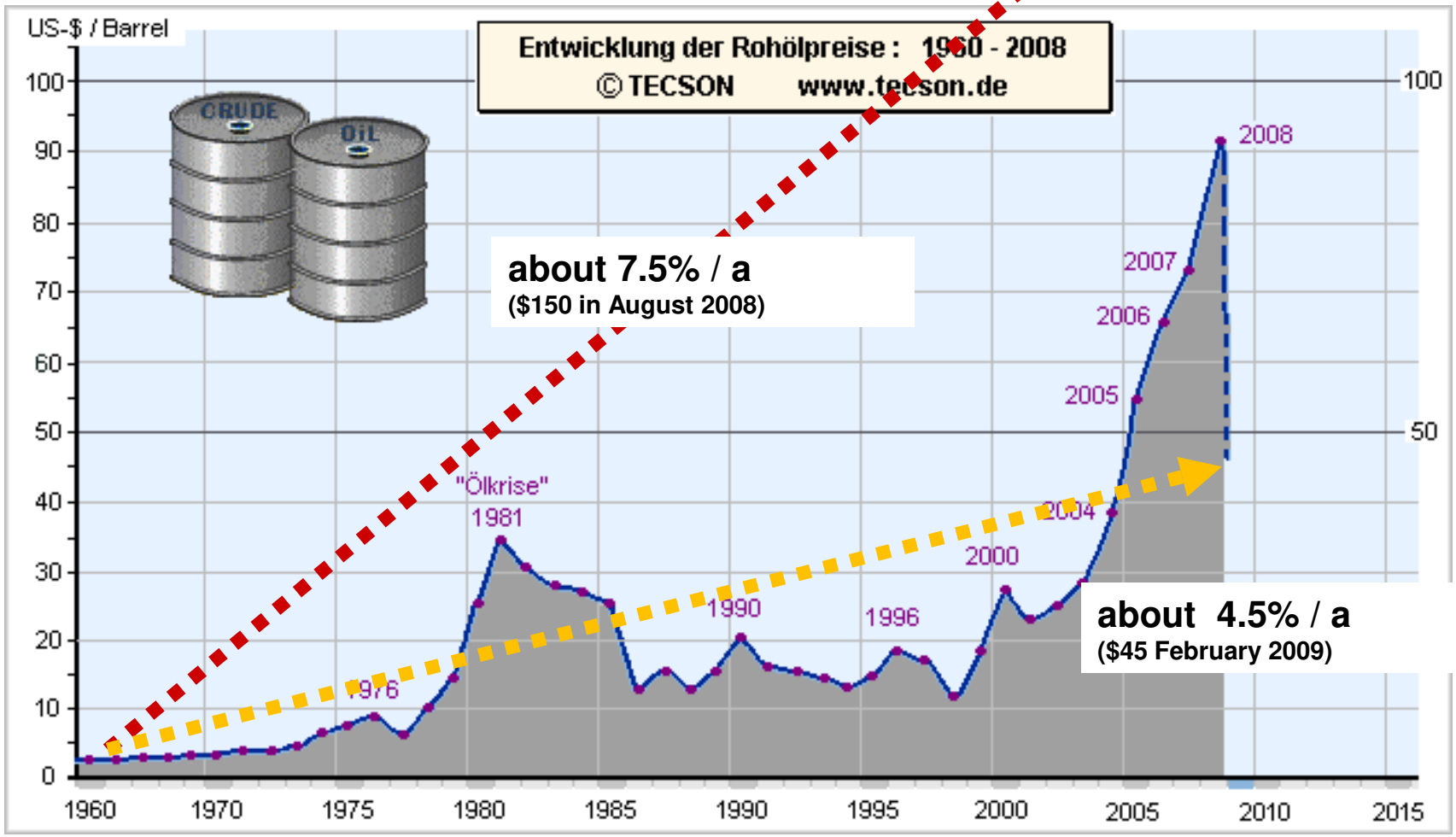
Threatened area in the case of Greenland ice melting
(Increase by 6-7m; all glaciers +Antarctic: by 60-70m)

Why should solar energy be used?

Rising global carbon dioxide emissions



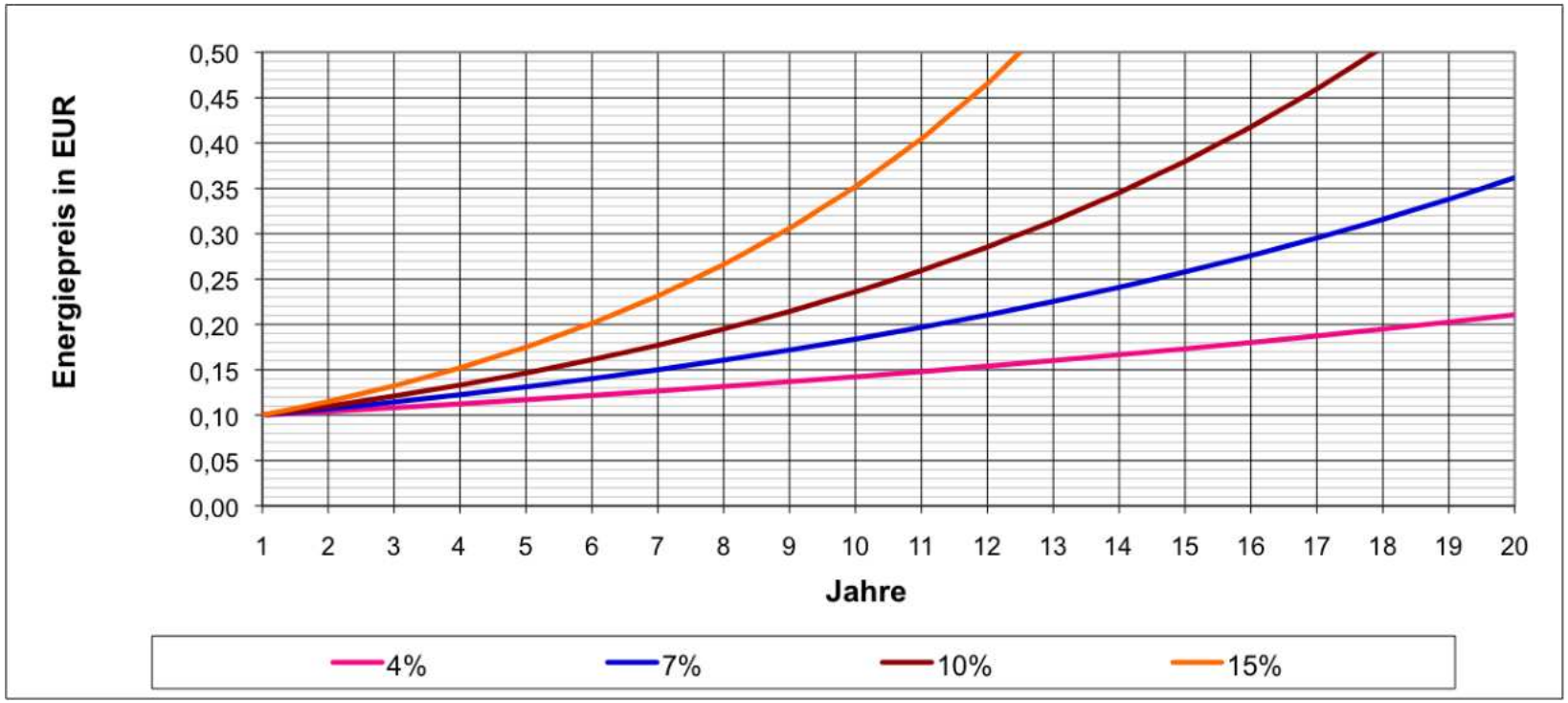
Why should solar energy be used?



Source: tecson, u.a.

Why should solar energy be used?

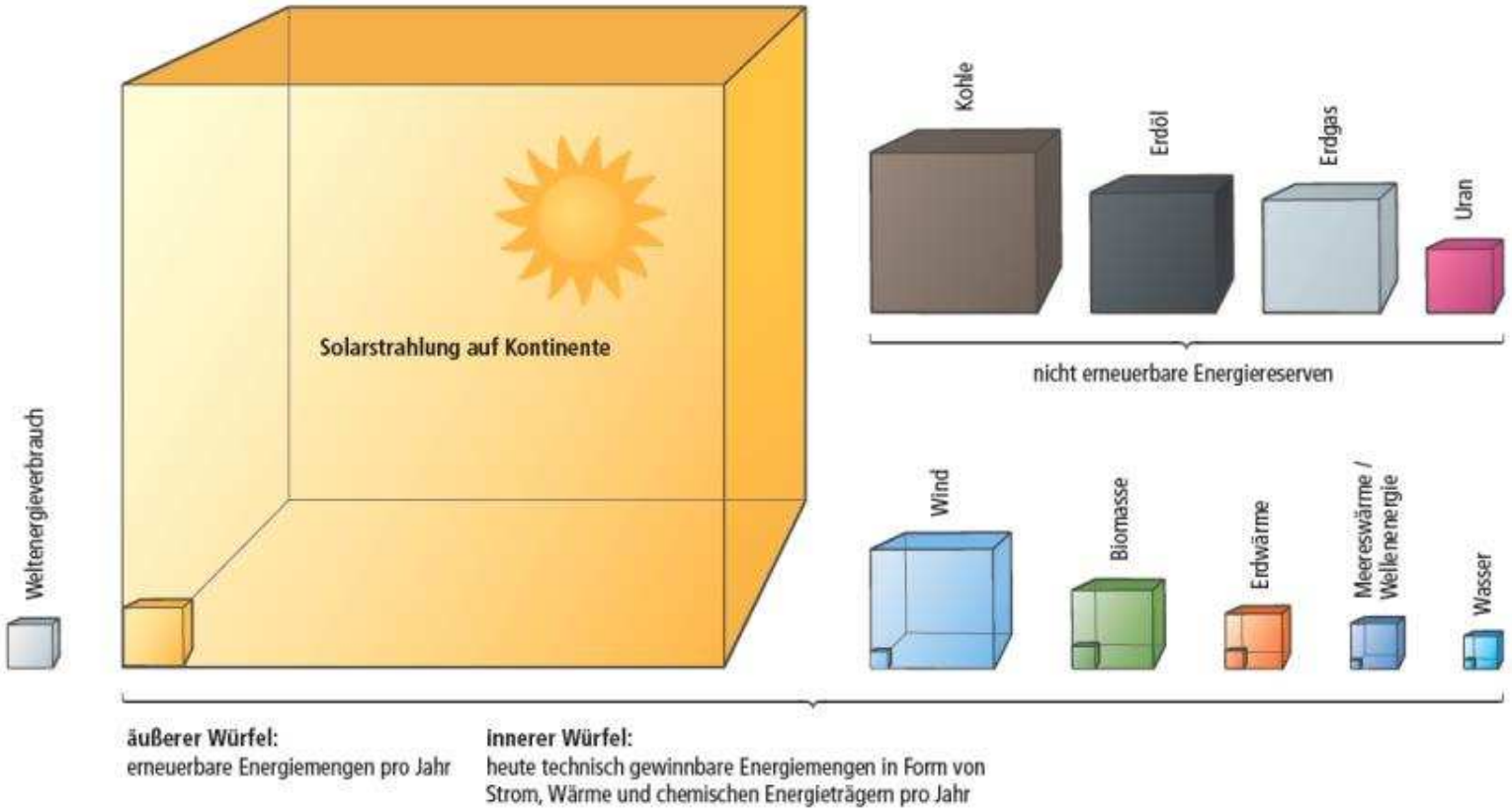
Energy costs today - Energy costs tomorrow



Energy costs increased by 4,7,10, or 15%

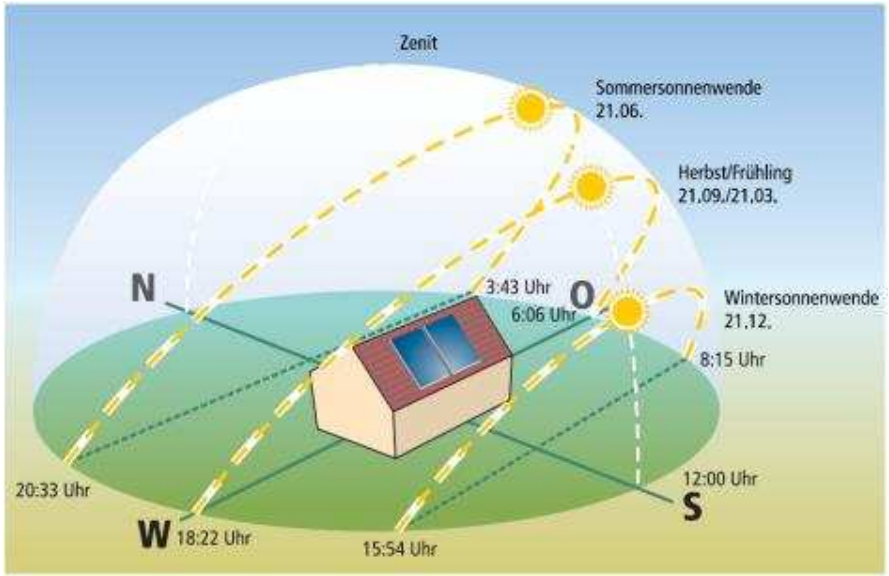
Why should solar energy be used?

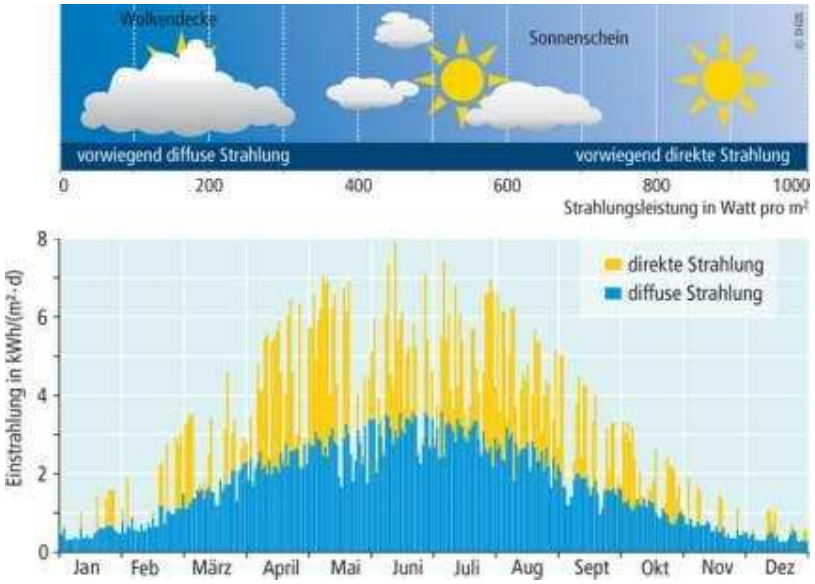
- **Renewable energies: potentials**



Solar Energy Supply

- **Solar energy use**
  Solar energy supply
  – astronomically and meteorologically conditioned variations

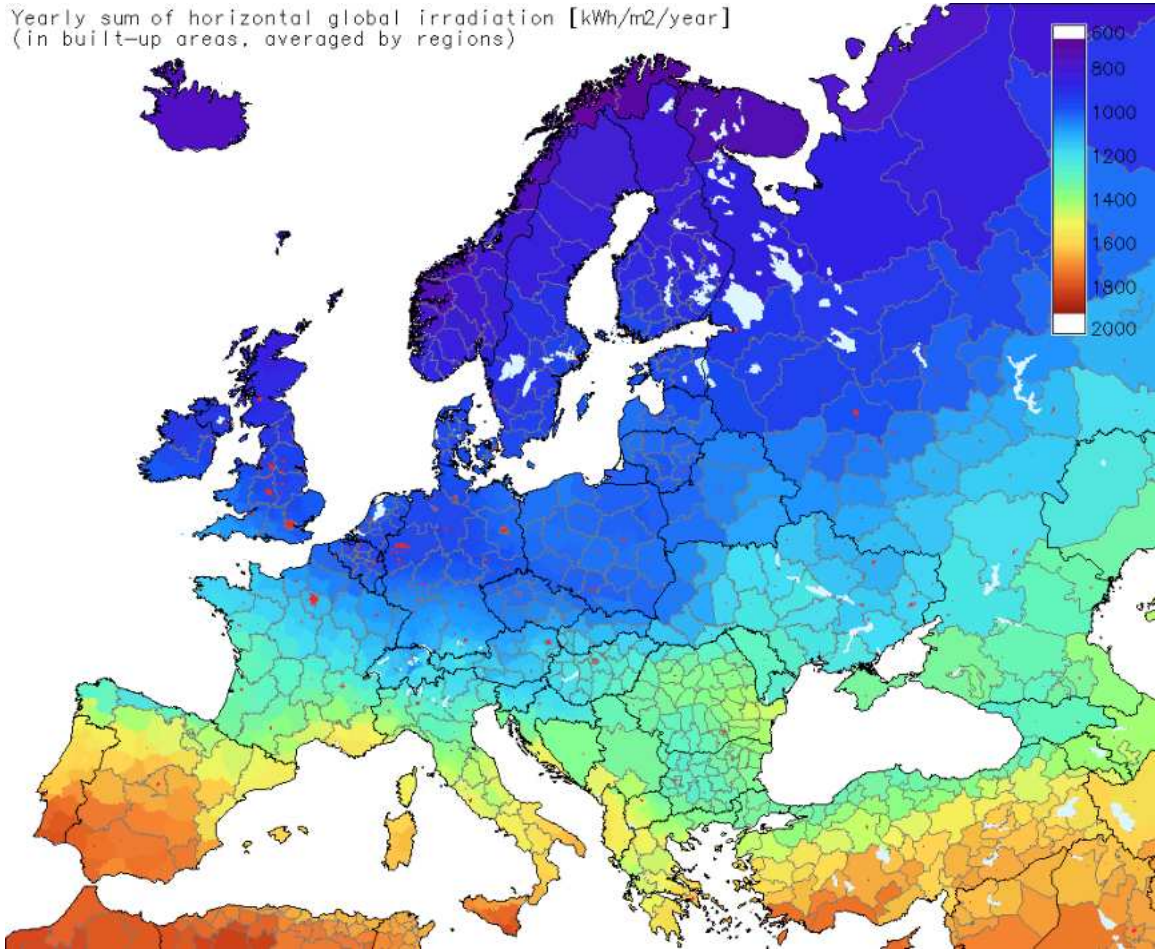




Solar Energy Supply

- **Solar energy**

  Solar energy supply in Europe:
  Geographical distribution of annual totals
  (kWh/m^2 per annum)

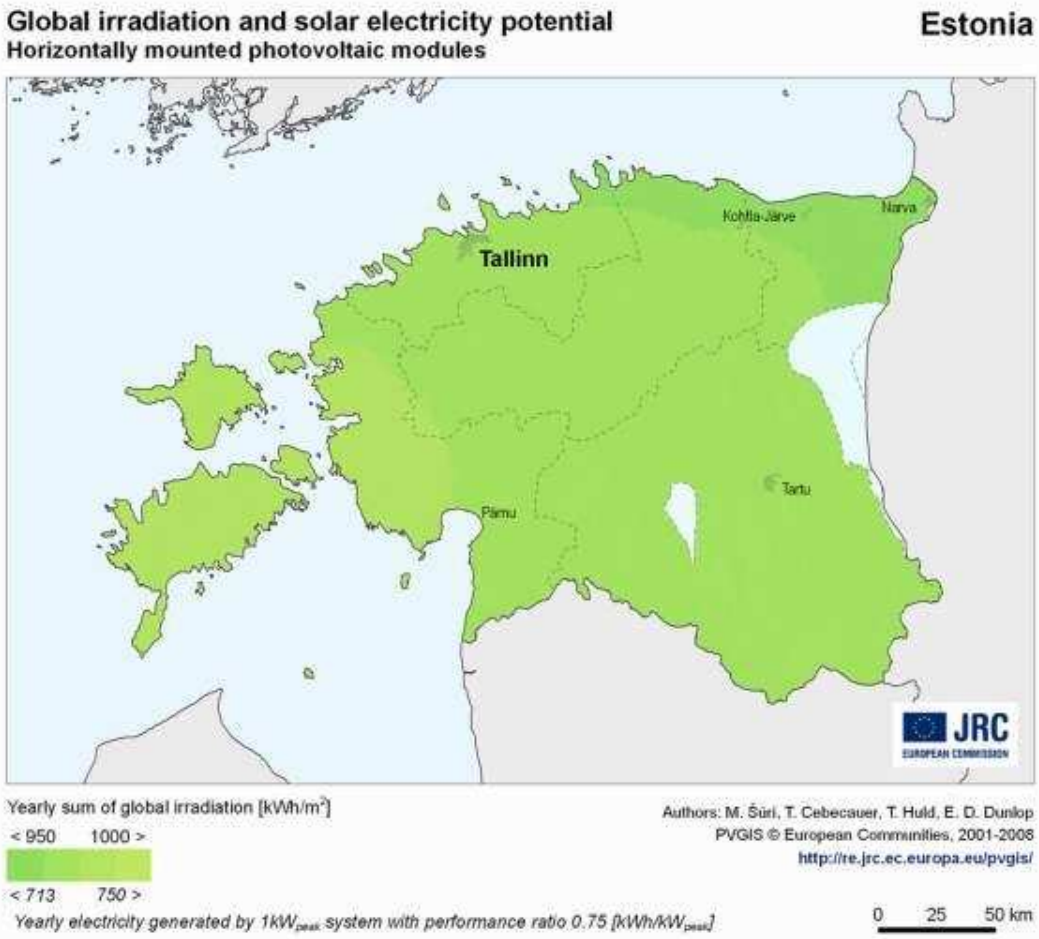


Solar Energy Supply

- **Solar energy**

  Solar energy supply in Estonia:
  Geographical distribution of annual totals
  (kWh/m^2 per annum)

  1,000 kWh/m^2
  correspond to about
  100 liter heating oil



Solar Energy Supply

- **Solar energy supply in Estonia**
  (global radiation)

Tallinn	960 kWh/m^2 per annum
Tartu	969 kWh/m^2 per annum
Vilsandi	1.026 kWh/m^2 per annum

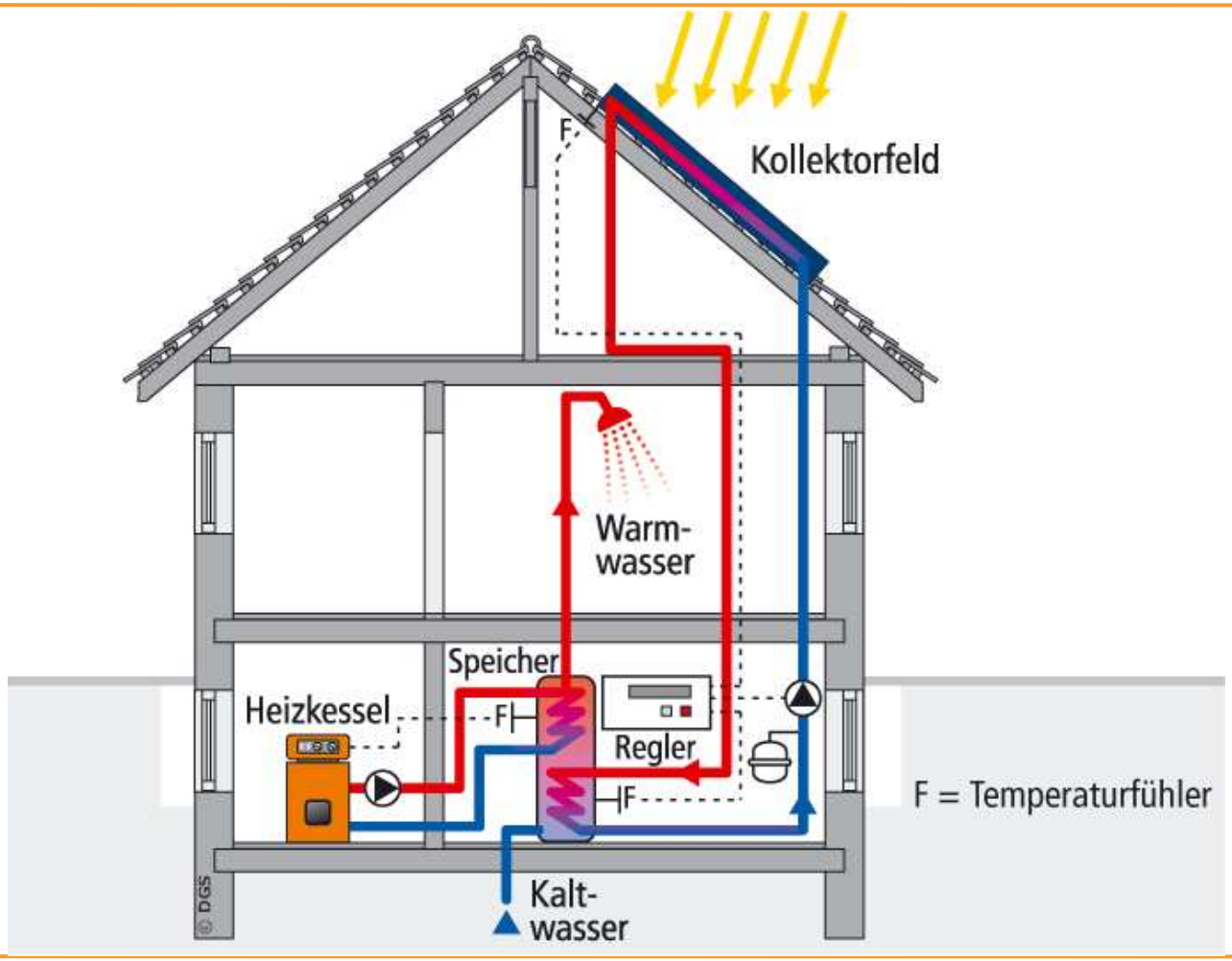
Possibilities of Using Solar Energy

- **Solar energy use**

  - Solar thermal systems (solar thermal installations)
  Conversion of sunlight into heat (hot water, heating)

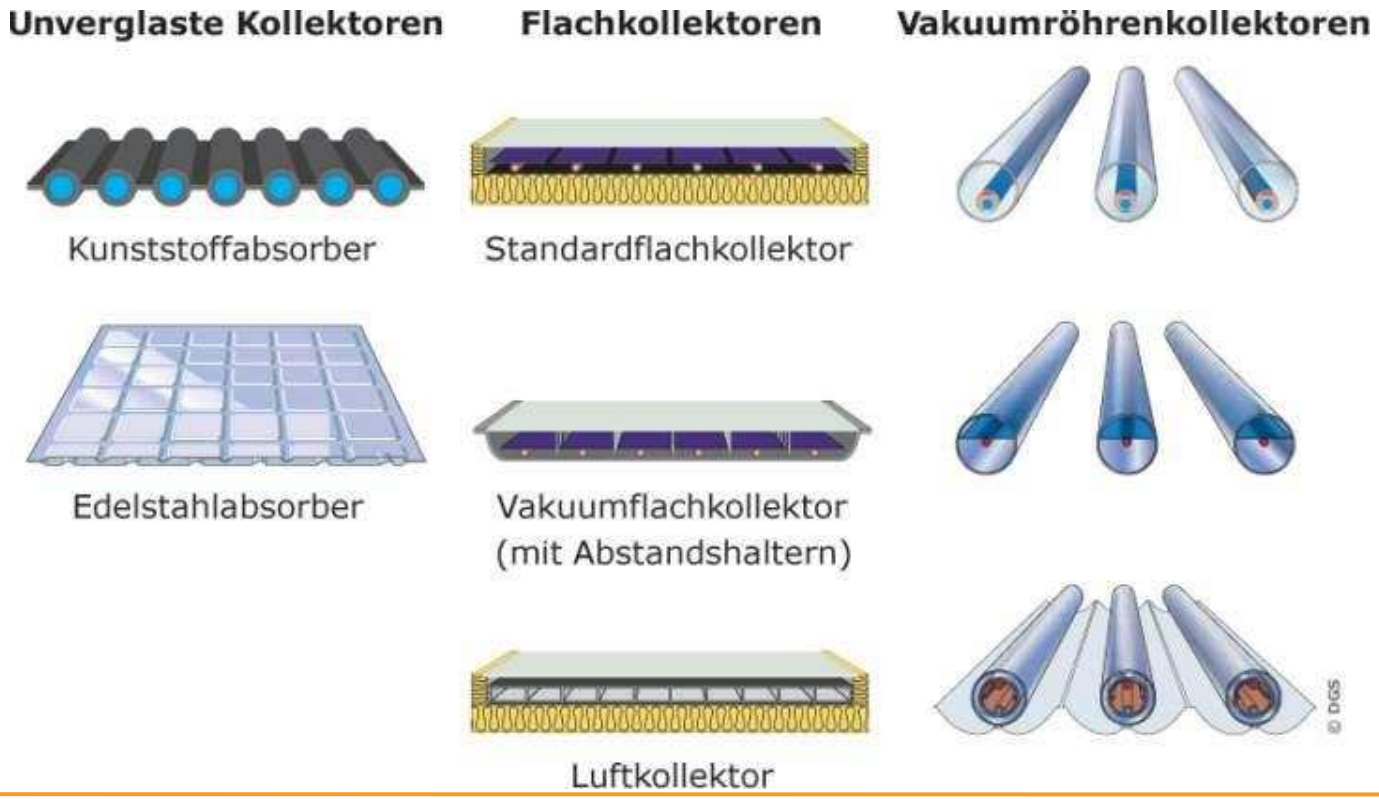
  -Solar power systems (photovoltaic installations)
  Conversion of sunlight into electricity (own consumption and / or Power supply)

Solar Heating – Structure and Function



Solar Heating - Components

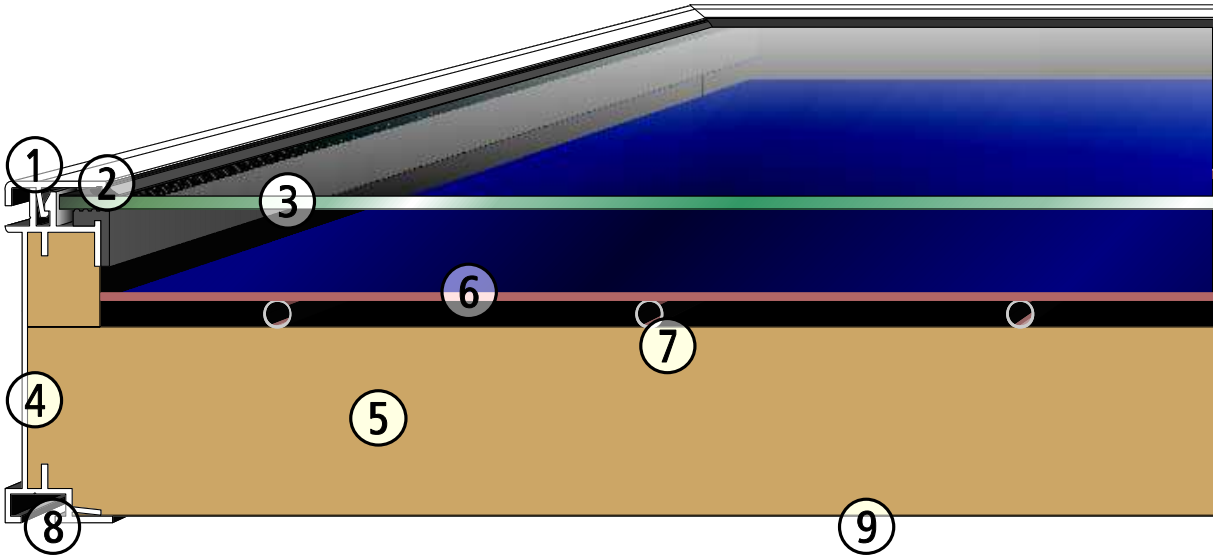
- **Collector designs**



Solar Heating - Components

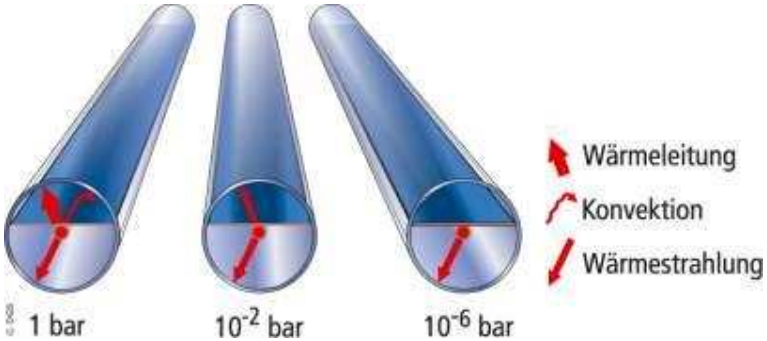
- **Flat collectors**

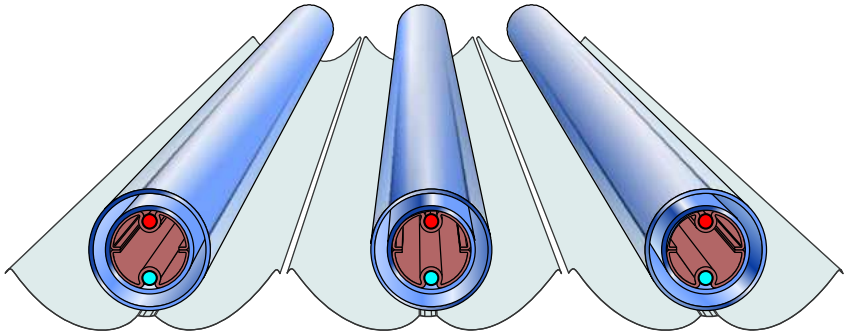
1. Rahmen
2. Dichtung
3. transparente Abdeckung
4. Rahmen Seitenwandprofil
5. Wärmedämmung
6. Vollflächenabsorber
7. Flüssigkeitskanal
8. Befestigungsnut
9. Rückwand

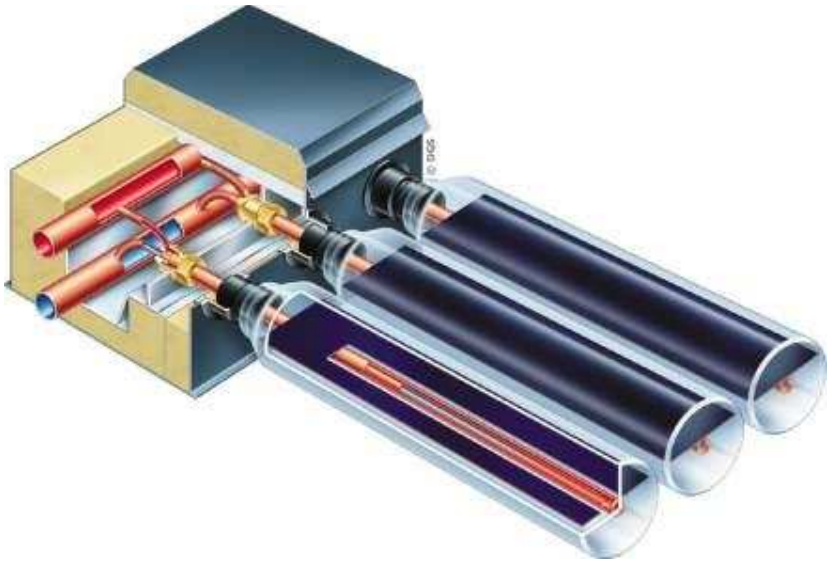


Solar Heating - Components

- **Vaccuum tube collectors**

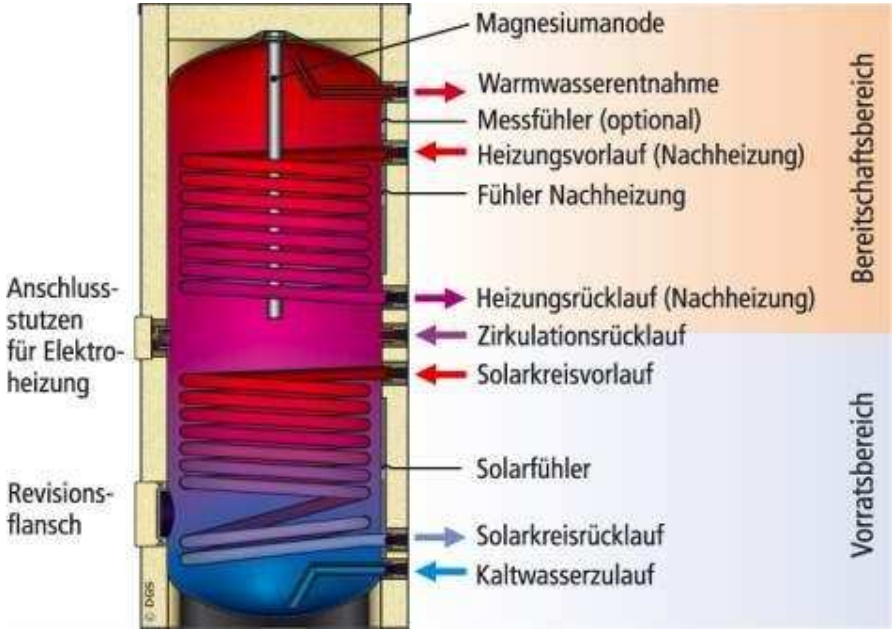


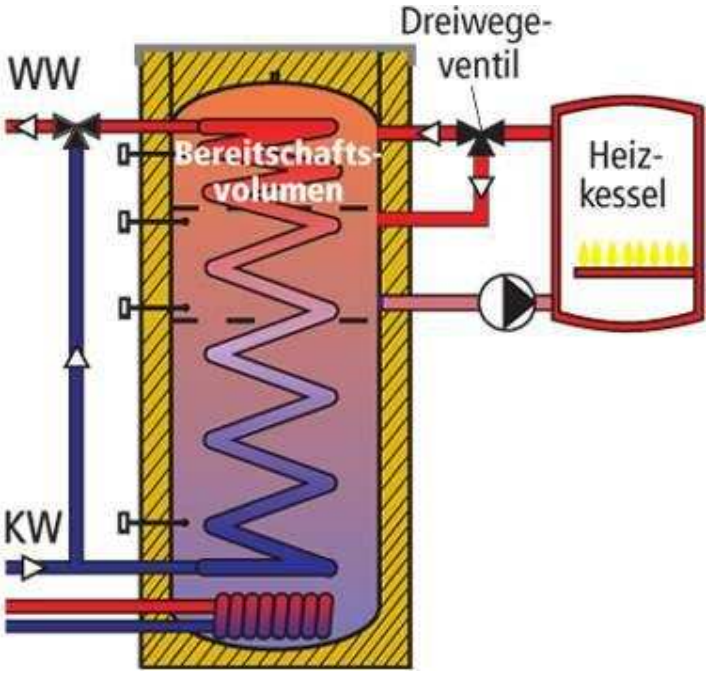




Solar Heating - Components

- **Tank**





Solar Heating - Assembly

(Wagner & Co., Cölbe)

Solar Heating - Assembly

(Wagner & Co., Cölbe)

Solar Heating - Assembly

(Wagner & Co., Cölbe)

Solar Heating – Example of Small Installations

Solar Heating – Example of Medium-Sized Installations

Solar Heating

- **Flat or tube collector?**

Flat collector:

+ good value for money

+ recommended in the case of favourable framework conditions

Tube collector:

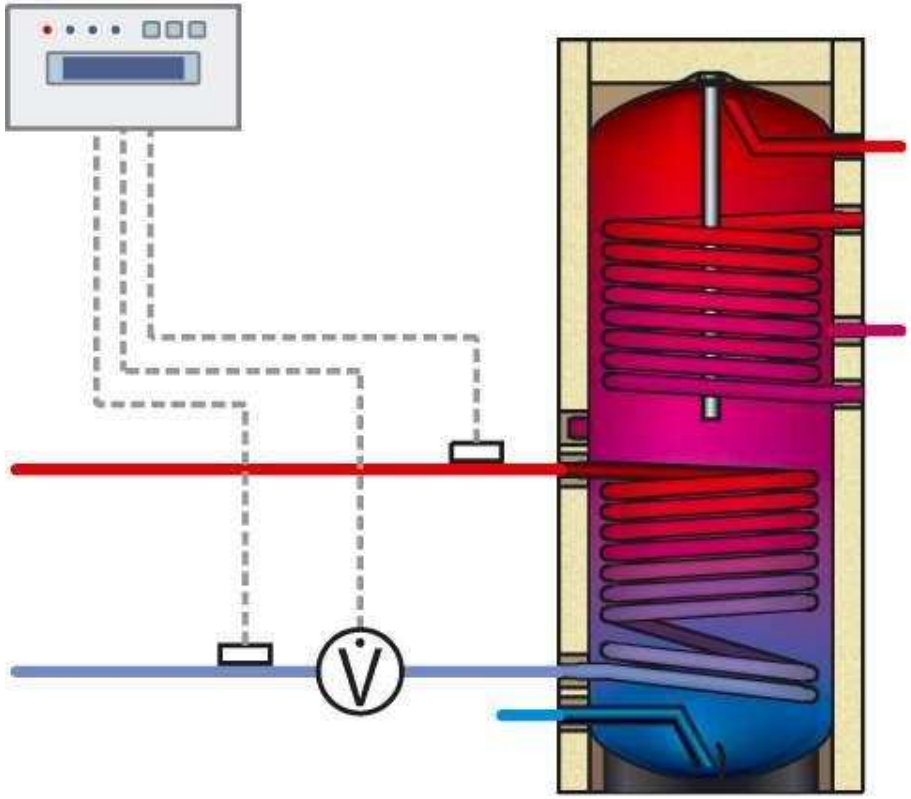
+ 30% less space required

+ flat roof: horizontal mounting possible

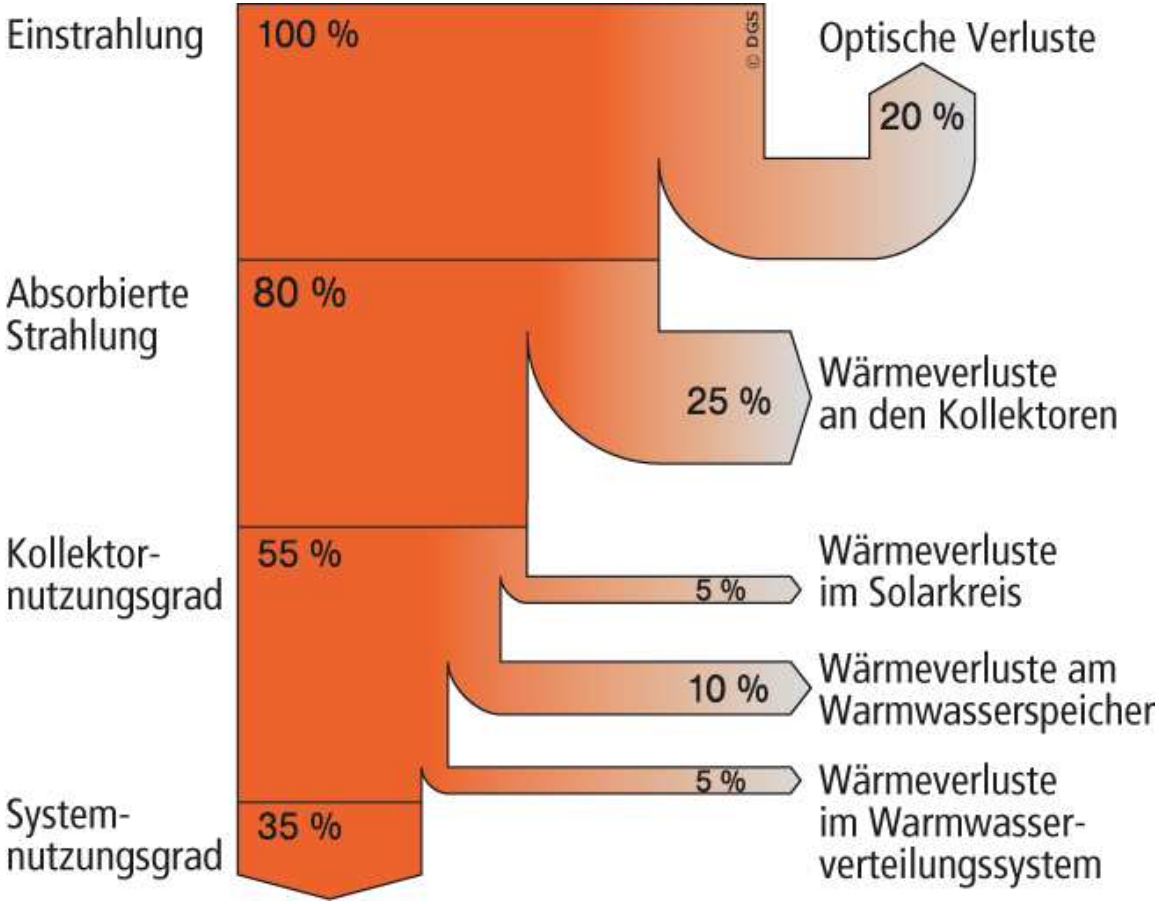
+ unfavourable orientation (rotation possible)

+ high temperatures

Solar Heating - Controlling

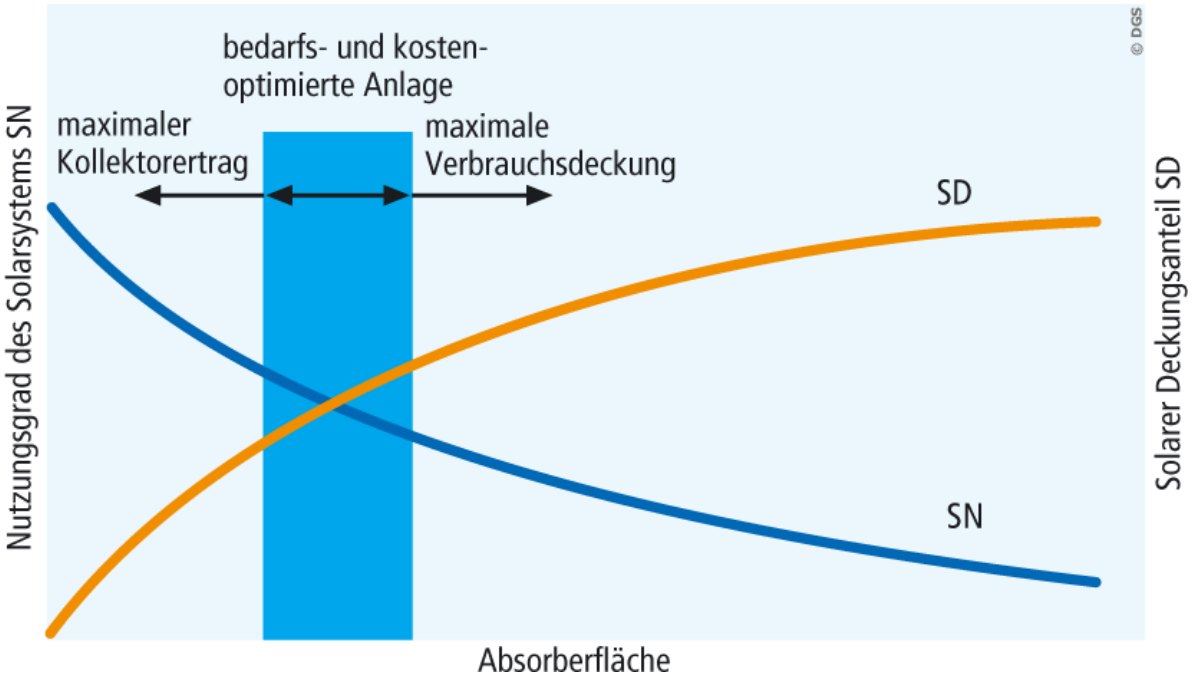


Solar Heating - Balance



Solar Heat - Dimensioning

- **Solar Thermal Systems**
  - Planning and interpretation



Interpretation:
60 liter (60° C) of hot water per m² of collector surface
Tank:
60 liter per m² of collector surface

Solar Heat - Dimensioning

Solar hot water preparation

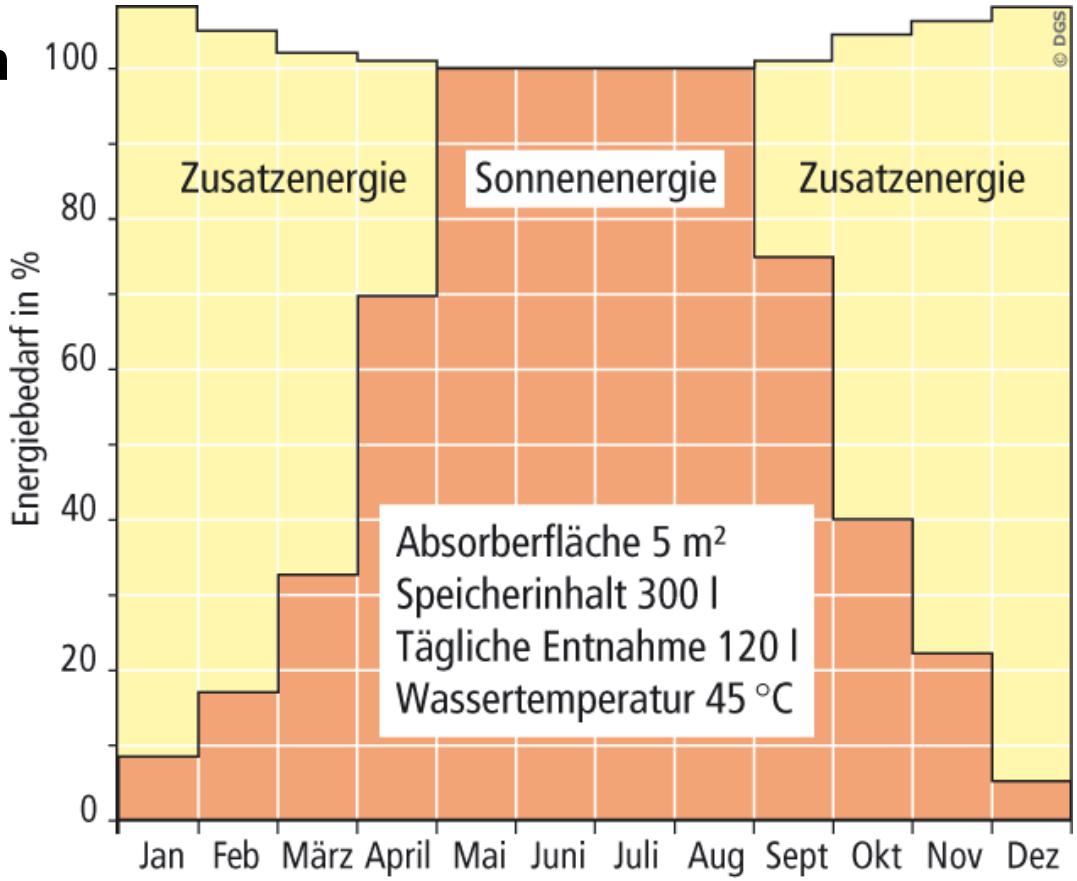
- Collector surface:

  about 1-1.5 m² per person [1)]

- Storage capacity:

  about 80 liter per person

1) 1m² for vacuum tube collectors,
1,5m² for flat collectors

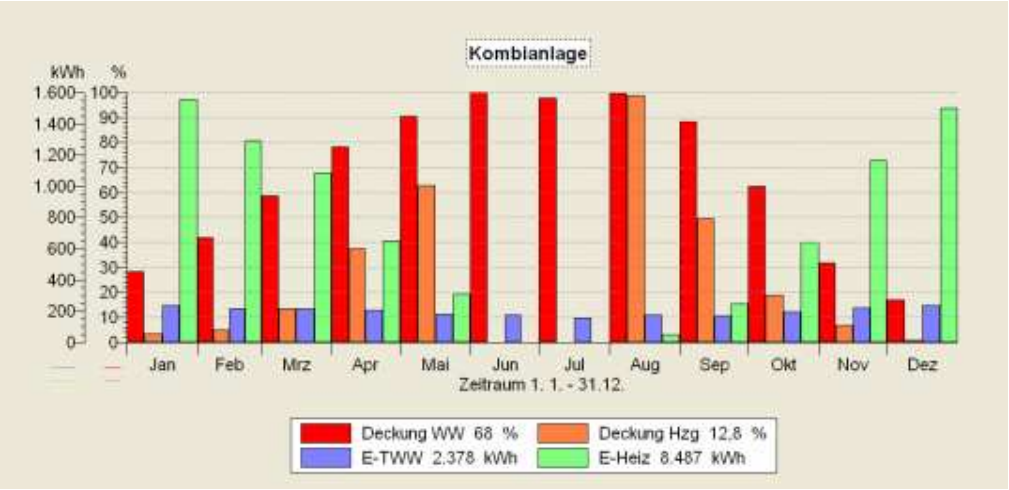


Solar Heat - Dimensioning

Solar heating support:

- Collector surface
  about 2-3 m² per person [1)]

- Storage capacity:
  about 50 liter of storage capacity per m² of collector surface [2)]



1) 2m² for vacuum tube collectors
   3m² for flat collectors
2) 60 L for flat collectors
   80 L for vaccum tube collectors

Solar Heating - Applications

- **Large solar thermal systems**

  - Residential buildings
  - Nursing homes
  - Hospitals
  - Accommodation facilities (hotels, guest houses)
  - Camps
  - Laundries
  - Car washes
  - Breweries
  - Sport facilities
  - ... Systems with high hot water consumption throughout the year (at least in the summer season)

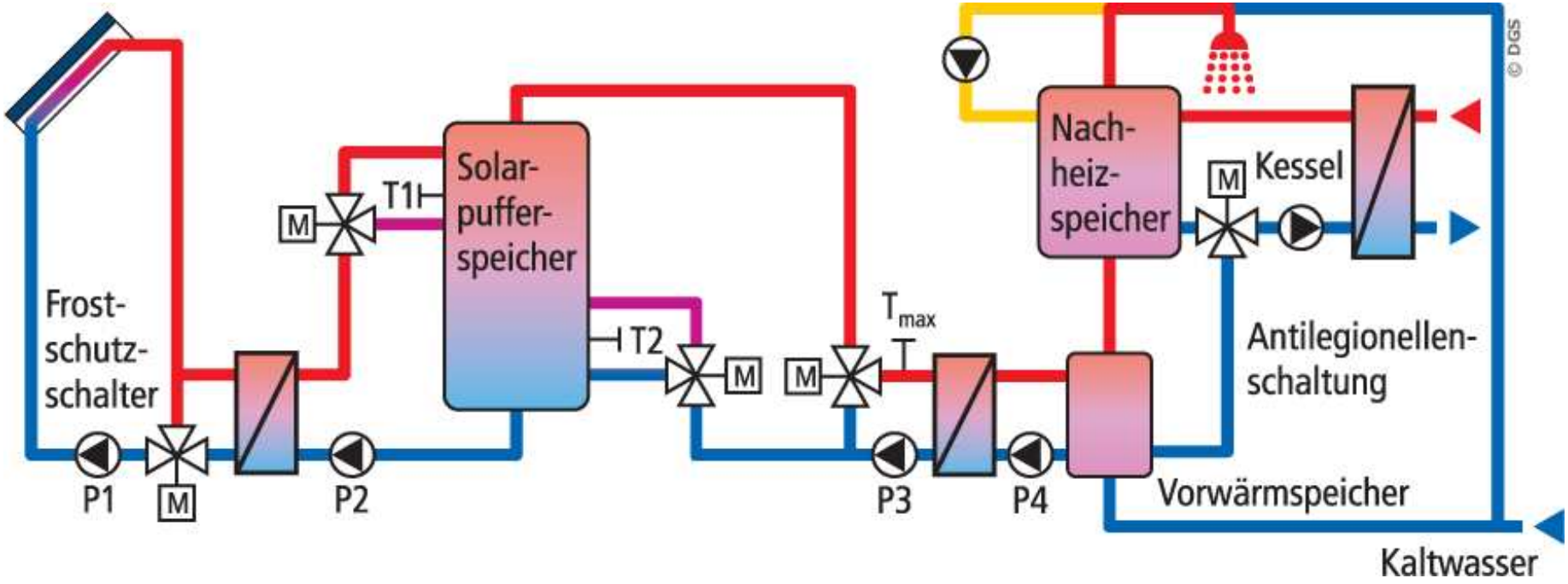
Solar Heating – Example of Large Systems

Solar Heating – Example of Large Systems

Solar Heating – Example of Large Systems

Solar Heating – Large Systems

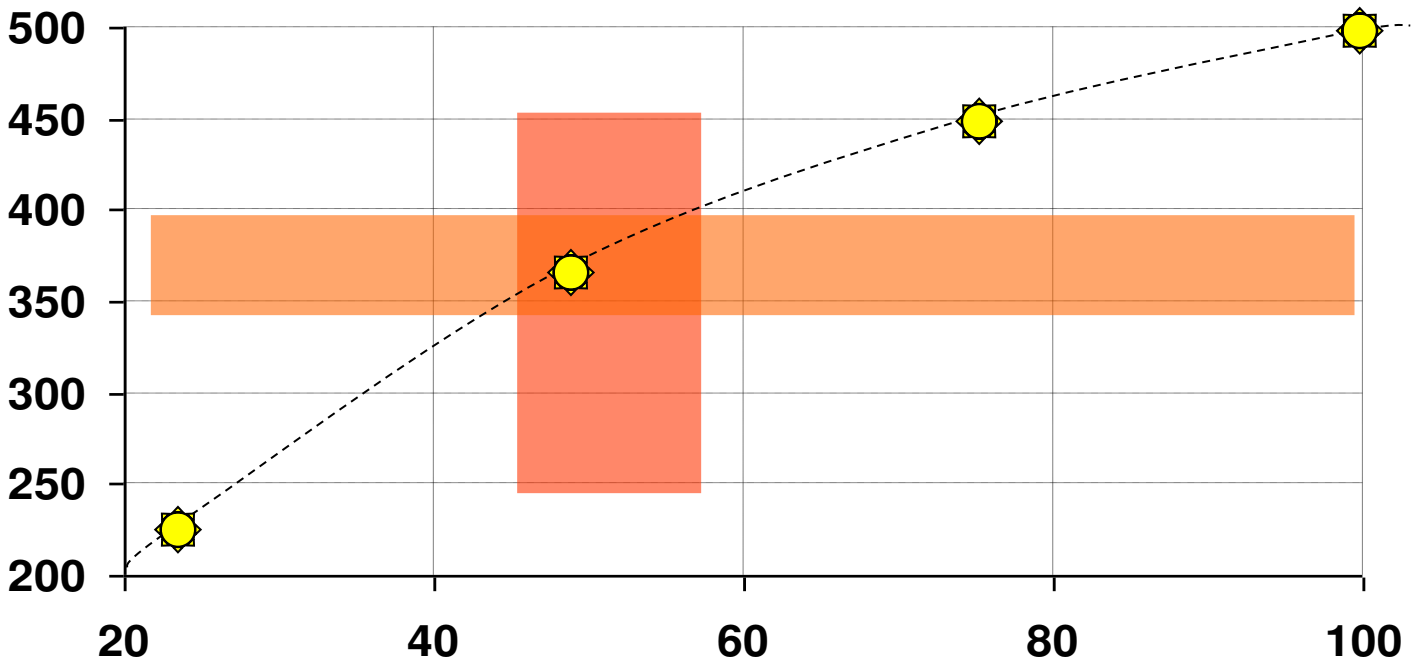
- **Tank discharge principle in the post-heating storage with an additional pre-heating storage**



Solar Heating - Dimensioning

Solar circle yield
[kWh/m²a]

Recommendation:
Load of 45 – 55 [Liter (60° C) /m²]



Load
[Liter/m²]

Solar Heating – Costs and Benefits

- **Costs and benefits**

Specific investment costs depending on the installation size
about **500 - 1.500 € / square meter of collector surface**

(Estonia: about 1,500 / per square meter of collector surface)

Specific solar circle yield
350 - 450 kWh/m²Jahr

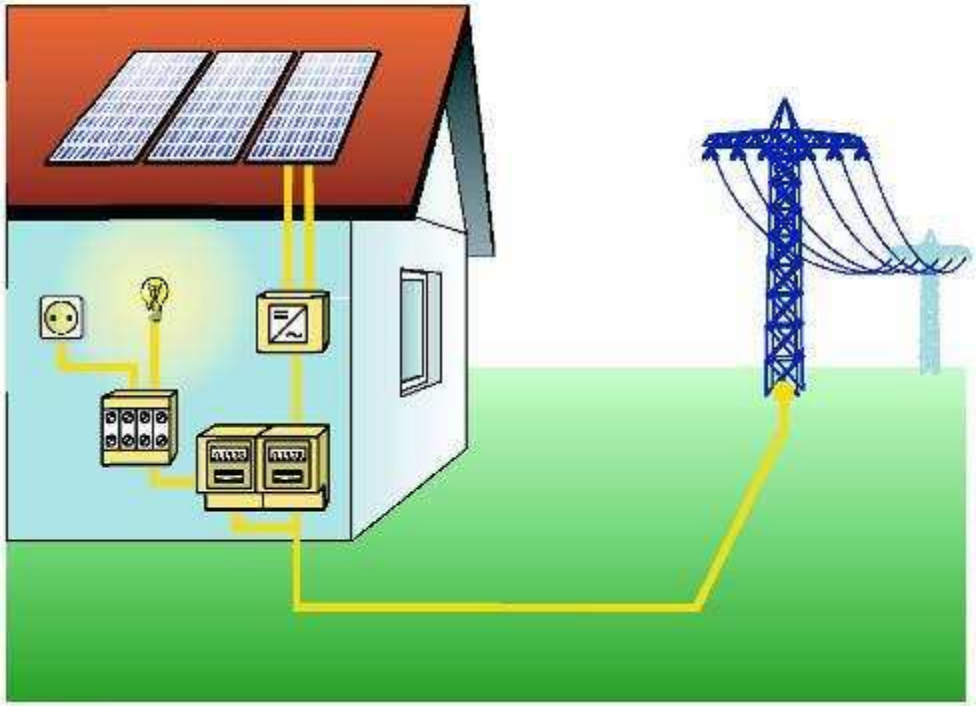
Energy savings in the total heat demand
depending on installation size and concept

about 10 - 40 %

In solar houses up to 100 %

Solar Power

- **Structure and function**



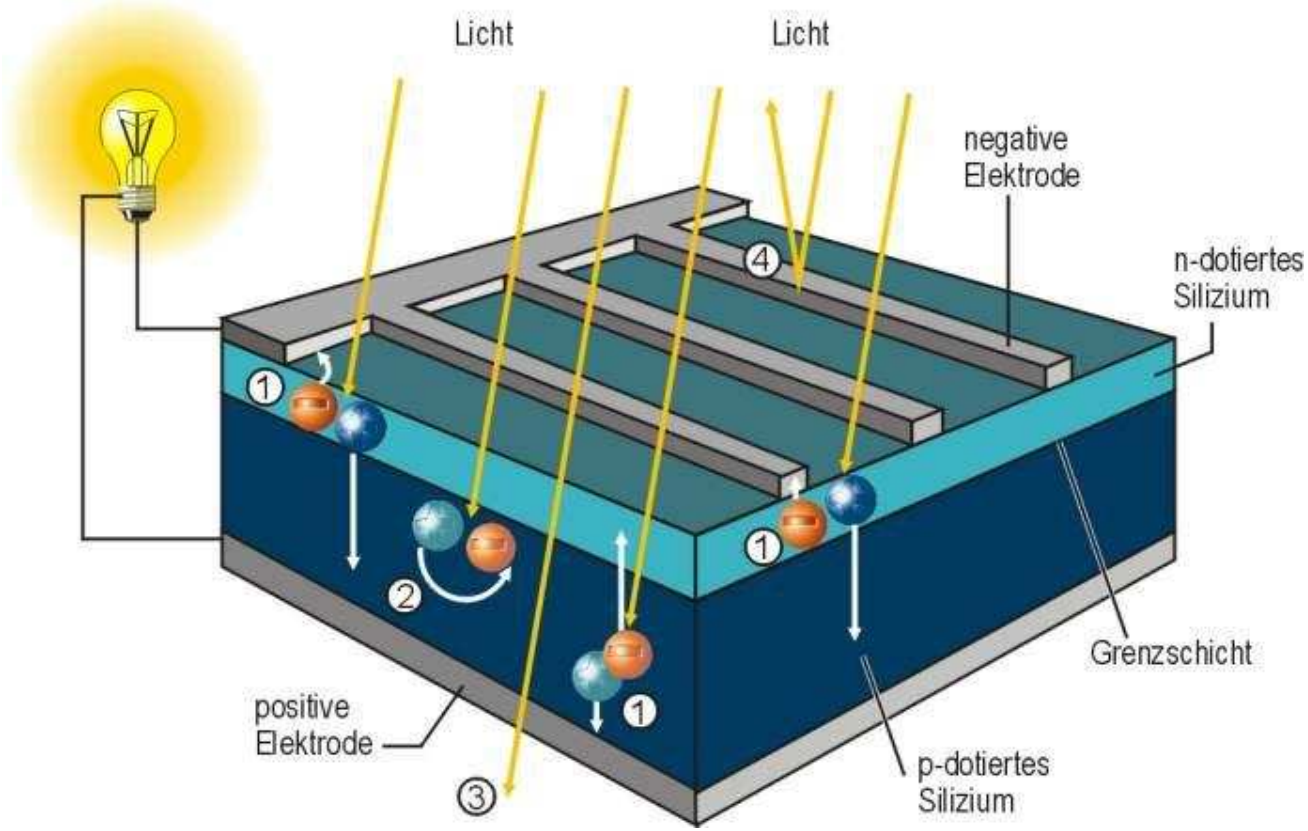
Solar Power – Basics

- **Structure and function of a solar cell**

▪ Charge separation
Recombination

Unused photon energy

Reflection and shadowing through front contacts



Solar Power – Basics

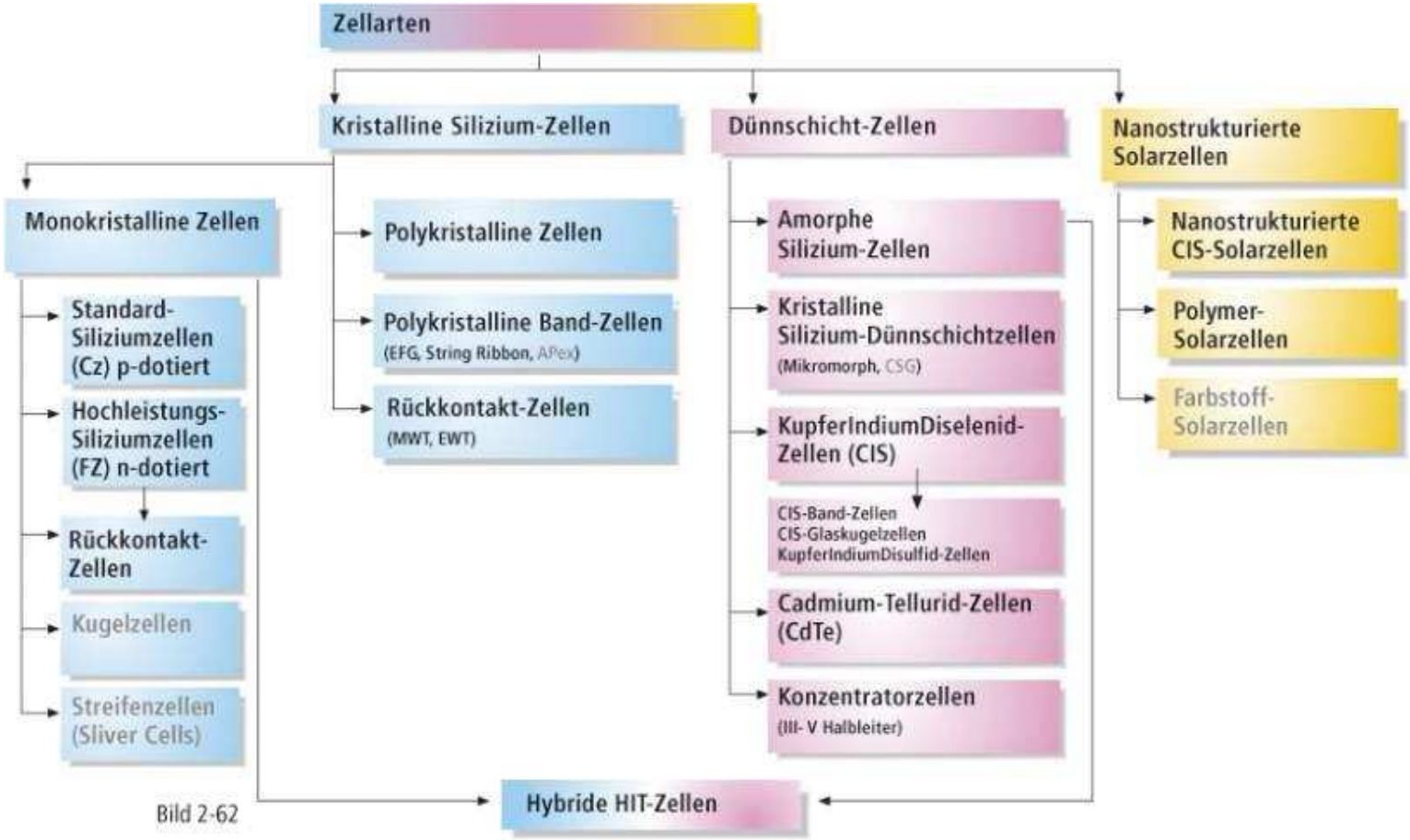
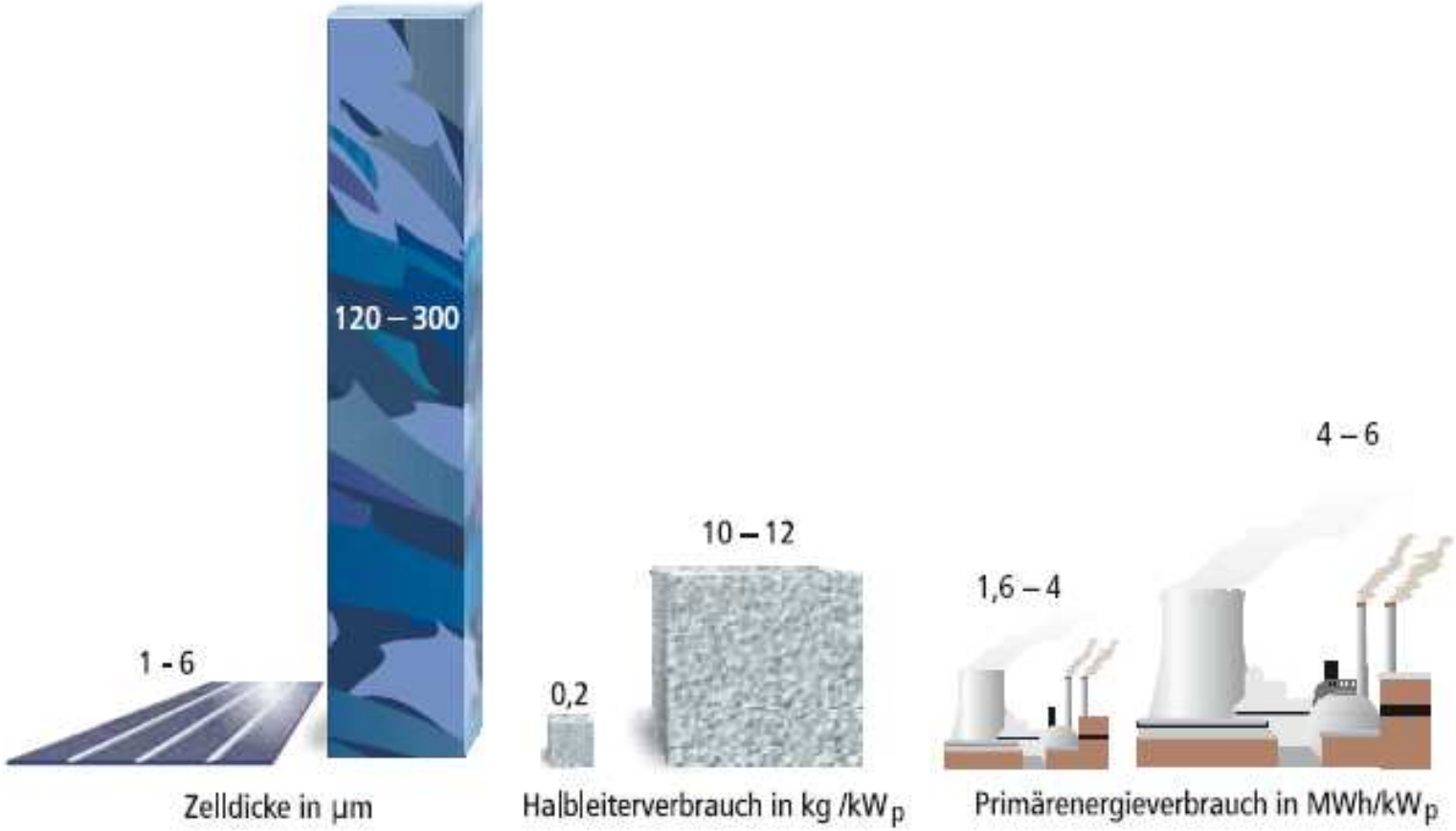
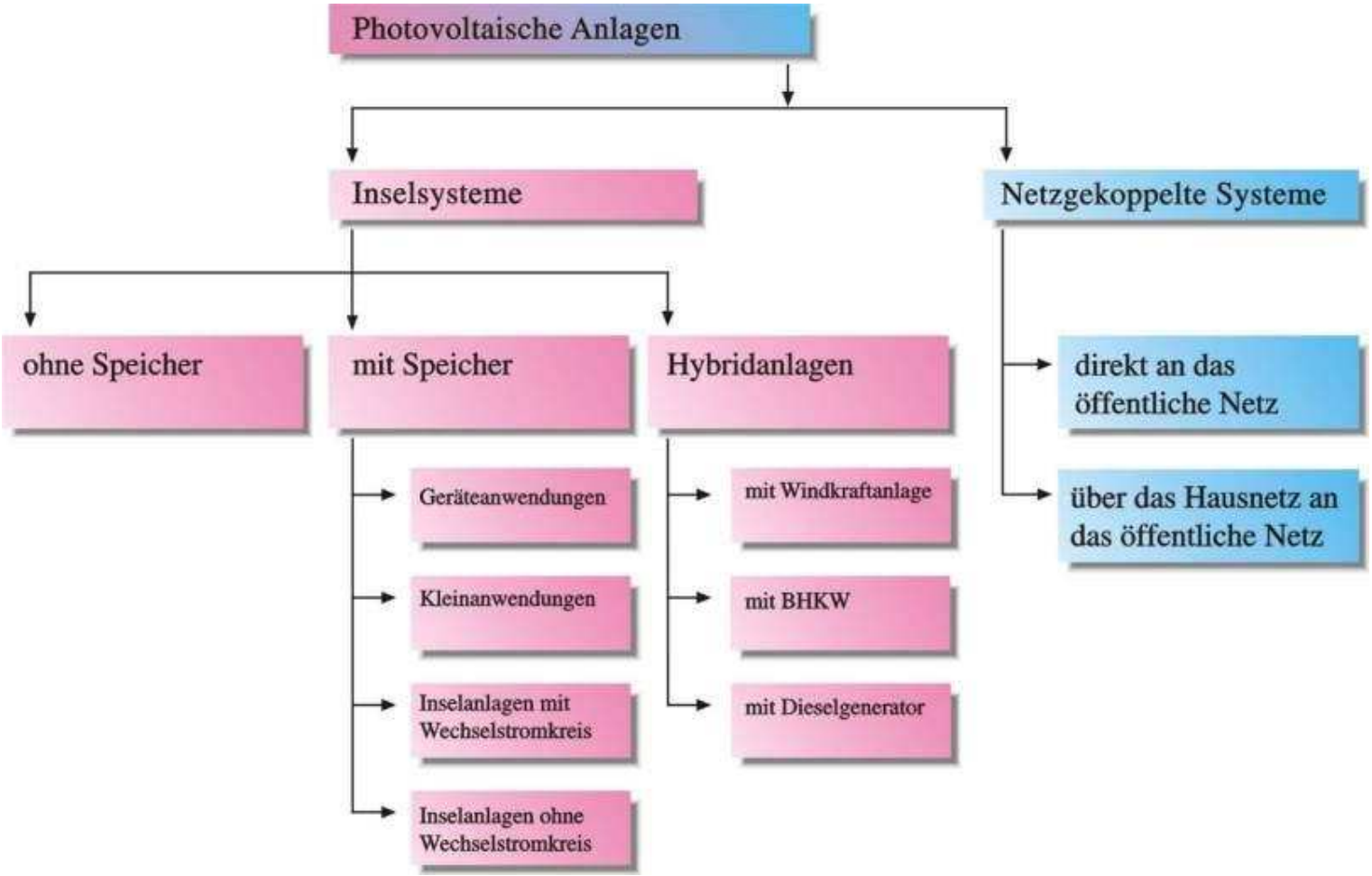


Bild 2-62

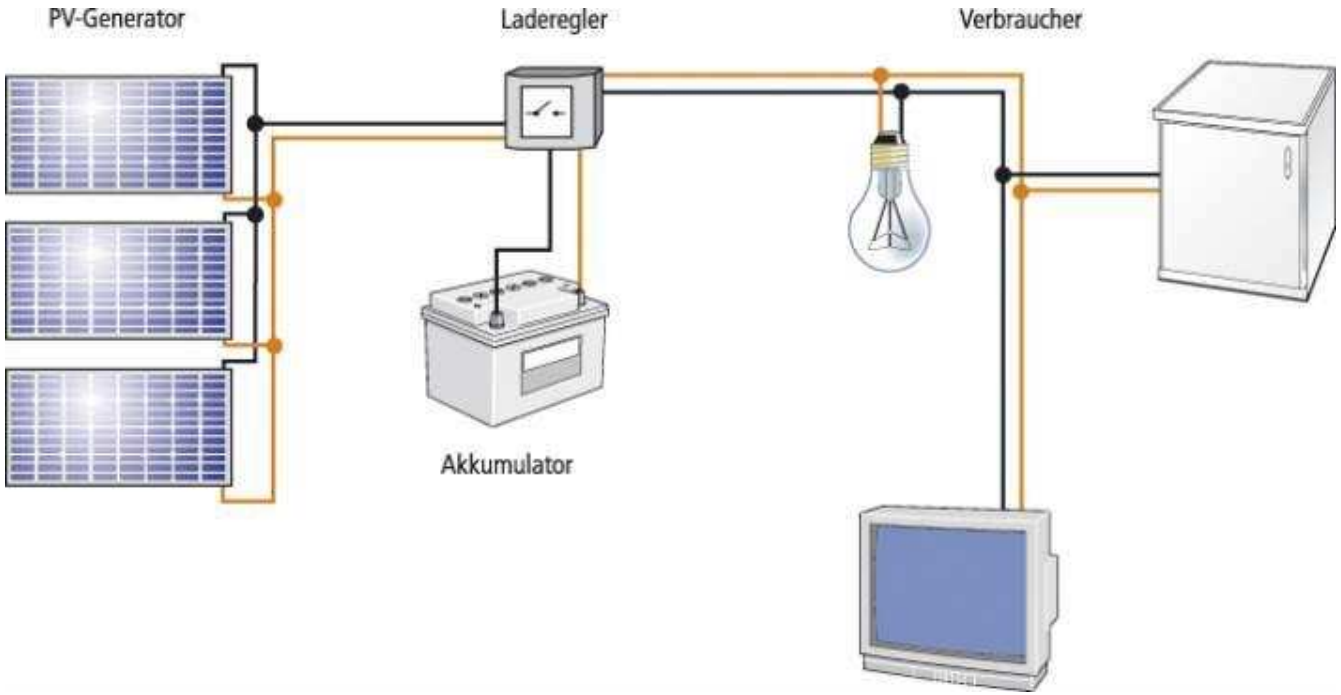
Comparison with thin layer crystalline cells



Solar Power – Installation Engineering



Solar Power – Off-Grid Systems



Solar Power – Grid-connected Installations

PV generator:
in series and parallel-connected PV-modules with a mounting frame

(1) Generator junction box (with protective equipment)

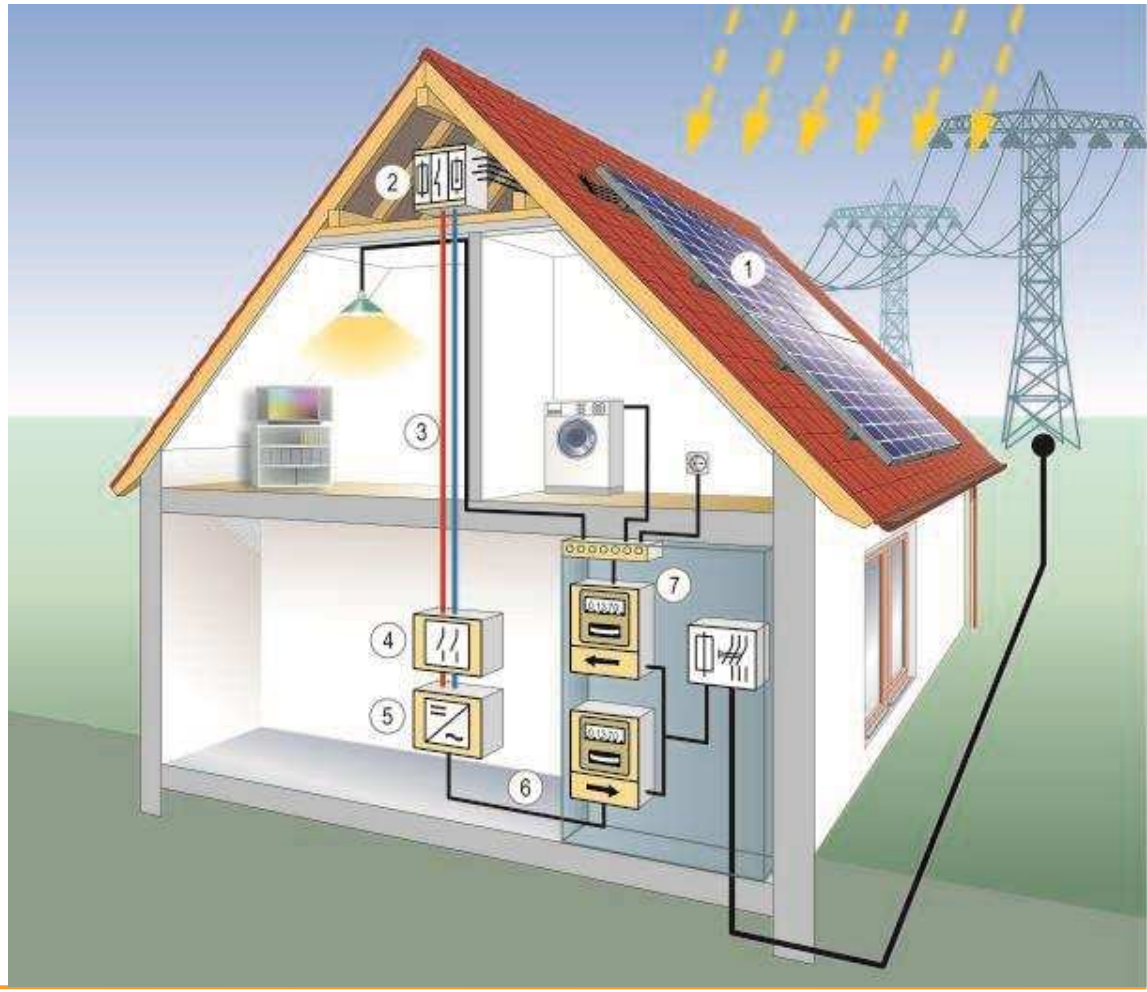
(2) DC wiring

(3) DC main switch

(4) Inverter

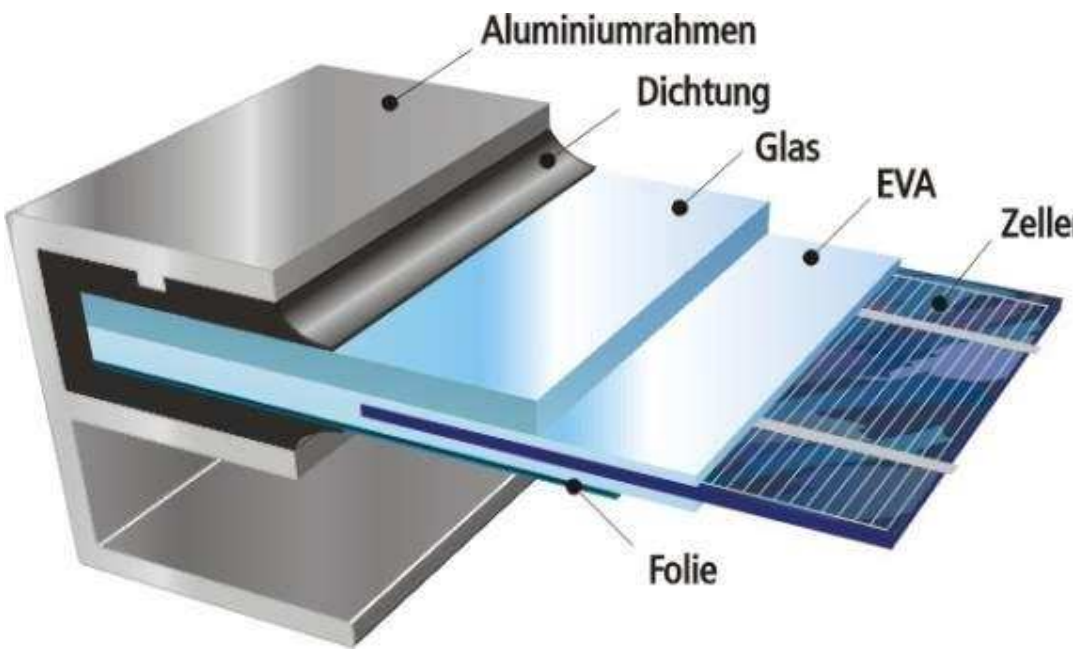
(5) AC wiring

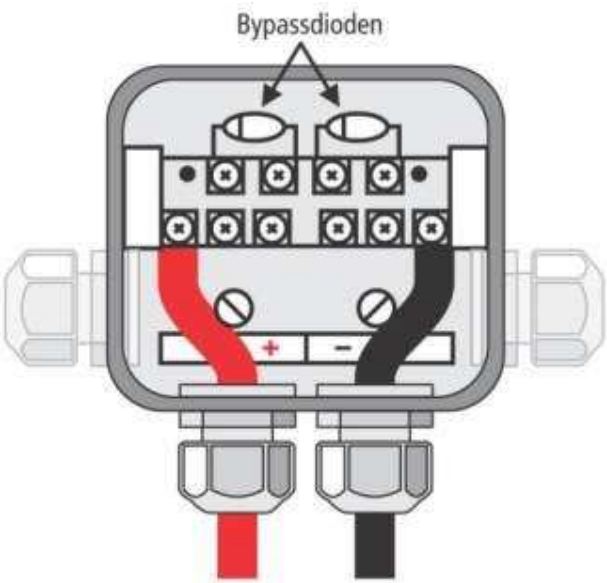
(6) Meter box with circuit distribution, input and output meter and service lines



Solar Power - Components

- **Modular structure**



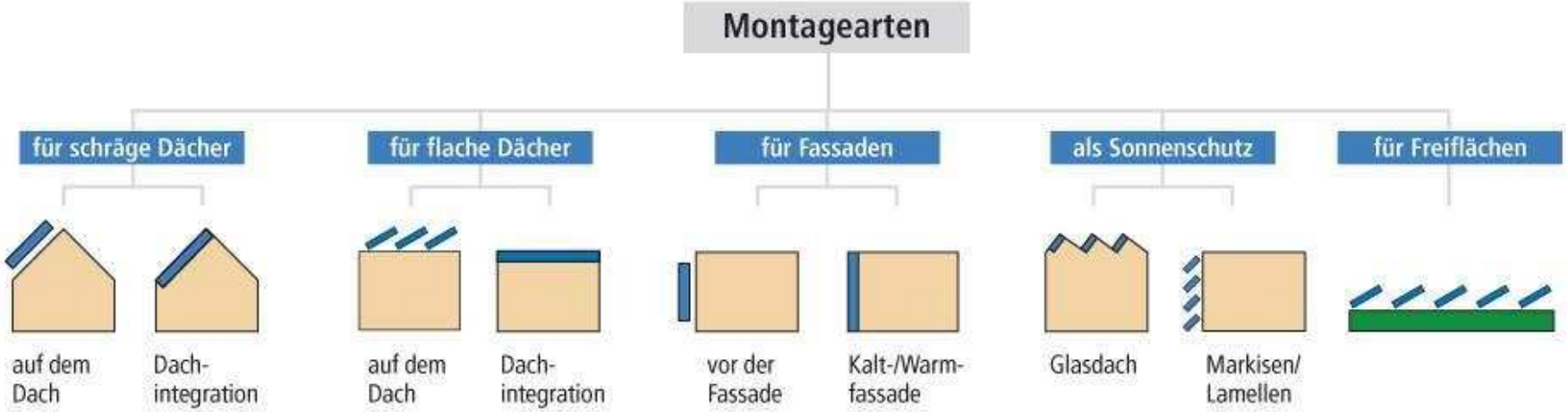


Solar Power - Components

Inverter

Solar panel

Solar Power - Assembly



Space requirements

Cell material	Panel efficiency	Required panel surface for 1 kW_p
Monocrystalline	11–16 %	7–9 m^2
Polycrystalline (EFG)	10–14 %	8–9 m^2
Polycrystalline	8–10 %	9–11 m^2
Thin layer: copper-indium-diselenide (CIS)	6–8 %	11–13 m^2
Thin layer: amorphous	4–7 %	16–20 m^2

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Solar Power - Examples

Solar Power - Examples

Solar Power - Examples

- **Dimensioning**

1 kW_p brequires approximately 10m^2 of space

1 kW_p produces about 800 kWh/year

Requirements:

- lack of shade

- azimuth between Southeast and Southwest

Solar Power

- **Costs**

1 kW_p costs about €2,500 – 3,500

1 kW_p produces about 800 kWh/year

In the case of power consumption

coverage > 30%

In the case of power supply compensation (EEG)

Estonia: tax reliefs,
loans, green certificates

Good Examples: Solar Thermal

- **Example 1 CAMPING SITE**

Places:
400

Collector surface:
30m²

Storage size:
1800 L

Measured savings:
70%

Good Examples: Solar Thermal

- **Example 2 HOTEL**

In the course of a complete renovation of the hotel **solar thermal installation was installed to heat water.** 51 m^2 of flat collectors heat the total of 4,500 liters of buffer store. Thus the energy saving of 70% is achieved annually. With investment costs of 37,000 € and funding of 14.700 €, the installation amortized within 8 years .

Good Examples: Solar Thermal

- **Example 3 MACHINES AND STEEL COMPANY**

Wood chip heating: 100 kW
Solar installations for water heating and heating support,
Collector surface: 80 m^2
Average solar circle yield:
381 kWh / m^2 per annum
Buffer storage: 5,900 l
Thus potential CO_2-reduction:
9.436 kg / year

Good Examples: Solar Thermal

- **Example 4 HOUSING ECONOMICS**

'The Settlement Garden City of Farmsen' was converted into a 'solar village'. By the end of 2009 approximately 1,100 homes received support for renewable heating and hot water. From approximately 1,200 m² of collector surface produces annually approximately 500,000 kWh of energy. Objective: the development of solar energy by the year 2014, approximately 2,000 square meters of collector surface for 1,825 houses (71.5% of housing stock).

Good Examples: Solar Power

- **Example 5 Photovoltaics - INDUSTRY**

Fronius deals since 1992 with solar electronics, in particular with the
Development and production of photovoltaic inverters for grid coupled and autonomous power supply sources.
Currently the largest photovoltaic solar power plant in Austria was built on top of the Fronius company building in Sattledt / Austria: capacity 604 kWp

Good Examples: Solar Power

- **Beispiel 6 Photovoltaics - WORKSHOPS**

ROST Workshops offer services in the area of printing, advertising and fairs.
PV panels on the shed roof
- Installation size:
 101 kWp
- Electricity production:
 64000 kWh/year

Good Examples: Solar Power

- **Example 7 Photovoltaik - AGRICULTURE**

In total **109 kWp of photovoltaic installations** were assembled on the livestock buildings of the farm. This installation produces about 92,000 kWh of solar power annually. With investment costs of about 200,000 € the investment will be refinanced within 10 years through the feed-in compensation (EEG).

- **Solar heating and solar power in Estonia**

Oil shale is the most important energy source in Estonia.
The share of renewable energy in overall energy consumption in 2008 was 13.5% in Estonia. The organic and wind energy are the primary types here.
Solar energy is used in Estonia to a small extent. The first solar projects (e.g. solar thermal systems for the hospital in Vändra, SOS Children's Village in Keila) are implemented for solar heat production.
Under the electricity market law the solar power costs are reimbursed (Elektrituruseadus) since 1 July 2010 at the level of 5,37 Cent/kWh.

Solar Energy - Promotion

- **EU – Guidelines and support programs**

  Regulations/decisions:

  Renewable energies:
  Directive 2009/28/EC
  Objective: Increasing the total number of renewable energies till 2020 to 20%. Incl. National Action Plans (Estonia: from 18 % in 2005 to 25% in 2020 of final energy consumption share).

EU – Funding (direct/indirect)

Applying for a direct EU funding requires significant amount of time and bureaucracy! This applies to direct EU funding programs such as LIFE III, Intelligent energy for Europe, Marco Polo, Leonardo da Vinci. These projects are created on European added value (a consortium with other partners)

More advantageous are the programs in which national/regional EU funds are available indirectly from the Structural and Cohesion Fund. This framework is suitable for SME projects in particular from the European Regional Development Fund (ERDF). Example in Poland: the Sectoral Operational Programme for increasing the competitiveness of companies (7 billion for 2007-2013)

Solar Energy – Customer Service

- **Various phases of consultations**

1. Becoming acquainted – building bridges
2. Questions – identifying the needs
3. Offering solutions – consolidating and negotiating
4. Achieving results – completion

- **Conclusion**

Summary
- Facts
- Important websites

Feedback
- Content?
- Presentation?
- Have the goals been achieved?
- Use for own applications?
- What is missing?
- Improvement proposals

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Training III for SMEs: Energy Efficient Construction and Application of Renewable Energies

Implementation report

Prepared by:

Latvian Chamber of Crafts

February, 2024

Co-funded by the Erasmus+ Programme of the European Union

"The European Commission support for the production of this publication does not constitute endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein"

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Attachments ..... **Fehler! Textmarke nicht definiert.**

Co-funded by the Erasmus+ Programme of the European Union

Introduction

The global energy landscape is evolving due to the depletion of fossil fuels and the urgent need to mitigate climate change. The course “Energy Efficient Construction and Application of Renewable Energies” aims to empower small medium enterprises and self-employed craftsmen by equipping them with the latest knowledge and techniques in energy efficiency and renewable energy. By implementing these practices, SMEs and self-employed craftsmen can reduce operational costs, enhance their market competitiveness, and contribute to a more sustainable future.

This course provides participants with an understanding of the current state of global energy consumption, the finite nature of fossil resources, and the critical importance of transitioning to sustainable energy practices. Turning to the practical side, it gives an overview of energy-efficient modernisation of buildings and the use of renewable energies. By understanding these issues, craftsmen in Latvia can play a pivotal role in local and global efforts to reduce carbon emissions and promote environmental sustainability.

Latvia is committed to improving energy efficiency and increasing the use of renewable energy sources. By adopting these measures, craftsmen can significantly reduce energy consumption, lower utility costs, and enhance the sustainability of their operations.

A key component of the course is educating participants about EU insulation standards and various insulating materials. Understanding how different materials insulate and how the insulation effectiveness is measured is essential for improving the energy efficiency of buildings. Participants also learn about the potential energy saving in older buildings and the impact of modern insulation standards on energy balance and emissions, enabling them to apply this knowledge to their own projects.

The course includes introduction to practical elements such as using the EVA 2010 Energy Consulting Programme to determine the final energy demand of model houses, applying thermography, and conducting blower door test measurements to find leaks. These skills enable participants to apply theoretical knowledge to real-world scenarios, ensuring they are well-prepared to implement energy-saving measures and technologies in their professional work.

By participating in this course, members of the Latvian Chamber of Crafts, including SME employers, employees, and self-employed craftsmen, gain valuable insights into energy efficiency and renewable energy. This knowledge will empower them to make informed decisions, adopt sustainable practices in their professional work, and enhance their specialisation.

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Admission and organisation of the training

Latvian Chamber of Crafts disseminated information about the chance to participate in the training by phone and e-mail.

The training was implemented by Latvian Chamber of Crafts' member Guntars Upenieks.

The curriculum was prepared by the Hanse Parlament. The lecturer dedicated to closely follow the provided curriculum, only adding materials where regional specifics were concerned – specifically in the Day 2 Unit 2.

The training was attended by 15 participants. All the training participants were Latvian Chamber of Crafts members (self-employed persons or SME representatives).

The training was held over a period of 2 days, as suggested by the Hanse Parlament.

The two-day seminar plan can be found below.

"Energy Efficient Construction and Application of Renewable Energies" curriculum (16 hours)

Day 1

No.	Topic	Format	Hours
1.	Availability of fuels. Overview of energy saving measures in different fields.	Lecture	2
2.	Insulation standards in the EU.	Lecture, discussion	1,5
3	Different insulating materials.	Lecture	1
3.	Determining the final energy consumption on the basis of a model house.	Lecture	1,5
4.	Identification of weak points and insulation optimization.	Lecture	1
5.	Heating and ventilation systems.	Lecture, discussion	1
	Total:		**8**

Day 2

No.	Topic	Format	Hours

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1.	Overview of the various forms of renewable energies and their technical implementation.	Lecture, discussion	2
2.	Situation in the country.	Lecture, discussion	1,5
3.	Presentation of a near-zero energy house and application of renewable energies.	Lecture, work in EVA 2010	1,5
4.	Project presentation.	Group work	1,5
5.	Summary and conclusion.	Discussion, flip chart	1,5
	Total:		**8**

Participants profile and organisation of the training

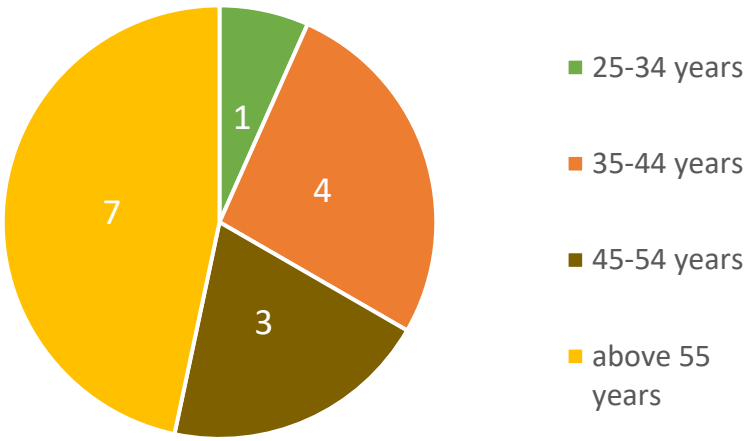
The training was held from 10 November to 11 November, 2022.

The training was carried out in person.

All of the participants of the Energy Efficient Construction and Application of Renewable Energies training were members of the Latvian Chamber of Crafts.

All 15 participants were male.

Age of participants:



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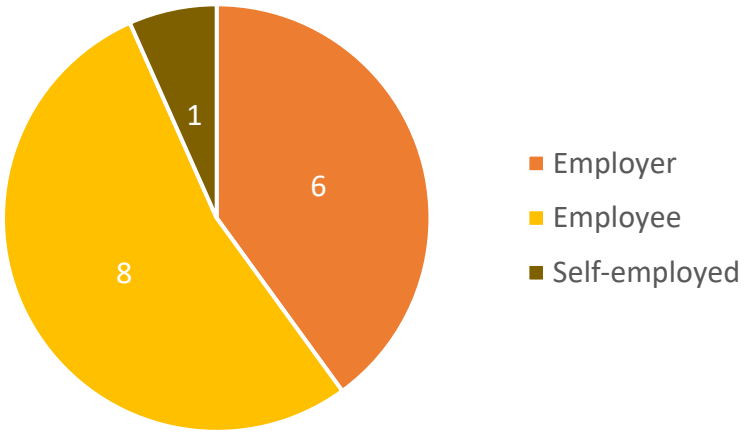
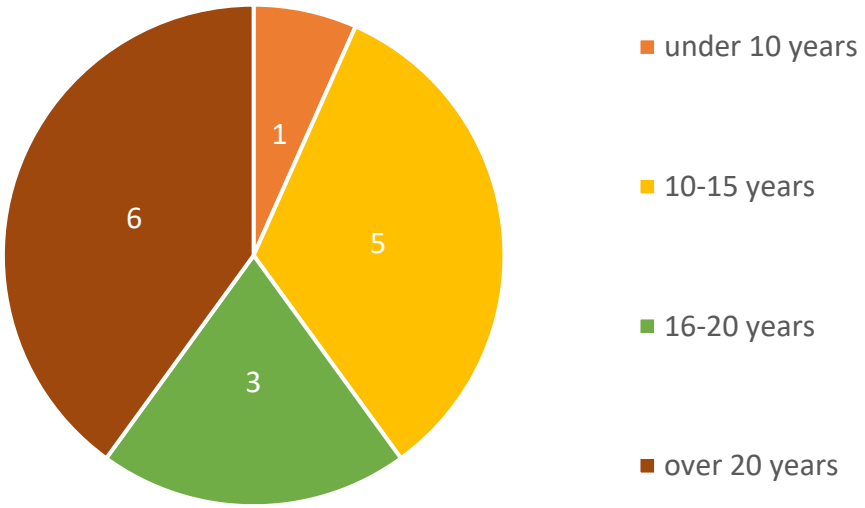
Most training participants came from SMEs. One of the participants was a self-employed craftsman:



All of the participants came from the building crafts group.

The represented crafts were: roofer, carpenter, painter, tinsmith.

The work experience of the trainees ranged from 7 to 44 years:



Execution of the Training

The training consisted of two day seminars (8 and 8 hours). The seminars were split into multiple lecture units, some of which involved discussions and practical work.

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Day 1

Availability of fuels. Overview of energy saving measures in different fields (2 hours)

This unit begins with a concise introduction to the course and an overview of the specific learning objectives for the training. Participants are then presented with key statistics on global energy consumption, highlighting the finite nature of fossil fuels and discussing future energy projections. The environmental impacts of fossil fuel combustion are examined next, detailing the contributions to climate change and air pollution. The session transitions to an economic analysis of various energy-saving measures, explaining their cost-benefit aspects and discussing economic incentives and policies that encourage energy conservation. The unit concludes with a group discussion, where participants share ideas and practical steps for saving energy in their personal and professional contexts, with a focus on efficiency and the potential adoption of renewable energy sources.

Insulation standards in the EU (1,5 hours)

This unit starts with an introduction to the importance of insulation in energy conservation, followed by an overview of EU insulation standards. Continuing at the household level, participants are taught how to identify which consumers are significant to energy consumption in a household.

Different insulating materials (1 hour)

Participants are educated on the different types of insulating materials, their properties, and how their insulating effects are measured. The session includes a description of real product examples and practical application scenarios, helping participants understand how to classify and choose appropriate materials for various settings. The unit concludes with an interactive discussion, encouraging participants to share their experiences and insights on insulation practices and materials used in their own projects.

Determining the final energy consumption on the basis of a model house (1,5 hours)

The unit begins with an explanation of how to evaluate the energy savings potential in buildings from the end of last century compared to those renovated according to current energy-saving regulations. Participants learn about the calculation and significance of the U-value and its impact on a building's energy balance. The session then explores model house energy losses and emissions. Practical application is emphasized through the use of the EVA 2010 Energy Consulting Programme (Project

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Brest), where participants can calculate and analyse energy demand using a provided model house.

Identification of weak points and insulation optimization (1 hour)

This unit introduces participants to the applications of thermography and blower door tests to identify weak points of buildings and ensure quality assurance. The session covers the identification of typical thermal bridges and air density envelopes in buildings. The lecturer also discusses the application of optimized insulation practices. The session ends with a discussion on the applicability of these techniques.

Optimized Construction and Heating Technology (1 hour)

The session begins with an overview of conventional heating systems. Technical aspects of condensing boilers and water heating are highlighted. The lecturer then follows by an overview of heating control technology. Finally, participants learn about the importance and installation of ventilation systems.

Presentation of a near-zero energy house and application of renewable energies (2 hours)

This unit provides an overview of the diverse types of renewable energy sources and their applications. Participants examine the feasibility and availability of these technologies in Latvia. The session encourages participants to consider the necessary steps to implement renewable energy solutions in their own enterprise and craft field. The unit concludes with a guided discussion, where participants answer key questions about the local situation, implementation requirements, and potential development options.

Situation in the country (1,5 hours)

This unit focuses on providing participants with the latest information on the energy situation in Latvia. The session includes an overview of national energy policies, current energy consumption trends, and the status and possible improvements of the renewable energy adoption. Participants are encouraged to discuss how these factors impact their professional practices and explore opportunities for growth within the local context.

Presentation of a near-zero energy house and application of renewable energies (1,5 hours)

Participants are introduced to the concept of a near-zero energy house, examining the influence of new insulation standards and optimisation of different components. The unit includes group work, where participants create predefined variants using the EVA 2010 Energy Consulting Programme. The participants are split into 4 groups:

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- Group 1: "Roof Insulation + Condensing + Solar" (4 people)
- Group 2: "No Insulation + Geothermal Heat" (3 people)
- Group 3: "Combined Variants + Geothermal Heat" (4 people)
- Group 4: "Exterior Wall Insulation + Roof Insulation" (4 people)

Each group analyzes how different insulation and heating options affect the final energy demand, primary energy demand, and pollution emission levels.

Project presentation (1,5 hours)

Participants present the results of their group work from the previous session. Each group uses a flip chart to display their findings on how different energy-saving measures impact final energy demand, primary energy demand, and pollution emissions. The session involves a detailed discussion of each group's results, providing feedback and insights on the various approaches explored.

Summary and conclusion (1,5 hours)

The final unit provides a comprehensive summary of all teaching units, consolidating the key points and insights gained throughout the course. Participants ask remaining questions and discuss possibilities to implement the course contents in their professional practices. Using a flip chart and sticky notes, participants highlight what they found most valuable and provide suggestions for future improvements.

Main Findings and Conclusions

Throughout the “Energy efficient construction and application of renewable energies” course participants were introduced to an overview of renewable energies and the opportunities the technology provides, as well as a more in-depth look on energy-efficient modernisation of buildings – recognising and planning the application of different insulation methods, heating and ventilation technology. Participants explored the feasibility and implementation of these technologies in their own contexts, gaining insights into the necessary steps for adoption.

Attendees of the course appreciated the scope of the content, which covered both theoretical and practical aspects of energy efficiency and renewable energy. Some of the participants noted that the course was their first in-depth insight to concepts such as near-zero energy houses and different insulation variants.

The hands-on exercises and real-world applications, such as using the EVA 2010 Programme and insight into conducting thermography and blower door tests, were highly valued. The interactive group discussions and collaborative activities were well-

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received, as they allowed participants to share ideas and learn from each other's experiences in different fields.

Participants noted that even though some of the content was not region-based – for example, the EVA 2010 Programme – it gave useful understanding of the broader, European-level situation and could be valuable when working abroad.

Some participants felt that the duration of the training units could have been longer to cover the material in depth and expressed interest in additional training. The lecturer took note of their interest, for now providing them with additional resources for further learning.

Overall, the course was well-received and deemed highly beneficial by the participants. Latvian Chamber of Crafts sees the possibility to continue implementing this kind of training program in the future, offering it to members of the chamber who are working in small and medium enterprises. According to the participants' reviews, it is likely that the training could be expanded beyond a two-day long seminar.

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Training IV Waste and Wastewater Management and Energy Production

- Curriculum
- Teaching Material (Presentation)
- Implementation Report

Curriculum for the seminar

“Waste and Wastewater Management and Energy Production”

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1. Summary of the most important features

1.1. Goal

The goal of this seminar is to give summary to employees and decision makers in SMEs as well as in the field of waste and wastewater management of technology for waste and wastewater management and of possibilities of energy production from waste and wastewater. The seminar provides information and facts related to various possibilities as well as well implemented examples in order to enable the participants to evaluate the implementation of possible measures at the enterprises which are specific in the industry and also in the new market areas for SMEs.

1.2 Target groups

Entrepreneurs, management personnel at the enterprises and also in the field of waste and wastewater management.

1.3 Duration and timing

The seminar can be implemented as a full-time or part-time course, it is separated into 7 modules and contains at least 9 and not more than 13 teaching units in total, each with the duration of 45 minutes. At first general economic and international issues are discussed. After that technologies, Best Practice and also possibilities of energy production, at first waste management and after that wastewater management are communicated. In conclusion on the basis of case studies the participants develop possibilities for the purpose of discovering new market areas in small and medium-sized enterprises. Wherever possible the seminar should include an excursion to waste and wastewater management facilities.

1.4 Qualification of lecturer(s)

The seminar should be preferably held by lecturers which possess not only in-depth knowledge in the field of waste and wastewater technologies but also country-specific knowledge, especially the financial framework conditions for the implementation of measures. It is recommended to utilize the services of at least 3 lecturers at the seminar. The lecturers should not only be competent in this field but also in the didactic field to possess presentation and discussion experience. Thereby it is of course advantageous to organize group work and to hold presentations of partial results by working groups.

1.5 Required technical equipment

- Flip chart
- Blackboard
- PC with projector
- Internet access for the lecturer’s laptop
- Screen

1.6 Methodological and didactic remarks

Depending on the knowledge of seminar participants the fundamental correlations are discussed to the necessary extent but anytime when it is desired they can be deepened. Each module should be concluded with a detailed discussion and debate as well as contribution of experiences and examples by the participants. For both big modules "Waste Management" and “Wastewater Management” work in small groups is recommended. Within the framework of the last module “Discovering market areas” the participants should elaborate their own strategies and solutions.

2. Seminar concept

2.1 General concept

2.1.1 Overview of the modules, key issues and contents (oriented at the contents of the master slide set for the lecturer)

Module 1: Questions of general economic and international development – 1 TU

Topic 1.1: Growth areas in the field of energy and environment
Topic 1.2: Tendencies of international development
Topic 1.3: Requirements for the cooperation

Module 2: Recycling Management and Cradle to Cradle – 1-2 TU

Topic 2.1: Requirements related to the reduction of consumption of raw materials
Topic 2.2: Recycling
Topic 2.3: The Cradle to Cradle Principle
Topic 2.4: Ecological Cycle
Topic 2.5: Technical Cycle
Topic 2.6: Examples for Best Practice and Products

Module 3: Technologies and Developments in Waste Management on the Example of City Cleaning – 2 TU

Topic 3.1: Overview of Tasks, Solutions and Developments
Topic 3.2: Best Practice Examples
Topic 3.3: Energy Production from Wastes

Module 4: Use of Wastes for Biogas and Electricity Generation – 1-2 TU

Topic 4.1: Best Practice Example of a Company
Topic 4.2: Biogas Installations
Topic 4.3: Substrata and Energy Yield

Module 5: Technologies and Developments of Wastewater Engineering – 2 TU

Topic 5.1: Volume Developments and also Treating Procedures and Results
Topic 5.2: Separation of Wastewater
Topic 5.3: Best Practice: Green Energy from Black Water

Module 6: Decentralized Wastewater Treatment – 1-2 TU

Topic 6.1: Subterranean Treatment Procedure
Topic 6.2: Best Practice Examples

Module 7: Discovering New Market Areas for SMEs – 1-2 TU

Topic 7.1: Presentation and Discussion of Case Studies
Topic 7.2: Development of Strategies

2.2 Learning Objectives and Methodological and Didactic Remarks related to Key Issues of the Concept

With the help of this seminar technologies and developments of waste and wastewater management should be communicated and at the same time new fields of activity should be shown to enterprises which offer rewarding market chances on the one hand, and make crucial contributions to the overcoming of energy and environmental problems on the other. The main learning objective is thus to provide an overview related to new waste and wastewater technologies and to recognize decentralized solutions for the own enterprise and also especially for the purpose of discovering new market areas.

Specific learning objectives of the seminar contain the following topics:

- Evaluations related to the general economic and international development
- Sensitization for the requirement of recycling management and energy production from waste and wastewater
- Learning technical and organizational solutions
- Sensitization for economic growth fields

The learning objectives for each module are described below:

2.2.1 Module 1: Questions of general economic and international development

The participants…
… recognize bottlenecks of economic development and new market chances for SMEs.
… get the idea related to international developments and market chances.
… learn the need for cooperation.

2.2.2 Module 2: Recycling Management and Cradle to Cradle

The participants…
… recognize the importance of reduction of raw materials consumption.
… learn the principles of recycling and recycling management.
… learn a new economic approach according to the Cradle to Cradle principle.
… obtain information related to Cradle to Cradle products.
… can evaluate possibilities and fields of application for the own enterprise.
… get an idea of the saving potential of raw materials and economic future-oriented approaches.

2.2.3 Module 3: Technologies and Developments in Waste Management on the Example of City Cleaning

The participants…
… get an overview about tasks and developments on the example of city cleaning.
… learning Best Practice examples of waste management.
… recognize the possibilities of energy production from waste.

2.2.4 Module 4: Use of Wastes for Biogas and Electricity Generation

The participants…
… recognize the possibilities of energy production from wastes.
… on the basis of specific examples can evaluate the suitability of wastes for the production of energy.
… learn market chances through the example of the enterprise.

2.2.5 Module 5: Technologies and Developments of Wastewater Engineering

The participants…
… get and overview about technologies and results of wastewater treatment.
… recognize the importance of wastewater separation.
… can evaluate the importance and the possibilities of energy production from wastewater using the Best Practice example.

2.2.6 Module 6: Decentralized Wastewater Treatment

The participants…
… learn technologies of decentralized wastewater treatment.
… are familiarized with the construction and the principle of operation of subterranean treatment systems.
… learn Best Practice examples.
… have the ability to find solutions for the own enterprise as well as especially for the new fields of activity of the enterprise.

2.2.7 Module 7: Discovering New Market Areas for SMEs

The participants…
… get an impression related to market developments and chances.
… elaborate strategies for the development of new market areas of the own enterprise.

3. Certificate

After the conclusion of the seminar the participants obtain a certificate in which training contents (key issues) are listed and which is signed by training centers (e.g. a Chamber) and the Hanseatic Parliament.

Veränderte Rahmenbedingungen für wirtschaftliches Handeln im Energie- und Umweltbereich

Dr. Jürgen Hogeforster
Chairman Hanse-Parlament

Vilnius, 07.04.2014

➢Hintergrund

Vor welchem Hintergrund spreche ich?

+ Landwirt
+ Politikberater
+ Unternehmensberater
+ Hauptgeschäftsführer Handwerkskammer
+ Chairman Hanse-Parlament
+ Bauunternehmer
+ Moderator/Journalist

Wir können zwar nicht in die Zukunft schauen, aber wir können sie bauen !

Hanseatic Parliament

- The Hanseatic Parliament has been working actively in the interests of small and medium enterprises since 1994 and was officially established as an association in St.Petersburg in 2004. The registered office is located in the Free and Hanseatic City of Hamburg.
- Network of more than 50 chambers of commerce, industry and crafts as well as similar associations around the Baltic Sea, representing more than 470.000 SMEs
- Objectives of the Hanseatic Parliament are:
  - **to develop a strong, innovative economic region of world standing**
  - to promote small and medium-sized businesses
  - to initiate outstanding qualifications
  - to deepen networking and co-operation
  - to strengthen sub-regions and their diversity
  - to establish a Hanseatic identity beyond national borders

Significance of SMEs

- 1. Strengthening of SMEs best way to strengthen european regions
- 2. SMEs are the economic, cultural and social backbone

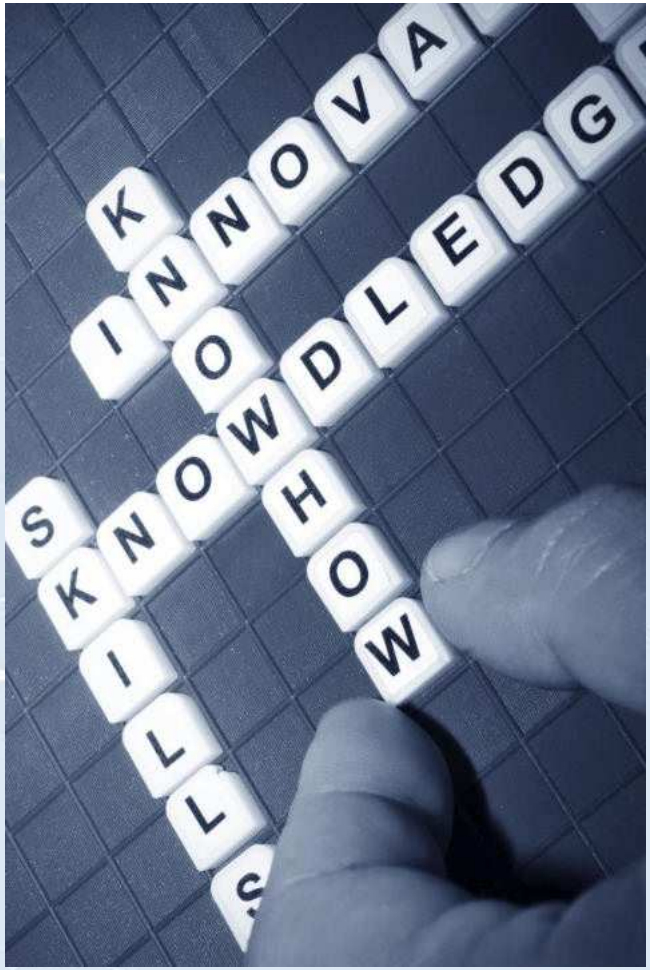
+ 99% of all companies in BSR
+ up to 70% of all jobs
+ 80% of all training positions
+ Family owned
+ responsible management

"I would like to thank you especially for your initiative to involve the academic community in the promotion of SMEs."

Support measures for SMEs

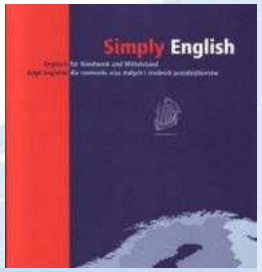
- ✓ Seminars on “International Business”
- ✓ Seminars for start ups
- ✓ Business Forums, Country Reports…
- ✓ Study courses
- ✓ Trainings

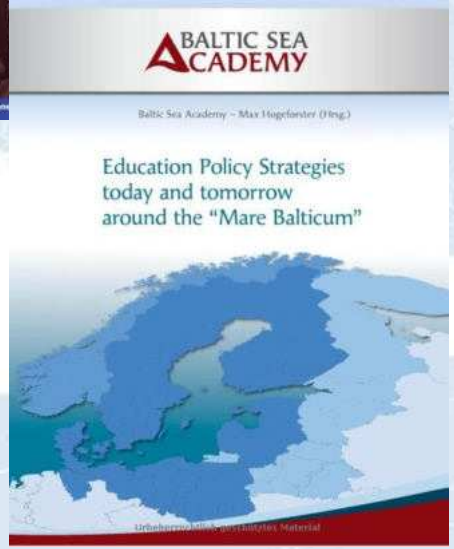
Alles kann kostenlos genutzt werden!



Support measures for SMEs

- » language courses (English – Polish / German / Russian for SMEs)
- » Design Workshop (Baltic Amber)
- » Matchmaking Events, Publications
- » virtual company register / EEN (www.eubizz.net).





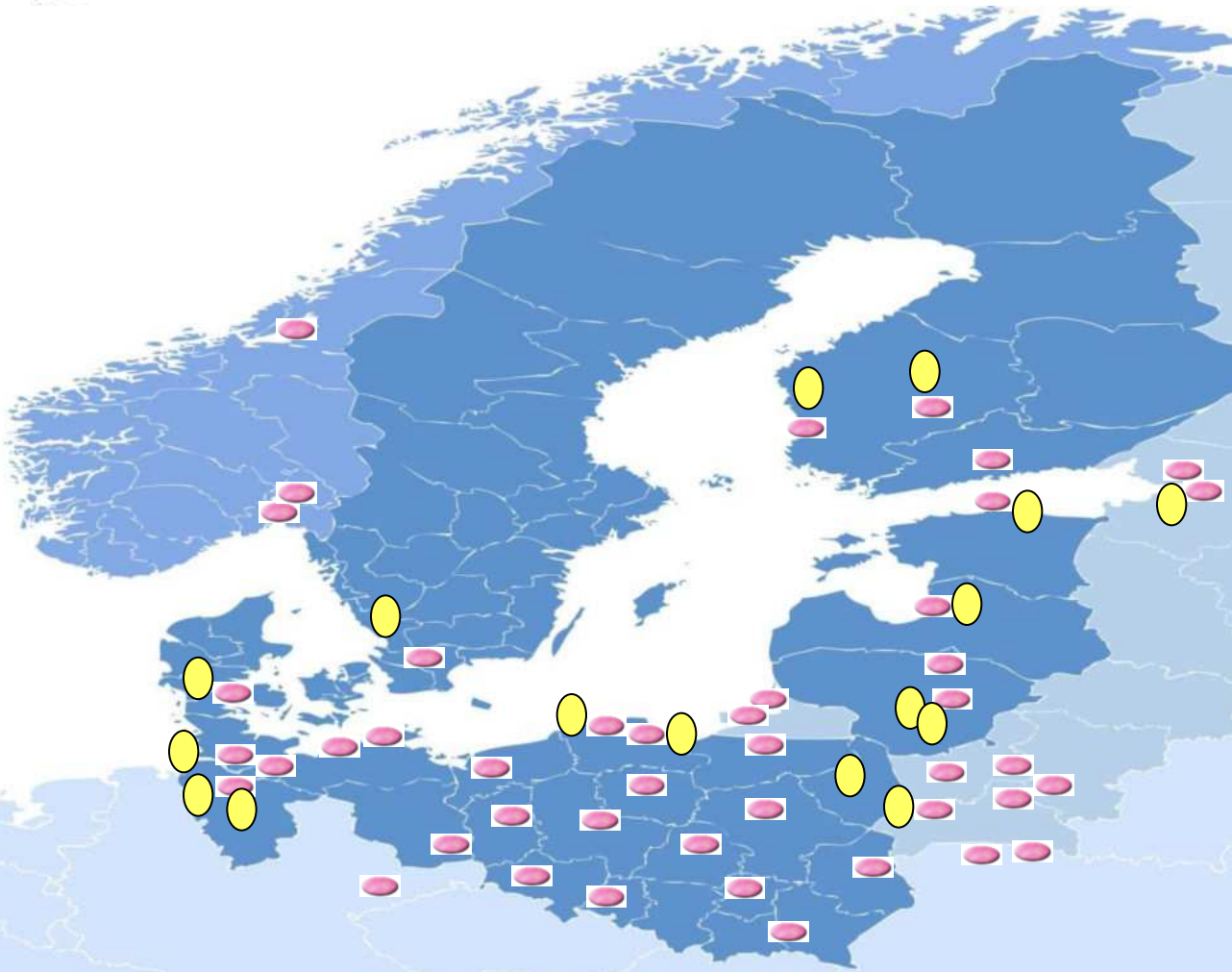
Future needs of SMEs

- All european countries are facing a lack of qualified personnel and managers ;Growing competition for young talents, increased by demographic development
- Increasing level of qualifications is required; High need for innovative solutions asks for qualified people = Qualification is most important task for SMEs to stay competitive versus LLC
- SMEs need closer cooperation and exchange with unviersities to stay competitive
- Risk for SMEs that best talents stay at university or go to major companies

Baltic Sea Academy

- Foundation of a Baltic Sea Academy as a link between SME organisations and academic institutions
- 22nd of February 2010
- Started with 10 members, 17 members in 2013

Mitglieder & Hochschulen



Białystok
Brest
Budapest
Bydgoszcz
Cottbus
Dresden
Danzig
Hamburg
Helsinki
Kaliningrad
Kopenhagen
Łódź
Lublin
Lübeck
Lüneburg
Malmö
Minsk
Moskau
Olstzyn
Oppeln
Oslo
Rostock
Panevėžys
Pori
Riga
Schwerin
Słupsk
Stockholm
St.Petersburg
Szczecin
Tallinn
Tampere
Trondheim
Vilnius
Warschau
Wrocław

Innovation & Qualification

BALTIC SEA ACADEMY

- Construction
- Energy
- Personnel

Innovation

- Product Innovations
- Process Innovations
- Concrete solutions

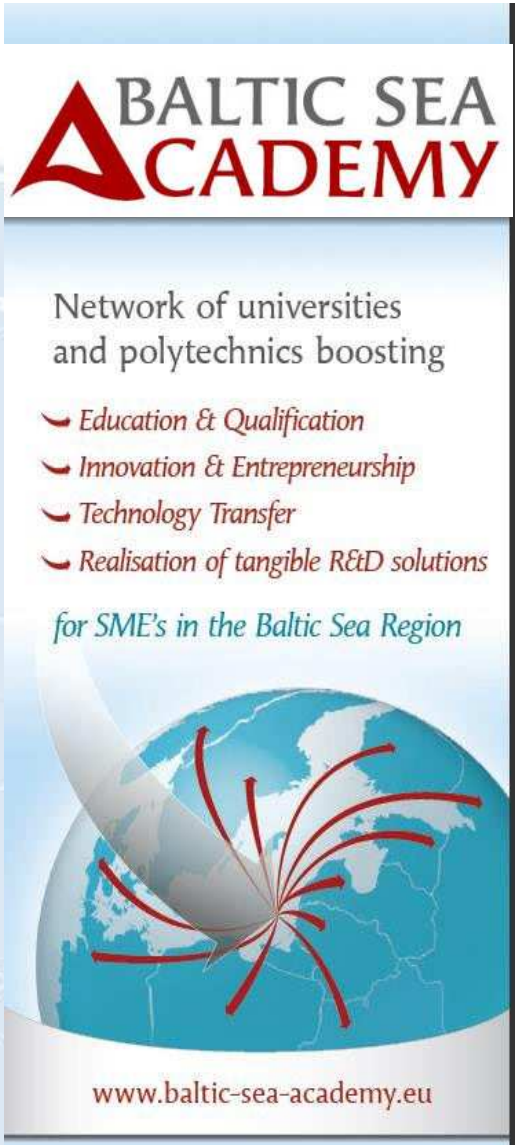
Qualification

- Dual study courses (simultaneous practical training and studies)
- further training courses
- vocational training

Hanseatic Parliament & Baltic Sea Academy

Hanse Parlament :
Network of 50 SME insitutions, mainly Chambers of Crafts, Commerce, Industry etc. in the BSR

Baltic Sea Academy:
Network of 17 Universities doing R&D and Qualification for SMEs



Seminar 7. und 8. April 2014 in Vilnius

Abfall- und Abwasserwirtschaft sowie Energiegewinnung

● Dr. Jürgen Hogeforster: Veränderte Rahmenbedingungen für wirtschaftliches Handeln im Energie- und Umweltbereich

ABFALL

● Dipl.Ing. S.R. Ganschow: Überblick über moderne Technologien der Abfallwirtschaft und Best Practice Beispiele aus Deutschland,Teil I

10.45 Kaffee-Pause

11.15 Dipl.Ing. S.R. Ganschow: Teil II

● Dr. Jürgen Hogeforster: Kreislaufwirtschaft und „Cradle to Cradle“ mit großen Chancen

12.45 Lunch

Seminar 7. und 8. April 2014 in Vilnius

● Dr. Kęstutis Armolaitis, Institute of Forestry: The utilization of forest fuel ash and domestic wastewater sludge in Lithuanian forests

ABWASSER

● Chemiker, H. J. Welsch: Die europäische Chemikalienverordnung REACH - Umsetzung in Unternehmen

15.30 Kaffee-Pause

● Dipl.Ing. Gintaras Vinikaitis: Kleine Anlagen in der Abwasserwirtschaft:

● Diskussion: Konsequenzen, Herausforderungen und Chancen in der Abfallwirtschaft für litauische Unternehmen

17.00 Ende des ersten Seminartages

Seminar 7. und 8. April 2014 in Vilnius

9,00 UHR ABWASSER

- Dr. Jürgen Hogeforster: Rückblick und Ausblick
- Chemiker, H. J. Welsch: Moderne Technologien in der Abwasserwirtschaft Best Practice Lösungen in Deutschland
- Dr. Jürgen Hogeforster: Subterra Klärtechnologien und Best Practice Beispiele

10.45 Kaffee-Pause

ENERGIEGEWINNUNG AUS ABFÄLLEN

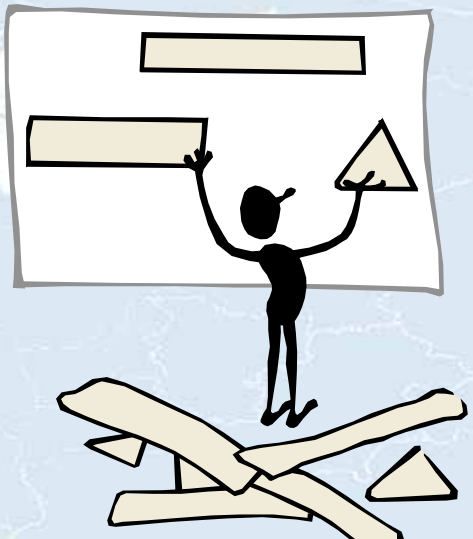
- Dipl.Ing. S.R. Ganschow: Practice Beispiele aus Deutschland
- Chemiker, H. J. Welsch: Energiegewinnung aus Abfall - die anaerobe Trockenfermentation

Seminar 7. und 8. April 2014 in Vilnius

- Dr. NN, Vilnius Gediminas Technical University Anaerobic digestion of sludge at the wastewater treatment plants with biological phosphorus removal: possible problems and solutions for them
- Arbeitsgruppen und Abschluss-Diskussion: Konsequenzen, Herausforderungen und Chancen für litauische Unternehmen

13.50 Feedback

14.00 Ende des Seminars

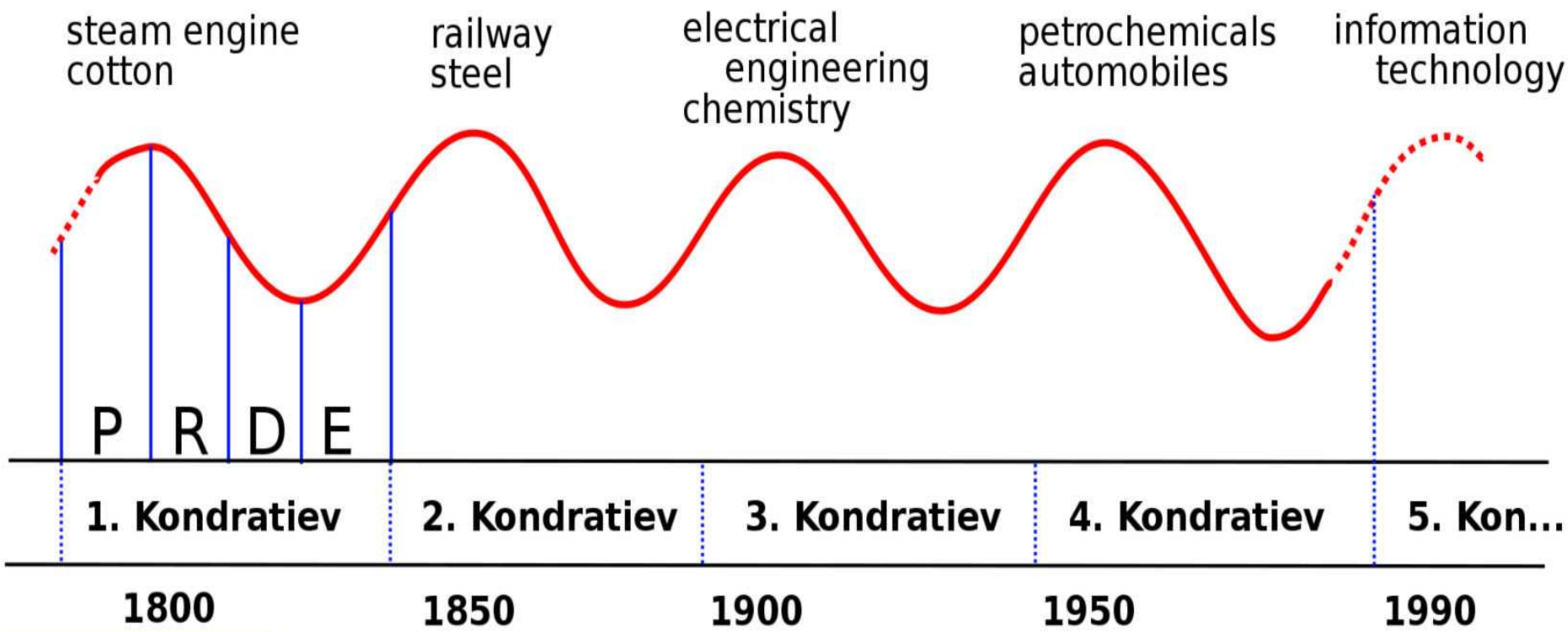


Langfristige Wellen

Nikolai Dmitriyevich Kondratiev
(1892 – 1938)

- Russian economist
- Proponent of the New Economic Policy (NEP)
- proposing the theory that Western capitalist economies have long term (50 to 60 years) cycles, "Kondratiev waves"

1. Langfristige Wellen



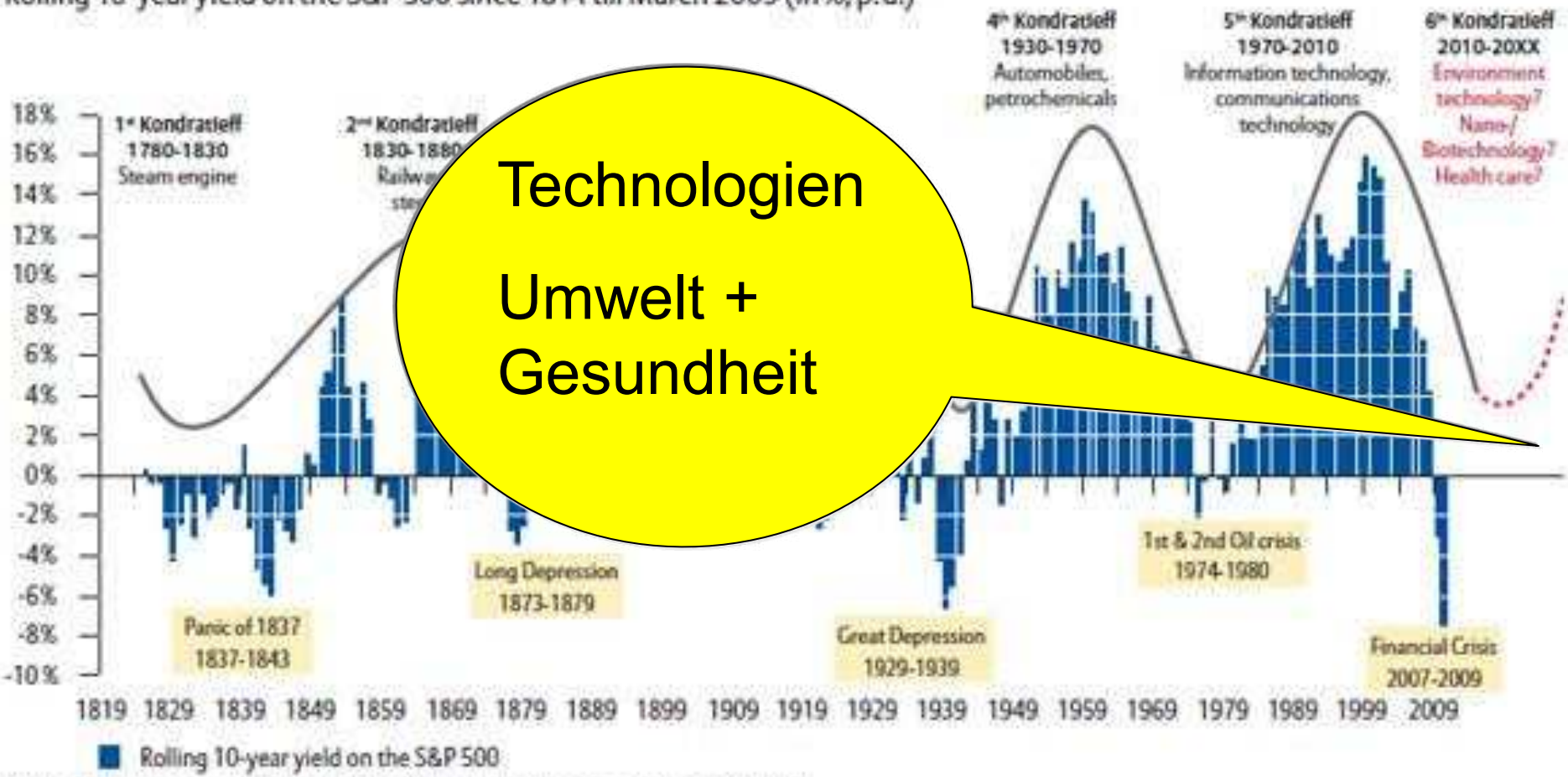
P: prosperity
R: recession
D: depression
E: improvement

Langfristige Wellen

Konkurrenz

Kooperation

Figure 1: Kondratieff cycles – long waves of prosperity.
Rolling 10-year yield on the S&P 500 since 1814 till March 2009 (in %, p.a.)



Technologien

Umwelt + Gesundheit

Source: Datastream; Illustration: Allianz Global Investors Capital Market Analysis

Mega-Trends

- **Sind unumkehrbar**
- **Wir sind im permanenten Wandel;**
  Phasen sind vorhersehbar. **Nun: Umwelt + Gesundheit?**
  Zeitalter des Vertrauens und der Kooperation
- **Neues Zeitalter** bereits angebrochen: Vergleichbar mit Übergang Agrargesellschaft zur Industrialisierung
- **Umwälzende Veränderungen** + Neuorientierung
- **Sowohl als auch** Entwicklungen

• Durch Veränderungen führen: Pionier + Bewahrer
• Change-Management: Auf Wandel einstellen und herbeiführen sowie Kräfte nutzen

KMU sind Gewinner

Erste Priorität
für KMU!

Großunternehmen

KMU

Arbeitsteilung

- Über Arbeitsteilung hohe Produktivitätsfortschritte
  Aber: Extreme Beschleunigung, Verlust Sinngebung
- Koordinierung über Machtstrukturen mit hohen Steuerungskosten
- Ausgliederung: Das System entlässt seine Kinder
- Explosion der Sozialkosten + sozialer Sprengstoff
- Materielles Wachstum schafft nicht mehr Wohlstandsmehrung
- Verwirtschaftung der Ressourcen – Wachstumsnachteile überwiegen Vorteile
- Widerspruch Logik Unternehmen/Haushalte und Gesamtgesellschaft

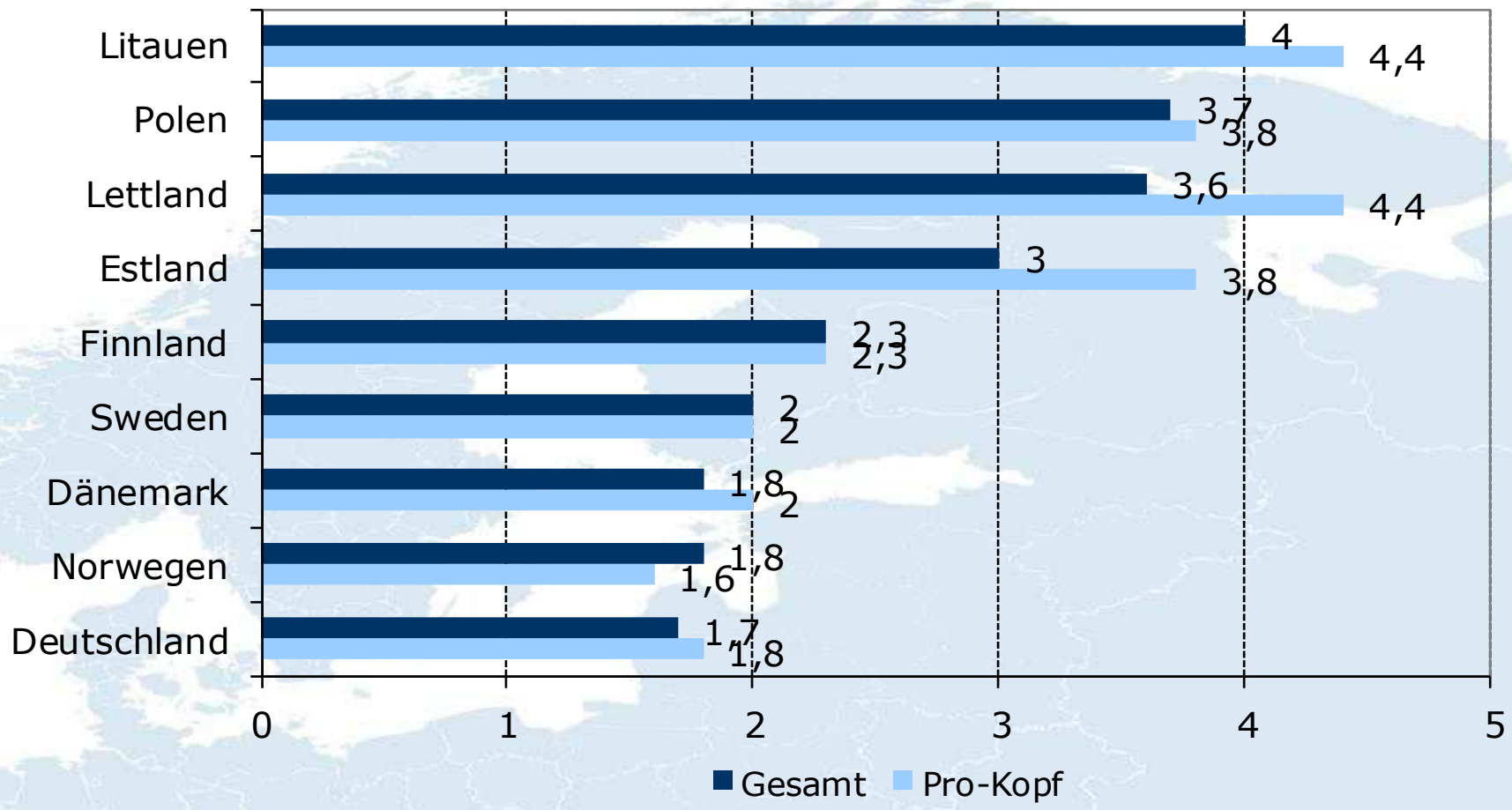
Arbeitsteilung: Konsequenzen

- Produktivitätsfortschritte durch Ganzheitlichkeit
  + Gruppenarbeit löst Fließband ab; nicht enge Spezialisten, sondern Teams bauen Häuser
  + Computer führen wieder Planung, Design + Fertigung zusammen; ermöglichen kostengünstig individuelle Produkte + Kleinserien
- <u>Kooperation</u> zentrales Merkmal neue Ökonomie
- Erfordert intensive Nutzung IuK-Technologien
- Koordination stärker durch Selbststeuerung und auf Basis Kooperation + Vertrauen: Neue Führung; Bedeutungsanstieg: Personal-soziale Kompetenz

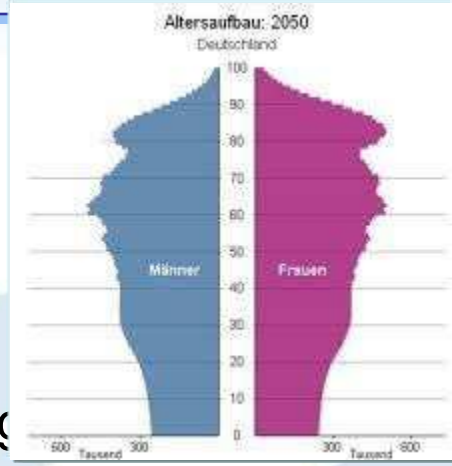
Hans-Jürgen Ahlers, Arbeitsteilung und Produktivität, in: Wirtschaftliche Grundbildung 4/1992, S. 15

Große Chancen

Durchschnittliche Wachstumsrate p. a. bis 2025

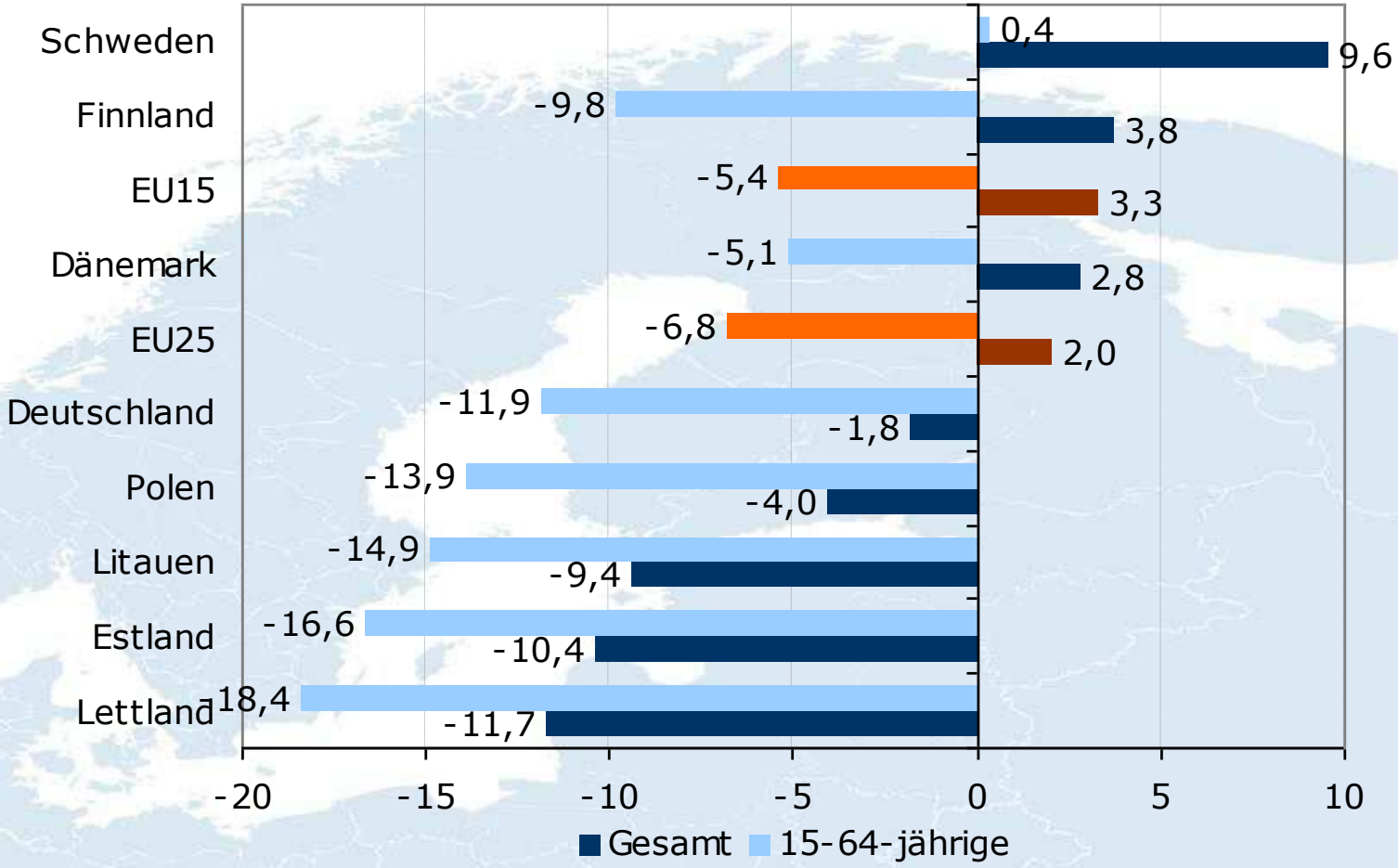


4. Demographischer Wandel



- KMU haben gute Wachstumschancen, aber nur mit qualifiziertem Personal
- Wegen Überalterung benötigen KMUs mehr Mitarbeiter
- Dramatische Abnahme Schulabgänger - Geburtenrückgang
- Sinkende Attraktivität berufliche Ausbildung bedroht KMU
- Steigender Wettbewerb um qualifizierte Jugendliche zwischen KMUs, größeren Unternehmen, Universitäten/Hochschulen und Verwaltungen
- KMUs drohen zum Verlierer zu werden und werden auf untere Niveaus abgedrängt
- Demographie weitgehend ähnlich in allen BSR-Ländern
  = Kaum Chancen auf Zuwanderungen aus **EU-Ländern**
  = eher Gefahr der <u>Abwanderung</u>
- **Fachkräftemangel bremst Wachstumsdynamik**

Demographische Prognosen 2006 - 2030



Unternehmensbefragung Litauen

- In 10 Jahren brauchen 40% der SMEs Betriebsnachfolger
- 70% der SMEs benötigen zusätzliche Fachkräfte
- 100% der SMEs können benötigte Fachkräfte nicht/nur schwer gewinnen
- Mittelfristig benötigen 78% der SMEs neue/zusätzliche Führungskräfte
- 96% der SMEs wünschen bessere praktische und 74% bessere theoretische Berufsausbildung
- 100% Anforderungen steigen + Fortfall Tätigkeiten untere Qualifikationsstufen
- 100% Starker Wettbewerb um Jugendliche

Große Chancen KMU

Zukunft gehört KMU in Netzwerken

- ✓ **Kooperationen**
- ✓ **Innovationen**
- ✓ **Qualifikationen**

Prägende Trends für die regionale Wirtschaft

- **In KMUs sind die Fachkräfte von entscheidender Bedeutung.**
  + Die Qualifikationsanforderungen sind hoch und weiter wachsend.
  + Im Rahmen Globalisierung haben KMU nur eine Chance auf hohem Innovations- und Qualitätsniveau = höchste Qualifikation
- **Weiter sinkende Transport- und Kommunikationskosten erhöhen die Mobilität der Produktionsfaktoren**
  + Unternehmen wandern zu attraktiven Standorten mit hohem Fachkräftepotential
  + Arbeitskräfte wandern zu Standorten mit attraktiven Bildungsangeboten und vielfältigem Arbeitsmarkt
- **Intensivierung des Standortwettbewerbs um (hoch)qualifizierte Arbeitskräfte und Kapital**
  + Bildungsangebote sind entscheidender Wettbewerbsfaktor
  - **Es drohen Standortnachteile und Abwanderungen**

Erstes Fazit: Betriebe + Gesellschaft

- ✓ Extrem hohe Dynamik mit schnellen Veränderungen: Die Schnellen fressen die Langsamen
- ✓ Rasanter technischer Fortschritt, insbesondere ICT mit Begünstigung dezentraler Entwicklungen
- ✓ Sehr hoher Innovationsbedarf
- ✓ <u>Engpass Fachkräfte, Informationsverarbeitung + Problemlösungskapazität</u>

= Überforderung Führung: Im Unternehmen reicht ein Kopf nicht aus! Alle Köpfe einbeziehen!!!!!!!!!!!

= Arbeitnehmer und Arbeitgeber sitzen in einem Boot: Alle Kräfte für gemeinsame Lösungen

= In Politik werden alle Köpfe benötigt: Bessere + neue Lösungen

Problemlösungs-Kapazitäten

Größte Produktivitätsreserven: Personal- und Organisations-Entwicklung!

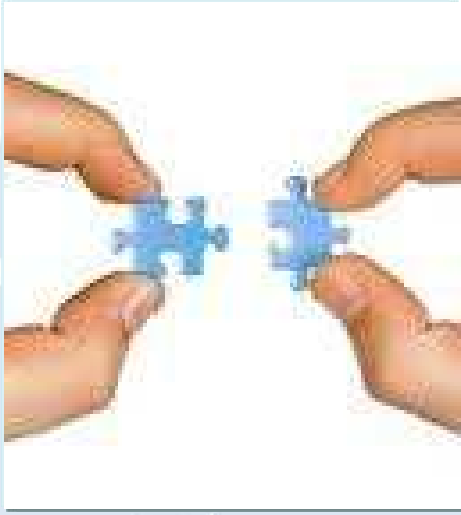
Mehr Software!

Wichtigstes Innovationsfeld!

- **Produktivitäts-Unterschiede südlich und nördlich der Ostsee**

Personal- + Organisationsentwicklung

Kooperation auf allen Ebenen in allen Bereichen:



- Innerbetriebliche Kooperation
  + Ausschöpfung große Produktivitätsreserven
  + Gewinnung und Bindung von Mitarbeitern
  + Alle Köpfe für Innovationen
- Zwischenbetriebliche Kooperation
  + Lieferung von Mehrwerten
  + Innovative Lösungen und Komplett-Leistungen
  + Verlängerte Wertschöpfungsketten einschl. Finanzierung
- Internationale Kooperation
  + Große Reserven bei weltweit wachsender Nachfrage
  + Grenzüberschreitende Partnerschaften
  + Gemeinsam mit Großunternehmen

Personal- + Organisationsentwicklung

+ Realisierung Kooperationen unterschiedlichster Form
+ Intensive Nutzung intelligente IT
+ Kooperations- und Vertrauensmanagement
+ Zusammenlegung der Stärken
+ stark erweiterte Wertschöpfungsketten

Beispiel: Dänisches (+ Hamburger) Baumodell

Unterschiedlichste Kooperationen sind ein Wachstumsfeld erster Güte !

BSR große Chancen

DENKEN LOHNT SICH.

- Ausgeprägter leistungsfähiger Mittelstand
- Hungrige Unternehmer mit großem Innovationspotential
- Exzellente Forschungs-Infrastruktur, insbesondere in Wachstumsfelder
- Mit Ausnahme Berufsbildung überwiegend gute Bildungssysteme
- Starker Geist des Zusammenhalts und der Kooperation
- Innovationen durch unterschiedliche Kulturen bei gemeinsamen Wollen

Vision

B Besser und
S Schneller als der
R Rest der Welt!

1 Bild sagt mehr als 1000 Worte

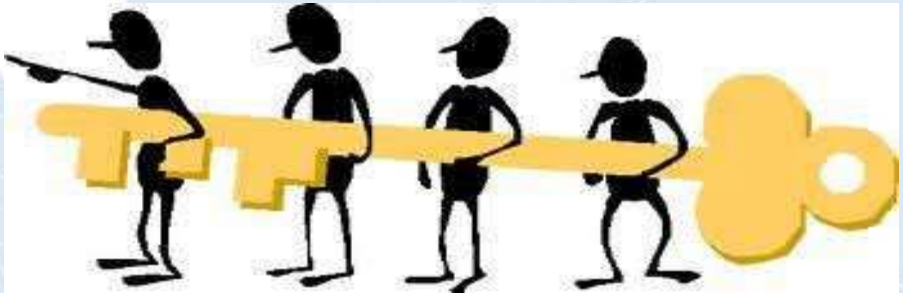
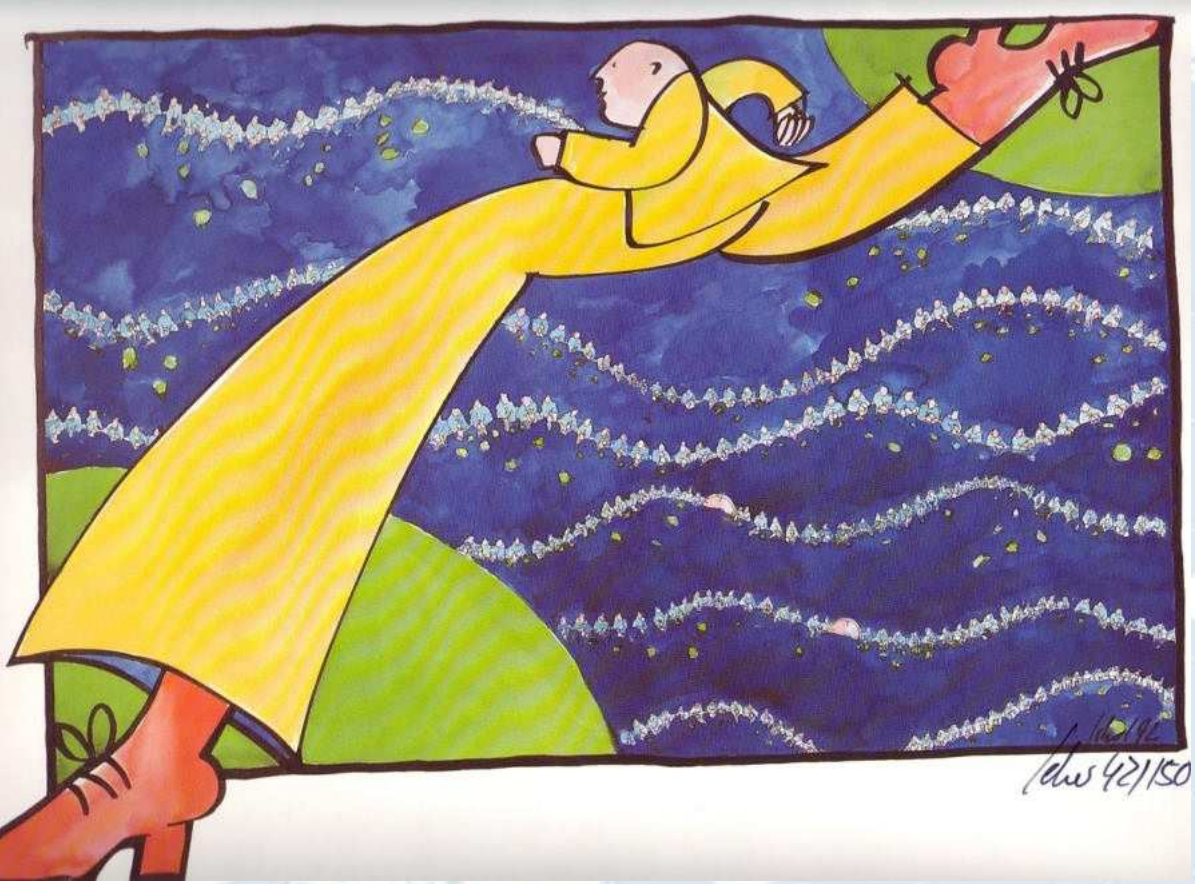


Bild zur Erinnerung

Unsere Köpfe sind rund, damit die Gedanken darin häufiger einmal die Richtung ändern können.

www.hanse-parlament.eu



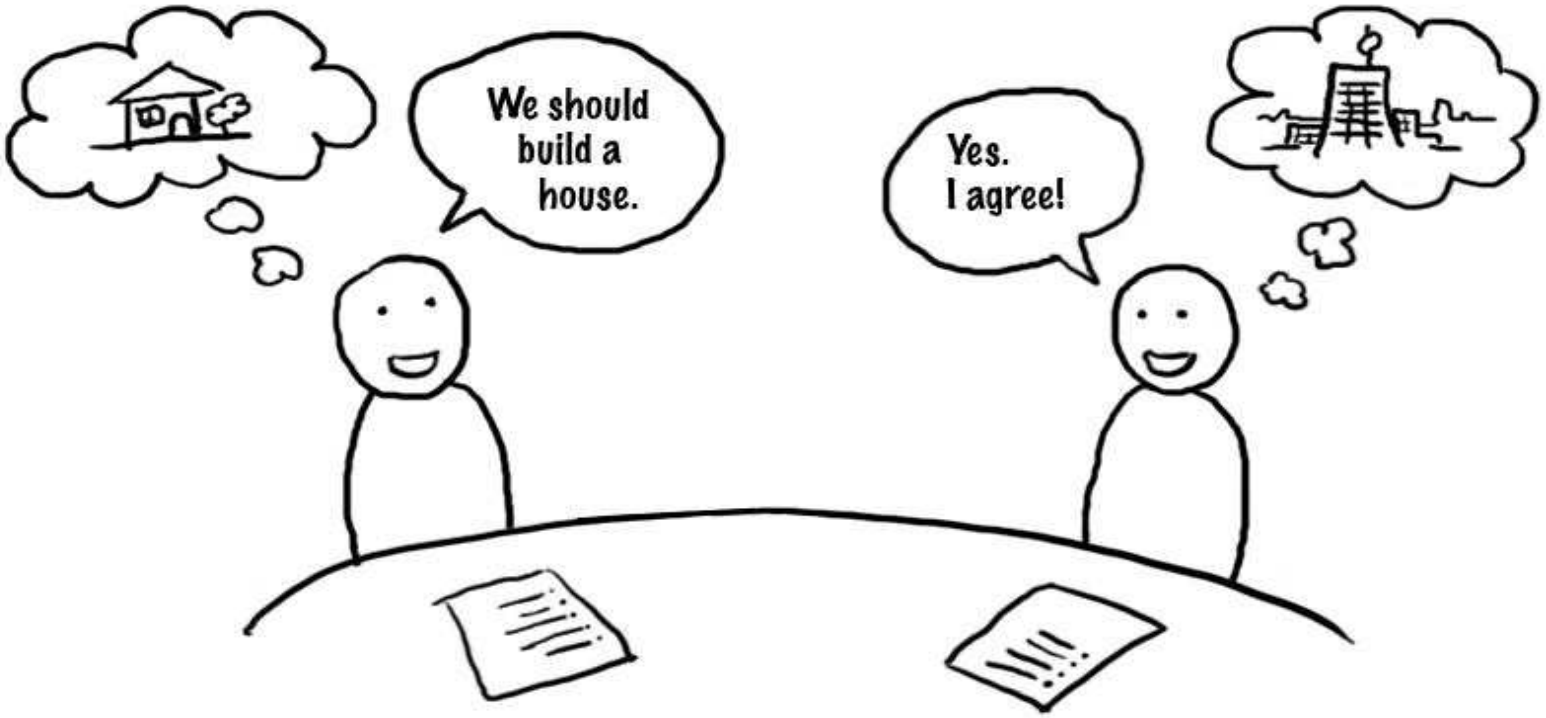
Ostsee: Mehr als Meer

KMU gestalten Zukunft !

Danke für Ihre Aufmerksamkeit !

Prozesse und Rahmenbedingungen

Questions and clarifications?



Hanse-Parlament

10:00

Dipl.Ing. S.R. Ganschow,

Stadtreinigung Hamburg:

Überblick über moderne Technologien der Abfallwirtschaft und Best Practice Beispiele aus Deutschland,Teil I

Viel Vergnügen

10:45

Kaffe-Pause und Erfahrungsaustausch

11:15

Hanse-Parlament

10:00

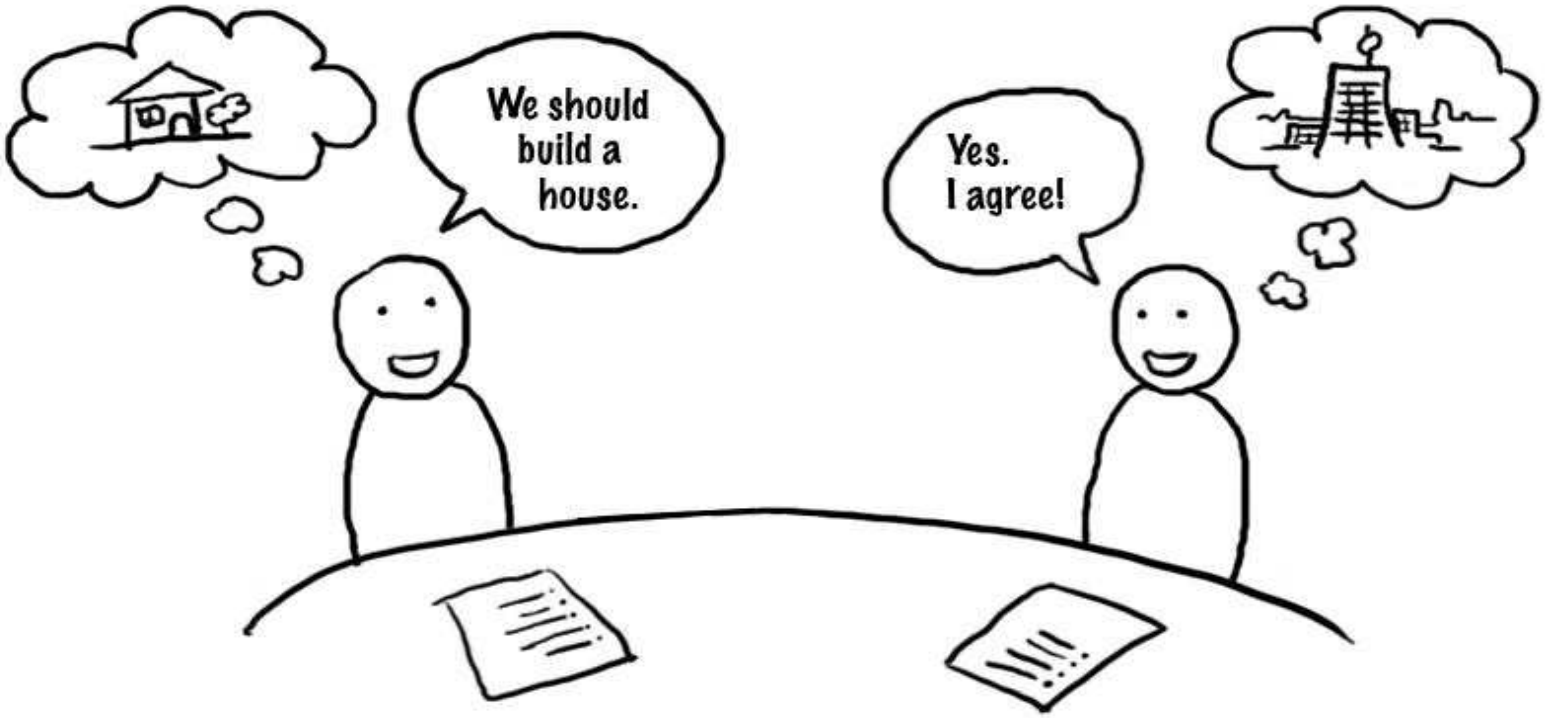
Dipl.Ing. S.R. Ganschow,

Stadtreinigung Hamburg:

Überblick über moderne Technologien der Abfallwirtschaft und Best Practice Beispiele aus Deutschland,Teil I

Abfall-Wirtschaft

Questions and clarifications?



Hanseatic Parliament

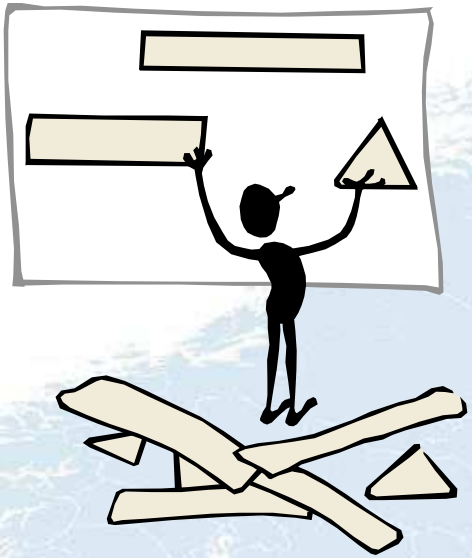
Cradle to Cradle – Visionen und Technologien zur Abfall- und Abwasserwirtschaft

Dr. Jürgen Hogeforster
Chairman Hanse-Parlament

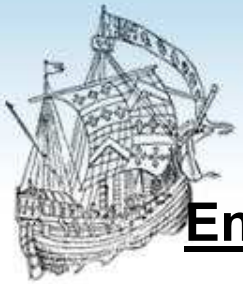
Vilnius, 7. April 2014

Hanseatic Parliament

Agenda



1. **Grüne Wachstumsfelder**
2. Internationale Entwicklung und Vernetzung
3. Technologie Cradle to Cradle
4. Das Wichtigste zum Schluss



Engpässe

Engpässe bestimmt durch Verhältnis Angebot + Nachfrage

Faktoren, die Nachfrage determinieren, bestimmen Engpässe, z. B.

- **Anzahl und Altersstruktur der Bevölkerung: Demograhischer Wandel**
- **Kaufkraft und Wünsche Verbraucher: Höheres verfügbares Einkommen und andere Bedürfnisse**
- **Gewerbliche Auftraggeber: Verlagerung Nachfrage ins Ausland und Ausstieg aus der Fertigungstiefe**
- **Öffentliche Auftraggeber: Hohe Nachfrage, wenig Kaufkraft**

Faktoren, die Angebot determinieren, bestimmen Engpässe, z. B.

- **Anzahl der Anbieter: Wachsender Wettbewerb – auch international**
- **Kosten und Qualität der Anbieter: Hoher technischer Fortschritt, großer und wachsender Preisdruck, Qualitäts-Reserven**

Wirtschaftliche Entwicklung erzeugt immer neue Engpässe!

Engpässe = Wachstumsfelder

Aus Problemen Chancen machen!

Heutige Engpässe sind Wachstumsfelder von morgen

- Gesundheit + Soziale Sicherung
- **Energie, Umwelt- + Klimaschutz**
- Dienste + Mehrwerte (postindustrielle Gesellschaft)
- Problemlösungskapazitäten + Bildung
- Zusammenarbeit + Organisation von Arbeit

Heutige + absehbare Engpassbereiche versprechen Wachstum + Gewinne

Wachstumsfelder Energie + Umwelt

Knappheit der Güter bestimmt Preis!

- ✓ Ständige Verknappung Energie, Wasser, Luft, Boden bei wachsender Nachfrage (Verdoppelung Energie!)
- ✓ Steigende Preise: Kostensenkung Einsparung Energie Wasser, Abwasser (Sparen wird zum Geschäft)
- ✓ Wachsende Nachfrage Einspar-Technologien
- ✓ Wachsende Nachfrage alternative Energieträger
- ✓ Unterstützung durch Gesetze
- ✓ Anreize durch Förderungen
- ✓ Beispiel Japan

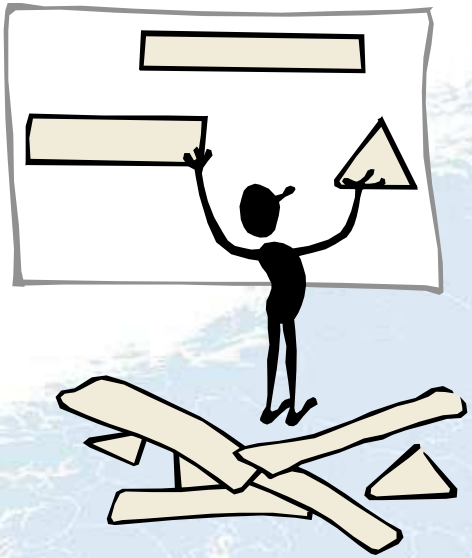
Wachstumsfelder Energie + Umwelt

Ökonomie durch Ökologie

- ✓ Preissteigerung + Gesetze erhöhen Produktions-kosten: Starke Anreize für Investitionen
- ✓ Zugleich neue Marktfelder für Unternehmen
- ✓ Hohes + wachsendes Umweltbewusstsein der Bevölkerung vergrößert Nachfrage nach Energie- und Umwelttechniken
- ✓ Nachhaltigkeit genießt hohe Wertpriorität und wird zum bedeutungsvollen Imagefaktor für Kunden und Unternehmen
- ✓ Grosse Chancen KMU, z. B. Energie, Abfall, Abwasser

Hanseatic Parliament

Agenda



1. Grüne Wachstumsfelder
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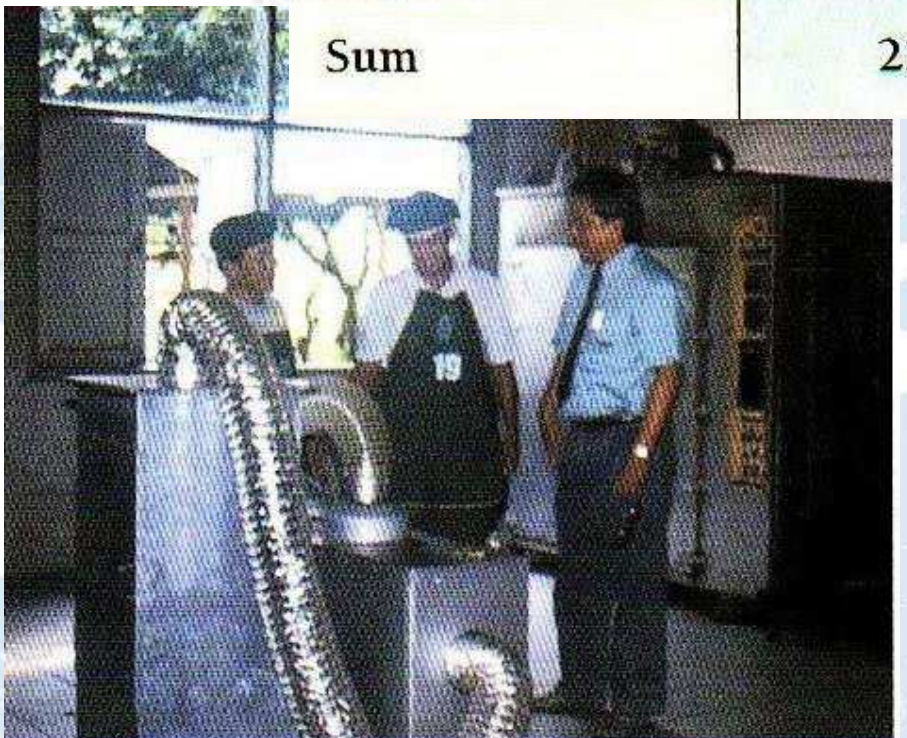
Wachstumsmärkte international

- Weltweit riesiger + weiter wachsender Bedarf zu Energieeinsparung, alternative Energieträger und Umwelttechniken
- Extrem hoher Energieverbrauch Schwellen- und Drittländer. Beispiel China
- Extreme Verknappung Trinkwasser und starke Gewässer-Verschmutzung
- Ungeheuerlich anwachsende Abfallberge

- ✓ **Erforderlich sind maßgeschneiderte Lösungen mit angepassten Techniken = <u>Stärke der KMU</u>**
- ✓ **<u>Wachsender Bedarf dezentrale Technologien</u>**

Energie-Einsparung

	Heat flow without insulation (W)	Heat flow with insulation (W)
External walls	10.391 W	4.282 W
Roof	13.201 W	4.213 W
Sum	**23.592 W**	**8.495 W**



Einfache Warmwasseraufbereitung + Solar

ภาพหลังคา
พลังแสงอาทิตย์
Close-Up view
of the solar roof.

Die VISION

„Wir müssen schneller und besser sein!“

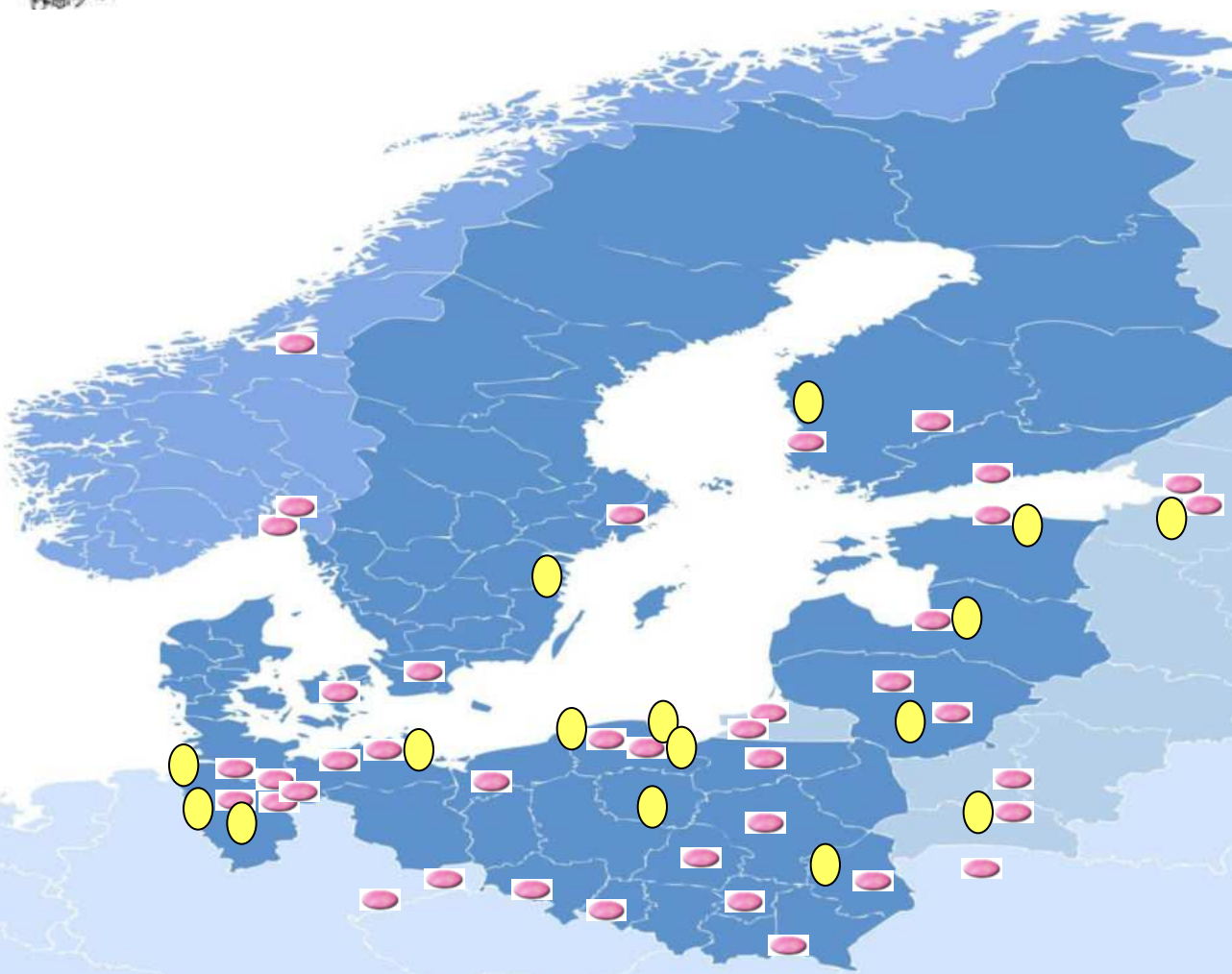
- Auf unterer Ebene können wir nur verlieren
- Für das Billige sind wir nicht reich genug

BSR

Besser und
Schneller als der
Rest der Welt

- ✓ **Stärkste Innovation**
- ✓ **Höchste Qualität**
- ✓ **Beste Qualifizierung und intensivstes Teilen des Wissens**

Mitglieder & Hochschulen

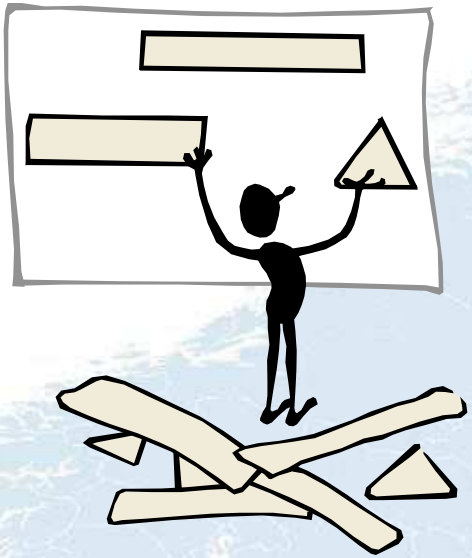


Białystok
Brest
Budapest
Bydgoszcz
Cottbus
Dresden
Danzig
Hamburg
Helsinki
Kaliningrad
Kopenhagen
Łódź
Lublin
Lübeck
Lüneburg
Malmö
Minsk

Olstzyn
Oppeln
Oslo
Rostock
Panevėžys
Pori
Riga
Schwerin
Słupsk
Stockholm
St.Petersburg
Szczecin
Tallinn
Tampere
Trondheim
Vilnius
Warschau
Wrocław

Hanseatic Parliament

Agenda



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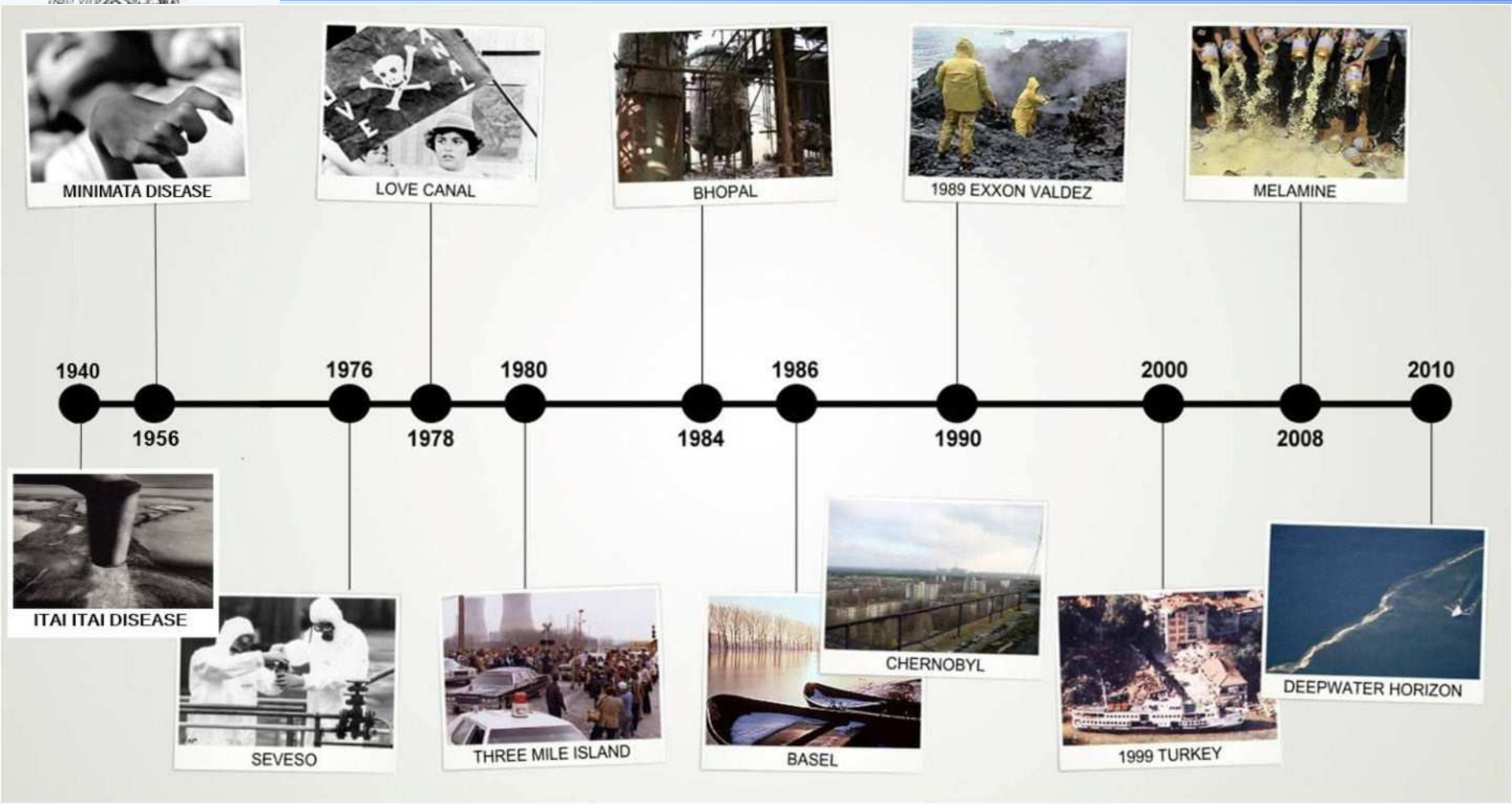
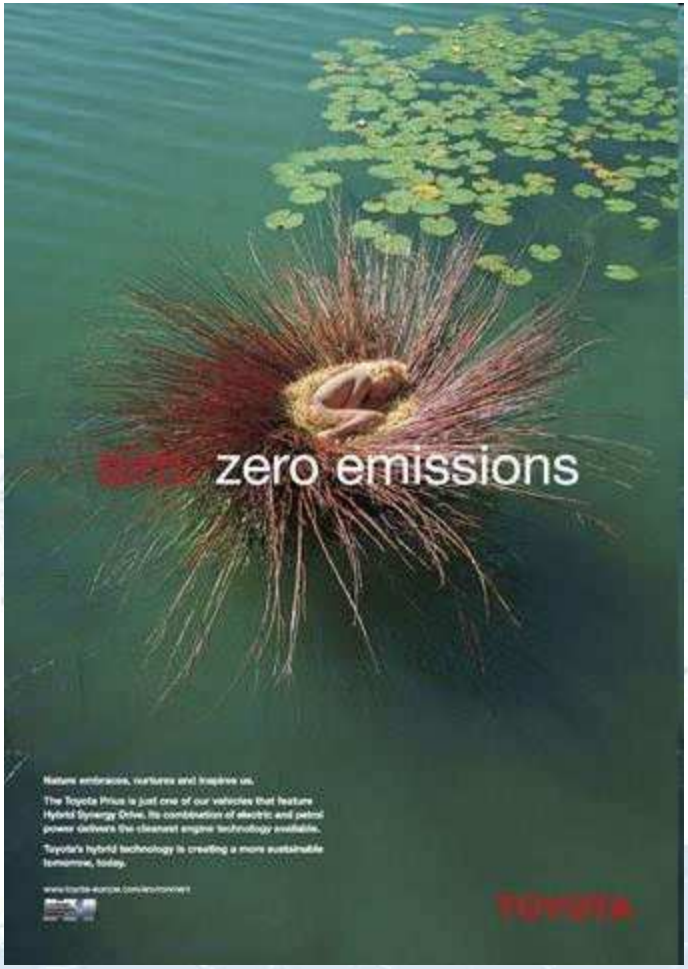
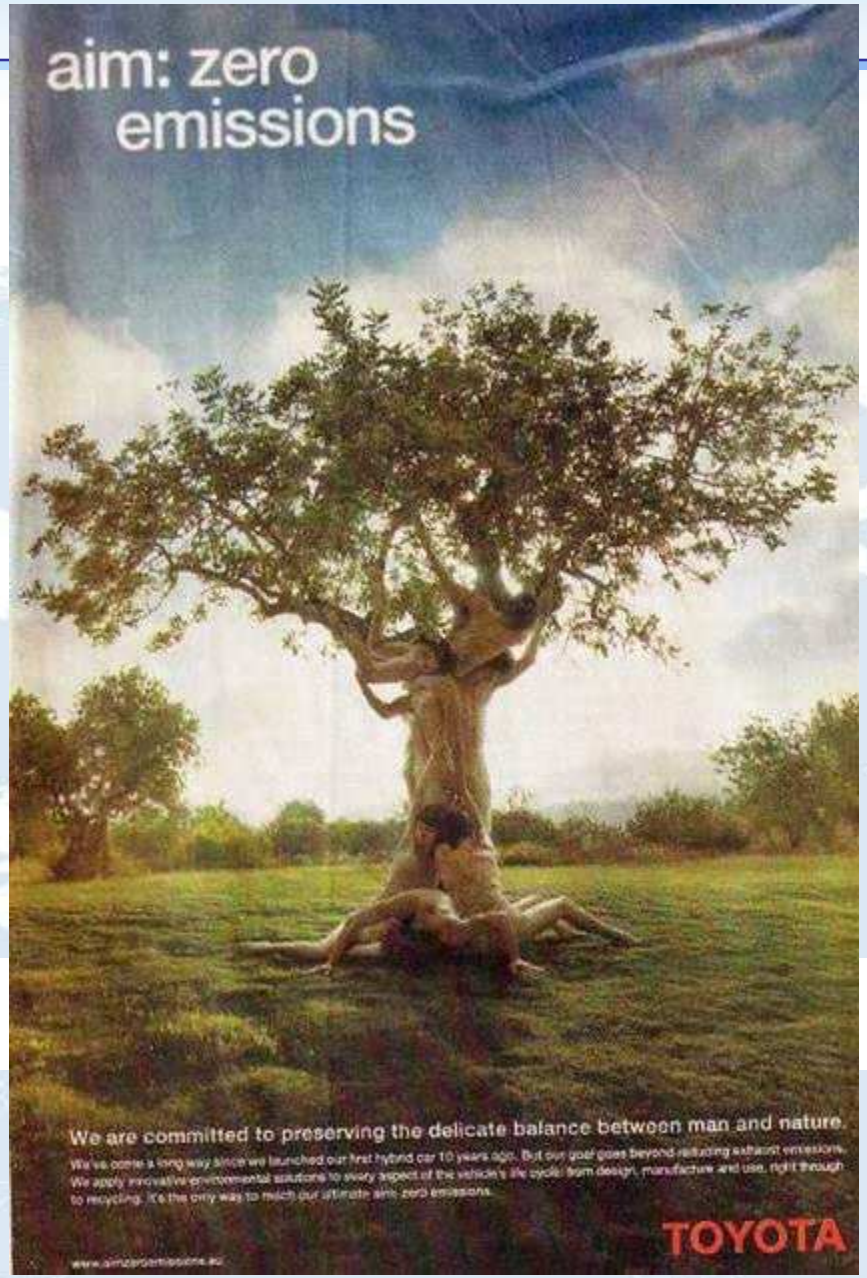
Cradle To Grave Design

Umweltkatstrophen

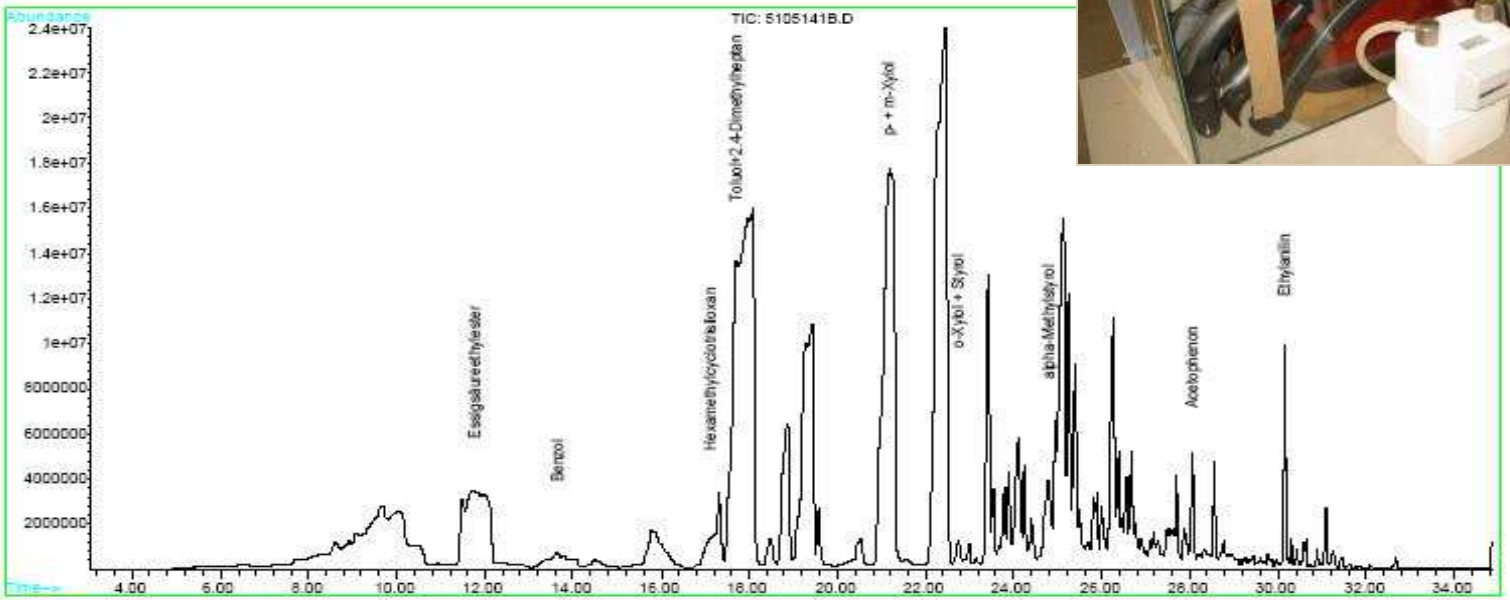



zero emissions
TOYOTA


aim: zero
emissions
We are committed to preserving the delicate balance between man and nature.
TOYOTA

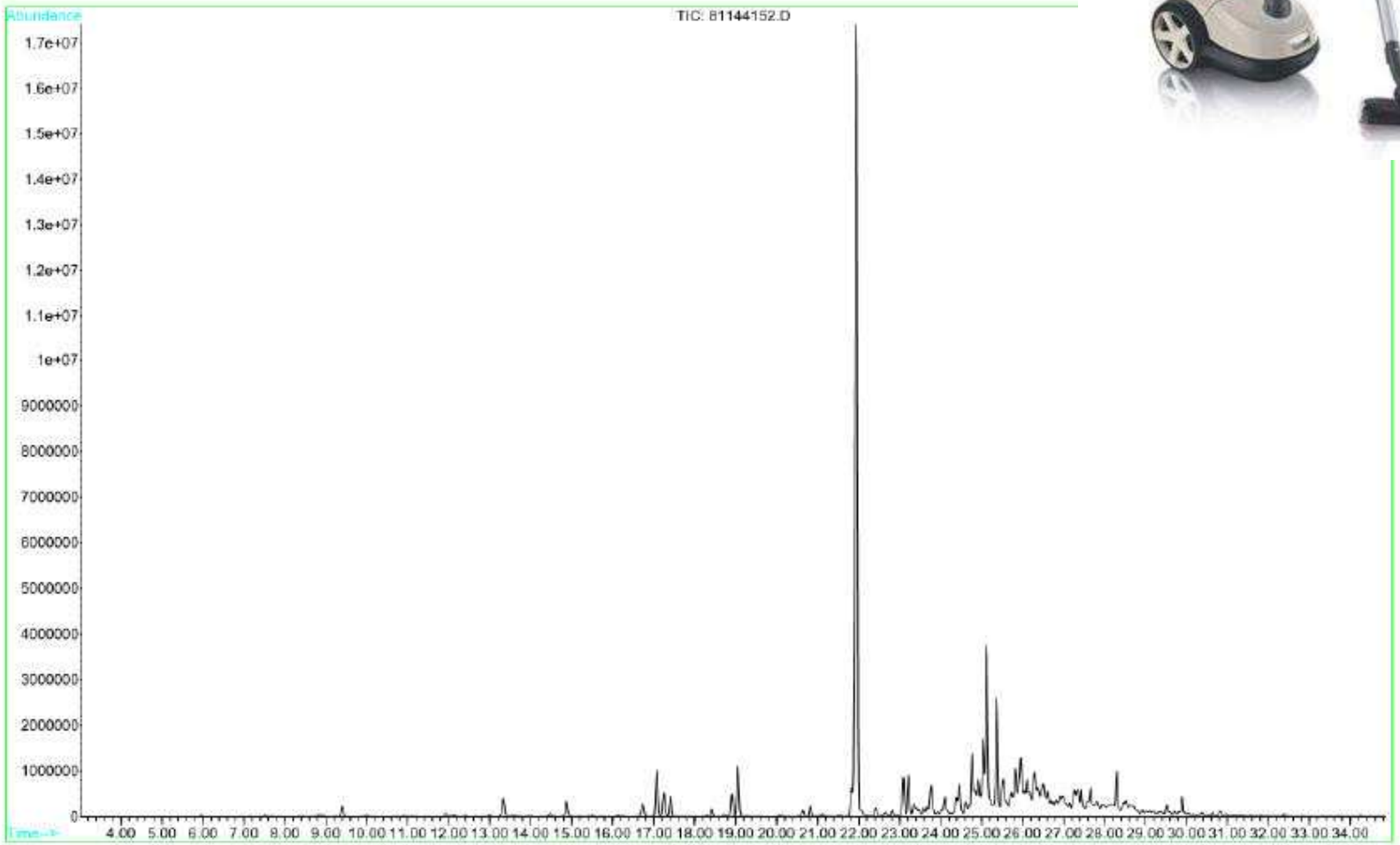
Off Gassing: Siemens Vacuum Cleaner *After 15 Minutes*

```
File        : C:\DATEN\SCREEN\130605\5105141B.D
Operator    : Ostrop
Acquired    : 14 Jun 2005  17:13     using AcqMethod VOLATILE
Instrument  :   ALGE GCD/
Sample Name: 5105141-01
Misc Info   : nach 15 min. Betrieb 300 l abgepumpt
Vial Number: 21
```



EPEA

Off Gassing: Philips Performer Green Vacuum Cleaner



Verlust von Humus

Wir verlieren 4000 – 6000 mal so viel Humus jedes Jahr als wieder auf gebaut wird

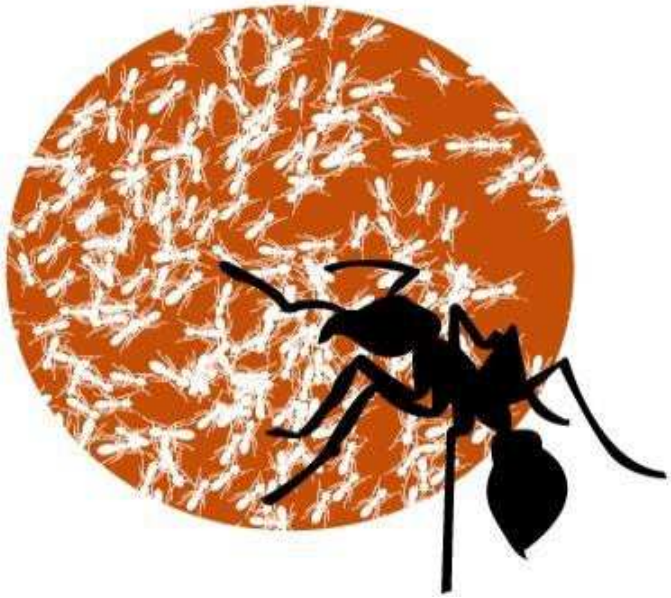
Sind wir zu viel?

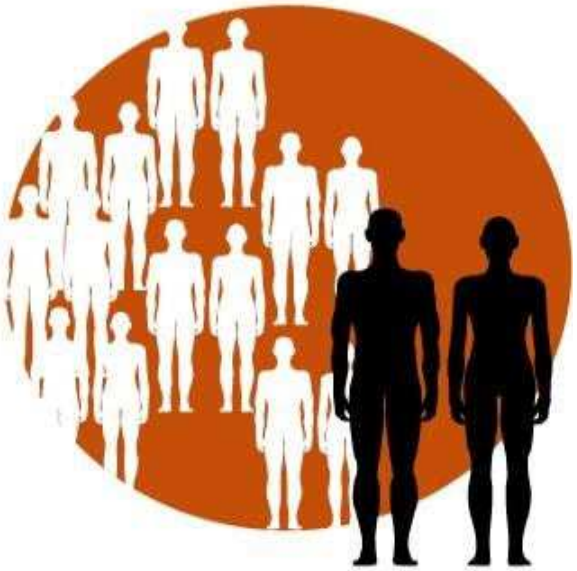
"**No** goal
is more crucial to healing the global environment, than **stabilizing human population.**"

Al Gore

EPEA

Die Biomasse der Ameisen ist 4x so groß wie die der Menschheit





EPEA

CRADLE TO CRADLE®: DOING THE RIGHT THINGS!

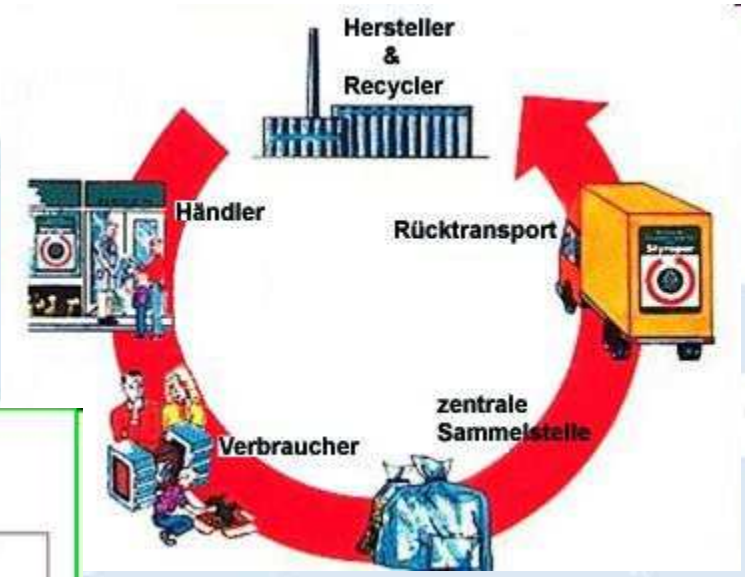
DOING THINGS RIGHT

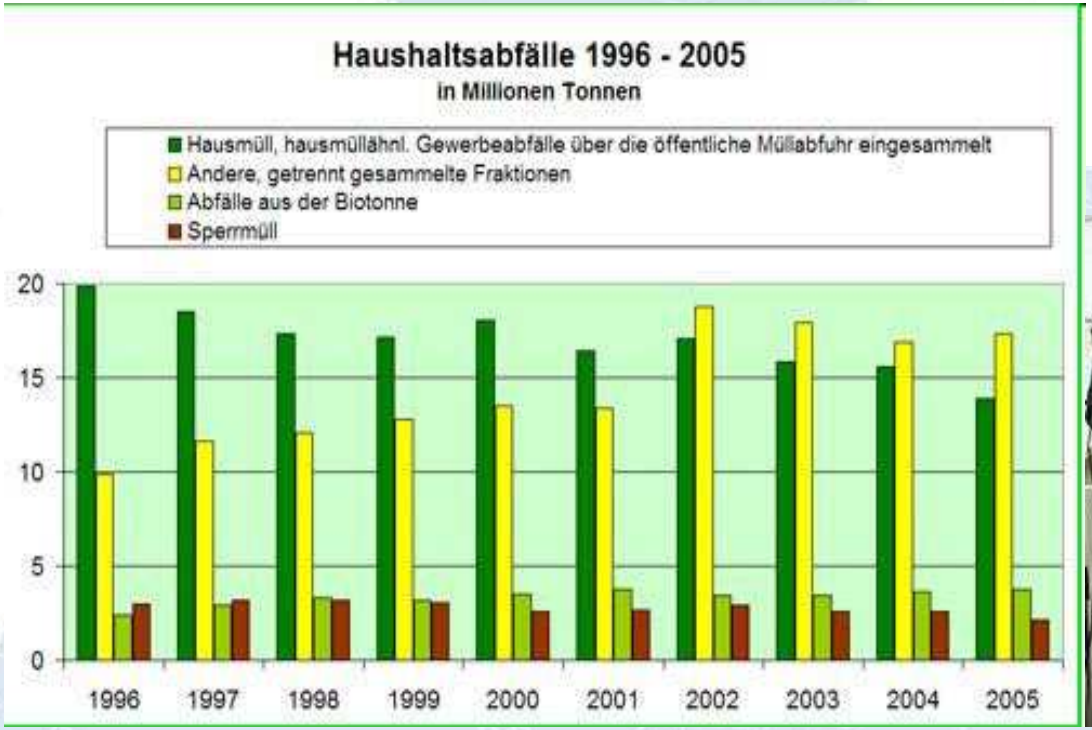
DOING THE RIGHT THINGS

EPEA

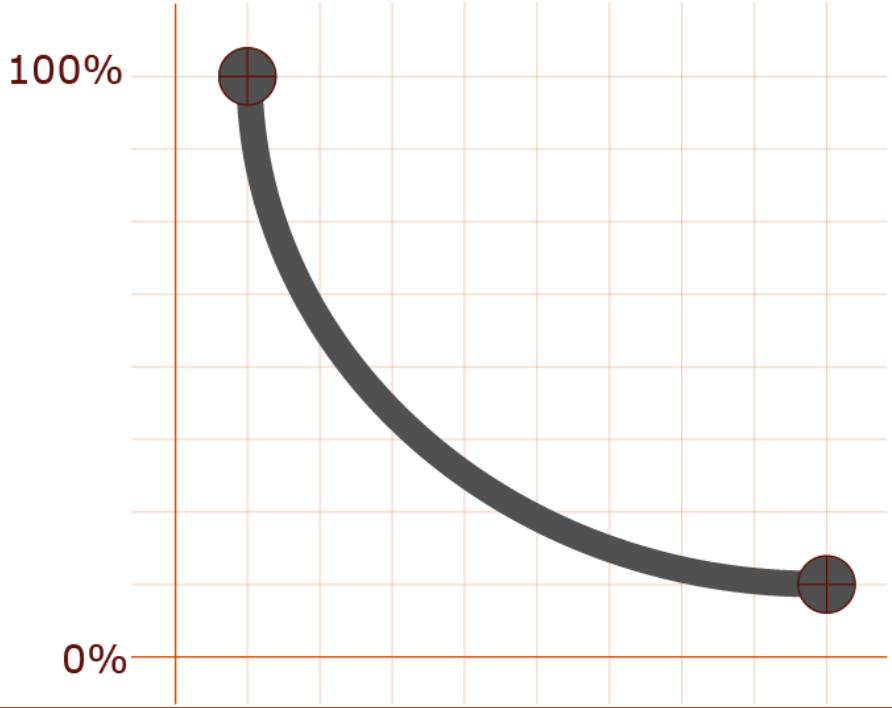
Recycling

Abfallvermeidung
ist Klimaschutz!


Hersteller
&
Recycler
Händler
Rücktransport
zentrale
Sammelstelle
Verbraucher


Haushaltsabfälle 1996 - 2005
in Millionen Tonnen
Hausmüll, hausmüllähnl. Gewerbeabfälle über die öffentliche Müllabfuhr eingesammelt
Andere, getrennt gesammelte Fraktionen
Abfälle aus der Biotonne
Sperrmüll
20
15
10
5
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

Von der Wiege zur Bare: Ziel = 0

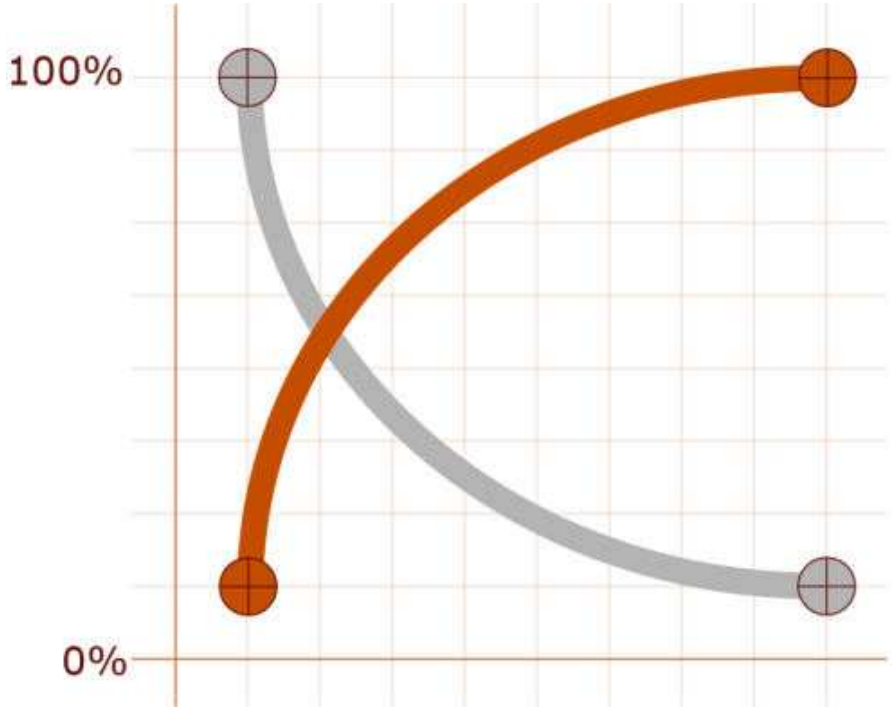


REDUZIERUNG,
Vermeidung,
Minimierung,
PRÄVENTION.

Öko-Effizienz

EPEA

Cradle to Cradle® : Das Ziel ist Qualität

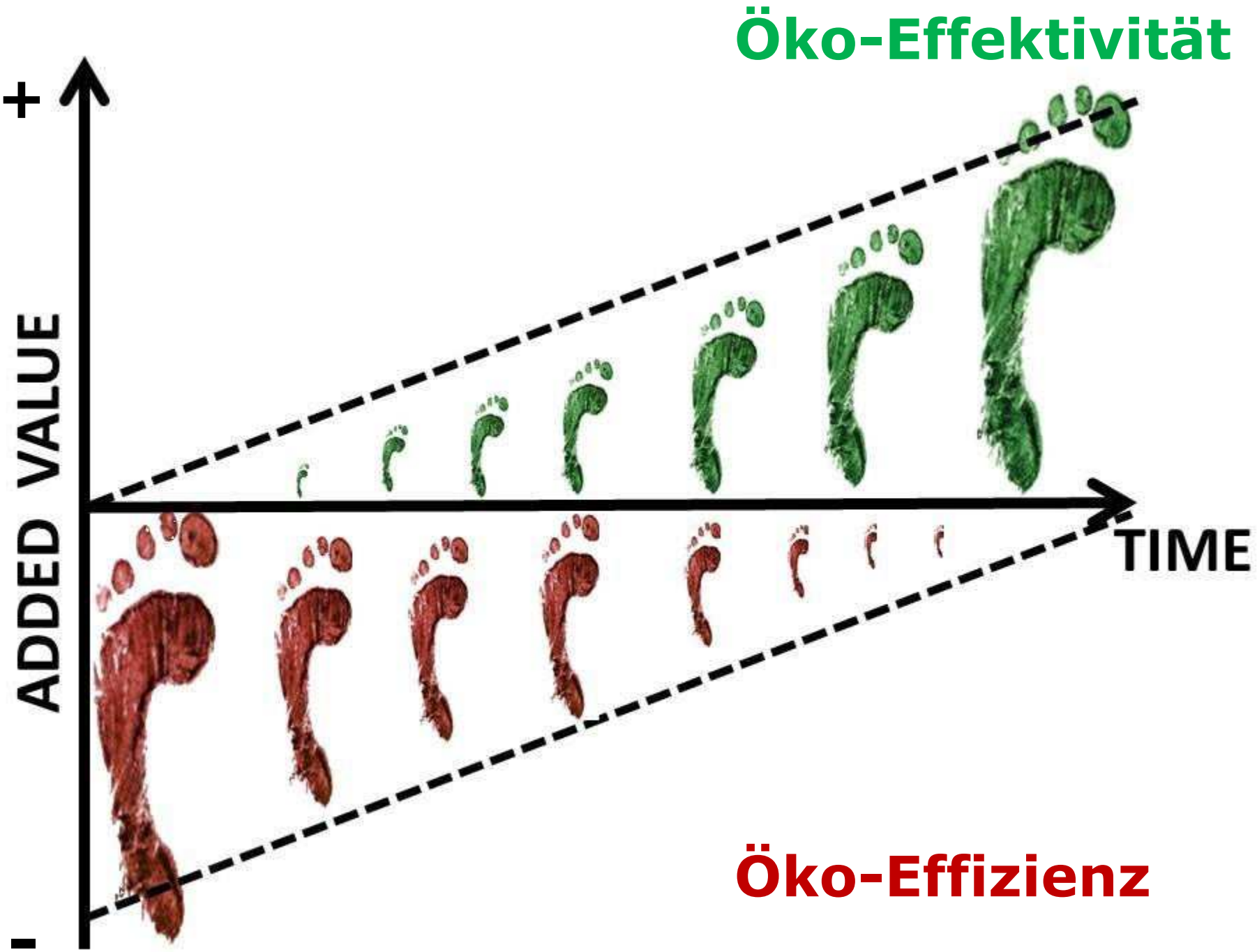


Öko-Effektivität

DEFINITION, ERHÖHUNG, UNTERSTÜTZUNG, OPTIMIERUNG

Öko-Effizienz

EPEA


Öko-Effektivität
+
ADDED VALUE
-
TIME
Öko-Effizienz

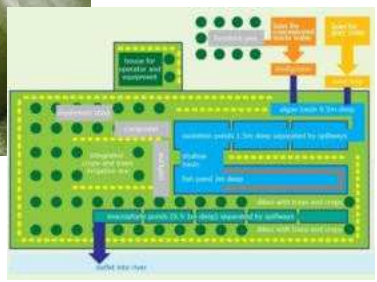
Das Cradle to Cradle®-Paradigma

- **Abfall ist Nahrung**
- **Nutzung erneuerbarer Energie**
- **Aktive Unterstützung von Diversität**

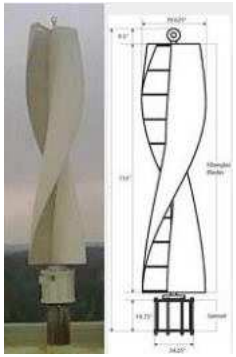
EPEA

Cradle to Cradle® Stoffstrommanagement in drei Clustern

Energie



Wasser



Energie

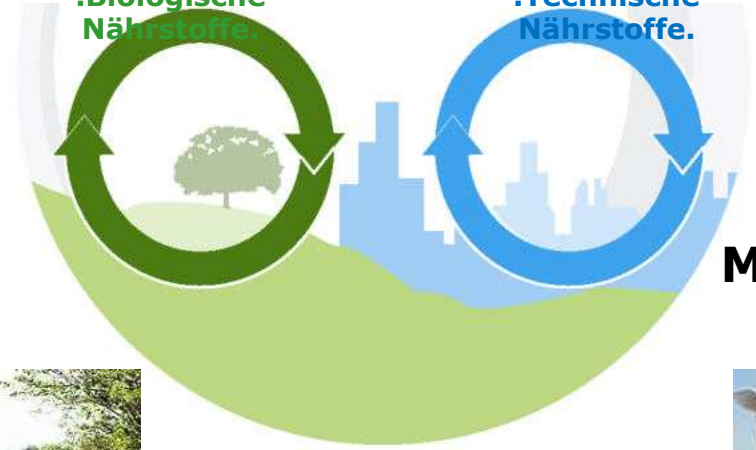
Wasser

Verbrauchsgüter

.Biologische Nährstoffe.

Gebrauchsgüter

.Technische Nährstoffe.

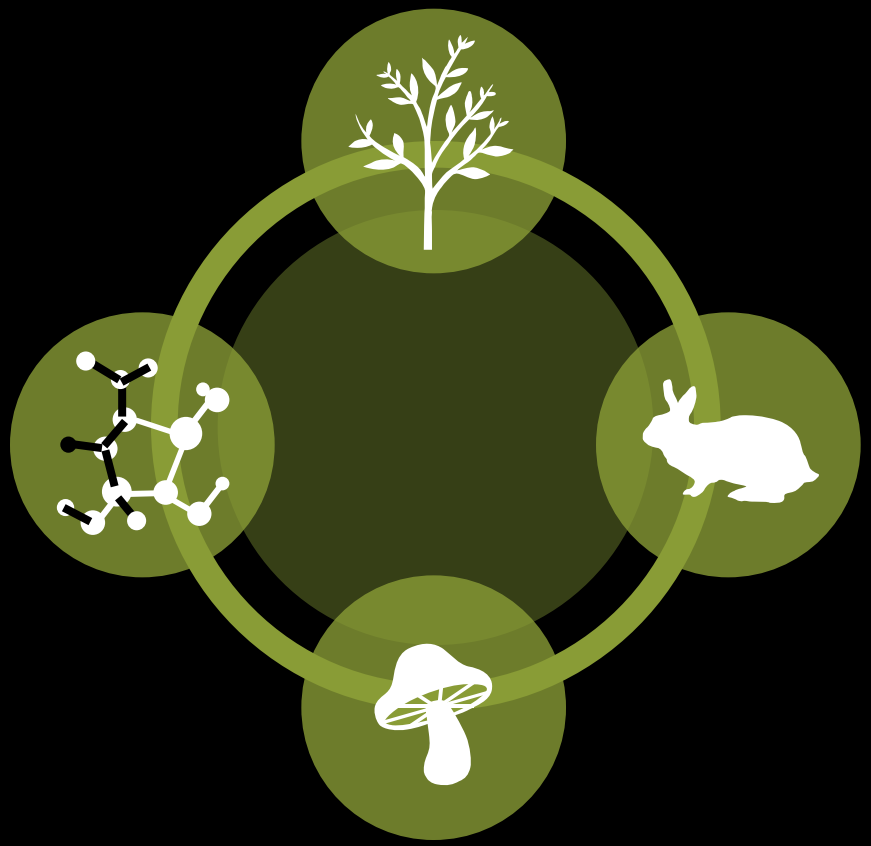


Mobilität

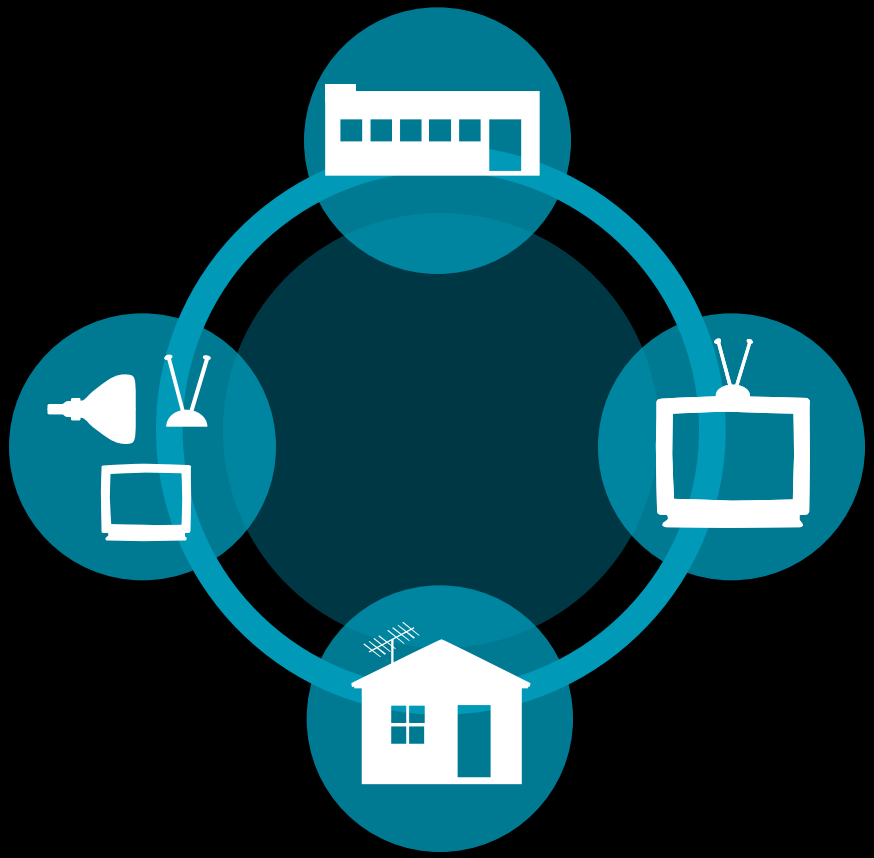
Materialien

Mobilität

Materialien



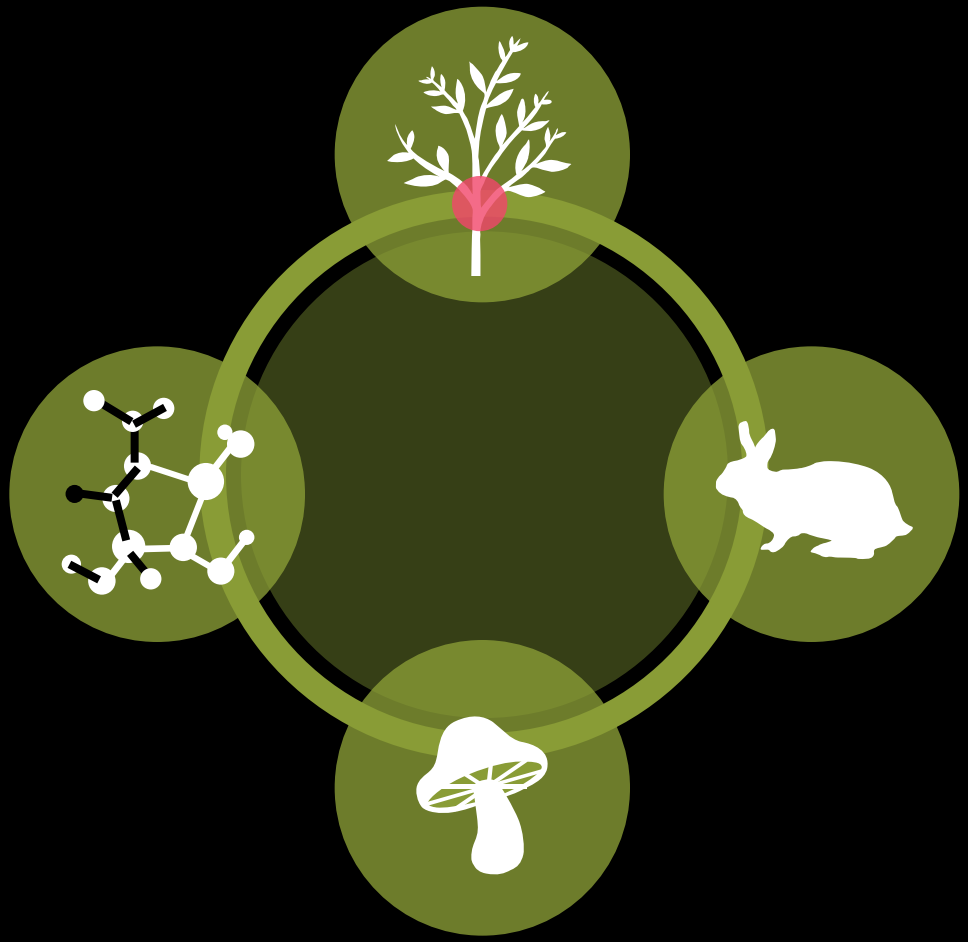
Biologischer Kreislauf



Technischer Kreislauf

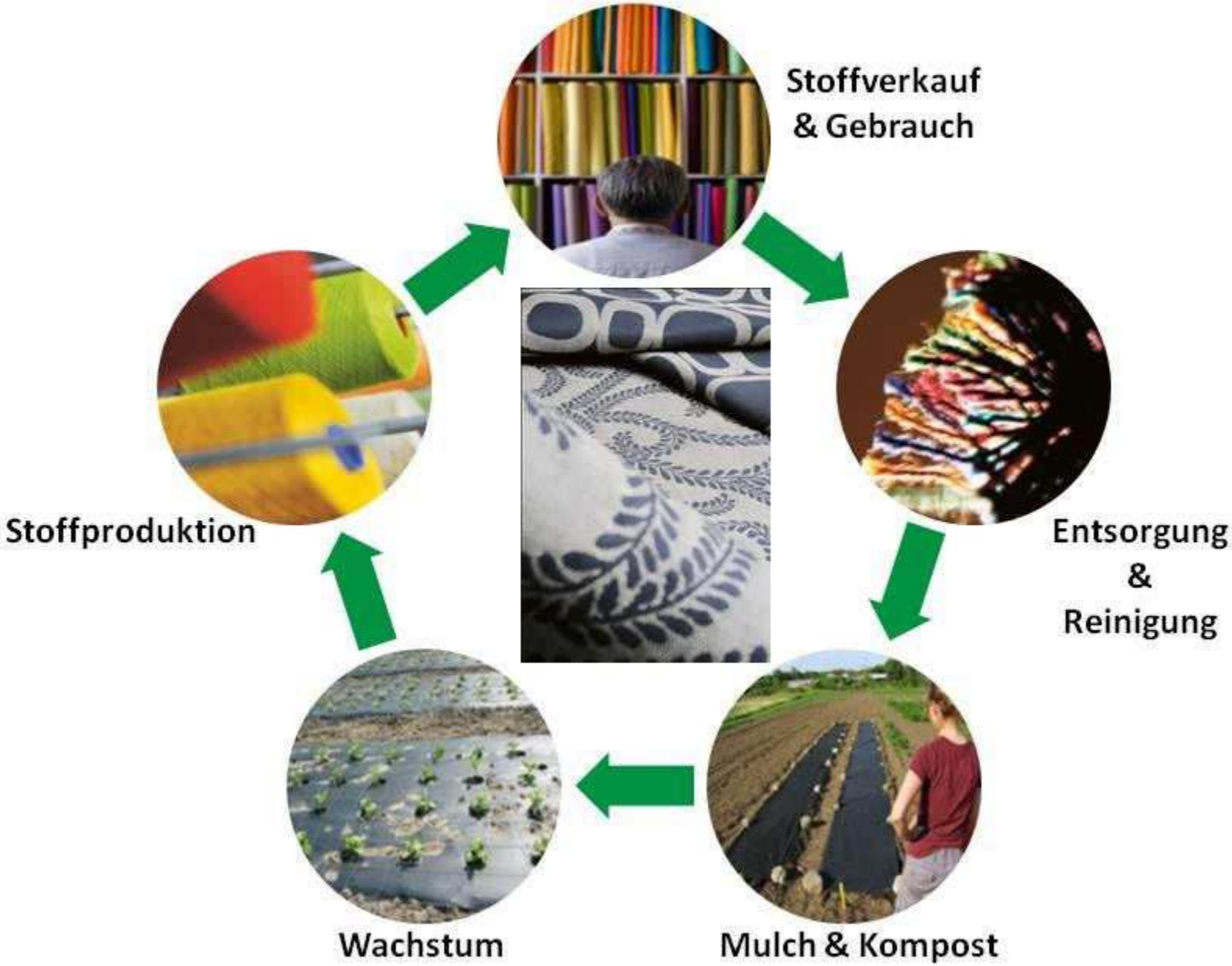
EPEA

Biologischer Kreislauf

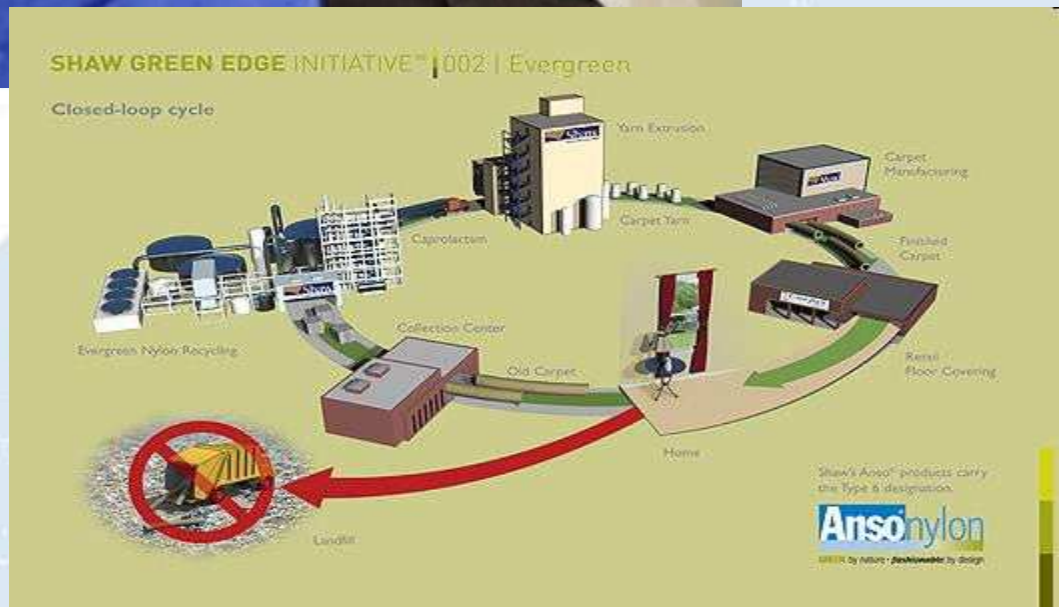


EPEA

climatex® Lifecycle™



Cradle to Cradle



Climatex® – beneficial fabrics

Climatex® beneficial fabrics for challenging applications:

Flameretardend, suitable for aviation needs.

Completely biodegradable, benefical ingredients.

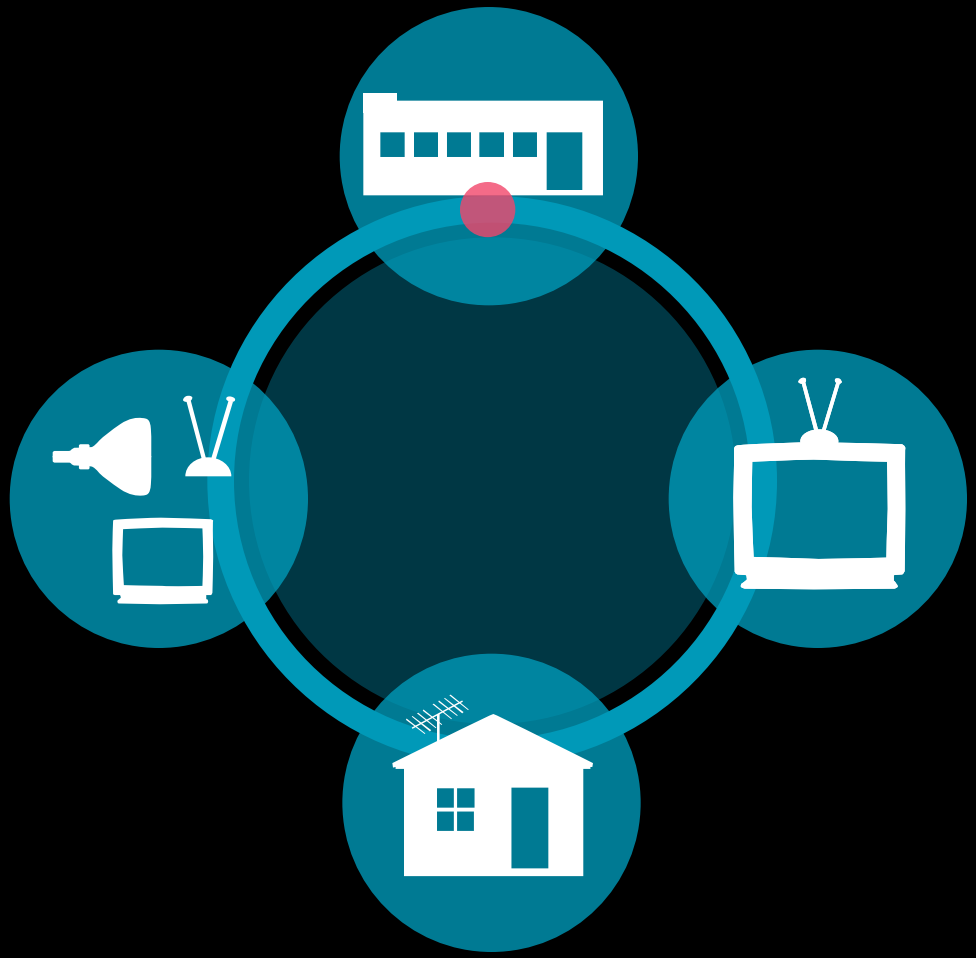
Improving Indoor Air Quality.

High comfort and beautiful designs.

Die Inneausstattung des Airbus A380 steckt voller Innovationen - viele werden umweltfreundlich hergestellt.

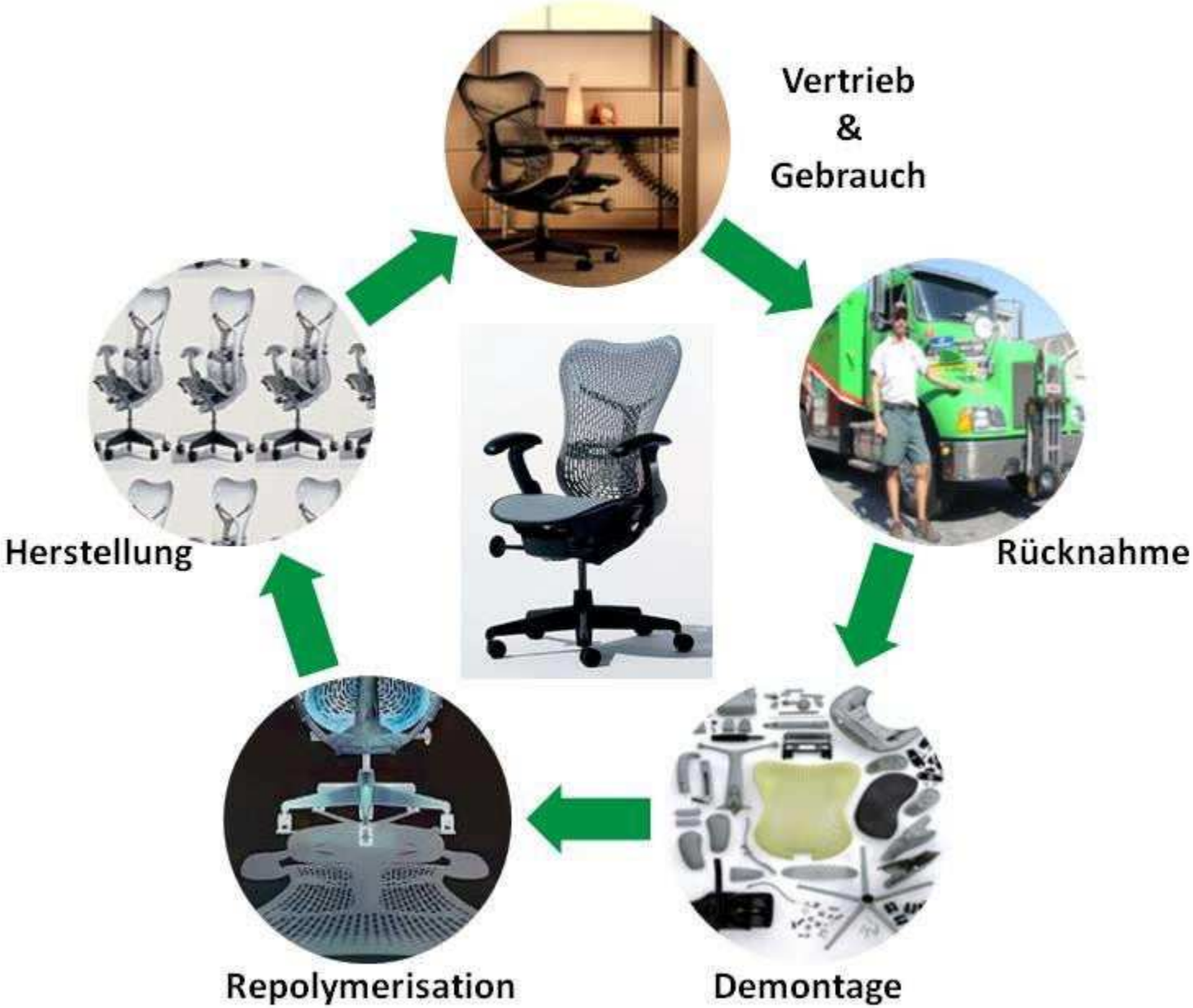
KLM

Technischer Kreislauf

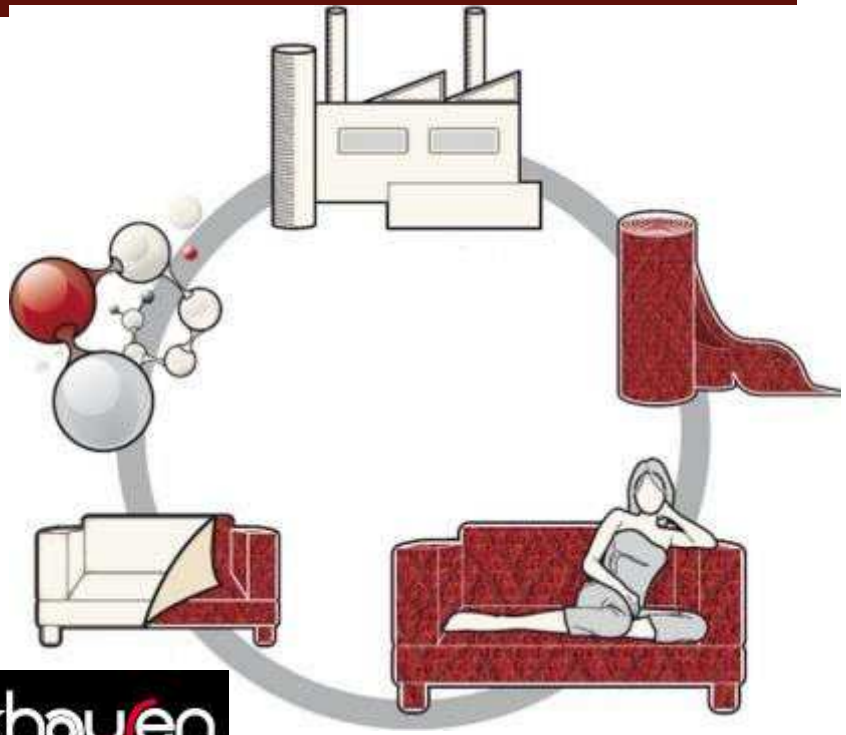


EPEA

MIRRA® Chair by Herman Miller



RETURNITY: DER STOFF DER VIELEN LEBEN



backhausen
interior textiles

EPEA

CRADLE TO CRADLE - OFFICE

Stoll Giroflex

G 656 Office Chairs
SILVER

Technical Cycle

Koninklijke Ahrend NV

A250 Desk Chairs
SILVER

Technical Cycle

Orangebox Ltd.

ARA Task Chair
SILVER

Technical Cycle

CERTIFIED
cradletocradle
SILVER

EPEA

van Gansewinkel Groep – Nutrient Management Company

"For us *Cradle to Cradle* is not an invention but a discovery of what our work really is about! It is so inspirational for our company."

Ruud Sondag, CEO
van Gansewinkel Groep

van Gansewinkel Groep

van Gansewinkel ■ Coolrec ■ Maltha ■ AVR

EPEA

WILLIAM MCDONOUGH: BUILDINGS LIKE TREES, CITIES LIKE FORESTS

FORD ROUGE CENTER

ADAM JOSEPH SMITH CENTER FOR ENVIRONMENTAL STUDIES OBERLIN, OH

EPEA

Partners in The Netherlands

Cradle to Cradle

Über 1.500 Produkte am Markt

- ✓ Essbare Flugzeugsitze
- ✓ Dauerhafte Bücher
- ✓ Ewige Zeitung
- ✓ Gesunde Kleidung
- ✓ ……
- ✓ ……

Cradle to Cradle

Eine Vision……

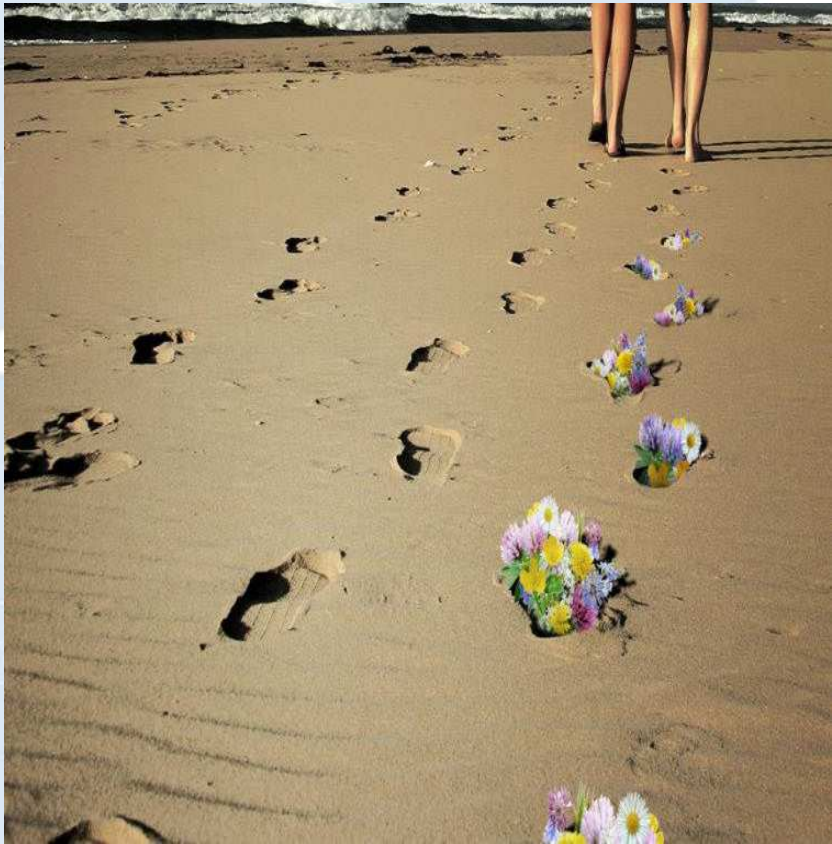
…….mit konkreten Lösungen

- KLM ab 2010
- Niederlande ab 2012
- Tourismus Nord- und Ostsee

= Große Chancen mit Zukunfts-Technologien

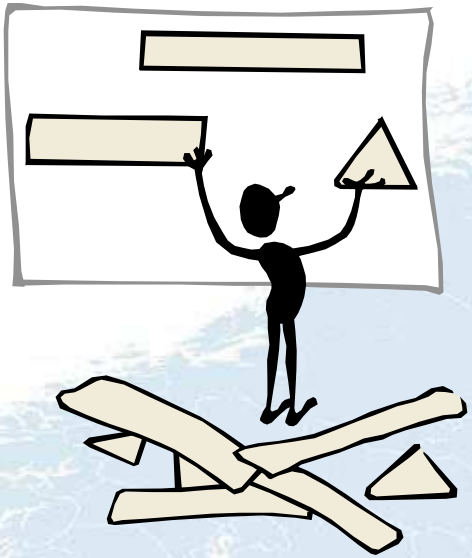
= Wachsende Märkte national + international

…….wird Realität



Hanseatic Parliament

Agenda



1. Grüne Wachstumsfelder
2. Internationale Entwicklung und Vernetzung
3. Technologie Cradle to Cradle
4. **Das Wichtigste zum Schlussa**

Hanseatic Parliament

Japan großer Erfolg durch abgasärmere Autos

Deutschland weltweit zweit größter Hersteller Windenergie und Photovoltaik

Hamburg Green Capital City Europa

Warum nicht Litauen…..

- größter Hersteller dezentrale Abwasserklärung?
- Führender Pionier Cradle to Cradle?
  Konzept liegt vor! EU will fördern!
  Warum nicht mit EU Förderung in Litauen realisieren?

Nutzung der Chancen verlangt neues Denken in der neuen Zeit !

Cradle to Cradle

Es liegt ein vollständiges Konzept und ein fertiger Antrag für ein Projekt zur Einführung und für Traings und Beratung „Cradle to Cradle“ vor.

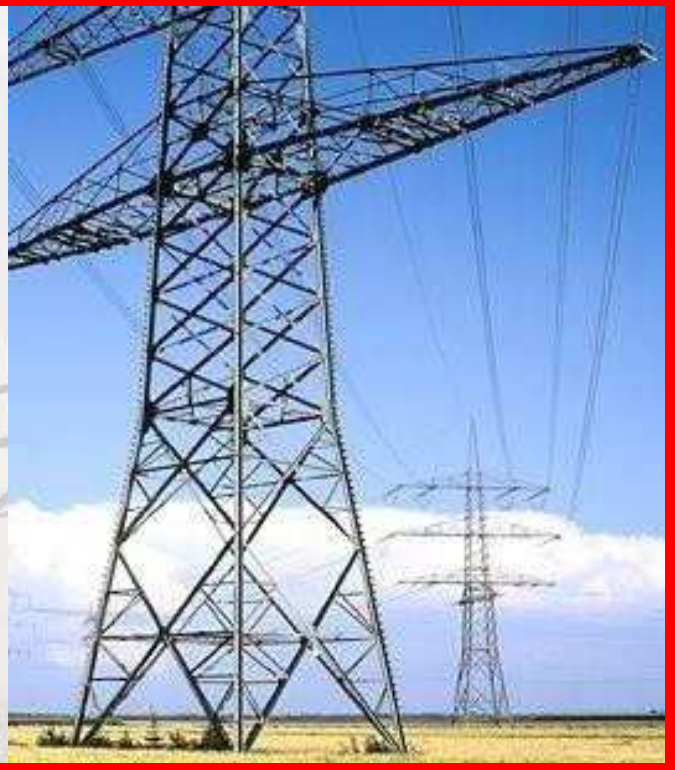
Warum dann nicht in Belarus ein zweijähriges Projekt, das die EU fördern will, durchführen und damit

- ✓ **Cradele to Cradle einführen und KMU in Belarus – wie in Holland – zum Marktführer machen,**
- ✓ **Führungs- und Fachkräfte beraten und trainieren <u>und</u>**
- ✓ **neue Zukunfts-Lösungen im Energiebereich realisieren**

??????????????????????????????

Neues Denken

Windräder auf Fernleitungsmasten

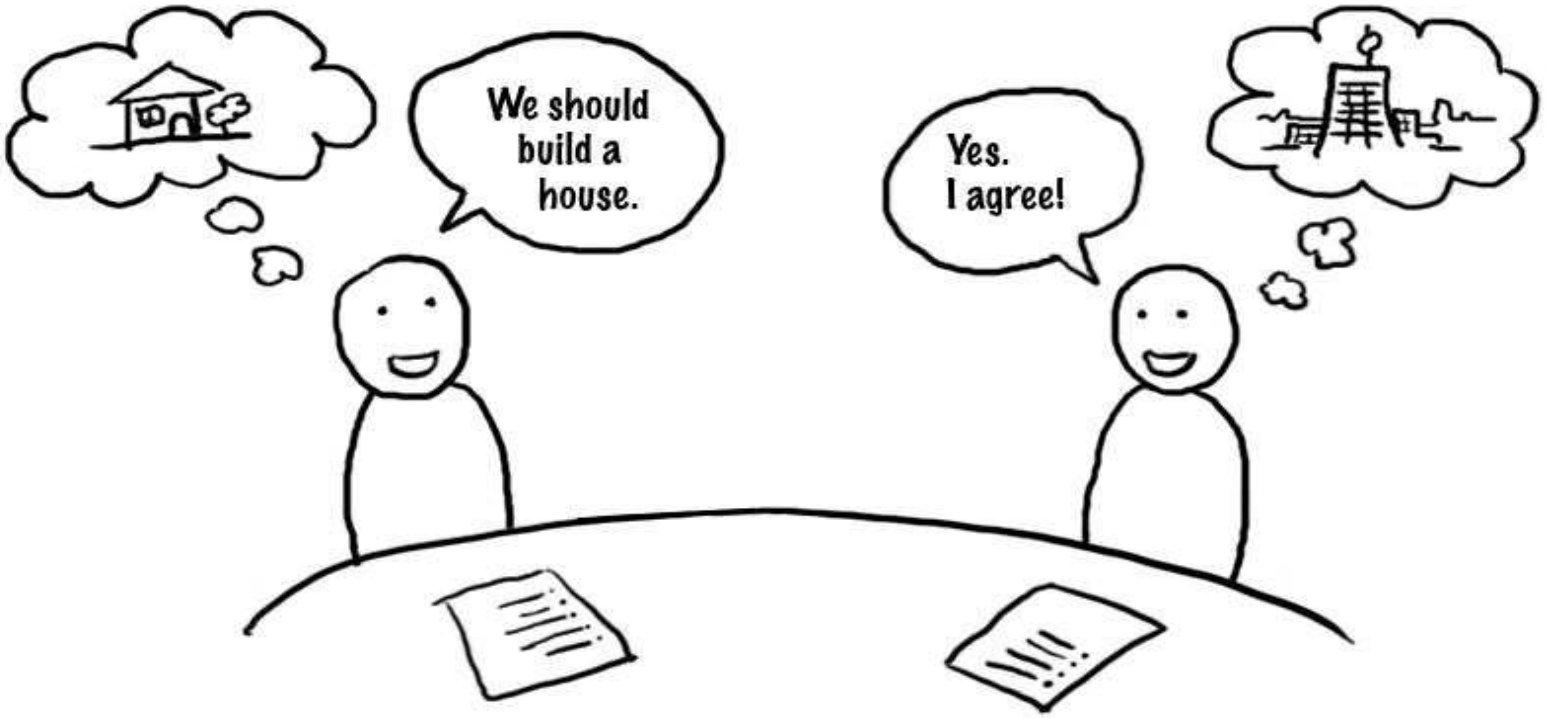


www.hanse-parlament.eu

Danke für Ihre Aufmerksamkeit !

Cradle to Cradle

Questions and clarifications?



Guten Appetit

12:45

13:45

Hanseatic Parliament

Presentation

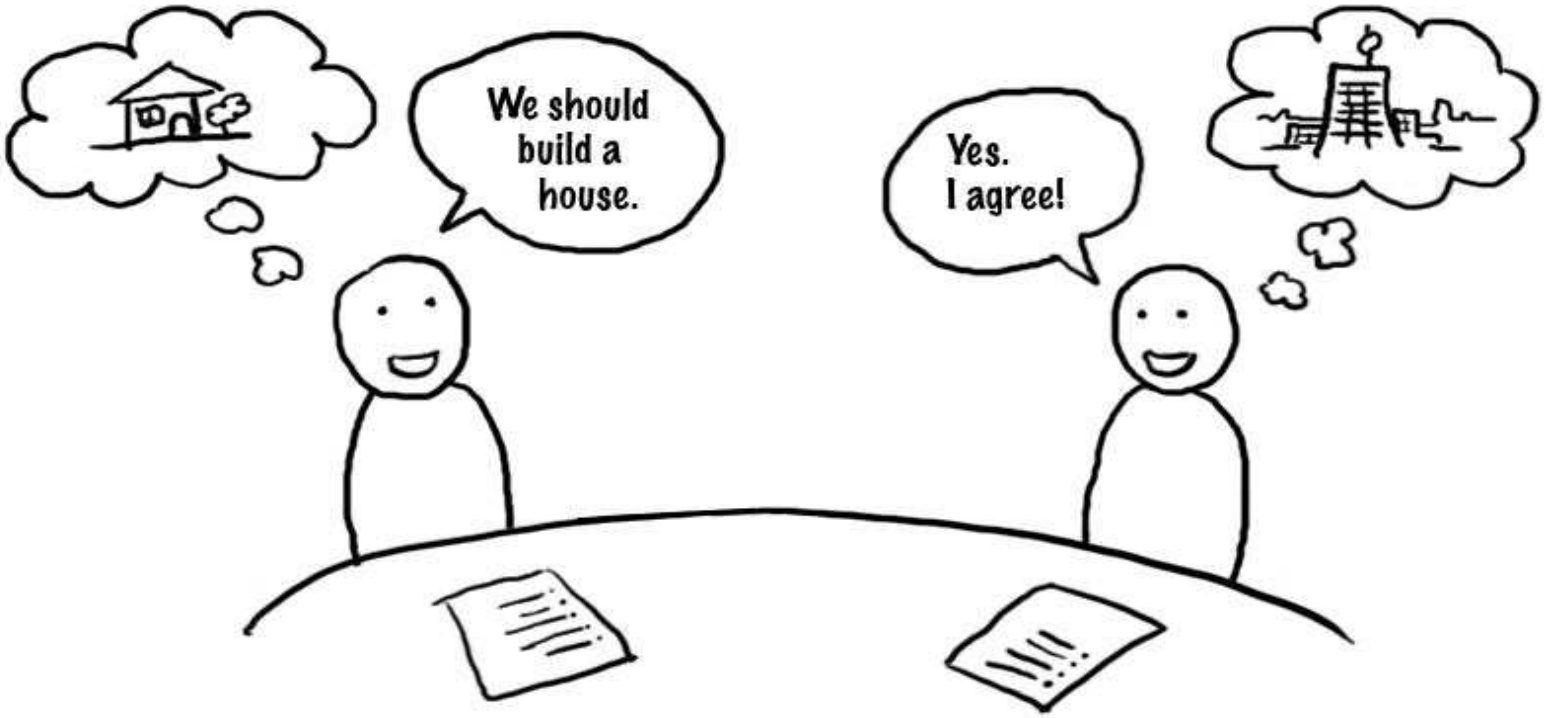
Dr. Kęstutis Armolaitis,

Institute of Forestry, Lithuanian Research Centre for Agriculture and Forestry:

The utilization of forest fuel ash and domestic wastewater sludge in Lithuanian forests

Waste-Water

Questions and clarifications?



Hanseatic Parliament

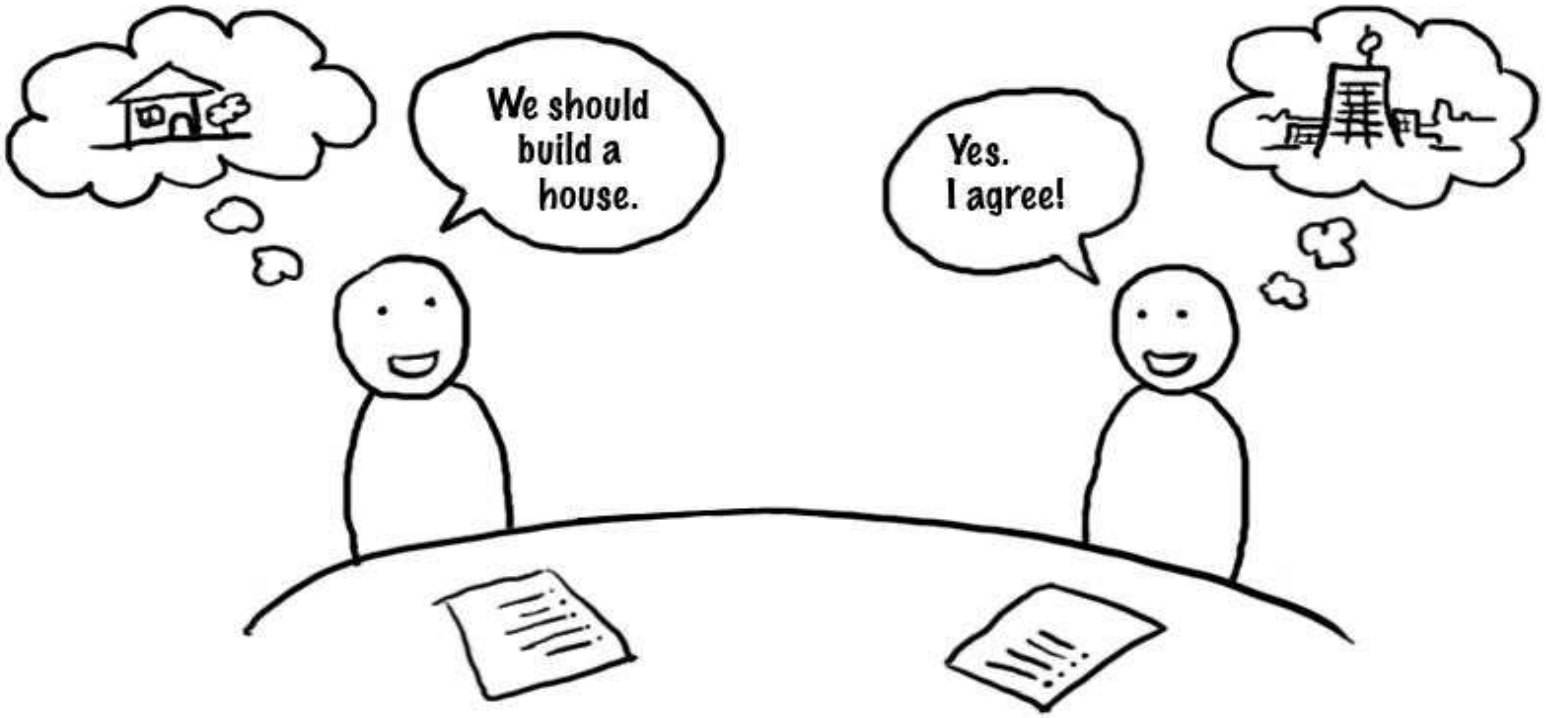
Chemiker, H. J. Welsch,

Zentrum für Energie-, Wasser und Umwelt-
technik der Handwerkskammer Hamburg:

Die europäische Chemikalienverordnung REACH
- Umsetzung in Unternehmen

REACH

Questions and clarifications?



Viel Vergnügen

15:30

Kaffee-Pause und Erfahrungsaustausch

16:00

Hanseatic Parliament

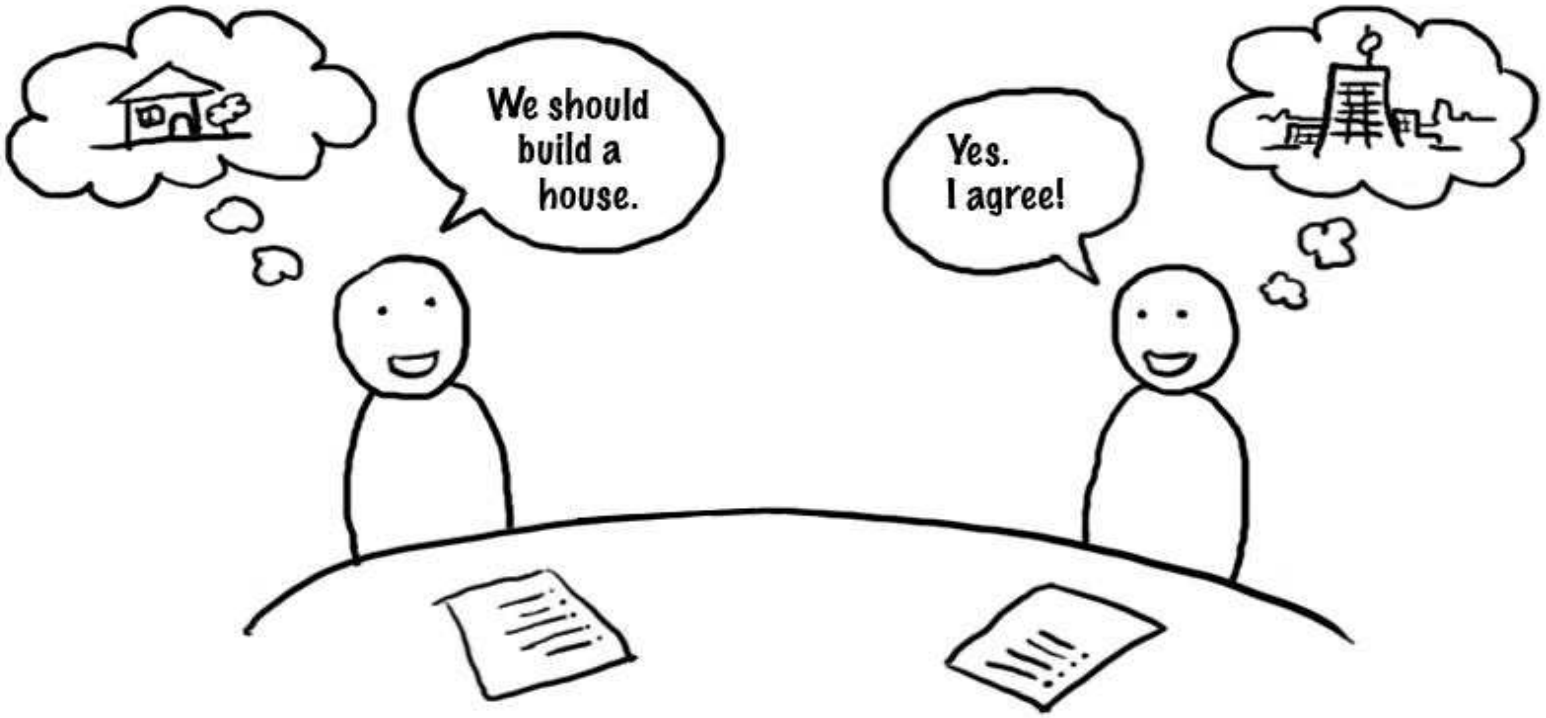
Dipl.Ing. Gintaras Vinikaitis,

Technischer Direktor UAB Traidenis, Alytus:

Kleine Anlagen in der Abwasserwirtschaft

Kleinanlagen Abwasser

Questions and clarifications?



Hanseatic Parliament

Diskussion:

Konsequenzen, Herausforderungen und Chancen in der Abfallwirtschaft für litauische Unternehmen

Morgen Fortsetzung

Bitte pünktlich um 9.00 Uhr

Wir wünschen Ihnen einen schönen, erholsamen Abend!!!!!!!!

Hanseatic Parliament

Herzlich Willkommen zum zweiten Seminartag

Zunächst ein kurzer Rückblick und Ausblick

Hanseatic Parliament

Was haben wir gestern gemacht?

- Veränderte Rahmenbedingungen angeschaut
- Intensiv befasst mit Abfallwirtschaft und dazu Beispiele aus Deutschland und Litauen kennengelernt
- Europäische Chemikalienverordnung behandelt
- Dann Abwasserwirtschaft zugewandt und ein innovatives Unternehmen mit der Herstellung von Kleinanlagen erlebt

Hanseatic Parliament

Wie geht es heute weiter?

- Chemiker, H. J. Welsch: Moderne Technologien in der ABWASSERWIRTSCHAFT - Best Practice Lösungen
- Dr. Jürgen Hogeforster: Subterra Klärtechnologien

10.45 Kaffee-Pause

<u>ENERGIEGEWINNUNG AUS ABFÄLLEN</u>

- Dipl.Ing. S.R. Ganschow: Practice Beispiele aus Deutschland
- Chemiker, H. J. Welsch: Energiegewinnung aus Abfall
- Dr. NN, Anaerobic digestion of sludge at the wastewater treatment plants with biological phosphorus removal
- Arbeitsgruppen und Abschluss-Diskussion

13.50 Feedback 14.00 Ende des Seminars

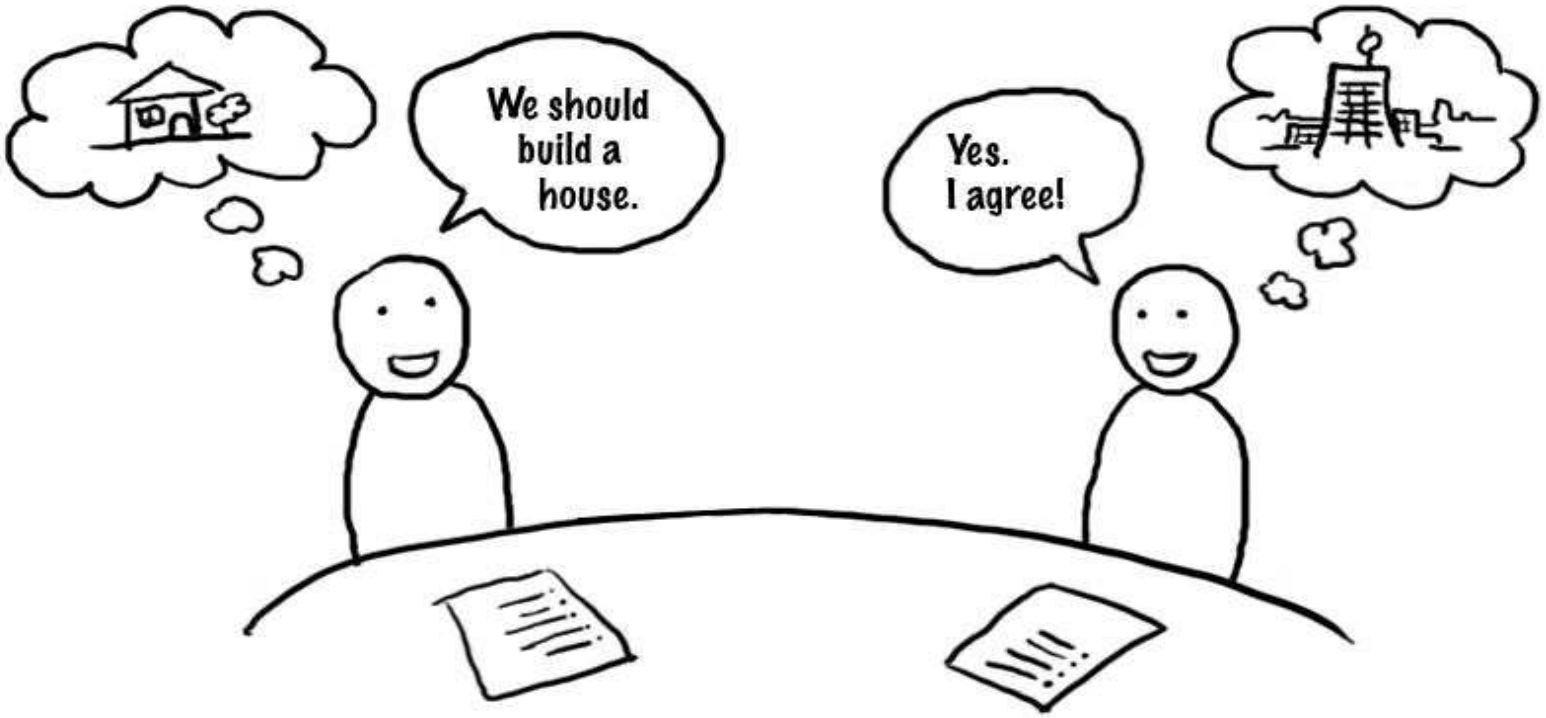
Hanseatic Parliament

Chemiker, H. J. Welsch:

Moderne Technologien in der Abwasser-Wirtschaft Best Practice Lösungen in Deutschland

Abwasser-Management

Questions and clarifications?

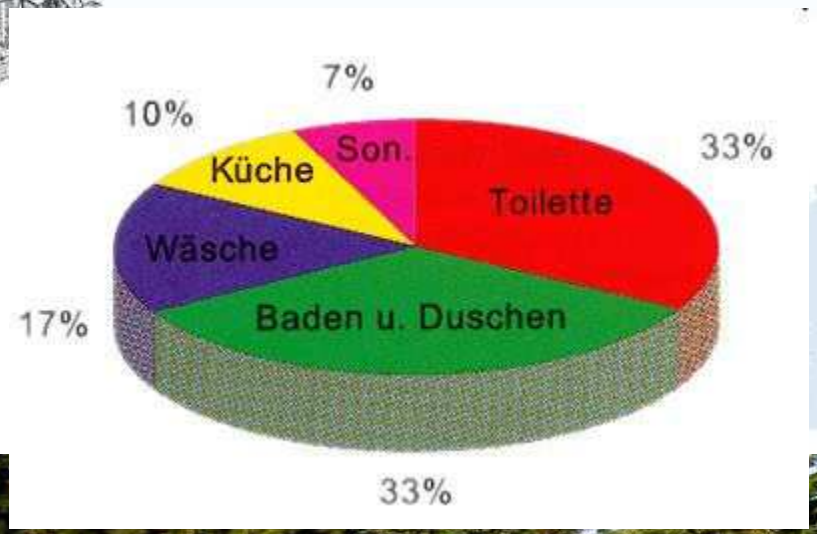


Subterra Klärtechnologien und Best Practice Beispiele

Dr. Jürgen Hogeforster
Hanse-Parlament

Vilnius, 08.04.2014

Biologische Abwasserklärung



Grundlagen

- Bei der Abwasserreinigung werden die Leistungen der natürlichen Mikroorganismen ausgenutzt.
- Die Mikroorganismen bauen organische Schmutzstoffe unterschiedlichster Art zu Kohlendioxid und Wasser ab.
- Der organisch gebundene Stickstoff wird über den Weg zu Ammonium Nitrit und Nitrat umgewandelt (Nitrifikation)

  Hierfür wird Sauerstoff benötigt (Aeroben Milieu)

Unterschiedliche Grenzwerte

Grenzwerte der Rahmenabwasserverwaltungs-vorschrift für Abwasseranlagen unterschiedlicher Größenordnung

	unter 1.000 EGW	bis 5.000 EGW	bis 20.000 EGW	bis 100.000 EGW	über 100.000 EGW
CSB (mg/l)	150	110	90	90	75
BSB (mg/l)	40	25	20	20	15
NH_4-N (mg/l)			10	10	10
N_{anorg}-N (mg/l)			18	18	18
P_{ges} (mg/l)					2

Bedingungen I

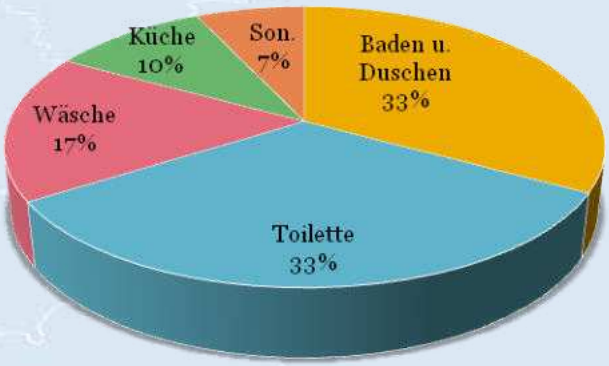
Voraussetzungen für die gute Reinigungsleistung der Kläranlagen

- Optimales Umfeld für die Population der Mikroorganismen
- Gleichmäßige Verteilung des Abwassers im Reinigungsraum
- Ausreichende Verweilzeit des Abwassers im Reinigunsraum
- Ausreichende Sauerstoffversorgung der Mikroorganismen für die Nitrifikation

Bedingungen II

Voraussetzungen für die gute Reinigungsleistung der Kläranlagen (2)

- In großen (Zentrale) Kläranlagen, wo große Abwassermengen in kurzer Zeit gereinigt werden müssen, ist viel Technik notwendig, um gute Reinigunsleistung zu erreichen.
- Bei dezentralen (kleinere) Anlagen sind die Voraussetzungen für gute Reinigungsleistung günstiger.



Schritte der Reinigung

Die Reinigung von Abwasser erfolgt im allgemeinen in zwei Schritten

1. In der mechanischen Vorklärung werden Feststoffe durch Sedimentation von Abwasser abgetrennt,
2. In der anschließenden biologischen Reinigungsstufe findet der Abbau von organischen Kohlenstoffverbindungen statt. Weiterhin werden von speziellen Mikroorganismen Stickstoff und Phosphorverbindungen (Pflanzennährstoffe) abgebaut.

Entwicklung der Subterra- Kläranlage

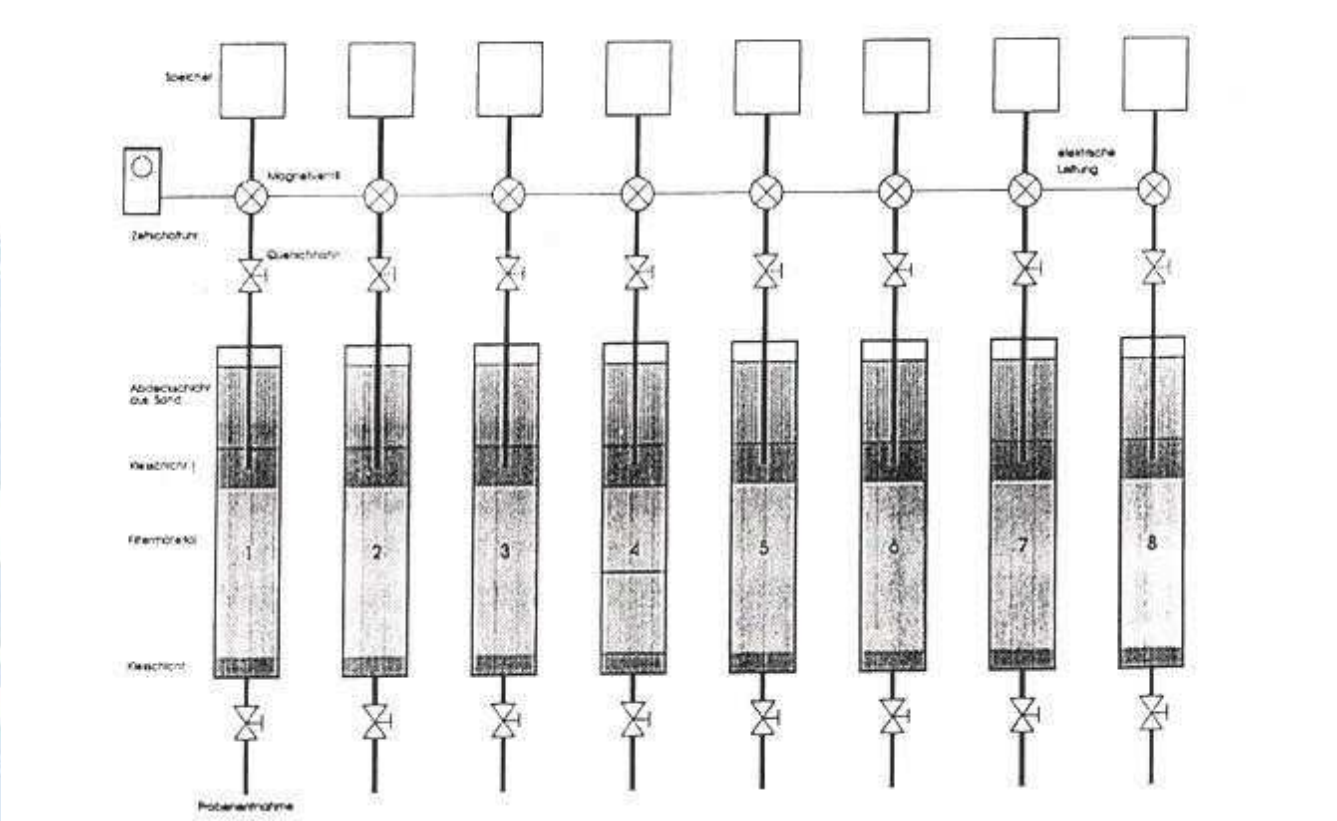
- Unsere Voruntersuchungen haben gezeigt, dass die (aerobe und anaerobe) Mikroorganismen-population im Wurzelbereich der Pflanzen bei der Abwasserreinigung eine entscheidende Rolle spielt
- Deshalb erschien es sinnvoll, den Bodenkörper, durch das Einbringen spezieller organischer Beimischungen als "Ansiedlungsstätte" für Mikroorganismen attraktiver zu machen.

Entwicklung der Subterra- Kläranlage (2)

- Um die Wirkung solcher Bodenzusätze zu ermitteln, wurden organische Substrate wie Wurzelholz, Rindenmulch, Torf, Kokosfaser und anorganischen Materialien (Sand ,Tongranulat) sowie gemischte Filter (Sand und organische Substrate) im Hinblick auf ihren Einfluss auf die Abwasserreinigungs-leistung, speziell auf die Nitrifikation und Denitrifikation untersucht.

Hierfür wurde eine Versuchsanlage aufgebaut.

Versuchsanlage



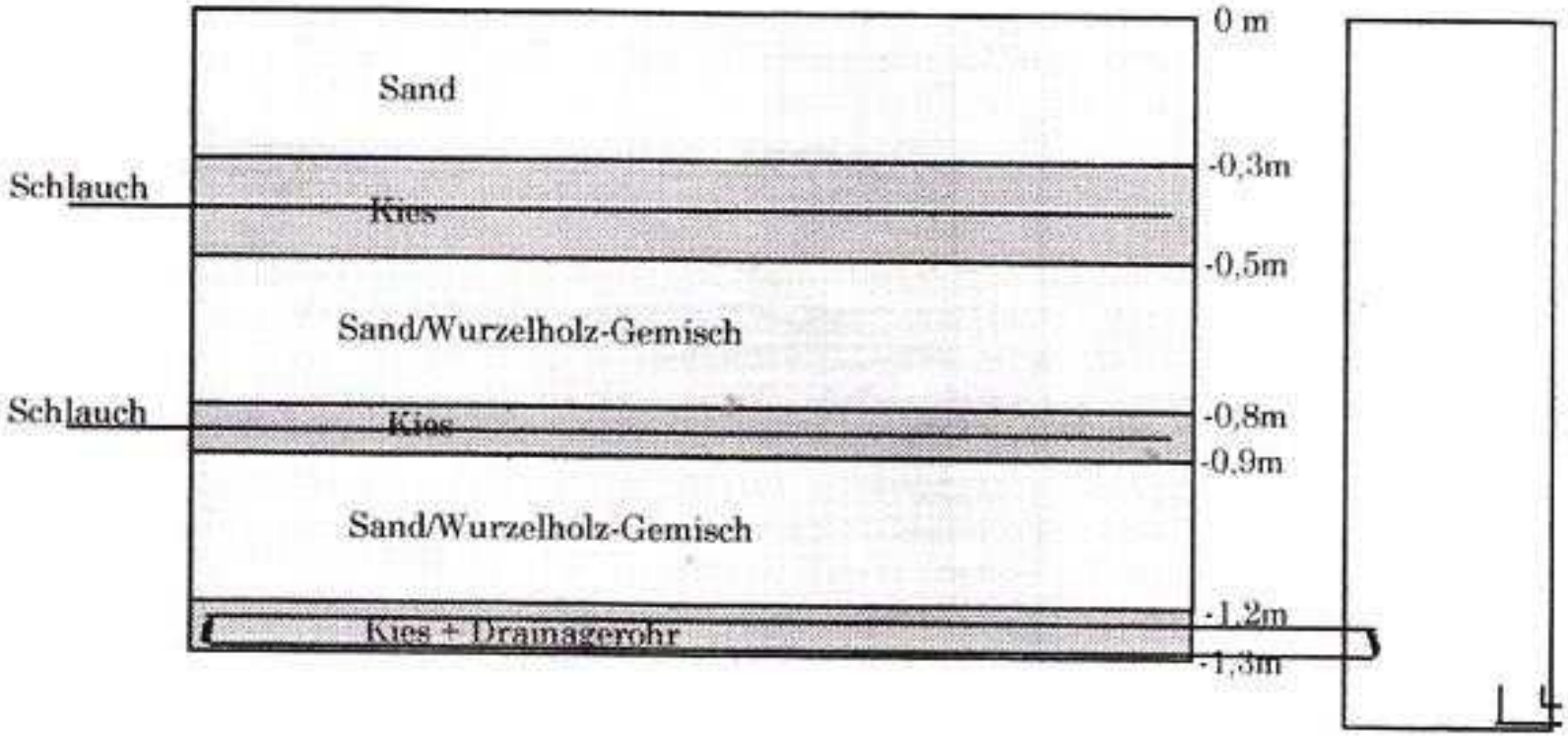
Filter	CSB	BSB_5	NH_4-N	N-anorg	PO_4-P
Koksfaser	57% (176)	90% (20)	96% (1,8)	63% (18,3)	36% (3,3)
Sand	89% (47)	98& (4)	95% (2,7)	41% (29,1)	95% (0,3)
Mischung aus Kokosfaser und Sand im Volumenverhältnis 1:3	87% (52)	98% (3)	98% (1,2)	38% (30,5)	93% (0,4)
Schichtung aus Kokosfaser und Sand	84% (68)	97% (5)	100% (0,1)	55% (22,1)	75% (1,3)
Mischung aus Wurzelholz und Sand	87% (54)	99% (2,5)	96% (2,0)	84% (8,1)	96% (0,2)
Tongranulat	88% (51)	96% (8)	90% (5,0)	34% (32,7)	32% (3,5)
Torf	47% (185)		68% (15,6)	47% (26,3)	23% (3,9)
Rindenmulch	76% (97)	95% (9)	99% (0,3)	83% (8,2)	27% (3,8)

Aufbau der Subterra-Kläranlagen

- Das Abwasser wird über ein spezielles Schlauch-system unterirdisch in den Boden eingeleitet und gleichmäßig verteilt. Dabei durchströmt es den Boden in vertikaler Richtung.
- Das Spezialschlauchsystem besitzt mikrofeine Poren, die sich erst ab einem bestimmten Wasserdruck öffnen.
- Da sich die Poren im Schlauch während der Ruhephasen schließen, wird eine Verstopfung der Poren (durch die Wurzeln der an der Oberfläche angesiedelten Pflanzen) verhindert
- Da das Abwasser unterirdisch gereinigt wird, treten keine Hygiene- und Geruchsprobleme auf.

Pilotanlage in Bonnhagen

Sand:	nicht mehr als	5 Gew.%	< 0,1 mm
		10 Gew %	0,2 mm
		60 Gew %	< 1 mm
Kies:	Grobkies etwa 5 bis 25 mm ∅		
Sand/Wurzelholz:	Mischung 4 : 1 (Volumenanteile)		



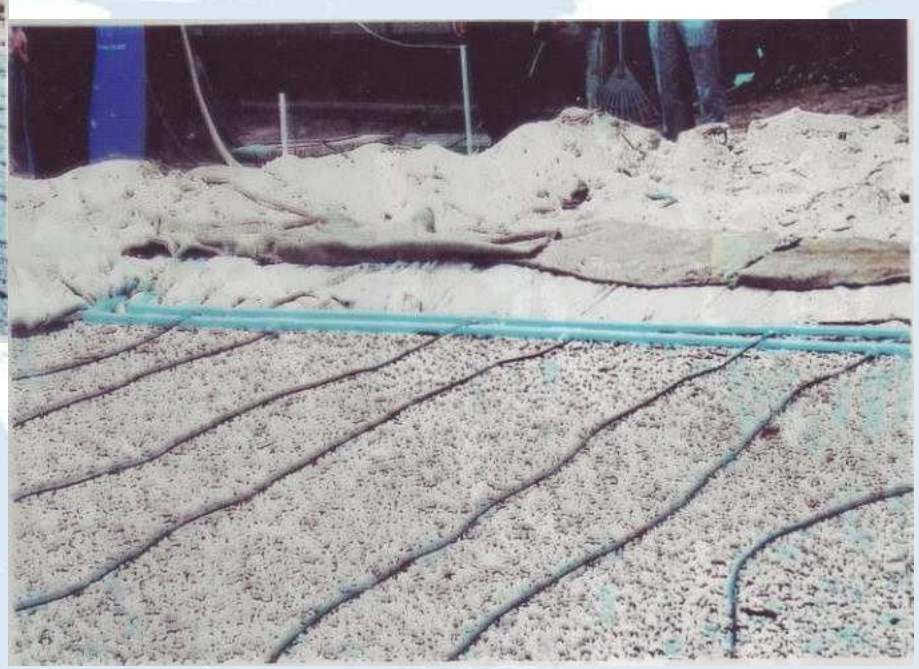
Bau einer Subterra-Kläranlage

Unterirdisches Beschickungssystem

Subterra in Betrieb

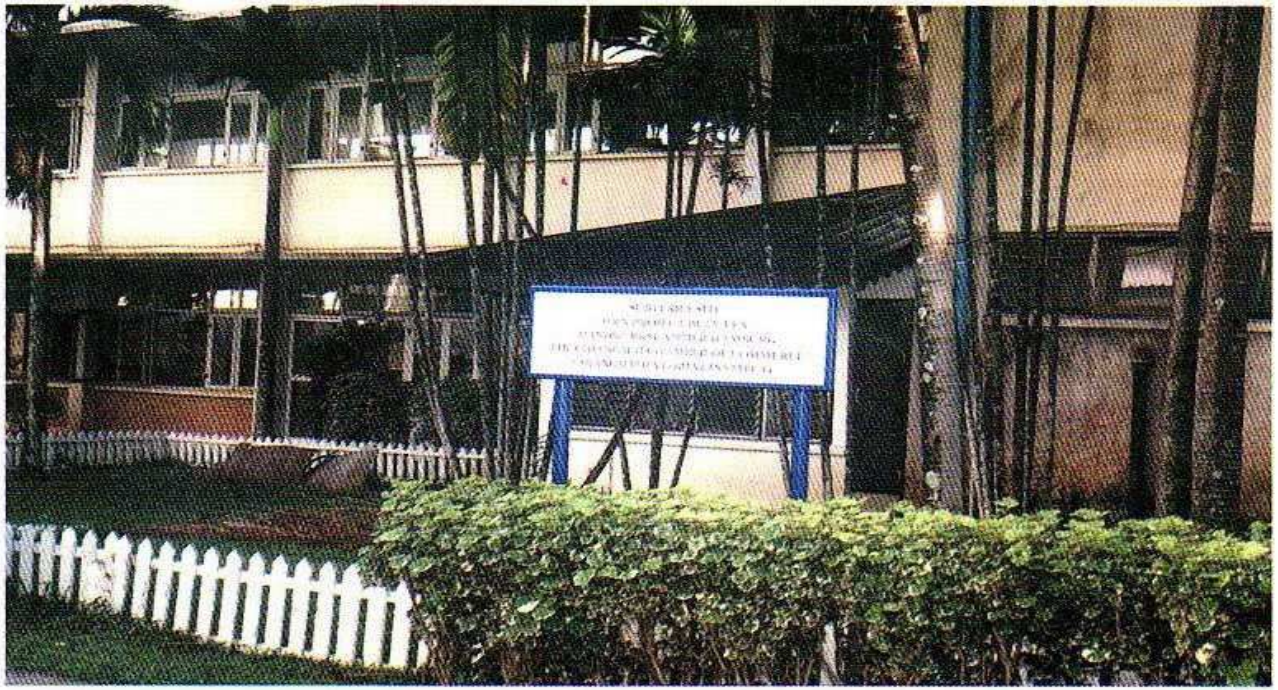
Subterra

Subterra



Subterra

The Subterra technology excels itself by good purification efficiency, process stability, small costs and small maintenance time. For each inhabitant to be connected (however, at least 4 persons) 3-5 m^2 area have to be taken as a basis. Particularly in rural areas this place is available in sufficient extent.



โรงบำบัดน้ำเสีย แบบใต้ผิวดิน ที่สถาบันราชภัฏเชียงใหม่
Subterra plant at Rajabhat Institute Chiang Mai.

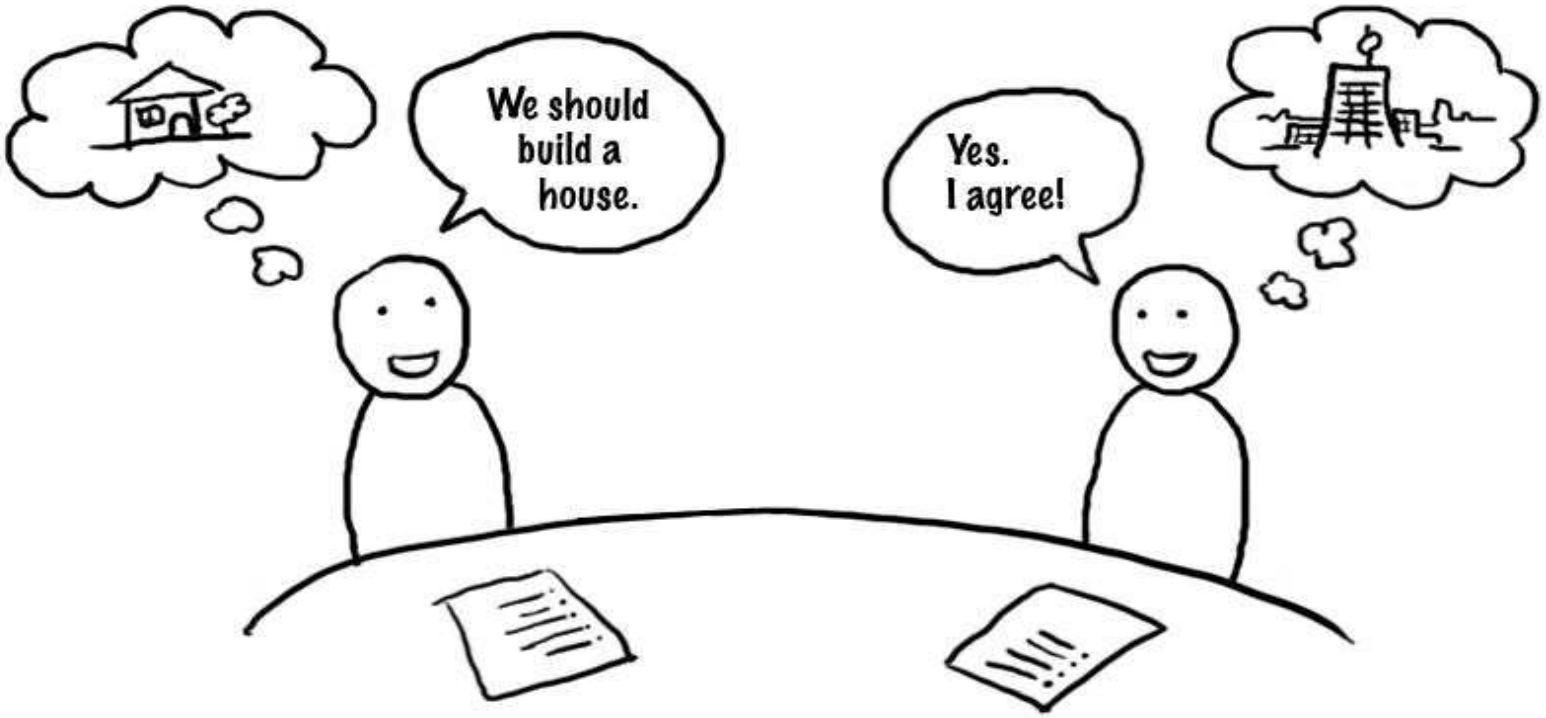
Gemeinsamkeit macht stark !

Wir können,

was wir wollen !

Subterra

Questions and clarifications?



Viel Vergnügen

10:45

Kaffee-Pause und Erfahrungsaustausch

11:15

ENERGIEGEWINNUNG AUS ABFÄLLEN, ABWASSER UND BIOMASSE

1. **Dipl.Ing. S.R. Ganschow:**

   Practice Beispiele aus Deutschland

2. **Chemiker, H. J. Welsch:**

   Energiegewinnung aus Abfall –
   die anaerobe Trockenfermentation

ENERGIEGEWINNUNG AUS ABFÄLLEN, ABWASSER UND BIOMASSE

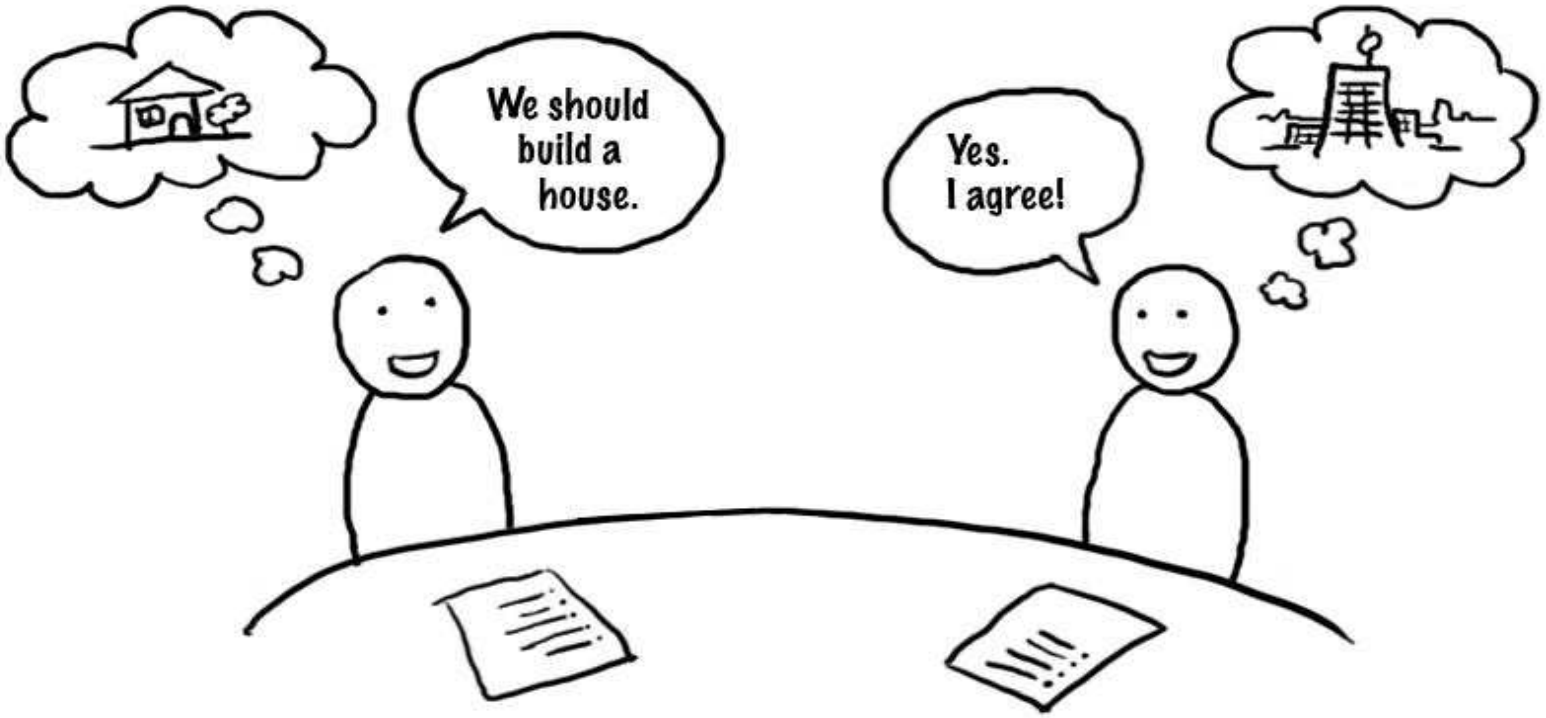
Dr. NN,

Vilnius Gediminas Technical University

Anaerobic digestion of sludge at the wastewater treatment plants with biological phosphorus removal: possible problems and solutions

Energiegewinnung

Questions and clarifications?



Vorschlag

Kleine Arbeitsgruppe mit dem Nachbar

Konsequenzen, Herausforderungen und Chancen für litauische Unternehmen

20 Minuten Zeit

Was haben Sie in den Arbeitsgruppen besprochen?

- Welche Themen waren wichtig?
- Welche Fragen sind aufgetaucht?
- Welche Chancen für litauische Unternehmen?
- ……?

Closing Discussion

Fragen und Diskussion zum gesamten Seminar

- Welche Fragen gibt es noch?

- Welche Themen sind noch offen und wie können sie künftig bearbeitet werden?

Prozess des Seminars

Was ist ein Prozess? Starten – Durchführen mit Beteiligung – Beenden - Rückkopplung

1. **Start heute Vormittag mit Abstimmung: Welche Themen wollen wir behandeln?**
2. **Durchführung: Präsentationen mit Beteiligung durch Fragen, Diskussionsrunden, = Ständige Vergewisserung: Wo stehen wir? Was kommt an? Was interessiert? Was fehlt? Was kommt im Prozess neu hinzu?**
3. **Beenden: Jetzt Schluss!**

Feedback

Rückkopplung durch Meinungsäußerung per Zuruf

- Was haben wir gemacht?
- Wie haben wir gearbeitet?
- Was war gut?
- Was war schlecht und sollte verbessert werden?

Schriftliche Rückkopplung

Bitte Fragebogen ausfüllen und abgeben!

Ваше мнение о Ганзейской конференции 06.11.2013

Мы просим участников конференции высказать своё мнение о конференции. Ваша оценка поможет нам избежать ошибок в будущем, и улучшить качество проводимых нами мероприятий.

1. Что Вы думаете о следующих аспектах мероприятия?

	абсолютно да	да	вполне	не совсем	абсолютно нет
Мероприятие было очень интересным	❑	❑	❑	❑	❑
Докладчики были очень компетентны	❑	❑	❑	❑	❑
Качество докдадов соответствовало моим ожиданиям	❑	❑	❑	❑	❑
На доклады было отведено достаточно времени	❑	❑	❑	❑	❑
Для вопросов и дискуссий было достаточно времени	❑	❑	❑	❑	❑
Идея чередования докладов и работы за круглыми столами мне нравится	❑	❑	❑	❑	❑
Конференция прошла в рабочей и оживленной атмосфере и была довольно продуктивна	❑	❑	❑	❑	❑
Участие в конференции мне многое дало	❑	❑	❑	❑	❑
Прочее:	❑	❑	❑	❑	❑
	❑	❑	❑	❑	❑

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Ostsee: Mehr als Meer

KMU gestalten Zukunft !

Herzlichen Dank!

Uns hat es viel Freude bereitet!

Wir freuen uns auf ein Wieder-sehen!

Wir wünschen Ihnen viel Erfolg und auch persönlich alles Gute!

Danke für Ihre Aufmerksamkeit !

www.hanse-parlament.eu

Vielen Dank für Ihre Aufmerksamkeit!

Überblick über Moderne Technologien der Abfallwirtschaft und Best Practice-Beispiele aus Deutschland, Teil 1

STADTREINIGUNG HAMBURG

Vilnius, 07.04.2014

Sven Robert Ganschow

Inhalt

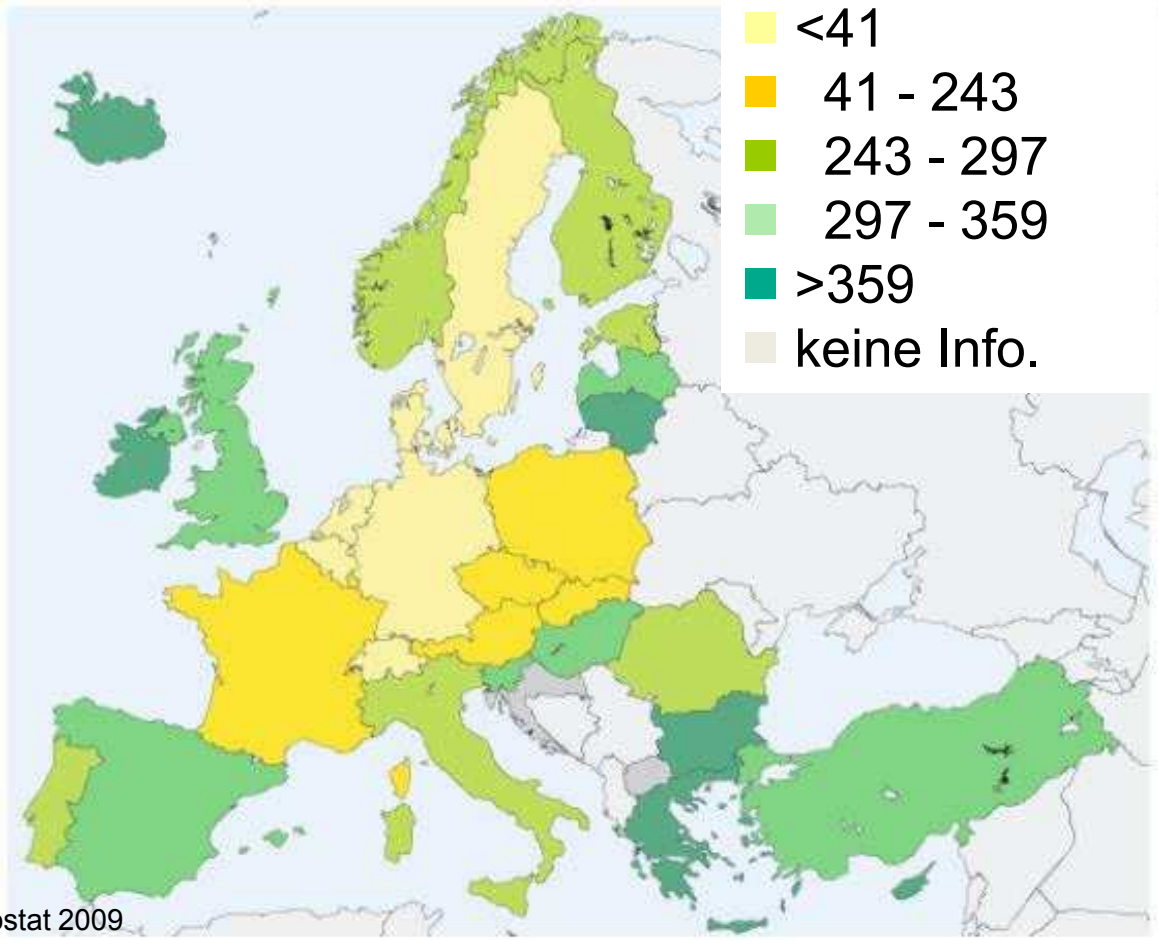
STADTREINIGUNG HAMBURG

1. Abfallwirtschaft in Deutschland
2. Stadtreinigung Hamburg
3. Hamburger Wertstoffkampagne

1. Abfallwirtschaft in Deutschland

STADTREINIGUNG HAMBURG

- Deponierung von Hausmüll in Europa (in kg/Einwohner), Basis-Jahr 2007



Quelle: Eurostat 2009

1. Abfallwirtschaft in Deutschland

STADTREINIGUNG HAMBURG

Zuständigkeit

abhängig von Herkunft des Abfalls

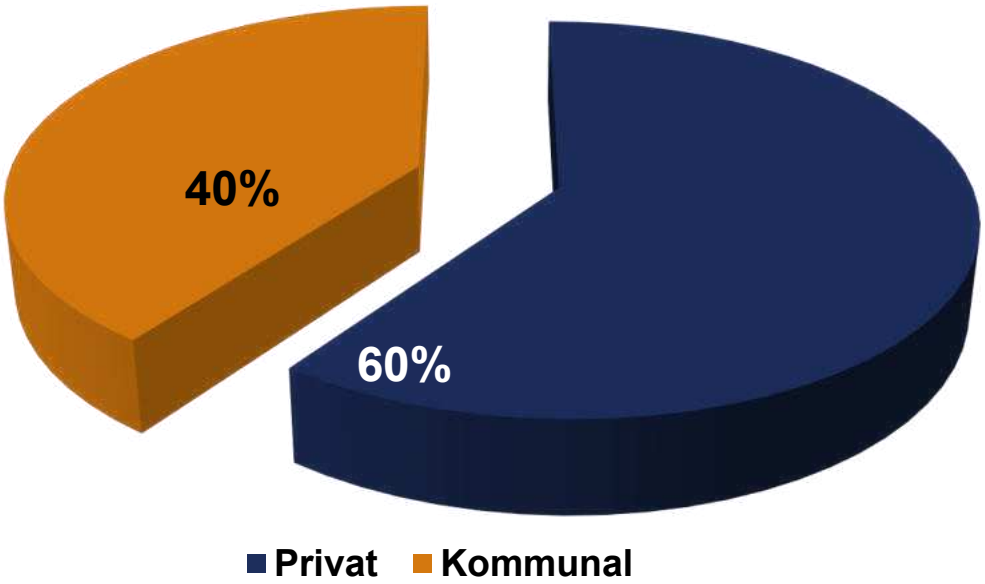
- **Abfall aus Haushaltungen**
  - Private Haushalte haben die Pflicht, ihren Abfall dem öffentlich-rechtlichen Entsorgungsträger zu überlassen
  - Kommunen sichern die Entsorgungssicherheit

- **Abfall aus Industrie und Handel**
  - Für Abfall zur Verwertung gilt:
    Entsorgungsauftrag wird im Wettbewerb vergeben

1. Abfallentsorgung in Deutschland

STADTREINIGUNG HAMBURG

- Markt des kommunalen Abfallmanagements:
  - 40 % über Städte und Gemeinden
  - 60 % der Städte und Gemeinden haben Verträge mit Privatunternehmen (40 % große Firmen, 20 % kleine und mittlere Firmen)



1. Abfallwirtschaft in Deutschland

STADTREINIGUNG HAMBURG

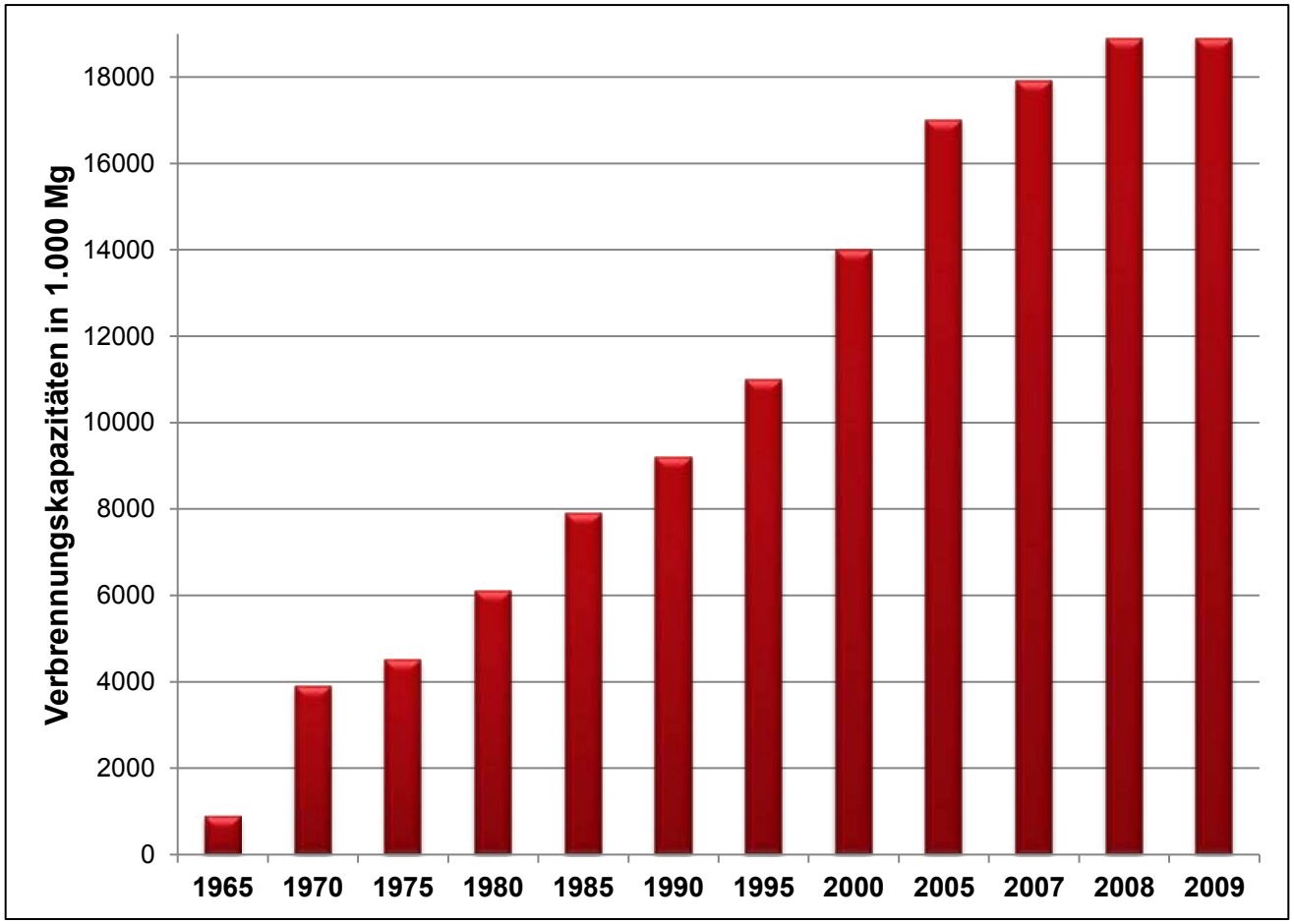
Paradigmenwechsel Klima- und Ressourcenschutz

- Europäische Abfallrahmenrichtlinie (2008) und Novelle Kreislaufwirtschaftsgesetz (ab 1.06.2012)
  - **5-stufige Abfallhierarchie:**
    1. Vermeidung,
    2. Vorbereitung zur Wiederverwendung,
    3. Recycling,
    4. Sonstige Verwertung (insb. energetisch),
    5. Beseitigung
  - Gewährleistung flächendeckender Getrenntsammlung (Metalle, Bioabfälle, Papier, Glas, Kunststoffe) ab 2015
  - Quoten für Vorbereitung zur Wiederverwendung, Recycling und sonstige stoffliche Verwertung bis 2020
    - Siedlungsabfälle: 65 %
    - Bau- und Abbruchabfälle: 80 %

1. Abfallwirtschaft in Deutschland

STADTREINIGUNG HAMBURG

- 70 Müllverbrennungsanlagen (Kapazität ~ 19 Mio. Mg/a) und 60 Mechanisch-Biologische Anlagen (Kapazität ~5,7 Mio. Mg/a) in Betrieb



2. Hamburg
- ein deutsches Bundesland

STADTREINIGUNG HAMBURG

Hamburg ist das zweitkleinste Bundesland (vor Bremen) der Bundesrepublik Deutschland von insgesamt 16 Bundesländern

STADTREINIGUNG HAMBURG

2. Freie und Hansestadt Hamburg

Daten:

- zweitgrößte Stadt der Bundesrepublik nach Berlin
- 1,8 Mio. Einwohner (wie in Minsk)
- 900.000 Haushalte
- 755 km² Fläche
- mehr als 10.000 km Straßennetz

Besonderheiten:

- Hafen, Kaufleute, Schifffahrt, Luftfahrt, Medien und Unterhaltung, Verwaltung, Sport, Hafencity
- 2013 Internationale Bau- und Gartenbauausstellung

Hamburg, das Tor zur Welt

2. Stadtreinigung Hamburg
Aufgaben und Organisation

STADTREINIGUNG HAMBURG

- 2.500 Mitarbeiter
- 24 Standorte
- 4 Regionen
- Fuhrpark: 700 KFZ

- Seit 1994: Anstalt öffentlichen Rechts
- Eigentümerin / Träger: FHH
- Öffentlich rechtlicher Entsorgungsträger

2. Stadtreinigung Hamburg - Unternehmensdaten und Aufgaben

STADTREINIGUNG HAMBURG

Aufgaben im Stadtreinigungsgesetz (SRG) festgelegt

(Zielbild Senat, Unternehmenskonzept, BSC, Strategien)

Hoheitliche Aufgaben	**Gewerbliche Tätigkeit (im Wettbewerb)**	**Weitere Bereiche**
▪Sammlung, Transport, Behandlung von Abfällen aus Haushalten ▪Fahrbahn- und Gehwegreinigung ▪Winterdienst ▪Katastrophenschutz	▪Sammlung, Transport, Behandlung von Abfällen ▪Reinigungsleistungen (Veranstaltungen) ▪Winterdienst	▪Unternehmenszweck dienlich z. B.: ▪ Anlagen zur Energieerzeugung (PV, Wind, Deponiegas) ▪ Papiervermarktung

2. Stadtreinigung Hamburg - Unternehmensdaten und Aufgaben

STADTREINIGUNG HAMBURG

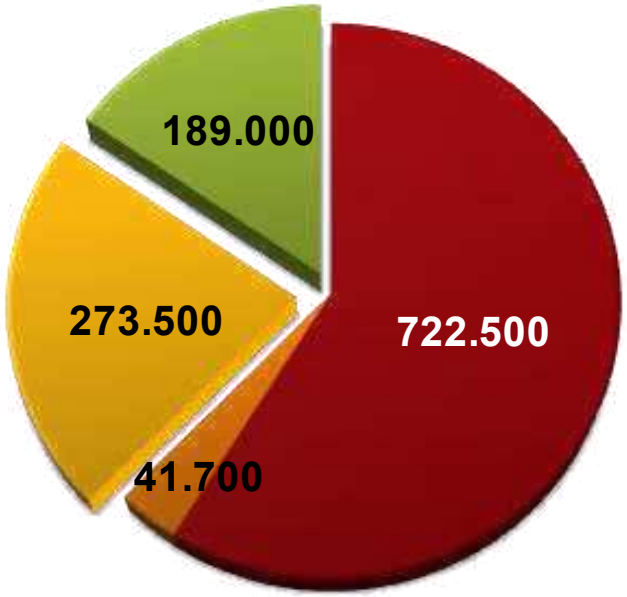
Abfallsammlung 2013: 1,23 Mio. Mg

Gewerblich: ~ 462.500 Mg

- Industrie und Handel
- Andere Kommunen

Hoheitlich: ~ 764.200 Mg

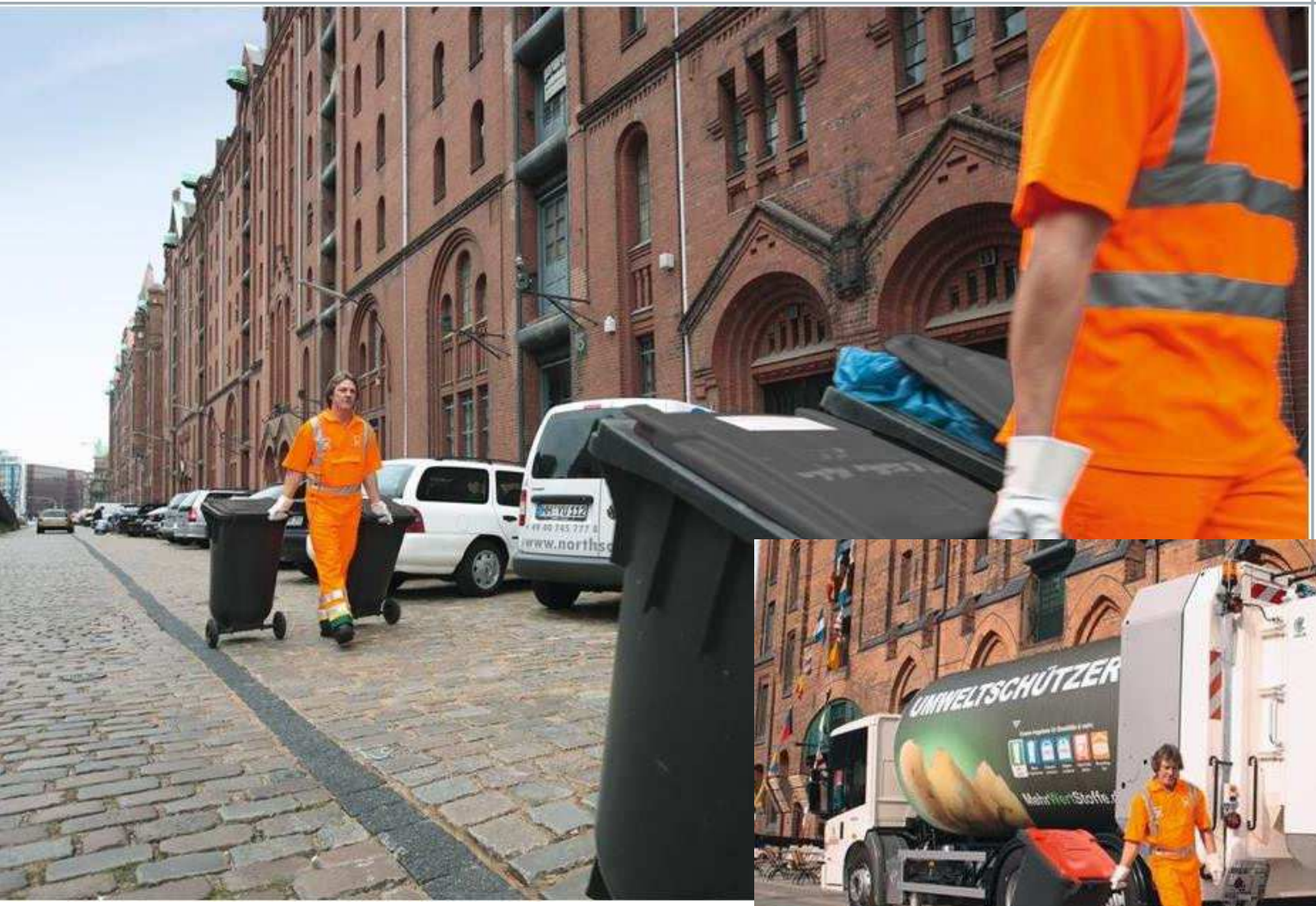
- Private Haushalte und Geschäfte
- Straßenreinigung



inkl. vorläufige Daten für Dezember 2013

2. Stadtreinigung Hamburg
Sammlung von Siedlungsabfällen

STADTREINIGUNG HAMBURG

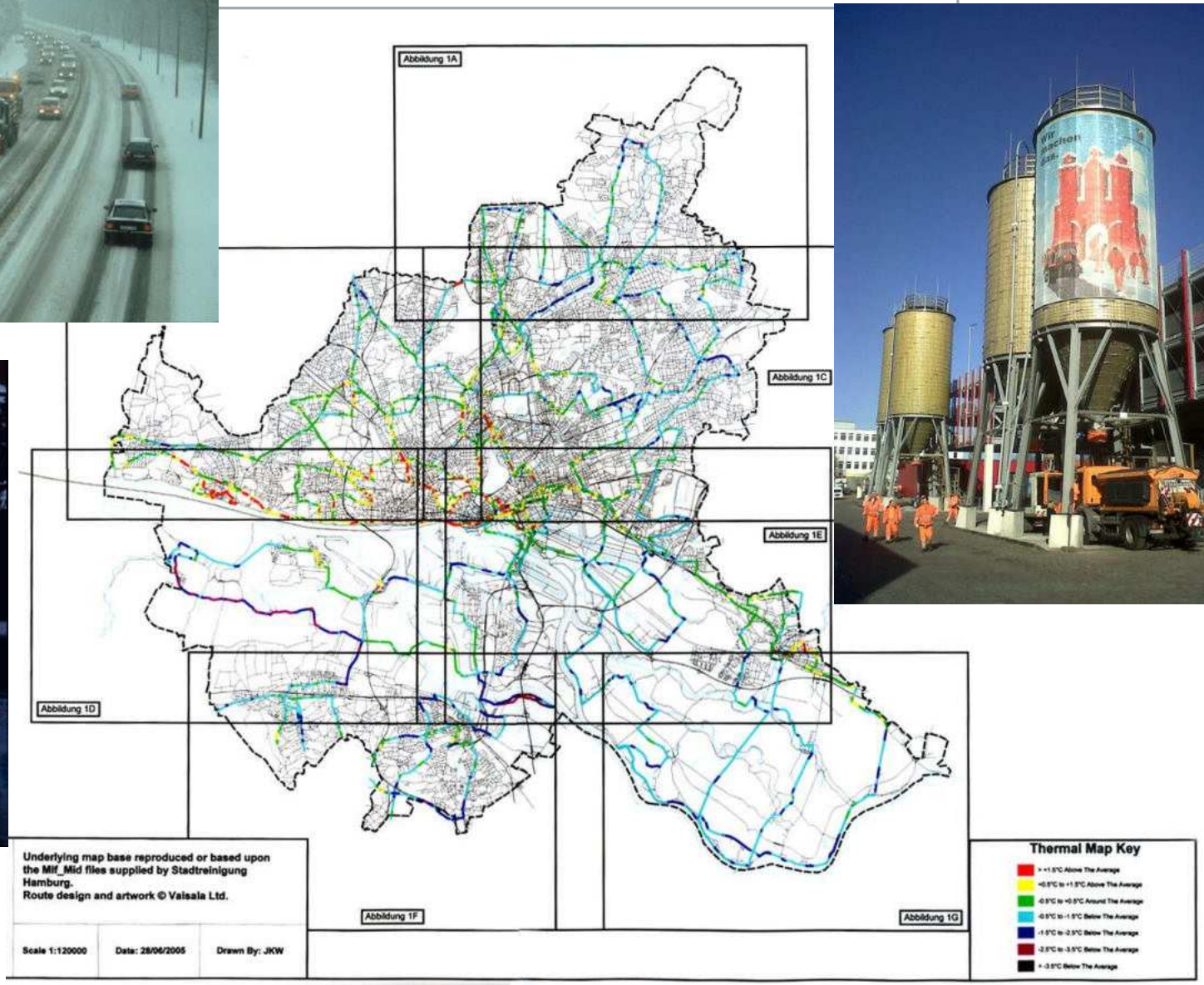


2. Stadtreinigung Hamburg - Fahrbahn- und Gehwegreinigung

STADTREINIGUNG HAMBURG

2. Stadtreinigung Hamburg - Sicherer Winterdienst

STADTREINIGUNG HAMBURG



2. Stadtreinigung Hamburg
Umweltgerechte Abfallbehandlung

STADTREINIGUNG HAMBURG

2. Klima- und Ressourcenschutz

STADTREINIGUNG HAMBURG

Biogas- und Kompostwerk BKW Bützberg
Kapazität: 70.000 Mg/a

BIOWERK
Kapazität: 20.000 Mg/a
SRH: 47,5 %

MVA Stellinger Moor
Kapazität: 180.000 Mg/a
Eigentum der SRH

MVA Stapelfeld (EQT, EON)
Kapazität: 350.000 Mg/a
Vertrag bis 2016
(SRH: 200.000 Mg/a)

Hamburg

MVR Müllverwertungsanlage
Rugenberger Damm (VE, EWE, SRH)
Kapazität: 320.000 Mg/a
Vertrag bis 2019

MVB Müllverwertungsanlage
Borsigstraße (VE, EON)
Kapazität: 320.000 Mg/a
Vertrag bis 2/2014

- Kapazität thermische Verwertung (Restabfall) ~ 1 Mio. Mg/a
- Kapazität Fermentation (Bioabfall) ~ 100.000 Mg/a

STADTREINIGUNG HAMBURG

2. SRH-Abfall-management 2012

HERKUNFT

Gesamtmenge: 1.200.492 t

Haushalte/Geschäfte

Industrie/Gewerbe

Kehricht/Märkte/Veranstaltungen

Andere Kommunen

BEHANDLUNG

Zwischenlager (Behandlung 2013 in MVA)
0,00 t

Müllverbrennungs-anlagen
930.354 t

Externe Verwertung (PPK, Metalle, Holz, E-Schrott, Laub etc.)
210.251 t

Biogas- und Kompostwerk Bützberg
56.894 t

Biogasanlage BIOWERK
1.329 t

Gebrauchtwaren-kaufhäuser STILBRUCH
1.664 t

ERGEBNIS

Strom/Wärme

Sekundärrohstoffe/ Recyclingprodukte

Biogas und Kompost

Strom/Wärme

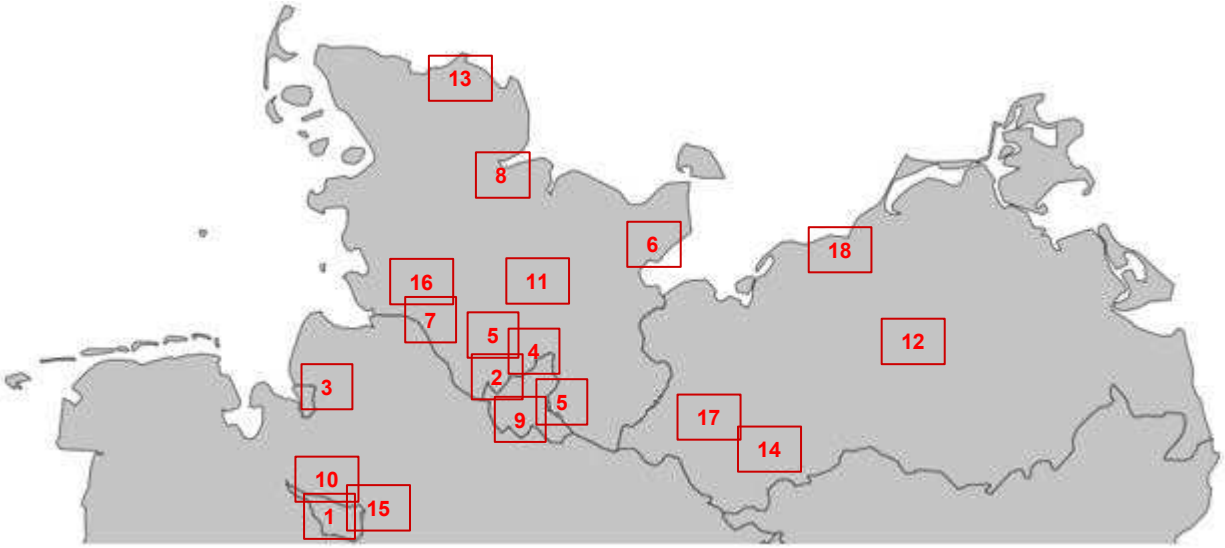
Möbel/ sonstige Produkte

2. Verbrennungskapazitäten in Norddeutschland

STADTREINIGUNG HAMBURG

	Inbetrieb-nahme	Kapazität in Mg	
1	1969	620.000	Bremen (MHKW)
2	**1973**	**180.000**	**Hamburg, Stellinger Moor (MHKW)**
3	1977	315.000	Bremerhaven (MHKW)
4	**1979**	**350.000**	**Stapelfeld (MHKW)**
5	**1994**	**320.000**	**Hamburg, Borsigstraße (MHKW)**
6	1984	60.000	Neustadt/Holstein (MHKW)
7	1984	80.000	Tornesch-Ahrenlohe (MHKW)
8	1996	140.000	Kiel (MHKW)
9	**1999**	**320.000**	**Hamburg, Rugenberger Damm (MHKW)**

	Inbetrieb-nahme	Kapazität in Mg	
10	2005	50.000	Bremen-Blumenthal (EBS)
11	2005	150.000	Neumünster (EBS)
12	2006	50.000	Ludwigslust (MVA)
13	2007	150.000	Flensburg (EBS)
14	2007	90.000	Stavenhagen (EBS)
15	2009	230.000	Bremen-Hafen (MKK)
16	2009	254.000	Glückstadt (EBS)
17	2009	80.000	Hagenow (EBS)
18	2009	170.000	Rostock (EBS)
		3.609.000	



2. Verbrennungskapazitäten in Norddeutschland

STADTREINIGUNG HAMBURG

- vorhandene Behandlungskapazitäten derzeit angemessen mit Abfällen ausgelastet

- zukünftige Bewertung der Kapazitätsauslastung schwierig, abhängig von
  - die Entwicklung der Primär- und Sekundärabfälle
  - die Restlaufzeiten der MBAs
  - die Kostenentwicklung der Abfallverbrennungsanlagen

2. Entwicklung Verbrennungsmengen

STADTREINIGUNG HAMBURG

- immer weniger Primärabfälle zur Verbrennung durch intensivere Getrenntsammlung / Recycling von
  - Altpapier
  - Bioabfällen
  - Verpackungen (z. T. stoffgleiche Nichtverpackungen)
  - Glas
  - Textilien
  - E-Schrott
- Je nach Verfahren entstehen in Recyclinganlagen Sekundärabfälle, die thermisch behandelt werden müssen, z. B.
  - Sortierreste
  - Siebreste
  - Gärrestfehlchargen

3. Hamburger Wertstoffkampagen

STADTREINIGUNG HAMBURG

Klima- und Ressourcenschutz bei der SRH

§§§
KrWG

1896 1973 1994 1999 2005 2011 **2012**

… der Weg zum Klima- und Ressourcenschützer, …
Einsatz erneuerbare Energien, KFZ-Modelle, Fahrertraining, Gebäudemanagement, Beschaffungsverhalten, Einzelprojekte, stoffliche und energetische Nutzung von Abfällen
➔ Hamburger Wertstoffkampagne seit 2011

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

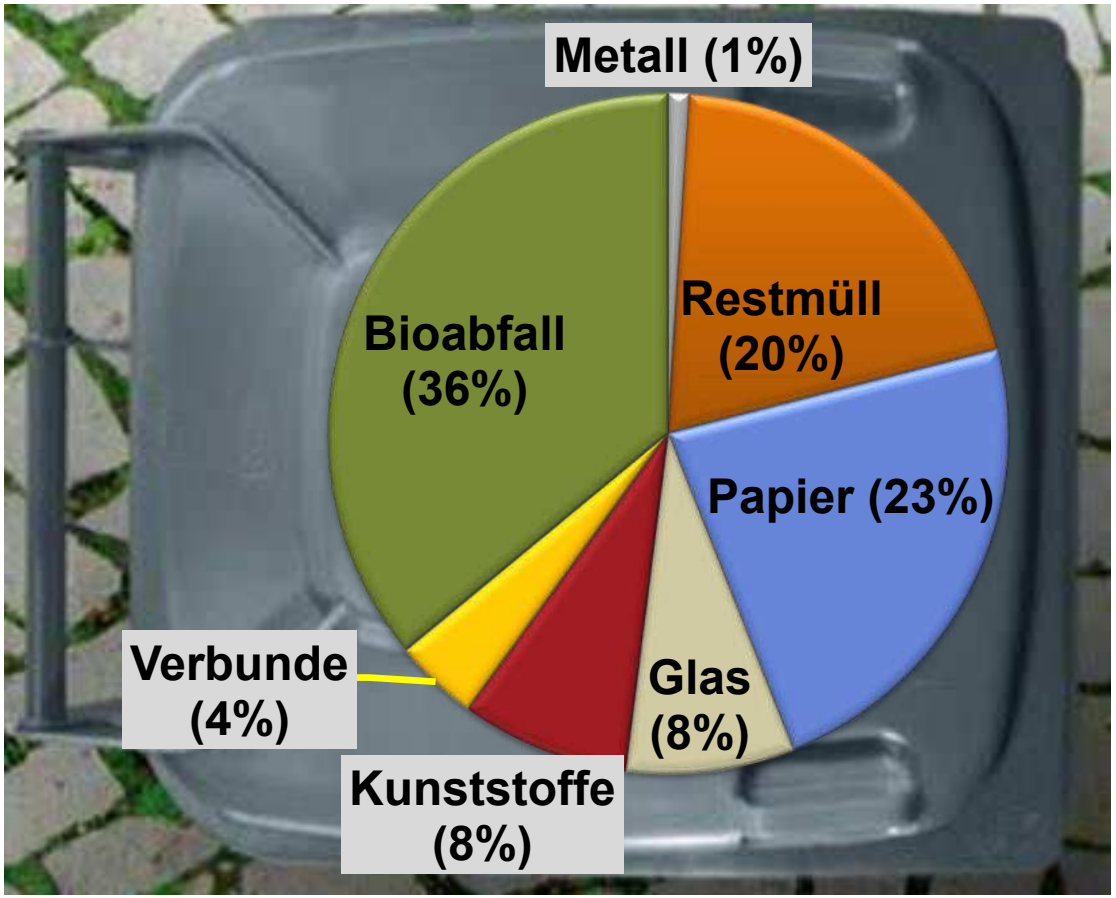
Ziele zum Start:

- Reduzierung Restmüll (Graue Tonne)
- Steigerung Getrenntsammlung
- Fokus haushaltsnahe Abfallmengen:
  Bioabfälle, Grünabfälle, Altpapier, Metalle, Kunststoffe
- Anpassung der Behandlungskapazitäten
- Vermarktung und stoffliche Verwertung
  - Erschließung neuer Wege für
    Vermarktung und Verwertung

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

- Vorherige Hausmüllanalyse in Hamburg:



3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

Recycling-Offensive der SRH: Ziele bis 2012

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

Seit 01.01.2011
Hamburger Recycling-Offensive
(durch Hamburger Senat beschlossen)

Verordnung	Gebühren	Gelbe HWT	Kampagne	Anlagen
Regeltonne Bio und Papier	Anreizsysteme für Bürger	Miterfassung sNVP	Öffentlichkeits-arbeit	Anpassung von Kapazitäten

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

- Getrenntsammlung in Hamburg
  - Holsystem
    - Biotonne (Grüne Tonne) gegen Gebühr
    - Verpackungen und stoffgleiche Nichtverpackungen (Kunststoffe, Metall)
    - (Gelbe Tonne/Sack / kostenlos)
      Neu: Wertstofftonne ab 1.05.2011
    - Papier (Blaue Tonne, Straßensammlung / kostenlos)
    - Restmüll (Graue Tonne) gegen Gebühr
    - Sperrmüll auf Bestellung
    - Sacksammlung (Laub)
  - Bringsystem
    - Depotcontainer (Papier, Glas, Wertstoffe)
    - Problemstoffsammlung (stationär / mobil)
    - 13 Recyclinghöfe

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

- Zielvorgaben Recycling-Offensive (Basis: 2007)

	IST 2007 (Mg)	Ziel 2012 (Mg)
Altpapier	77.100	+30.000
LVP / HWT	27.700	+12.000
Bioabfall	26.800	+20.000
Grünabfall	11.000	+10.000
Restmüll	557.000	-50.000

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

- Zielvorgaben und erreichte Mengen 2012 sowie vorläufige Istmengen 2013

	IST 2007 (Mg)	Ziel 2012 (Mg)	IST 2012 (Mg)	2013 (Mg)
Altpapier	77.100	+30.000	+16.000	+19.900
LVP / HWT	27.700	+12.000	+4.000	+5.500
Bioabfall	26.800	+20.000	+27.000	+27.500
Grünabfall	11.000	+10.000	+8.500	+10.600
Restmüll	557.000	-50.000	-79.000	-90.600

~767.000 Mg CO_2 Einsparung = 0,44 Mg/Bürger

(Recycling-Offensive 2010 bis 2013)

inkl. vorläufige Daten für Dezember 2013

3. Hamburger Wertstoffkampagne

STADTREINIGUNG HAMBURG

- BKW Bützberg (seit 2011) ➔ Doppeltstrategie

Kapazität: 70,000 Mg/a (60,000 Mg Bioabfall; 10,000 Mg Grünabfall)

Kompost: 35.000 Mg/a (Schließung der Humuskreisläufe)

3. Entwicklungen Wertstoffwirtschaft

STADTREINIGUNG HAMBURG

- Recyclinghöfe: Noch mehr Bürgerservice

Überblick über Moderne Technologien der Abfallwirtschaft und Best Practice-Beispiele aus Deutschland – Teil 2

STADTREINIGUNG HAMBURG

Vilnius, 07.04.2014

Sven Robert Ganschow

Inhalt

STADTREINIGUNG HAMBURG

1. Hausmüllzusammensetzung
2. Batteriesammelsystem
3. Neue Sammelsysteme
4. Ausblick

1. Hausmüllzusammensetzung in Hamburg

STADTREINIGUNG HAMBURG

- Grundlage für weitere strategische Analysen der Stadtreinigung Hamburg
- Nachweis der Repräsentativität der gewählten Stichproben vorangegangener Hausmüllanalysen
- wo möglich, wurden die gleichen Behälter wie bei den vorherigen Sortieranalysen (2008, 2011) gesammelt und sortiert
- Es wurden je Region 66.000 l Behältervolumen sortiert
  - Abschätzung der Steigerungsmöglichkeiten der getrennten Erfassung ausgewählter Fraktionen
  - Art und Menge der Elektro-Altgeräte im Hausmüll
- Bestimmung des Anteils stofflich nicht verwertbaren PPK (Hygiene-Haushaltspapier)
- Bestimmung des Verpackungsanteil im Restmüll

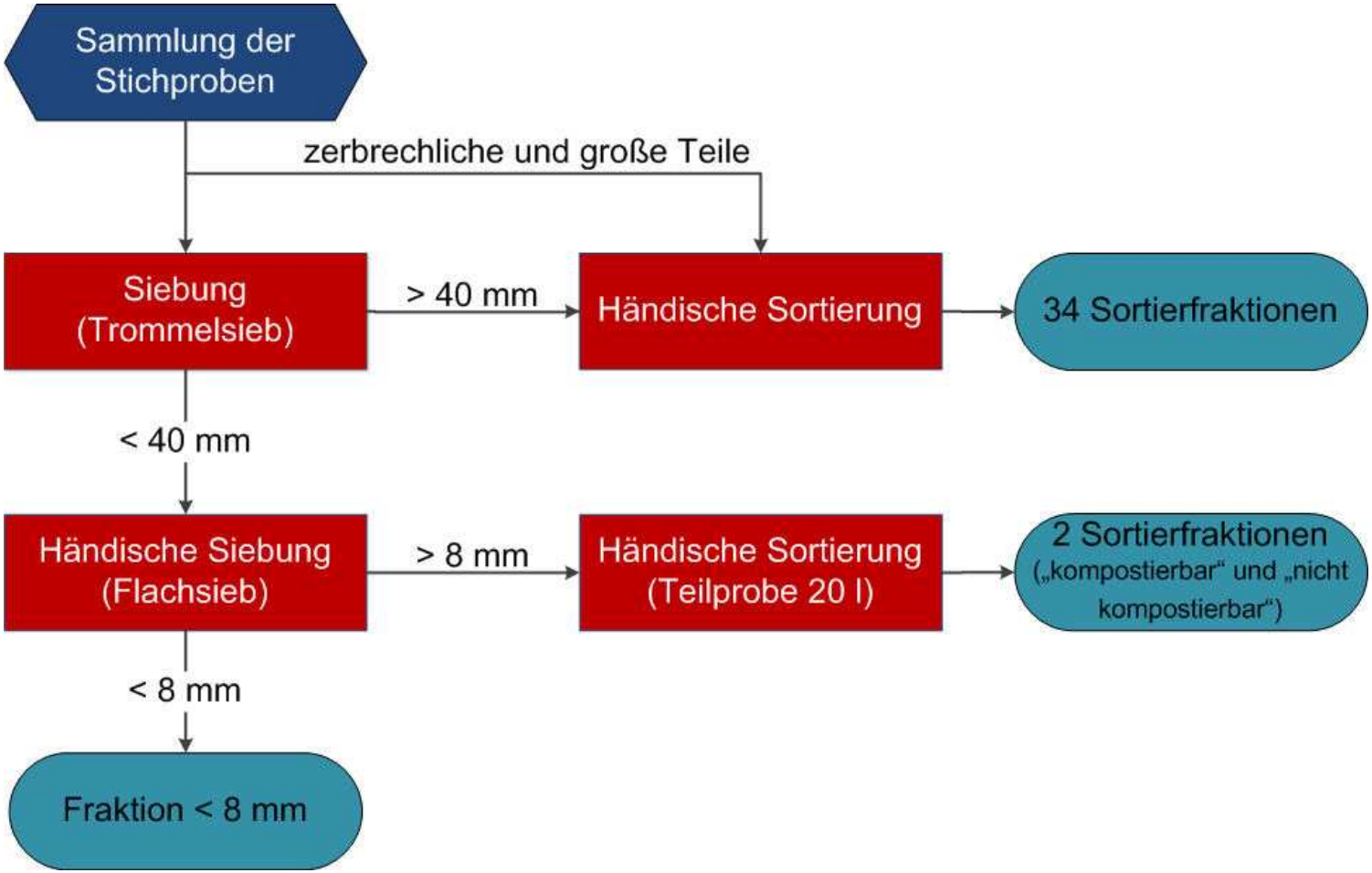
1. Hausmüllzusammensetzung Datengrundlage

STADTREINIGUNG HAMBURG

Siedlungsstruktur Nr.	Erläuterungen	Behälterausstattung	Schicht-Nr.
1 bis 4 (Lockere Bebauung)	Einfamilienhäuser, Reihenhäuser, Stadthäuser	**ohne** Bio- und Papiertonne	0
		mit Bio- und Papiertonne, **neu**	1
		mit Bio- und Papiertonne, **älter**	2
5 und 6 (Mehrfamilienhäuser)	Mehrfamilienhäuser/ Zeilenbauweise, Blockrandbebauung	**ohne** Bio- und Papiertonne	3
		mit Bio- und Papiertonne, **neu**	4
		mit Bio- und Papiertonne, **älter**	5
7 (City)	innerstädtische Bebauung	**ohne** Bio- und Papiertonne	6
		mit Bio- und Papiertonne, **neu**	7
8 (Großsiedlungen)	Großsiedlungen	**ohne** Bio- und Papiertonne	8
		mit Bio- und Papiertonne, **neu**	9

1. Hausmüllzusammensetzung
Methodik - Fließschema der Sortierung

STADTREINIGUNG HAMBURG



1. Ergebnisse 2012

- Füllstand, Raum- und Schüttdichte

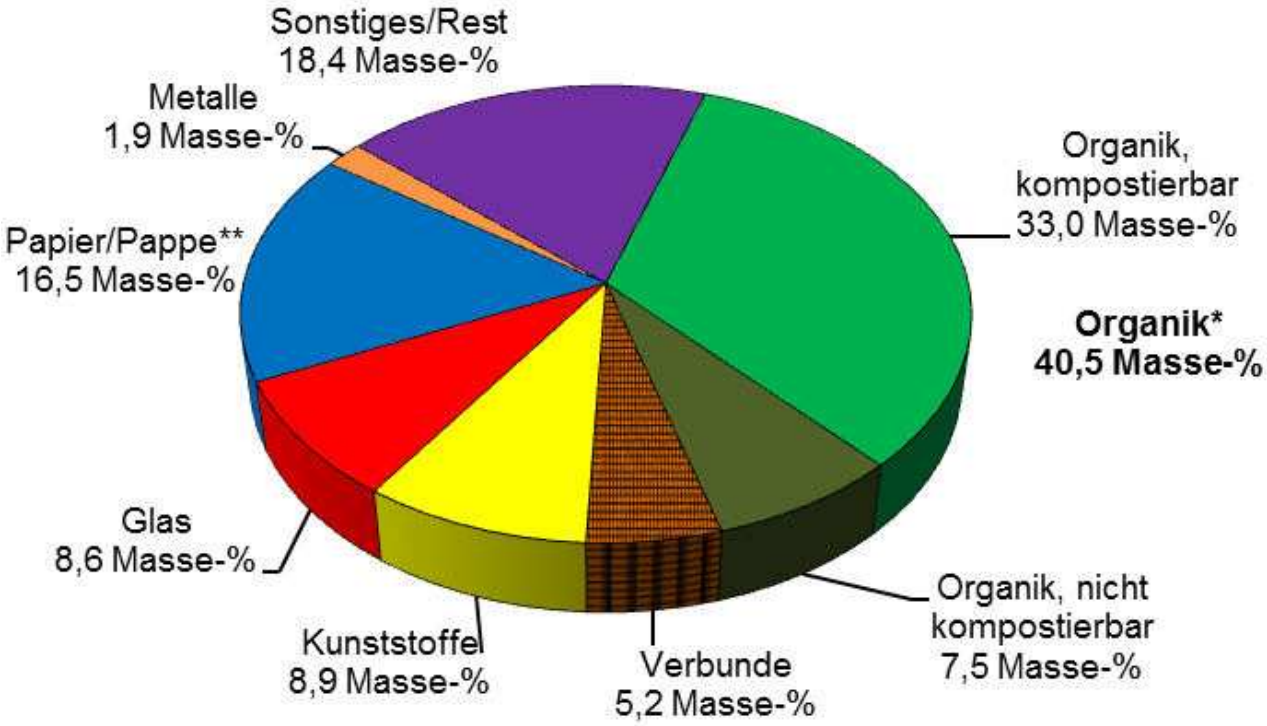
STADTREINIGUNG HAMBURG

Struktur-Nr. Kurzbezeichnung	Behälterausstattung	Schicht	Füllstand in Vol.-%	Raumdichte in kg/Liter	Schüttdichte in kg/Liter
Struktur 1 - 4 lockere Bebauung	ohne Bio- und Papiertonne	0	74,8	0,129	0,170
	mit Bio- und Papiertonne, neu	1	79,0	0,127	0,160
	mit Bio- und Papiertonne, älter	2	68,6	0,100	0,149
Struktur 5, 6 Mehrfamilienhäuser	ohne Bio- und Papiertonne	3	73,2	0,124	0,172
	mit Bio- und Papiertonne, neu	4	82,8	0,112	0,135
	mit Bio- und Papiertonne, älter	5	66,6	0,103	0,155
Struktur 7 City	ohne Bio- und Papiertonne	6	76,8	0,114	0,154
	mit Bio- und Papiertonne, neu	7	68,0	0,101	0,148
Struktur 8 Großsiedlungen	ohne Bio- und Papiertonne	8	72,0	0,099	0,137
	mit Bio- und Papiertonne, neu	9	66,6	0,099	0,135
		Minimum	65,9	0,098	0,139
		Mittelwert	**72,8**	**0,113**	**0,156**
		Maximum	81,5	0,131	0,172

1. Ergebnisse 2012

STADTREINIGUNG HAMBURG

233,35 kg/Ew, Jahr



Organik* = Summe aus kompostierbarer und nicht kompostierbarer Organik aller Fraktionen

Papier/Pappe** = inklusive Haushalts-Hygienepapiere (stofflich nicht verwertbar)

Verbunde = Verbundverpackungen, Materialverbunde und die Elektroschrottfraktion

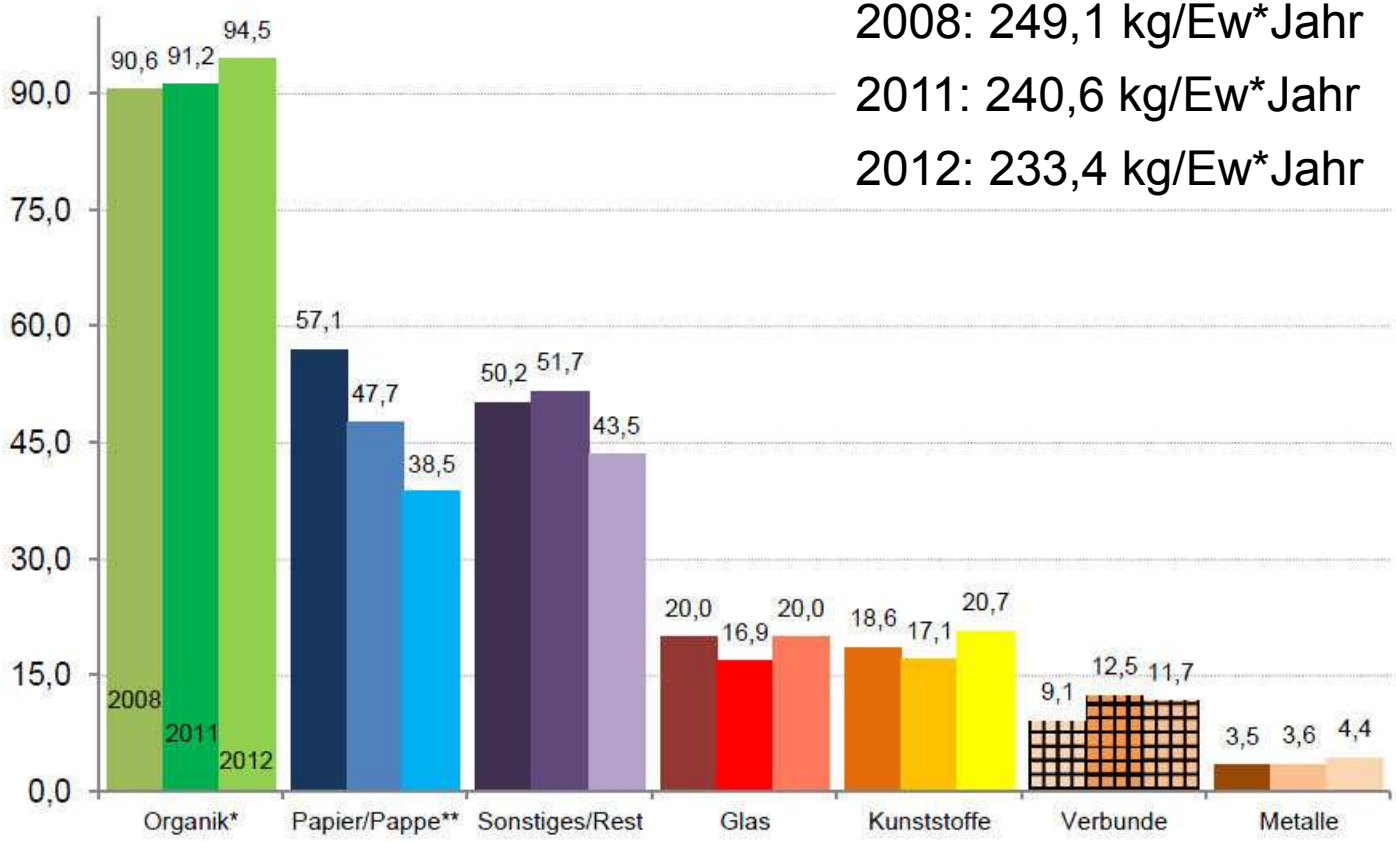
1. Vergleich 2012 zu 2011 und 2008

STADTREINIGUNG HAMBURG

2008: 249,1 kg/Ew*Jahr

2011: 240,6 kg/Ew*Jahr

2012: 233,4 kg/Ew*Jahr



2. Rücknahmesystem in Deutschland für Batterien

STADTREINIGUNG HAMBURG

Primär-Batterien

- Zink-Kohle
- Alkali-Mangan
- Zink-Luft
- Silberoxid
- Lithium-Mangandioxid

Sekundär-Battierien (Akkus)

- Nickel-Cadmium
- Blei
- Nickel-Metallhydrid
- Lithium-Ion
- Lithium-Polymer

Bild-Quelle: GRS Batterien

2. Rücknahmesystem Batterien

STADTREINIGUNG HAMBURG

Batterie-Verordnung:

- Trat 1998 in Kraft
- wird regelmäßig überarbeitet und an die neuesten EU-Vorschriften angepasst
- Batterien und Akkus dürfen nicht in den Hausmüll
- unabhängig vom Schadstoffgehalt
- Verbraucher muss sie zur Verkaufsstelle zurückbringen oder zu Annahmestellen der Kommunen
- Handel und Kommunen haben unentgeltliche Rücknahmepflicht (Marke und System der Batterie ist egal)

Bild-Quelle: GRS Batterien

2. Rücknahmesystem Batterien

STADTREINIGUNG HAMBURG

- Hersteller und Importeure haben Pflicht, Handel und Kommunen mit geeigneten Sammelbehältern zur kostenlosen Sammlung auszustatten
- Stiftung Gemeinsames Rücknahmesystem der Hersteller (GRS Batterien) ist gemeinsames Rücknahmesystem der Hersteller
- Über 900 Hersteller und Importeure sind beteiligt
- Sie zahlen Entsorgungskostenbeitrag für ihre in Deutschland in Verkehr gebrachten Batterien und Akkus, abhängig vom Gewicht und dem elektromagnetischen System
- GRS Batterien hat flächendeckenden Sammelsystem in Deutschland aufgebaut
- Es gilt nicht für Kraftfahrzeug-Batterien.

Bild-Quelle: GRS Batterien

2. Recyclinghöfe der SRH - Annahmestellen für Batterien

STADTREINIGUNG HAMBURG

Kfz-Batterien-Annahme

3. Entwicklungen Wertstoffwirtschaft

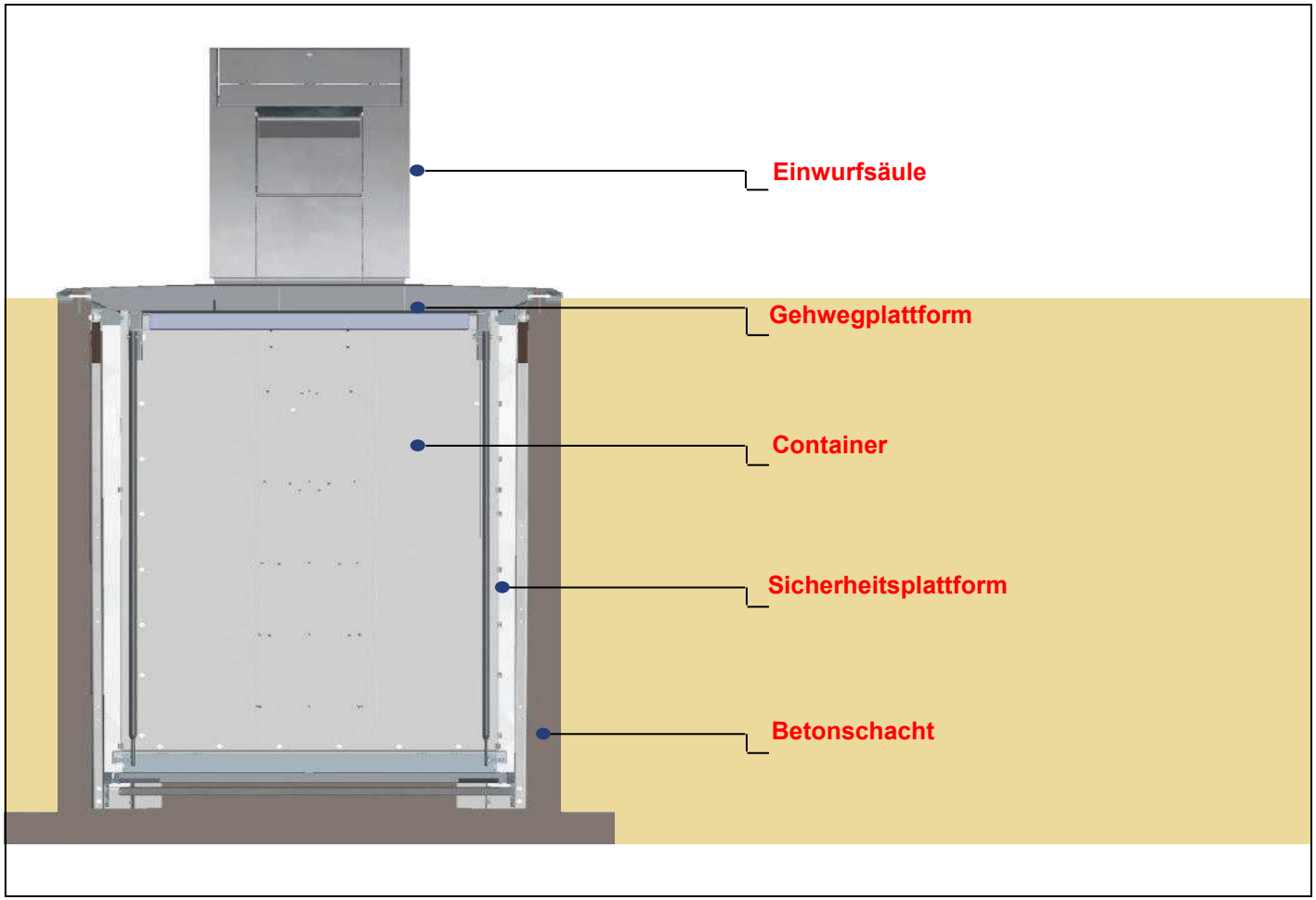
STADTREINIGUNG HAMBURG

- Sammelbehälter: „Große Klappe“ für Depotcontainer, Unterflursysteme, Papierkörbe „Big Belly“, …

3. Unterflurbehälter:

STADTREINIGUNG HAMBURG

So ist das Prinzip:



3. Unterflurbehälter:

STADTREINIGUNG HAMBURG

Technische Daten:

Kranaufnahme

Einwurfsäule

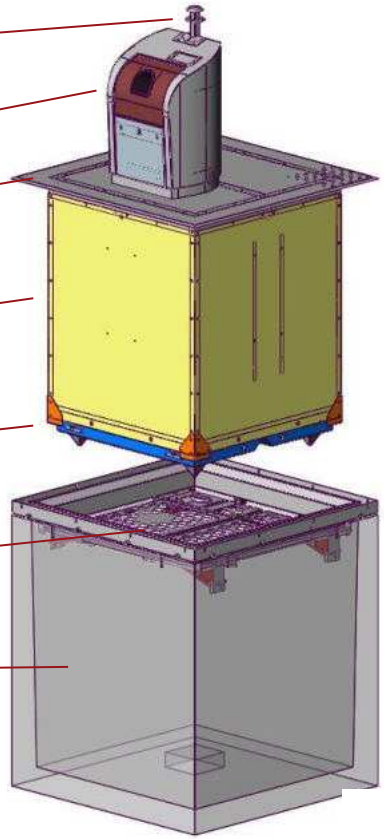
Boden

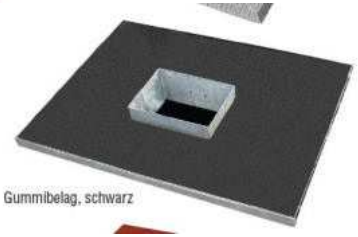
Container

Bodenklappen

Sicherheitsboden

Betonschacht





3. Was sind Unterflursysteme?

STADTREINIGUNG HAMBURG

- 3-5 cbm große unterirdische Müllsammelbehälter
- Unterschied privater Grund und öffentlicher Grund
- 95 % aller Projekte werden auf privatem Grund realisiert
- Ersetzt bis zu 40 Restmülltonnen a 120 L

Grundvoraussetzungen

- Entsorgung benötigt 10 m lichte Höhe
- Schwerlastfähige Um- bzw. Zufahrt
- Leitungsfrei
- Maximale Entfernung zur Fahrzeugmitte 8 m

3. Unterflursysteme

STADTREINIGUNG HAMBURG

Vorteile:

- Beanspruchung von wenig Grundstücksfläche
- Leichte Bedienung für ältere und behinderte Menschen
- Imagesteigerung durch innovative Lösungen bei der Abfallentsorgung
- Verringerte Geruchsbelästigung
- Optimale Ausnutzung des Behältervolumens
- Keine Befüllung mit sperrigen Gegenständen (Sperrmüll) mehr möglich
- Beistellungen gehen durch die gute Übersichtlichkeit des Systems stark zurück
- Eventuelle Brände erlöschen von selbst

3. Unterflursysteme

STADTREINIGUNG HAMBURG

3. Unterflursysteme für alle Abfallfraktionen

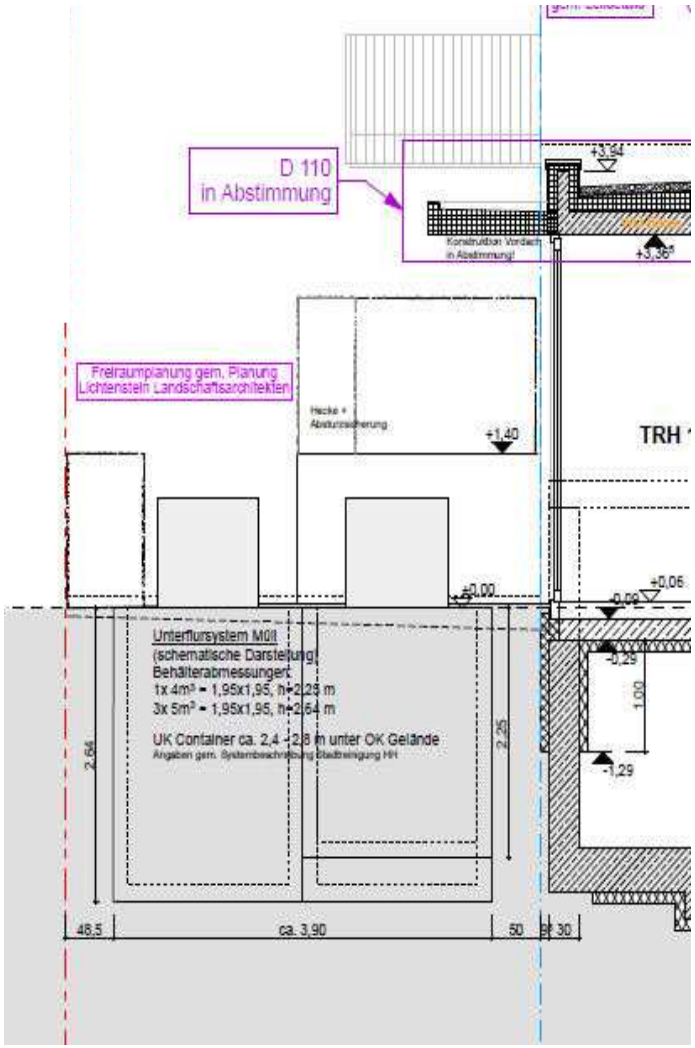
STADTREINIGUNG HAMBURG

Die SRH bietet der Wohnungswirtschaft gemäß Wertstoffverordnung alle Abfallfraktionen im Unterflursystem an.

- **Restmüll**
- **Leichtstoffe (Hamburger Wertstofftonne HWT)**
- **Papier**
- **Bio**

3. Anforderungen der Wohnungswirtschaft

STADTREINIGUNG HAMBURG



- Entsorgung auf engstem Raum für Neubauten - platzsparend
- barrierefrei - einfach zu befüllen
- Müll wird unsichtbar- Aufwertung der Objekte
- Einmalige Investitionskosten sind überschaubar durch Kostensplitting zwischen Bauherren und SRH
- Gebühren für Bauherren bei Neubau zweitrangig
- Zentrale Müllstandstandorte mit bis zu 350 WE planbar
- Kritische Betrachtung der Betriebskosten bei Bestandsgebäuden
- Müllschleusen möglich
- Attraktivität des Wohnumfeldes steigern

3. Service für die Wohnungswirtschaft

STADTREINIGUNG HAMBURG

- Beratung, Standortprüfung, Kostenvergleich
- „Kostensplitting“ Hamburger Model
- Begleitung und Beratung von A-Z
- Standortmanagement SRH
- Rundum-Betreuung durch Werkstattdienst und Hersteller
- Mitarbeiter der Wert GmbH und SRH ständig vor Ort

3. Biosammlung mit Unterflursystemen

STADTREINIGUNG HAMBURG

- Seit Juli 2011 wird in zwei Wohnanlagen mit je 100 Mietparteien die Sammlung von Bioabfällen über Unterflursysteme getestet.

- keine negativen Erfahrungen bei aktiven Biosystemen.
- Die Systeme entwickeln Temperaturen von bis zu 80 Grad Celsius, was dazu führt, dass die Stahlbehälter an der kälteren Außenseite kondensieren. Dieses Kondensat tropft in den Betonschacht.

3. Standort Thedestraße, Hamburg

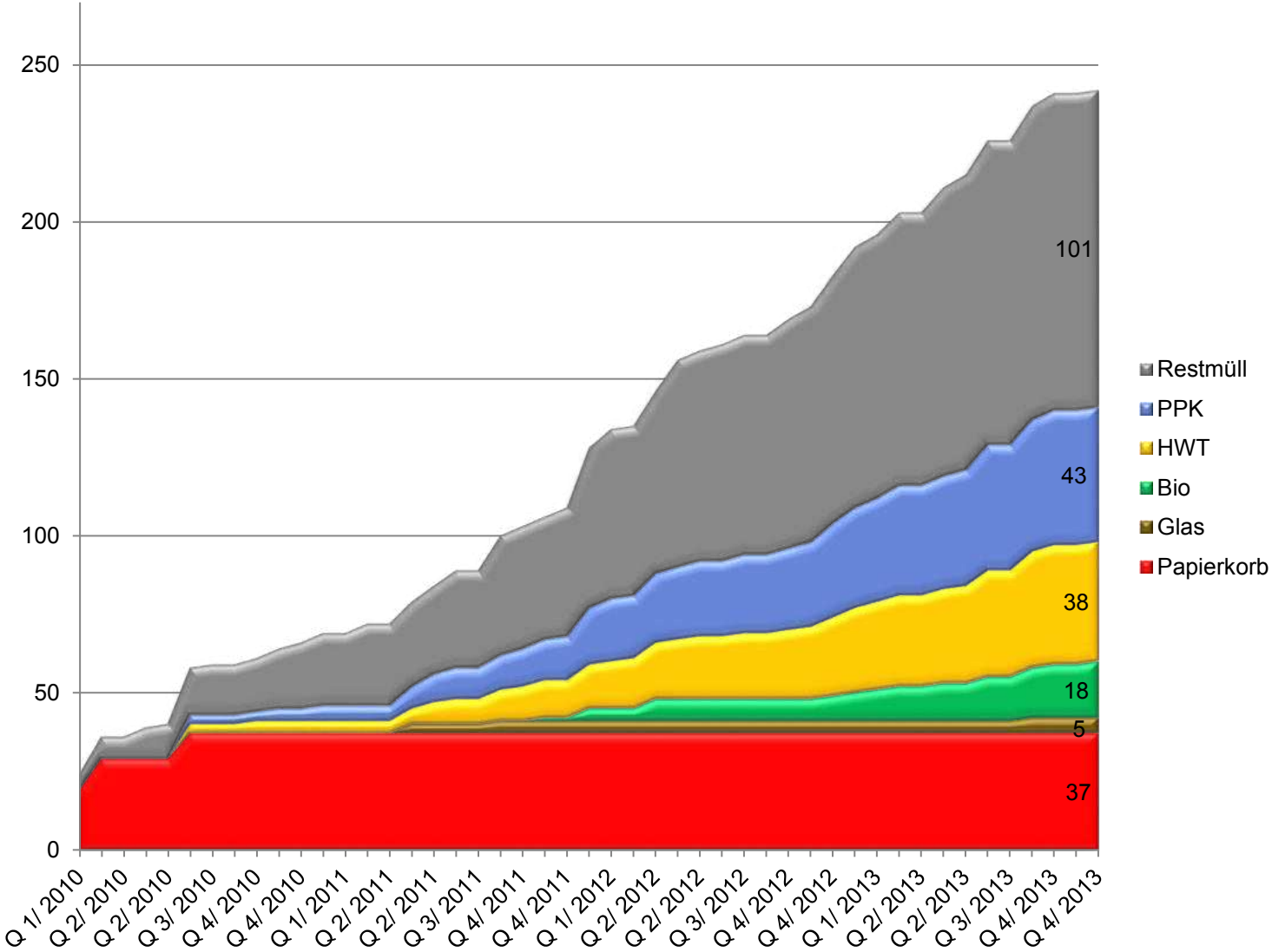
STADTREINIGUNG HAMBURG

3. Standort Hamburg, IBA – IGS-Gelände

STADTREINIGUNG HAMBURG

3. Bestand Unterflursysteme in Hamburg (September 2013)

STADTREINIGUNG HAMBURG



3. Ausblick

STADTREINIGUNG HAMBURG

- Abfallwirtschaft in Deutschland
  -> neues Kreislaufwirtschaftsgesetz
- Stadtreinigung Hamburg:
  -> Entsorgungssicherheit und guter Service
- Best Practice – technisch:
  -> Entwicklung und Ausbau neuer Techniken
- Best Practice – strategisch:
  -> Wertstoffoffensive für Wohnungswirtschaft
  -> Getrenntsammlung für weitere Fraktionen
  z. B. E-Schrott, Textilien, Schuhe
- Best Practice - nachhaltig:
  -> Intensivierung Klima- und Ressourcenschutz
  -> Wärmenetze

Vielen Dank für Ihre Aufmerksamkeit

STADTREINIGUNG HAMBURG

Energiegewinnung aus Abfällen
Best Practice-Beispiele
aus Deutschland

STADTREINIGUNG HAMBURG

Vilnius, 08.04.2014

Sven Robert Ganschow

Inhalt

STADTREINIGUNG HAMBURG

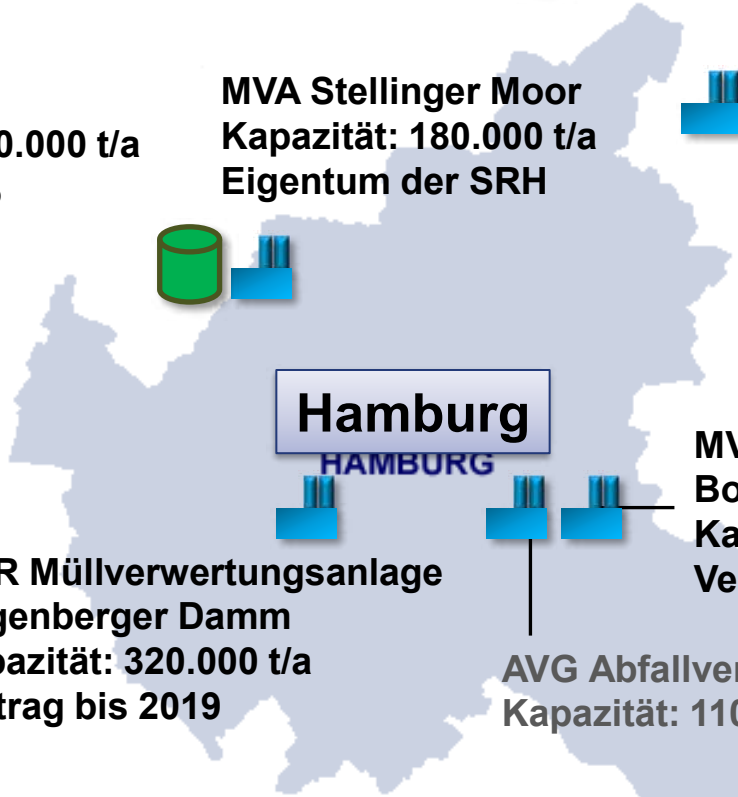
1. Energienutzung aus Müllverbrennung
2. Kompostwerk
3. Biowerk für Speiseabfälle
4. Ausblick

1. Energie aus Abfall: Drei Anlagen bei der Stadtreinigung Hamburg

STADTREINIGUNG HAMBURG

1. Stadtreinigung Hamburg
Abfallsammlung und -behandlung

STADTREINIGUNG HAMBURG



Biogas- und Kompostwerk BKW Bützberg
Kapazität: 70.000 t/a

BIOWERK
Kapazität: 20.000 t/a
SRH: 47,5 %

MVA Stellinger Moor
Kapazität: 180.000 t/a
Eigentum der SRH

MVA Stapelfeld
Kapazität: 350.000 t/a
Vertrag bis 2016

MVB Müllverwertungsanlage Borsigstraße
Kapazität: 320.000 t/a
Vertrag bis 2/2014

MVR Müllverwertungsanlage Rugenberger Damm
Kapazität: 320.000 t/a
Vertrag bis 2019

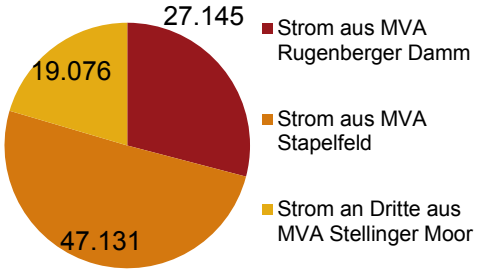
AVG Abfallverwertungsgesellschaft
Kapazität: 110.000 t/a (Sondermüll)

Kapazität Bioabfallbehandlung ~ 90.000 t/a
Kapazität MVAen ~ 1 Mio. t/a

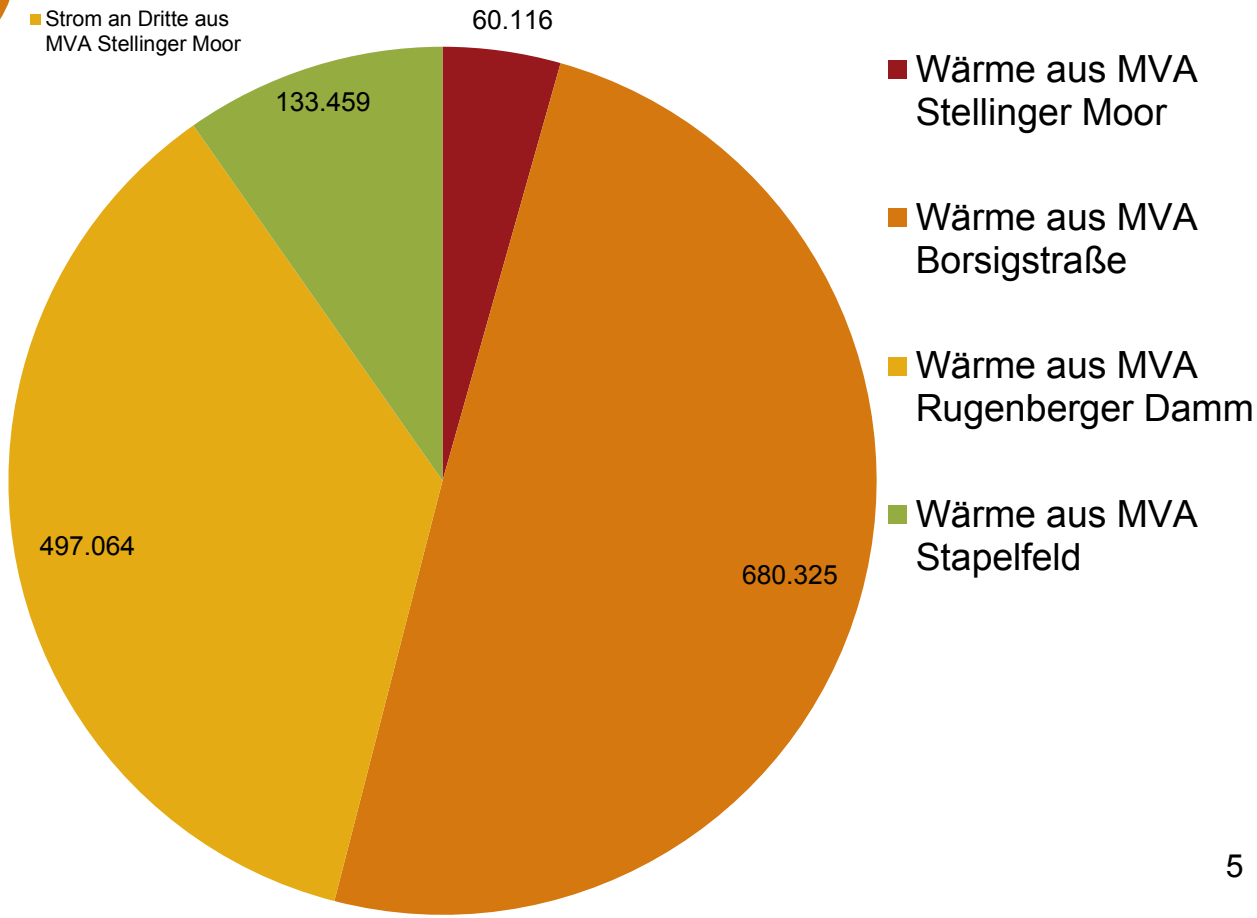
2. Energieproduktion in Hamburgs MVAs in MWh

STADTREINIGUNG HAMBURG

Stromproduktion gesamt: 93.352



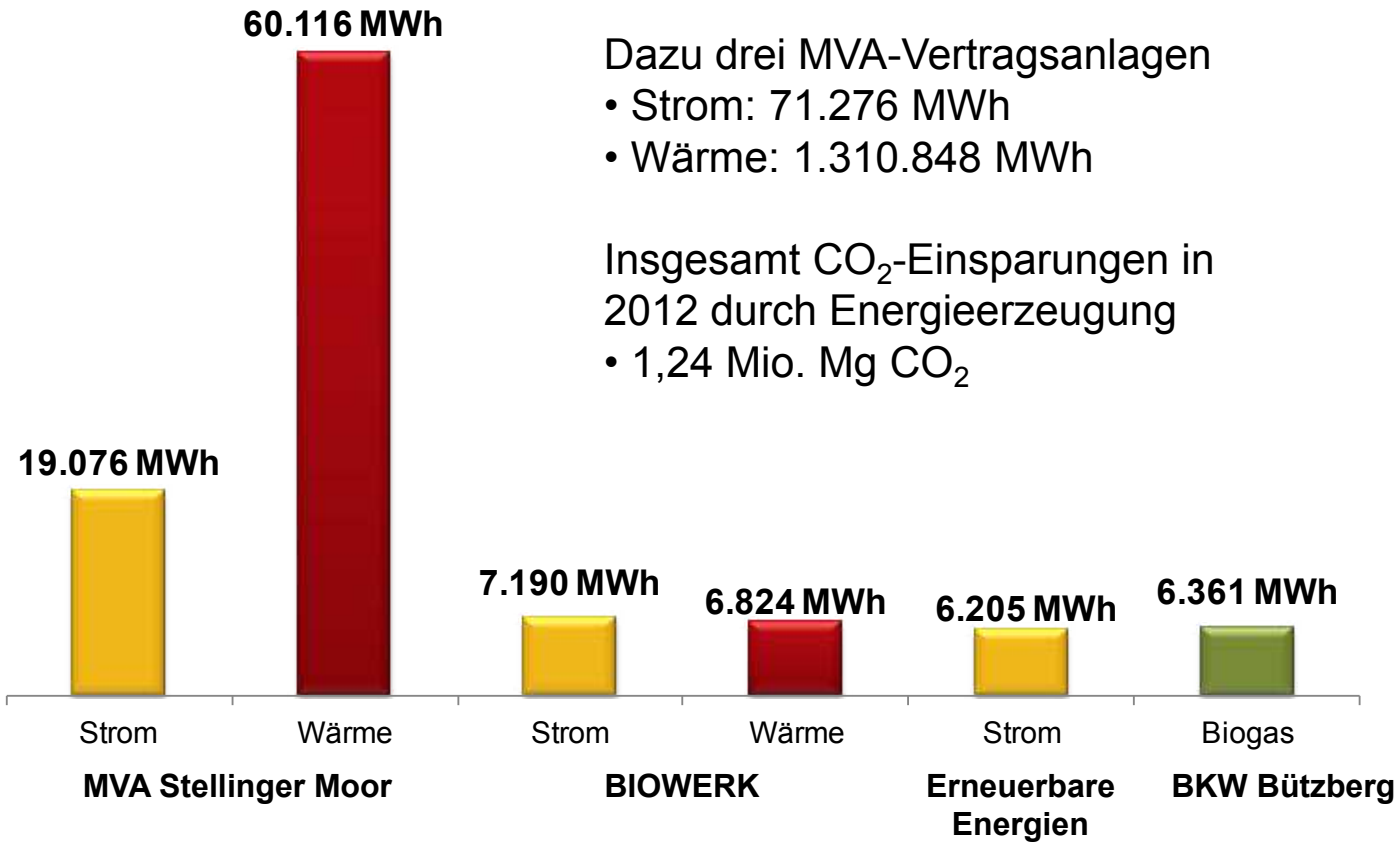
Wärmeproduktion gesamt in MWh: 1.370.964



1. Klima- und Ressourcenschutz

STADTREINIGUNG HAMBURG

- SRH nicht nur Entsorger sondern auch Versorger (2012)



Dazu drei MVA-Vertragsanlagen
- Strom: 71.276 MWh
- Wärme: 1.310.848 MWh

Insgesamt CO_2-Einsparungen in 2012 durch Energieerzeugung
- 1,24 Mio. Mg CO_2

2. Kompostwerk Bützberg
- Energie aus Abfall

STADTREINIGUNG HAMBURG

- **SRH-Doppelstrategie** für maximale Nutzung Bioabfall
- Ausbau Kompostwerk Bützberg:
  Fermentation von Bioabfällen als Vorschaltanlage

1. **Biogaserzeugung durch Fermentation**

   70.000 t Bioabfälle/a liefern 25,3 Mio. kWh/a; genug Energie für rd. 10.000 2-Personen-Haushalte

2. **Stoffliche Nutzung durch Kompostierung**

   Kompostierung Gärrest liefert 35.000 t/a Qualitätskompost

2. Kompostwerk mit Trockenfermentation

STADTREINIGUNG HAMBURG

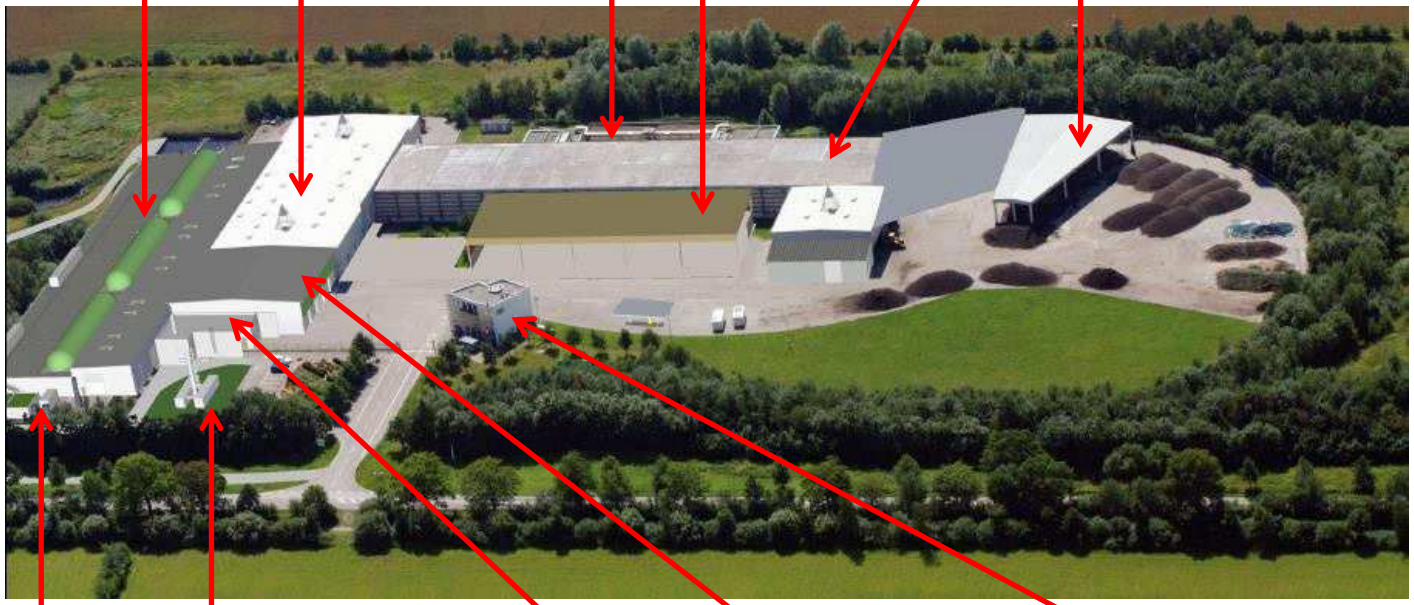
Kompostanlage
Bützberg
Besteht seit 1995

Neue
Biogas- und
Kompostanlage
Bützberg
ab 10-2011

Trockenfermentationsanlage

Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG



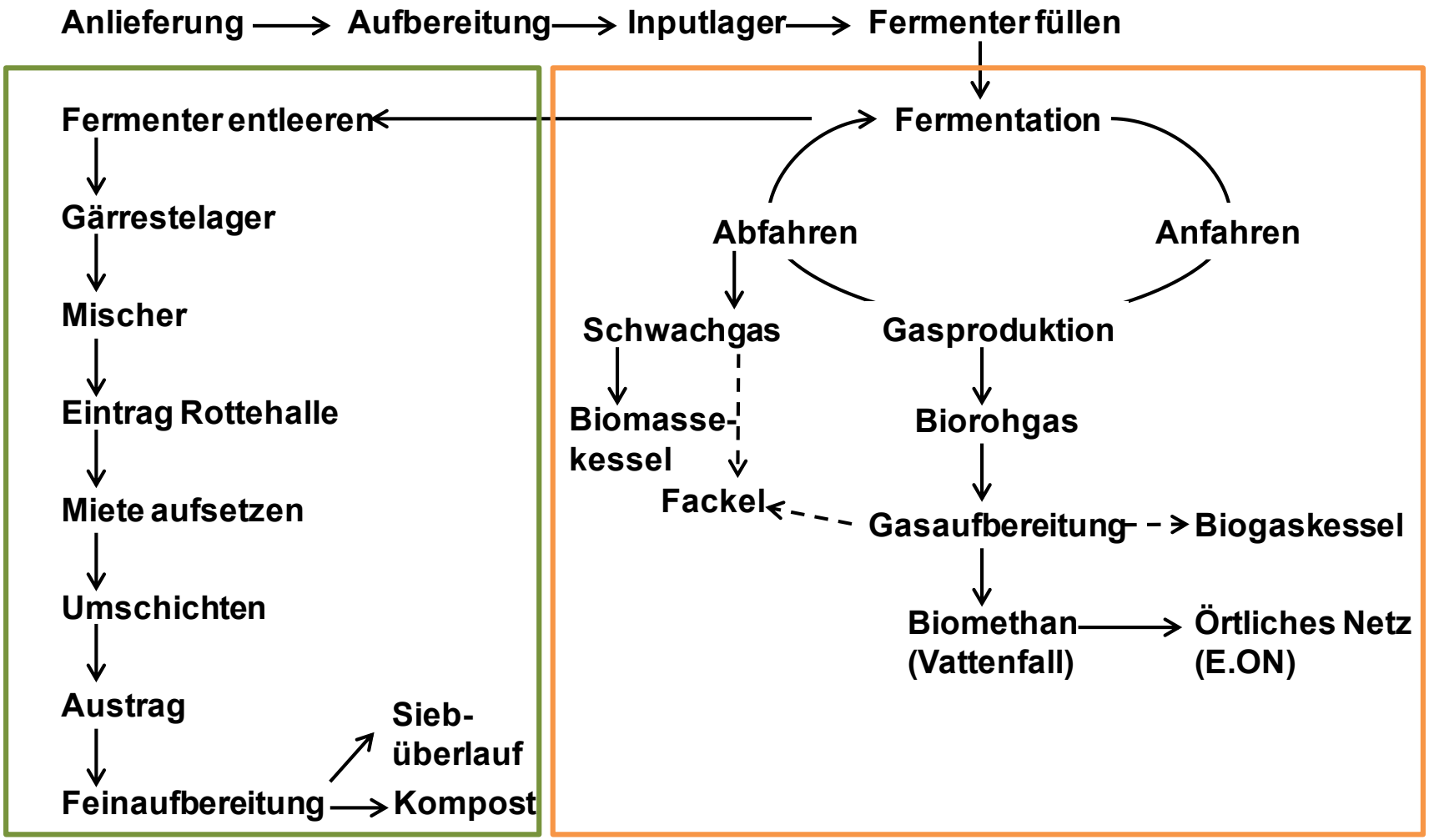
Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG

- **2008**
  Kauf Kompostwerk Bützberg (Bau 1994)
- **2009**
  Entscheidung für Erweiterung der Kompostierungsanlage
- **2009 bis 2011**
  Planung, Genehmigung und Bau BKW Bützberg
- **1. Dezember 2011**
  Offizielle Inbetriebnahme mit 1. Bürgermeister Olaf Scholz
- **2011 bis 2012**
  Probebetrieb
- **2012**
  Dauerbetrieb

Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG



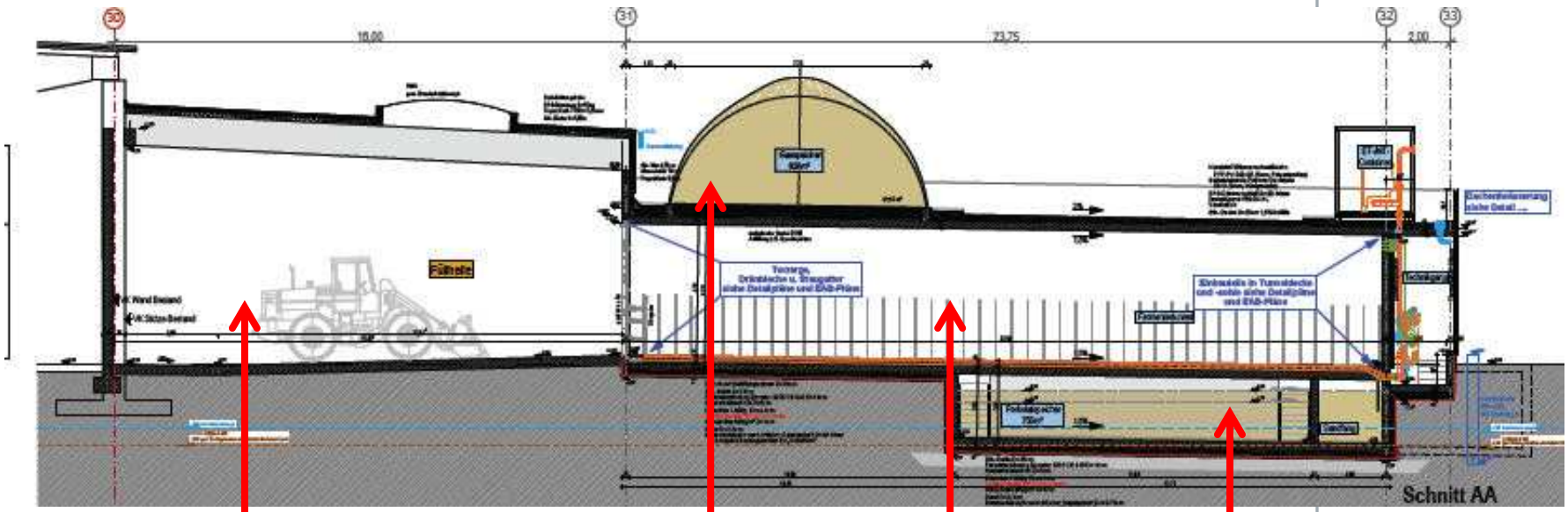
2. Kompostierung

1. Trockenfermentation

2. Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG

- Querschnitt durch Fermentationsbereich



Logistikhalle

Gasspeicher

Fermenter

Perkolat-
behälter

2. Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG

- Bioabfallannahme in Anlieferhalle
- Aufbereitung: Sieben, sortieren, zerkleinern (< 80 mm)

2. Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG

- 21 Fermenter (24 m x 5 m x 4,5 m)
- Fermentationsdauer 21 Tage bei 38° C
- 3 Gasspeicher mit je 950 m³
- Gasaufbereitung (Vattenfall), Netzeinspeisung (E.On)

2. Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG

- Kompostierung
- Lagerung Kompost im teilweise überdachten Lager
- Kompostvermarktung

GÜTEZEICHEN KOMPOST
RAL

2. Blockheizkraftwerk Bützberg

STADTREINIGUNG HAMBURG

- **Input Bio-und Grünbfall 70.000 Mg/a**

- Biogasproduktionsrate 350 - 700 m³ Biogas/h
- Biomethan nach Aufbereitung 2,5 - 2,8 Mio. m³/a
  - Energieinhalt Biomethan ca.10 kWh/m³ => 25 Mio. kWh/a
- Kompost ca. 35.000 Mg/a

- Strukturmaterialüberschuss ca. 5.000 Mg/a
  - Brennstoff zu Biomasseheizkraftwerken
- Output Störstoffe: max. 3.500 Mg/a

3. Biomassenutzung in Hamburg, Biogasanlage Stellinger Moor

STADTREINIGUNG HAMBURG

STADTREINIGUNG HAMBURG

3. Standort Biowerk

3. Abfälle für die Biogasanlage Stellinger Moor

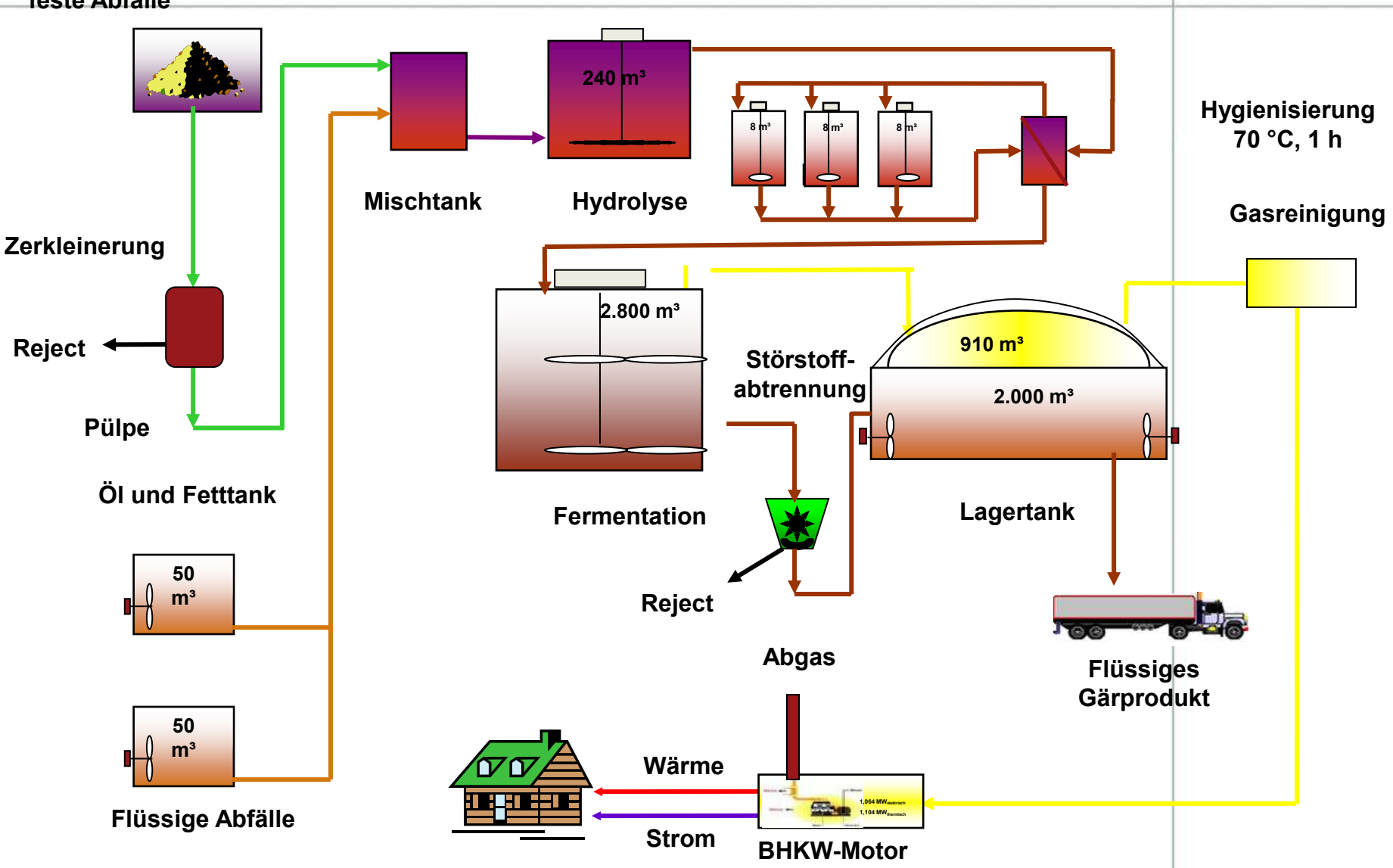
STADTREINIGUNG HAMBURG

Speiseabfälle

Verpackte Lebensmittel

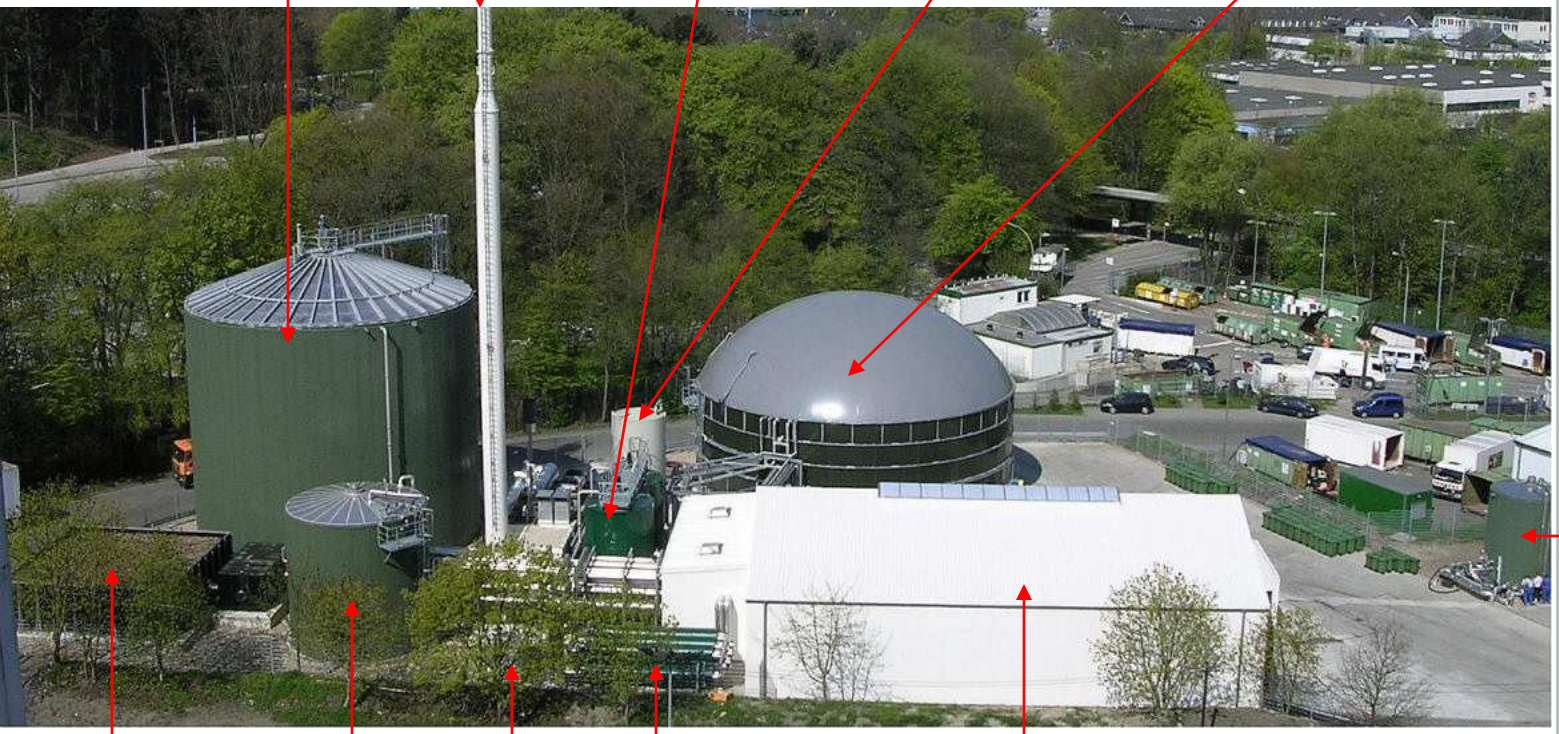
3. Biogasanlage: Vereinfachtes Fließbild

STADTREINIGUNG HAMBURG



3. Außenansicht der Biogasanlage

STADTREINIGUNG HAMBURG



3. Biogasanlage: Organische Pülpe

STADTREINIGUNG HAMBURG

3. Biogasanlage: Verpackungsreste

STADTREINIGUNG HAMBURG

3. Fermentation

STADTREINIGUNG HAMBURG

3. Energieerzeugung

STADTREINIGUNG HAMBURG

- Gasproduktionsrate ca. 330 m³/h
- Energieinhalt Biogas ca. 6,5 kWh/m³
- MWM Deutz
  12 Zylinder V-Motor
- 1.021 kW elektrische Leistung
- 1.070 kW thermische Leistung
- Gesamtwirkungsgrad 82,6 %
- 6,7 Mio kWh/a Strom
- 7,0 Mio kWh/a Wärme

3. Standort und Wärmeverteilung

STADTREINIGUNG HAMBURG

3. Biogasanlage: Betriebserfahrungen

STADTREINIGUNG HAMBURG

- Mechanische Aufbereitung
  - Störstoffe im Abfall
  - Abfallzerkleinerung
  - Abfalltrennung
- Anlagentechnik
  - Behälter
  - Pumpen
  - Gasanalyse
- Biologie und Energieerzeugung
  - Gasquantität und Gasqualität
  - Gasreinigung
  - Motorenanlage

3. Wirtschaftliche Eckdaten

STADTREINIGUNG HAMBURG

- Investitionskosten ca. 5 Mio. EUR (Brutto)
- Erlöse
  - Abfallbehandlungskosten in BGA << Verbrennungspreise in MVA
  - Energielieferungserlöse
    - Strom nach EEG und KWKG ca. 11,5 Ct/kWh
    - Wärme ca. 1 Ct/kWh
- Kosten
  - Betriebsmittel (Wasser, Energie, Chemikalien)
  - Reststoffentsorgung (Gärrest, Störstoffe und Verpackungen)
  - Instandhaltungskosten (BHKW und Maschinentechnik) (ca. 2,5 %)
  - Personal (4 Mitarbeiter)
  - Flächenmiete
  - Kapitaldienst (Darlehenstilgung)
- Abschreibung
  - 15 Jahre für Bautechnik
  - 10 Jahre für Maschinentechnik (BHKW)
- Wirtschaftlichkeit
  - Mittelrückfluss nach ca. 10 Jahren

3. Anlageneckdaten

STADTREINIGUNG HAMBURG

- **Eingangstoffe**
  - überlagerte Lebensmittel 15.000 Mg/a
  - Frischwasser 3.450 Mg/a
  - Reststoffmix 2.000 Mg/a
  - Fette 2.850 Mg/a
  - Gesamtmenge Eingang 23.300 Mg/a
- **Ausgangsstoffe**
  - Gärrest 17.350 Mg/a
  - Biogas 3.350 Mg/a
  - Pressabfälle + Fe – Metalle 2.250 Mg/a
  - Gesamtmenge Ausgang 22.950 Mg/a
- **Energie**
  - Elektrische Energie 6,70 Mio kWh/a
  - Thermische Energie 7,00 Mio kWh/a

Vielen Dank für Ihre Aufmerksamkeit!

STADTREINIGUNG HAMBURG

- Hamburg grüßt Vilnius am 07.04.2014

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Entwicklungstendenzen in der Abwassertechnik

Referent: Hans Jürgen Welsch

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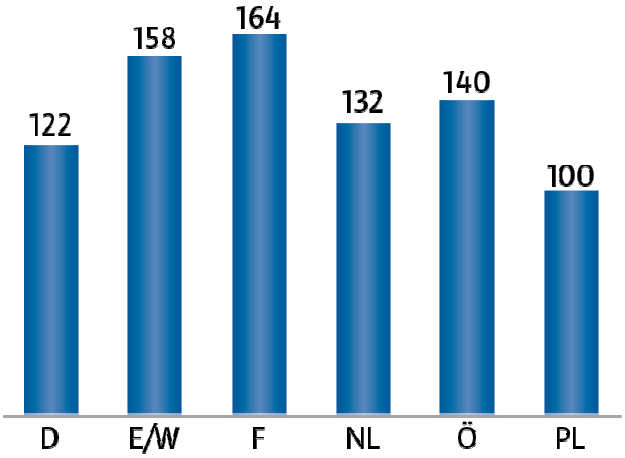

Trinkwasserverbrauch 2007 im europäischen Vergleich in L/(E d) [1]

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Häusliches Schmutzwasser

Der private Wasserverbrauch beträgt in Deutschland zur Zeit etwa 122 L/(E*d). Häusliches Schmutzwasser lässt sich i.A. gut biologisch reinigen. Übliche Zulaufwerte kommunaler Kläranlagen bei weitgehend häuslichem Schmutzwasser sind:

$BSB_5 \approx 300$ mg/L N ≈ 55 mg/L P ≈ 9 mg/L

⇒ BSB_5 : N : P ≈ 100 : 18 : 3

Günstig für die biolog. Reinigung wäre ein BSB_5 : N : P ≈ 100 : 5 : 1

⇒ N und P liegen im Überschuss vor.

Anmerkung:

Der BSB_5 beschreibt wie viel Sauerstoff Mikroorganismen beim Abbau organischer Stoffe in einer Wasserprobe innerhalb von 5 d verbrauchen.

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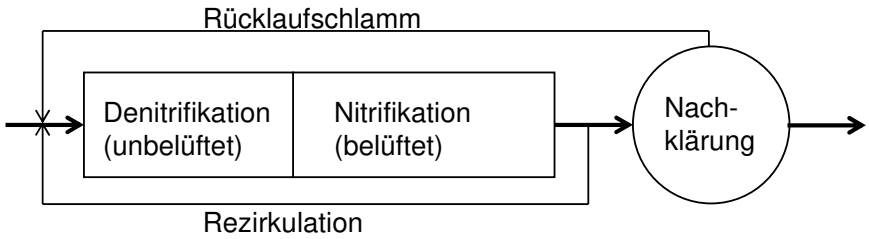

Abb.: Mögliches Schema einer Stickstoffelimination des Abwassers

Nachteile:

- ca. 19.000 m^3 Beckenvolumen für die Biologie notwendig (bei 100.000 E)
- organische Stoffe werden für die Denitrifikation verbraucht und stehen nicht mehr für die Biogasproduktion (Methan CH_4) zur Verfügung
- pro 1 m^3 ankommendes Abwasser werden insgesamt ca. 3 m^3 Rezirkulat und Rücklaufschlamm zurückgepumpt
- 1 g NH_4^+ ≈ 3,55 g O_2

⇒ großer Energieaufwand erforderlich ⇒ hohe Kosten

In Deutschland gelangen 12 – 54 kg Kohlenstoffdioxid CO_2 pro Einwohner und Jahr als Folge der Abwasserreinigung in die Atmosphäre

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Nitrifikation/Denitrifikation

$NH_4^+ \rightarrow NO_2^- \rightarrow NO_3^- \longrightarrow N_2$

autotroph — heterotroph — CSB/N ≈ 5,5

aerob — anoxisch

Nitritation/Denitration

$NH_4^+ \longrightarrow NO_2^- \longrightarrow N_2$

autotroph — heterotroph — CSB/N ≈ 3,6

aerob — anoxisch

Deammonifikation

$NH_4^+ \longrightarrow NO_2^- + NH_4^+ \longrightarrow N_2$

autotroph — autotroph — CSB/N ≈ 0

aerob — anoxisch

Abb.: Verfahren der Stickstoffeliminierung

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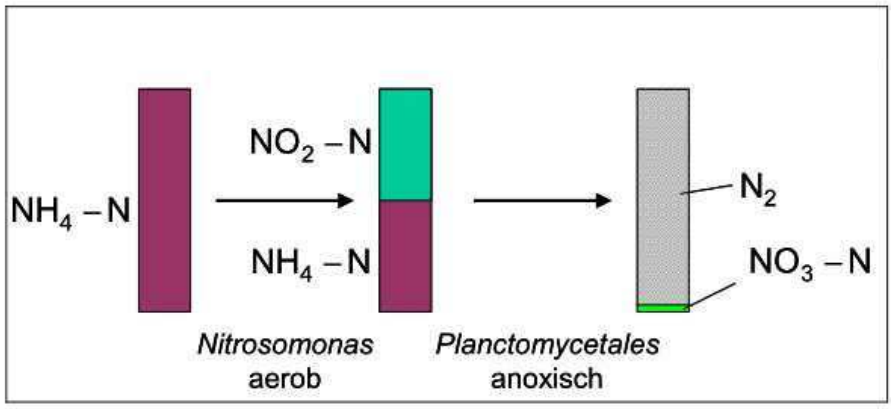

Abb.: Deammonifikation als autotropher Prozess in zwei Schritten

Um eine möglichst vollständige Ammoniumelimination durch Deammonifikation zu erreichen, muss zunächst im ersten Schritt etwa die Hälfte der Ammoniumfracht zu Nitrit oxidiert werden. Im zweiten Schritt wird unter anoxischen Bedingungen das gebildete Nitrit mit einem Großteil des Ammoniums zu N_2 umgesetzt. Dabei wird eine geringe Menge (ca. 11% der zugeführten Ammoniumfracht) an Nitrat gebildet.

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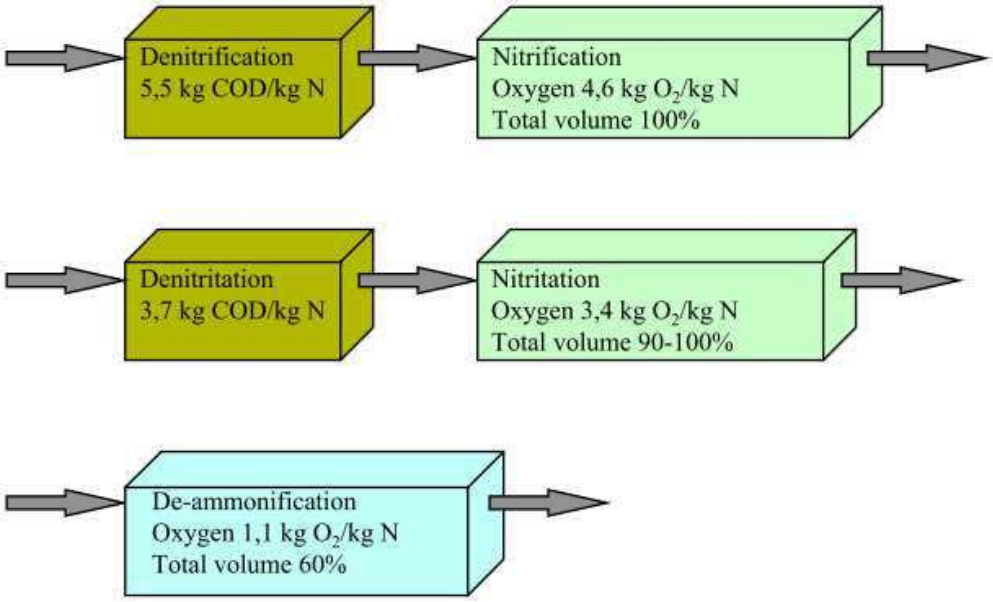

Abb.: Vergleich der biologischen Prozesse zur Stickstoffentfernung [4)]
(engl. COD = CSB)

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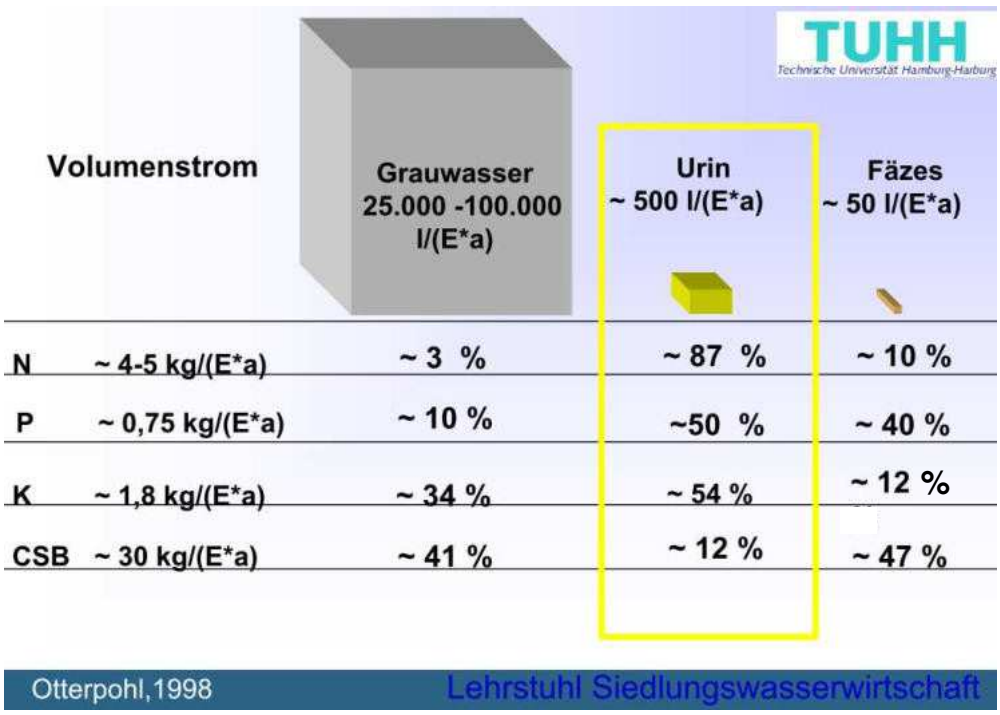

Volumenstrom		Grauwasser 25.000 -100.000 l/(E*a)	Urin ~ 500 l/(E*a)	Fäzes ~ 50 l/(E*a)
N	~ 4-5 kg/(E*a)	~ 3 %	~ 87 %	~ 10 %
P	~ 0,75 kg/(E*a)	~ 10 %	~50 %	~ 40 %
K	~ 1,8 kg/(E*a)	~ 34 %	~ 54 %	~ 12 %
CSB	~ 30 kg/(E*a)	~ 41 %	~ 12 %	~ 47 %

Hinweis:

Grauwasser ist häusliches Abwasser ohne Fäkalien und ohne Urin

CSB chemischer Sauerstoffbedarf; gibt an, wie viel Sauerstoff notwendig ist um die organischen Stoffe in einer Wasserprobe zu CO_2 und H_2O zu oxidieren

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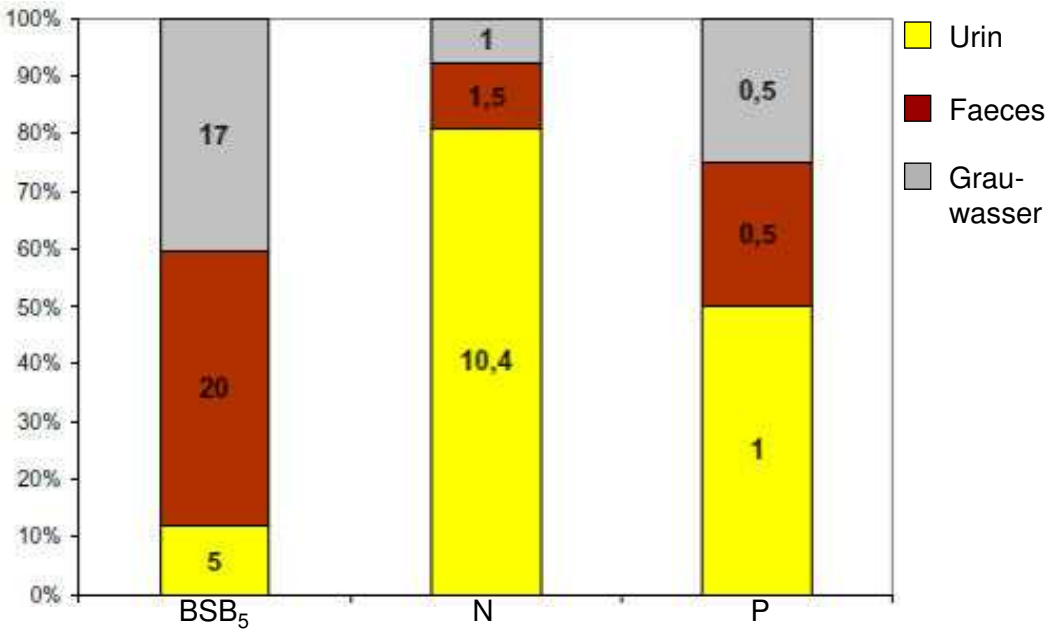

Abb.: Einwohnerspezifische BSB_5-, N- und P-Frachten in den verschiedenen Teilströmen [g/(E*d)] (DWA 2009)

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Abb.: wasserfreies Urinal (Urinova)

Abb.: Separationstoilette (Roediger) [2]

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Vorteile der Trennung von Abwasser

- Das Volumen der biologischen Reinigungsstufe kann auf 1/3 verringert werden
- Die aufwändige Steuerung für die Stickstoffeliminierung entfällt
- Schadstoffe (z.B. Medikamente) befinden sich vor allem im Urin- und Fäkalabwasser, in dem kleineren Volumen ist zudem ein Abbau dieser Stoffe besser möglich
- Der notwendige Sauerstoffeintrag reduziert sich um ca. 40 %
- Sehr viel weniger Energie für das Rückpumpen von Abwasser notwendig
  $\Rightarrow$ weniger Energiekosten und weniger CO_2 wird an die Umwelt abgegeben
- Stickstoff und Phosphor können z.B. als Magnesiumammoniumphosphat ($MgNH_4PO_4$) ausgefällt und als Dünger verkauft werden
- Organische Stoffe können in stärkerem Umfang für die Biogasproduktion genutzt werden. Statt 11 W/(E*d) zu verbrauchen, können 2 W/(E*d) an Primärenergie gewonnen werden [7)]
- geringerer Klärschlammanfall
- bessere Klärschlammqualität (mehr landwirtschaftliche Nutzung möglich)

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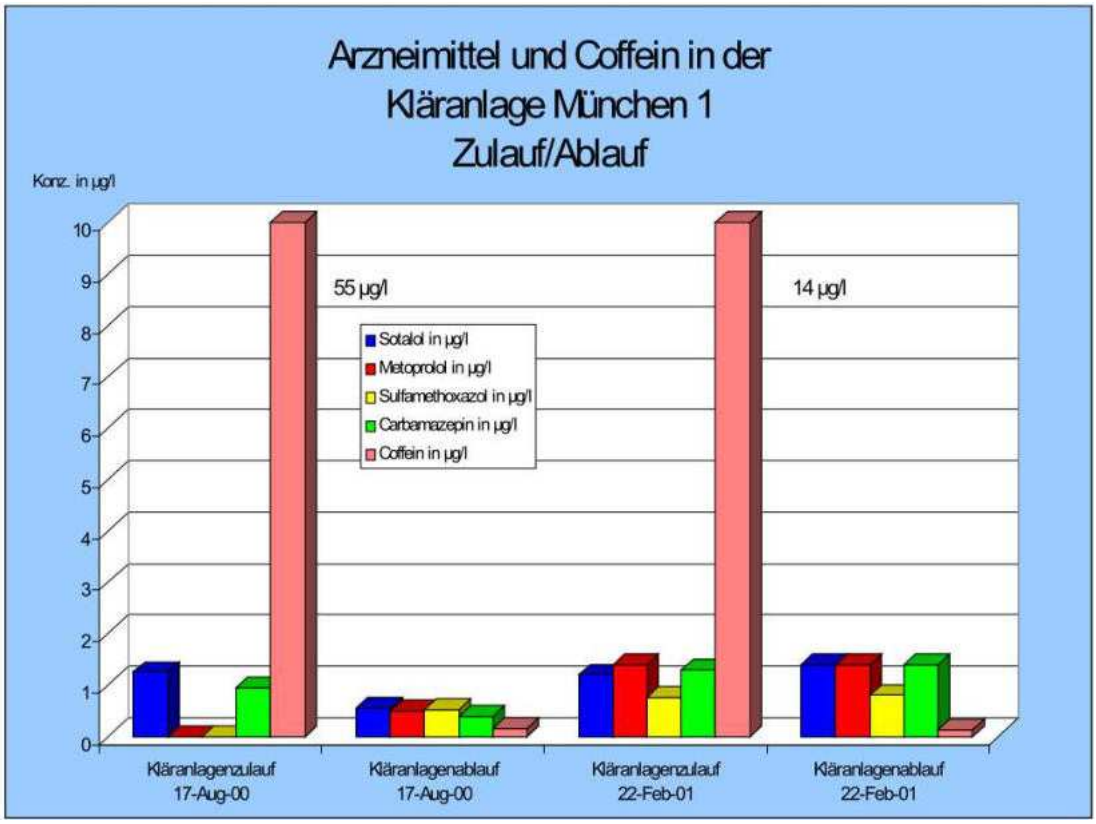
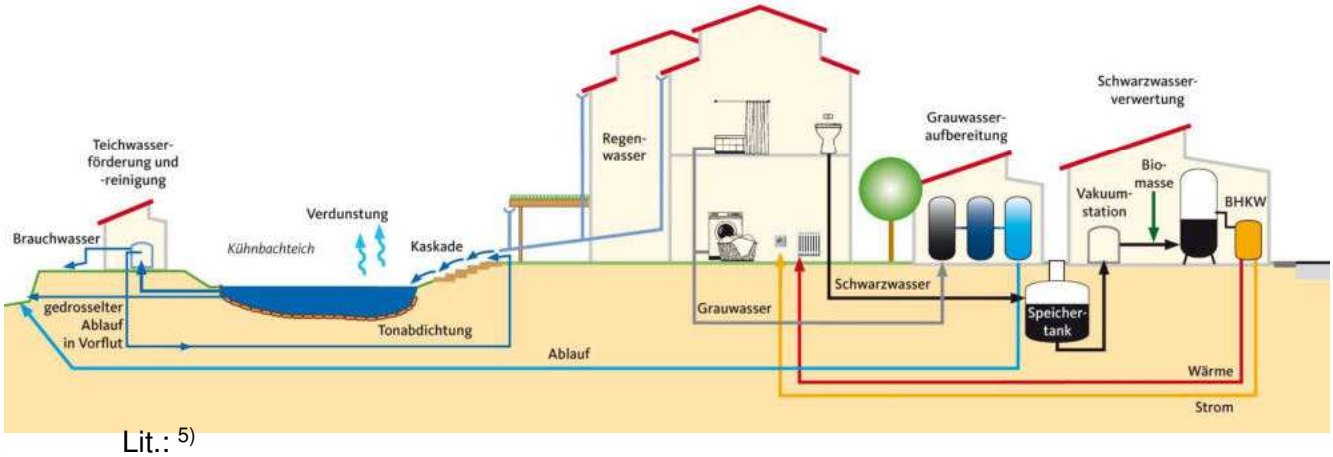


Abb.: Ausgewählte Arzneimittelwirkstoffe im Kläranlagenzu- und -ablauf [6)]

HAMBURG WATER Cycle – Teil Wasser

- Getrennte Erfassung der Abwasserteilströme Schwarz- und Grauwasser
- Erfassung und Transport des Schwarzwassers mit Vakuumtechnik
- Schwarzwasser mit Schmutz- und Wertstoffen bleibt konzentriert
- Separate Schwarzwassererfassung ermöglicht eine Vergärung mit anderer Biomasse und damit eine regenerative Energiegewinnung vor Ort



Lit.: [5)]

Literatur:

1) Branchenbild der deutschen Wasserwirtschaft 2011

2) Jörg Longdong Sicherheiten und Risiken der Siedlungswasserwirtschaft

3) Abschlussbericht zum Forschungs- und Entwicklungsvorhaben: „Großtechnisches Untersuchungsvorhaben zur Deammonifikation von Stickstoff in hochbelasteten Teilströmen mit Hilfe eines Schwebebettverfahrens“

4) Johansson, Nyberg, Beier, Hippen, Seyfried und Rosenwinkel
Cost efficient sludge liquor treatment

5) Hamburg Wasser Niels-Peter Bertram Vortrag zum Wohnprojekt Jenfelder Au 2011

6) Bayerisches Landesamt für Wasserwirtschaft Arzneimittel in der Umwelt 2004

7) Horn u.a. Schlussbericht des Forschungsvorhabens „Kläranlage der Zukunft“ 2009

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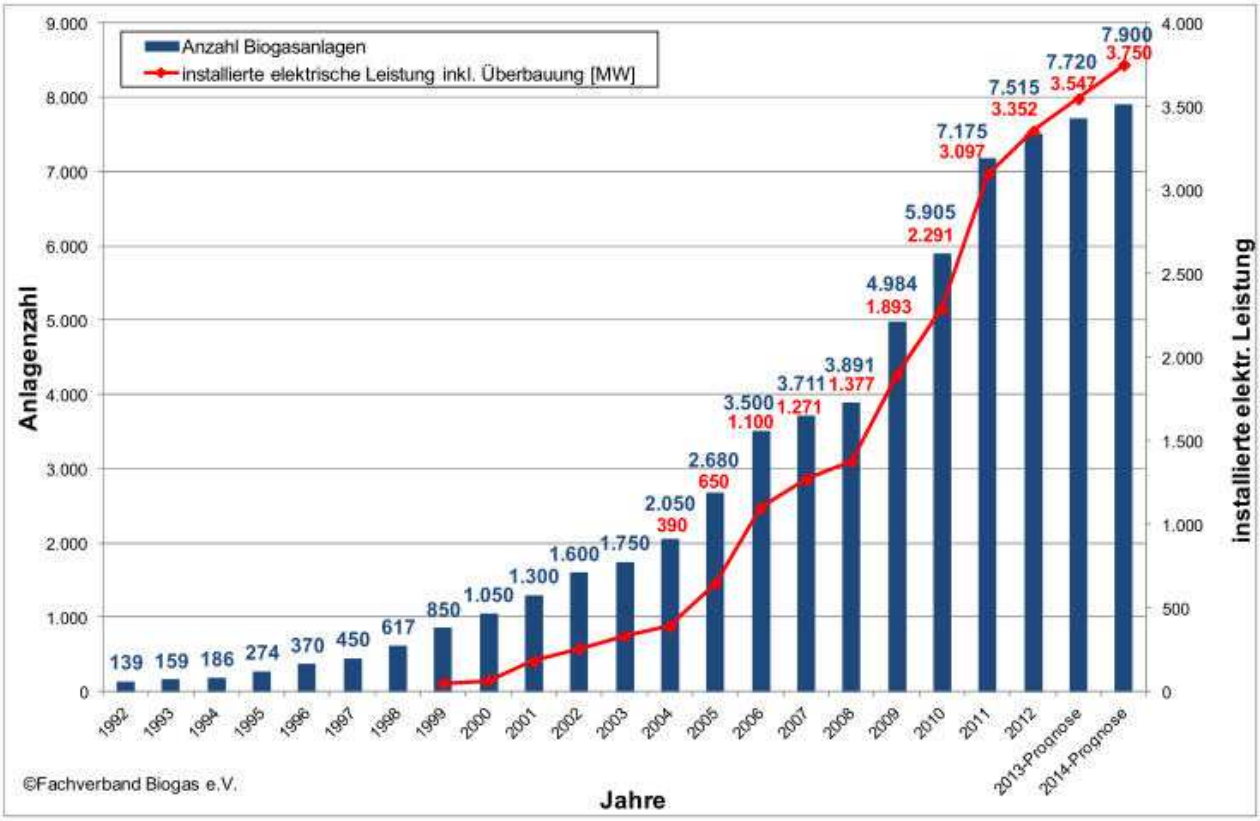
Anaerobe Trockenfermentation (ATF)

Dozent: Hans Jürgen Welsch



Handwerkskammer Hamburg
ZEWU – Zentrum für Energie-, Wasser- und Umwelttechnik

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Aerobe Behandlung (Kompostierung)

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O \quad \Delta G \approx -2880\ kJ$$

Anaerobe Behandlung (Faulung):

$$C_6H_{12}O_6 \rightarrow 3CO_2 + 3CH_4 \quad \Delta G \approx -132\ kJ$$

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Eiweiß | Kohlenhydrate | Fette

↓ ***Hydrolyse***

Aminosäuren | Zucker | Fettsäuren

↓ ***Säurebildungsphase***

Essigsäure (Acetat) H_2 CO_2	organische Säuren Alkohole, Aldehyde

↓ ***Essigsäurebildungsphase***

Essigsäure (Acetat) H_2 CO_2

↓ ***Methanbildungsphase***

Methan (ca. 60 - 70 % des Faulgases)
CO_2 (ca. 30 - 40 % des Faulgases)

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Anaerobe Behandlungsverfahren

Suspension/Lösung

Nassvergärung

TS < 15 %

- i.d.R. kontinuierlicher Betrieb
- für flüssige und feste Stoffe geeignet
- gute Stoff- und Energie-verteilung

Feststoffverfahren

Trockenfermentation

TS ≈ 20-40 %

- (dis)kontinuierlicher Betrieb
- für stapelbare, feste Stoffe geeignet
- keine Durchmischung
- hohe Raumbelastung
- kleinere Volumina der Reaktoren

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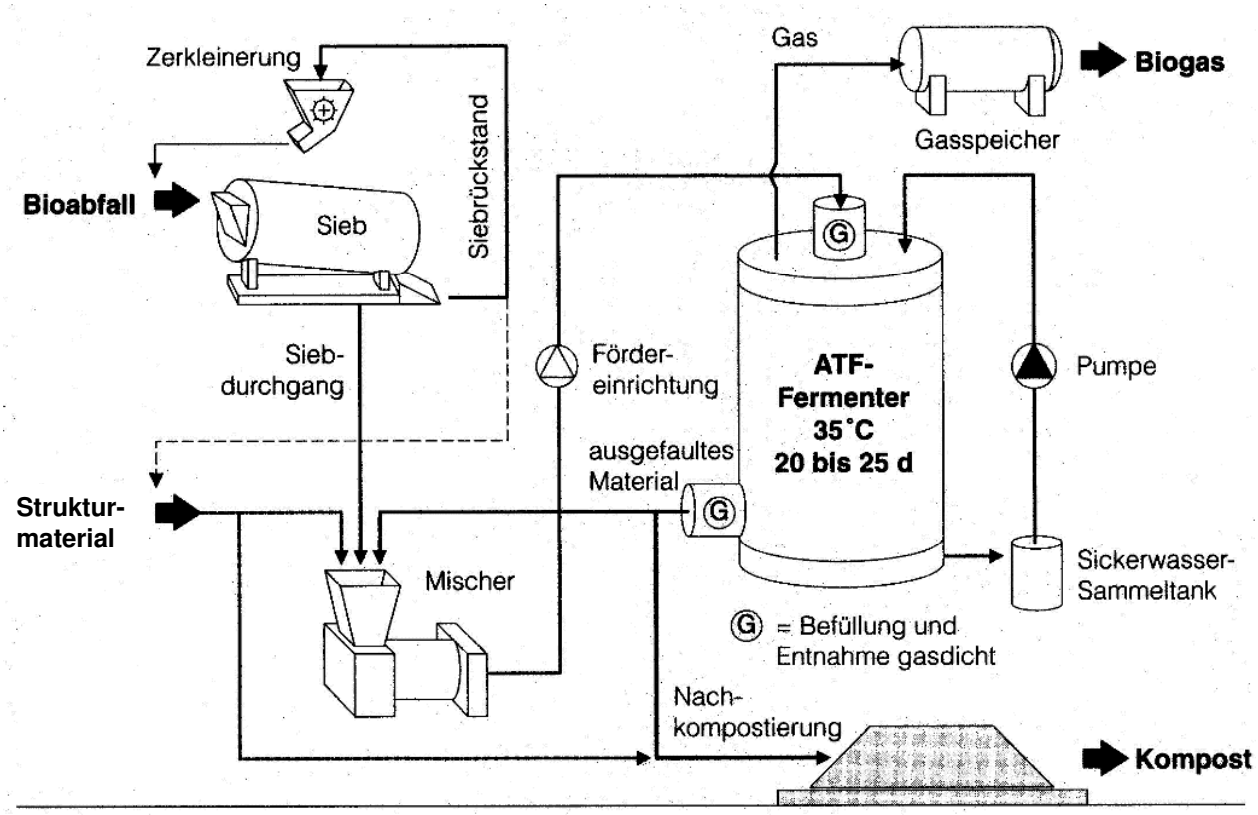
Vorteile der anaeroben Trockenfermentation:

- hohe Raumbelastung
- kleine Reaktorvolumina möglich
- wenig Abwasseranfall
- wenig störanfällig (Plastik, Sand)
- keine Schwimmschlamm- und Schaumbildung im Reaktor
- geringe Lagervolumina für den Gärrest
- geringerer Wärmebedarf
- nur geringe Vorzerkleinerung nötig
- Störanfällige Einbring- und Rührtechniken entfallen, der Energiebedarf der Anlage ist vergleichsweise gering.

Nachteile der anaeroben Trockenfermentation:

- Anwendung auf feste Stoffe beschränkt
- weniger praktische Erfahrungen
- keine Durchmischung des Reaktorinhaltes
- schlechtere Wärmeverteilung im Substrat
- Ex-Schutz bei Entleerung notwendig



Quelle: Hamburg Gas Consult GmbH

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Foto: Werner Streich AgrEnviCon GmbH

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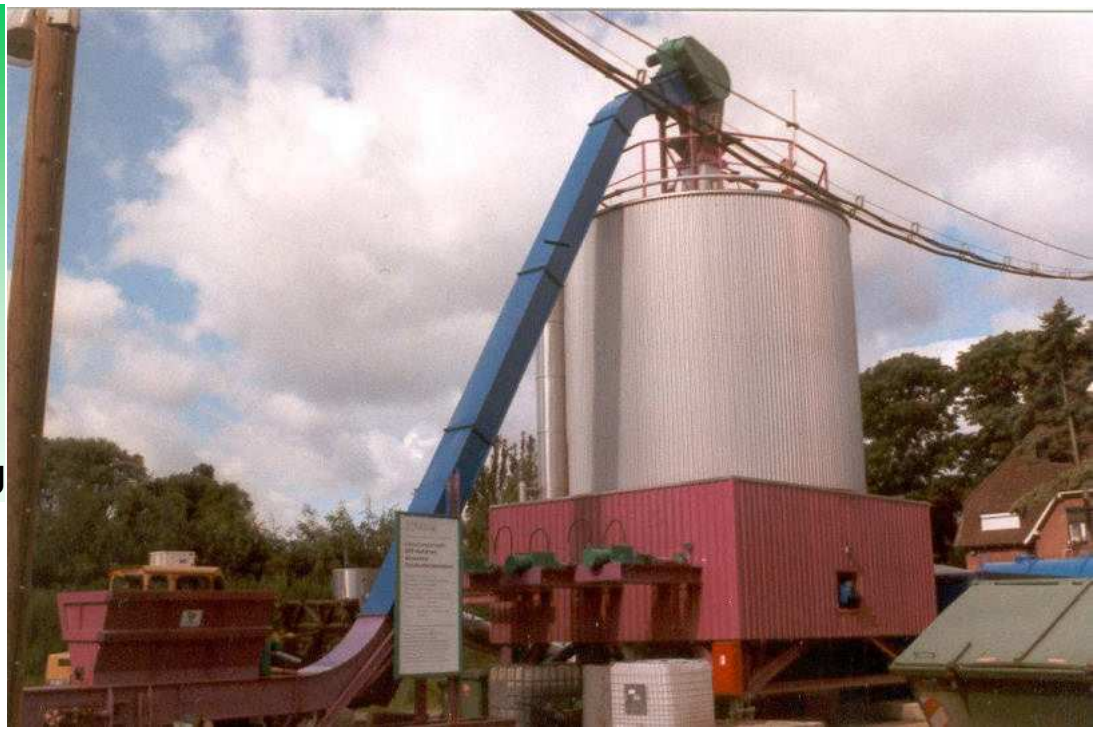

Foto: H.J. Welsch

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Tabelle 7-8: Praktisch erreichbare Biogasausbeuten und Methangehalte ausgewählter biogener Abfälle (Loll, 2001)

Abfallart	Biogasausbeute[1)] [l/kg oTR_{zu}]	CH_4 [Vol.-%]
Bioabfall	300– 400	60–70
Grünschnitt	500– 600	55–60
Marktabfall	550– 600	55–65
Fettabscheider	600–1000	70–75
Kartoffelschlempe	400– 700	60–65
Biertreber	500– 700	50–70
Obsttrester	500– 800	55–65
Rapsschrot	400– 900	65–70
Panseninhalt	400– 500	65–70
Speiseabfall	800–1000	60–65

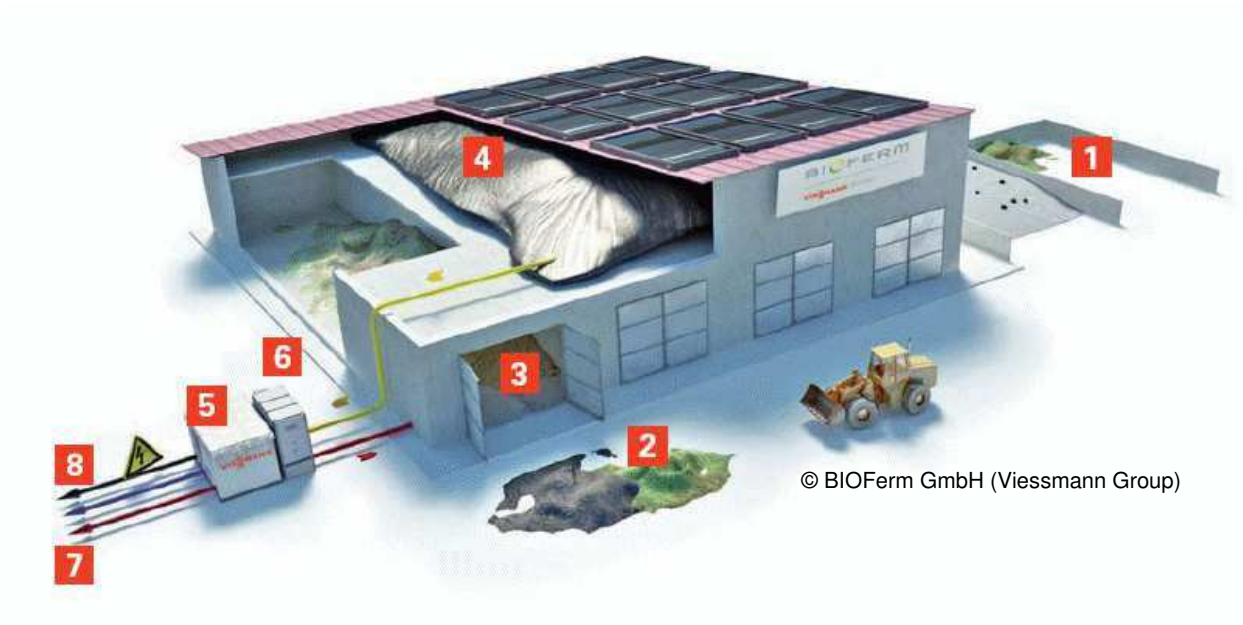

Abb.: BIOFerm-Anlage Tierpark München

1 Biomasse 2 Anmischplatz 3 Fermenter
4 Gasspeicher 5 Heiztechnik 6 Blockheizkraftwerk
7 Kälte- Wärmenutzung 8 Stromeinspeisung

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Abbildung: BIOFerm GmbH (Viessmann Group)

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Abbildung: BIOFerm GmbH (Viessmann Group)

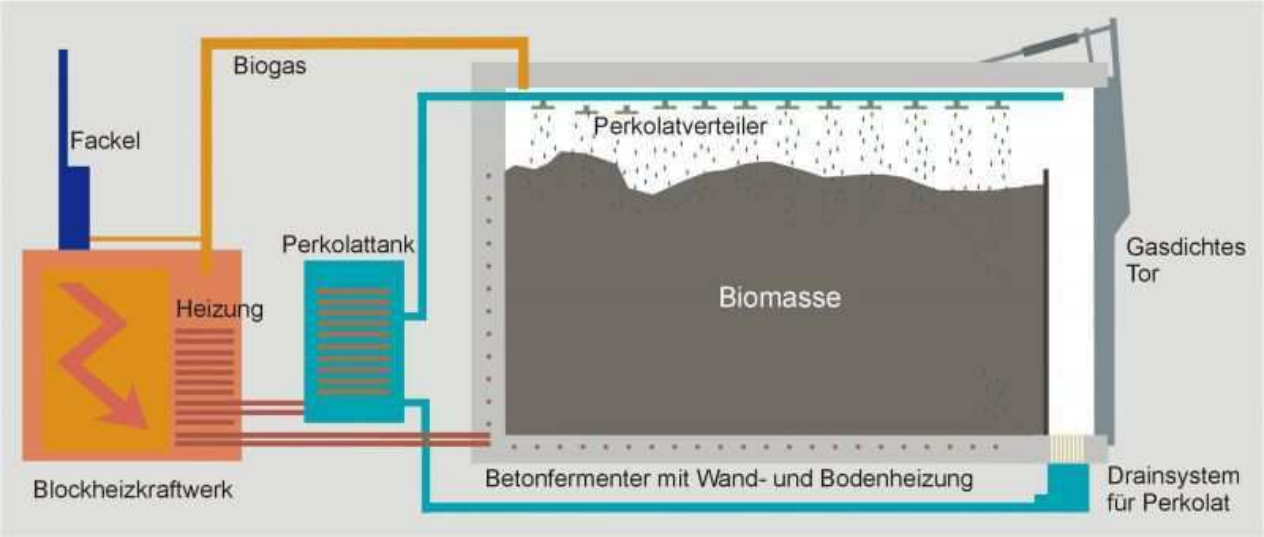


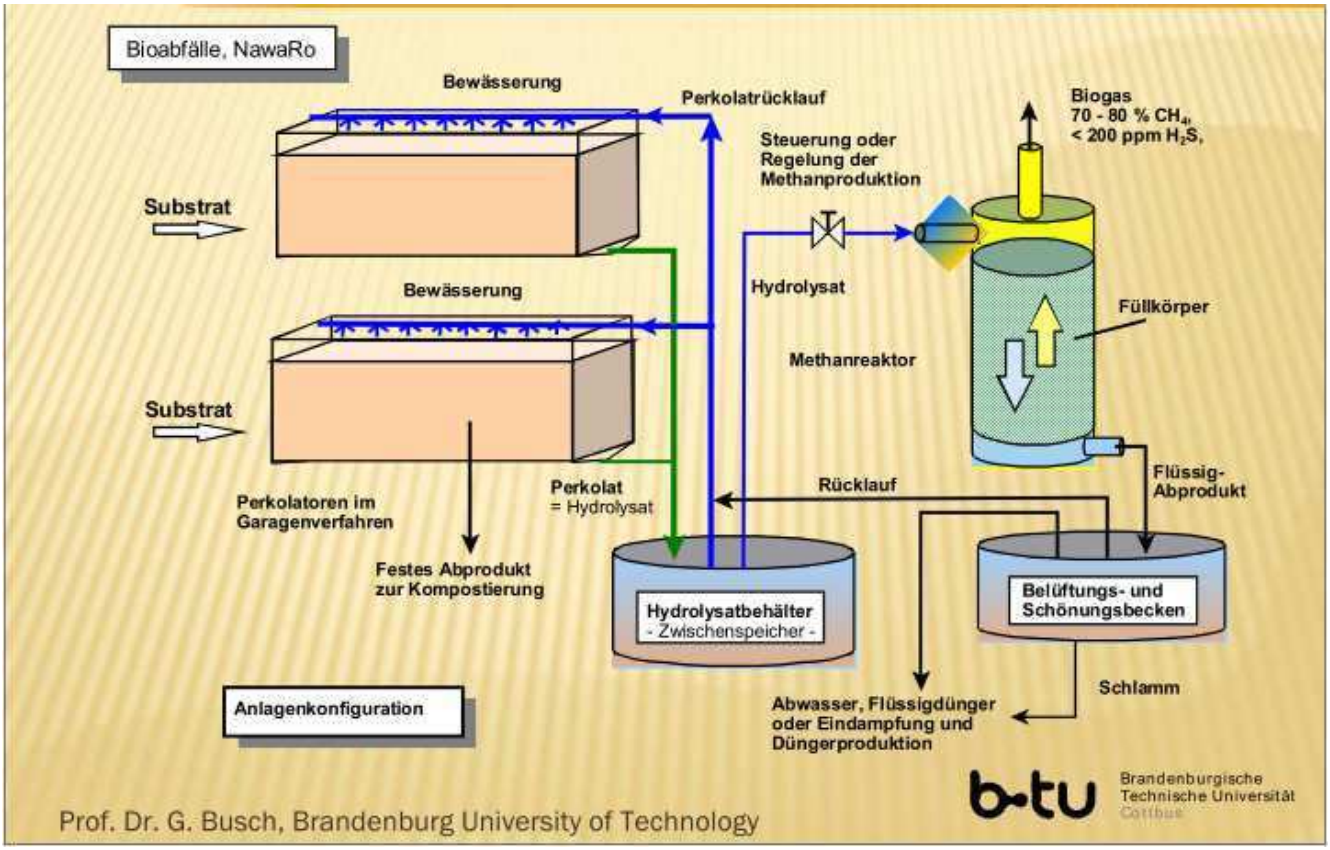
Abb: Schema des BEKON-Trockenfermentationsverfahrens

- Zu Beginn wird das Frischsubstrat mit bereits vergorenem Material vermischt
- Verweilzeit je nach Substrat ca. 4-8 Wochen
- Während des Vergärungsprozesses wird das Substrat ständig mit Perkolat (einer mit Methanbakterien angereicherten Lösung) besprüht,

Lit.: BEKON Energy Technologies GmbH & Co. KG

BEKON Biogasanlage München

Lit.: BEKON Energy Technologies GmbH & Co. KG



Fest-Flüssig-Fermentation: GICON-Verfahren

Lit.: G. Busch Substratspezifische Verfahrensanpassung bei der Biogasgewinnung aus Abfällen

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Systemvorteile der zweistufigen Biogastechnologie

- Durch die apparative Trennung von Hydrolyse und Methanisierung entfällt die strikte Wahrung des Gleichgewichts von Säurebildung und –verbrauch. Dadurch erhöht sich a priori die Stabilität des Gesamtprozesses.
- Das Hydrolysegas enthält einen hohen Anteil des insgesamt gebildeten Kohlenstoffdioxids. Dadurch reichert sich das Methan im Biogas an und kann Konzentrationen > 80 % erreichen. Dieses „Gas-Splitting“ erlaubt niedrigere Kosten für die Reinigung des Gases zur Netzeinspeisung.
- Die Biogasproduktion kann mit geringer Zeitverzögerung direkt durch die Zugabe an Hydrolysat bedarfsabhängig gesteuert werden.
- Nicht bioverfügbare Bestandteile des Substrats können bereits schon in der Hydrolyse ausgeschleust werden und belasten nicht den Methanreaktor.
- Durch die Zugabe von nahezu feststofffreiem Hydrolysat in die Methanisierung können dort Hochleistungssystem (z. b. Festbettreaktoren) mit hoher Gasproduktivität (> 10m³/(m³*d) und kurzen Verweilzeiten (<24 h) verwendet werden.

Lit.: G. Busch Substratspezifische Verfahrensanpassung bei der Biogasgewinnung aus Abfällen

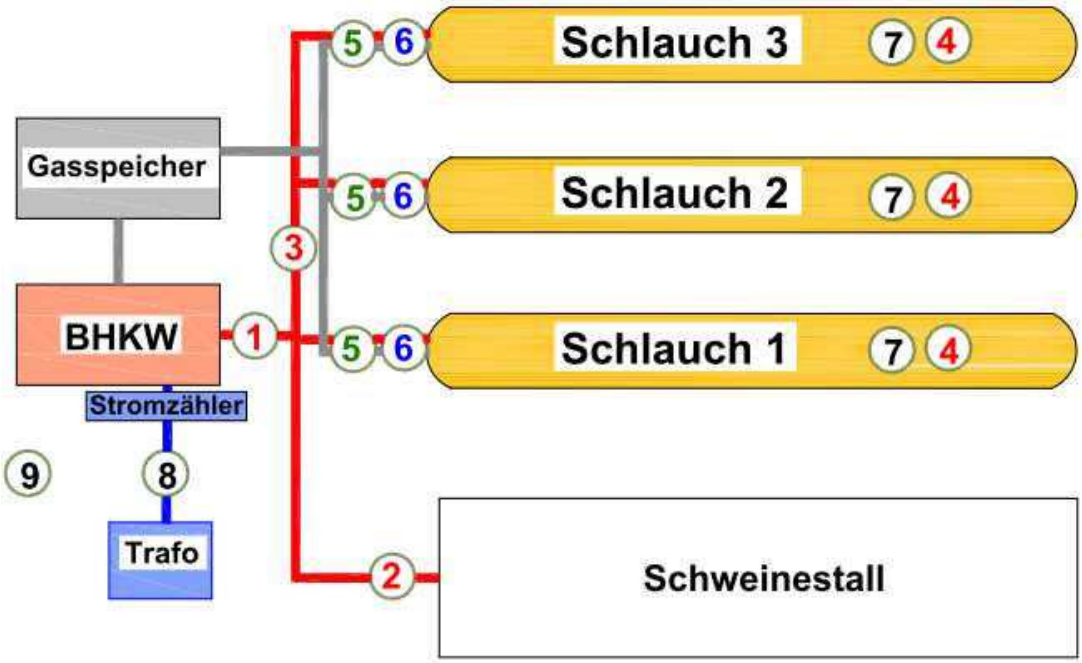

Abb.: Versuchsaufbau Trockenfermentationsanlage Köllitsch

Messpunkte:

1 Gesamtwärmeerzeugung
2 Wärmeverbrauch
3 Prozesswärme
4 Temperaturmessung im Substrat
5 Messung Temperatur, Druck, Biogasmenge, Methan
6 H_2S-Messung
7 Substratbeprobung vor und nach dem Einpressen
8 Ermittlung - Wirkungsgrad, Laufzeiten, Störungen
9 Außentemperatur

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Beschickung mit Frontlader und Silopresse

Lit.: Sächsische Landesanstalt für Landwirtschaft „Demonstration und Entwicklung des Verfahrens der Trockenfermentation im Siloschlauch zur Nutzung in der landwirtschaftlichen Praxis“

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Verlegen der Bodenheizung

Lit.: Sächsische Landesanstalt für Landwirtschaft „Demonstration und Entwicklung des Verfahrens der Trockenfermentation im Siloschlauch zur Nutzung in der landwirtschaftlichen Praxis“

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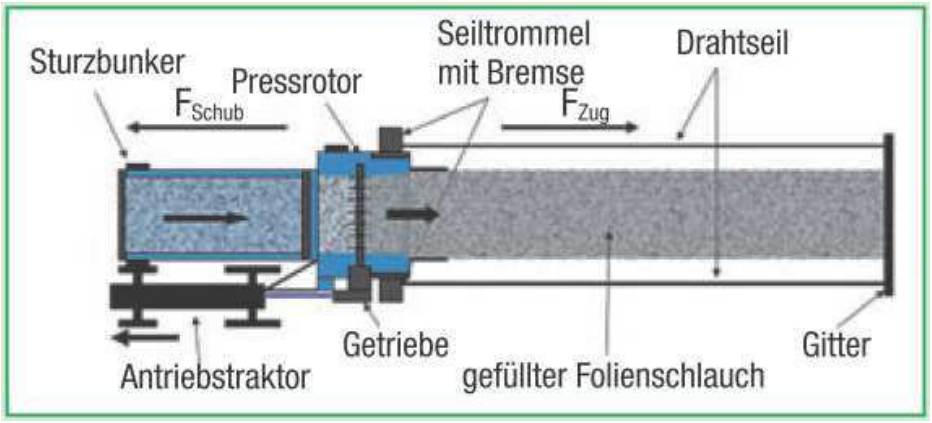
Der Verdichtungsrotor presst bei der klassischen Silopresse das Erntegut in den am hinteren Ende verschlossenen Schlauch gegen ein Gitter, das wiederum über Seiltrommeln mit der Maschine verbunden ist (Abbildung). Die kontinuierliche Zufuhr erhöht den Druck gegen das Gitter, dem durch Regulierung des Bremsdruckes über die Seiltrommeln entgegengewirkt wird – nach diesem Prinzip erfolgt die Steuerung der Verdichtung im Schlauch. Durch den im Schlauch entstehenden Druck werden Maschine und Traktor nach vorne gedrückt, während der gefüllte Schlauch liegen bleibt.



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Ende

Danke für ihre Aufmerksamkeit

REACH
für
nachgeschaltete Anwender

ZEWU

Dozent: Hans Jürgen Welsch

R Registrierung

E Evaluierung

A Autorisierung von

CH Chemikalien

⇒ **Erfassung, Bewertung und Zulassung von Chemikalien**

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REACH ist seit dem 1. Juni 2007 in der gesamten EU geltendes Recht.

Die Nichteinhaltung kann mit einem Bußgeld bis zu 50000 € oder Gefängnisstrafe bis zu 2 Jahren geahndet werden. [1)]

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Warum REACH?

Wir kennen ca. 40 Millionen Chemikalien und uns fehlen Daten wie diese Stoffe (zusammen)wirken.

In allen industrialisierten Ländern hat sich die Zahl der Allergiker in den vergangenen drei Jahrzehnten verdoppelt bis verdreifacht – Tendenz weiter steigend. [2)]

Wie groß der Einfluss der Umweltfaktoren ist, weiß niemand so genau. Derzeit sind mehr als 60.000 verschiedene Chemikalien im Alltagsleben des modernen Menschen zu finden, schätzt die US-Behörde "Environmental Protection Agency". Dazu kommen weitere 13.000, die in Kosmetika, Medikamenten, Pflanzenschutzmitteln, Lebensmitteln und so weiter enthalten sind. Inwiefern diese Vielfalt an Stoffen die Entstehung von Allergien begünstigt oder überhaupt beeinflusst, wird derzeit erforscht. Es ist aber ein schwieriges und sehr komplexes Unterfangen, da viele Schäden schleichend entstehen und sich oft nur schwer, falls überhaupt, auf ihre tatsächliche Ursache zurückführen lassen. [2)]

Um wirksamer helfen zu können, fehlen Daten. Mit REACH sollen Informationen gesammelt werden, um die Beschäftigten und die gesamte Bevölkerung besser schützen zu können.

2) http://www.stern.de/gesundheit/allergie/ueberblick/volkskrankheit-allergie-abwehr-in-not-585236.html

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Gesundheitsgefährdend

Krebserregende Stoffe in PC-Peripherie entdeckt

In Tastaturen, Mäusen und Headsets wurden bei einem Test krebserregende Stoffe gefunden. Rund ein Viertel aller getesteten Produkte sind betroffen.

Die Zeitschrift c't testete insgesamt 28 Technikprodukte auf enthaltene Schadstoffe. In einem Viertel davon fand sie erschreckenderweise den verbotenen, krebserregenden Stoff SCCP. Auch Peripherie mit Hautkontakt, wie Mäuse, Tastaturen und Headsets, waren vom Giftfund betroffen.

Betroffen waren unter anderem drei von acht getesteten Mäusen, zwei von sieben Tastaturen und drei von vier Headsets, in denen der krebserregende Stoff PAK (Polycyclischer aromatischer Kohlenwasserstoff). Teilweise wurden **Konzentrationen bis zu 534 mg pro Kilogramm PAK** entdeckt. Das überschreitet den PAK-Grenzwert, der leider erst 2015 eingehalten werden muss, enorm. Erschreckend auch die Entdeckung des eigentlich bereits verbotenen SCCP (ein kurzkettiges Chlorparaffin) in zwei Tastaturen, zwei Mäusen, zwei USB-Kabeln und allen vier Headsets.

Lit.: http://www.pcwelt.de/news/Krebserregende_Stoffe_in_PC-Peripherie_entdeckt-Gesundheitsgefaehrdend-8517396.html?redirect=1

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Auf Initiative Deutschlands – EU plant neue Grenzwerte für PAK

Ob in Mousepads, Spielzeugen oder Badeschuhen - unabhängige Labore weisen in Verbraucherprodukten immer wieder Chemikalien nach, die zur Stoffgruppe der PAK gehören. Oft in Konzentrationen, die zum Beispiel für Autoreifen nicht zulässig sind. "Viele der nachgewiesenen PAK sind krebserregend, erbgut-verändernd oder fortpflanzungsgefährdend", so Flasbarth. Doch nicht nur das, sie werden in der Umwelt kaum abgebaut und können sich in Organismen anreichern. Das Umweltbundesamt empfiehlt daher, die Umwelt-einträge von Stoffen mit einer derartigen Kombination von Eigenschaften - Persistenz, Bioakkumulationspotenzial und Toxizität - durch gesetzliche Regelungen soweit wie möglich zu minimieren.

Angestoßen durch eine deutsche Initiative hat die EU-Kommission nun einen Vorschlag zur Verringerung von PAK vorgelegt - auf Grundlage der Chemikalienverordnung REACH. Dieser sieht für Verbraucherprodukte einheitliche Grenzwerte vor. Danach wären Produkte, die krebserregende PAK in einer Konzentration von mehr als 1 mg/kg enthalten, künftig verboten.

Presseinformation Nr. 44/2012 des (deutschen) Umweltbundesamtes

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EU: PAK in Verbraucherprodukten ab 2015 strenger geregelt

Kunststoff- und Gummiteile in Verbraucherprodukten dürfen in der EU ab Dezember 2015 nur noch minimale Spuren krebserregender Polyzyklischer Aromatischer Kohlenwasserstoffe (PAK) enthalten. Die neuen, strengeren Grenzwerte gelten für eine Reihe von Alltagsprodukten wie Spielzeug- und Sportartikel, Werkzeug, Haushaltsgeräte, Bekleidung und Uhren. [1]

Info:

Durch REACH sind seit 2007 mehr als 150 Stoffe reglementiert worden!

[1] http://www.umweltbundesamt.at/aktuell/presse/lastnews/news2014/news_140110/

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Frage 1

Muss ich REACH in meinem Betrieb umsetzen?

- Verwende ich im Betrieb Chemikalien, Metalle, Kunststoffe oder Naturstoffe?
- Verwende ich im Betrieb Lacke, Klebstoffe, Reinigungsmittel, Kosmetika?

Wenn Sie eine dieser beiden Fragen mit Ja beantworten konnten, dann sind Sie ein nachgeschalteter Anwender und Sie müssen REACH im Betrieb umsetzen.

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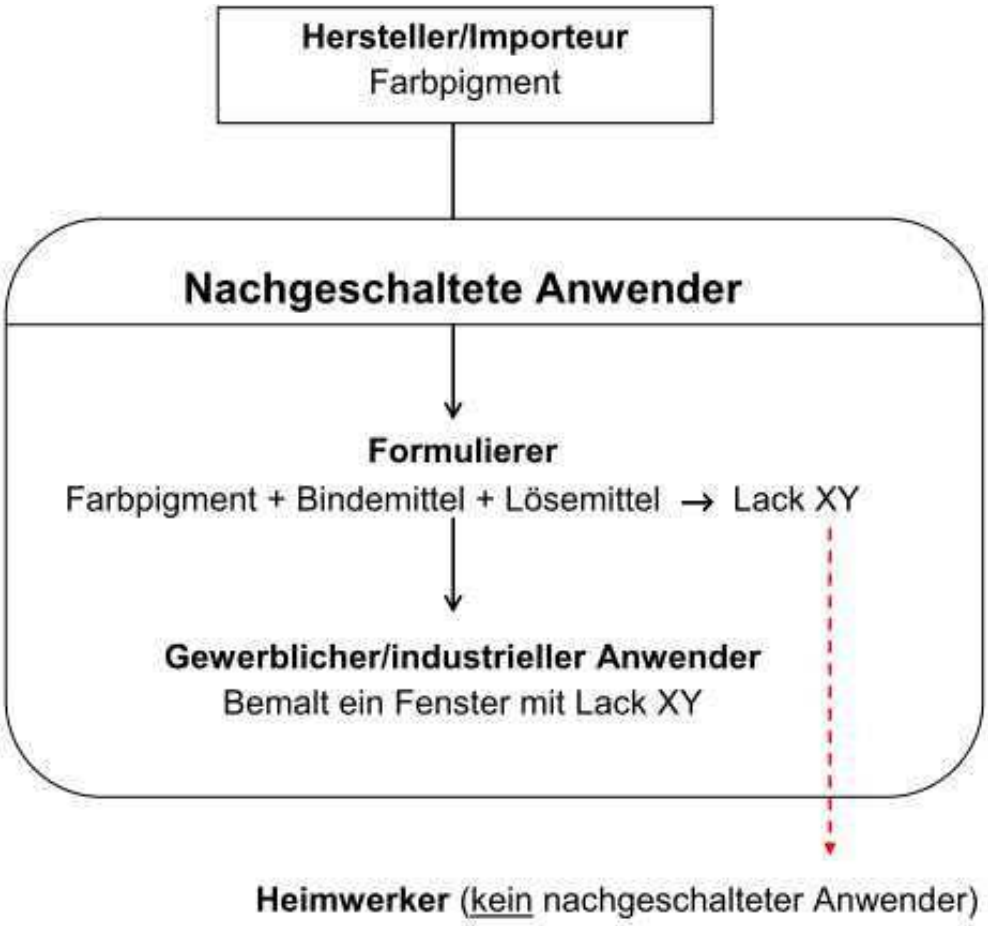

Grundsätzlich werden folgende Gruppen in REACH unterschieden:

- Hersteller von Stoffen (Chemikalien)
- Importeure (EU gilt als „Inland“)
- Händler
- nachgeschaltete Anwender (fast alle Handwerksbetriebe)

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Hinweis:

Nachgeschaltete Anwender sind (juristische) Personen, die Stoffe beruflich verwenden.

Frage 2

Was sind Chemikalien im Sinne von REACH?

- Stoffe
- Zubereitungen (Stoffgemische)
- Stoffe in Erzeugnissen/Produkten

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REACH regelt den Umgang mit Chemikalien als solchen und zusätzlich in Zubereitungen und Erzeugnissen. Alle Verpflichtungen beziehen sich daher auf die einzelnen Stoffe, nicht auf die fertigen (oder halbfertigen) Produkte.

REACH umfasst alle chemischen Stoffe, gleichgültig ob sie gefährliche Eigenschaften haben oder nicht.

Für einige Bereiche gilt REACH nicht z.B.:

Abfall, Arzneimittel, Lebensmittel, radioaktive Stoffe,

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Frage 3

Was soll mit REACH erreicht werden?

REACH soll die sichere Verwendung von Stoffen fördern. Deshalb ist ein ständiger Austausch zwischen allen Beteiligten in der Lieferkette notwendig. Durch Zusammenarbeit zwischen Herstellern/Importeuren, Händlern, Weiterverarbeitern und Anwendern wird eine größere Transparenz über die gesamte Produkt-/Lieferkette hinweg erreicht.

Händler sind verpflichtet, die erhaltenen Informationen weiterzuleiten, damit die Informationskette nicht unterbrochen wird.

Nachgeschaltete Anwender erhalten so mehr Informationen und können sich und die Beschäftigten besser schützen. Sie müssen aber auch selbst aktiv werden. Dazu gehört vor allem, dass sie ihre Lieferanten über die (abweichende) Verwendung ihrer Produkte unterrichten.

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Frage 4

Was muss ich als nachgeschalteter Anwender tun?

- Das Sicherheitsdatenblatt des Lieferanten überprüfen.
- Stelle ich dabei Mängel fest, muss ich den Lieferanten informieren.
- Empfohlene Sicherheitsvorschläge (P-Sätze) umsetzen (z. B. Schutzausrüstung, Belüftung usw.).
- Überprüfen, dass mein Verwendungszweck durch das Datenblatt gedeckt ist.
- **Datenblätter mindestens 10 Jahre aufbewahren!**

ABSCHNITT 1: Bezeichnung des Gemischs und des Unternehmens

1.1 Produktidentifikator

- Zemente gemäß der DIN EN 197 und DIN 1164
  CEM I Portlandzemente, CEM II Portlandkompositzemente, CEM III Hochofenzemente,
  CEM IV Puzzolanzemente und CEM V Kompositzemente aller Festigkeitsklassen (32,5, 42,5 und 52,5)
- Hydraulischer Tragschichtbinder gemäß der DIN 18506
  HRB aller Festigkeitsklassen (12,5, 12,5 E, und 32,5 E)
- Putz- und Mauerbinder gemäß der DIN EN 413
  MC aller Festigkeitsklassen (5, 12,5 und 22,5)
- Hydraulischer Kalk gemäß der DIN EN 459
  HL aller Festigkeitsklassen (2, 3,5 und 5)
- Sonderbindemittel Euromix

1.2. Relevante identifizierte Verwendungen des Gemischs und Verwendungen, von denen abgeraten wird

Name	Portlandzementklinker	Flue dust, Portlandzement-klinkerherstellung
EC-Nummer	266-043-4	270-659-9
CAS-Nummer	65997-15-1	68475-76-3
Registriernummer	ausgenommen (siehe 15.1)	01-2119486767-17-0042
Konzentrationsspanne [M.-%]	5 - 100	0 - 5
Einstufung gemäß RL 67/548/EWG	Xi, reizend R37/38, R41, R43 	Xi, reizend R37/38, R41, R43
Einstufung gemäß Verordnung (EG) Nr. 1272/2008	Gefahr, Kat. 1 H315, H317, H318, H335 	Gefahr, Kat. 1 H315, H317, H318, H335

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Relevante identifizierte Verwendungen des Gemischs und Verwendungen, von denen abgeraten wird.

Die Zemente/Bindemittel werden in industriellen Anlagen zur Herstellung/Formulierung von hydraulischen Produkten, wie Transportbeton, Werktrockenmörtel, Putze etc. eingesetzt.

In der Endanwendung werden die Zemente/Bindemittel und damit hergestellte hydraulische Produkte zur Herstellung von Baustoffen und Bauteilen sowohl von industriellen und professionellen Anwendern (Fachkräfte im Baugewerbe) als auch von privaten Endverbrauchern eingesetzt.

Hierzu werden Zemente und zementhaltige hydraulische Bindemittel mit Wasser versetzt, homogenisiert und zum gewünschten Baustoff und Bauteil verarbeitet. Die hiermit verbundenen Tätigkeiten umfassen den Umgang mit trockenen (Pulver) und mit Wasser versetzten (Suspension) Materialien. Sie lassen sich Verfahrenskategorien und Deskriptoren gemäß ECHA Leitfaden R.12 (ECHA-2010-G-05) zuordnen (siehe Tabelle).

10	Auftragen durch Rollen oder Streichen		**X**
11	Nicht-industrielles Sprühen		**X**
13	Behandlung von Erzeugnissen durch Tauchen und Gießen		**X**
14	Produktion von Gemischen oder Erzeugnissen durch Tablettieren, Pressen, Extrudieren, Pelettieren	**X**	**X**
19	Handmischen mit engem Kontakt und nur persönlicher Schutzausrüstung		**X**
22	Potenziell geschlossene Verarbeitung mit Mineralien /Metallen bei erhöhter Temperatur Industrieller Bereich		**X**
26	Handhabung von festen anorganischen Stoffen bei Umgebungstemperatur	**X**	**X**

Handwerkskammer Hamburg
ZEWU – Zentrum für Energie-, Wasser- und Umwelttechnik

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Frage 5

Wie bleibe ich ein nachgeschalteter Anwender?

- wenn ich STOFFE aus der EU bestimmungsgemäß verwende.
- wenn ich ZUBEREITUNGEN aus der EU bestimmungsgemäß verwende.

Frage 6

Wann muss ich eine Registrierung vornehmen?

- Bei Herstellung von Stoffen ab 1000 kg pro Kalenderjahr.
- Bei Importen von Stoffen, auch in Zubereitungen, von außerhalb der EU ab 1000 kg pro Kalenderjahr.

Die Registrierung hat bei der Europäischen Chemikalienagentur (ECHA) in Helsinki zu erfolgen. Dafür ist immer ein technisches Dossier zu erstellen und einzureichen. Ab 10 t eines Stoffes pro Kalenderjahr muss zusätzlich noch ein umfangreicher Stoffsicherheitsbericht beigefügt werden.
Eine Registrierung ist ein sehr teures und aufwändiges Verfahren!

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Frage 7

Was muss ich ggf. noch berücksichtigen?

- Wenn Ihr mein Lieferant meine geplante Verwendung nicht im Datenblatt aufführt
  ... dann setze ich mich mit dem Lieferanten diesbezüglich in Verbindung.
- Wenn mein Lieferant aus Gesundheits- oder Umweltschutzgründen die Registrierung meiner geplanten Verwendung verweigert ...
  ... Dann muss ich mir entweder einen anderen Lieferanten suchen, der meine geplante Verwendung unterstützt oder
  ... selbst die Registrierung bei der europäischen Chemikalienagentur durchführen. (hierfür kann eine eigene Stoffsicherheitsbeurteilung notwendig sein!)
- Wenn ich Zubereitungen herstelle und verkaufe ...
  ... gebe ich ein Sicherheitsdatenblatt für diese Zubereitung an den Kunden weiter.
- Wenn ich etwas Problematisches im Zusammenhang mit einem Stoff oder einer Zubereitung beobachte ...
  ... dann melde ich dies meinem Lieferanten.

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Unter REACH werden besonders besorgniserregende Stoffe identifiziert [http://www.reach-info.de/svhc.htm] und in der sogenannten Kandidatenliste geführt. Werden chemische Stoffe zu Erzeugnissen verarbeitet (z.B. ein Farbstoff in einem Kunststoffprodukt), müssen innerhalb der Lieferkette Informationen zu den enthaltenen, besonders besorgniserregenden Stoffen und zur sicheren Handhabung weitergegeben werden. Verbraucher oder nachgeschaltete Anwender können beim Händler, Hersteller oder Importeur nachfragen, welche besonders besorgniserregenden Stoffe der Kandidatenliste in einem Erzeugnis enthalten sind. Händler, Hersteller und Importeure müssen sie dann innerhalb von 45 Tagen kostenlos darüber informieren – unabhängig von einem möglichen Kauf.

Die Auskunftspflicht gilt sobald die Konzentration des jeweiligen Stoffes im Erzeugnis 0,1 Massenprozent überschreitet. Sie gilt für die meisten Gegenstände, z.B. Haushaltswaren, Textilien, Schuhe, Sportartikel, Möbel, Heimwerkerbedarf, Elektro-/Elektronikgeräte, Spielzeug, Fahrzeuge oder Verpackungen.

Sie gilt nicht in Bereichen, die speziellen Regelungen unterliegen. Dazu gehören z.B. flüssige oder pulverförmige Produkte (wie Lacke oder Farben), Medizinprodukte, Arzneimittel, Lebensmittel, Kosmetika, Wasch- und Reinigungsmittel, Futtermittel, Pflanzenschutzmittel und Biozide.

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VO (EG) Nr. 1907/2006 (REACH-Verordnung), Informationspflichten nach Art. 33

Sehr geehrte Damen und Herren,

die Europäische Chemikalienagentur ECHA hat auf Ihrer Internetseite eine Liste besonders besorgniserregender Stoffe veröffentlicht, die die Kriterien des Art. 57 der oben bezeichneten REACH-Verordnung erfüllen und nach dem Verfahren des Art. 59 der Verordnung ermittelt wurden (http://echa.europa.eu/chem_data/candidate_list_table_en.asp). Ich bitte Sie, mir/uns mit Bezug auf Art. 33(2) der o.g. Verordnung mitzuteilen, ob einer dieser besonders besorgniserregenden Stoffe in dem von Ihnen vertriebenen Erzeugnis „XXXX“ in Anteilen über 0,1 % enthalten ist und mir/uns die zur sicheren Verwendung des Erzeugnisses XXXX erforderlichen Informationen zur Verfügung zu stellen.

Gemäß Art. 33 der o.g. Verordnung sind Sie als Lieferant von XXXX verpflichtet, mir als Verbraucher/ Verbraucherin diese Informationen innerhalb von 45 Tagen zur Verfügung zu stellen.

Mit freundlichen Grüßen

Quelle: http://www.reach-info.de/auskunftsrecht.htm

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Ende

Danke für ihre Aufmerksamkeit

Work Package 4: Second centre level "Continuing vocational training" (EQF Level 4-6)

Activity A5 Transfer:

Result 4.5 Trainings Energy Saving and Renawable Energies

Part D

Training IV

Waste and Wastewater Management Energy Production

Prepared by:

AGBAR - Escuela del Agua

September, 2023

With the support of the Erasmus+ Programme of the European Union

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Introduction

- Contextualisation within the overall project:

  The objective of the seminar is for the participants to learn about waste and wastewater management technologies, the possibilities of energy production from these, and to be able to estimate the potential implementation in their company. Likewise, a vision of the potential new business areas in which small and medium-sized companies can develop their activity will be obtained.

- Modality, where and when:

  The seminar has been 100% face to face training.
  The sessions were developed on Thursdays on the 27th of April and 4th of May of 2023, during 9 hours. It took place at the headquarters of the Official College of Industrial Engineers of Catalonia.
  The training was taught by three trainers. Each of them could offer their personal experience in terms of waste and wastewater management energy production.

- By completing the seminar, the participant will obtain the following skills:
  - Knowledge of current energy issues for small and medium-sized businesses, and new market opportunities.
  - Awareness of the need to reduce the consumption of raw materials.
  - Knowledge about the principles of recycling and the new Cradle to Cradle approach.
  - Skills to evaluate the application of the Cradle to Cradle principle, and the benefit obtained in saving raw materials.
  - Overview of the cleaning processes of a city.
  - Examples of best practices in waste management.
  - Knowledge of energy generation technologies from waste and wastewater, and application of best practices in each case.
  - Awareness of the importance of wastewater separation.
  - Knowledge of decentralized wastewater treatment technologies.
  - Knowledge of the principles of operation and construction of underground treatment systems, and examples of the application of best practices.
  - Skills to find energy generation solutions for your own company, and new fields of activity for it.
  - Knowledge of the market, the possibilities it offers, and the development of strategies for development in new business areas.

- Attendants:

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Directors and managers of small and medium-sized companies in any field, who want to obtain a global vision of energy management and generation in the field of waste and wastewater

- Competence acquisition methodology:

  The curriculum was adapted and translated into Catalan. It was a 100% face to face training: 9 hours, 2 mornings from 4,5 hours each one.

  The acquisition of skills will be achieved through face-to-face master classes taught by experts, to acquire the fundamental theoretical knowledge in management and generation of energy from waste and wastewater.

  Collaborative work and debate will be encouraged.

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Admission and organization of the trainings

- Organization of the training

  - **School of Water.** created by Agbar in 2012, is the benchmark in training, awareness, talent development and knowledge in the field of water and the environment.Our activity is aimed at training for companies, administrations and professionals in the water sector, as well as for the general public. Thus, we develop training programs, promote dual vocational training in the water sector, develop environmental education programs and design exhibition, museum and hydraulic heritage projects.The training programs, whether those in our catalog or those custom-designed for companies, cover all areas of the complete water cycle; they use methodologies that facilitate a unique learning experience and immediate applicability in all key positions of an organization. Our approach combines the academic and technical rigor provided by 165 years of experience in integrated water cycle management and collaboration with the best universities, technical schools and business schools.

  - **Official College of Industrial Engineers from Catalonia (COEIC).** It is the professional organization of the Industrial Engineers of Catalonia, committed to the professional development of engineers. It represents engineers in the industrial field, defending the profession and its interests, and regulating its practice. COEIC promotes the progress of engineering and deploys activities of a technical, scientific and cultural nature.

- Partners and stakeholders who participate in the advertise of the program:
  - **CECOT.** business organization active in different sectors of activity and professionals from different areas of the company who, organized as a multi-sectoral business confederation, look after the competitiveness and interests of companies. Resources come, fundamentally, from the fees of associates, sponsorship and public-private projects that directly promote or in which actively participate.

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- Selection of participants, possible admission requirements

  Participants in the seminar were informed by advertising through organizations and stakeholders who will publicize the course. They were able to register through the website of the center where the training takes place.

- Brief notes on counselors and teachers, their qualifications and experience:

  - **Oriol Vilaseca**, Chemical engineer, PhD in Materials Science and Technology. Director General of Vilaseca Consultors SLP.
  - **Juan Carlos Ruiz**, Chemical engineer. Responsable for Aigües de Barcelona projects. Faculty and collaborator of Escuela del Agua.
  - **Xavier Elías,** PhD industrial engineer. Senior Expert of Agbar. Director of the postgraduate course in Circular Economy (COEIC)

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Participants profile and organization of the training

- 3 women and 7 men took the training. They all are working in a technical department or technical company and all are from Catalonia, Spain.

- Number of participants

Nº	Participant	Training
1	Madorell Costa, Xavier	Industrial engineer
2	Floriach Triado, Albert	Aigües de Mataró
3	Sans Cura, Aina	Consell Comarcal del Pla de l'Estany
4	Isidoro Maya Agudo	Industrial engineer
5	Miquel Palou	
6	Marina Hinojosa Baquedarno	Técnica de Desarrollo de Negocio de Economía Circular Cataqua
7	Sònia Quintana Cayuelas	Industrial engineer - Agbar
8	Albert Badell Ortega	Tècnic de laboratori
9	Adolfo Pino Villalobos	Responsable d'operacions Aigües de Sabadell
10	Antonio Izquierdo Alsina	Tècnic de plantes d'Aigües de Sabadell

Execution of the seminar

- Organization and plan

Day	Timetable	Module	Unit	Speaker
27 abril 2023	First Journey	4,5 hours		
	9:00-9:45	Module 1: 0,75 hores	General questions of international economic development	Oriol Vilaseca
	9:45-11:15	Module 2: 1,5 hores	Recycling management.. Cradle to Cradle	Xavier Elias
	11:15-11:45		Break	
	11:45-13:15	Module 3: 1,5 hores	Technologies and developments in industrial waste management	Xavier Elias
	13:15-14:00	Module 4: 0,75 hores	Use of waste for the generation of biogas and electricity	Oriol Vilaseca
4 maig 2023	Second Journey	4,5 hores		
	9:00-10:30	Module 5: 1,5 hores	Engineering technologies and developments in waste water	Juan Carlos Ruiz
	10:30-12:00	Module 6: 1,5 hores	Decentralized treatment of waste water	Juan Carlos Ruiz
	12:00-12:30		Break	
	12:30-14:00	Module 7: 1,5 hores	Discover new market areas for small and medium-sized companies	Oriol Vilaseca

- Explanations and notes on implementation

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The seminar was very interesting for the debate and moments of reflection that were generated in the classroom. It should be noted that the teachers were very experts in the subject and that the participants were very interested and specialized people. Very good academic level and a very participatory audience.

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Main Findings and Conclusions

- Summary assessment of implementation

    - 70% of the participants were completely satisfied with the training received and 40% of the participants can apply the content to their current job.
    - Regarding the organization of training action, 60% participants are very satisfied and the other 40% are satisfied.
    - 70% of them think that the topics discussed have been interesting and the concepts presented were in a clear and orderly manner and the documentation was adequate.
    - The atmosphere created by the teacher facilitated participation.

When we asked in an open form about the aspects to improve, the contributions has been:

- Share presentations before class.
- More time for practical exercises
- Some test to consolidate concepts
- Bibliography and references
- Difficult parking
- Too short of time

When we asked in an open form about positive aspects, the contributions has been:

- The professionalism, experience and enthusiasm of the speakers
- The quality of the presentations and the breakfast
- The environment is very accessible to comment and participate at all times.
- The level of expertise of speakers

When we asked in an open form about other courses you would like to take, they said:

- Circular economy
- Hydrogen
- Energy efficiency and management

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Attachments

- **ATTACHMENT 1: LIST OF PARTICIPANTS**
- **ATTACHMENT 2: CURRICULA (adapted and translated into Catalan by the trainer)**
- **ATTACHMENT 3: PUBLICATION ABOUT THE COURSE (web)**
- **ATTACHMENT 4: BEST PICTURES**
- **ATTACHMENT 5: SATISFACTORY QUESTIONNAIRE**

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ATTACHMENT 1: LIST OF PARTICIPANTS

Producció d'energia i gestió de residus i aigües residuals

Data: 27 d'abril i 4 de maig de 2023

	Cognoms, Nom	27/04/2023	04/05/2023
1	Badell Ortega, Albert 47673123B	Albert	Albert
2	Floriach Triadó, Albert 38814910N		
3	Hinojosa Baquedano, Marina 47871985F		
4	Izquierdo Alsina, Antonio 43440206 Z		
5	Madorell Costa, Xavier (9896)		
6	Maya Agudo, Isidoro (20458) 53594818-B		
7	Palou, Miquel ~~4155~~ 53398021 Y		
8	Pino Villalobos, Adolfo 38107578M		
9	Quintana Cayuelas, Sònia (18917) 53293670E		
10	Sans Cura, Aina 48050197 - T		

Organitzat per: Enginyers Industrials de Catalunya Delegació del Vallès, 3LoE, Escuela del Agua

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ATTACHMENT 2: CURRICULA (adapted and translated into Catalan by the trainer)

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Work Package 4:

Second centre level "Continuing vocational training"

Activity A5 Transfer:

Trainings Energy Saving and Renawable Energies

Part D

Training IV

Waste and Wastewater Management Energy Production

TÍTOL DE L'ACCIÓ FORMATIVA	Producció d'energia i gestió de residus i aigües residuals
OBJECTIU DE L'ACCIÓ FORMATIVA	L'**objectiu** del seminari és que el participant conegui les **tecnologies de gestió de residus i aigües residuals**, possibilitats de **producció d'energia** a partir d'aquests, i que pugui estimar la potencial **implementació** a la seva empresa. Així mateix, s'obtindrà una visió de les **possibles noves àrees de negoci** en què poden desenvolupar la seva activitat les petites i mitjanes empreses.
MODALITAT	Presencial
DESTINATARIS	**Directius i responsables de petites i mitjanes empreses** de qualsevol àmbit, que vulguin obtenir una visió global de la gestió i generació energètica a l'àmbit dels residus i de les aigües residuals.
NOMBRE DE PARTICIPANTS	12÷15 alumnes
CAPACITACIO DELS FORMADORS	**Docents i Professionals amb experiència docent** amb sòlids coneixements teòrics i pràctics en: - tecnologies de gestió i de generació d'energia a partir de residus i aigües residuals, i - el marc legal i financer d'aplicació.
METODOLOGÍA D'ADQUISICIÓ DE COMPETÈNCIES	L'adquisició de competències s'assolirà mitjançant **classes magistrals presencials** impartides per experts, per adquirir els coneixements teòrics fonamentals en gestió i generació d'energia a partir de residus i aigües residuals. Es fomentarà el **treball col·laboratiu** i el **debat**.

CONTINGUTS D'APRENENTATGE	**Mòdul 1. Qüestions generals de desenvolupament econòmic internacional.** 1.1. Àrees de creixement a l'àmbit de l'energia i el medi ambient. 1.2. Tendències de desenvolupament internacional. 1.3. Requisits per a la cooperació. **Mòdul 2. Gestió del reciclatge. *Cradle to Cradle*.** 2.1. Requisits relacionats amb la reducció del consum de matèries primeres. 2.2. Reciclatge. 2.3. El principi *Cradle to Cradle* (disseny de productes i processos industrials amb impacte positiu al medi ambient). 2.4. Cicle ecològic. 2.5. Cicle tècnic. 2.6. Exemples de bones pràctiques i disseny de productes. **Mòdul 3. Tecnologies i desenvolupaments en la gestió de residus a partir de l'exemple de la neteja urbana.** 3.1. Visió general de les tasques, solucions i desenvolupaments. 3.2. Exemples de bones pràctiques. 3.3. Generació d'energia a partir dels residus. **Mòdul 4. Utilització de residus per a la generació de biogàs i electricitat.** 4.1. Exemple de bones pràctiques a una empresa. 4.2. Instal·lacions de biogàs. 4.3. Substrats i rendiment energètic. **Mòdul 5. Tecnologies i desenvolupaments d'enginyeria en aigües residuals.** 5.1. Desenvolupaments de volum, procediments de tractament i resultats. 5.2. Separació d'aigües residuals. 5.3. Millors pràctiques: energia verda obtinguda de les aigües negres. **Mòdul 6. Tractament descentralitzat d'aigües residuals.** 6.1. Procés de tractament subterrani. 6.2. Exemples de bones pràctiques. **Mòdul 7. Descobrir noves àrees de mercat per a les petites i mitjanes empreses.** 7.1. Presentació i debat de casos pràctics. 7.2. Desenvolupament d'estratègies.
COMPETÈNCIES ADQUIRIDES	Amb la realització del seminari, el participant obtindrà les competències següents: - Coneixement de la problemàtica energètica actual per a les petites i mitjanes empreses, i de les noves oportunitats de mercat. - Conscienciació de la necessitat de reduir el consum de matèries primeres.

	- Coneixement dels principis del reciclatge i del nou enfoc *Cradle to Cradle*, - Habilitats per avaluar l'aplicació a la seva empresa del principi *Cradle to Cradle*, i del benefici obtingut en estalvi de matèries primeres. - Obtenció d'una visió general del processos de neteja d'una ciutat. - Coneixement d'exemples de les millors pràctiques en gestió de residus. - Coneixement de tecnologies de generació d'energia a partir dels residus i de les aigües residuals, i aplicació de les millors pràctiques en cada cas. - Conscienciació de la importància de la separació de les aigües residuals. - Coneixement de les tecnologies de tractament descentralitzat d'aigües residuals. - Coneixement dels principis de funcionament i construcció dels sistemes de tractament subterrani, i exemples d'aplicació de les millors pràctiques. - Habilitats per trobar solucions de generació d'energia a la seva pròpia empresa, i nous camps d'activitat per aquesta. - Coneixement del mercat, les possibilitats que ofereix, i l'elaboració d'estratègies per al desenvolupament en noves àrees de negoci.
TEMPORITZACIÓ	Durada total del curs: 9 hores (12 Unitats Didàctiques ; 1 Unitat Didàctica = 0,75 hores). - Primera jornada: 4,5 hores (6 Unitats Didàctiques): · Mòdul 1: 0,75 hores (1 Unitat Didàctica) · Mòdul 2: 1,5 hores (2 Unitats Didàctiques) · Mòdul 3: 1,5 hores (2 Unitats Didàctiques) · Mòdul 4: 0,75 hores (1 Unitat Didàctica) - Segona jornada: 4,5 hores (6 Unitats Didàctiques): · Mòdul 5: 1,5 hores (2 Unitats Didàctiques) · Mòdul 6: 1,5 hores (2 Unitats Didàctiques) · Mòdul 7: 1,5 hores (2 Unitats Didàctiques) Calendari de realització del curs: 2^{on} trimestre 2023 (pendent d'establir data definitiva)
CERTIFICACIÓ D'APROTIFAMENT	Els participants, al finalitzar el seminari, reben un certificat d'assistència i aprofitament expedit per l'entitat formadora, en el que figuren els continguts de la formació impartida.
REGISTRES	- registres d'assistència - enquestes de satisfacció

ATTACHMENT 3: PUBLICATION ABOUT THE COURSE

https://www.laescueladelagua.com/programa/executive-education/seminario/seminario-produccion-de-energia-y-gestion-de-residuos-y-aguas-residuales/

Inicio > Executive Education > Seminario > Seminario Producción de Energía y Gestión de Residuos y Aguas Residuales

SEMINARIO

Seminario Producción de Energía y Gestión de Residuos y Aguas Residuales

Presencial | Abril, 2023

+34 932 479 735 | +34 616 778 523

CONTACTA CON ADMISIONES

Presentación | Contenidos | **Equipo docente** | Admisión y datos básicos

A continuación destacamos a los principales ponentes y expertos que nos acompañarán para cada una de las sesiones.

PONENTES

D. ORIOL VILASECA

Ingeniero químico, doctor en Ciencia y Tecnología de Materiales. Director general de Vilaseca Consultors SLP.

D. JUAN CARLOS RUIZ

Ingeniero químico. Responsable de proyectos de Aigües de Barcelona. Profesor y colaborador de la Escuela del Agua.

D. XAVIER ELÍAS

Doctor ingeniero industrial. Director del posgrado en Economía Circular. Econotermia.

https://formacio.eic.cat/cursos/1128602

932957807 626686717 Segueix-nos a:

Centre de formació i ocupació
Associació / Col·legi

Enginyers Industrials de Catalunya 160 anys

Inici Cursos Enginyers Empresa Campus virtual Entitats afins

Esteu aquí: Inici › Cursos › Producció d'energia i gestió de residus i aigües residuals. Curs Presencial › Cursos

Producció d'energia i gestió de residus i aigües residuals. Curs Presencial

Àrea: Seguretat i Medi Ambient Modalitat: Presencial Data inici: 27/04/2023 Localització: Delegació del Vallès

Inscripció tancada

El període d'inscripció per aquest curs ha finalitzat.

Descripció

L'objectiu del seminari és que el participant conegui les tecnologies de gestió de residus i aigües residuals, possibilitats de producció d'energia a partir d'aquests, i que pugui estimar la potencial implementació a la seva empresa. Així mateix, s'obtindrà una visió de les possibles noves àrees de negoci en què poden desenvolupar la seva activitat les petites i mitjanes empreses.

Amb la realització del seminari, el participant obtindrà les competències següents:
- Coneixement de la problemàtica energètica actual per a les petites i mitjanes empreses, i de les noves oportunitats de mercat.
- Conscienciació de la necessitat de reduir el consum de matèries primeres.
- Coneixement dels principis del reciclatge i del nou enfoc Cradle to Cradle
- Habilitats per avaluar l'aplicació a la seva empresa del principi Cradle to Cradle, i del benefici obtingut en estalvi de matèries primeres.
- Obtenció d'una visió general del processos de neteja duna ciutat.
- Coneixement d'exemples de les millors pràctiques en gestió de residus.
- Coneixement de tecnologies de generació d'energia a partir dels residus i de les aigües residuals, i aplicació de les millors pràctiques en cada cas.
- Conscienciació de la importància de la separació de les aigües residuals.
- Coneixement de les tecnologies de tractament descentralitzat d'aigües residuals.
- Coneixement dels principis de funcionament i construcció dels sistemes de tractament subterrani, i exemples d'aplicació de les millors pràctiques.
- Habilitats per trobar solucions de generació d'energia a la seva pròpia empresa, i nous camps d'activitat per aquesta.
- Coneixement del mercat, les possibilitats que ofereix, i l'elaboració d'estratègies per al desenvolupament en noves àrees de negoci.

Vols fer una consulta?

+34 93 2957807 - 93 2957808
+34 626686717
formacio@serveis.eic.cat

Descomptes

Si estàs a l'atur ets estudiant o tens fins a 34 anys, pots gaudir d'una sèrie d'avantatges addicionals. Vàlid només per a persones associades o col·legiades.

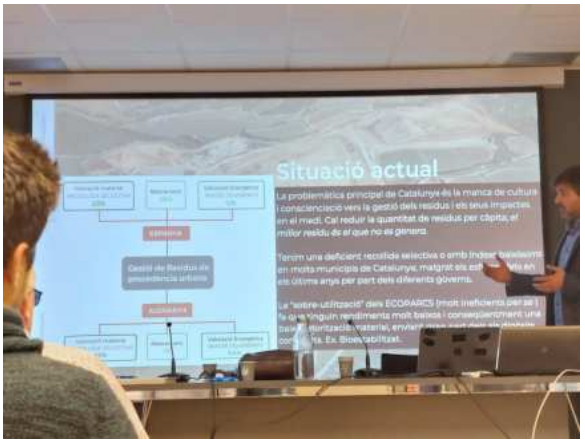
Consulta'ls!

Fundación Estatal para la Formación en el Empleo

Gestionem els tràmits per tal que puguis gaudir de la bonificació corresponent per formació.

Informa-te'n!

ATTACHMENT 4: BEST PICTURES



ATTACHMENT 5: SATISFACTORY QUESTIONNAIRE (sample of tree questionnaires in catalan language)

Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

Nom del Curs : **Producció d'energia i gestió de residus i aigües residuals**
Curs Presencial

Aula : SABADELL

Data : 27/04/2023 i 04/05/2023

Amb aquest qüestionari volem conèixer quin és el grau de satisfacció de la formació rebuda. Per a nosaltres és molt important saber la seva opinió, ja que les seves respostes suposaran una valuosa informació que ens permetrà millorar el nostre servei. Li agraïm la seva col·laboració així com la confiança dipositada.

Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	9	10

Aspectes generals	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda		X			
Crec que podré aplicar els continguts a la meva feina actual o futura		X			
Tornaries a fer un curs amb nosaltres ?		X			
Aspectes concrets del curs					
L'organització de l'acció formativa ha estat correcta		X			
Els temes tractats han estat interessants		X			
S'han assolit satisfactòriament els objectius plantejats en el programa del curs		X			
Aspectes concrets per a cada professor					
Francesc Daura					
La valoració global del professor és satisfactòria		X			
Els conceptes s'han exposat de manera clara i ordenada		X			
La documentació ha estat adequada		X			
Els exercicis pràctics han estat útils		X			
L'ambient creat pel professor ha facilitat la participació		X			

Suggeriments

Aspectes a millorar

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Aspectes positius a destacar

Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

Web i Butlletí

La coordinació amb els altres professors ha estat correcta

Sí, tot correcta

Quins altres cursos t'agradaria fer?

Organitza

Enginyers Industrials de Catalunya

Escola de l'Aigua 10 anys

Col·labora

cecot

En el marc de

WFEO

3LoE

Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

Nom del Curs : **Producció d'energia i gestió de residus i aigües residuals**
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Aula : SABADELL

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Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	9	10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No he puc avaluar
Estic satisfet/a de la formació rebuda		X			
Crec que podré aplicar els continguts a la meva feina actual o futura		X			
Tornaries a fer un curs amb nosaltres ?		X			

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta		X			
Els temes tractats han estat interessants		X			
S'han assolit satisfactòriament els objectius plantejats en el programa del curs		X			

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria	X				
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada	X				
Els exercicis pràctics han estat utils			X		
L'ambient creat pel professor ha facilitat la participació		X			

Suggeriments

Aspectes a millorar

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Aspectes positius a destacar

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Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

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La coordinació amb els altres professors ha estat correcta

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Quins altres cursos t'agradaria fer?

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Organitza

Enginyers Industrials de Catalunya

Escuela del Agua 10 anys

Col·labora

cecot

En el marc de

3LoE

Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

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Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	9	10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X				
Crec que podré aplicar els continguts a la meva feina actual o futura		X			
Tornaries a fer un curs amb nosaltres ?		X			

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta		X			
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs		X			

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria		X			
Els conceptes s'han exposat de manera clara i ordenada		X			
La documentació ha estat adequada		X			
Els exercicis pràctics han estat útils					X
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar

La la part de la primera sessió va amb massa curta de temps.....

Aspectes positius a destacar

La facilitat per fer preguntes i generació de debat

Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

Web

La coordinació amb els altres professors ha estat correcta

Sí

Quins altres cursos t'agradaria fer?

Organitza

Enginyers Industrials de Catalunya

Escuela del Agua 10 anys

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Enginyers Industrials de Catalunya

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Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	X	9	10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X				
Crec que podré aplicar els continguts a la meva feina actual o futura	X				
Tornaries a fer un curs amb nosaltres ?	X				

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta	X				
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs	X				

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria		X			
Els conceptes s'han exposat de manera clara i ordenada		X			
La documentació ha estat adequada		X			
Els exercicis practics han estat útils			X		
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar

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Aspectes positius a destacar

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Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

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La coordinació amb els altres professors ha estat correcta

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Quins altres cursos t'agradaria fer?

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Organitza

Enginyers Industrials de Catalunya

Escola del Treball 10 anys

Col·labora

cecot

En el marc de

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Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

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Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	9	10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X				
Crec que podré aplicar els continguts a la meva feina actual o futura		X			
Tornaries a fer un curs amb nosaltres ?	X				

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta	X				
Els temes tractats han estat interessants		X			
S'han assolit satisfactòriament els objectius plantejats en el programa del curs		X			

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria	X				
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada	X				
Els exercicis practics han estat utils		X			
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar

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Aspectes positius a destacar

Ponents

Com ens ha conegut ? (Web, Fulls, Butlleti, Agenda, Linkedin, Twitter)

Web, Butlleti

La coordinació amb els altres professors ha estat correcta

Sí

Quins altres cursos t'agradaria fer?

Relacionats amb energia

Organitza

Enginyers Industrials de Catalunya

Escuela del Agua 10 anys

Col·labora

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Enginyers Industrials de Catalunya

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Aula : SABADELL

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Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	X	10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda		X			
Crec que podré aplicar els continguts a la meva feina actual o futura		X			
Tornaries a fer un curs amb nosaltres ?	X				

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta		X			
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs		X			

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria	X				
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada	X				
Els exercicis pràctics han estat utils		X			
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar Bibliografía, referencias

Aspectes positius a destacar

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Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

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La coordinació amb els altres professors ha estat correcta

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Quins altres cursos t'agradaria fer? RSU, Economía Circular

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Organitza

Enginyers Industrials de Catalunya

Escuela del Agua 10 anys

Col·labora

cecot

En el marc de

WIPO

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Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

Nom del Curs :	**Producció d'energia i gestió de residus i aigües residuals**
Aula :	SABADELL **Curs Presencial**
Data :	27/04/2023 i 04/05/2023

Amb aquest qüestionari volem conèixer quin és el grau de satisfacció de la formació rebuda. Per a nosaltres és molt important saber la seva opinió, ja que les seves respostes suposaran una valuosa informació que ens permetrà millorar el nostre servei. Li agraïm la seva col·laboració així com la confiança dipositada.

Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0 1 2 3 4 5 6 7 8 9 10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X				
Crec que podré aplicar els continguts a la meva feina actual o futura	X				
Tornaries a fer un curs amb nosaltres ?	X				

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta	X				
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs	X				

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria	X				
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada	X				
Els exercicis pràctics han estat utils		X			
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar

Difícil aparcament (zona blava màxima 2h)

Aspectes positius a destacar

Pisper, dinamisk

Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

Empresa, Escola de l'aigua

La coordinació amb els altres professors ha estat correcta

Sí

Quins altres cursos t'agradaria fer?

Hidrogen

Organitza

Col·labora

En el marc de

Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

Nom del Curs : **Producció d'energia i gestió de residus i aigües residuals**
Curs Presencial

Aula : SABADELL

Data : 27/04/2023 i 04/05/2023

Amb aquest qüestionari volem conèixer quin és el grau de satisfacció de la formació rebuda. Per a nosaltres és molt important saber la seva opinió, ja que les seves respostes suposaran una valuosa informació que ens permetrà millorar el nostre servei. Li agraïm la seva col·laboració així com la confiança dipositada.

Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	9	10

Aspectes generals

	Totalment d'acord	D'acord		En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X					
Crec que podré aplicar els continguts a la meva feina actual o futura		X				
Tornaries a fer un curs amb nosaltres ?	X					

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta	X				
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs		X			

Aspectes concrets per a cada professor

Francesc Daura

La valoració global del professor és satisfactòria		X			
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada		X			
Els exercicis pràctics han estat útils					X
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar

M'ha fet falta algun test per consolidar conceptes, encara que sigui col·lectiu, i també crec que pot obrir a debat.

Aspectes positius a destacar

Claredat de les explicacions i adaptació als mòduls i pla formatiu.
L'ambient del seminari ha sigut molt accessible a comentaris i participar en tot moment.

Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

Per recomanació de l'empresa (Agbar). També coneixia l'escola d'enginyers a la universitat.

La coordinació amb els altres professors ha estat correcta

Tot correcte. Certa correlació entre el que ha explicat cadascú.

Quins altres cursos t'agradaria fer?

Tinc en ment el curs actual de Economia Circular, ja que és en el que es basen els projectes ~~que~~ que van sortint en el meu departament.

Organitza

Enginyers Industrials de Catalunya

Escuela del Agua 10 anys

Col·labora

cecot

En el marc de

3LoE

Enginyers Industrials de Catalunya

ENQUESTA DE SATISFACCIÓ DEL CLIENT FORMACIÓ COEIC

Nom del Curs : **Producció d'energia i gestió de residus i aigües residuals**
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Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0 1 2 3 4 5 6 7 8 9 10

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X				
Crec que podré aplicar els continguts a la meva feina actual o futura	X				
Tornaries a fer un curs amb nosaltres ?	X				

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta	X				
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs	X				

Aspectes concrets per a cada professor

Francesc Daura Tots els professors xuvos Elios, Oriol Vilosca, Jaume Lutz Pere Valbo

La valoració global del professor és satisfactòria	X				
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada	X				
Els exercicis pràctics han estat útils	X				
L'ambient creat pel professor ha facilitat la participació	X				

Suggeriments

Aspectes a millorar pasar tot el a un lados ... per poder llegir

Aspectes positius a destacar

.....
.....
.....

Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

.....
.....
.....

La coordinació amb els altres professors ha estat correcta

.....
.....
.....

Quins altres cursos t'agradaria fer?

.....
.....
.....

Organitza

Col·labora

En el marc de

Enginyers Industrials de Catalunya

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Amb aquest qüestionari volem conèixer quin és el grau de satisfacció de la formació rebuda. Per a nosaltres és molt important saber la seva opinió, ja que les seves respostes suposaran una valuosa informació que ens permetrà millorar el nostre servei. Li agraïm la seva col·laboració així com la confiança dipositada.

Marqui, si us plau, amb una x la resposta que s'adeqüi millor a la seva valoració.

Com és de probable que recomanis el Col·legi/Associació d'Enginyers Industrials de Catalunya a un amic o col·lega?	0	1	2	3	4	5	6	7	8	9	(10)

Aspectes generals

	Totalment d'acord	D'acord	En desacord	Totalment en desacord	No ho puc avaluar
Estic satisfet/a de la formació rebuda	X				
Crec que podré aplicar els continguts a la meva feina actual o futura	X				
Tornaries a fer un curs amb nosaltres ?	X				

Aspectes concrets del curs

L'organització de l'acció formativa ha estat correcta	X				
Els temes tractats han estat interessants	X				
S'han assolit satisfactòriament els objectius plantejats en el programa del curs	X				

Aspectes concrets per a cada professor

(Francesc Daura) ? Oriol Vilaseca / Xavier Elias / Juan Carlos Ruit

La valoració global del professor és satisfactòria	X				
Els conceptes s'han exposat de manera clara i ordenada	X				
La documentació ha estat adequada	X				
Els exercicis pràctics han estat útils					X
L'ambient creat pel professor ha facilitat la participació		X			

Suggeriments

Aspectes a millorar

Compartir les presentacions abans de les classes.
Disposar de més hores i poder fer exercicis pràctics.

Aspectes positius a destacar

- La professionalitat, experiència i entusiasme dels ponents
- La qualitat de les presentacions i l'esmerzar.

Com ens ha conegut ? (Web, Fulls, Butlletí, Agenda, Linkedin, Twitter)

Soc col·laboradora i per rebre els cursos per correu

La coordinació amb els altres professors ha estat correcta

Totalment

Quins altres cursos t'agradaria fer?

Relacionats amb

Organitza

Enginyers Industrials de Catalunya

Escuela del Agua 10 anos

Col·labora

cecot

En el marc de

WSPA

3LoE

26/04/2023 Doc. Nº 90155 Pág. 2 de 2

Co-funded by the Erasmus+ Programme of the European Union

Training V Energy saving and use of alternative Energies

Curriculum

Curricula

Energy saving and use of alternative energies

Satakunta University of Applied Sciences (SAMK), project partner number 7

Compiled by Dr Kari Lilja and Dr Sirpa Sandelin

HANSE-PARLAMENT E.V.

Co-funded by the Erasmus+ Programme of the European Union

samk

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Introduction

Continuously increasing amount of greenhouse gases in atmosphere and increasing average temperature on the earth, the greenhouse effect, is believed to be a consequence of greenhouse gases. Worldwide climate change treaty and both European Union and national regulation with the aim to control the ongoing climate change and to limit the rise of temperature have directed the focus of the energy policy to renewable and alternative energy sources. The aim of the curricula presented below is to respond the requirements set by these new trends of the energy policy.

Target group

The target group of curricula consists of different persons with various backgrounds, knowledge and experience, thus all potential students do not have the same start level. This means that in curricula two start points have been included (Figure 1), one for beginners, who should get elementary training including basics of electric, physics, chemistry, electronic, buildings and construction before the courses. Case by case also the potential lack of knowledge in mathematics should be tackled. If the local or national qualification rules contain admission requirements, it is responsibility of each local actor giving the training to make sure that

a) each participant has the required education, skills and experience, and
b) for those who do not have required education and experience, the elementary training described above will give the required skills.

The second start point is for those who already have the basic knowledge needed, who for example have technical or electric qualification, and who wants to specialize in renewable energy.

The qualification requirements and ways to reach qualifications and licenses to electric and energy work are quite different in the BSR-countries, thus the curricula can be written only as a form of framework inside which the local actors should be able to modify the contents of courses according to their own regulations and local requirements.

Work required

In the curricula the average work required by each course is measured in ECTS credit units (Abbreviated in this presentation as CU). One credit unit is 27 hours studying, and the total of obligatory theory courses and practice is 22 ECTS credit units corresponding 594 hours containing lectures, guided training in practice, individual studies and assignments. The practical training varies from 1 to 5 CU:s depending to the earlier proved experience of student. Furthermore, there is voluntary course packet “Management and entrepreneurship”, 15-25 CU:s, that is targeted to those planning to found a business of their own. All the courses can be used as separate modules.

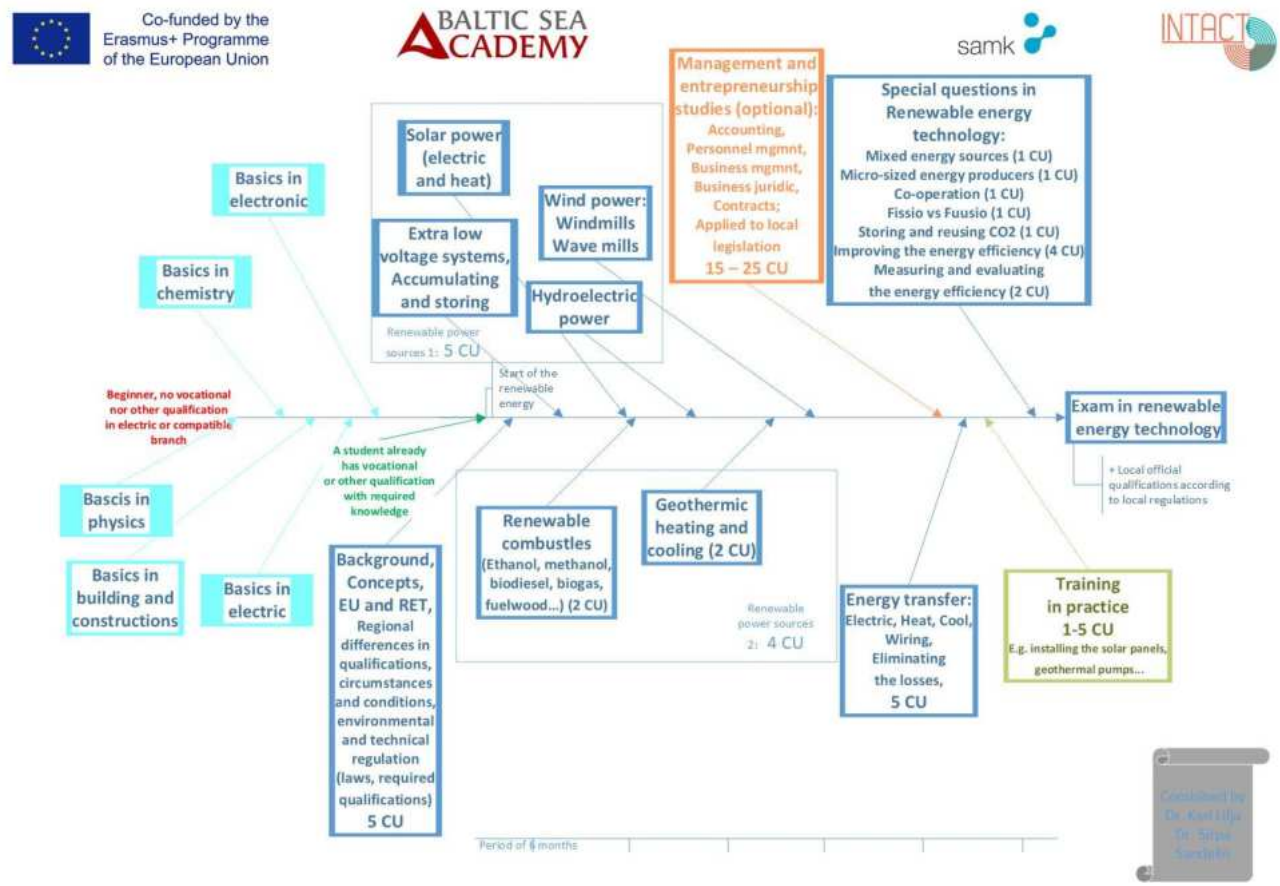

Figure 1: Content and order of Courses

Variation in regulations and circumstances

The regulation on both construction and electric branches is based on national-wide qualification systems limiting the rights of workers to do certain tasks, and national and even local requirements concerning e.g. isolation of houses, distances of wind mills from settled areas or location of geothermal heat well.

The national and local differences become more highlighted in the need of certain services like heating and cooling. In the southern part of Finland, cooling is needed approximately 2 months per year (Past year was an exception), whereas in Lapland there can be only few days when the cooling would be appreciable. With heating and thermal insulation, the situation is even more complicated. In south-western part of Finland, the temperature in winter varies mostly between -5 and +2 degrees, but there may be cold periods, when a temperature remains week or two under -20 degrees. Furthermore, it is always possible that the temperature sinks below -30 degrees and even close to -40. In eastern and northern parts of Finland the temperature varies during the winter mostly between -15 and -25 degrees but may sometimes go close to -40 degrees and stay there for weeks. Other parts of Finland are something between these. The new energy efficiency - and thermal insulation rules are measured according to average circumstances, which means that in one part of the country they can be oversized and in some other part of the country they might be hardly undersized.

This diversity in local circumstances will be multiplied if we compare northern Finnish village to southern German, Polish or Estonian city, and furthermore, in addition to temperature, rain and snow, other variations will be found from possibilities to use district heating, solar power and heat, wind power or geothermic heat. In the most northern village in Finland and in EU, the sun is shining days and nights for 74 days, two and a half months, in summer and staying under the horizon 51 days in the winter, during the period, when the energy would be needed most. In the most southern part of Germany there is only few hours difference in sunny periods between winter and summer. The district heating is reasonable in villages and cities where the buildings are close to each other and close to power plant producing heat. In Finland there are regions where the distance between two farms or detached houses may be dozen kilometers.

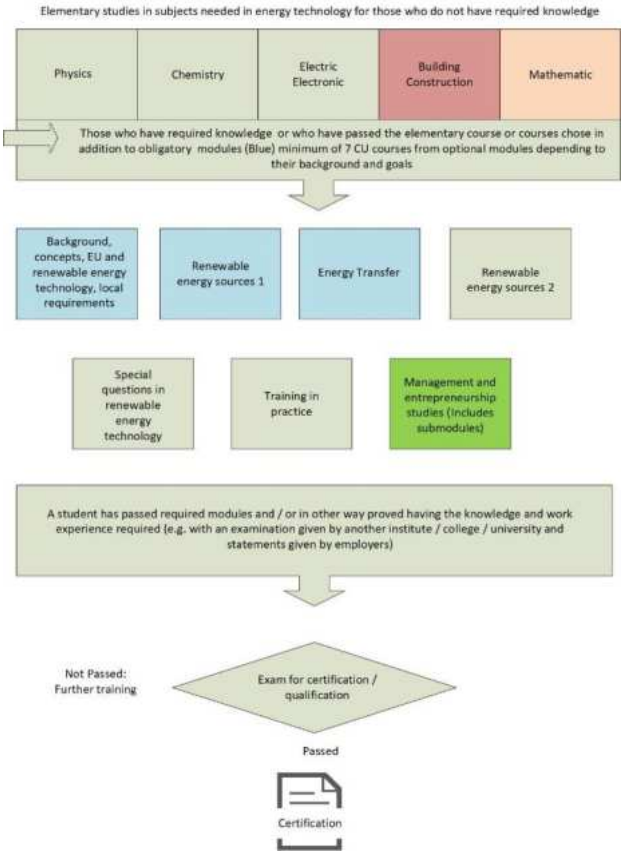

Figure 2: Modular structure

Modular structure

Due to the regional differences, some of which were described above, the contents of courses concerning regulation and its adaptation to local circumstances must be responsibility of local institutes. In this curriculum just the frames are included. As the target group of this training is refugees and immigrants, the background, knowledge and experience of participants may vary a lot. The courses have been packed as modules (**Fehler! Verweisquelle konnte nicht gefunden werden.**), and each module contains certain independent topics (Figure 3: Obligatory and optional coursesFigure 3). Each topic, its subtopics, goals and examples of material will be described below in the chapter "Contents of curricula".

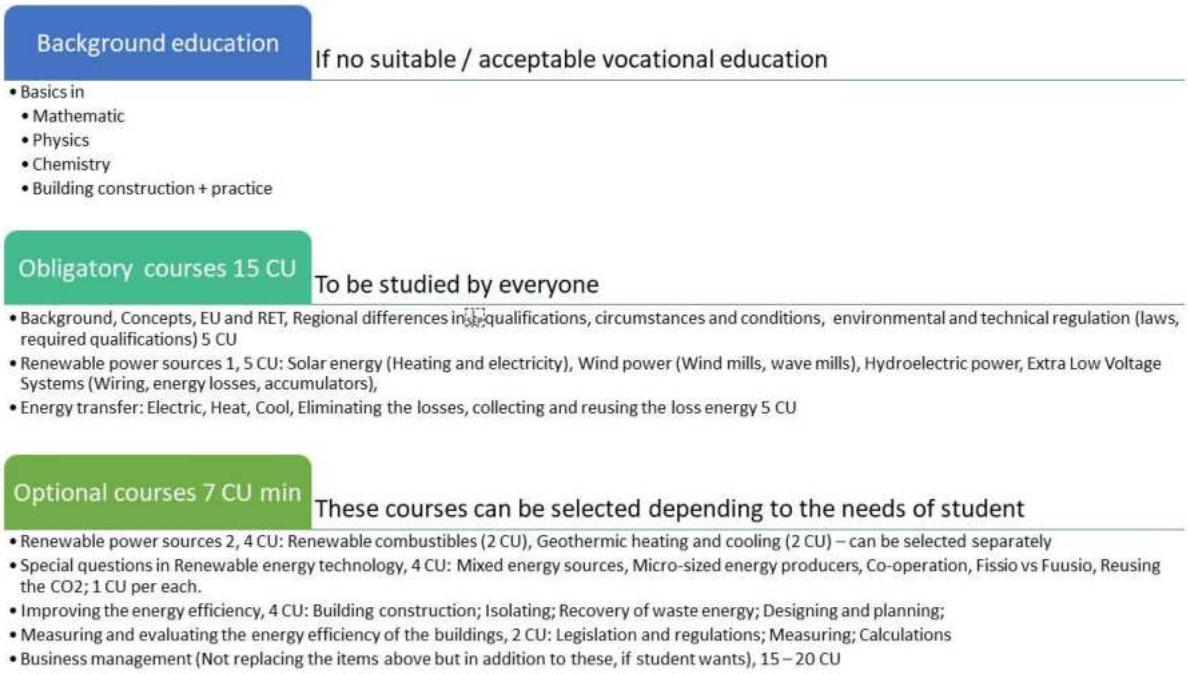

Figure 3: Obligatory and optional courses

Contents of the curricula

Obligatory parts

Background, Concepts, EU-regulation and regional and local differences, 5 CU

Motivation is one of the important factors behind the good results in learning. It is essential for students beginning their studies to know why these subjects must be studied, why these topics should be learned. In the first course this motivation is raised and supported by highlighting the emerging concept of sustainable development and clarifying the conceptual hierarchy between energy technology, renewable energy, energy efficiency and sustainable development (Figure 4). Student should also know, what is the sense of climate change or greenhouse effect, how they may effect on our daily life and how is the EU-level regulation to which the national regulation is based trying to tackle them. Furthermore, it is also important to realize that the national regulations and requirements for qualifications are not necessarily similar in different BSR-countries, nor in line with EU-directives.

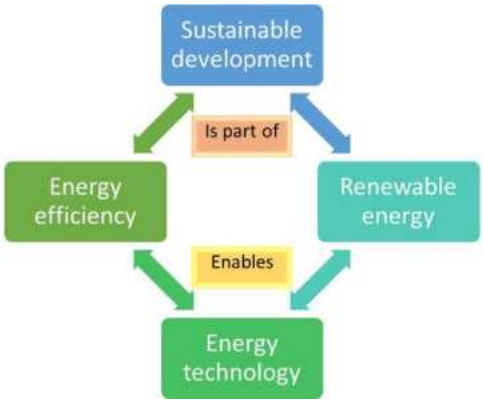

Figure 4: Conceptual structure of energy efficiency and renewable energy

The issues that should be dealt with during the course *Background, Concepts, EU-regulation and regional and local differences* and their relational proportions are

ISSUES	Goals of learning	Links to the material (Examples)
• **Concepts of (20 %)**	Goal: Understanding the sense of terminology	
○ Sustainable development	Goal: Understanding the diversity and variety of concepts and goals within the term "Sustainable development"	UN: Goals of sustainable development
○ Renewable energy		www.irena.org/
○ Energy efficiency		Energy efficiency
○ Energy technology		Clean ET
○ Greenhouse effect		What it is?
○ Climate change		NASA knows
• Main points of energy and renewable energy policies of EU (30 %)	Goal: Understanding the background of new energy policy	Example: Energy policy
○ EU Energy strategy including	Goal: Understanding the sense and goals of common energy strategies	Theme: Energy ; The future of energy
▪ EU 2020 Climate and energy package	Goal: Understanding the differences of strategies (short / long term; targets and goals)	EU2020
▪ EU 2030 – policy		EU2030
▪ EU 2050 Low Carbon goal		EU2050
▪ EU adaptation strategy		Adaptation strategy
▪ EU adaptation to climate change		Adaptation to ; Climate change

○ EU research and development (R&D) concerning the energy technology	Goal: Understanding how the policies are based to the results of scientific research	EU Energy Technology Research
▪ European Energy research alliance		Coordinating Energy Research
• Local regulations and requirements of qualifications (50 %)	Goal: Understanding the diversity of regulation	
○ Each country deal with their regulations, that are not necessary applicable in other countries.	Goal: Knowing the applicable regulation in students own area well enough to pass the local examination if the base education fulfills the requirements.	Links to local authorities. Example: Link to Finnish TUKES
○ Local hierarchy of regulations		According to local documentation
○ Local hierarchy of qualifications and requirements		According to local documentation

Renewable Energy Sources 1, 5 CU

The topic *"Renewable Energy Sources"* has been divided into two courses, each with the extent of 5 CU:s. In the first course the focus is on the carbon neutral renewable energy sources. Solar power, wind power and hydroelectric power are contemporary the most promising energy sources in this branch. The geothermal or volcanic heat and electric produced by geothermal condensing power plants will be discussed in Renewable Energy Sources 2 -course. The issues that should be dealt with during the course *Renewable Energy Sources 1* and their relational proportions are

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Solar power (25 %)	To understand how the solar power works	EnergySage Solar (commercial community)
○ Heat	To understand the operational basics of heating panels and other systems collecting and utilizing the solar heat.	Solar heat collector
○ Electric	To understand the operational basics of electric panels and other systems producing electric by utilizing the solar.	How do they work
○ Dual production	To know the benefits and challenges of dual production (Both heat and electric)	Solar thermal plants
○ Scalable systems	To know how to enable and utilize the scalability of solar power systems	
○ Planning	To know fundamentals of planning effective and economic solar power systems	
○ Installing	To be able to install and implement the solar power system either as single heating or electric system or as a part of	

	electric power network or heating network	
○ Environmental aspects	To know the environmental aspects of solar power system during the whole life cycle of the system from manufacturing to recycling	
• Wind power (25 %)	To know fundamentals of wind power	Tutorials Examples: Wind power in Finland and in Europe
○ Wind mills	To understand how the windmills work, what are their benefits and challenges and what the utilizing of windmills requires.	How they work
▪ Different technologies	To know and identify different type of windmills and their functionalities	
▪ Offshore	To know benefits and challenges of windfarms offshore	
▪ Ashore	To know benefits and challenges of windfarms ashore	
▪ Windfarms	To know the issues that should be taken into account when planning and building the windfarms	Impacts on environment
▪ Scalability of systems	To know the benefits, challenges and requirements of scalable wind power systems	
▪ Planning	To know fundamentals of planning effective and economic wind power systems	
▪ Installing	To be able to install and implement the wind power system either as single electric system or as a part of electric power network	
▪ Environmental aspects	To know the environmental aspects of wind power system during the whole life cycle of the system from manufacturing to recycling	
○ Wave mills	To understand basic functionality of wave mils, and the benefits and challenges of using the wave power	Slowmill Baltic area
▪ Different technologies	To know the different technologies available when developing the wave mills	
▪ Contemporary situation in development	To know the contemporary situation of development, the challenges met and victories gained	
▪ Environmental aspects	To know the environmental aspects of wave power system during the whole life cycle of the	

	system from manufacturing to recycling	
• Accumulating and storing technologies (20 %)	To understand the functional properties and differences of different energy storing systems	Storing the energy
○ Batteries	To know different types of batteries, their properties and suitability to different usages.	Battery technologies for vehicles
○ Hydrostatic accumulating (pump power plants)	To know the functionality of hydrostatic accumulating, its benefits and challenges.	
○ Kinetic accumulating	To know the functionality of kinetic accumulating (Storing the energy as kinetic form, e.g. in flywheel), its benefits and challenges.	
○ Other storing technologies	To know and name other storing technologies, to be up-to-date in technologic development	
○ Efficacy and losses	To know factors impacting the efficacy and losses of different accumulating technologies, how to affect them and how to gain the best benefits.	
○ Environmental aspects	To know the environmental aspects of different accumulating technologies during the whole life cycle of the system from manufacturing to recycling	
• Hydroelectric power (5 %)	To understand the functional properties and differences of different hydroelectric power systems	Different types of plants
○ Different technologies and solutions	To identify different technologies and solutions and to know their benefits and challenges	
○ Scalability (from banks of creeks to huge pondage power stations)	To know the possibilities of scalable power systems	
○ Usability	To understand the aspects impacting the usability of hydroelectric power	
○ Environmental aspects	To know the environmental aspects of different hydroelectric power technologies during the whole life cycle of the system from manufacturing to recycling	
• Extra low voltage systems (ELVS; Voltage < 50 V) (40 %) 25 %	To understand the connections between variables Power (P), Voltage (U), Current (I) and Resistance (R): P=UI and U = RI, and impacts of these on designing the systems and wires	ELV-systems E.g. Wiring (Commercial) Serie or Parallel (Commercial) In buildings

○ Differences compared to systems with higher voltage	To understand the difference between higher voltage systems and extra low voltage systems as well as between AC (Alternating current) and DC (Direct current)	
○ Planning ELVS	To know requirements to be taken into account when planning the systems	
○ Installing and implementing ELVS	To know requirements and properties to be taken into account when installing and implementing the systems	Installing
○ Minimizing losses	To understand how to minimize losses in extra low voltage systems	

Energy Transfer 5 CU

Both in centralized and distributed energy production transferring the energy is one of the major sources of loss, particularly when transferring the electric, heat or cool. This course covers the different transferring technologies and possibilities to minimize the loss. Although it might be unbelievable at first sight, in different forms of energy the variables impacting the loss are quite similar – with one exception that confirms the rule. The most impacting variables are the distance between energy source and user, diameter or cross-sectional area of wire or pipe and the material the pipe or the wire is made of. The exception is transfer of combustibles either in pipe or over the sea, on the road or on the rails in the containers. In these cases there are many other variables too. The issues that should be dealt with during the course and their relational proportions are

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Transfer of heat and cool (30 %)	To understand the challenges of transferring heat and cool	Concepts Distance cooling Distance heating
○ Transferring strategies and techniques ▪ Pipe, container, [radiation] ▪ Usage and usability	To understand factors impacting the choice of technique	Designing (Commercial)
○ Variables impacting the loss ▪ Cross-sectional area of pipe ▪ Distance = length of the pipe ▪ Volume of the container ▪ Material of pipe or container and used insulate materials ▪ Properties of heat carrier, e.g. density, viscosity and specific heat capacity ▪ Efficacy of pumps (speed of the heat carrier) ▪ surrounding temperature ▪ Efficacy of heat exchanger in both ends of the pipe	To know the variables affecting the efficiency of transfer	
○ Environmental aspects	To know the environmental aspects of heat and cool	

	transfer during the whole life cycle of the system from manufacturing to recycling	
○ Maintenance backlog (in conceptual level)	To understand the meaning and impacts of maintenance backlog	Definition
• Transfer of electric (30 %)	To understand the challenges of transferring electric	
○ Transferring strategies and techniques ▪ Wire, batteries, [radiation] ▪ Usage and usability	To understand factors impacting the choice of technique	Wireless transfer
○ Variables impacting the loss	To know the variables affecting the efficiency of transfer	
▪ Cross-sectional area of wire ▪ Distance = length of the wire ▪ Capacity of the battery ▪ Material of wire = specific resistance ▪ Properties of current: Voltage, direct or alternating current, frequency ▪ Properties of transformers ▪ Properties of load, e.g. idle power, stability of load, load peaks		
○ Superconductive materials and techniques		
• Transfer of combustibles (20 %)	To understand the challenges of transferring compustibles	
○ Transferring strategies and techniques ▪ Pipes ▪ Containers in cars, trains and ships	To understand factors impacting the choice of technique	
○ Causes of losses ▪ Accidents, technical faults and human incidents ▪ Energy used by pumps and vehicles	To understand the main causes of losses, to know how to avoid losses	
○ Environmental aspects	To know the environmental aspects and risks of combustible transfer during the whole life cycle of the system from manufacturing to recycling	

• Minimizing, collecting and reusing the loss energy (15 %)	To understand the benefits of minimizing the loss, to know how to minimize the energy loss	Designs
○ Insulation	To understand how the constructions can affect energy loss.	Heat losses Thermal insulation
○ Minimizing the friction	To understand how the design of systems can impact on energy economy	Friction in pumps
○ Minimizing the air / water / electric resistance	To understand what the resistance is and how to impact on it.	
○ Recovery of heat (see above)	To know how to recovery (loss) heat	
○ Recovery of kinetic energy e.g. in electric cars	To know how to recovery kinetic energy	
○ Technologic challenges in minimizing and reusing the loss energy	To know the technologic challenges that are slowing down the development	
○ Loss caused in energy transfer – see the next course: Energy transfer	To understand the importance of energy transfer in minimizing the losses.	
○ Environmental aspects	To know the environmental aspects of minimizing energy losses during the whole life cycle of the system from manufacturing to recycling	
○ Commercial aspects		
• Storing the heat / cool (5 %)	To understand the possibilities, challenges and benefits of storing the heat. To know the methods used and methods under the development.	New ways Molten sand

Optional parts

(At least 7 CU must be chosen)

Renewable Energy Sources 2 4 CU

The second part of Renewable Energy Sources -course concentrates in sources the renewability or carbon neutrality of which can be questioned. E.g., producing and using ethanol causes in most cases carbon dioxide whereas cultivating the plants from which ethanol is made of binds carbon dioxide via photosynthesis. What is the final result concerning the carbon neutrality depends on many variables? However, the research, production and use of these so-called renewable combustibles has increased during the latest decades due to the fact that they can be used in many contemporary motors with minor modifications.

Geothermal heating and cooling, including geothermal condensing power plants used in some volcanic regions is in common considered to be riskless, carbon neutral and not affecting to the greenhouse effect but – depending to the area where geothermal heat is used – the situation is not necessary so simple. In Finland, for example, the soil contains radioactive radon, which is released to the atmosphere when a heath well is drilled. In Siberia and Northern Canada, drilling the soil may release huge amounts of methane that is considered to be one of the greenhouse gases, to the atmosphere, and drilled wells in volcanic soil may cause carbon monoxide and carbon dioxide emissions. On the other hand, some of the systems, e.g., geothermal heat pumps, are easily included into contemporary central heating systems.

Minimizing, collecting and reusing the loss energy is – on point of view of sustainable development - an essential part of both traditional energy technology and renewable energy technology. Among the known

examples of minimizing the loss are the thermal insulation regulations of buildings and regulations concerning the idling of motor vehicles. In many cases – like examples above – minimizing the energy loss also supports the reducing of pollutant emissions. The two topics, *renewable combustibles* and *geothermal energy*, which are available to be included to the course *Renewable Energy Sources 2* are 2 CU courses each.

ISSUES	Goals of learning	Links to the material (Examples)
• Renewable combustibles (2 CU)	To understand the challenges and possibilities of production and usage of renewable combustibles	Products (commercial) Global aspect Renewable energy
○ e.g. ethanol, methanol, biodiesel, biogas, carbo monoxide, fuel wood	To know the most common renewable fuels and different ways to produce them	Examples Articles
○ Usage and usability	To be aware of the challenges and issues concerning to the usage of renewable combustibles	Use of cleaner fuels
▪ Changes and modifications required to motors and heating systems	To understand the requirements renewable fuels set to the motors and heating systems	Motors
○ Production	To understand the production of different renewable combustibles	Materials (commercial) Technology
○ Environmental aspects	To know the environmental aspects of different renewable combustibles during the whole life cycle of the system from manufacturing to recycling	
○ Commercial aspects	To understand how the marketing and delivery of renewable combustibles can be developed	
• Geothermal heating and cooling (2 CU)	To know the geothermal heat and benefits and challenges in utilizing it.	Heating and Cooling Power plants History and…
○ Known applications	To know what kind of applications to utilize geothermal heat has been develop.	www.thermia.com (Commercial)
○ Usability of geothermal systems	To know, where, when and how to use geothermal systems	
○ Scalability of systems	To understand the requirements a scalability sets to planning and manufacturing the systems	
○ Planning and installing geothermal systems	To be able to plan, install and implement common small geothermal systems	
○ Environmental aspects	To know the environmental aspects of utilizing geothermal heat during the whole life cycle of the system from manufacturing to recycling	
○ Commercial aspects	To understand the issues impacting to marketing and	

	implementing the geothermal systems	
○ Other applications basing to thermal pumps	To know other applications and implementing and usage of them.	Heat pump systems Articles
▪ Air source heat pump		
▪ Exhaust (air) heat recovery		
▪ Exhaust water heat recovery		
▪ Reuse of the heat from cooling systems		

Special Questions in Renewable Energy Technology

As the target group of the education is immigrants and refugees, many of them coming from countries where the lack of energy in everyday life is emerging, and where the lack of infrastructure emphasizes the mixed energy sources, micro-sized energy producers and co-operation between separate stakeholders. On the other hand, mixed energy production and micro-sized energy producers are emerging phenomena also in European Union. The micro-sized electric plants like solar electric panels and windmills, as well as systems they are using, will most probably operate in low voltage area from 12 to 48 volts to minimize both losses caused by inverters and accidents caused by higher voltage. However, there are many issues in low voltage systems that should be considered when planning and implementing the systems. Finally, the contemporary situation in nuclear power should be discussed. Although the nuclear power is not considered as renewable power, the energy technicians should have at least basic knowledge concerning the fission, fusion and their risks and opportunities. Furthermore, there has been developed small fission plants, which are said to be a solution to complement the local production of renewable energy. The environmental activists in many countries are now changing their earlier strongly negative attitudes and accepting the nuclear power as temporary solution, which helps reducing greenhouse gases during the way to completely green energy production, whatever it could be.

The topics that are available and their CU-values are

ISSUES	**Goals of learning**	**Links to the material (Examples)**
• Mixed energy sources (1 CU)	To realize that system may produce more than one type of energy, to know when, and how, this kind of systems would be usable and why.	Depending to the interests
○ Heat and cool (e.g. heat pumps)	To be able to install and implement simple heath pump	
○ Heat and electric (e.g. solar plants, condensing power plants)	To identify different ways to produce energy in larger scale	
○ Heat and kinetic (e.g. condensing power plants)		
○ Electric and kinetic (e.g. wind mills)		
• Micro-sized energy producers (1 CU)	To know the challenges in micro-size energy production	VTT Heat VTT Microgrids
○ Trading the energy (surplus or everything), connecting to networks / grids ○ Local regulations ○ Governmental support ○ Pricing and taxation systems	Local circumstances vary, to be completed by local education provider	E.g. Blockchain

• Co-operation (1 CU ○ Producers ○ Consumers ○ Suppliers of equipment ○ Energy transfer operators	To understand the importance of co-operation between different participants in renewable energy markets.	Blockchain Path to success Collaboration is crucial
• Fission and fusion (1 CU) ○ Benefits (impartial and objective approach) ○ Risks (impartial and objective approach) ○ Small-sized fission plants ○ Contemporary situation of fusion plant development	To have a true and fair view concerning the contemporary situation of nuclear power, and the possibilities and risks of different ways to produce and utilize nuclear power.	Nuclear power today Fission VS fusion Fusion today (example)
• Storing and Reusing the CO2 (1 CU)	To understand the challenges of storing and reusing CO2	Reusing technologies Storing Is storing safe?
• Improving the energy efficiency, (4 CU) ○ Building construction ○ Isolating ○ Recovery of waste energy ○ Designing and planning;	To understand what factors have an impact on energy efficiency, how to improve energy efficiency and how to design and plan energy effective constructions	Competitive approach Energy Efficiency in buildings How to improve Improving… How to… (Commercial)
• Measuring and evaluating the energy efficiency (2 CU) ○ Legislation and regulations ○ Measuring ○ Calculations	To be able to measure and evaluate the energy-efficiency of building	Measuring Evaluating Tools (example)

Management and entrepreneurship studies (Optional courses)

One goal of this education is to encourage and help persons with a business idea to start their own business instead of working as an employee. The management and entrepreneurship studies will be offered as optional studies so that every student can choose those courses best applied to his/her situation and needs. The optional courses offered could include

- Business management
- Business jurisprudence
- Contract jurisprudence
- Personnel management
- Accounting
- Tax jurisprudence
- Financial management
- Marketing and communication

etc. All the courses should be applied to local legislation and regulations.

Further material

Further material can be applied according to needs. Following links, e.g., are worth looking into:

http://veste-project.eu/results/

https://www.oph.fi/download/178167_further_qualification_for_entrepreneurs_2012.pdf

https://www.oph.fi/download/140416_vocational_qualification_in_electrical_engineering_and_automation_technology_2009.pdf

https://www.globalccsinstitute.com/

https://www.weforum.org/system-initiatives/shaping-the-future-of-energy

https://www.irena.org/

https://europa.eu/youreurope/business/index_en.htm

https://www.interreg-central.eu/Content.Node/4-energy-final.pdf

https://drive.google.com/file/d/1kD9kjDCFdnMG4sU8sUBib9pbItAgNzBZ/view

Also the products of earlier courses are useful:

Curriculum_Energy efficient construction_

Curriculum_Energy efficiency_EN.pdf

Curriculum_Seminar Solar Energy_EN.pdf

Modifications allowed

The proportional division and content of separate courses suggested above can be changed if local conditions or needs of participants could be responded better by other solutions.

Examinations and qualifications

Examinations will be coordinated, and competences will be controlled according to local regulation and locally required qualifications. It is each local actor's responsibility to take care that the admission requirements are fulfilled before the qualification application.

Training VI Modular Building Owner Energy Training

- Curriculum
- Implementation

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Co-funded by the Erasmus+ Programme of the European Union

Report on the planning/conceptualization of the Builder-owner seminar

Created by:

Mike Seiferheld, Chamber of Crafts, Dresden

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Introduction

The construction industry is increasingly focussing on sustainability and material savings. The aim of the workshop is to give future building owners (private or SME craft businesses) a comprehensive overview of what to expect from a building project or refurbishment. The aim is to provide an independent insight into the building envelope and system technology in order to support the client in their decision-making phase and to encourage them to stick to their ideas and convictions.

To this end, independent facts and specialist knowledge should be conveyed in precisely measured doses.
Finally, an insight into the funding and financing options will be provided.

Period of realisation:

This seminar is designed to be accessible to all interested parties. Each of the three modules comprises 8 hours and each module is held over two evenings.

Planned were:
Module 1 on 29 and 30 May from 3:15 p.m. to approx. 7:00 p.m.
Module 2 on 12 and 13 June from 3:15 p.m. to approx. 7:00 p.m.
Module 3 on 26 and 27 June from 3:15 p.m. to approx. 7:00 p.m.

Methods:

Training takes place in modern seminar rooms. For practical demonstrations/presentations of systems and/or materials, the workshops with training walls of the relevant specialist areas/trades could be used, provided these are available in our training centre.

Seminar content:

In this workshop, the different interests of the participants should be taken into account. The three modules could also be taken individually or in one go. At the beginning of each module, the various interests are queried again in order to be able to address specific questions in a more targeted manner.

Contents of the modules:

- Legal issues and responsibilities of a building owner and
  Basics of the building envelope/building envelope according to GEG
- Fundamentals of systems engineering - heat generation and
  Electricity from renewable energies
- Basics of SmartHome system technology - drinking water and waste water in the building

Costs/calculation and possible subsidy programmes

Special features of the implementation:

This special seminar is aimed at prospective builders as well as construction companies and architects. It can be extended to all other trades in the field of 'turnkey construction'.

Approval and organisation of the training

Selection of participants / target group:

This seminar is primarily aimed at potential private builders and their construction planners and architects. The seminar can be attended by both men and women.

This seminar was advertised in regional magazines and on social media channels. Participants can register independently via the training centre's course portal at https://njumii.de. The motivation for participants to register is the desire to realise a private construction project in the near future and to find out again or in advance about the legal regulations and the resulting possibilities for implementing the construction project. Each participant is responsible for the costs of the training.

Participants receive comprehensive support at the Dresden Chamber of Crafts training centre. Customer support is the point of contact before the start of the course, e.g. with regard to costs, time frame, general conditions and admission requirements. After registration or at the start of the course, the course administration takes over the participant support. At the beginning of the course, they will provide comprehensive information on the general conditions in the centre and the course schedule. A welcome, information on break times, house rules and instructions are provided at the start of the course. The course administration team will also answer any questions that arise at the beginning or during the course.

The workshop comprised 3 modules, each with 8 teaching units on a part-time basis. For each module, the 8 hours are divided into 2 x 4 hours in the afternoon between 15:00 and 19:00. There is no special entry requirement in the sense of special vocational training.

Information on lecturers:

The lecturers used are all from the areas of construction preparation, construction consultancy and relevant trainers from our company from the relevant areas. All of them have several years of professional experience in these areas and have already worked at our company for various training courses.

Planned realisation of the training

The course should be conducted in accordance with the following syllabus. The modules have the following content structure:

Module 1 - Legal issues and responsibilities of a building owner and basics of the building envelope/building envelope according to GEG

- Laws and regulations
- Contractual variants for new construction
- Contractual variants for renovation and remodelling
- Acceptance of the building project
- Questions/reflection/warranty
- Building envelope - basic terms
- New construction, existing buildings differences similarities
- Building physics, sustainable building, quality assurance

Module 2 - Fundamentals of systems engineering - heat generation and electricity from renewable energies

- System technology according to GeG
- Heating system
- Sensible and energy-efficient system concepts
- Variants of electricity generation
- Electricity from renewable energies
- New and innovative system technology

Module 3 - Basics of SmartHome system technology - drinking water and wastewater in buildings, costs/calculation and possible funding programmes

- SmartHome support
- Drinking water connection
- Drinking water hygiene
- Waste water
- Subsidy programmes
- Construction cost calculation

A scheduled final round serves to answer individual questions from the participants, to give tips on the individual areas or to evaluate the workshop for the following sessions.

Key findings and conclusions

Benefit:

At the end of the seminar, the participants, current and future builders (private or SME craft businesses), will have gained a comprehensive overview of what is involved in a construction or renovation project for the individual builder.
Starting with the application for planning permission and the corresponding legal requirements, through various types of contracts and the scope of the construction project with the question, 'What could I do myself?'.
Independent insights were provided for the building envelope and system technology, which are intended to support building owners in their discovery phase and encourage them to stick to their ideas and convictions.
To this end, independent facts and specialist knowledge were provided in precisely measured doses.
Finally, an insight was given into the available funding and financing options.

Conclusion:

The 'Building Owner Seminar' is a valuable training programme for future building owners who are interested in planning and implementing their planned construction project in accordance with legal requirements and using the latest resource-saving, sustainable technologies.

The promotion of the seminar should be expanded, and new ways should be found to reach this desired clientele of participants in advance and to sensitise them to the seminar.

Detail concept

Ablaufplan/ Feinkonzept zu den Lerneinheiten im Bauherrenseminar

Ziel des Workshops ist, dass künftige Bauherren (privat oder KMU- Handwerksunternehmen) einen umfänglichen Überblick bekommen, was bei einem Bauvorhaben oder einer Sanierung auf den Bauherren zukommt. Für die Gebäudehülle und die Anlagentechnik soll ein unabhängiger Einblick gegeben werden, um den Bauherren in seiner Findungsphase zu unterstützen und dass dieser gestärkt ist, an seinen Ideen und Überzeugungen festzuhalten.

Dafür soll genau dosiert unabhängige Fakten und Fachwissen vermittelt werden.

Im Abschluss soll noch ein Einblick auf die Förderungs- und Finanzierungsmöglichkeiten gegeben werden.

1.Modul			
Einführung in die Schulungsschwerpunkte			
	Begrüßung und Vorstellung Hintergründe und Ziele des Weiterbildungsprogramms	Begrüßung der Teilnehmer und Kurzvorstellung des Dozenten	Seiferheld
	Vorstellung der Teilnehmer und Ziel der Anwesenheit – geplante oder aktive Baumaßnahme?	Teilnehmer Startrunde mit Kaffee Übersicht der Zielgruppe und deren Interessen an dem Thema.	Seiferheld

Datum 24.07.2024 15:15 – 19:00 Uhr

4 UE	Lernrubrik	Inhalt	Dozent
rechtliche Belange und Verantwortung eines Bauherrn			
1,0 UE	Gesetze und Regelungen:	Überblick zur Einhaltung von - Baurecht (Antrag u. Genehmigung) - B-Plan - Denkmalschutz - GeG etc. - Umweltschutzauflagen? - Versicherungen: Bauherrenhaftung / Haftpflichtversicherung - Versicherung von priv. Helfern Mögliche Übertragung von Verantwortung auf Architekten, Bau-leiter, Energieberater o.ä. mit Rechten und Pflichten	Kesselring
0,5 UE	Kaufvertragsvarianten Neubau:	- Unterschied Neubau schlüsselfertig, - Neubau mit Bausatz / RM- Montage - VOB - Gewährleistung - Bank-Bürgschaften / Erfüllungsbürgschaft etc.	Kesselring
1,0 UE	Vertragliche Varianten bei Sanierung und Umbau:	- Generalunternehmer - Beauftragung von Einzelmaßnahmen - VOB und Gewährleistung	Kesselring
0,5 UE	Abnahme	- Gewerke- Abnahme - Gesamtabnahme - Tagesberichte - Ablauf, Regelungen und rechtliche Belange	Kesselring
1,0 UE	Fragen zur Reflektion und Zusammenfassung:	Bsp. Abläufe eines Projekts mit Bezug auf vorangegangene Punkte - Welche Verantwortung kann ich als Bauherr selber tragen?	Kesselring

		- Was traue ich mir zu? - Wo brauche ich Unterstützung? - Gewerke, Schnittstellen und Gewährleistung	

Datum 25.07.2024 15:15 – 19:00 Uhr

4 UE	Lernrubrik	Inhalt	Dozent
Grundlagen der Gebäudehülle / Gebäudehülle nach GEG			
0,5 UE	Bauwerksgefüge und Grundbegriffe:	- Sparren, First, Traufe, Kniestock, Wände, Gründung …etc. - Konstruktionszeichnung mit Beschriftung - Bauarten/ Varianten - Nichtwohngebäude	Dr. Franke
0,5 UE	Neubau:	Überblick in verschiede Bauweisen und deren Eigenschaften. (Massivhaus, Holzrahmenbau, Fachwerkhaus, Blockhaus …etc.) Bilder, Darstellung schematische Konstruktionen	Dr. Franke
0,5 UE	Bestandsgebäude:	Überblick zur Einschätzung des Gebäudes: #Fakten sammeln: Bauart in Qualität, Alter, Zustand … Kostenfalle Schnäppchenhaus … Bsp. Denkmal geschütztes Gebäude Bilder, Darstellung schematische Konstruktionen	Dr. Franke
0,5 UE	Grundlagen der Bauphysik:	- Was ist ein U-Wert - Dampfdicht, Diffusionsoffen - Feuchtigkeit im Gebäude - Luftdichtigkeit - Sommerlicher WS	Dr. Franke
0,5 UE	Neubau:	- Erfüllen des GEG- Nachweises - Bsp. Bilanzierung und Einflüsse zeigen	Dr. Franke
0,5 UE	Bestandsgebäude:	- Verbrauchsausweis möglich? - Vorschriften für die Sanierung nach GEG - Ausnahme Deckmalschutz - Bsp. Bilanzierung und Einflüsse zeigen - Ertüchtigung der Gebäudehülle für geringere VL- Temp.	Dr. Franke

0,5 UE	Qualitätssicherung der Gebäudehülle	- Blower Door Test - Einfluss Wärmebrücken / Wärmebrückenfaktor im Nachweis	Dr. Franke
0,5 UE	Nachhaltigkeit	- Übersicht von ausgewählten Materialien, und Konstruktionen. - Sensibilisierung auf Inhaltsstoffe und gesundes Raumklima - Ausblick Ökobilanzierung	Dr. Franke

Datum 31.07.2024 15:15 – 19:00 Uhr

Grundlagen der Anlagentechnik - Wärmegewinnung			
2. Modul			
4 UE	**Lernrubrik**	**Inhalt**	**Dozent**
1,0 UE	Anlagentechnik nach GeG	Fragen an die Bauherren zur Aufdeckung der Mythen und von Fehlverständnis. Hintergrundwissen: - Wie wird eine Anlage im GeG betrachtet. - Norm- Werte vs. Stand der Technik - Grundlage zur Ermittlung auf der Skala A-H ist der Wärmeerzeuger, der aus einem Medium Wärme erzeugt. - Primärenergiefaktor Bsp. auch ein Gebäude mit „F“ kann das GeG erfüllen.	Herr Dietrich
1,0 UE	Heizungsanlage:	- Welche grundlegenden Komponenten gehören zu einer Heizungsanlage und zur WW- Aufbereitung. - Was ist ein hydraulischer Abgleich - Optimierungsmöglichkeiten (Heizungscheck 2.0) Heizkurve – Einstellmöglichkeiten	Herr Dietrich

		- Was wird gern **nicht** gemacht? (Wasseraufbereitung, Befüllstation etc)	
2,0 UE	Sinnvolle und energieeffiziente Anlagenkonzepte	- Solarthermie, Biomasse, Wärmepumpe (Funktion und Prinzip kurz erläutern und veranschaulichen) - Vollständige Anlagenkonzepte nach GEG vorstellen Ergebnis im GeG. A – F - Wartung und Instandhaltung	Herr Felgentreff

Datum 01.08.2024 15:15 – 19:00 Uhr

Grundlagen der Anlagentechnik – Strom aus erneuerbaren Energien			
4 UE	**Lernrubrik**	**Inhalt**	**Dozent**
2,0 UE	Varianten der Stromgewinnung	Photovoltaik: - PV nicht gleich PV – was ist eine gute Qualität - Welche Varianten gibt es und was ist in Entwicklung - Übersicht eines Anlagenkonzeptes - Bsp. Leistung einer Anlage - Stromspeicher - Wartung und Instandhaltung - rechtliche Randbedingungen – Einspeisung Verkauf etc. Bsp. Angebote über Leasing usw. Ausblick auf: - Windkraft - Wasserkraft - Sonstige	Herr Felgentreff
2,0 UE	neue innovative Anlagentechnik	- Nahwärmenetze / Natürliche Wärmespeicher - Kühlung im Sommer - Sektorenkopplung - mehrstufige Wärmepumpen Systeme	Herr Felgentreff

		- Wärmegewinnung aus dem Abwassersystem
		- Warmwasser / Trinkwasserstation, Durchlauferhitzer
		- H2 – Bsp. HPS – Picea
		- Überblick zur intelligenten Gebäudesteuerung
		  o Nutzung solarer Gewinne
		  o Verschattung im Sommer
		  o Kopplung von Haushaltsgeräten zu PV- Stromnutzung
		  o Weiteres	

Datum 07.08.2024 15:15 – 19:00 Uhr

Grundlagen der Anlagentechnik			
3. Modul			
2 UE	**Lernrubrik**	**Inhalt**	**Dozent**
	SmartHome- Unterstützung	richtige Ansätze? - Mehr als nur Licht an - Heizungssteuerung (Sinnvolles und „Spielerein“)	Nieschalke/ Seiferheld

Trinkwasser und Abwasser im Gebäude			
2 UE	Trinkwasseranschluss	- Rechtliche Regelungen für Trinkwasser - Aufgaben und Rechte mit den zuständigen Wasserwerken - Komponenten und Überblick	Seiferheld/ Hausdorf

	Trinkwasserhygiene	- Keime und sauberes Trinkwasser - Weitere Inhaltsstoffe im Trinkwasser	Seiferheld/ Haus-dorf
		- Anlagenkonzept zur Warmwasseraufbereitung mit Blick auf Wasserhygiene. / Verweis auf Anlagentechnik? - Nutzungsgewohnheiten reflektieren – Bsp. für verschiedene Haushalte. / Verweis auf Anlagentechnik?	Seiferheld/ Haus-dorf
	Abwasser:	- Abwasseranschluss - Rechtliches bez. Abwasser (Regenwassereinleitung, verbotene Entsorgung) - Ausblick, welche Inhaltstoffe können Kläranlagen nicht filtern.	Seiferheld/ Haus-dorf

Datum 08.08.2024 15:15 – 19:00 Uhr

Förderprogramme / Kosten und Kalkulationen			
4 UE	**Lernrubrik**	**Inhalt**	**Dozent**
2,0 UE	Förderprogramme	Wichtige Förderprogramme: - Zuständige Stellen: KFW, Bafa etc. - Überblick Förderprogramme - auch indiv. Förderung der Bundesländer - besondere Kredite (Bsp. SAB) Kehrseite von Förderungen: - Preisbeobachtungen - Förderung ist keine Finanzierung / Veranschaulichung - Umfang Mehraufwand, um Förderungen zu bekommen BSP: Wieviel Mehrkosten bis zum KFW- Haus? - Ausblick auf zusätzliche Investitionen (Zufahrt,	Hr. Helm
2,0 UE	Baukostenkalkulation	Übersicht erstellen: - Normen und Richtlinien	Hr. Helm

		- Baunebenkosten (Notar, Architekt, Energieberater etc.) - Erschließungskosten - Kostenüberblick	
Zusammenfassung und Abschluss			
	abschließender Überblick über das Gesamtsystem eines Gebäudes	*Bild mit Gebäude und Komponenten*	Hr. Helm
		Wichtig ist noch einmal die Angst zu nehmen und zu betonen, mit offenen Augen und strukturiert an das jeweilige Projekt heranzutreten.	Seiferheld
	Abschlussrunde: mit Fragen, Tipps, und Reflektion		
		Offene Schlussrunde	Seiferheld

Trainings VIII
Energy saving and energy efficiency

- Implementation Report
- Konzept Heizungsoptimierung
- Wartungsarbeiten an Heiz- und Trinkwasser-Anlagen
- Konzept Wartungsarbeiten an Heizungs- und Trinkwasser-Anlagen
- Konzept Wärmepumpensysteme
- Auslegung und Planung von Wärmepumpen
- Konzept Auslegung und Planung von Wärmepumpen

Three-level Centers of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy

Co-funded by the Erasmus+ Programme of the European Union

Report on the implementation

1. heating optimization (incl. hydraulic balancing)
2. maintenance work on heating and drinking water systems
3. heat pump systems
4. design and planning of heat pumps (BAFA)

Prepared by:

Annegret Umlauft, Chamber of Crafts Dresden

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Attachments ..... **Fehler! Textmarke nicht definiert.**

Introduction

Heating optimization is an essential part of the energy-efficient refurbishment of buildings. It aims to reduce energy consumption, increase user comfort and reduce the environmental impact. A central aspect of this optimization is hydraulic balancing, which ensures that the heating system works efficiently and that all radiators are supplied with heat evenly.

In addition to hydraulic balancing, common methods of heating optimization include checking and optimizing the control technology as well as the maintenance and repair of heating systems. If necessary, replacing the system with a new technology, e.g. heat pump technology, can also bring success. As a result, these seminars are thematically coordinated and, in view of the challenges in the areas of energy, climate and environmental protection, all pursue the goal of increasing the skills of employees/entrepreneurs and boosting the competitiveness of trade businesses.

Period of implementation:

1. Heating optimization (incl. hydraulic balancing) with 16 units - 12-13.12.23

2. Maintenance work on heating and drinking water systems with 8 units - 15.12.2022

3. Heat pump systems with 8 units - 30.05.2023

4. Design and planning of heat pumps (BAFA) with 16 units - 05.06.2024 to 06.06.2024

The seminars were each held as full-time one-day seminars, with each teaching unit (UE) lasting 45 minutes.

Methodik:

The training takes place in modern seminar rooms. For practical demonstrations/presentations of systems and/or materials, the workshops with training walls of the relevant departments/trades could be used, as well as the rooms and facilities of our Energy Efficiency Center for Buildings (EEZ).

Seminar contents:

<u>Heating optimization:</u>

The main topic of this 2-day seminar is the reduction of energy consumption for heating and hot water heating. More and more buildings are being modernized in terms of energy efficiency. This requires not only the use of efficient heat generators, but also the optimal coordination of all components of the heat supply with each other and with the building. Based on current requirements for heating system modernization, the

course provides assistance for stocktaking and highlights key dependencies in system optimization.

Maintenance work on heating and drinking water systems:

In this one-day seminar, the course participants were taught in a structured way how regular inspections and maintenance of building services systems can increase their operational safety, extend their service life and achieve energy savings. Regular maintenance is mandatory for the proper operation of building services systems.

Heat pump systems:
This one-day seminar provided further knowledge on the areas of application, implementation, operation and cost-effectiveness of heat pumps. Although there is a general basic knowledge of possible applications and the installation of heat pump systems, there is often a lack of clarity about their actual efficiency depending on the actual circumstances. Heat pumps for the efficient use of renewable energies are in demand. They work reliably and independently of an oil or gas supply. But does every system always pay off everywhere? Further knowledge was imparted here in order to be able to provide customers/builders with professional planning and advice in practice.

Design and planning of heat pumps (BAFA)
In this two-day seminar, the heat pump system was taught across all manufacturers. The focus was on the planning, installation, maintenance and optimum setting of heat pumps. The use of environmentally friendly heat pump systems in new builds and renovations was also discussed. Both the system temperatures and the necessary efficiency are considered in relation to the heat source to be used. The use of new refrigerants and the associated higher flow temperatures were also discussed.

Special features of the implementation:

These special seminars are aimed at specialists in the plumbing, heating and air conditioning trades as well as the electrical trade, building energy consultants, planners and those interested in the subject, employees of the real estate industry and housing associations and also prospective building owners as well as construction companies and architects.

Approval and organization of the training

Selection of participants/target group:

The seminar is basically aimed at all specialists in the sanitary, heating and air conditioning trade, building energy consultants, planners and anyone interested in the subject.

Participants can register independently via the training center's course portal at https://njumii.de. The motivation for participants to register is the desire to receive further training in their position and for the performance of their own job. The costs of the training are usually borne by the company, as the possible transfer of new tasks or the more efficient performance of current tasks creates corresponding added value.

The training center of the Dresden Chamber of Crafts provides comprehensive support for participants. Customer support is the point of contact before the start of the course, e.g. for information on costs, time frame, general conditions and admission requirements. After registration or at the start of the course, the course administration takes over the participant support. At the start of the course, they will provide extensive information on the general conditions in the building and the course schedule. A welcome, information on break times, house rules and instructions are provided at the start of the course. The course administrator will also answer any questions that arise at the beginning or during the course.

A total of 30 participants attended these 4 courses. All four courses were held in presence with 8 or 16 full-time teaching units. General basic knowledge of heating technology and construction planning is a prerequisite for admission. There is no special entry requirement in terms of specific vocational training.

Information about lecturers:

Most of the lecturers/trainers we use are permanently employed trainers in the field of building technology or independent specialist lecturers with a high level of expertise in the relevant specialist areas. All of them have several years of professional experience in the specialist areas and/or have already worked for various training courses at our company.

Participant profile and organization of the training

The participants were exclusively employees from companies in the sanitary, heating and air conditioning technician sector. All of the participants have a vocational qualification in this field and intend to gain further professional qualifications or a master craftsman's certificate.

Implementation of the training

The seminars were conducted in accordance with the curricula listed below. The training courses were held on the premises of njumii, the training center for the skilled trades. Theory and workshop areas with state-of-the-art technology were used.

1. **heating optimization (incl. hydraulic balancing)**

- Clarification of the energy efficiency of heating systems

- Providing an overview of legal regulations and requirements, in particular for securing the energy supply from 01.09.2022
- Building Energy Act: requirements for heating, cooling and ventilation technology as well as hot water preparation
- Carrying out a heating check in accordance with DIN EN 15378-1:2017-09
- Clarification of measures for optimization - heat generator/control
- Heating circulation pump and hydraulic balancing

2. maintenance work on heating and drinking water systems

- Overview of inspection - maintenance - repair of building services systems
- Clarification of the current legal requirements (GEG, EnSikuMaV and EnSimiMaV)
- Development of maintenance and servicing work on the heat generator (checklists)
- Practical explanations/questions
- Drinking water systems in buildings (legal basis / technical rules / overview of maintenance-relevant and safety-related equipment in drinking water installations / operation, maintenance and service of drinking water systems in accordance with DIN EN 806-5)
- Maintenance contracts - content, structure

3. heat pump systems

- Clarify the components of the heat pump system
- List and explain heat source systems
- Clarification - What are heat utilization systems
- Planning a heat pump system
- Structure and function of the refrigeration circuit
- Recording and explaining measurement data on the refrigeration circuit

4. design and planning of heat pumps (BAFA)

- Introduction to
- Preliminary study
- Detailed planning
- Domestic hot water heating
- Dimensioning of the heat generator
- Buffer storage tank (heat storage tank)
- Sound
- Preparation of quotation
- Commissioning, instruction and documentation
- Inspection and maintenance (theory)

- Calculation exercise using software

No examination was taken on the seminar content. Participants receive a personal certificate of attendance at the end of the seminar (a sample is attached to the report).

The feedback from participants via the questionnaires was predominantly very positive. Only the desire for further seminars on the subject of heating optimization/use of heat pumps was noted. No further potential was identified by the participants.

The individual curricula aimed to enable the participants to use their knowledge efficiently and responsibly in their everyday work.

Main results and conclusions

Benefit:

After completing each individual seminar, participants will be able to integrate the knowledge they have acquired into their daily work routine, provide advice and planning for heating optimization and, if necessary, refer to good alternatives for maintenance work.

The strengths of the training include the selected and applied highly practice-oriented mix of methods consisting of trainer input, instruction and subsequent implementation by the participants using the examples provided. The number of participants was deliberately limited to a maximum of 12 in order to ensure the individual nature of the support provided by the trainer.

Knowledge of current legal requirements and the possibilities of new technologies enables the implementation of effective measures to improve energy efficiency in residential and commercial buildings. The combination of technical adaptations and modern control technology not only leads to a reduction in energy consumption and heating costs, but also to increased comfort for users. In view of the current challenges in the area of climate protection, the implementation of such measures makes both economic and ecological sense. Heating optimization should therefore be considered an integral part of any energy-efficient refurbishment.

Summary:

These four seminars on the main topic of heating optimization and the use of heat pumps are valuable training opportunities for professionals interested in understanding and applying the latest technologies. With a strong focus on practical applications and a comprehensive curriculum, they provide participants with the tools they need to be successful and effective in their defined field of activity at a time when resources are becoming scarcer and the sustainability of our technologies (longevity, recycling and reuse of raw materials - in this case energy) play a major role.

The training will be continued and expanded on the basis of the successfully tested seminar offerings with the same partners and the named target groups. In terms of

content, the fast-moving nature of the topics must be taken into account when continuing the training and appropriate adjustments to the curriculum must be made on an ongoing basis by the administrative parties involved.

As things stand at present, a useful addition to the seminars on offer would be to establish a link to the “Cradle to Cradle - Circular Economy” seminar. This course is also offered by the Dresden Chamber of Crafts training center and was developed and tested as part of the 3LoE project.

IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Heizungsoptimierung - aber richtig!

13.11.2024 - 14.11.2024 | Vollzeit 08:00 bis 15:15 Uhr | Dresden | 340 € inkl. Lehrmaterial

Um den Energieverbrauch für Heizung und Warmwassererwärmung zu senken, werden immer mehr Gebäude energetisch modernisiert. Dies erfordert nicht nur den Einsatz effizienter Wärmeerzeuger, sondern auch die optimale Abstimmung aller Komponenten der Wärmeversorgung aufeinander sowie auf das Gebäude. Ausgehend von aktuellen Anforderungen an die Heizungsmodernisierung werden im Kurs Hilfestellungen für die Bestandsaufnahme gegeben und maßgebliche Abhängigkeiten bei der Anlagenoptimierung aufgezeigt.

Das erwartet Sie:

-
- Energieeffizienz an Heizunganlagen
- Überblick zu gesetzlichen Regelungen und Anforderungen insbesondere zur Sicherung der Energieversorgung ab 01.09.2022
- Gebäudeenergiegesetz: Anforderungen an die Heizungs-, Kühl- und Raumlufttechnik sowie Warmwasserbereitung
- Heizungscheck nach DIN EN 15378-1:2017-09
- Maßnahmen zur Optimierung - Wärmeerzeuger/Regelung
- Heizungsumwälzpumpe und hydraulischer Abgleich

Dauer

16 Unterrichtsstunden

Zielgruppe

Fachkräfte des Sanitär-, Heizungs- und Klimatechnikerhandwerks, Gebäudeenergieberater, Planer und Fachinteressierte

Voraussetzung

Keine besonderen Zugangsvoraussetzungen erforderlich

Abschluss

Teilnahmebescheinigung

Hinweis

Die Veranstaltung wird von der Deutschen Energieagentur (DENA) auf die Energieeffizienz-Expertenliste für Förderprogramme des Bundes angerechnet und zwar mit 16/16/16 Punkten für Wohngebäude/Nichtwohngebäude/ Energieberatung Mittelstand. Der Kurs wurde entwickelt vom Energie-Effizienz-Zentrum für Gebäude (EEZ) - Kompetenzzentrum im Netzwerk Komzet.

IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Online anmelden:

Ihr Ansprechpartner: Peggy Unglaub, peggy.unglaub@hwk-dresden.de
Tel / 0351 4640-114, Fax / 0351 4640-34114

Alle Details auf: https://www.njumii.de/Kurs/Nr-83346

ANMELDUNG

Heizungsoptimierung - aber richtig!

Kurs

Termin

Name *Vorname* *Geburtsdatum*

Straße, Hausnummer

PLZ *Ort*

E-Mail, Telefon, Fax

Beruf

Zahler der Gebühr: ☐ privat ☐ Firma (bitte Adresse angeben / Stempel)

Firmenname

Straße, Hausnummer

PLZ, Ort

Es gelten die Teilnahmebedingungen (www.njumii.de/tb) und Widerrufsbelehrung (www.njumii.de/widerruf) der Handwerkskammer Dresden. Änderungen bleiben vorbehalten! Falls Sie diese Dokumente in gedruckter Form benötigen, wenden Sie sich bitte per E-Mail an info@njumii.de oder telefonisch an 0351 4640-100.

Die Handwerkskammer Dresden verarbeitet Ihre Daten gemäß den gesetzlichen Grundlagen der Datenschutz Grundverordnung, insbesondere Art. 6 DSGVO, des Bundesdatenschutzgesetzes und des Sächsischen Datenschutzdurchführungsgesetzes, z.B. zur Anmeldung, Durchführung und Abrechnung von Bildungsmaßnahmen ggf. auch unter Einsatz von Dienstleistern. Darüber hinaus informieren wir Sie über zukünftige Bildungsmaßnahmen, Seminare und Veranstaltungen, die wir in Kooperation mit njumii - Das Bildungszentrum des Handwerks, Dresden, durchführen. Den Widerspruch können Sie schriftlich bei der Handwerkskammer Dresden, Am Lagerplatz 8, 01099 Dresden, per Telefax +49 (0)351 4719-188 oder per E-Mail an widerspruch@hwk-dresden.de einlegen. Umfassende Hinweise zum Datenschutz finden Sie unter: www.njumii.de/ds.

Ich erkläre mit meiner Unterschrift, dass ich die Hinweise zur Kenntnis genommen habe und mit diesen einverstanden bin.

Datum *Unterschrift*

Ihr Ansprechpartner
Peggy Unglaub

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Am Lagerplatz 8
01099 Dresden

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Handwerkskammer Dresden

Handwerkskammer Dresden

Handwerkskammer Dresden
Hauptabteilung Bildungszentren
Auswertung Teilnehmerbefragung

☐ **Zwischenbefragung vom**

☑ **Endbefragung vom** 31.03.2023

		sehr gut	gut	mittelmäßig	schlecht	BZ	QKZ (80%)
Kurs:	Wartungsarbeiten an Heiz.- u. Trinkwasser						
Klasse:	214085						
Zeitraum:	31.03.2023						
Teilnehmer/-innen:	3						
ausgewertete Fragebögen:	3						
Bewertung des Kurses							
1(S)	Wie beurteilen Sie die Beratung vor Kursbeginn?	1	1	0	0	1,50	90,00
Wie zufrieden sind Sie							
1(S)	mit der Betreuung und Kursorganisation?	1	2	0	0	1,67	86,67
2(S)	mit der Ausstattung der Unterrichtsräume?	3	0	0	0	1,00	100,00
3(S)	mit der Ausstattung der Werkstätten (sofern Sie dort Unterricht hatten)?	3	0	0	0	1,00	100,00
4(S)	mit dem Angebot in der Mensa/Kantine?	0	2	1	0	2,33	73,33
Bewerten Sie bitte den Kurs hinsichtlich							
1(P)	der Aktualität	1	2	0	0	1,67	86,67
2(P)	der Praxisnähe	1	2	0	0	1,67	86,67
3(P)	des zeitlichen Ablaufs (Dauer, Unterrichtszeiten)	1	2	0	0	1,67	86,67

Gesamtbewertung

P = Produkt	**PBZ = Produktqualität**	**1,67**	
S = Service	**PQKZ = Produktkennzahl (%)**	**86,67**	ohne Mensa
BZ = Bewertungszahl	**SBZ = Servicequalität**	**1,50**	**1,29**
QKZ = Qualitätskennzahl	**SQKZ = Qualitätskennzahl (%)**	**90,00**	**94,17**

Begründung/Kommentare:

Handwerkskammer Dresden

Handwerkskammer Dresden
Hauptabteilung Bildungszentren
Auswertung Teilnehmerbefragung

☐ **Zwischenbefragung vom**

☑ **Endbefragung vom** **31.03.2023**

		sehr gut	gut	mittelmäßig	schlecht		
Kurs:	**Wartungsarbeiten an Heiz.- u. Trinkwasser**						
Klasse:	**214085**						
Zeitraum:	**31.03.2023**						
Teilnehmer/-innen:	**3**						80%
ausgewertete Fragebögen:	**3**					**BZ**	**QKZ**
	Bewertung des Dozenten	**Dozentenname Hr. Dietrich**					
1	das Fachwissen	2	0	1	0	1,67	86,67
2	die Fertigkeits- und Wissensvermittlung	2	0	1	0	1,67	86,67
3	die Unterrichtsgestaltung	1	1	0	1	2,33	73,33
4	die fachliche Betreuung	1	1	0	1	2,33	73,33
5	das Verhalten / Auftreten	2	0	1	0	1,67	86,67
6	die erhaltenen Kursunterlagen	1	1	0	1	2,33	73,33

Gesamtbewertung

BZ = Bewertungszahl	**Qualität**	**2,00**
QKZ = Qualitätskennzahl	**Qualitätskennzahl (%)**	**80,00**

Begründung/Kommentare:

Handwerkskammer Dresden

Handwerkskammer Dresden
Hauptabteilung Bildungszentren
Auswertung Teilnehmerbefragung

☐ **Zwischenbefragung vom**

☑ **Endbefragung vom** **31.03.2023**

		sehr gut	gut	mittelmäßig	schlecht		
Kurs:	**Wartungsarbeiten an Heiz.- u. Trinkwasser**						
Klasse:	**214085**						
Zeitraum:	**31.03.2023**						
Teilnehmer/-innen:	**3**						80%
ausgewertete Fragebögen:	**3**					**BZ**	**QKZ**
Bewertung des Dozenten	**Dozentenname Hr. Seiferheld**						
1 das Fachwissen		2	0	0	1	2,00	80,00
2 die Fertigkeits- und Wissensvermittlung		2	0	1	0	1,67	86,67
3 die Unterrichtsgestaltung		1	1	0	1	2,33	73,33
4 die fachliche Betreuung		1	1	0	1	2,33	73,33
5 das Verhalten / Auftreten		2	0	0	1	2,00	80,00
6 die erhaltenen Kursunterlagen		1	1	0	1	2,33	73,33

Gesamtbewertung

BZ = Bewertungszahl	**Qualität**	**2,11**
QKZ = Qualitätskennzahl	**Qualitätskennzahl (%)**	**77,78**

Begründung/Kommentare:

IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Wartungsarbeiten an Heizungs- und Trinkwasseranlagen

15.11.2024 | Vollzeit 08:00 bis 15:15 Uhr | Dresden | 290 € inkl. Lehrmaterial

Regelmäßige Wartung für den bestimmungsgemäßen Betrieb von haustechnischen Anlagen ist Pflicht. Den Kursteilnehmern wird strukturiert vermittelt, wie regelmäßige Inspektionen und Wartungen an haustechnischen Anlagen deren Betriebssicherheit erhöhen und Nutzungsdauern verlängern sowie die Energieeinsparungen erzielt werden können.

Das erwartet Sie:

-
- Überblick Inspektion - Wartung - Instandsetzung von haustechnischen Anlagen
- Aktuelle gesetzliche Vorgaben (GEG, EnSikuMaV und EnSimiMaV)
- Wartungs- und Instandhaltungsarbeit am Wärmeerzeuger (Checklisten)
- Praktische Erläuterungen
- Trinkwasseranlagen in Gebäuden (Gesetzliche Grundlagen / Technische Regeln / Überblick wartungsrelevanter und sicherheitstechnischer Einrichtungen in Trinkwasserinstalationen / Betrieb, Wartung und Service von Trinkwasseranlagen nach DIN EN 806-5
- Wartungsverträge

Dauer

8 Unterrichtsstunden

Zielgruppe

Fachkräfte des Sanitär-, Heizungs- und Klimatechnikerhandwerks, Anlagenbauer, Mitarbeiter der Immobilienwirtschaft und Wohnungsbaugesellschaften

Voraussetzung

Keine besonderen Zugangsvoraussetzungen erforderlich

Abschluss

Teilnahmebescheinigung

Hinweis

Die Veranstaltung wird von der Deutschen Energieagentur (DENA) auf die Energieeffizienz-Expertenliste für Förderprogramme des Bundes angerechnet und zwar mit 8/8/8 Punkten für Wohngebäude/Nichtwohngebäude/ Energieberatung Mittelstand. Der Kurs wurde entwickelt vom Energie-Effizienz-Zentrum für Gebäude (EEZ) - Kompetenzzentrum im Netzwerk Komzet.

IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Online anmelden:

Ihr Ansprechpartner: Peggy Unglaub, peggy.unglaub@hwk-dresden.de
Tel / 0351 4640-114, Fax / 0351 4640-34114

Alle Details auf: https://www.njumii.de/Kurs/Nr-83367

ANMELDUNG

Wartungsarbeiten an Heizungs- und Trinkwasseranlagen

Kurs

Termin

Name *Vorname* *Geburtsdatum*

Straße, Hausnummer

PLZ *Ort*

E-Mail, Telefon, Fax

Beruf

Zahler der Gebühr: ☐ privat ☐ Firma (bitte Adresse angeben / Stempel)

Firmenname

Straße, Hausnummer

PLZ, Ort

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Datum *Unterschrift*

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Handwerkskammer Dresden
Am Lagerplatz 8
01099 Dresden

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IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Wärmepumpensysteme

04.11.2024 | Vollzeit 08:00 bis 15:15 Uhr | Dresden | 290 € inkl. Lehrmaterial

Wärmepumpen zur effizienten Nutzung regenerativer Energien sind gefragt. Sie arbeiten zuverlässig und unabhängig von einer Versorgung mit Öl oder Gas. Doch rechnet sich jede Anlage immer und überall? Obwohl generelles Grundwissen zu Anwendungsmöglichkeiten und Errichtung von Wärmepumpenanlagen besteht, herrscht oft Unklarheit über deren wirkliche Effizienz in Abhängigkeit von den tatsächlichen Gegebenheiten. Das Seminar vermittelt erweiterte Kenntnisse zu Anwendungsbereichen, Umsetzung, Betrieb und Wirtschaftlichkeit.

Das erwartet Sie:

- Komponenten der Wärmepumpenanlage
- Wärmequellensysteme
- Wärmenutzungsanlage
- Planung einer Wärmepumpenanlage
- Aufbau und Funktion des Kältekreislaufes
- Erfassung von Messdaten am Kältekreislauf

Dauer

8 Unterrichtsstunden

Zielgruppe

Fachkräfte des Sanitär-, Heizungs- und Klimatechnikerhandwerks sowie des Elektrohandwerks

Voraussetzung

Keine besonderen Zugangsvoraussetzungen erforderlich

Abschluss

Teilnahmebescheinigung

Online anmelden:

Ihr Ansprechpartner: Peggy Unglaub, peggy.unglaub@hwk-dresden.de
Tel / 0351 4640-114, Fax / 0351 4640-34114

Alle Details auf: https://www.njumii.de/Kurs/Nr-93561

ANMELDUNG

Wärmepumpensysteme

Kurs

Termin

Name *Vorname* *Geburtsdatum*

Straße, Hausnummer

PLZ *Ort*

E-Mail, Telefon, Fax

Beruf

Zahler der Gebühr: ☐ privat ☐ Firma (bitte Adresse angeben / Stempel)

Firmenname

Straße, Hausnummer

PLZ, Ort

Es gelten die Teilnahmebedingungen (www.njumii.de/tb) und Widerrufsbelehrung (www.njumii.de/widerruf) der Handwerkskammer Dresden. Änderungen bleiben vorbehalten! Falls Sie diese Dokumente in gedruckter Form benötigen, wenden Sie sich bitte per E-Mail an info@njumii.de oder telefonisch an 0351 4640-100.

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Datum *Unterschrift*

Ihr Ansprechpartner
Peggy Unglaub

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Am Lagerplatz 8
01099 Dresden

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Handwerkskammer Dresden
Hauptabteilung Bildungszentren
Auswertung Teilnehmerbefragung

☐ **Zwischenbefragung vom** _____

☑ **Endbefragung vom** **06.06.2024**

		sehr gut	gut	mittelmäßig	schlecht		
Kurs:	**Auslegung und Planung von Wärmepumpen**						
Klasse:	**W270033-24-002**						
Zeitraum:	**05.06. - 06.06.2024**						
Teilnehmer/-innen:	**7**						80%
ausgewertete Fragebögen:	**7**					**BZ**	**QKZ**
Bewertung des Kurses							
1(S)	Wie beurteilen Sie die Beratung vor Kursbeginn?	5	2	0	0	1,29	94,29
Wie zufrieden sind Sie							
1(S)	mit der Betreuung und Kursorganisation?	6	1	0	0	1,14	97,14
2(S)	mit der Ausstattung der Unterrichtsräume?	6	1	0	0	1,14	97,14
3(S)	mit der Ausstattung der Werkstätten (sofern Sie dort Unterricht hatten)?	6	0	0	0	1,00	100,00
4(S)	mit dem Angebot in der Mensa/Kantine?	3	4	0	0	1,57	88,57
Bewerten Sie bitte den Kurs hinsichtlich							
1(P)	der Aktualität	5	2	0	0	1,29	94,29
2(P)	der Praxisnähe	7	0	0	0	1,00	100,00
3(P)	des zeitlichen Ablaufs (Dauer, Unterrichtszeiten)	6	1	0	0	1,14	97,14

Gesamtbewertung

P = Produkt	**PBZ = Produktqualität**	**1,14**	
S = Service	**PQKZ = Produktkennzahl (%)**	**97,14**	ohne Mensa
BZ = Bewertungszahl	**SBZ = Servicequalität**	**1,23**	**1,14**
QKZ = Qualitätskennzahl	**SQKZ = Qualitätskennzahl (%)**	**95,43**	**97,14**

Begründung/Kommentare:

Handwerkskammer Dresden

Handwerkskammer Dresden
Hauptabteilung Bildungszentren
Auswertung Teilnehmerbefragung

☐ **Zwischenbefragung vom**

☑ **Endbefragung vom** **06.06.2024**

		sehr gut	gut	mittelmäßig	schlecht		
Kurs:	**Auslegung und Planung von Wärmepumpen**						
Klasse:	**W270033-24-002**						
Zeitraum:	**05.06. - 06.06.2024**						
Teilnehmer/-innen:	**7**						80%
ausgewertete Fragebögen:	**7**					**BZ**	**QKZ**

	Bewertung des Dozenten	**Dozentenname Hr. Sporkhorst**					
1	das Fachwissen	7	0	0	0	1,00	100,00
2	die Fertigkeits- und Wissensvermittlung	6	1	0	0	1,14	97,14
3	die Unterrichtsgestaltung	4	3	0	0	1,43	91,43
4	die fachliche Betreuung	6	1	0	0	1,14	97,14
5	das Verhalten / Auftreten	7	0	0	0	1,00	100,00
6	die erhaltenen Kursunterlagen	4	3	0	0	1,43	91,43

Gesamtbewertung

BZ = Bewertungszahl	**Qualität**	**1,19**
QKZ = Qualitätskennzahl	**Qualitätskennzahl (%)**	**96,19**

Begründung/Kommentare:

IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Auslegung und Planung von Wärmepumpen (BAFA)

16.01.2025 - 17.01.2025 | Vollzeit 09:00 bis 16:00 Uhr | Dresden | 500 € inkl. Lehrmaterial

In diesem Zwei-Tagesseminar wird Ihnen das System der Wärmepumpe herstellerübergreifend vermittelt. Dabei geht es um die Planung, Installation, Wartung und optimale Einstellung von Wärmepumpen. Ebenso wird der Einsatz von umweltschonenden Wärmepumpensystemen im Neubau und Altbausanierung thematisiert. Dabei werden sowohl die Systemtemperaturen als auch die notwendige Effizienz in Abhängigkeit der zu nutzenden Wärmequelle betrachtet. Auch der Umgang mit neuen Kältemitteln und die damit verbundenen möglichen höheren Vorlauftemperaturen werden vermittelt.

Details zur Förderung entnehmen Sie bitte dem
Bundesförderung Aufbauprogramm Wärmepumpe (BAW) des Bundesamts für Wirtschaft und Ausfuhrkontrolle.

Das erwartet Sie:

- Einführung
- Voruntersuchung
- Detailplanung
- Trinkwassererwärmung
- Dimensionierung des Wärmeerzeugers
- Pufferspeicher (Wärmespeicher)
- Schall
- Angebotserstellung
- Inbetriebnahme, Unterweisung und Dokumentation
- Inspektion und Wartung (Theorie)
- Rechenübung unter Verwendung einer Software

Dauer

16 Unterrichtsstunden

Zielgruppe

Handwerker aus den Bereichen Sanitär/Heizung/Klima, Elektrotechnik, Kälte-Klima und Schornsteinfeger, TGA-Planer, Gebäudeenergieberater

IHR PERSÖNLICHES BILDUNGSANGEBOT.

Die komplette Kursübersicht finden Sie hier: www.njumii.de

Voraussetzung

Sollten Sie eine Förderung beim BAFA beantragen, darf die Anmeldung zur Schulung erst mit Erhalt des Zuwendungsbescheides erfolgen.

Achtung: Dieser Kurs kann gefördert werden. Bitte informieren Sie sich auf den Seiten des BAFA zum Aufbauprogramm Wärmepumpe.

Abschluss

Teilnahmebescheinigung

Hinweis

Die Handwerkskammer Dresden ist als Bildungsträger beim Bundesamt für Wirtschaft und Ausfuhrkontrolle gelistet. Dadurch kann die Teilnahme mit 90 Prozent bezuschusst werden.

Die Veranstaltung wird von der Deutschen Energieagentur (DENA) auf die Energieeffizienz-Expertenliste für Förderprogramme des Bundes angerechnet und zwar mit 16/16/16 Punkten für Wohngebäude/Nichtwohngebäude/Energieaudit DIN 16247/Contracting.
Der Kurs wurde entwickelt vom Energie-Effizienz-Zentrum für Gebäude (EEZ) - Kompetenzzentrum im Netzwerk Komzet.

Online anmelden:

Ihr Ansprechpartner: Peggy Unglaub, peggy.unglaub@hwk-dresden.de
Tel / 0351 4640-114, Fax / 0351 4640-34114

Alle Details auf: https://www.njumii.de/Kurs/Nr-126247

ANMELDUNG

Auslegung und Planung von Wärmepumpen (BAFA)

Kurs

Termin

Name *Vorname* *Geburtsdatum*

Straße, Hausnummer

PLZ *Ort*

E-Mail, Telefon, Fax

Beruf

Zahler der Gebühr: ☐ privat ☐ Firma (bitte Adresse angeben / Stempel)

Firmenname

Straße, Hausnummer

PLZ, Ort

Es gelten die Teilnahmebedingungen (www.njumii.de/tb) und Widerrufsbelehrung (www.njumii.de/widerruf) der Handwerkskammer Dresden. Änderungen bleiben vorbehalten! Falls Sie diese Dokumente in gedruckter Form benötigen, wenden Sie sich bitte per E-Mail an info@njumii.de oder telefonisch an 0351 4640-100.

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Ich erkläre mit meiner Unterschrift, dass ich die Hinweise zur Kenntnis genommen habe und mit diesen einverstanden bin.

Datum *Unterschrift*

Ihr Ansprechpartner
Peggy Unglaub

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Co-funded by the Erasmus+ Programme of the European Union

Training IX
Course of rational media and energy consumption and their production and distribution

- Implementation Report A
- Implementation Report B

Implementation Report A

Course of rational media and energy consumption and their production and distribution

Prepared by Izba Rzemieslnicza Malej i Sredniej Przedsiebiorczosci

Legal basis:

1. Regulation of the Minister of National Education of March 19, 2019, on continuing education in extra-curricular forms (Journal of Laws of 2019, item 652)

2. Regulation of the Minister of National Education of January 10, 2017, on the apprentice examination, master's examination and verification examination conducted by examination boards of chambers of crafts (Journal of Laws of 2017, item 89)

Entrance requirements for participants:

The course was addressed to people who wanted to acquire knowledge and skills and improve professional qualifications in the area related to the energy industry and the renewable energy sector.

Educational goals:

The aim was to prepare course participants for work in the energy sector, including renewable energy sources, and to improve their professional qualifications by:

- participation in theoretical and practical classes conducted by specialists

- acquiring knowledge about the socially important issue of sustainable development in the energy sector

- acquiring competences enabling you to take apprentice and/or master's examinations.

Framework Course Plan

1. Operation of electrical installations, machines and devices up to 1 kV (8 hours of theoretical classes);

2. Installation of interior electrical installation elements (16 hours of theoretical classes);

3. Carry out inspection and maintenance of indoor electrical installations under supervision (16 hours of theoretical classes);

4. Installation, inspection, maintenance and inspection of solar installations (8 hours of theoretical classes + 8 hours of practical classes; 16 hours in total);

1. to carry out the installation of photovoltaic system components and conduct its maintenance and periodic inspections (22 h of theoretical classes + 8 h of practical classes; Total 30 h of classes).
70 h of theoretical classes + 16 h of practical classes were conducted.
In total, the course included 86 h of classes.

Target group
The course was attended by 14 people (14 M).
All participants passed the internal exam on 31.08.2023 and completed the course on 03.09.2023. They received Certificates of completion of the course issued by the organizer.
Supporting documents: teaching logbook, attendance lists, copies of course completion certificates.

Description of learning outcomes
(1) Upon completion of the course, the participant has acquired knowledge and skills regarding:
(a) operation of installation of electrical machines and equipment up to 1 kV
b) installation of components of indoor electrical installations
c) carry out visual inspection and maintenance of indoor electrical installations under supervision
d) perform installation, visual inspection, maintenance and inspection of solar installations
e) perform installation of elements of photovoltaic installation and perform its maintenance and periodic inspection
2 The participants of the course gained knowledge of socially important issues of sustainable development in the energy sector.
3. upon completion of the course, the participant meets the formal criteria for taking the journeyman/master electrician exam.

Method and form of completion

To complete the course, the following were required: attendance at theoretical and practical classes, passing the internal final exam.

14 participants successfully completed the course.

8 participants of the course took the journeyman electrician exam, passed the exam and were qualified as journeyman electricians.

6 people took the master's exam in the electrician profession.

Supporting documents: copies of journeyman certificates, master's diplomas.r.rrr, records in the Land Registers kept by the Chamber of Crafts in Szczecin.

12.09.2023 r. 10 people (10 M) took the qualification exam before the Qualification Commission of the Association of Polish Mechanical Engineers and Technicians (SIMP): 7 persons were qualified to operate equipment, installations and networks in the position of: operation.

3 persons were qualified to deal with operation of equipment, installations and networks in the position of: supervision.

Implementation Report B

Course of rational media and energy consumption and their production and distribution

Prepared by Izba Rzemieslnicza Malej i Sredniej Przedsiebiorczosci

Legal basis:

1. the Regulation of the Minister of National Education of 19.03.2019 on continuing education in extracurricular forms (Journal of Laws of 2019, item 652).
2. the Regulation of the Minister of National Education of 10.01.2017 on journeyman's examination, master's examination and verifying examination, conducted by examination commissions of chambers of craftsmen (Journal of Laws of 2017, item 89).

Prerequisites for participants:

The course was aimed at people who wanted to acquire knowledge and skills and improve their professional qualifications in the area related to the energy industry and the renewable energy sector.

Learning objectives:

The goal was to prepare course participants for work in the energy sector including renewable energy sources, and to improve their professional qualifications by:
- participation in theoretical and practical classes conducted by specialists
- acquiring knowledge of the socially important topic of sustainable development in the energy sector
- acquiring competencies that will allow them to take journeyman and/or master's exams.

Framework Plan of the Course

1. operation of electrical installations, machinery and equipment up to 1 kV (8 h theoretical classes);
2. assembly of elements of indoor electrical installations (16 h theoretical classes);
to carry out inspection and maintenance of indoor electrical installations under supervision (16 h of theoretical classes);
2. to carry out installation, visual inspection, maintenance and periodic inspection of solar installations (8 h of theoretical classes + 8 h of practical classes; Total 16 h);
3. to perform the installation of photovoltaic installation elements and to carry out its maintenance and periodic inspections (22 h of theoretical classes + 8 h of practical classes; Total 30 h of classes).
70 h of theoretical classes + 16 h of practical classes were conducted.
In total, the course included 86 h of classes.

Target group

The course was attended by 12 people . 10 adults/workers and 2 students.
All participants completed the course. They received Certificates of completion of the course issued by the organizer.
Supporting documents: teaching logbook, attendance lists, copies of course completion certificates.

Description of learning outcomes

1 Upon completion of the course, the participant has acquired knowledge and skills regarding:
(a) operation of installation of electrical machines and equipment up to 1 kV
b) installation of components of indoor electrical installations
c) carry out visual inspection and maintenance of indoor electrical installations under supervision
d) perform installation, visual inspection, maintenance and inspection of solar installations
e) perform installation of elements of photovoltaic installation and perform its maintenance and periodic inspection
2 The participants of the course gained knowledge of socially important issues of sustainable development in the energy sector.
3. upon completion of the course, the participant meets the formal criteria for taking the journeyman/master electrician exam.

Method and form of completion

In order to complete the course, the following were required: attendance at theoretical and practical classes, positive passing of the internal final exam.
12 participants successfully completed the course.
11 course participants took the journeyman electrician exam, passed the exam and were qualified as journeyman electricians.
1 person took the master's exam in the electrician profession.

Supporting documents: copies of journeyman certificates, master's diploma, records in the Land Registers kept by the Chamber of Crafts in Szczecin.

4 people took the qualification exam before the Qualification Commission of the Association of Polish Mechanical Engineers and Technicians (SIMP) and obtained qualifications to deal with the operation of equipment, installations and networks in the following position: operation.

Supporting documents: copies of authorizations.