



From Generation to Integration – Investment Opportunities in the German Energy market

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- I. The role of GTAI
- II. The German 'Energiewende'
- III. From generation to integration

- *Germany Trade & Invest* is the foreign trade and inward investment promotion agency of the Federal Republic of Germany.
- The agency is promoted by the Federal Ministry of Economics and Technology and the Federal Government Commissioner for the New Federal States in accordance with a German Parliament resolution.

Germany Trade & Invest acts as an one-stop agency for international investors covering the entire investment decision process:

Strategy

- Identification of business opportunities
- Competitor profiling
- Determination of project-specific location factors
- Macro location analysis

Decision

- Preparation and coordination of site visits
- Cost factor assessment
- Finance & incentives consulting
- Information on tax & legal issues
- Link to business partners, local authorities, and service providers

Implementation

- Facilitation of administrative permits
- Support in negotiating with cooperation partners
- PR support
- Recruitment assistance

Complete your project management needs from our range of investment and one-stop project consultancy services.

Strategy

Evaluation

Decision & Investment

Project Management Assistance

Business opportunity analysis and market research

Market entry strategy support

Project partner identification and contact

Joint project management with regional development agency

Coordination and support of negotiations with local authorities

Location Consulting/Site Evaluation

Identification of project-specific location factors

Cost factor analysis

Site preselection

Site visit organization

Final site decision support

Support Services

Identification of relevant tax and legal issues

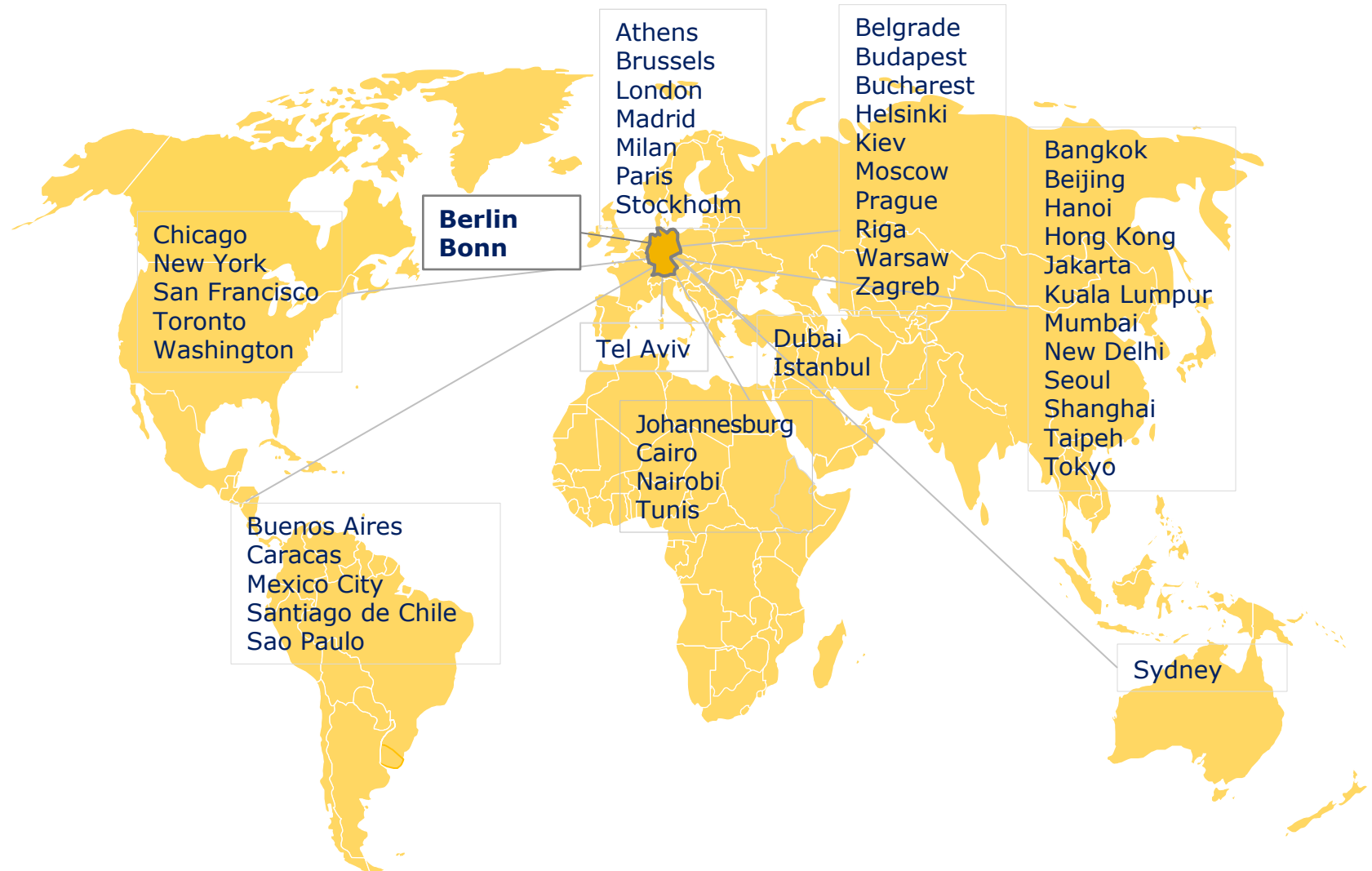
Project-related financing and incentives consultancy

Organization of meetings with legal advisors and financial partners

Administrative affairs support

Accompanying incentives application and establishment formalities

Two headquarters in Germany - 46 locations worldwide



I. The role of GTAI

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Main Objectives:

Climate protection measures	2020	2050
CO2 cuts vs. 1990	-40%	-80%
Renewable share of...	2020	2050
Total energy consumption	18%	60%
Electricity consumption	35%	80%
Heat generation	14%	60%
Energy efficiency measures		
Increase in energy productiveness	2.1% p.a.	
Reduction of energy consumption	-50% (2050 vs. 2008)	
Reduction of electricity consumption	-25% (2050 vs. 2008)	
Renovation rate	2% p.a.	
Reduction of energy for transportation	-40% (2050 vs. 2005)	

The German renewable energy strategy consist of four incentive pillars:

Renewable Energy Sources Act (EEG)

- Objective: renewable energies should represent 35% of the total power production in Germany by 2020.
- Conducive feed-in tariffs are the main legal instrument used to promote renewable energies.
- Added bonuses for innovative technologies and CHP.

Renewable Energy Heat Act (EEWärmeG)

- Objective: 14% of heat produced by renewable energies by 2020.
- Obligation to integrate heat production from renewable sources in new construction or CHP as a substitute.

Cogeneration Act (KWK)

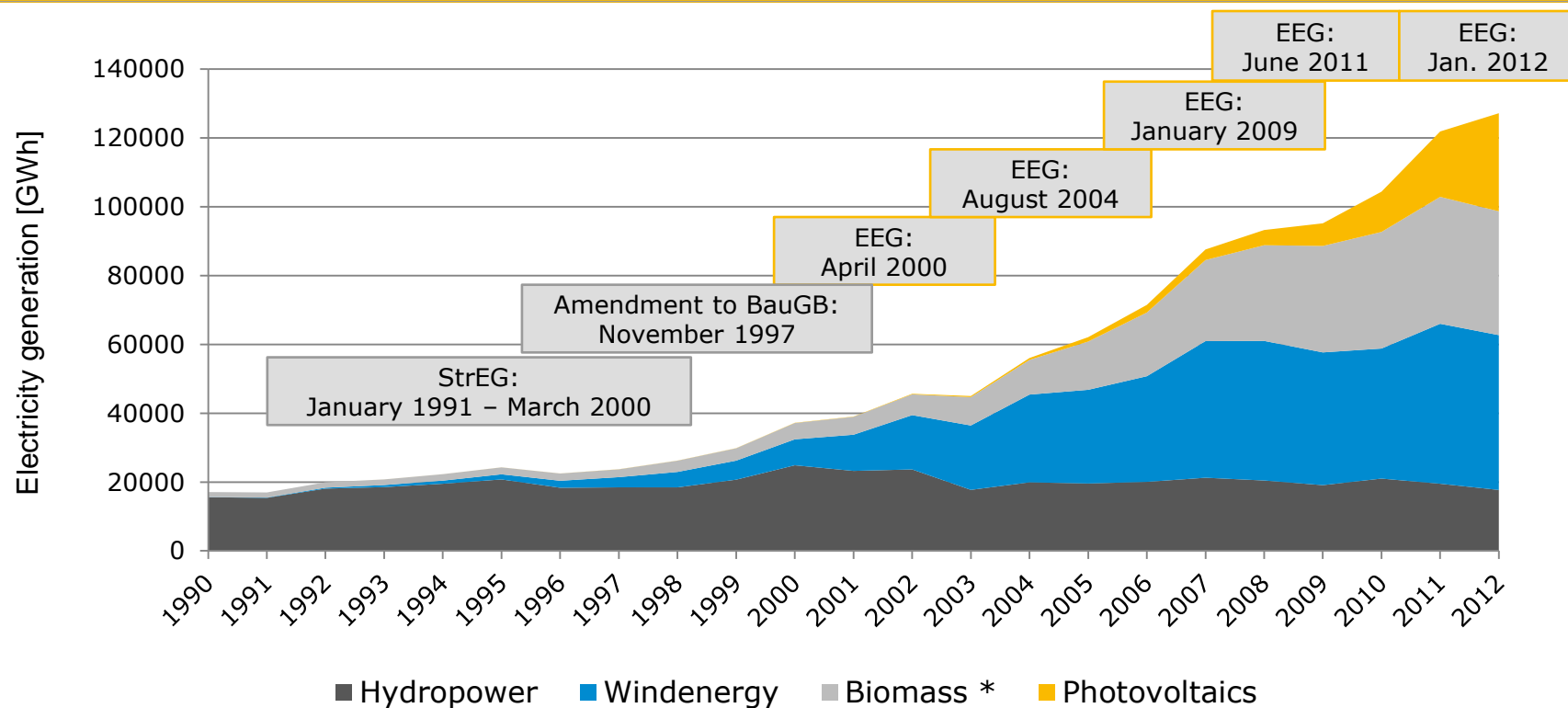
- Objective: 25% of electricity produced by cogeneration by 2020.
- Cogeneration bonuses and subsidies of up to €750 million per year from 2009.

Biofuels Quota Act (BioKraftQuG)

- Fixed blending mandates for biofuels: From 6.6% in 2006, the government currently aims 12.0% by 2020
- Fuel tax exemption for special biofuels (2nd gen.)

The „EEG“ was the main driver for the growth of renewable electricity, which had a 23% share of German electricity consumption in 2012

Development of electricity generation from renewable energy sources in Germany 1990 - 2012

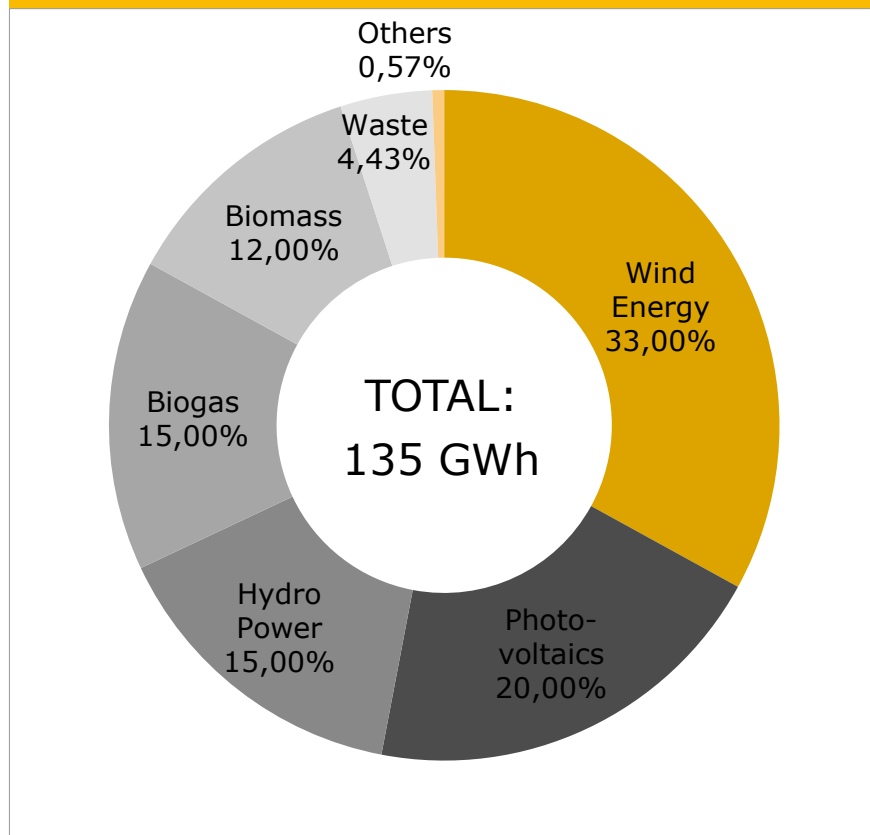


* Solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas;

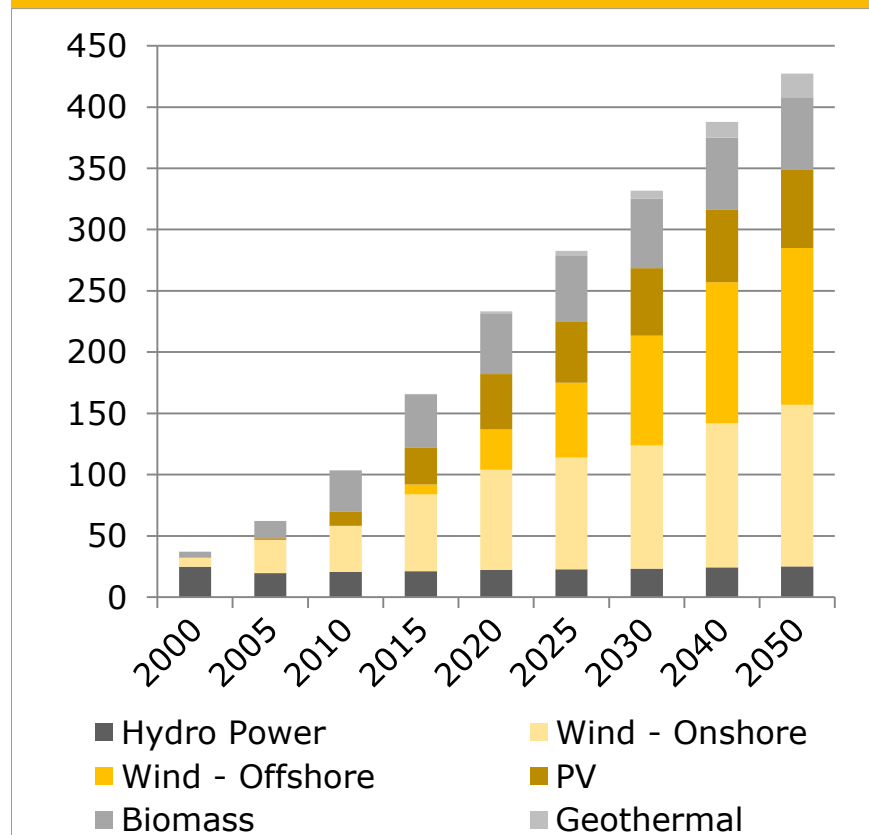
Electricity from geothermal energy is not presented due to the negligible quantities of electricity produced; StrEG: Act on the Sale of Electricity to the grid; BauGB: Construction Code; EEG: Renewable Energy Sources Act; Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat);

Governmental targets for renewables' share in the German electricity mix: 35% by 2020; 80% by 2050 → **strong increase of fluctuating sources**

Structure of Electricity Production from Renewable Energies in Germany 2012¹⁾



Prognosis of Electricity Production (in TWh/a) from Wind in Germany²⁾



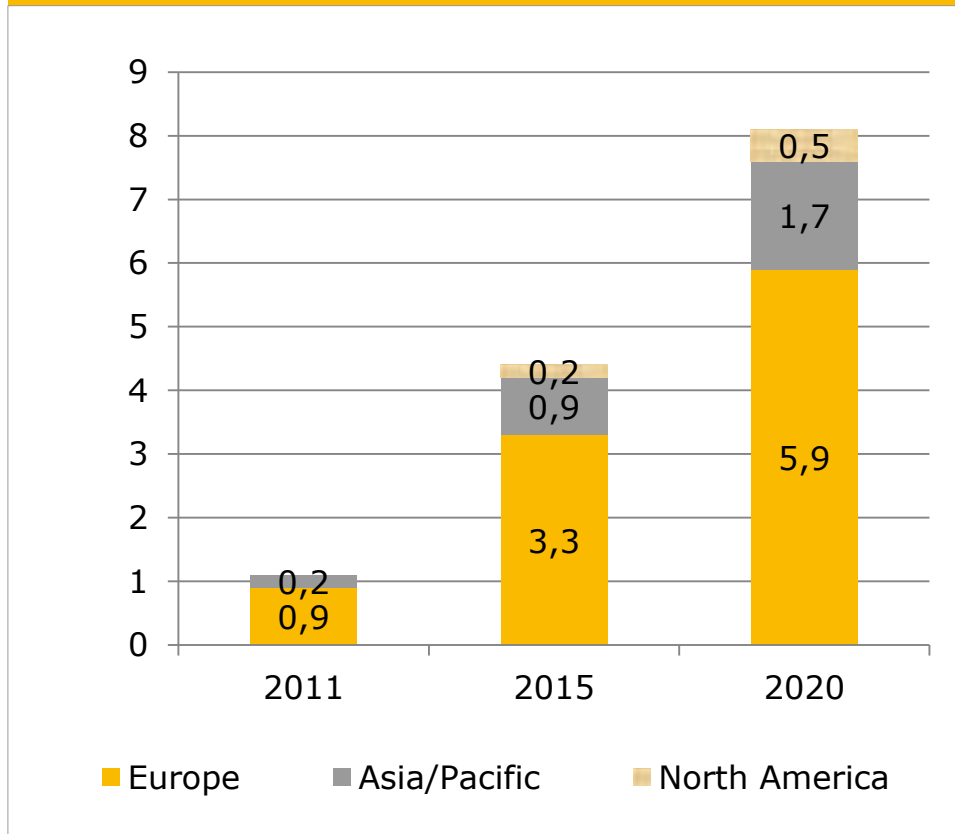
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Europe will remain the most important offshore market in the future.

Prognosis of yearly installed offshore capacity (in GW)¹⁾

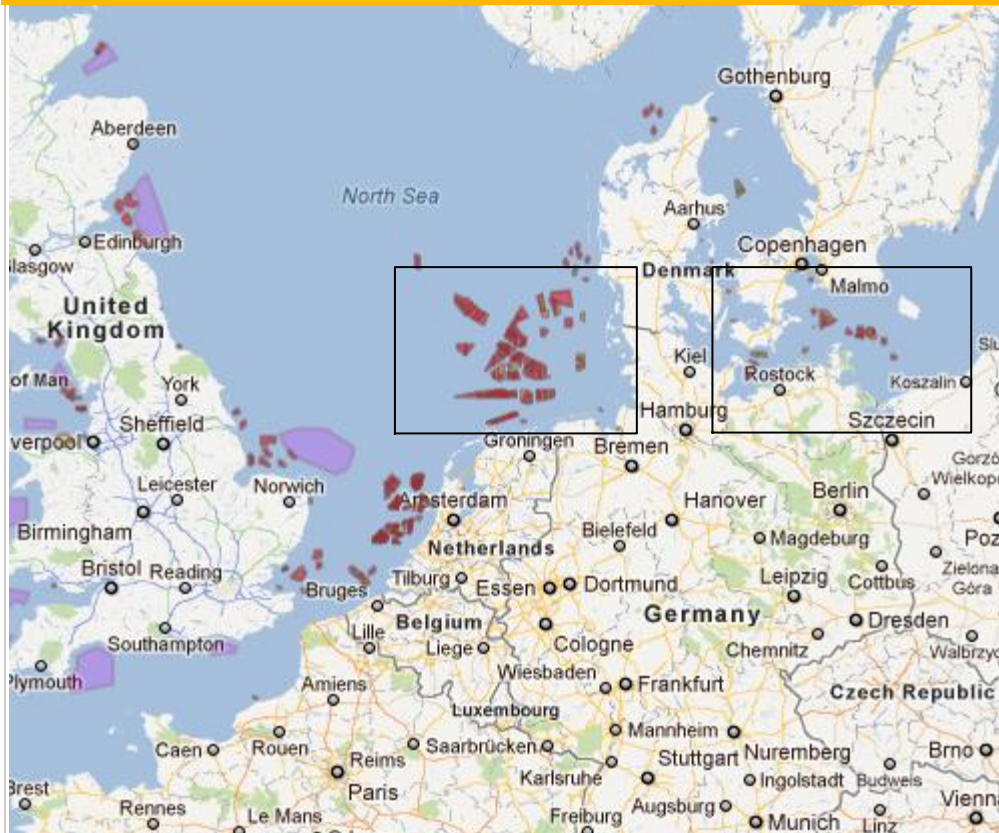


- Germany provides an offshore **pipeline of over 8 GW** approved projects. It's offshore development is strongly supported by the government's new Energy Concept 2050 and subsequent political government initiatives.
- The Wind Energy Agency expects **5,261 MW of cumulated offshore installations in Germany by 2015²⁾**

Source 1) Roland Berger 2011: wind Turbine Manufacturing – a case for consolidation, 2) wab 2012

Offshore wind farm development in Europe concentrates on Northern Europe.

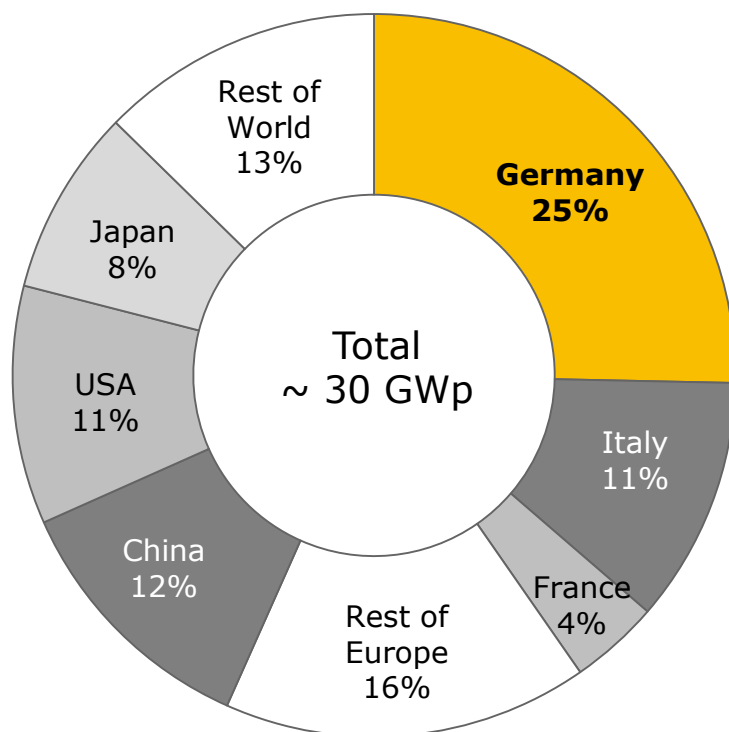
Current offshore wind farm projects in Northern Europe



Approx. "German"
projects

Germany was the world's largest PV market in 2012;
While Europe accounted for more than 50% of the world market

New PV Installations 2012 in MWp¹



German PV Market 2012²

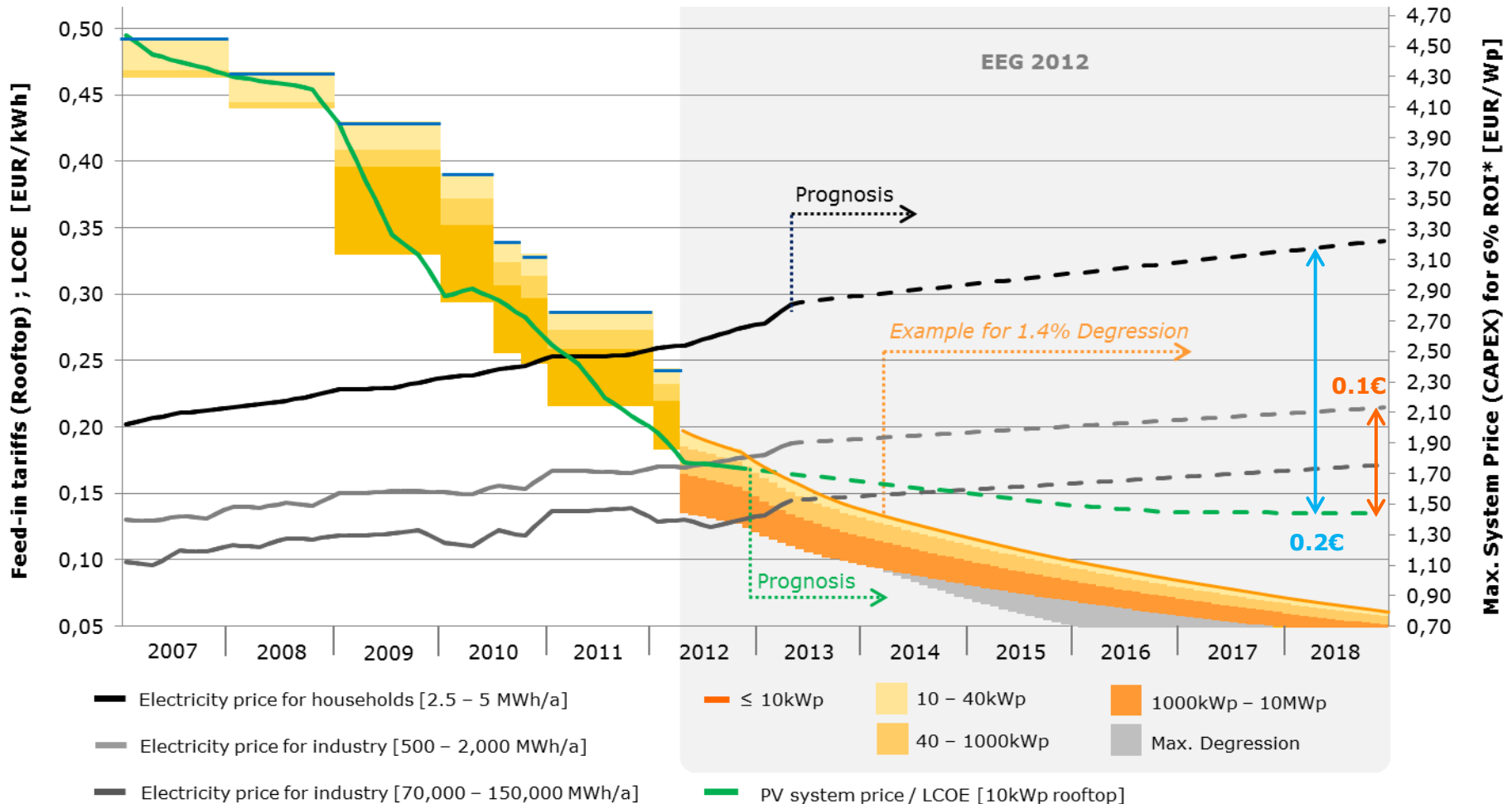
- Newly installed PV power 7.6 GWp
- Total installed PV power 32.4 GWp
- FIT commitment for 52 GWp
- Share of final electricity consumption 4.7 %

German PV Industry 2012³

- Investments in new installations € 11.2 bn
- Industry Turnover of manufacturers € 13.0 bn
- Export share 60 %
- Number of jobs 100.000

Sources: 1) EPIA estimates February 2013 2) Federal Network Agency February 2012, BMU 2013; 3) BMU 2013, BSW 2013

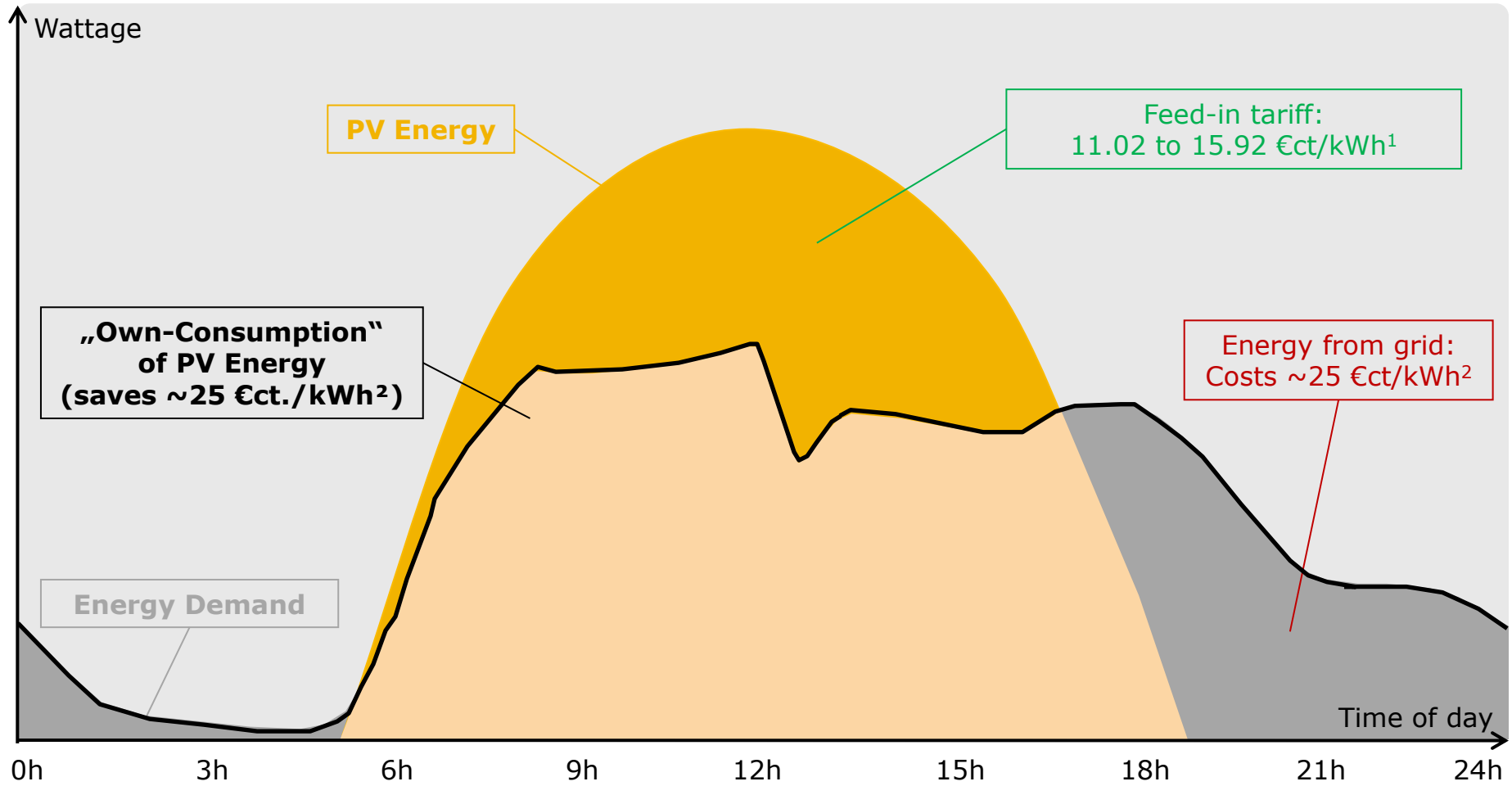
Demand break-through for the residential segment is expected in 2018



* Model calculation for rooftop systems, based on 802 kWh/kWp (Frankfurt/Main), 100% financing, 6% interest rate, 20 year term, 2% p.a. O&M costs
 Sources: Feed-in Tariffs: BMU 2013; System Prices: BSW 2013; Model Calculation: Deutsche Bank 2010; Electricity Prices 2007-2013: Eurostat 2013.

The Principle of „Own-Consumption“

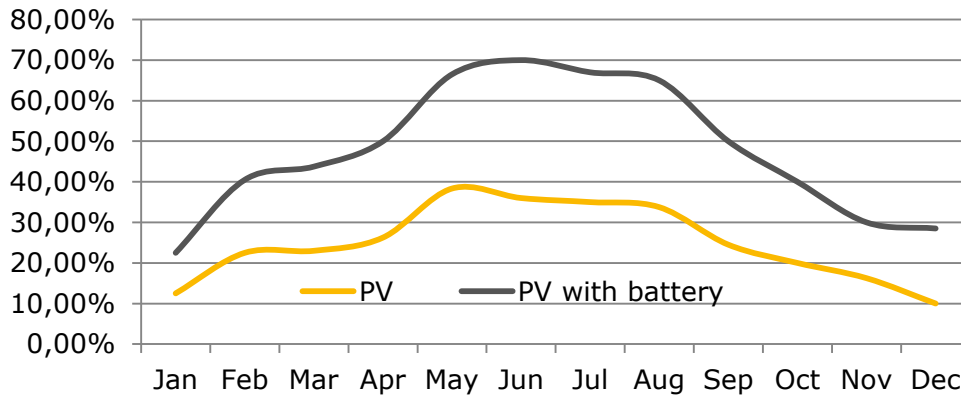
Own-consumption of PV energy enables cost savings on electricity bills,
Feed-in tariff is only used for surplus electricity:



Notes: 1) Depending on size /type of system; Min. to max . tariff of April 2013 of new EEG 2012 2) Depending on electricity retail price of respective utility company.

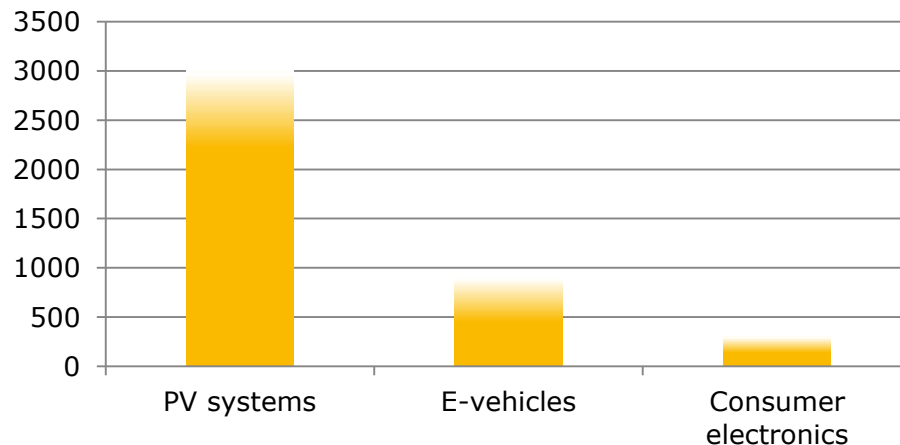
Demand break-through for the residential segment is expected in 2018

Private PV own-consumption potential with and w/o battery

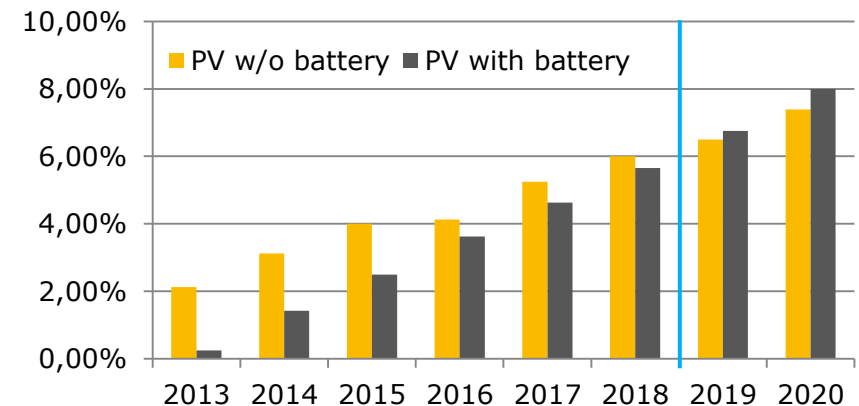


- More than 43 GWp of unsubsidized solar to be installed until 2020
- Own-consumption w/o battery is about 30% of annual consumption
- Double own-consumption to 60% with a 2 kWh battery system

Costs of Li-ion battery packs in different applications (EUR/kWh)



IRRs of unsubsidized solar systems in Southern Germany



Source: UBS AG, 2013

Storage support programs in Germany: **Market-pull incentives**

Program	Target group	Description	Remarks
KfW 203	Municipalities	For extension and new construction of storage projects	Interest rate @ 0.6 – 1.3% up to 30 years
KfW 204	Municipal utilities and PPPs	For extension and new construction of storage projects	€50 million loan limit
KfW 207 & 274	Private consumers	For Energy storage combined with renewable generators	
KfW 275	Private consumers	Investment grants up to 30% and low interest loans for PV-connected storage with grid connection and data management systems	€25 million for 2013, potential €25million for 2014
KfW 291	Companies in Germany	For large-scale investments of large enterprises in the German <i>Energiewende</i> (energy supply, efficiency, storage and transmission)	Loans of €25 – 100 million
KfW 230	Companies in Germany	Investment grants up to 30% and low interest loans for large-scale pilot projects	

→ In addition: Electricity storage facilities are exempt from grid tariffs, EEG levies and, in the case of pumped hydro, also electricity taxes.

Introduced in May 2013 with 25m€ funding per year

OpEx incentive



CapEx incentive

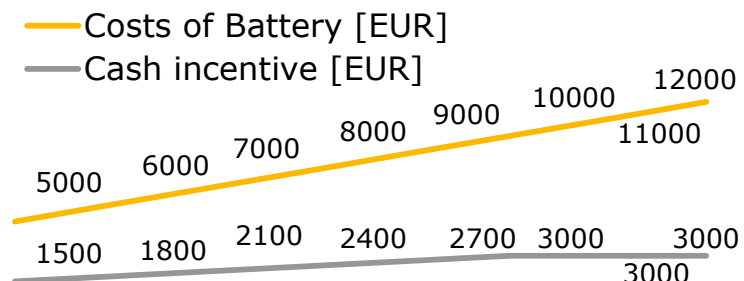
- KfW program with interest-reduced loans
- For PV systems up to 30 kWp
- For batteries providing min. 7 years present value guarantee
- Battery management system must have open interface for external control
- Max. PV output at grid-connection point must be reduced by 40%
- Conditions:
 - Up to 100% of net investment
 - 5/10/20 year loan with 1/2/3 years of free redemption
 - Fixed interest rates
 - Application through client's „house bank“

- Cash incentive on purchase price
- To be cleared with KfW program → loan reduction
- Calculation scheme:

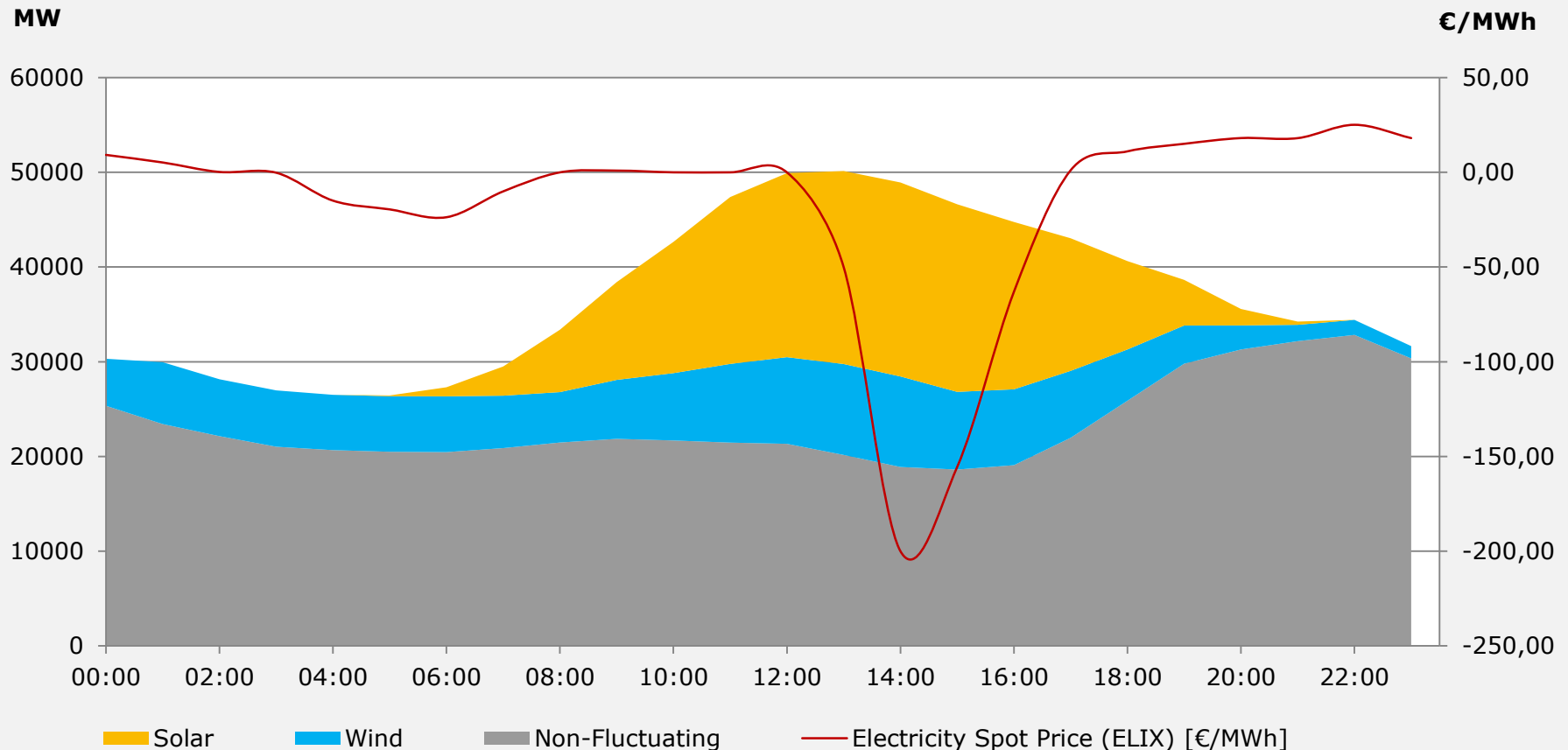
$$\frac{\text{Cost of Battery [EUR]}}{\text{PV capacity [PV-kWp]}} \times 0.3 \times \text{PV capacity}$$

→ Max.: 600 EUR/PV-kWp

→ Example for a 5 kWp PV system:



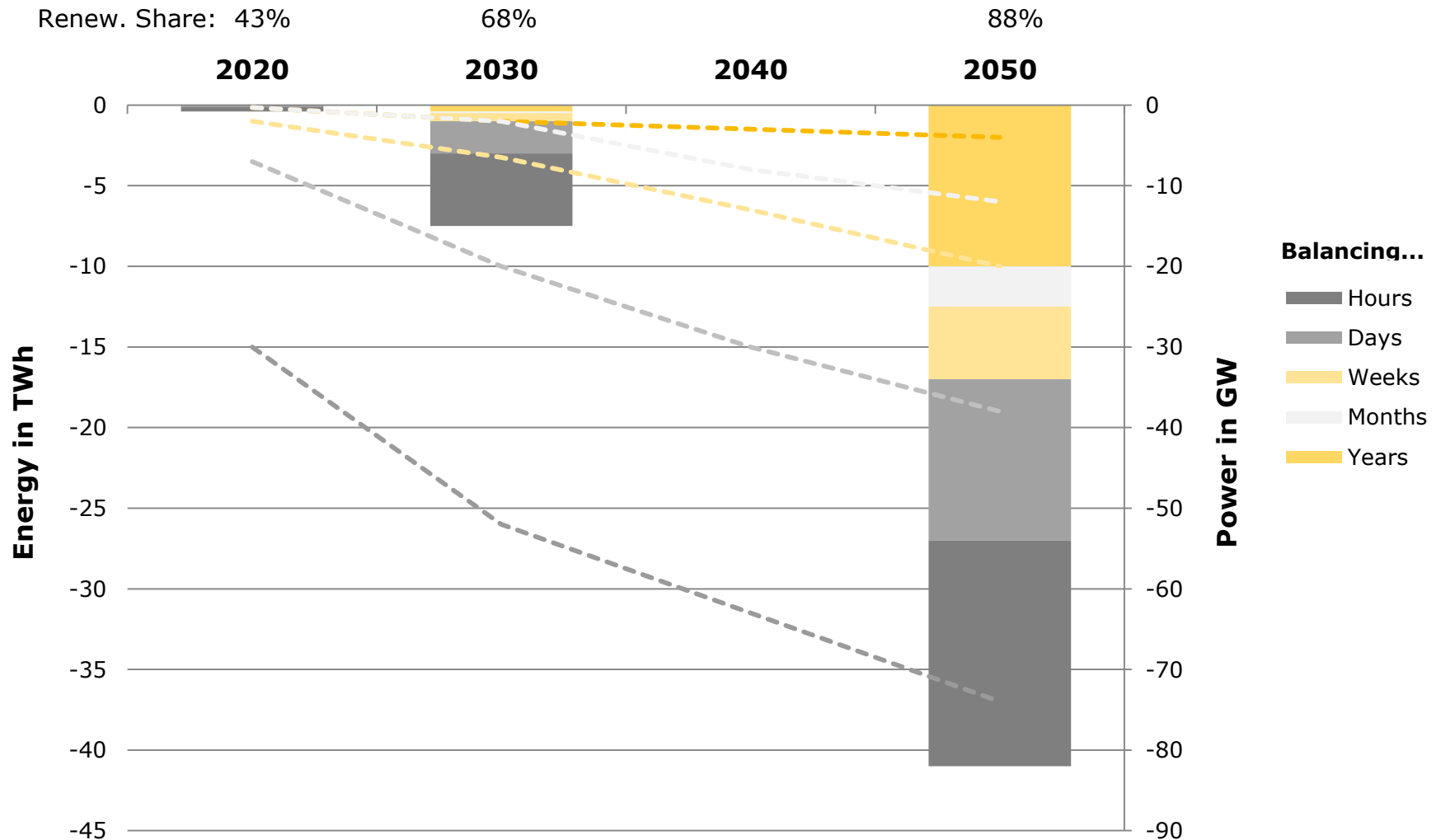
Punctual overcapacities in electricity production through fluctuating RES
 → Increasing volatility of electricity prices! → Business case for storage?



Electricity generation in Germany June 16th 2013 @ ~34 GWp installed PV capacity

*Source: EEX 2013 (<http://www.transparency.eex.com>)

Grid-connected storage will be essential at > 50% fluctuating sources



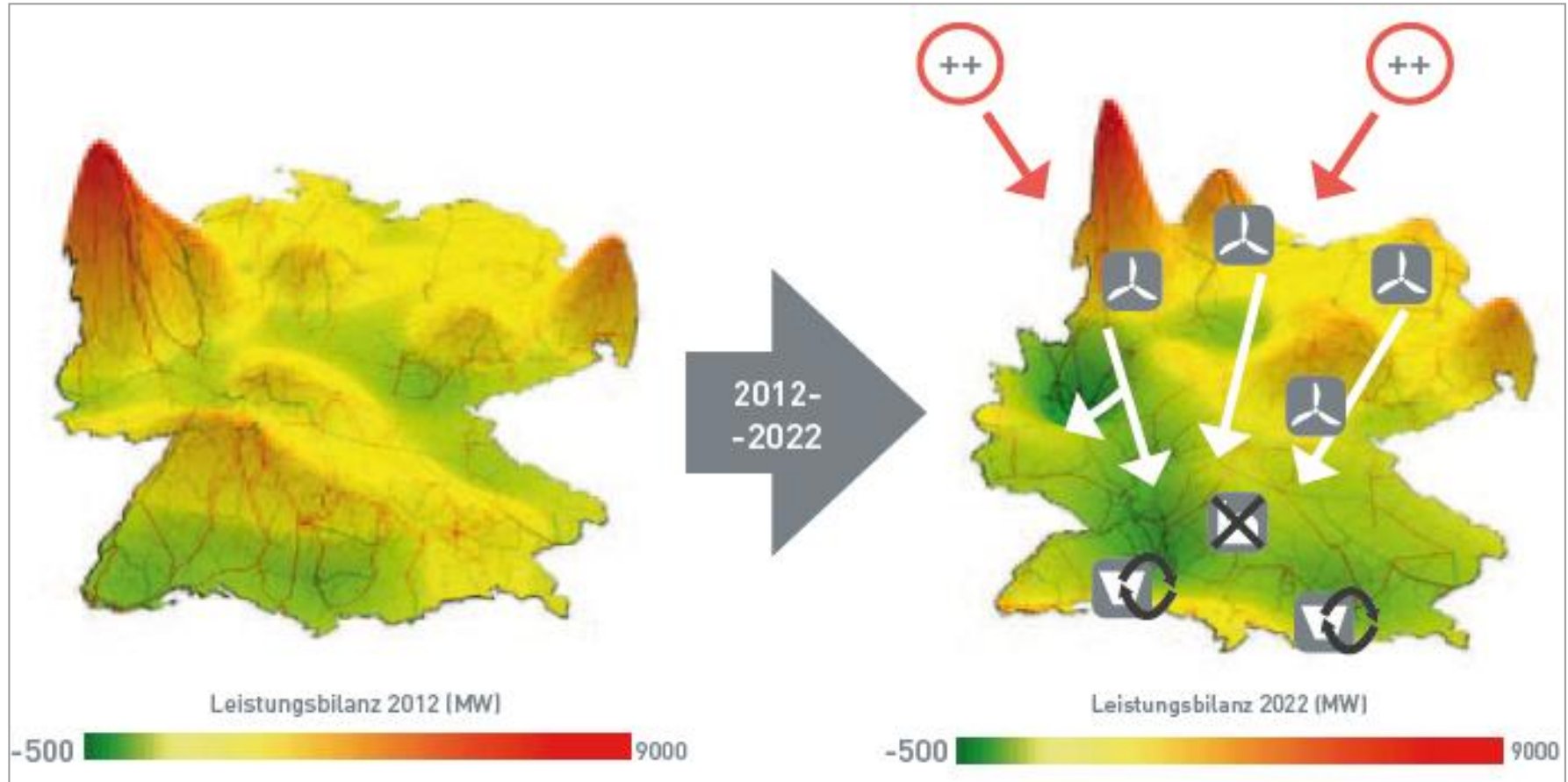
Ambitious growth targets for RE: what does this mean for energy storage?

	RE-share	Required compensation capacity (GW)	TWh of energy required
2015	n.a. (30%)	ca. 22	30
2020	35%	ca. 26	37
2025	>35%	ca. 28	39

	State of the art	2040
PV - Own Consumption	0.4% of the overall generated PV power is used for own-consumption	2025: 20% of PV generated power for own-consumption (35% in 2040).
Balancing Power	Required Balancing Power of ~7.4 GW	In 2025 the demand for Balancing Power increases by 50% to 2010 and by 70% in 2040.
Surplus energy	Storage demand for a surplus of 150 GWh (2011)	Storage necessity 2025: 3.5 TWh 2040: 40 TWh

Expected: Investment of € 25 - 30 billion in storage capacity until 2030

New power structure in 2022 will lead to bottlenecks in Germany



Power balance 2012

Power balance 2022

THANK YOU!

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