GROWING BEYOND THE FEED-IN TARIFF

PRIORITIES TO SUPPORT PV IN THE AGE OF RETAIL PARITY

EU PVSEC 2012

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Hosted by BSW-Solar, the German Solar Industry Association

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Germany: an industrialized country with limited natural resources, but some sun

- Population 81 million
- 40-80 GW demand
- Limited natural resources
  - Coal
  - Enough sun for a family to meet its own needs (net)
- Significant engineering, heavy industry
- Strong environmental culture, anti-nuclear movement, desire for energy independence

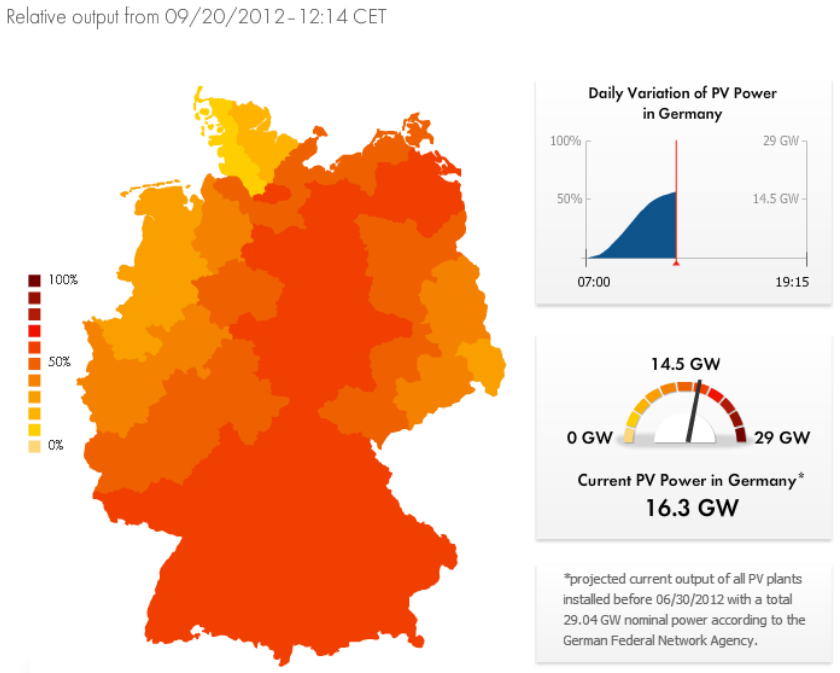
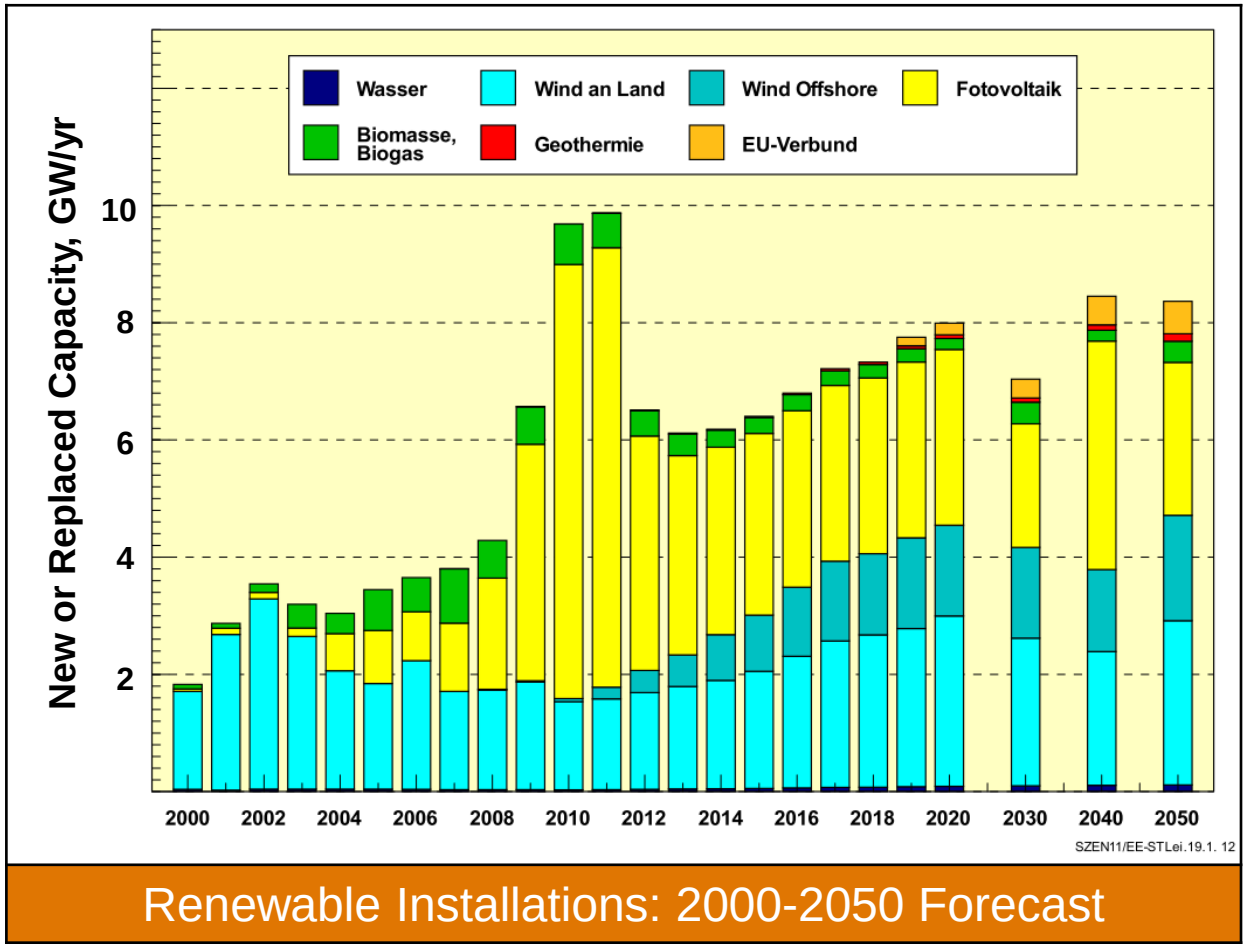


Image Source: SMA Solar Technology AG, http://www.sma.de/en/company/pv-electricity-produced-in-germany.html

Total PV capacity is about 30 GW, per capita 20x USA's 5.7 GW

Germany has aggressive, long-term solar and renewable electricity goals



Renewable Installations: 2000-2050 Forecast

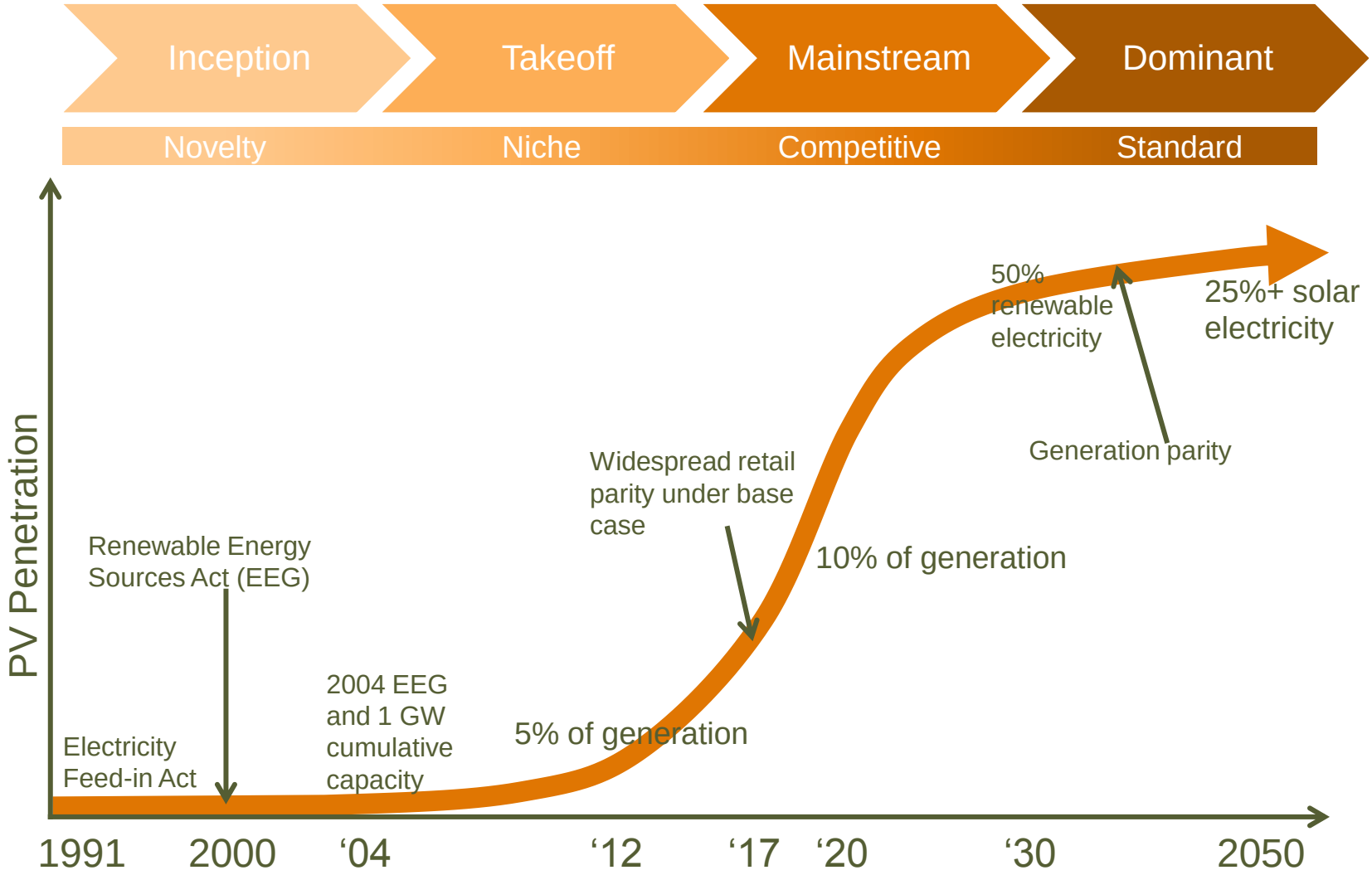
Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
Langfristszenarien und Strategien für den Ausbau der erneuerbaren Energien in Deutschland bei Berücksichtigung der Entwicklung in Europa und global
http://www.fvee.de/fileadmin/publikationen/Politische_Papiere_anderer/12.03.29.BMU_Leitstudie2011/BMU_Leitstudie2011.pdf

The country's solar sector, driven by feed-in tariffs (FITs), is in flux

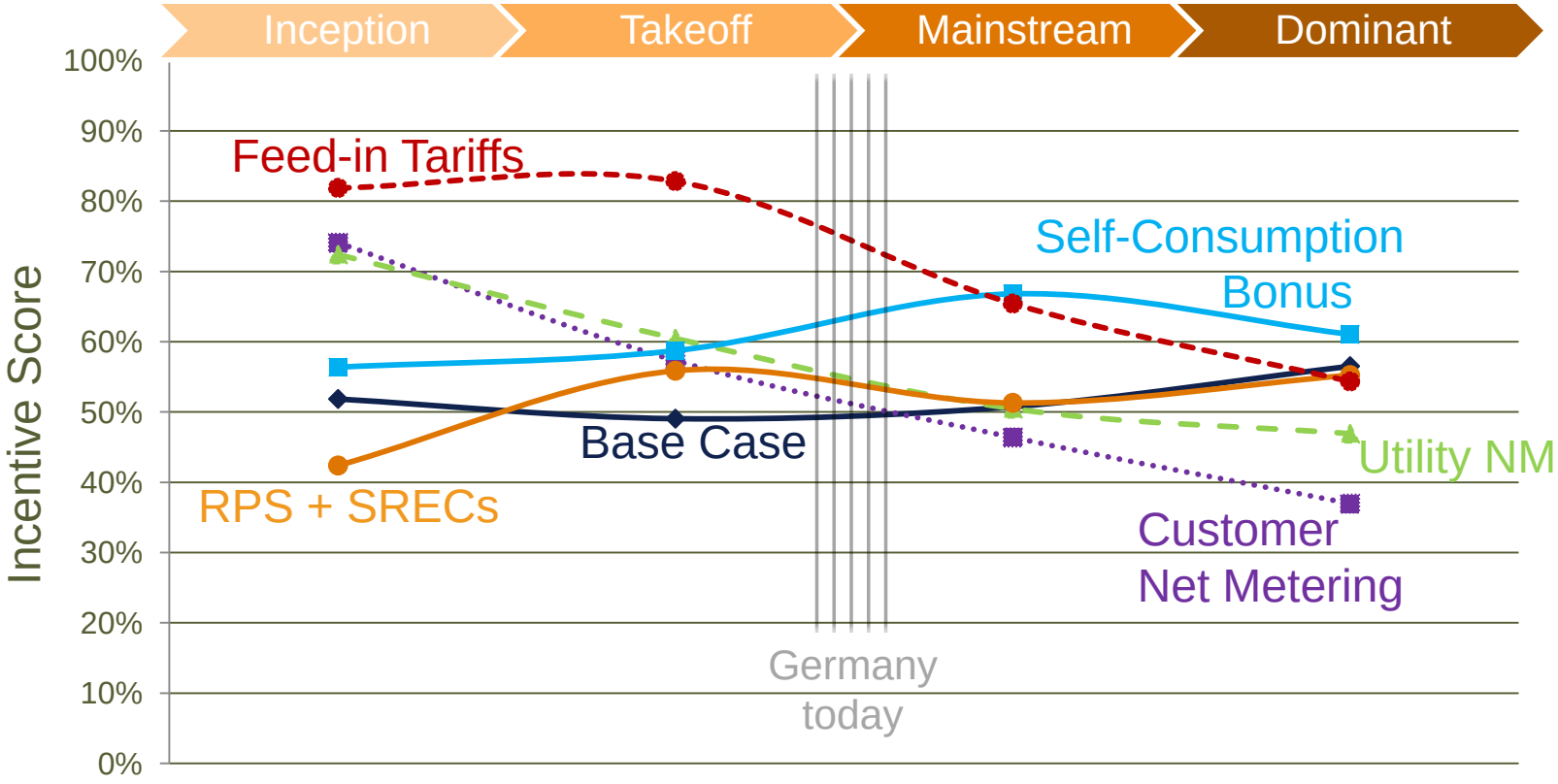
- 52 GW cap on FIT support under the latest EEG (renewable energy law)
- CDU party planning a fundamental revision of the EEG
- FDP party advocating a moratorium on solar
- Grid parity is coming soon (already here, in some sectors)

Traditional FIT-driven growth will end soon, perhaps in a few years!

Solar needs different types of support in different market phases



Support mechanisms can be rated by creation of necessary growth conditions



FITs were previously the best tool for solar growth, but they and other existing mechanisms are all problematic in the mainstream phase.

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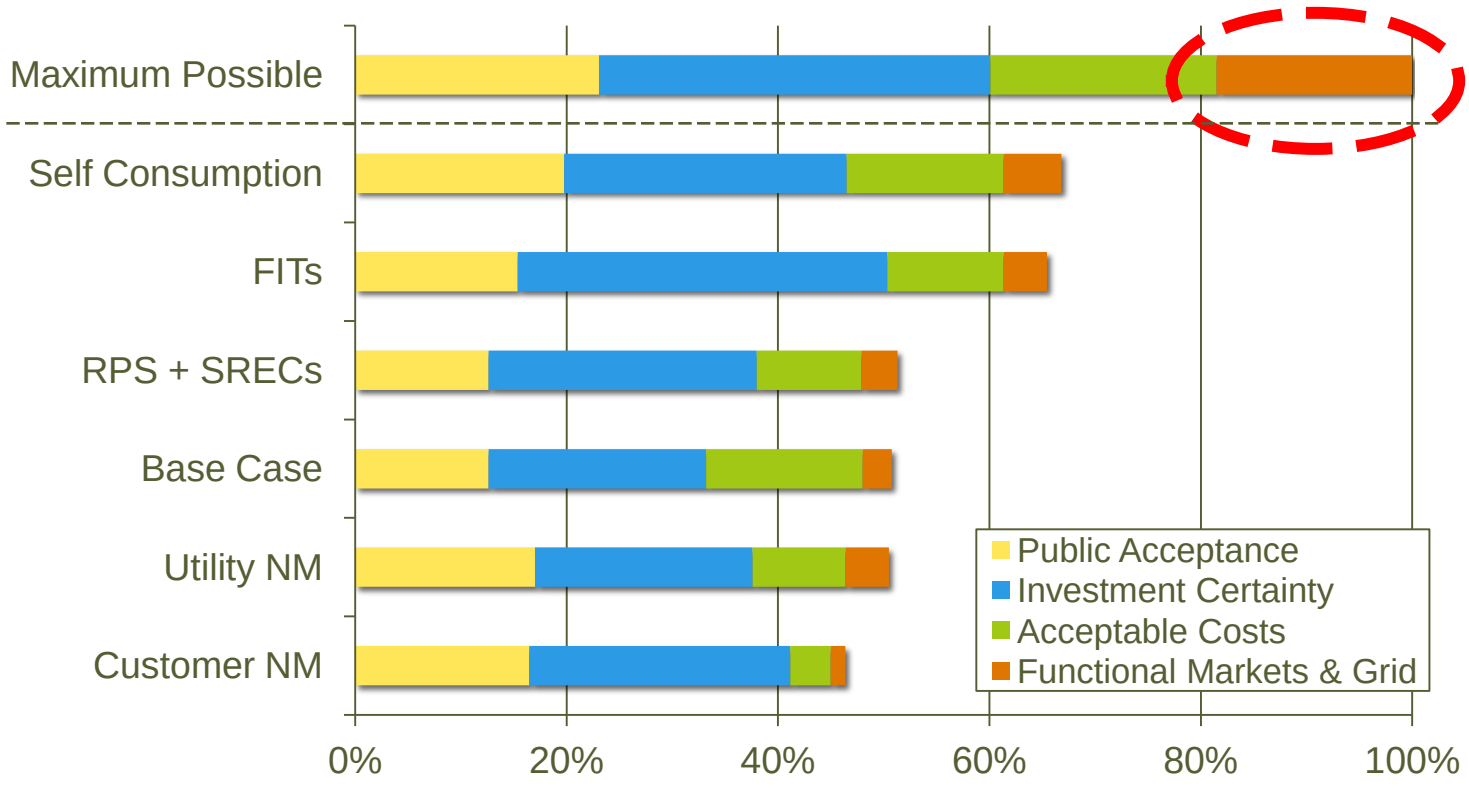

FITs create investment certainty, but no existing incentive effectively addresses market and grid function.

Priorities to support future PV growth

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Meanwhile, maintain acceptance by supporting local/regional generation and empowering individual prosumers.

Key design choices for a post-FIT system

Behind the Meter (self-consumption)

- Constant kWh rates

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Goal: widespread adoption of solar PV as part of a secure energy system

Needed: Strong market signals, alongside the investment certainty to promote growth

Behind the Meter (self-consumption)	Grid Feed-In (excess or all generation)
☑ Constant kWh rates	☐ Spot market price
☐ Time of Use (TOU), per kWh electricity rates	☑ Bilateral contracts
☑ Additional peak demand charges (such as critical peak pricing or peak kW)	☑ "Full value" standardized power purchase agreements (PPAs)
	☐ Capacity market

Getting these design changes right is going to be hard, so now is the time to start the process!

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Thank you

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Key design choices for a post-FIT system

Behind the Meter (self-consumption)

- Constant kWh rates
  - (Business As Usual)

Possible Outcomes

- Some market segments highly profitable; runaway growth
- Lack of grid-friendly operation
- Prosumers do not pay full costs of their grid usage, burdening other consumers

Key design choices for a post-FIT system

Behind the Meter (self-consumption)

- Time of Use (TOU), per kWh electricity rates

Possible Outcomes

- Only market segments able to offset load at grid peak periods adopt solar
- Shift away from peak period consumption
- Prosumers pay for grid usage, but not fully
- Depending on peak rates, extra support for storage may be necessary
- Peak rates may overly burden some consumers
- More complexity increases role of third parties

Key design choices for a post-FIT system

Behind the Meter (self-consumption)

- Additional peak demand charges (such as critical peak pricing or peak kW)

Possible Outcomes

- Delay grid parity for market segments unable to offset peak use with PV
- Widespread peak shaving, maybe storage
- Prosumers pay for grid use and utilities earn revenue
- Peak rates will burden some consumers; calculation may be contentious
- More complexity increases role of third parties

Key design choices for a post-FIT system

Grid Feed-In (excess or all generation)

- Spot market price
  - Instantaneous or PV average

Possible Outcomes

- Insufficient ROI if not supplemented by self-consumption
- Limited or no demand signals
- Systemic failure to compensate for true costs/value unsolved (merit order effect, missing money)

Key design choices for a post-FIT system

Grid Feed-In (excess or all generation)

- Bilateral contracts

Possible Outcomes

- Feasible for third-party aggregators or large operators
- Opportunity to integrate non-energy aspects such as grid services, backup, local grid needs, etc.
- Insufficient ROI without additional measures

Key design choices for a post-FIT system

Grid Feed-In (excess or all generation)

- "Full value" standardized power purchase agreements (PPAs)

Possible Outcomes

- Easier financing due to long-term, guaranteed cash flow
- Technical complexity if PPA rates vary by time of day, favoring aggregators and large operators
- Encourage grid-friendly feed-in
- Calculation of generation's value may be contentious
- Insufficient ROI, near-term, without additional measures

Key design choices for a post-FIT system

Grid Feed-In (excess or all generation)

- Capacity market
  - Income per kW, not per kWh

Possible Outcomes

- Create positive ROI for PV investors unable to self-consume
- Investment in capacity to meet grid needs, including solar, storage, backup, and demand response
- Design contentious, difficult, and hard to change once in place