Germany's Renewable Energy Promotion

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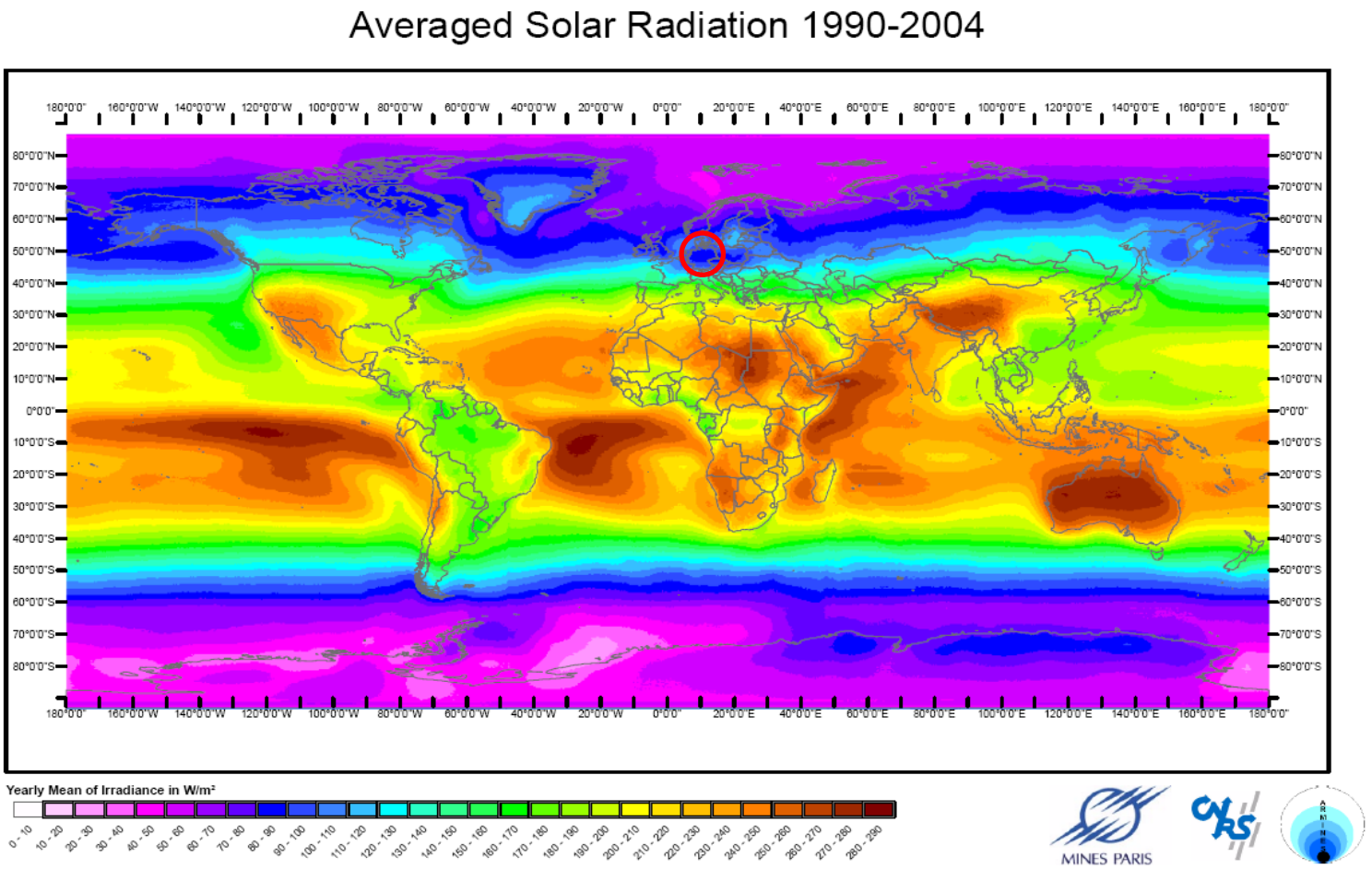
Background

- An increasing number of industrialized countries back public financing of renewable energies.
- Germany's support scheme, based on feed-in-tariffs (FITs), is often cited as a role model, one that sets “a shining example in providing a harvest for the world” (The Guardian, 2007).
- We reviewed the Germany's FIT, focusing on its costs, its impacts on job creation, climate protection and energy security.

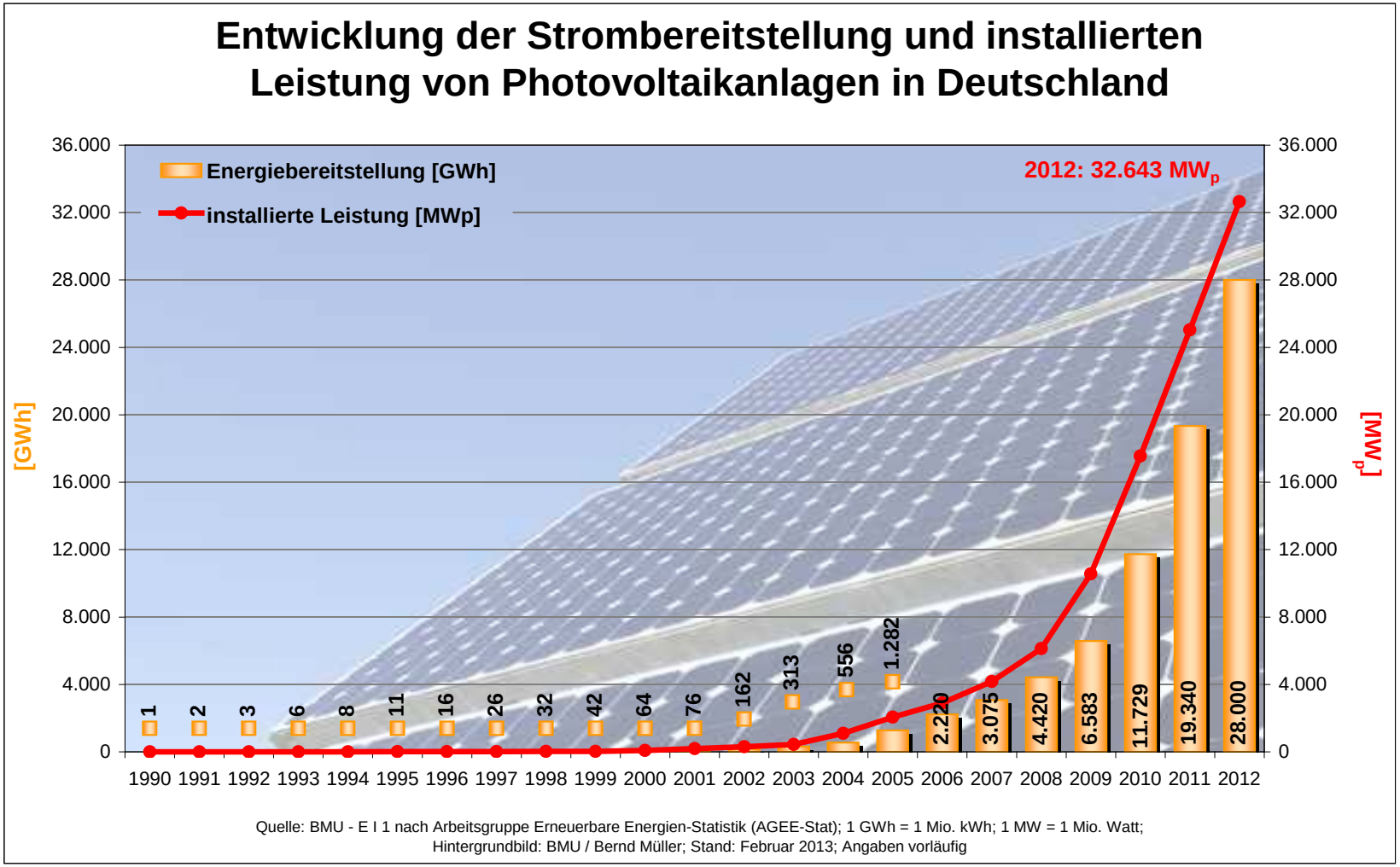
Preview of findings

- Our analysis suggests that Germany's support scheme is:
- expensive,
- neither creates jobs,
- nor reduces emissions,
- and does not contribute to energy security.

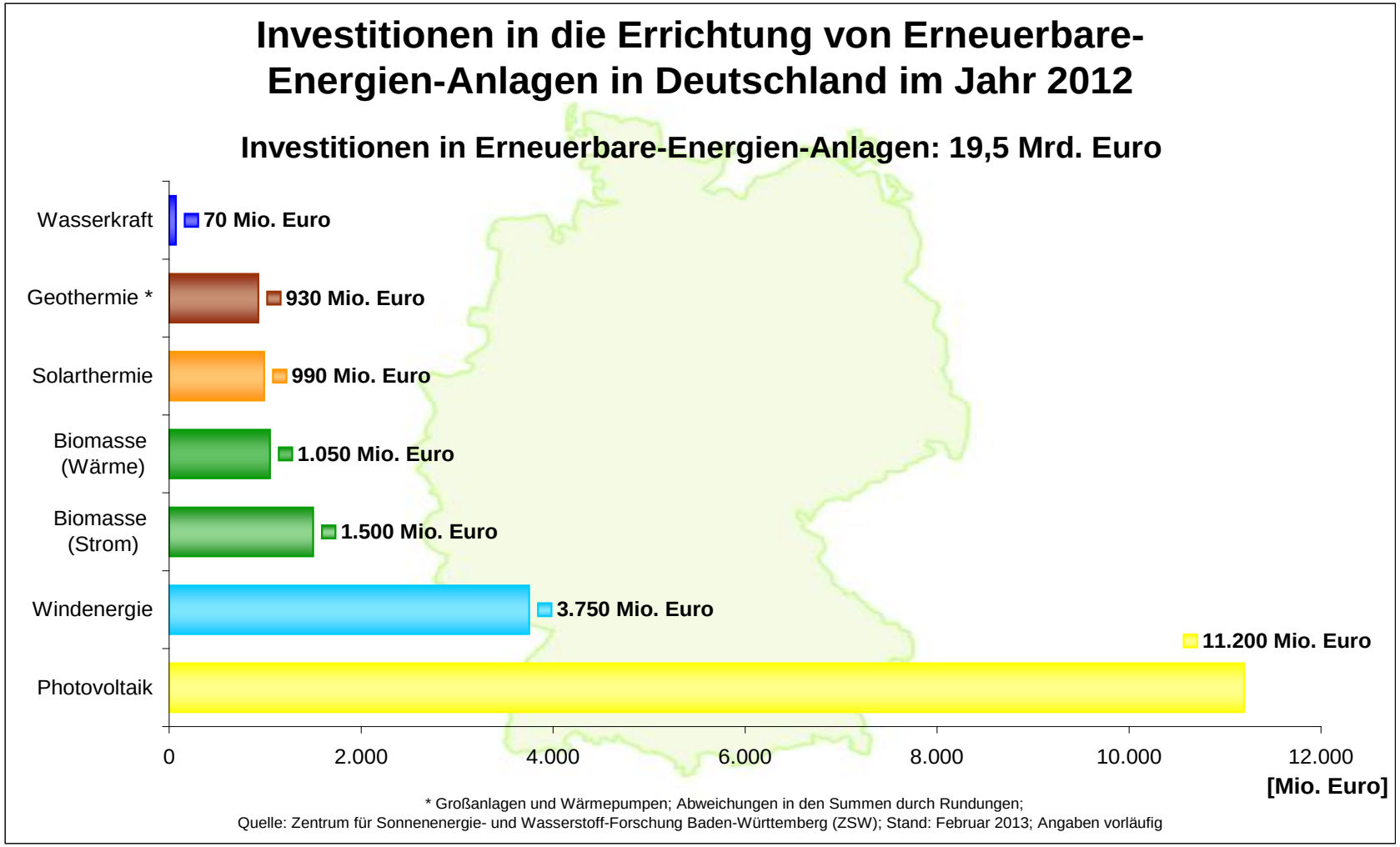
Germany's endowment with sun



PV development



Investment


Investitionen in die Errichtung von Erneuerbare-Energien-Anlagen in Deutschland im Jahr 2012
Investitionen in Erneuerbare-Energien-Anlagen: 19,5 Mrd. Euro
Wasserkraft
70 Mio. Euro
Geothermie *
930 Mio. Euro
Solarthermie
990 Mio. Euro
Biomasse (Wärme)
1.050 Mio. Euro
Biomasse (Strom)
1.500 Mio. Euro
Windenergie
3.750 Mio. Euro
Photovoltaik
11.200 Mio. Euro
0
2.000
4.000
6.000
8.000
10.000
12.000
[Mio. Euro]
* Großanlagen und Wärmepumpen; Abweichungen in den Summen durch Rundungen;
Quelle: Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW); Stand: Februar 2013; Angaben vorläufig

Facts & Figures

- Under German law, renewables receive guaranteed technology-specific feed-in-tariffs for all electricity produced over 20 years.
- Technologies are effectively supported based on their (lack of) competitiveness: the less competitive, the higher the tariff.

Technology-Specific Feed-in Tariffs in Euro Cents per kWh

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wind On-shore	9.00	8.90	8.70	8.53	8.36	8.19	8.03	9.20	9.11	9.02	8.93
Wind Off-shore	9.00	8.90	9.10	9.10	9.10	9.10	8.92	15.00	15.00	13.00	13.00
Photovoltaics	48.09	45.69	57.40	54.53	51.80	49.21	46.75	43.01	39.14	28.74	24.43
Biomass	10.13	10.03	17.50	17.33	17.16	16.99	16.83	11.67	11.55	11.44	11.32
Average tariff	8.91	9.16	9.29	10.00	10.88	11.36	12.25	13.57	15.63	---	---

Sources: EEG 2000, 2004, 2009. Biomass: IWR (2007), BMU, own calculations.

- In comparison: conventional electricity production cost are between 2 and 9 Cents per kWh.

Facts & Figures

- In 2002, the total amount of feed-in-tariffs was roughly €2.23 bn.
- In 2010, it was €13.2 bn; in 2012, the figure is €18 bn.
- While PV receives more than 48% of feed-in tariffs, it accounts for only about 20.6% of renewable electricity.

Share of Feed-in Tariffs by Technology

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Wind Power	64.5%	65.1%	63.7%	54.3%	47.1%	44,5%	39.5%	31.5%	25.4%	25.4%	23.1%
Biomass	10.4%	12.5%	14.1%	17.7%	23.0%	27.4%	29.9%	34.5%	32.2%	26.7%	26.4%
Photovoltaics	**3.7%**	5.9%	7.8%	15.1%	20.3%	20.2%	24.6%	29.3%	38.6%	46.3%	**48.5%**
Total in bn. €	**2.23**	2.61	3.61	4.40	5.61	7.59	9.02	10.8	13.18	16.76	**18.04**

Sources: BDEW (2002-2012) and own calculations

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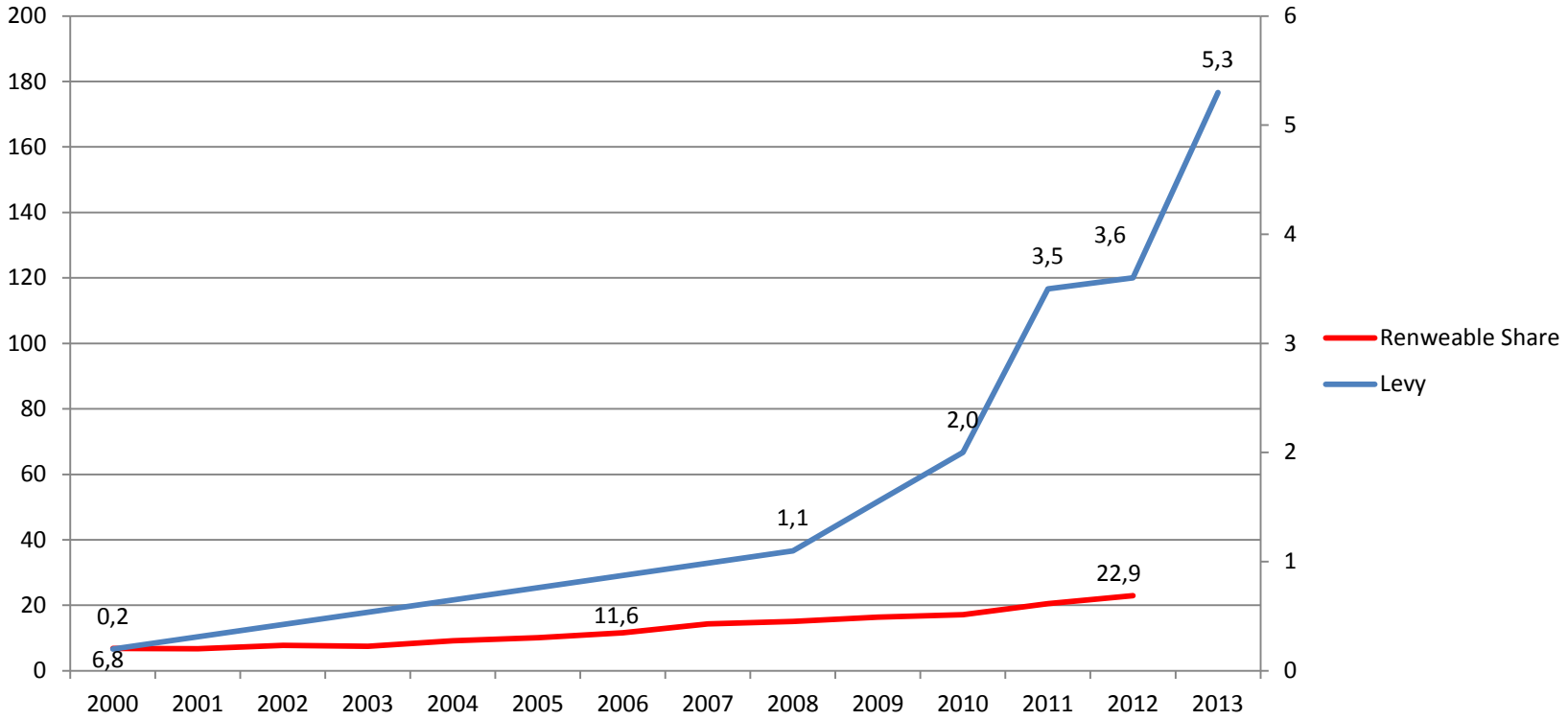
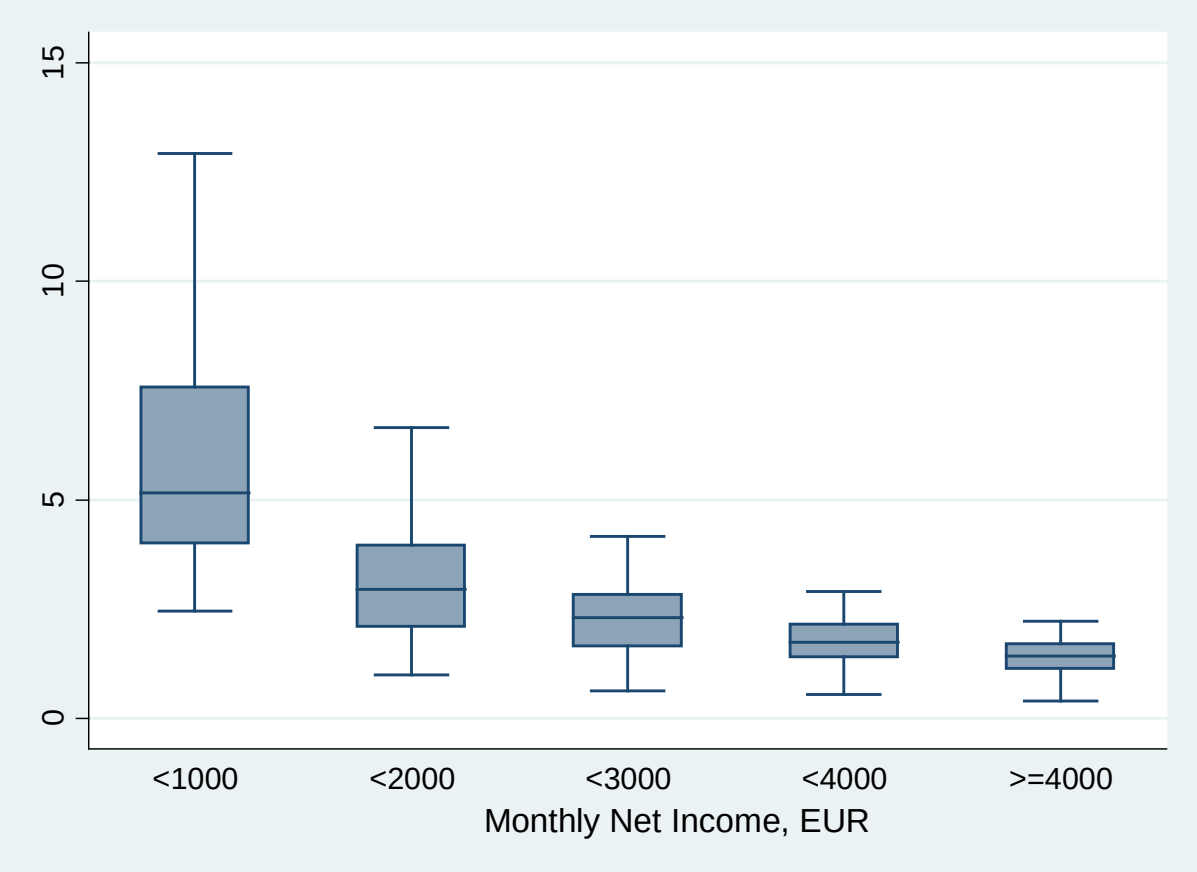
Renewable share and levy, 2000-2012



Sources: Grösche and Schröder, 2012
Prognose der EEG-Umlage 2010 -2013
BMU, 2013

Share of household income spent on electricity, 2010



Sources: RWI, forsa

Cost Assessment

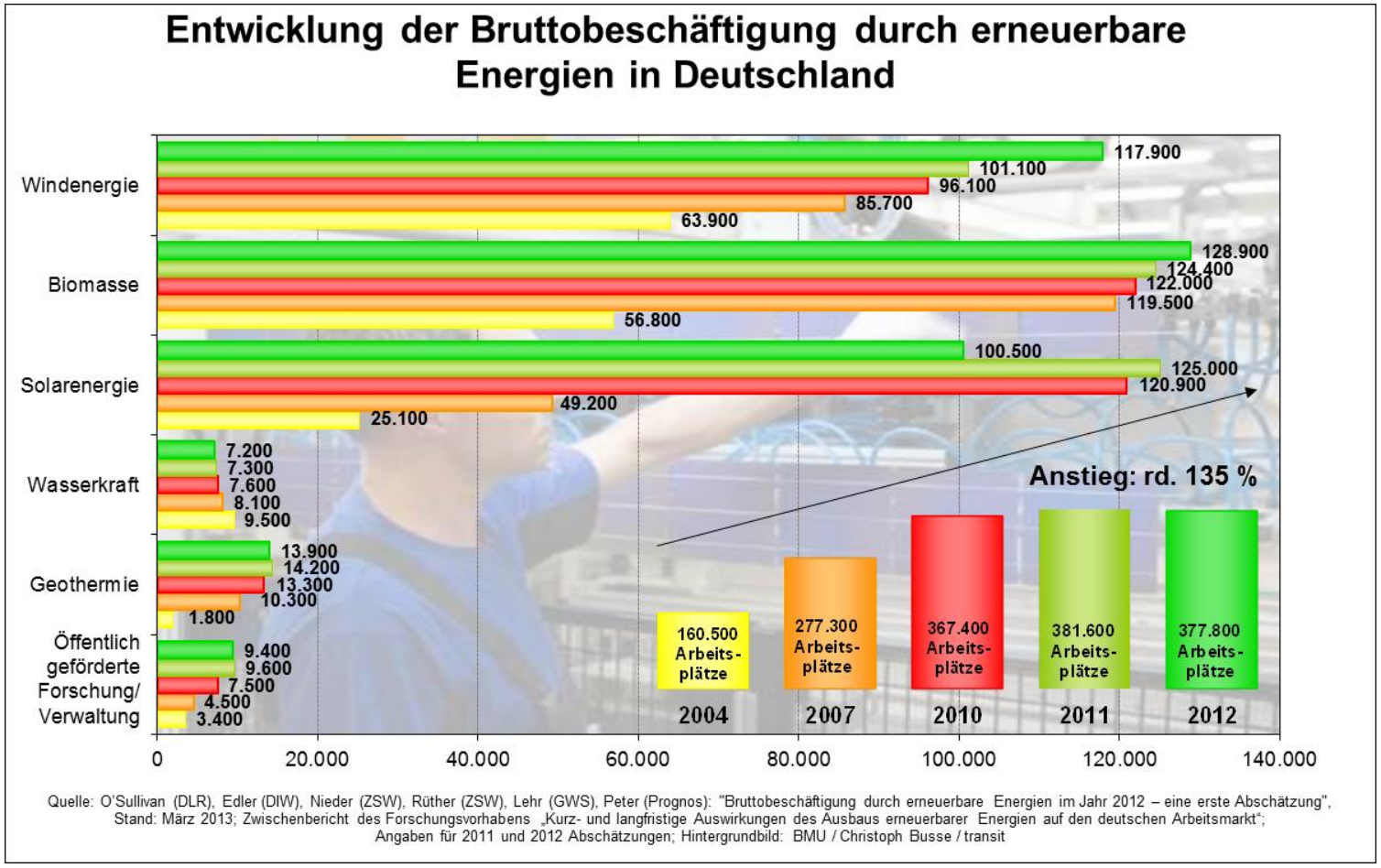
- Any **assessment of the real net present cost** of the feed-in tariff scheme needs information on:
  - The volume of renewable electricity generation.
  - The feed-in tariffs.
  - The difference between feed-in tariffs and market prices.
  - The rate of inflation.

- Putting these numbers together, the estimated net present cost for all PV-modules installed between 2000 and 2012 is about € **108** Bn. The corresponding figure for wind for the interval between 2000 and 2010 is € **20.5** Bn.

Cost effectiveness

- PV is among the most expensive greenhouse gas abatement options.
- Given the net cost of €0.42/kWh for modules installed in 2008, and assuming the PV displaces conventional energy generated from a mixture of gas and hard coal with an emissions factor of 0.584 kg CO2/kWh, yields an abatement cost of €716/tonne.
- The IEA has estimated an abatement cost from PV of €1000/tonne.
- Since the establishment of the European Emissions Trading System (ETS) in 2005, the price of certificates has never exceeded €30/tonne of CO2.

Gross employment in the renewable energy sector 2004 to 2012



Employment

- The gross number of employed says little about net job creation.
- Referencing gross figures obscures the broader implications for economic welfare by omitting any accounting of offsetting effects:
  - New green jobs are filled by workers who were previously employed.
  - Germany's feed-in tariff scheme increases electricity prices, thereby crowding out jobs.
  - The support scheme diverts funds from alternative and possibly more beneficial investments, thereby preventing job creation elsewhere.

Employment

- Estimating net job creation is tricky, because it requires comparing the situation with subsidies to the counterfactual situation had there been no subsidies.
- Nevertheless, the simulation studies that have explored this issue (e.g. IWH, 2004; RWI, 2004; Hillebrand et al., 2006) generally find that the employment effects from the EEG are zero or negative over the long-run.
- Developments over the past year support this bleak assessment: Several German solar companies – among them Q-Cells, Bosch Solar, and Schott Solar – have closed.
- Solarworld, with 1500 employees, is also teetering.

Climate Impact Assessment

- It is important to recognize that other instruments to reduce CO2 are already in place in Europe, making the FIT redundant.
- Specifically, the European emissions trading scheme (ETS) determines the total amount of CO2 emissions.
- The promotion of renewable energies reduces the emissions of the electricity sector but, by lowering demand for CO2 allowances from this sector, thereby lowers their price.
- Other sectors in the ETS can thus buy allowances more cheaply so that they reduce less.

Energy security

- As sun and wind is highly intermittent in Germany, back-up energy systems must be in place to ensure against blackouts.
- Moreover, these systems rely on fossil fuels, principally gas, which must be imported to meet domestic demand.
- In 2011, 36.2% of German gas imports originated from Russia.

Burden on policy-makers

- In general, skepticism is warranted of the government's ability to pick winners and losers via the setting of tariffs for different energy sources.
- A priori, it remains an open question of whether any adjustment to the FIT adequately reflects past and future reductions in production costs.
- Policy-makers find themselves in an on-going game of catch-up in their attempts to repeatedly recalibrate the tariff structure based on their understanding of the latest turn in market developments.

Conclusion and policy recommendations

- Germany is currently spending huge sums of money on the support of a renewable energy technology, PV, that contributes less than 4% to overall electricity generation.
- The instrument used to support PV, the feed-in-tariff, confers zero benefits for employment creation or climate protection.
- Nevertheless, government intervention can serve to support renewable energies through other mechanisms that harness market incentives or correct market failures:
  - Funding for R&D
  - ETS
  - Carbon taxes

Additional Information

- Frondel, M., Ritter, N., and Vance, C. (2010). "Economic impacts from the promotion of renewable energy technologies: The German experience." Energy Policy, 38(8): 4048-4056.
- The associated working paper, which contains detailed information on the cost calculations, can be downloaded from: http://repec.rwi-essen.de/files/REP_09_156.pdf
- Grösche, P. and Schröder, C. (2012) On the redistributive effects of Germany's feed-in tariff http://econstor.eu/bitstream/10419/49291/1/66579133X.pdf
- BMU (2013), Entwicklung der erneuerbaren Energien in Deutschland im Jahr 2012