

## Energy

# German Renewable Energy Day

Solar PV:

In Germany: From rooftop to large-scale –

In Thailand: From large-scale to small-scale?

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[www.renewables-made-in-germany.com](http://www.renewables-made-in-germany.com)

[www.efficiency-from-germany.info/en](http://www.efficiency-from-germany.info/en)

## Contents of this presentation

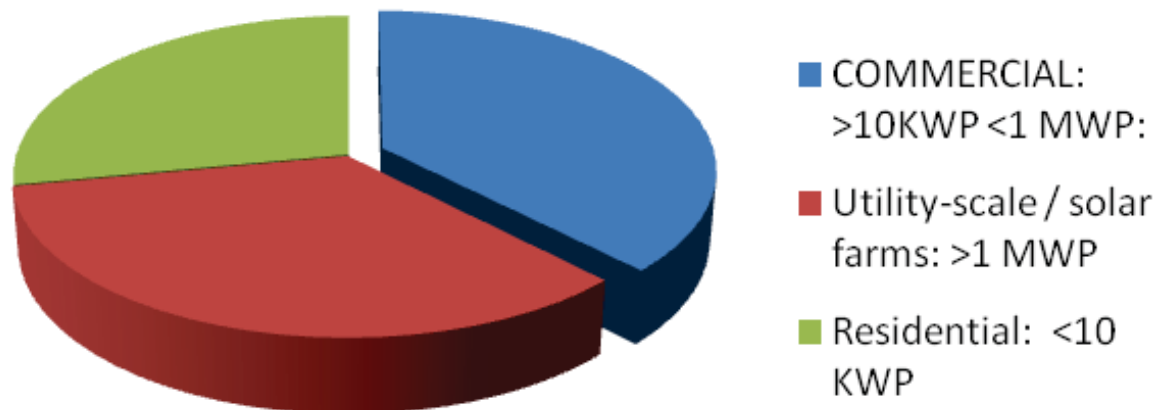
- ▶ The 3 PV solar market segments and how the proportions vary
- ▶ Germany: how the PV market developed, by segment (small to large)
- ▶ Thailand and Germany: comparisons
- ▶ Developing the rooftop segment:
  - ▶ Potential scale: how big is the business opportunity in Thailand?
  - ▶ Characteristics and challenges of the segment: how it differs from utility-scale
  - ▶ New benefits from successful development of the rooftop segment

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# The 3 PV market segments

## Solar market segments: definitions

### The 3 market segments in solar



# Solar market segments: examples

## Solar farms



← Lop Buri 73 MW

Lop Buri 2.3 MW →



## Commercial rooftops



← PTT car park 330 KW

Tesco Lotus zero-carbon store:  
Bang Pra, Chonburi 330 KW →



## Residential



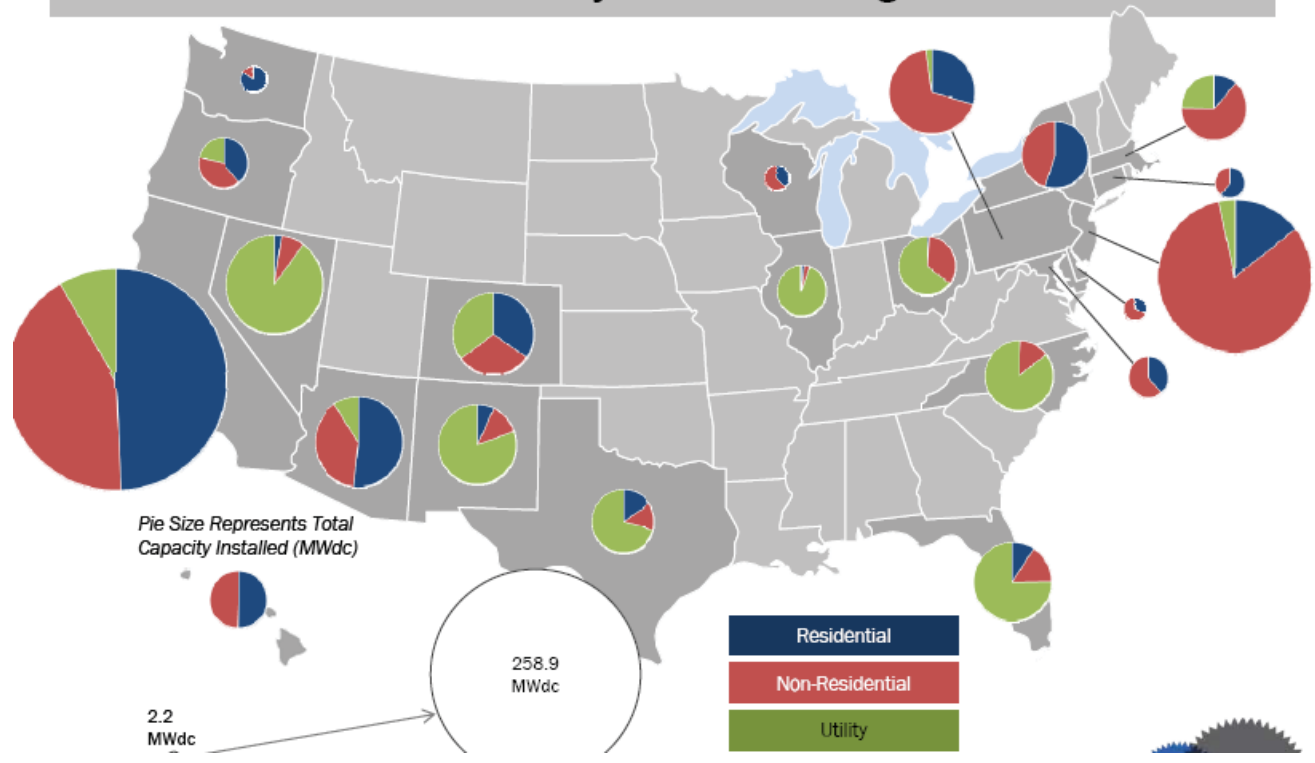
← Sky Park Hotel 6.7KW

Had Yai 3,2 KW →



# Solar market segments: varying proportions

U.S. Market in 2010 - by State & Segment



- \* Large variations in proportions by segment
- \* Residential market, as a % of total, ranges from zero to 50%.
- \* Commercial and institutional (non-residential) ranges from zero to 80%

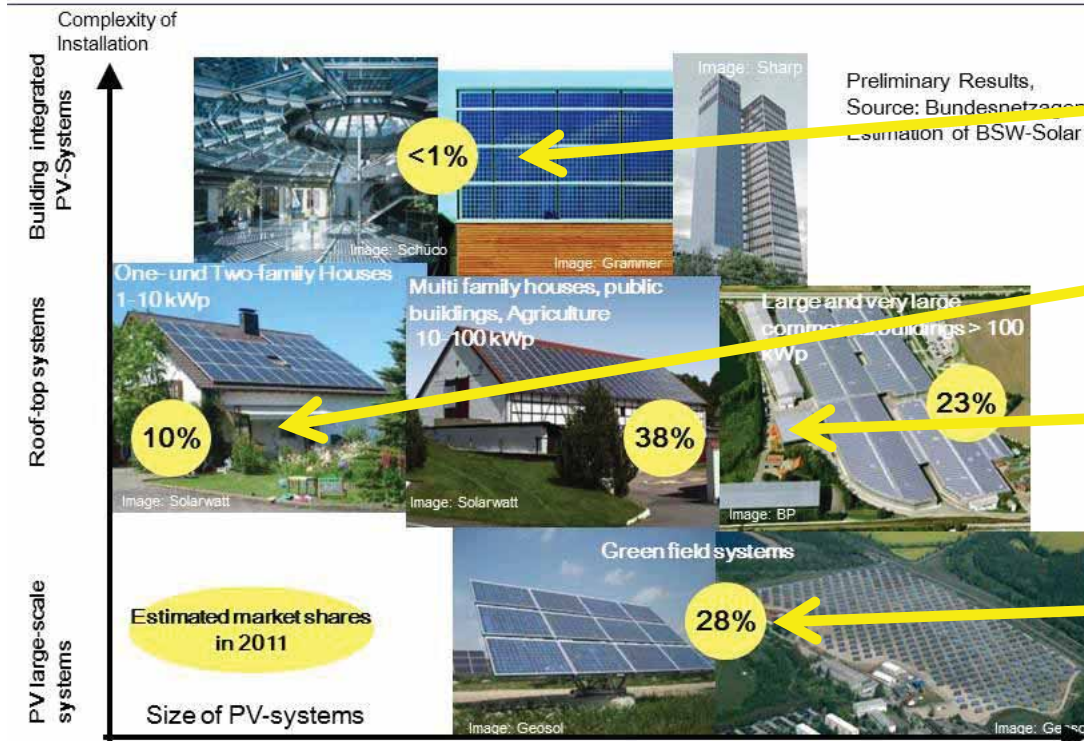
Source: GTM Research

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# PV market segments: Germany – breakdown and trends

# Germany: rooftop still dominant in 2011

Segmentation of German PV Market – Shares of newly installed capacity



BIPV: <1%

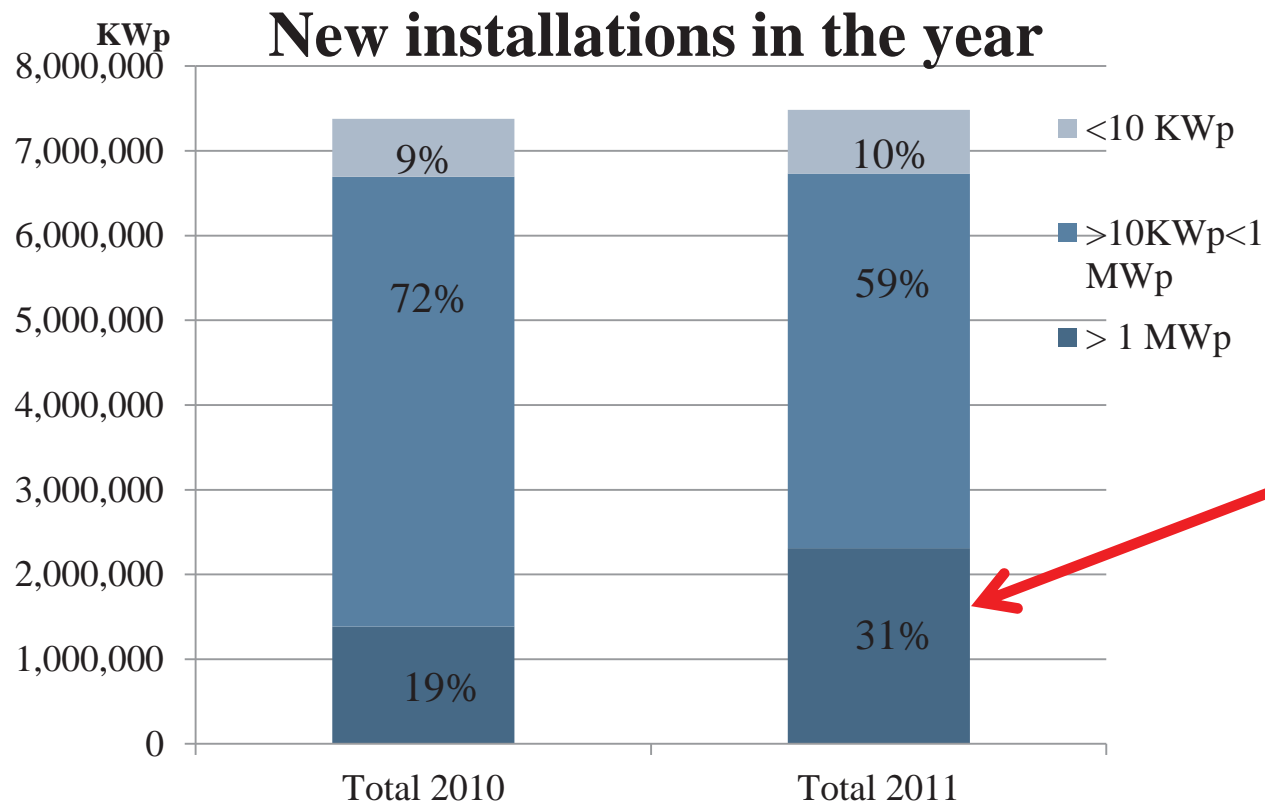
Residential: 10%

Commercial: 61%

Utility-scale solar farms: 28%



## Germany: PV from rooftop to large-scale



Utility-scale solar farms  
>1MWp: increasing:  
to 31% here  
[28% on previous slide]

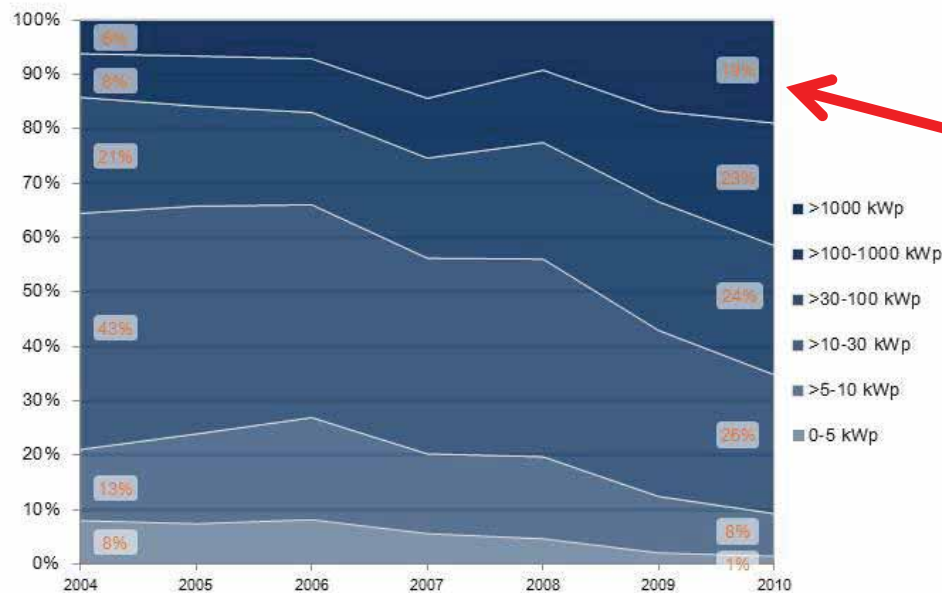
Source: Bundesnetzagentur

## Germany: PV from rooftop to large-scale

### Development of system sizes in Germany : cumulative installed capacity



*Development of system sizes in relation to installed capacity*



Source: Federal Network Agency

Utility-scale solar farms reached 10% of total cumulative installed capacity in 2011

# Germany: sustained growth in annual PV sales

## Market Development Germany



**Market data Photovoltaics in Germany 2011\***  
 Newly installed capacity: ca. 7,500 MWp  
 Total installed capacity: 24,800 MWp  
 Solar power produced: 18,500 GWh  
 Number of systems installed: 1,090,000

**Milestones**  
 1991: First Feed-in Law (FIT with low tariffs)  
 1991-1995: 1,000 roofs program (grants)  
 1999-2003: 100,000 roofs program (loans)  
 2000: Renewable Energy Sources Act (EEG) (FIT)  
 2004, 2009, 2010: Amendment (revision) of EEG (FIT)



Total installed capacity still grew by >40% in 2011

Total number of PV systems now over 1 million

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# PV markets Germany and Thailand compared

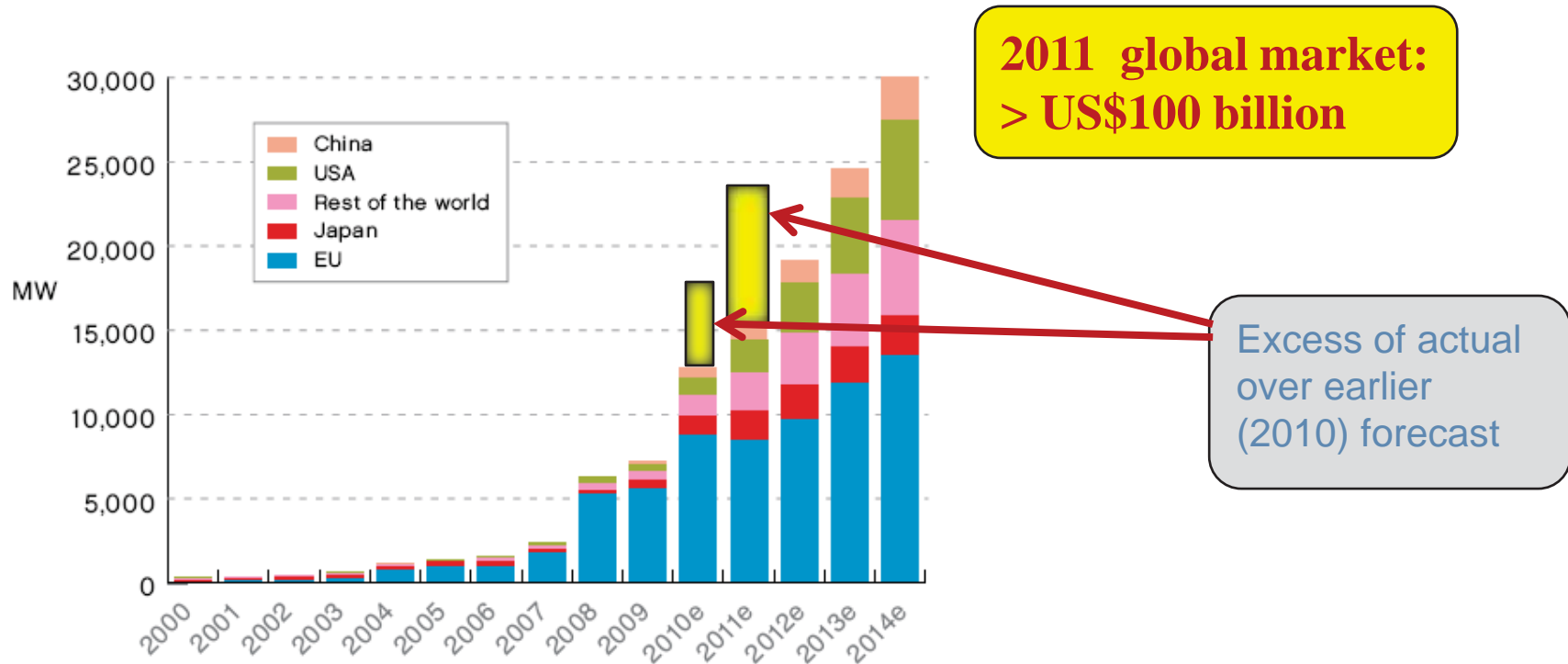
## Germany and Thailand: comparisons

		
	<b>Germany</b>	<b>Thailand</b>
Cumulative PV installations to 2011: MW	24800	180 - 300
Cumulative PV installations to 2011: units / systems	>1 million	<500
% of utility-scale solar farms in 2011 (cumulative % of capacity)	10%	99%
% of commercial rooftop installations in 2011 (% of capacity installed in the year)	61%	<1%
<b>Population in million</b>	<b>82</b>	<b>65</b>

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PV markets  
scale of the business opportunity

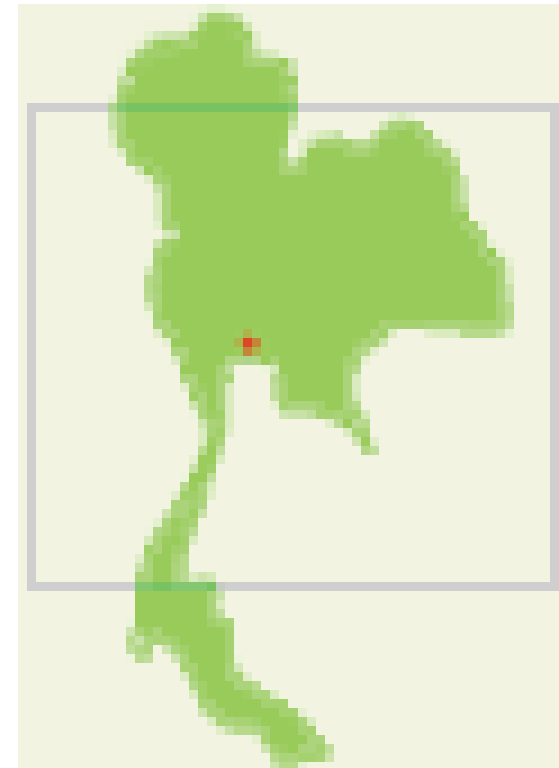
# Market size of PV: world



Sample source for 2011 estimated actual:  
<http://www.renewableenergyfocus.com/view/22139/global-solar-pv-to-reach-24-gw-in-2011/>

## Market size of PV: the frame in Thailand

- ▶ The latest national *Alternative Energy Plan* sets a target of >2000 MW for PV over the decade
- ▶ Value of this will be in range of
  - ▶ In € 4 – 8 billion
  - ▶ In THB: 160 – 320 billion.
- ▶ Commercial rooftop market could represent:
  - ▶ At 20% of total market: THB 32 – 64 billion
  - ▶ At 40% of total market: THB 64 – 128 billion
- ▶ Thailand's "official" target for solar has been multiplied by 4 since 2009.
- ▶ All major global forecasts for PV growth have been exceeded over the past decade.
- ▶ **THE ONLY WAY TO GO IS UP!!**





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# From utility-scale to rooftop: challenges

## How rooftop markets differ from utility-scale

Feature	Examples
<b>Larger customer base</b>	>1 million systems in Germany, compared with only hundreds in Thailand today.
<b>Radically different marketing task</b>	Mix of customers of varying sizes (industrial / commercial / government), compared with single-client utility market today
<b>Standards for products and services</b>	High volume of installations requires standard, reliable products and practices. No longer possible to rely on complex checks / audits of each individual installation.
<b>Training and skills</b>	Uniform, high-quality skills needed sustainably throughout the country. No longer possible to send short-stay project teams from a single, central base.
<b>Grid integration</b>	Uniform and practical framework needed for PPA, and possibly uniform solutions for off-grid
<b>Finance and insurance</b>	Simplified uniform criteria for financial evaluation for high-volume application, without compromising security of lenders
<b>New technical parameters and opportunities</b>	Opportunities for uniform solutions in storage, smart grids, demand response management.

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From utility-scale to rooftop:  
benefits

## Benefits of major progress in PV rooftop markets

- ▶ Expansion of available market, contributing to national goals for growth in renewable energy, increased energy security, and greenhouse gas reduction.
- ▶ New activities / strengths for regional leadership in ASEAN (storage, smart grids, demand response management, software) and to attract inward investment.
- ▶ Education, skills and employment: country-wide development of new skills in design (including aesthetic design through BIPV), construction, operation and maintenance leading to new jobs. Impact on rural development
- ▶ Fits national objectives for *one tambon one renewable energy*: increases range of choice for communities
- ▶ Compatible with global growth of distributed energy generation and associated technological innovation, which will lead to high interest by foreign partners in working with Thai business to develop national and ASEAN market.

Headline (Verdana Bold 18)

Thank you very much for your attention!  
Khop Khun Khrab!

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Presentation prepared in collaboration with GIZ and BSW