

Solar Thermal and Photovoltaic Market Development in Europe

Gerhard Stryi-Hipp

Managing Director of

BSW - German Solar Industry Association

Board member of

ESTIF – European Solar Thermal Industry Federation

Stralauer Platz 34, D-10243 Berlin

Tel. +49 30 2977788 51, Fax +49 30 2977788 99

stryi-hipp@bsw-solar.de, www.solarwirtschaft.de

BSW - Bundesverband Solarwirtschaft German Solar Industry Association

TASK Representing German solar branch
in the solar thermal energy and photovoltaics sectors

VISION A worldwide sustainable energy supply using solar
energy

ACTIVITIES Lobbying, political advice, public relations, market
observation, standardization

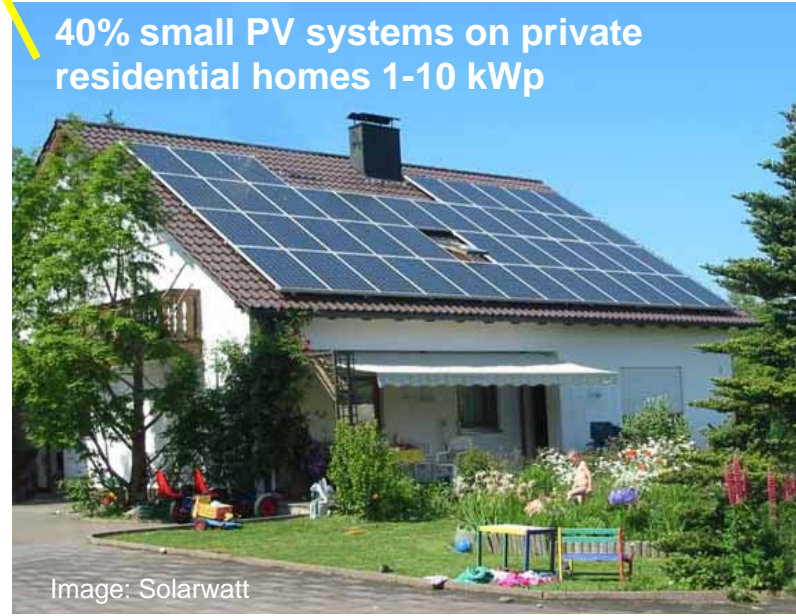
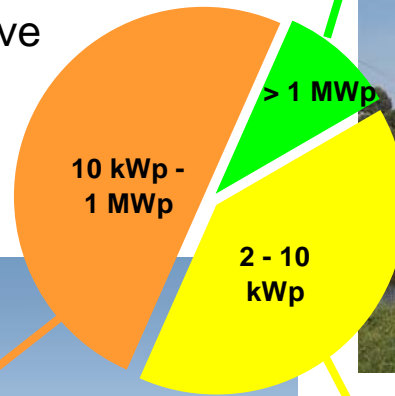
TIME Over 25 years of activity in the solar energy sector

MEMBERS More than 650 solar producers, suppliers, wholesalers,
installers and other companies active in the solar field

HEADQUARTERS Berlin

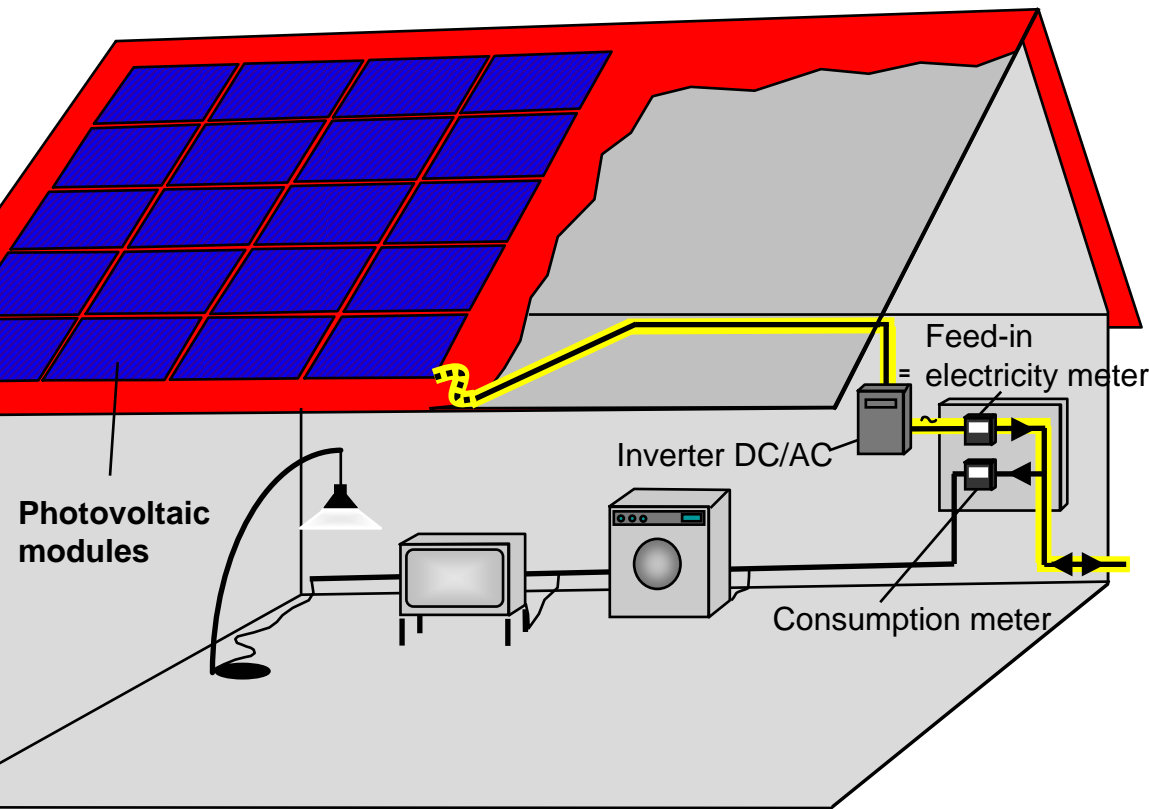
Use of Photovoltaics in Germany

- More than 300,000 PV systems have already been installed
- 98% of systems are connected to the grid



Grid-Connection of PV Systems in Germany

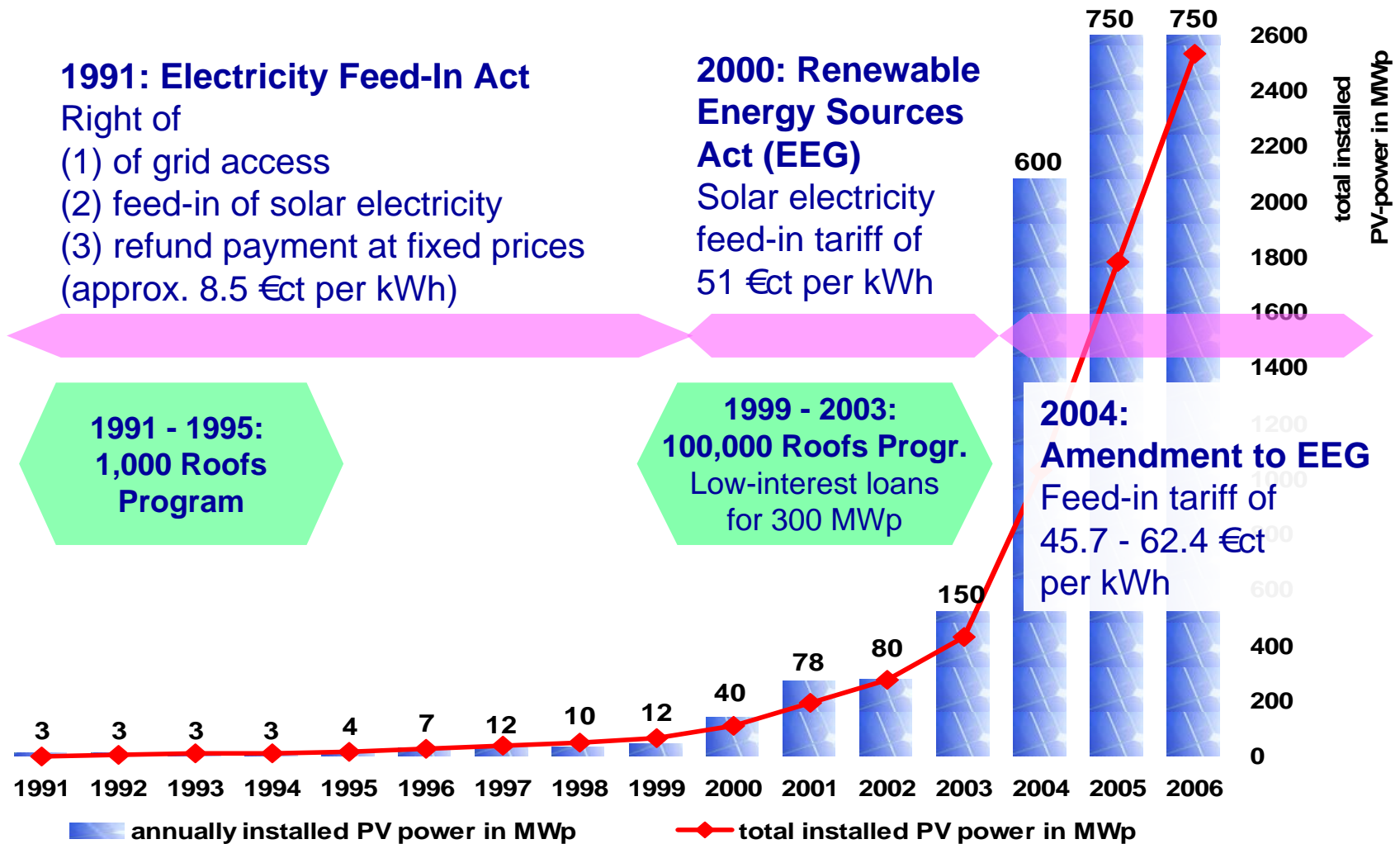
Every kWh of solar electricity produced is fed into the grid, sold to the utility and paid with a fixed price



Typical data of a small PV system

Investment costs per kWp:	4 800 €
Production of solar electricity:	900 kWh/a
Feed-in tariff:	49.21 €ct/kWh paid over 20 years
Feed in payment:	443 €/a
Interest rates (KfW):	4.7%/a eff

Development of the German PV-market



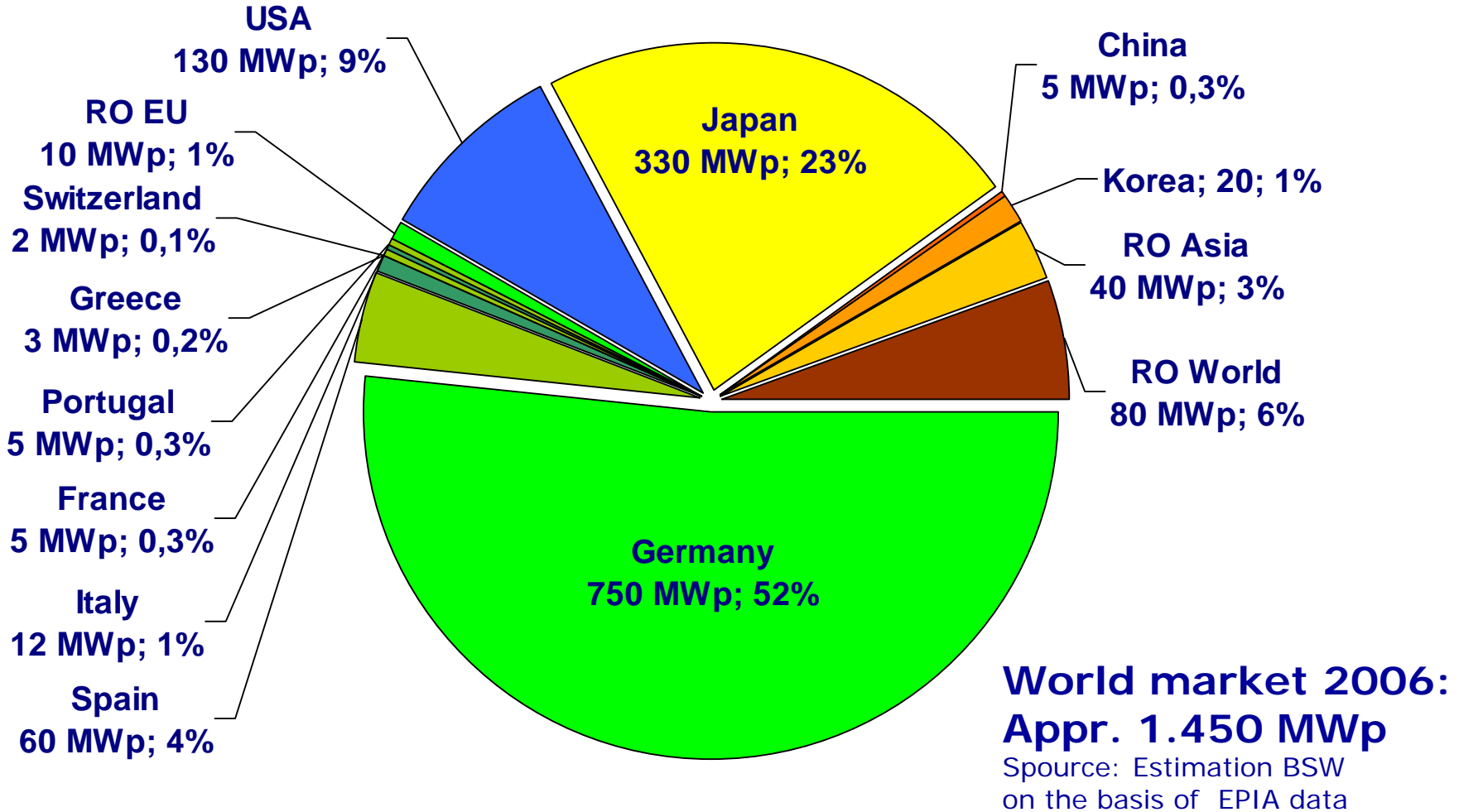
German Solar Market 2006

	Photovoltaics*	Solar Thermal Low Temperature
Newly installed power	750 MWp (el)	1.050 MW (therm)
Newly installed solar area	6 750 000 m ²	1 500 000 m ²
Total installed power	2 540 MWp (el)	5 750 MW (therm)
Total installed solar area	22.8 Mio m ²	8.2 Mio m ²
No. of newly installed systems	90 000	140 000
No. of total systems installed	300 000	940 000
Turnover 2006	3 800 Mio €	1 200 Mio €
Employees	35 000	19 000
Market growth 2006	+ 0%	+ 58%

*grid-connected

Photovoltaic World Market 2006

Germany is the biggest PV-market since 2004



Emerging Photovoltaic Markets

Europe: Countries with Feed-in tariffs

- Spain
- Italy
- France
- Greece

Countries with long experience in photovoltaics, with great potential and political framework

- USA, especially California

Countries with political willingness and market entrance programs

- South East Asia (ASEAN-Staates), especially South Korea

Spain



- **Market size 2006: 60 MWp**
- Administrative barriers hinder market growth in 2006
- The draft of a new decree is published
- Feed-in tariffs shall depend on inflation rate
- Cap of 371 MWp in 2010

	PV Plants <100 kWp	PV Plants 100kWp - 10MWp	PV Plants > 10 MWp
Decree Draft	ca. 44 €/kwh	ca. 41.7 €/kwh	ca. 23 €/kwh
RD 436/2004	ca. 44 €/kwh	ca. 23 €/kwh	ca. 23 €/kwh



Italy



- High number of applications in 2005/2006: > 500 MWp
- **But: PV systems connected to the grid 2006: 7.9 MWp**
- Reasons: Administrative barriers, problems with grid connection, applications not serious
- **New decree of February 2007: Conto energia**
 - Simplified application
 - Installation without approval
 - Cap raised to 1.200 MWp
 - New target: 3.000 MWp until 2016
 - **Feed-in tariff per kWh (plus net metering)**

	not -	partly –	fully integrated
1 - 3 kWp	40 €ct	44 €ct	49 €ct
3 - 20 kWp	38 €ct	42 €ct	46 €ct
>20 kWp	36 €ct	40 €ct	44 €ct



Greece



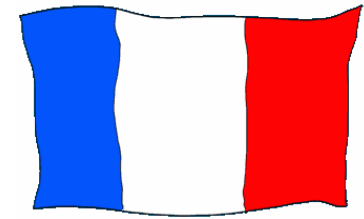
- **Market size 2006: 0,6 MWp**
- Renewable Energy Law No 3468 came into force on 27. Juni 2006

- **Feed-in tariffs per kWh**

	Mainland	Island
< 100 kWp	45 €ct/kWh	50 €ct/kWh
> 100 kWp	40 €ct/kWh	45 €ct/kWh

- **No approval for PV systems below 150 kWp necessary**
- Every investor must be registered as commercial at the tax office
=> private people will not invest
- **Target: 700 MWp until 2020**

France



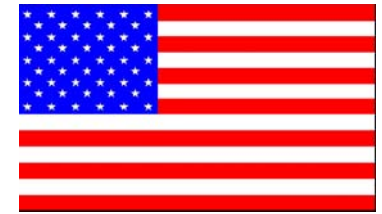
- **Market size: 5.3 MWp France metropol**
14,1 MWp with DOMTOMs (ADEME)
- New regulation from 26. Juli 2006

- **Feed-in tariffs per kWh**

	Metropol	Corsica, Oversea Dept
Basis	30 €ct	40 €ct
Building integrated	55 €ct	55 €ct

- In addition: tax reduction and sometimes regional grants
- **Targets: 120 MWp until 2010, 490 MWp until 2015**

USA



- **Market size 2006: 130 MWp (+30%)**
- **Main markets: California + New Jersey**
- National level: tax reduction by 30% of the investment
 - limited to 2000 \$ for private and 25000 \$ for commercial investments and limited to end of 2008
 - It is planned to delete the limits

California

- 21.08.06: Gouverneur Schwarzenegger signed the **1 Mio Roof Program**
- **Subsidy budget of 3.2 Billion \$**
- **Target: 3 GWp by 2017**




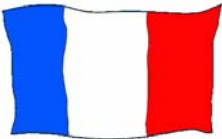

Western States (Western Governors Association)

- **Target: 4 GWp PV by 2015 (incl. California)**

New Jersey

- **Target: 90 MWp by 2008**

European PV markets are growing

	Feed in Tariff [€/kWh] Subsidy programm	Market size 2006	Targets
	37.96 – 54.21	750 MWp	20% RES-E in 2020
	23 – 44	60 MWp	371 MWp in 2010
	36 – 49	12 MWp	3000 MWp
	30 – 55 50% tax reduction max 8000/16000 € grants in some regions	12 MWp	490 MWp in 2015
	40 – 50 20%-60% grants for commercial plants	1.25 MWp (25% grid connected)	700 MWp in 2020

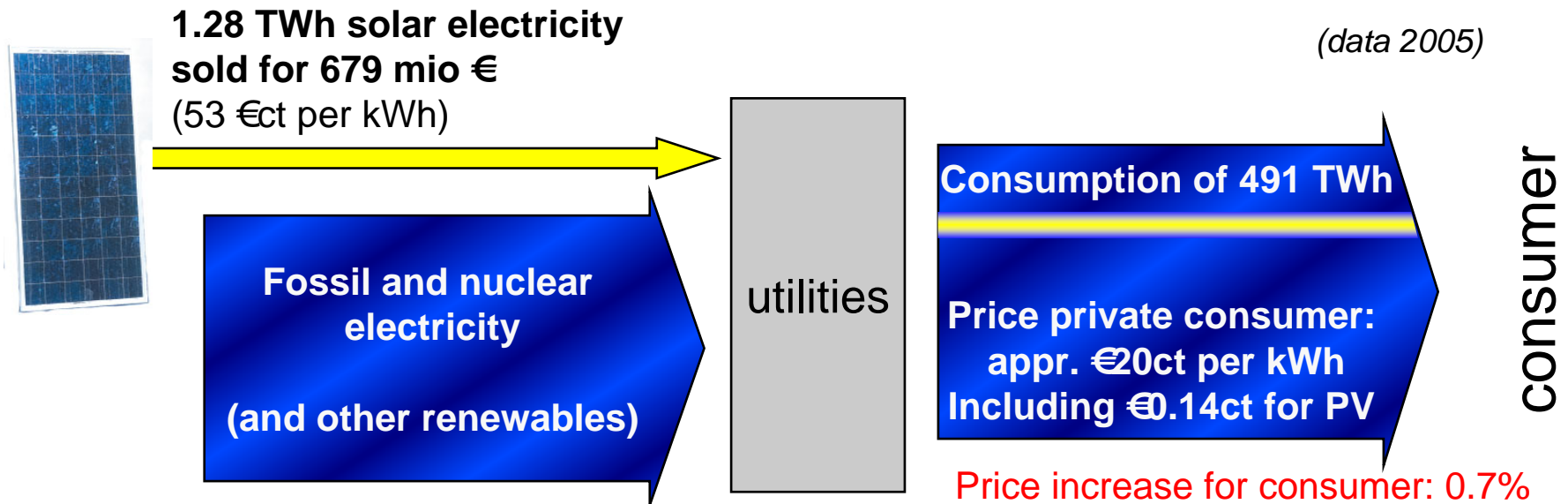
How the feed-in law is working: Example Germany

Principles

- Every PV system **has to be connected** to the grid by the utility
- Every solar kWh which is offered **has to be bought** by the utility
- Every solar kWh **has to be payed with a fixed price over 20 years**
- The feed-in tariff is **reduced every year by 5%** for new installed PV-systems

Who has to pay the higher PV costs?

- The costs for PV electricity are covered by all rate payers:



EEG: Photovoltaic Feed-in Tariffs

Feed-in tariffs in Germany for PV systems installed in 2007, payed over 20 years

Feed-in tariff per kWh	< 30 kWp	30–100 kWp	> 100 kWp
on buildings and noise protection walls	€ct 49.21	€ct 46.82	€ct 46.30
Façade-integrated	+ €ct 5		
Open land (ground-mounted)	€ct 37.96		

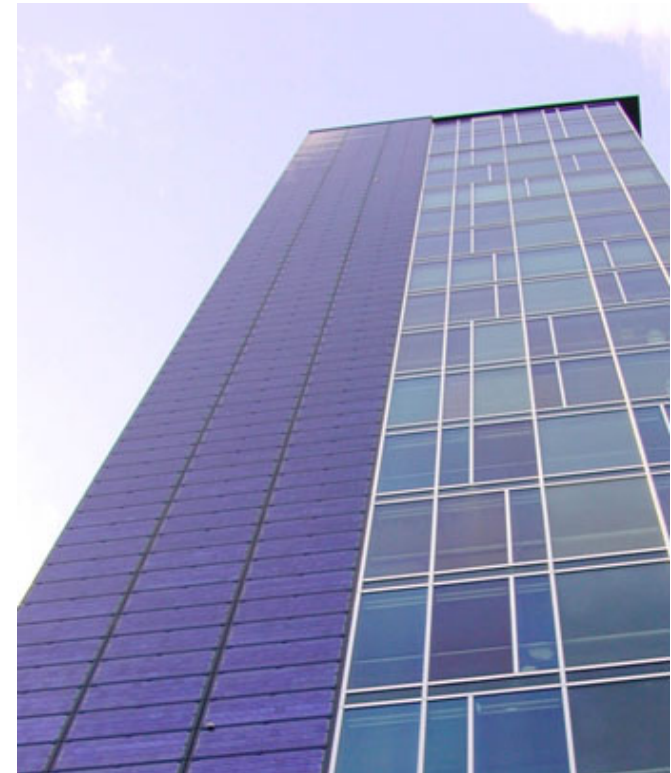


Image: Solar-Fabrik



Image: Degussa

Industry is following the market: example Germany

- **More than €10 billion were invested in PV systems since 2000**
- **More than €2 billion were invested in manufacturing plants since 2000**
 - About 40 companies produce silicon, wafers, cells, modules and inverters
 - Modern and automated production lines
 - Strong technological development and increased R&D activities
 - Improved efficiency, improved products
- **Drop in costs for PV systems of**
 - approx. 25% from 1999 to 2003
 - 60% from 1991 to 2003
 - price reduction of 10% since June 2006



Image: Q-Cells

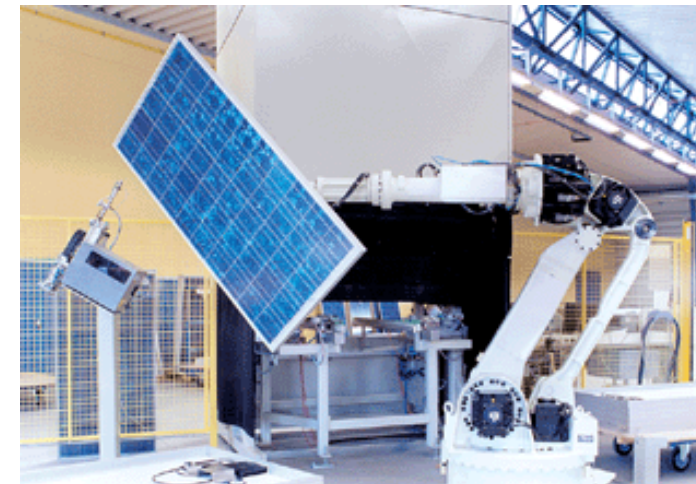
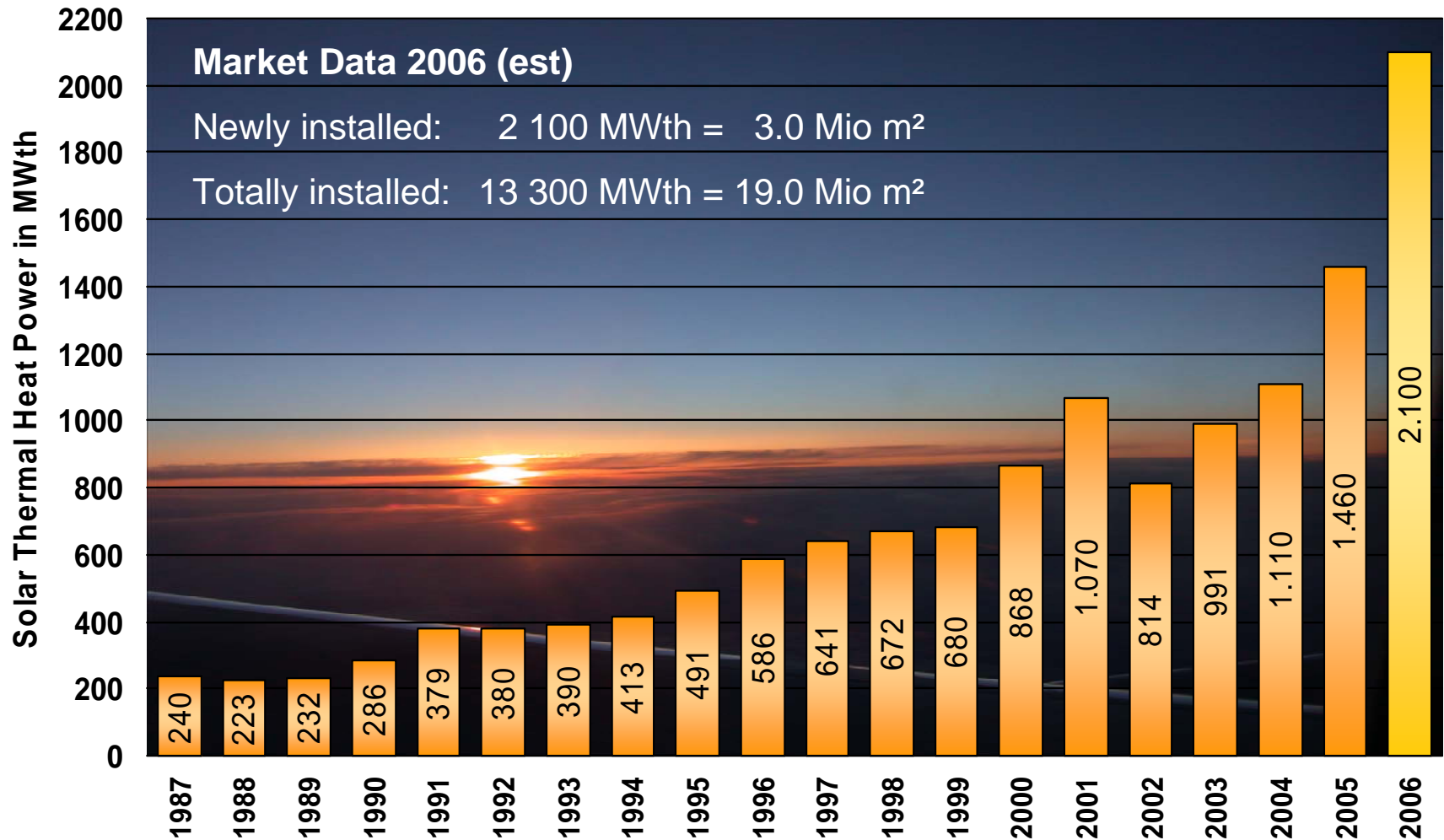


Image: Aleo

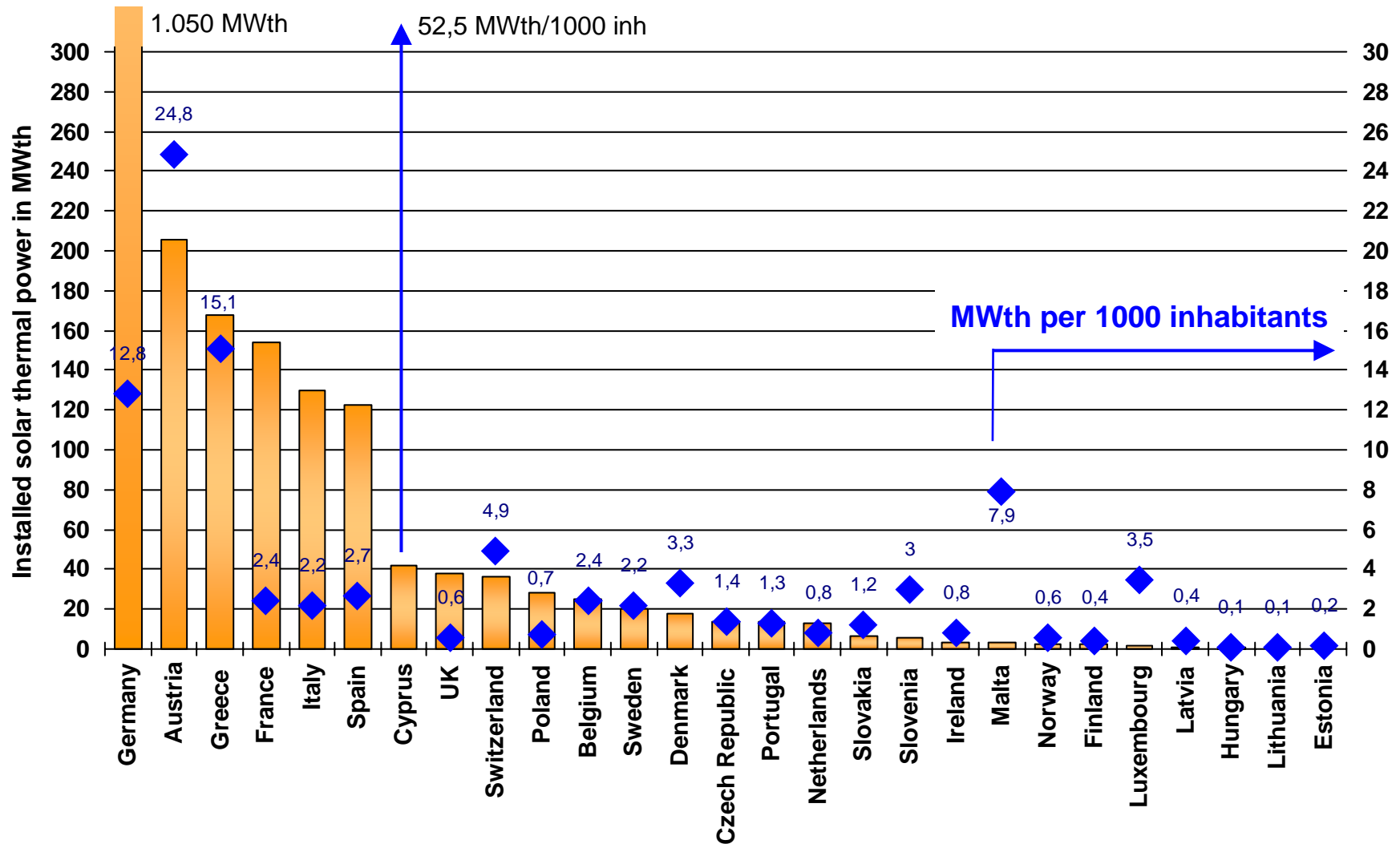
Development of the European Solar Thermal Market

Annually installed heat power in European Countries



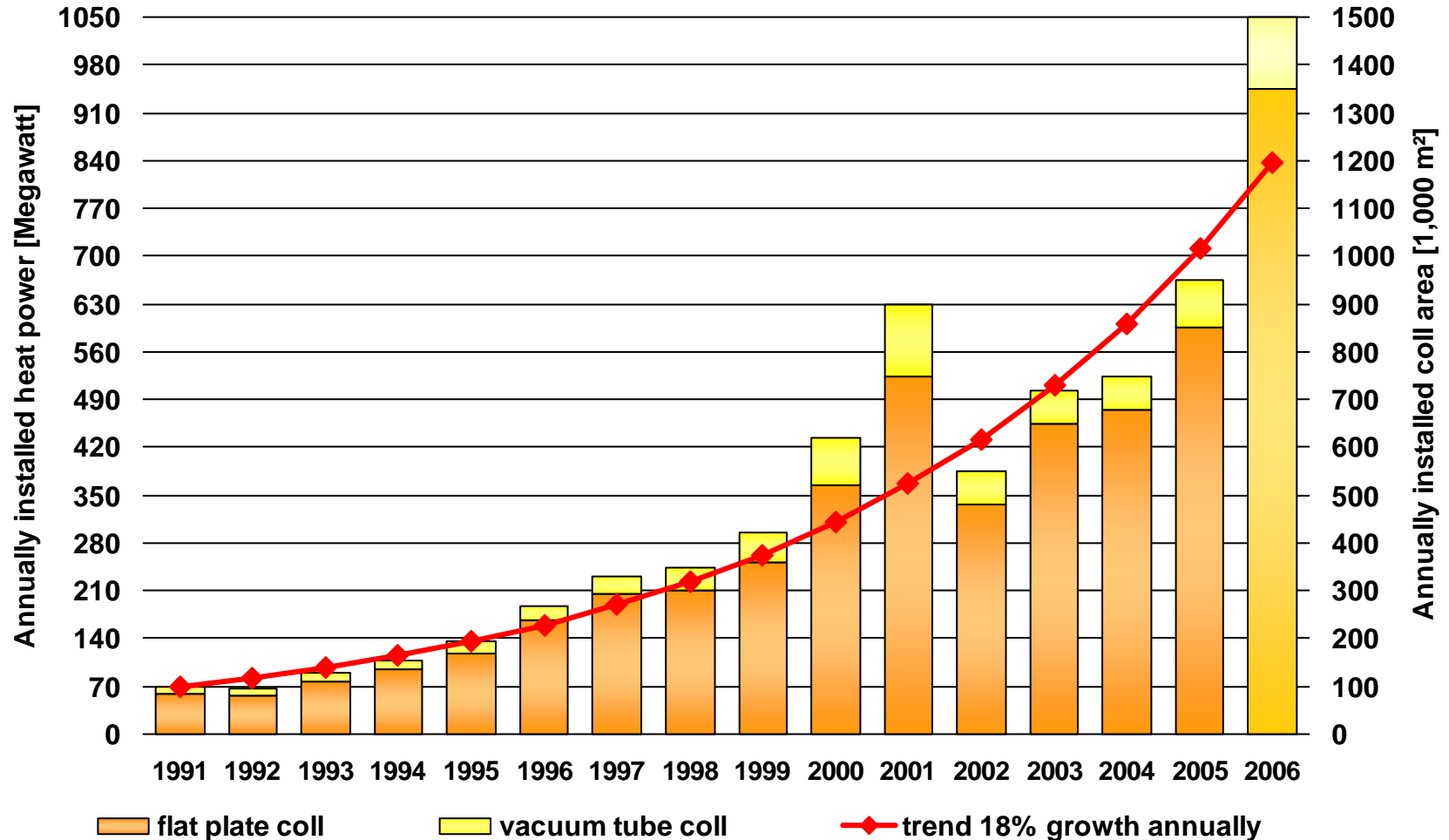
Data: ESTIF, 2006: preliminary

Solar Thermal Markets 2006 in Europe

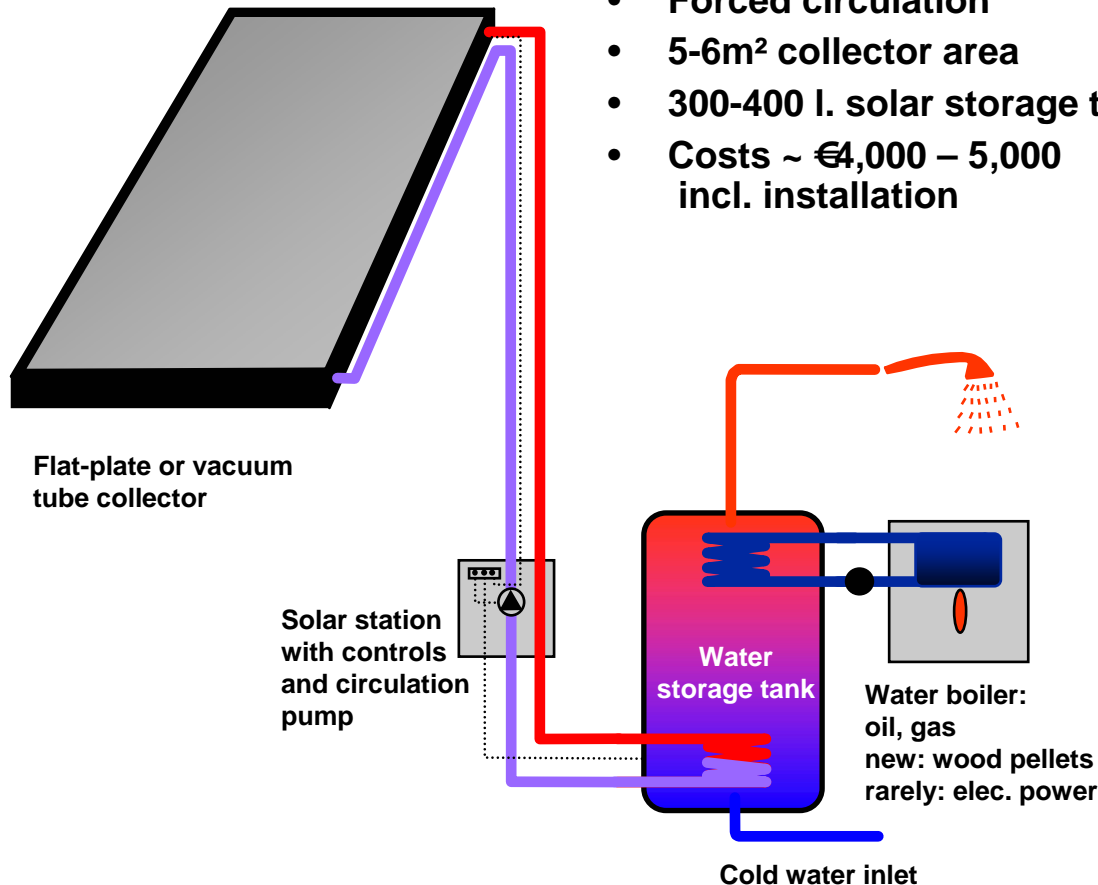


Solar Thermal Market Development in Germany

Annually installed heat power and collector area



Standard System for Domestic Hot Water Production

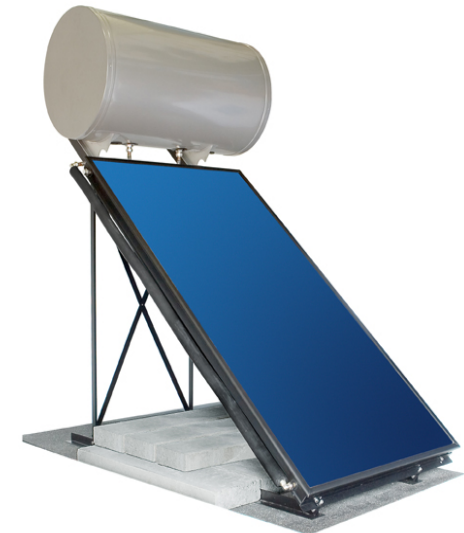


Typical data for Germany (4-person household)

- Forced circulation
- 5-6m² collector area
- 300-400 l. solar storage tank
- Costs ~ €4,000 – 5,000 incl. installation

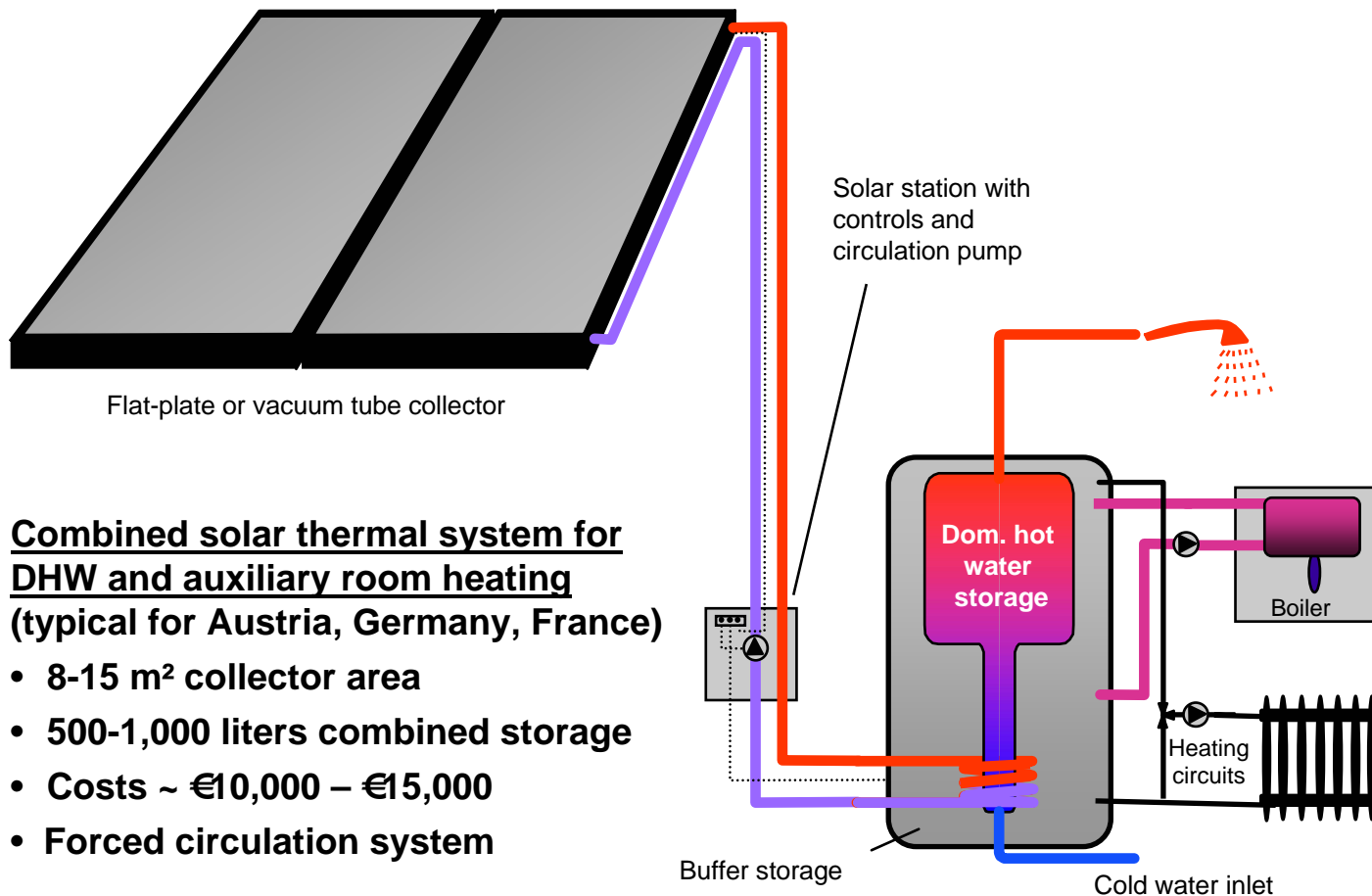
Typical data for Southern Europe

- Thermosyphon system
- 2-4 m² collector area
- 80-150 l. storage tank
- Natural circulation



Market share in Germany: 55%

Typical Solar Thermal Combi System



© PARADIGMA

Combi storage

Combined solar thermal system for DHW and auxiliary room heating (typical for Austria, Germany, France)

- 8-15 m² collector area
- 500-1,000 liters combined storage
- Costs ~ €10,000 – €15,000
- Forced circulation system

Market share in Germany: 45%



DHW system with vacuum tube collectors



DHW system with flat-plate collectors



Left: combined solar thermal system for DHW and room heating support

Right: PV system combined with skylights

Special Know-how in Large Scale Solar Thermal Systems

Large solar thermal systems for multi family houses, hotels, hospitals, nursing homes etc. has to be designed very well

German companies have gathered a lot of experiences and offer matured systems



Solar Thermal Vision 2030 of the European Solar Thermal Technology Platform ESTTP

New buildings

100% solar heated buildings will be the building standard

Existing building stock

Solar refurbished buildings, > 50% solar heated, will be the most cost effective way to refurbish the building stock

Industrial and agricultural applications

solar thermal systems will cover process heating and cooling demands

Overall goal: Cover 50% of the low temperature need up to 250°C





How to develop market: Stimulation of growth of demand and supply is necessary

DEMAND

Renewable energy **policy**target setting.....monitoring.....

Information of the public.....**awareness** campaign.....

External motivation by growing energy price, climate change..

Subsidy program...enlarged program...Renewable Energy Law...

SUPPLY

Installer (educated by supplier).....official education of installer.....

System houses building up **market structures** (system know-how)....

Production of mounting material.....

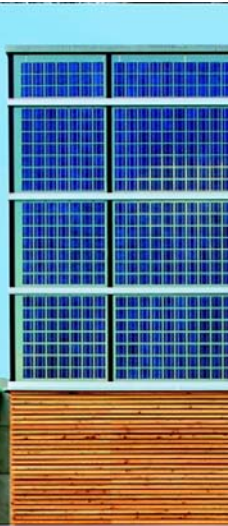
Production of PV modules/ST collectors.....


Production of special components

The industry will invest and the solar market will grow if there are a reliable policy framework and attractive market conditions

Conclusions

- **The German PV market**
 - developed very well and is the biggest market worldwide
 - is driven by the feed-in tariff for solar electricity (EEG)
- **In more and more European countries feed-in tariffs are established and a strong market PV market growth is expected, especially in ES, IT, FR, GR**
- **The German solar thermal market**
 - is the biggest market in Europe, but Austria and Greece are No 1 and 2 per capita
 - is growing fast
- **Other European solar thermal markets are developing very well, especially FR, ES, AT, IT**
- **Meanwhile solar thermal is seen as a very important technology with a high potential**





***„Solar architecture
is not about fashion,
it is about survival“
Sir Norman Foster***

Thank you very much for your attention