

Building on the experience of European markets

**... to successfully develop PV
markets in the long term**



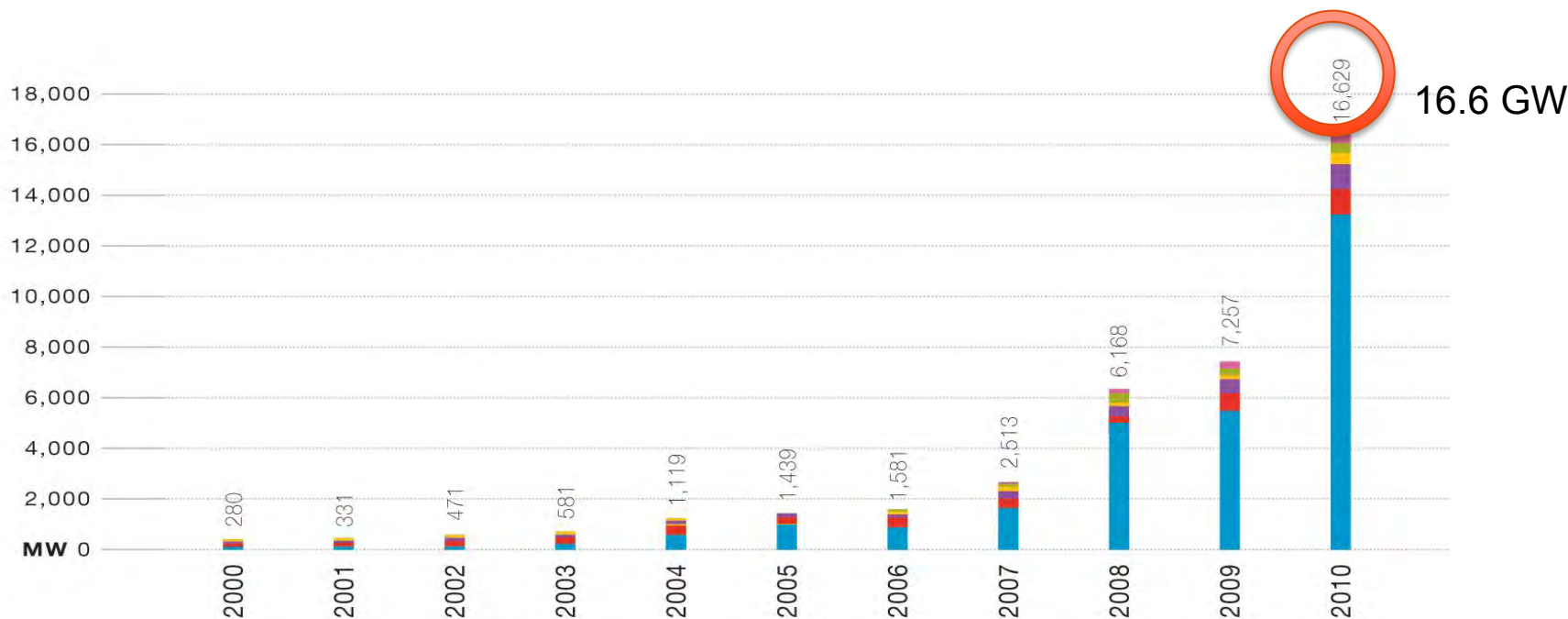
EPIA is the world's largest industry association devoted to the solar PV electricity market



- World largest industry association devoted to the Photovoltaic electricity market, 250 members
- Represents the whole value chain from Silicon feedstock to panels, system developers, equipment suppliers, utilities, research centers, etc.
- Established in Brussels in 1985
- Global membership, European focus

- **European Market Development vs Global development**
- **PV Observatory Policy Recommendations**
- **Main Messages**

Evolution of Global Annual PV Market – 2000-2010

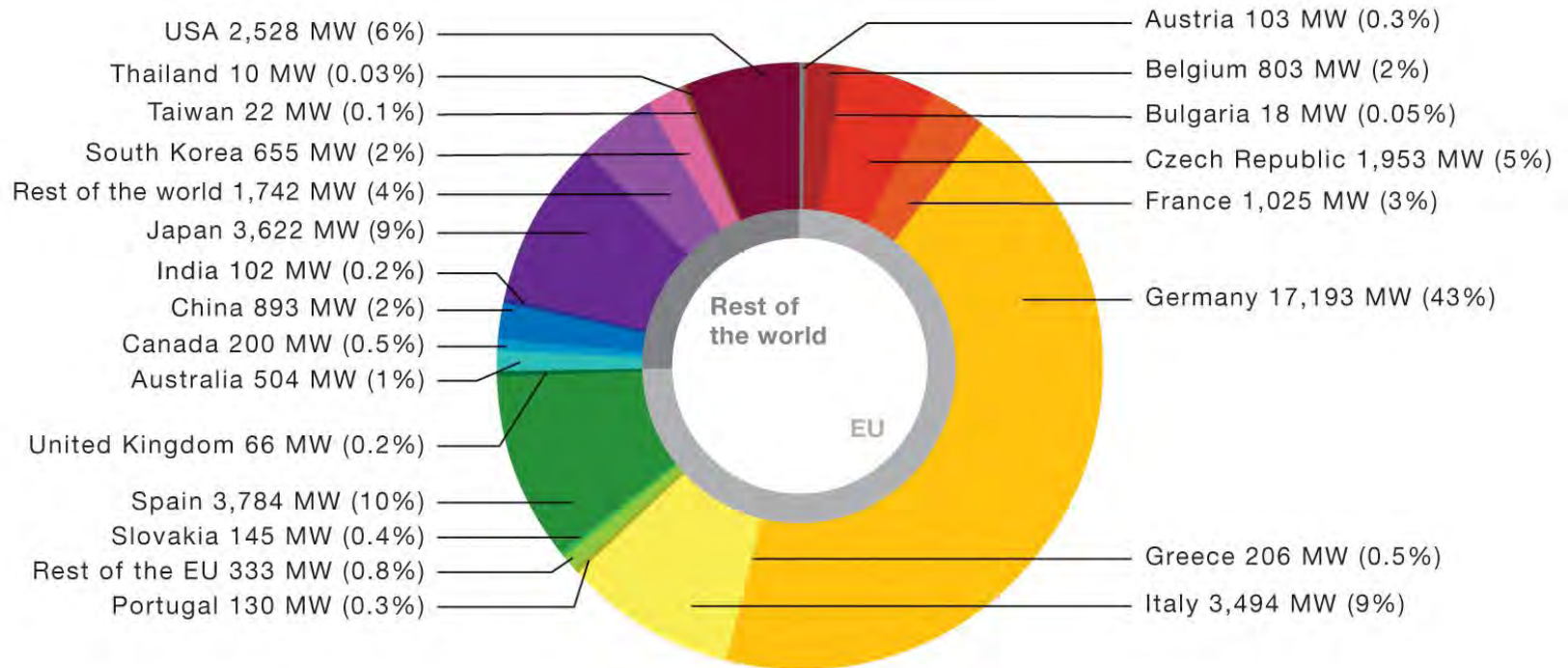


China	0	11	15	10	9	4	12	20	45	228	520
APEC	5	5	7	8	10	13	33	59	300	258	473
Rest of the world	88	56	80	77	29	10	118	63	115	130	417
North America	23	31	46	65	92	117	149	212	349	539	983
Japan	112	135	185	223	272	290	287	210	230	483	990
EU	52	94	139	199	707	1,005	983	1,950	5,130	5,619	13,246
Total	280	331	471	581	1,119	1,439	1,581	2,513	6,168	7,257	16,629

Evolution of global annual PV market - 2000-2010

source: EPIA

Share of Global Cumulative PV Power installed (MW, %)



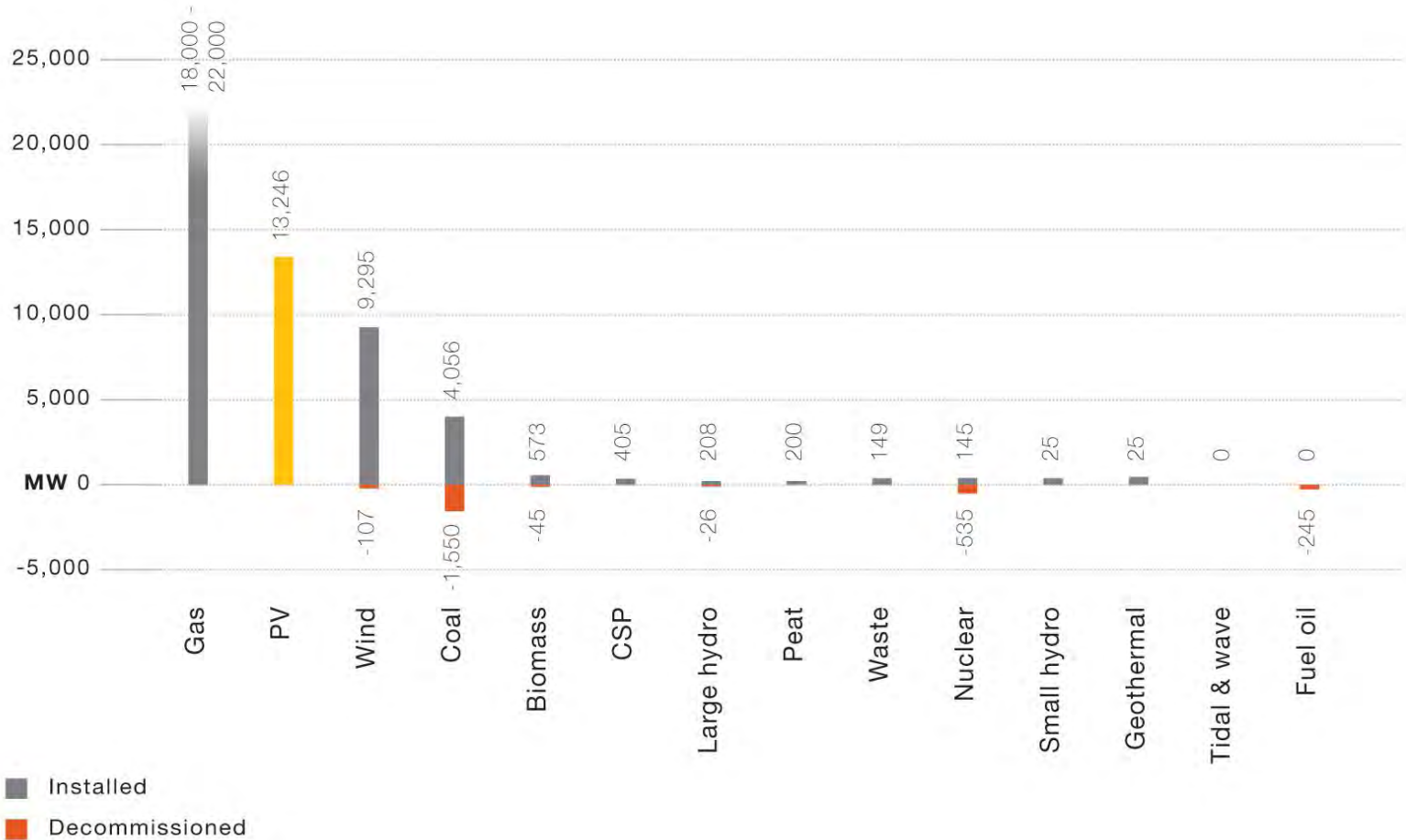
2010 global cumulative installed capacity share (MW, %)

source: EPIA

Our position in 2010... new installed capacity EU27 (MW)



- Uncertainties on gas, **PV** ahead of all RES



Power generation capacities added in 2010 in EU 27

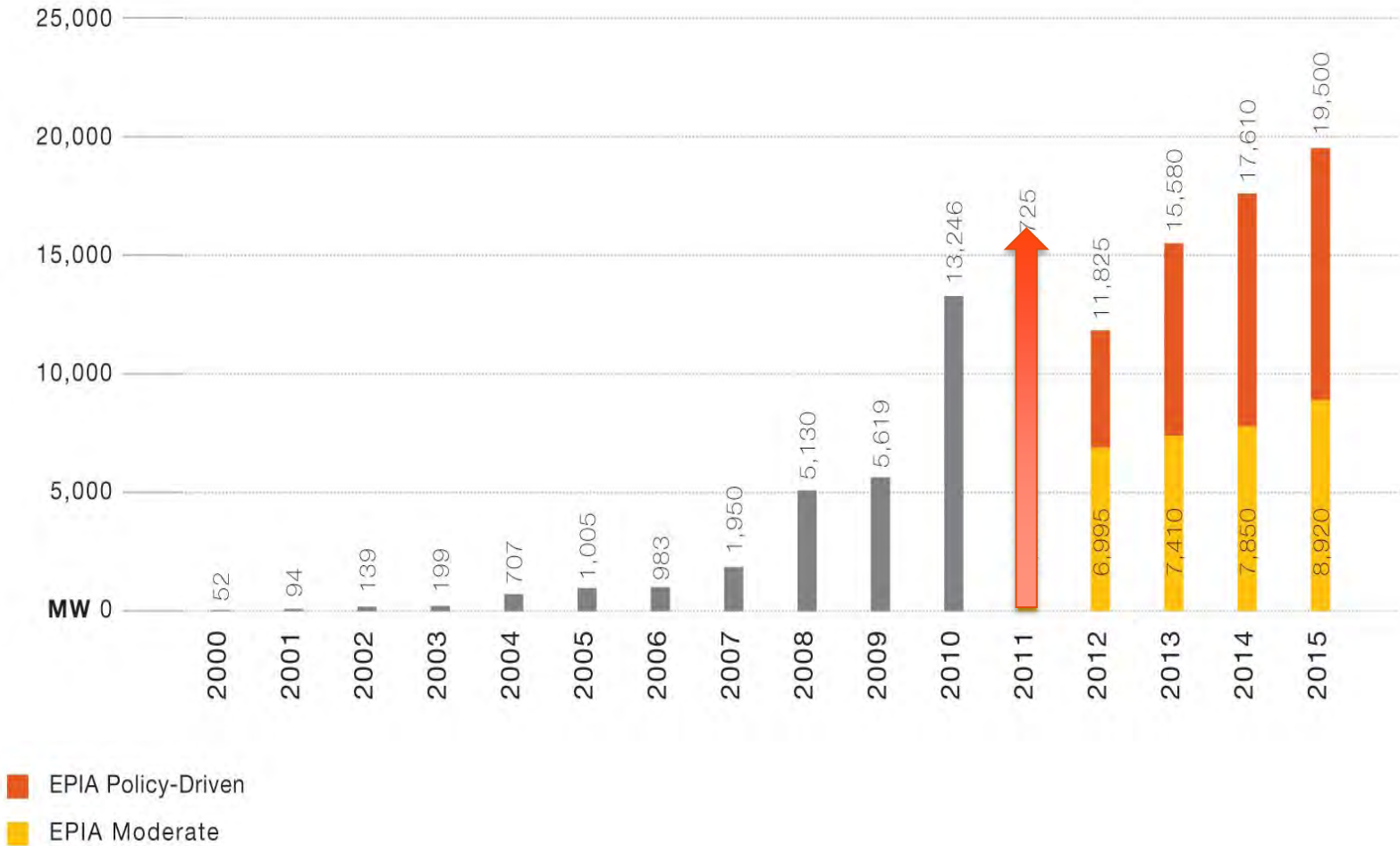
source: EPIA

... and where are we going?

Two short term scenarios

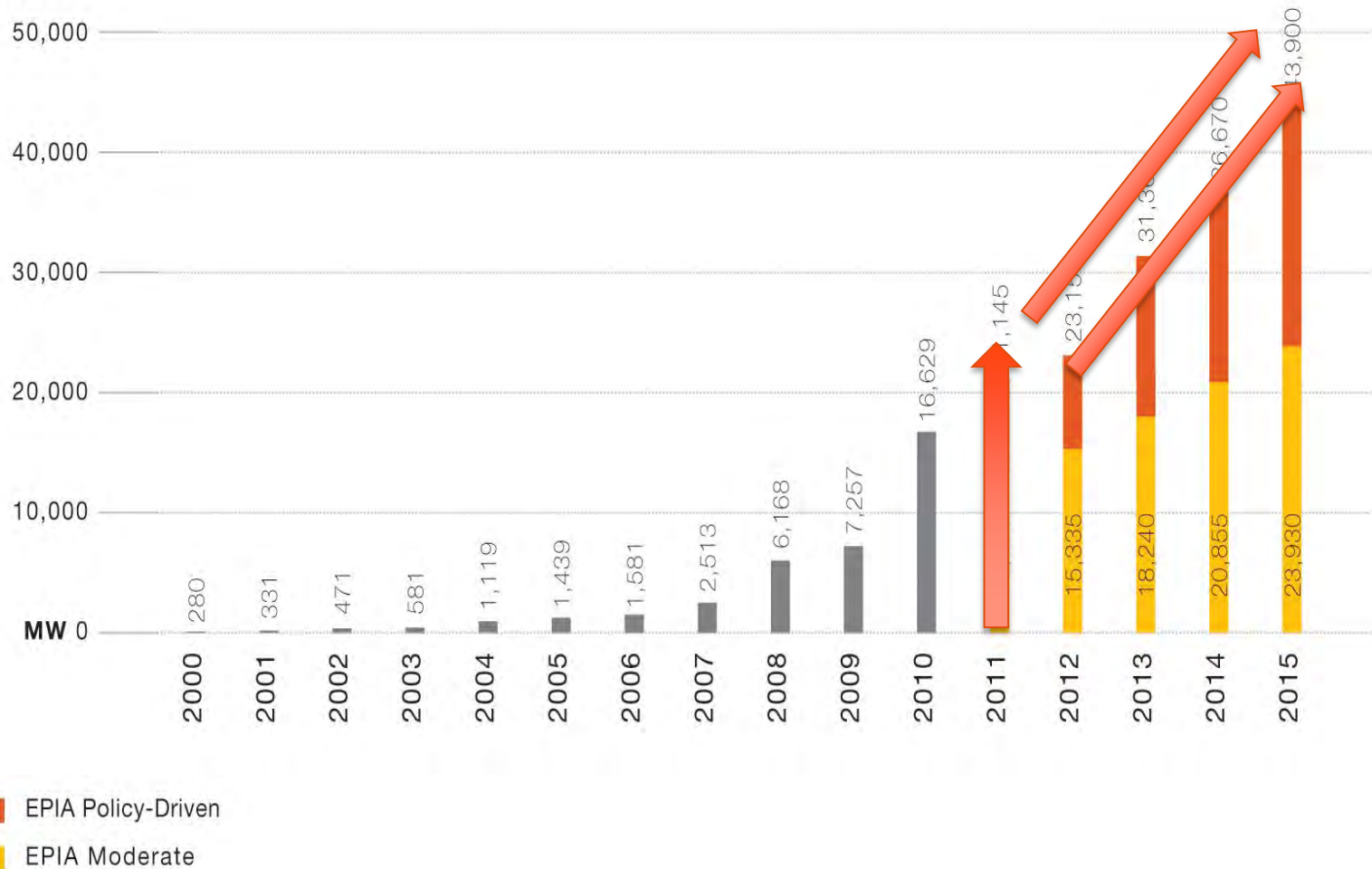
- **A Moderate scenario** (“Business-as-usual” market)
 - no major reinforcement of existing support mechanisms,
 - reasonable continuation of current FiTs aligned with PV systems prices.
- **Policy-Driven scenario:**
 - continuation or introduction of support mechanisms, namely FiTs,
 - strong political will to consider PV as a major power source in the coming years.
 - removal of non-necessary administrative barriers and the streamlining of grid connection procedures.

EU forecasts until 2015



European annual market scenarios - Moderate and Policy-Driven

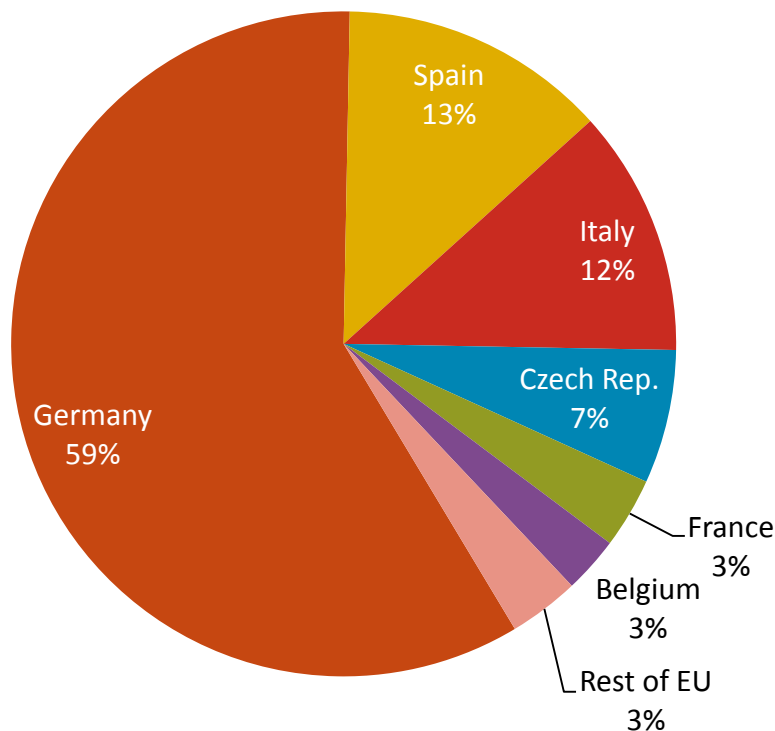
World forecasts until 2015



Global annual market scenarios - Moderate and Policy-Driven

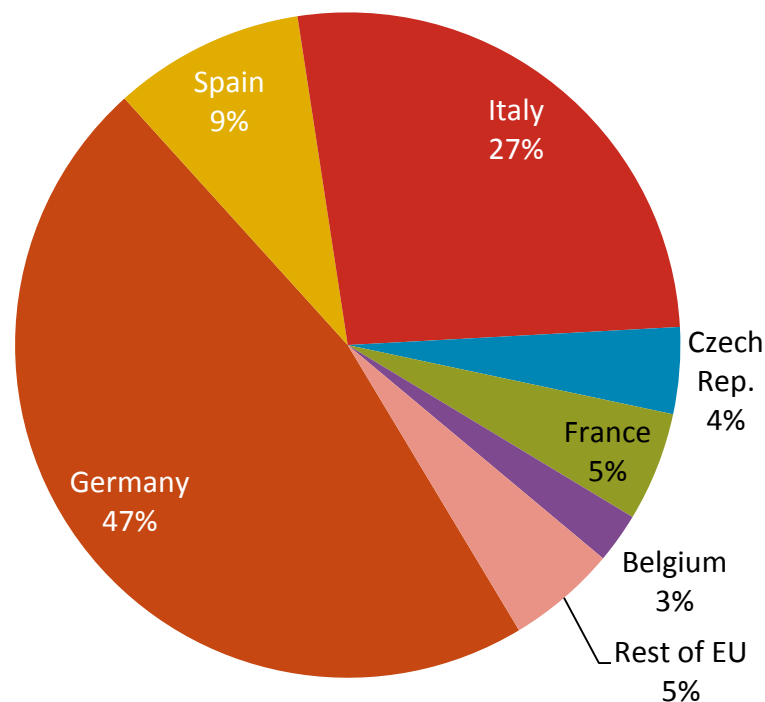
Few countries have really contributed until now but...

2010



2010: 30 GW

2011 est.



2011 (est): 45-47 GW

Installed capacity in EU:

2011 so far... (in MW)

	2010	2011 est.	
1	Germany	7.400	4000
2	Italy	2.300	8000
3	Czech Rep	1.490	10
4	Japan	990	1100
5	USA	900	1800
6	France	719	1400
7	Belgium	424	300
8	Spain	369	400
9	Australia	320	300
10	China	300-520	1500

India (600-800)
 Thailand (100?)
 Israel (100?)
 Canada...

UK (300-400)
 Greece (300)
 Solvakiya (350)
 Austria (100)

...

25 GW produces 35 TWh (world average)
 35 TWh relates to seven 1000 MW coal-fired
 power plants (5000 hours).

EU:

15-17 GW

World:

22-25 GW

Unlocking new markets, stabilizing others

In Europe:

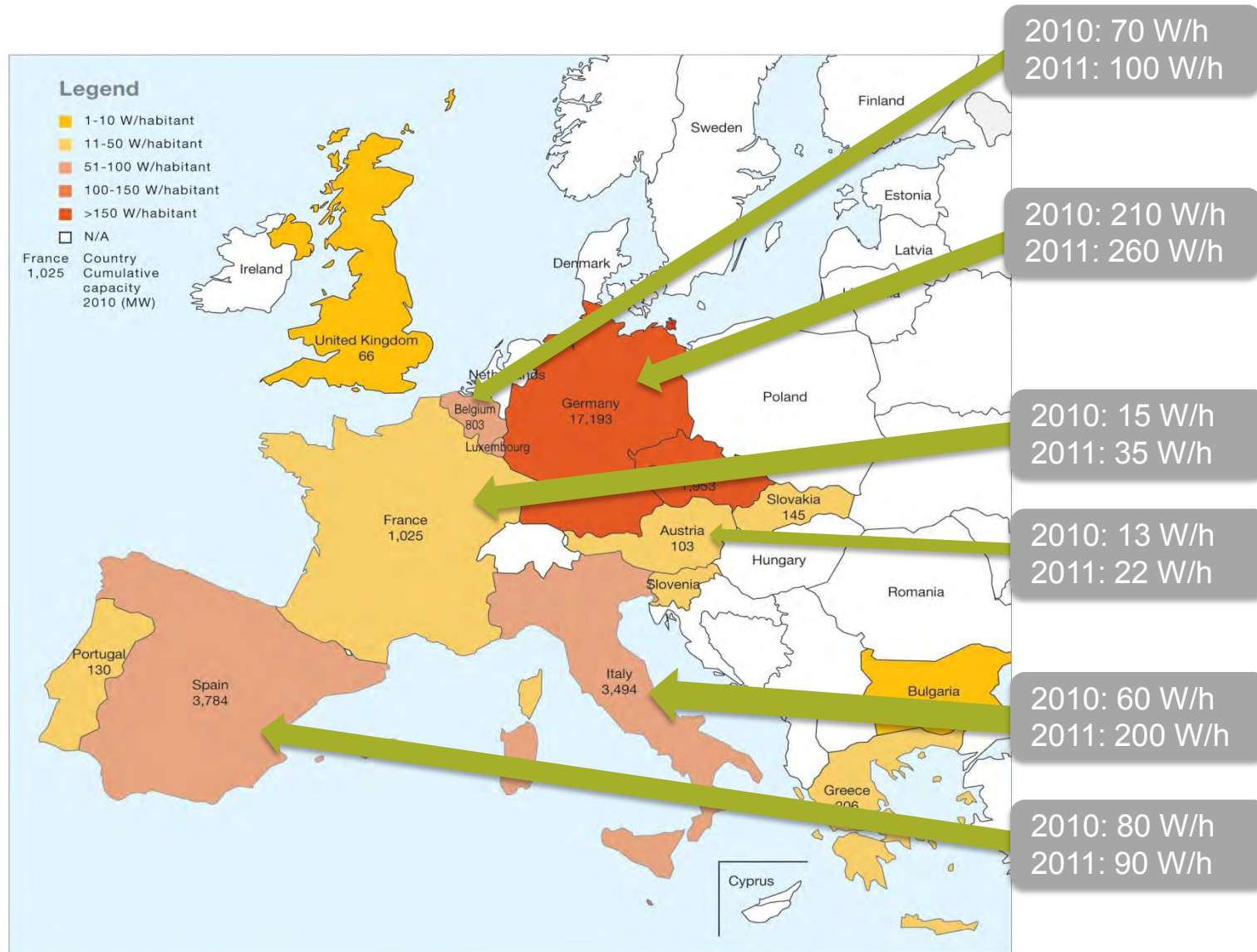
- Need to consolidate/further expand existing markets
 - Germany, Italy, France, Belgium, Spain, Greece, Portugal, Austria

- Need to unlock/develop medium size markets
 - UK, Slovakia, Bulgaria, Hungary, Romania, Turkey...

CUMULATIVE INSTALLED CAPACITY IN EU: LEADING COUNTRIES



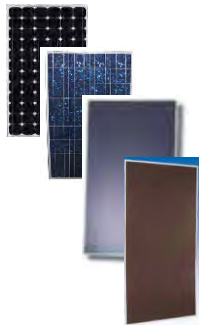
In W / habitant: another way to look at PV penetration.



PV is cheaper than what many people think

WHAT IS A PV SYSTEM?

PV modules



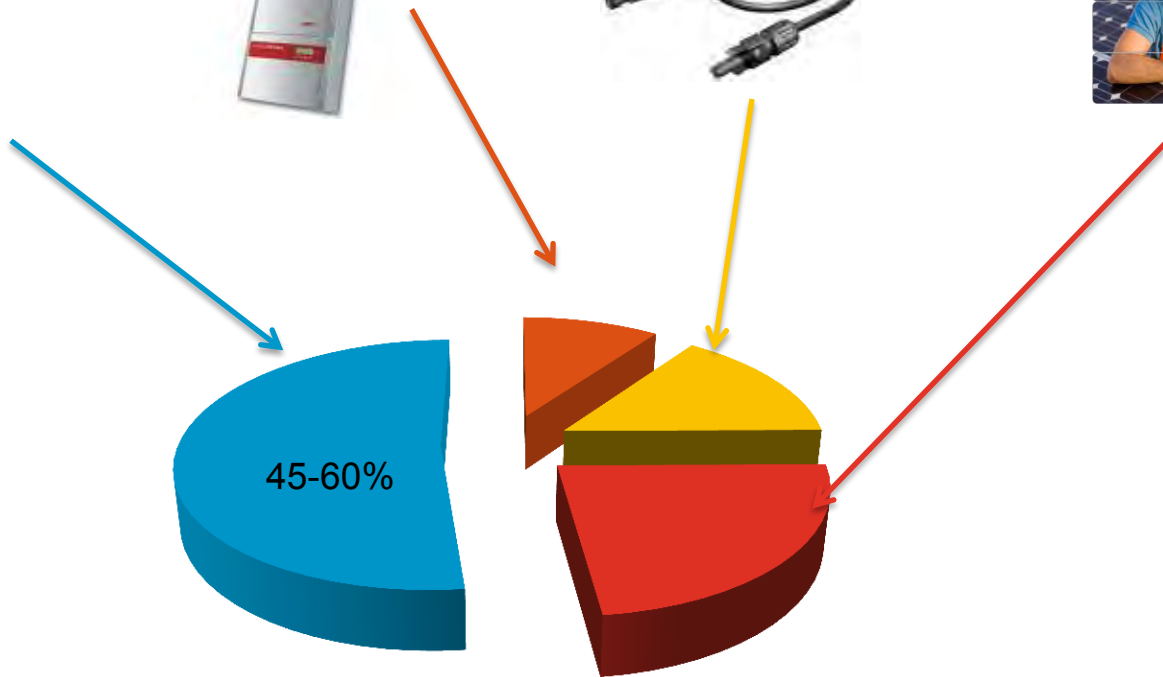
PV inverter



Balance of system



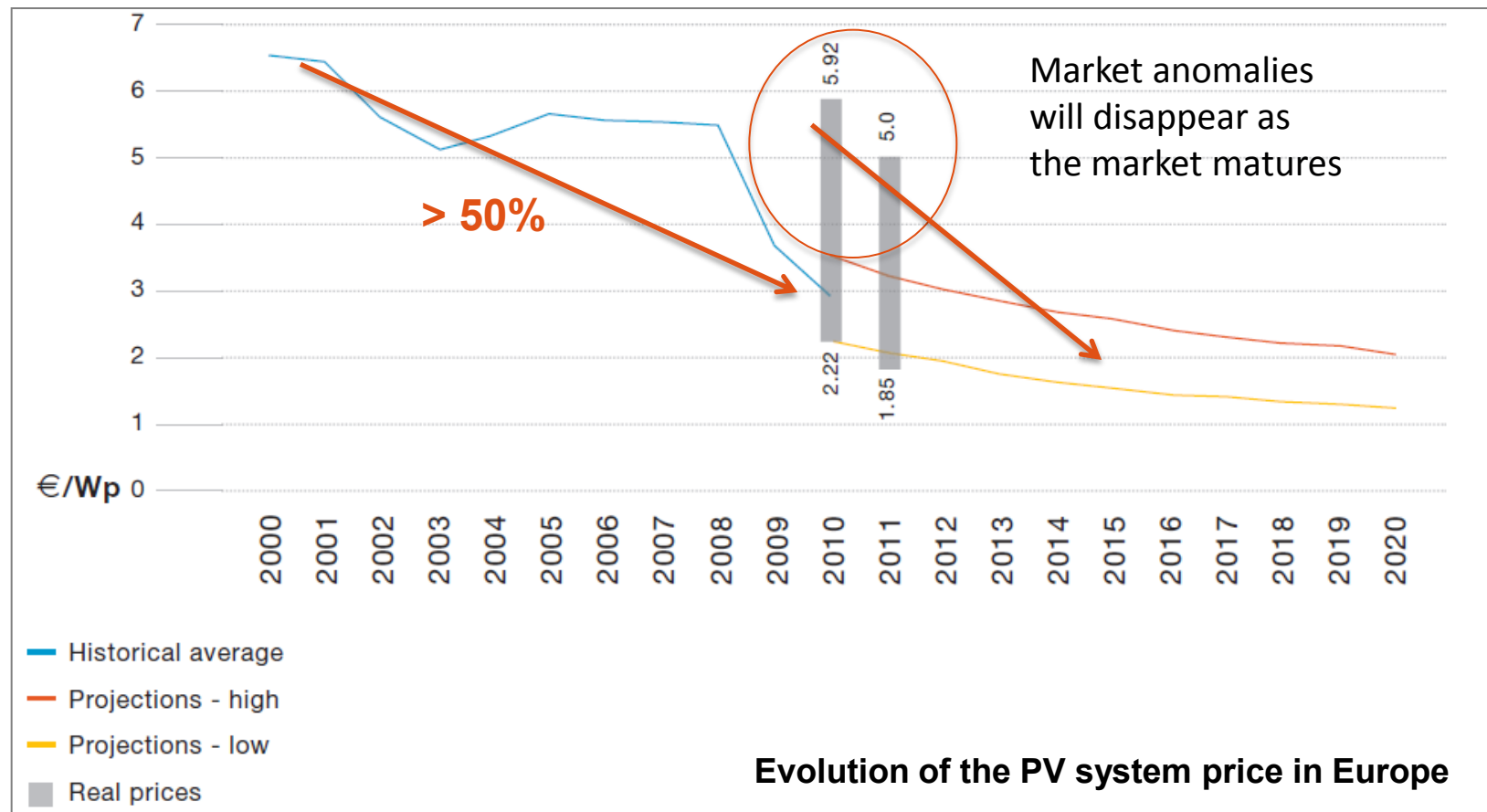
Installation



2010 situation (industry averages)

PV SYSTEM PRICE EVOLUTION

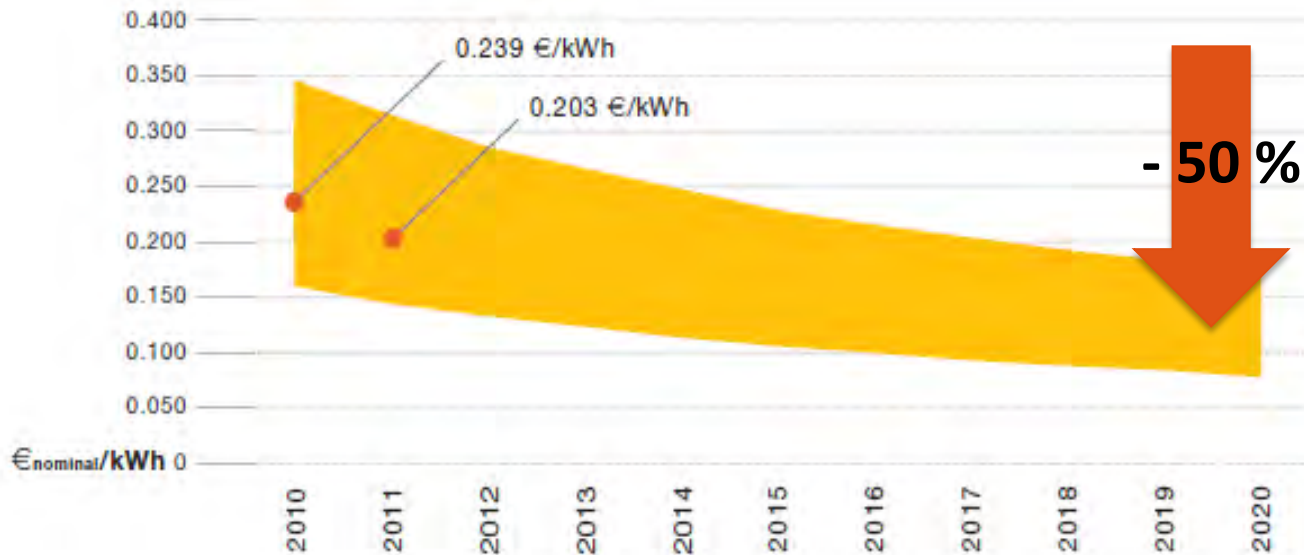
- The price of PV modules and systems has been going down for more than 30 years.
- This will continue thanks to further technological improvements and economies of scale.
- A 36-51% decrease could be achieved on average by 2020.



HOW MUCH DOES IT COST TO PRODUCE 1KWH FROM PV ?

- Generation cost of PV electricity → **LCOE**: Levelised Cost of Electricity
- Used widely to compare electricity from different energy sources

European PV LCOE range projection 2010-2020



- **5 countries:**

France, Germany, Italy, Spain, UK

- **4 market segments:**

- residential rooftop (3 kW),
- commercial rooftop (100 kW),
- industrial rooftop (500 kW),
- utility-scale ground-mounted (2.5 MW)

- **Crystalline Silicon and Thin Film technologies**

PV's generation cost could go down by 50% during this decade

COMPETITIVENESS: TWO PERSPECTIVES

Dynamic Grid Parity for electricity consumers:

The moment at which, in a particular market segment in a specific country, the present value of the long-term revenues from a PV installation is equal to the long-term cost of installing, financing, operating and maintaining the PV system.

PV installed on rooftops



Cheaper than...

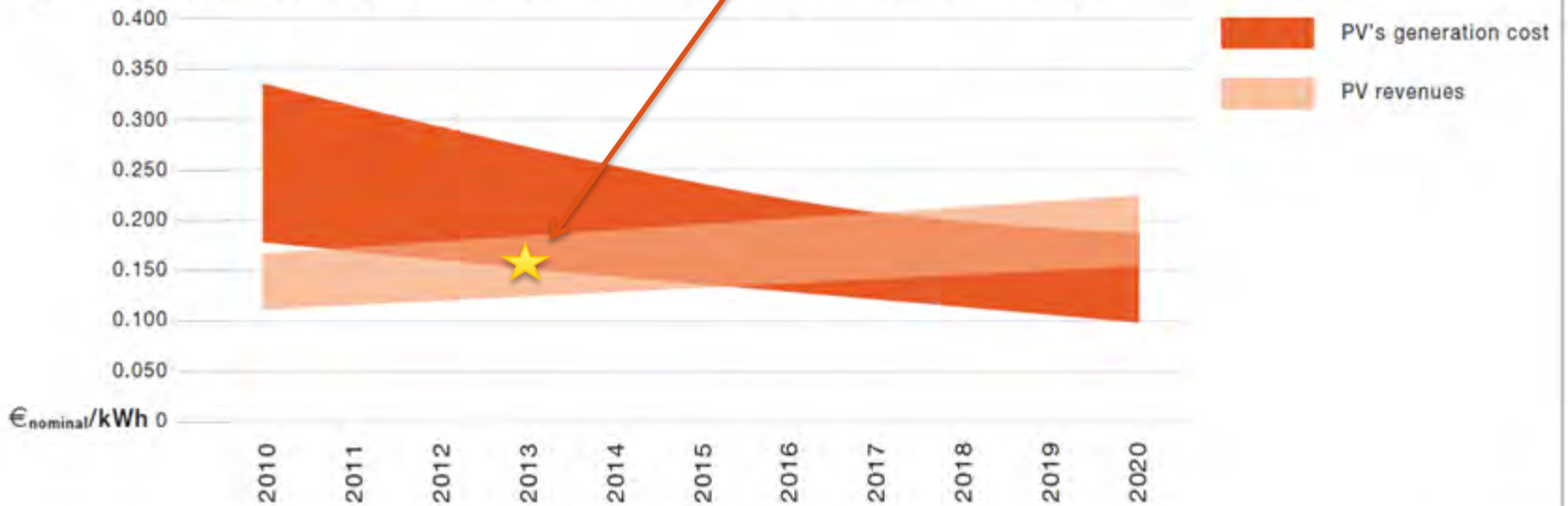


DYNAMIC GRID PARITY: THE 3 ROOFTOP SEGMENTS

		FR	DE	IT	ESP	UK
Residential	3 kW	2016	2017	2015	2017	2019
→ Commercial	100 kW	2018	2017	2013	2014	2017
Industrial	500 kW	2019	2019	2014	2017	2019

Based on the average irradiance per country.

Dynamic grid parity for commercial PV systems in Europe



Residential segment

2020



Real irradiance levels can change time when competitiveness is reached.

Dynamic Grid Parity for electricity consumers:

The moment at which, in a particular market segment in a specific country, the present value of the long-term revenues from a PV installation is equal to the long-term cost of installing, financing, operating and maintaining the PV system.

PV installed on rooftops



Cheaper than...



Generation Value Competitiveness for utilities:

The moment at which, in a specific country, adding PV to the generation portfolio becomes as equally attractive from an investor's point of view as a traditional and normally fossil-fuel based technology.

Large installations (rooftops or ground mounted)

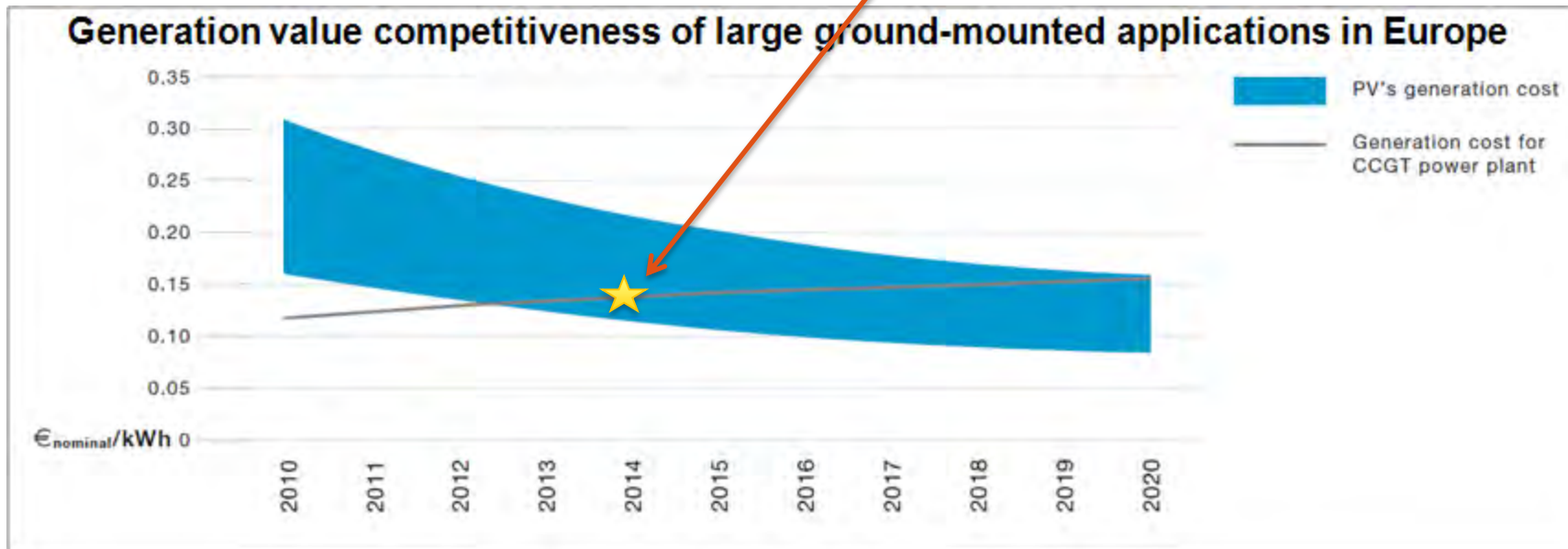


Cheaper than...



		FR	DE	IT	ESP	UK
Industrial	500 kW	2015	2017	2015	2015	2019
→ Ground-Mounted	2.5 MW	2015	2017	2014	2015	2019

Based on the average irradiance per country.





What could delay

- **Higher LCOE:**
 - Market anomalies (eg. admin. costs)
- **Specific applications:**
 - e.g. BIPV on existing buildings is more expensive
- Investors requesting a **“green premium”** above real investor’s risk



What could accelerate

- An unexpected surge in **fossil fuel prices**
- Any scheme rewarding higher electricity injected to the grid (**self-consumption or net-metering**)
- **Specific applications:** e.g. BIPV on new or renovated roofs
- **Prices going down faster**

Competitiveness can happen even quicker!

Policy recommendations

High level recommendations: PV Observatory

Sustainable support schemes

Reasonable IRR
Takes price decrease into account

Streamlined administrative processes

No un-necessary administration
Streamlined processes

Easy grid connection

Proportionate procedures
Primary access for PV

Ad hoc installers certification

Ensure confidence of customers

Sustainable PV development

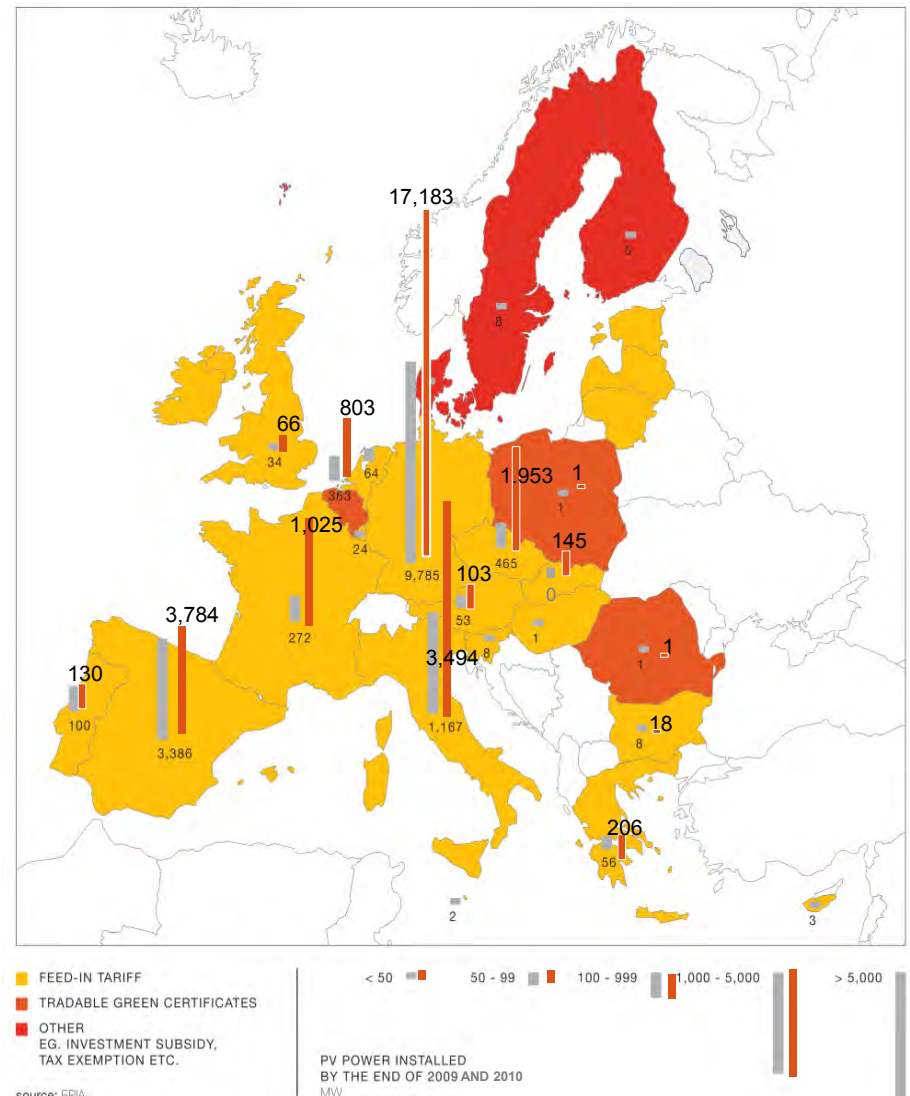
Reasonable growth every year

Overview on EU support scheme and power installed by the end of 2009 and 2010

21 EU countries have implemented FiT scheme for PV, more or less successfully

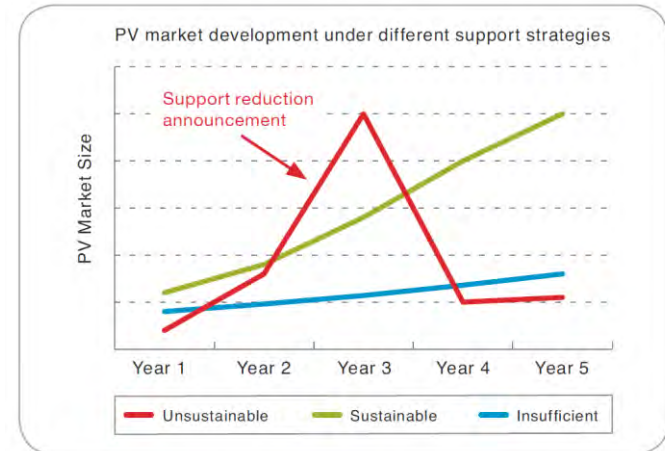
Effectiveness and long-term capacity to develop the market depends on 3 components :

- Sustainability of the scheme
- Streamlined administrative procedures
- Guaranteed effective grid connection procedures



Implementing sustainable support mechanisms

1. Use Feed-in Tariffs or similar mechanisms
2. Ensure transparent electricity costs for consumers
3. Encourage the development of a sustainable market by assessing profitability on a regular basis and adapting support levels accordingly
 - **Assessing the profitability** through IRR calculations
4. Guarantee a gradual market development with the **corridor concept**
5. Develop a national roadmap to PV competitiveness
 - Evaluate until when support schemes are needed



Adequate IRR levels according to investor profile

	Insufficient Support	Sustainable Support	Unsustainable Support
Private Investor	< 6%	6-10%	> 10%
Business Investor	< 8%	8-12%	> 12%



- Existing feed-in tariff
- Improved situation to clear-up the waiting queue

However...



- Capped by an annual budget
- Digression of feed-in tariff not know in advance

« Corridor » concept: a flexible market control mechanism

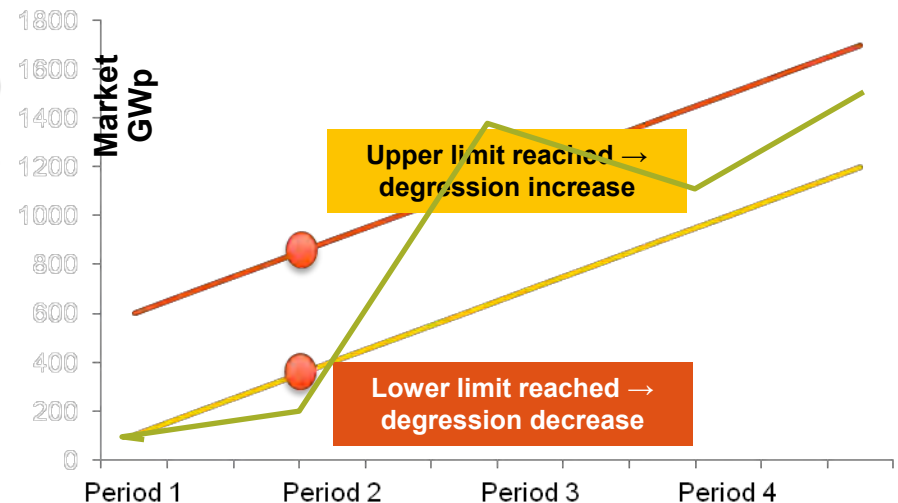
Support structure :

- ▶ Basic support : *Feed-in Tariffs weighted on the market development* → « corridor »

Rationale and advantages:

- ▶ Market > upper limit, degression rate 
- ▶ Market < lower limit, degression rate 
- ▶ Transparent control and predictable market
- ▶ Ensures sustainable growth of market

“Corridor” concept rationale



COMPETITIVENESS STARTING IN **2013** IN THE EU

- Over the next 10 years, **PV system prices could decline by 36-51%** in the largest EU countries; this is true for all market segments.
- **PV's generation cost could go down by 50% by 2020.**
- **PV can be competitive** in what are potentially the 5 largest EU electricity markets **before 2020.**
- Achieving PV competitiveness across Europe will, however, **require political commitment to regulatory frameworks** that support development of the technology and removal of market distortions.



European Photovoltaic Industry Association

www.epia.org

THANK YOU FOR YOUR ATTENTION!

Reinhold Buttgerit
r.buttgerit@epia.org