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Prof. Dr. Peter Hennicke

The German-Japanese Energy Transition Council:

How can international cooperation drive the Energiewende?

Reflections on the role of energy efficiency

Speech at the German-Japanese Energy Dialogue
On the occasion of the delegation trip of the German Foreign Office
November 14th, Tokyo

Successful start of the GJETC in Tokyo

Startsignal für das GJETC (v. l. n. r.): Mr. Yota Ono (METI), Prof. Dr. Peter Hennicke (Wuppertal Institut), Prof. Masakazu Toyoda (IEEJ) und Dr. Hans Carl von Werthern (Deutscher Botschafter in Japan). Foto: Lisa Eidt

The German-Japanese Energy Transition Council (GJETC)

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Organized by:

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Federal Foreign Office

jdzb Japanisch-Deutsches Zentrum Berlin ベルリン日独センター Japanese-German Center Berlin

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Federal Office for Economic Affairs and Export Control

AHK Deutsche Industrie- und Handelskammer in Japan 在日ドイツ商工会議所

Media Partner:

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Structure of the Expert Council (GJETC)

First meeting in Tokyo 28./29. September 2016

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JAPAN		GERMANY
METI	Financing	DBU + Mercator + Others
CHAIR: Masakazu Toyoda	Management	CHAIR: Prof. Peter Hennicke
Organization Office & Scientific Secretariat: IEEJ		Organization/Consulting: ECOS Consult Scientific Secretariat: Wuppertal Institute

Full Member Experts

Japan		Germany	
Jun Arima	Yasumasa Fujii	Claudia Kemfert	Patrick Graichen
Toshiharu Ikaga	Koji Nomura	Felix C. Matthes	Miranda Schreurs
Junichi Ogasawara	Tomihiro Taniguchi	Stefan Thomas	Eicke Weber

Associated Members

Japan			Germany		
Mami Ito	Hiroshi Okamoto	Shinichi Sasayama	Uwe Leprich	Manfred Rauschen	Franzjosef Schafhausen

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The study Program of the GJETC
- focus on strategic topics

1. **Energy transition** as a central building block of a future industrial policy – Comparison and analysis of long-term energy transition scenarios
2. Strategic framework and **socio-cultural aspects** of the energy transition
3. New allocation of roles and business segments of established and new participants in the energy sector currently and within a future **electricity market design**
4. **Energy end-use efficiency policies** and the development of energy service markets
5. Development of technical systems and new technologies on the way to an **energy transition**

Enabling international knowledge exchange and mutual learning

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GJETC

Japan

Government / multilevel

Private sector / Industry

Civil Society/NGOs

Media/Print, Internet

- Reinforcing existing bilateral cooperation
- Research driven initiative
- 20 renowned scientists
- Scientific secretariats (IEEJ, WI)
- Independent knowledge generation and dissemination
- Long term strategies (scenarios)
- Consultancy on systemic problem solutions
- Continuity of cooperation

Germany

Government / multilevel

Private sector / Industry

Civil Society/NGOs

Media/Print, Internet

Fostering the Energy Transition
to a low-carbon and risk minimizing energy system

Common point of departure

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Despite differences in policies on energy and its supply, Japan and Germany are confronted with similar challenges of the energy transition:

- **Restructuring the energy systems in such a way that they are low-risk, reliable, resource-efficient and decarbonized in the long term**
- **At the same time remaining internationally competitive and raising security of supply on the basis of ecological modernization**

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Reflections on the role of energy efficiency and the German Energiewende

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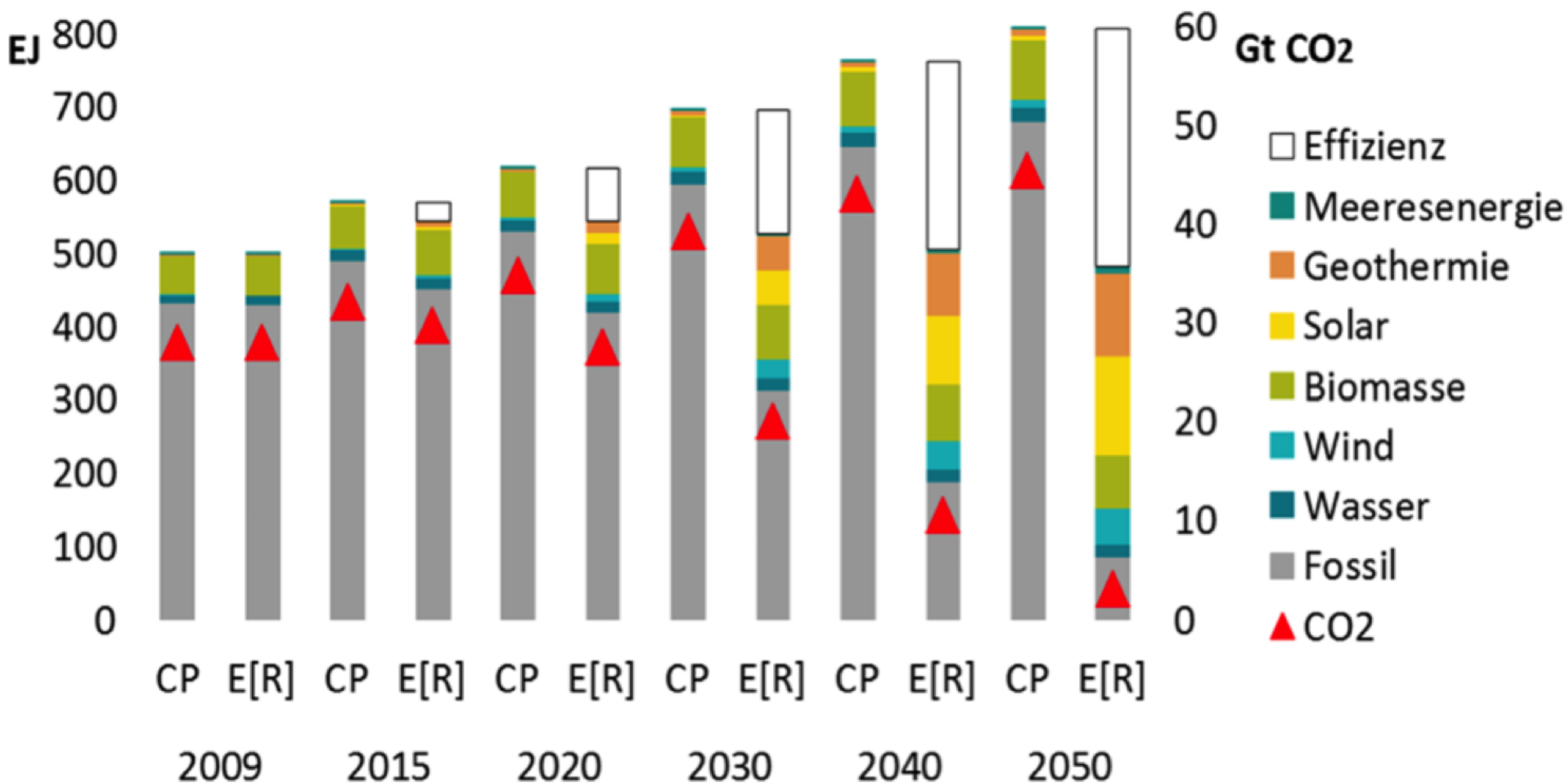
Global pathway to zero emissions: Efficiency + Renewables

IEA Current Policy (CP) vs. Energy (r)evolution (E(R))



Source: DLR 2015

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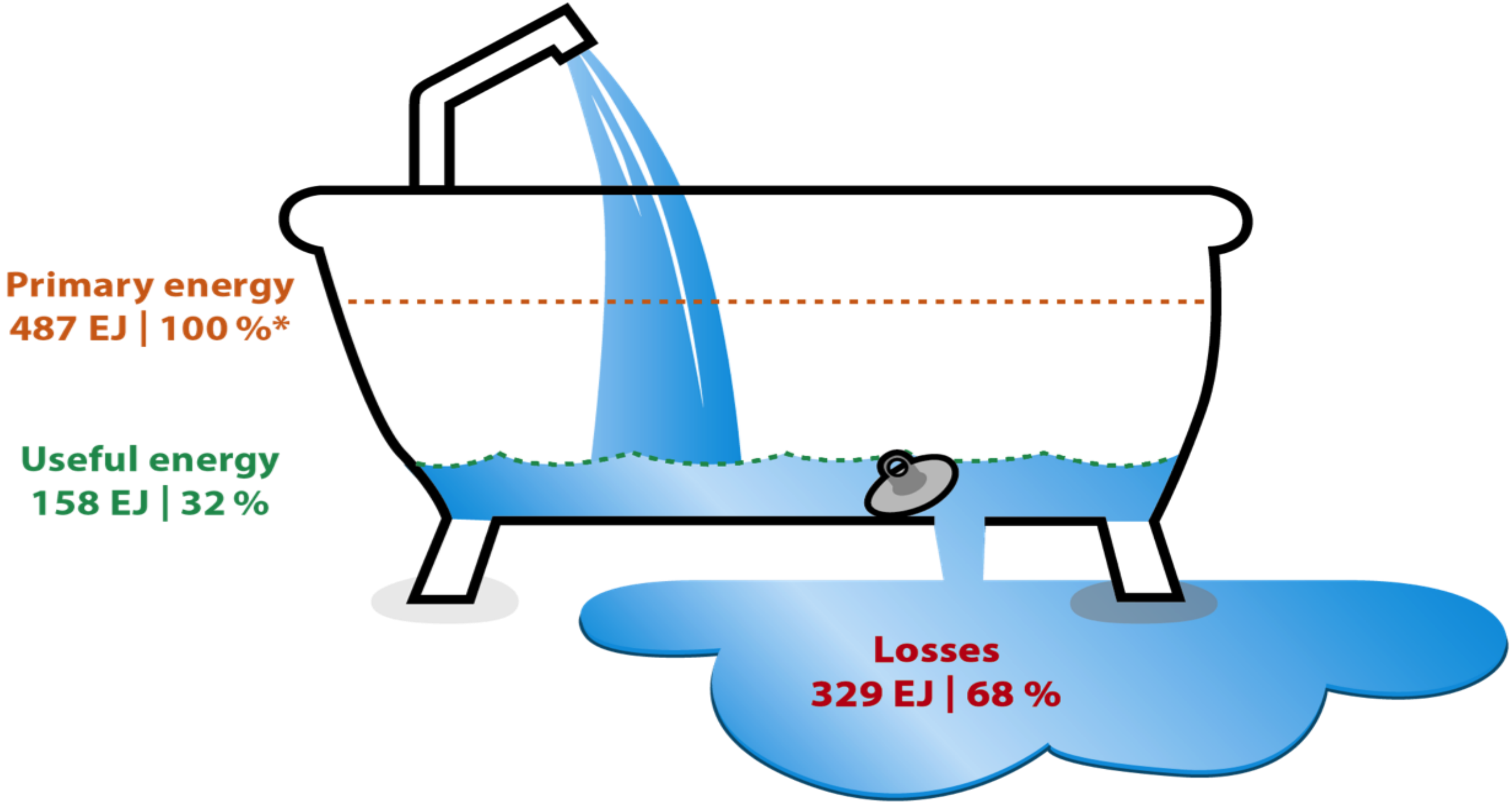
“Efficiency first” (IEA): Reduce losses of global energy system

…by the “energy efficiency revolution” and decentralized power



*Total primary Energy 519 EJ less 32 EJ non energetic consumption

Source: Hennicke/Grasekamp 2014; based on Jochem/Reize 2013; figures from IEA/OECD/IREES

Forecasted cost degression of new PV power
- in North America, Australia, India and Mena region (in cts/kWh)

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Solar (PV) tender in Abu Dhabi (9/2016): 2.4 cts/kWh
"Today, wind power costs only 3 cts/kWh" (Siemens)

* Real values EUR 2014; full load hours based on [27], investment cost bandwidth based on different scenarios of market, technology and cost development; assuming 5% (real) weighted average cost of capital.

Source: Agora, Current and Future Cost of PV, 2015.

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"Revolutionary Targets" (Chancellor Merkel)

Energy Concept, Federal German Government, 28 September 2010

Development Path	2020	2030	2040	2050
Greenhouse Gas Emissions	- 40%	- 55%	-70%	- 80 bis 95%
Share of renewable energies in relation to the gross final energy consumption	18%	30%	45%	60%
Electricity generated from Renewable Energy Sources in relation to gross final energy consumption	35%	50%	65%	80%
Primary Energy Consumption [base year 2008] / annual average gain in energy productivity of 2.1 %, based on final energy consumption.	-20%			-50%
Electricity Consumption [base year 2008]	-10%			-25%
Doubling the Building Renovation Rate from the current figure of less than 1 % a year to 2% of the current building stock ; reduction				-80%
Reduction of the **Final Energy Consumption** in the **Transport Sector** [base year 2005]	-10%			-40%

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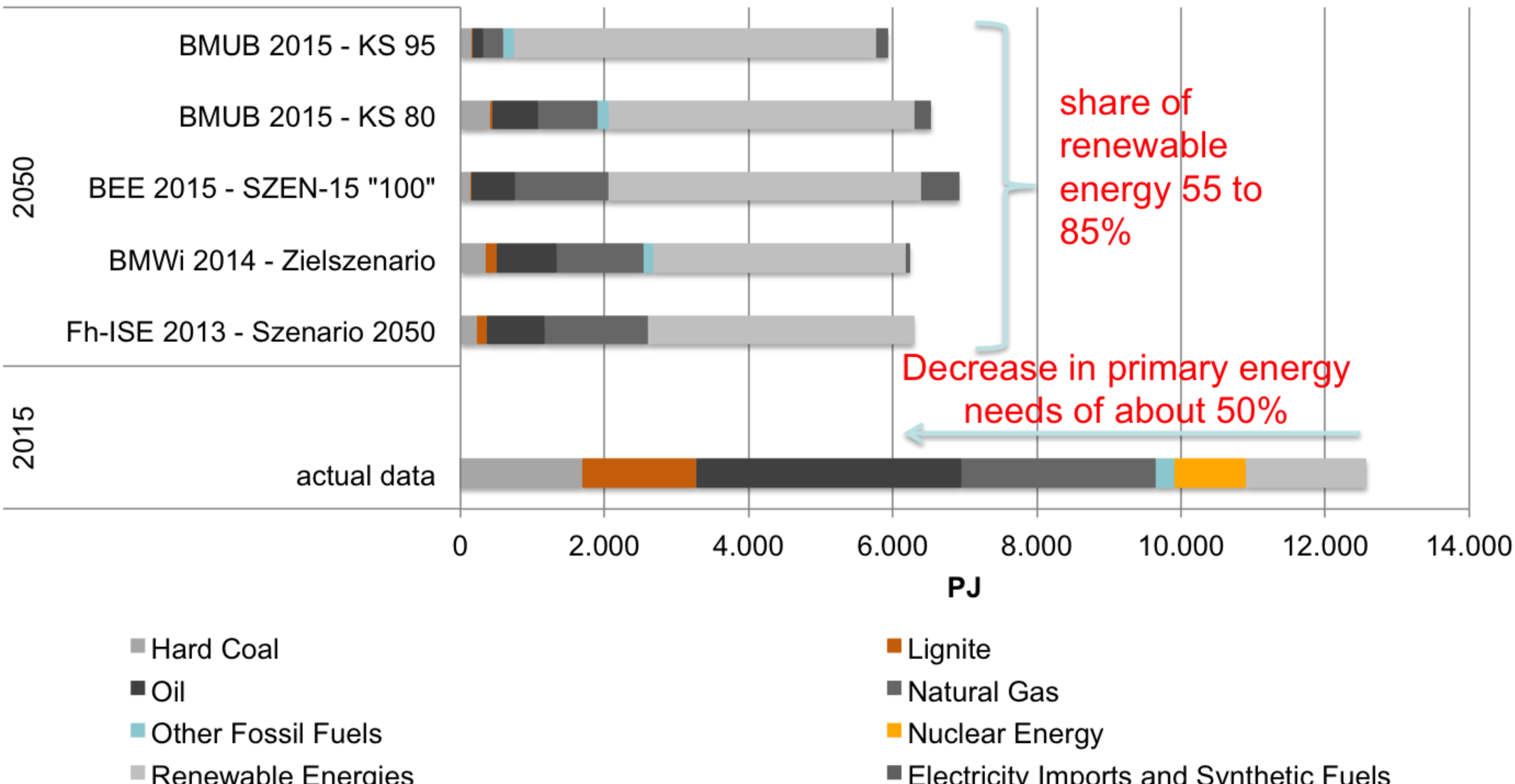
Research consensus: “Energiewende” is technically feasible

Decoupling GDP from quality of life



Source: Particular scenario studies and AG Energiebilanzen 2015.

Feed-in law opens the markets for German green electricity
…and for tremendous cost degression of wind and PV power

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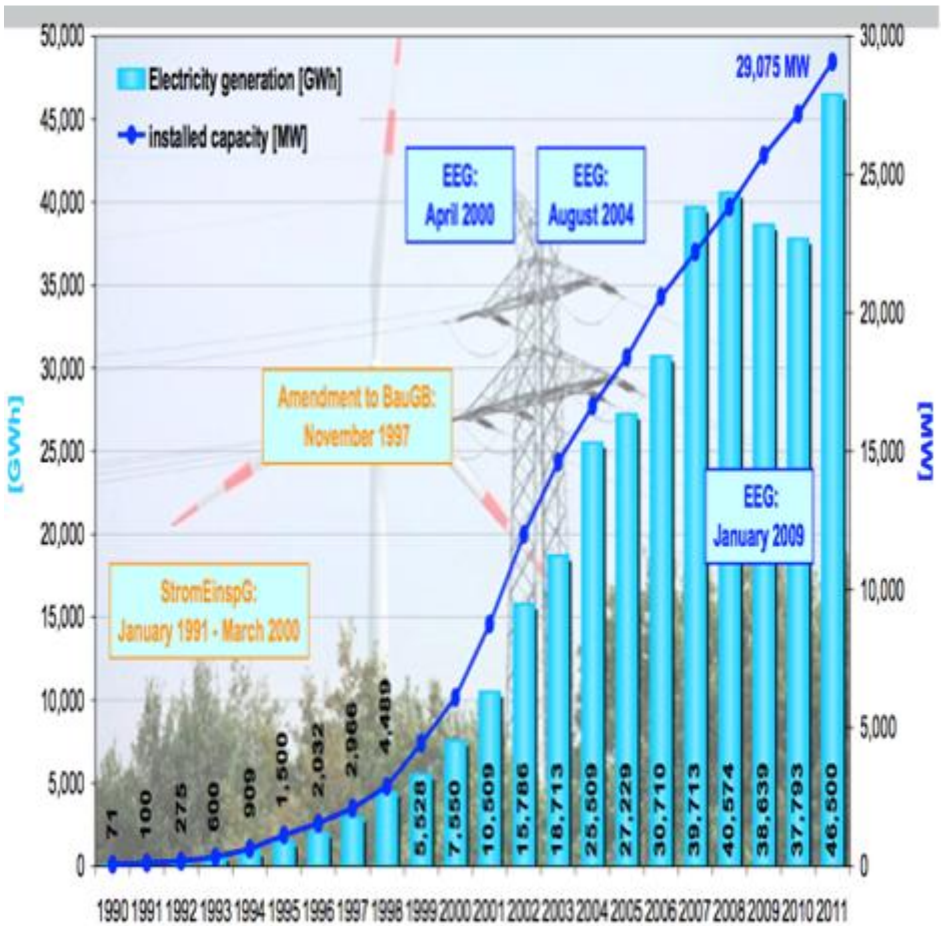
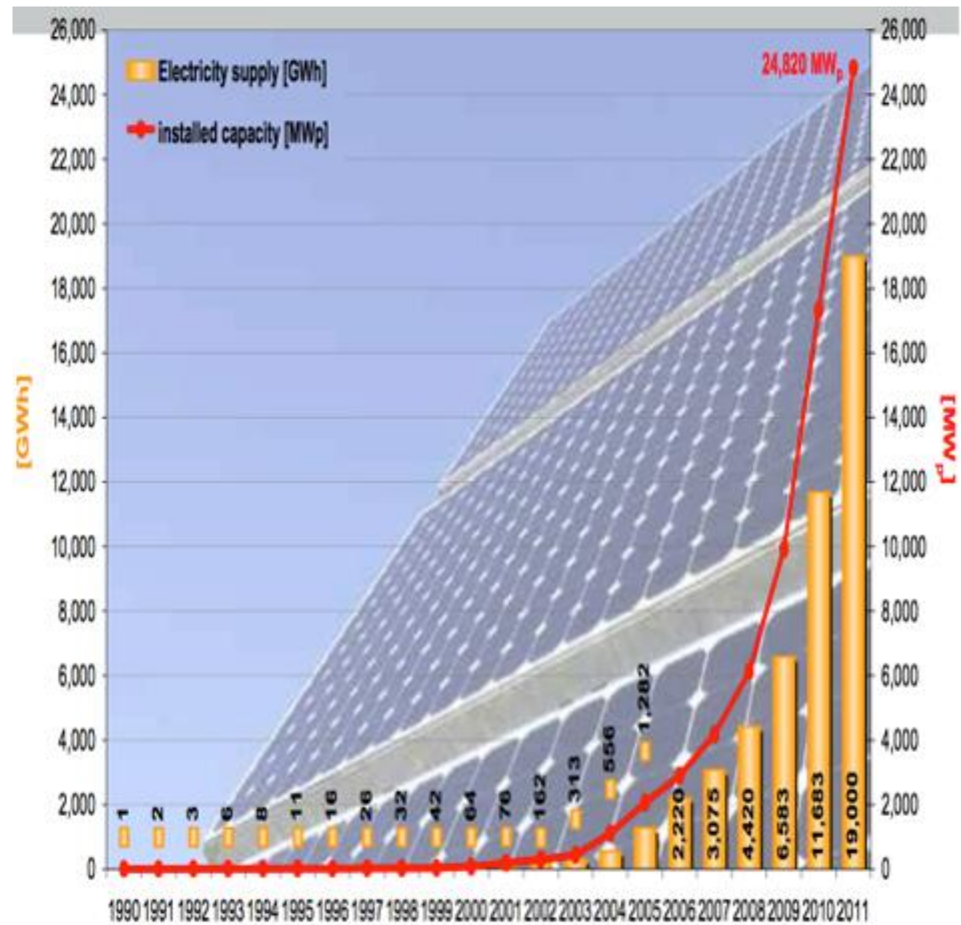
2015: Wind ca. 42 GW and PV ca. 40 GW; total share REN: 30% of electricity production





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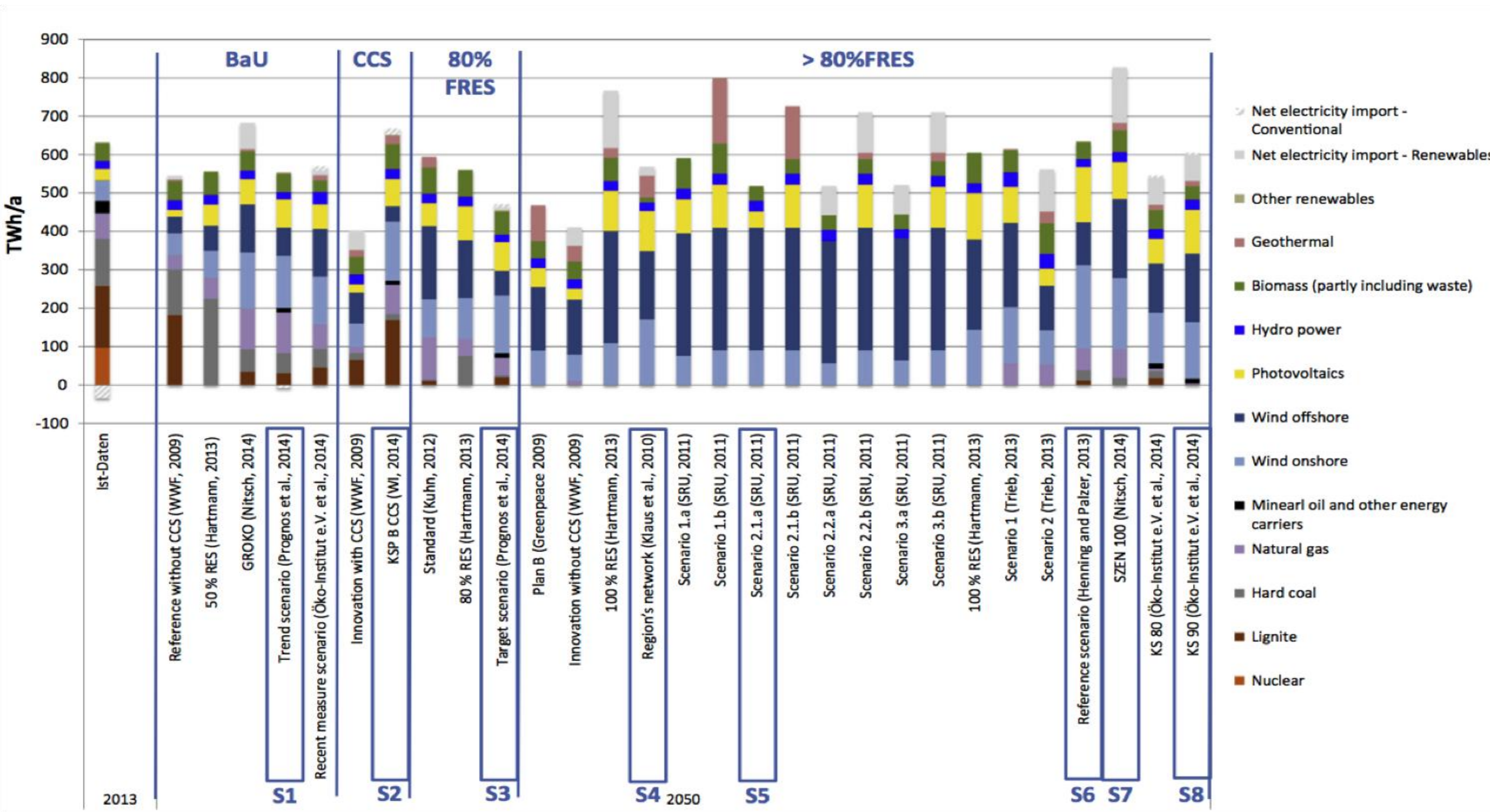
Typical scenarios of future German electricity production

Many options, but uncertainty on electricity demand in 2050



Source: B. Lunz et al. 2016.

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Controversial topics of the Energiewende

- Costs: How much, how long, for whom?
- Security of power supply vs. system integration of intermittent power?
- When phasing out coal, how much increase and incentives for REN?
- Focus on power: system transformation of heat and transport sector?
- Supply side biased; how to foster energy (resource) efficiency?
- Decentralized ("smart grids") vs. centralized power ("coal")?
- Citizens participation and democratization?
- Lifestyle changes: sustainable consumption and production?
- Political Leadership: Management and responsibilities?

Projections of the differential costs of the "Energiewende"
All sectors; according to German "Lead Scenario 2011"

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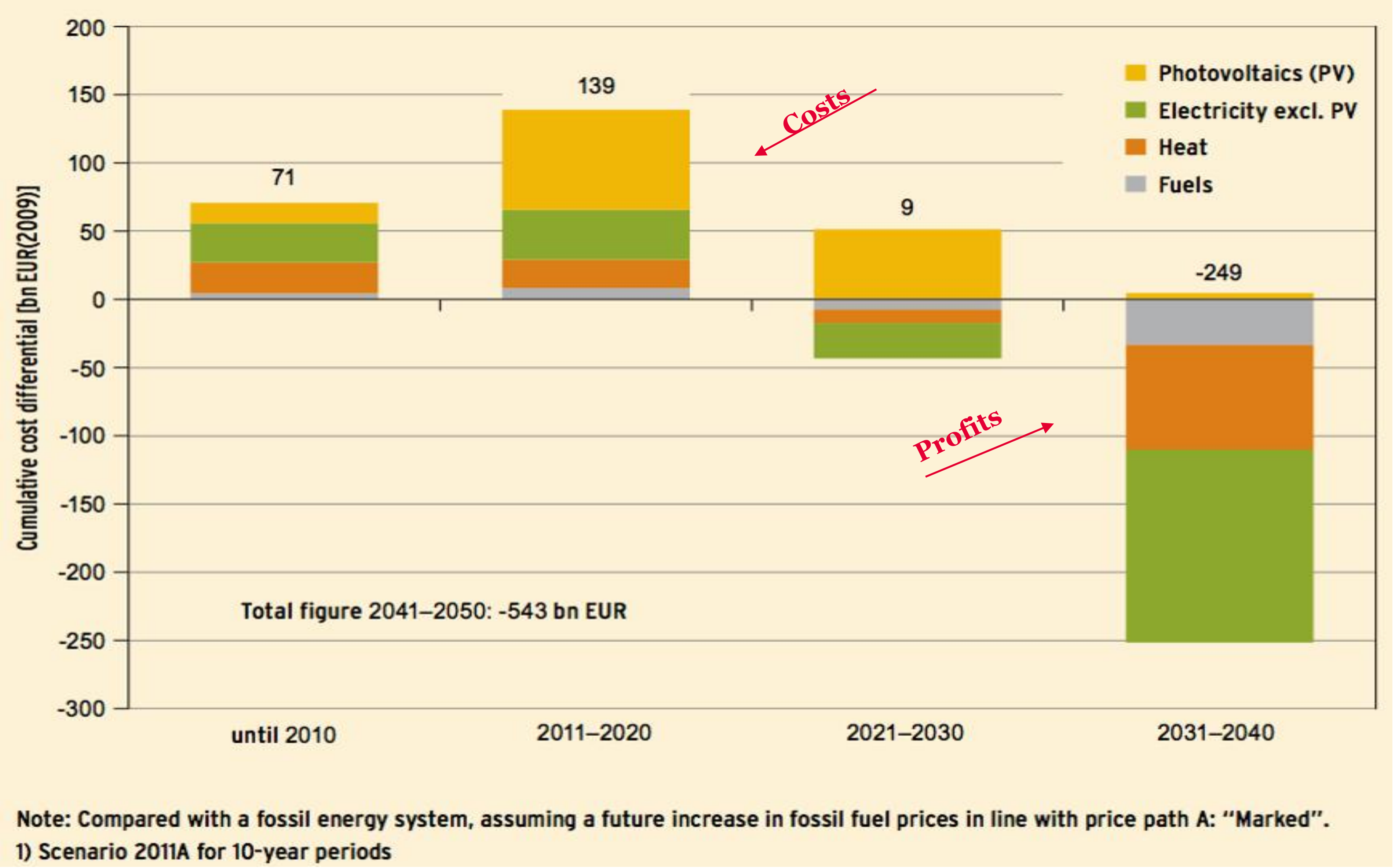
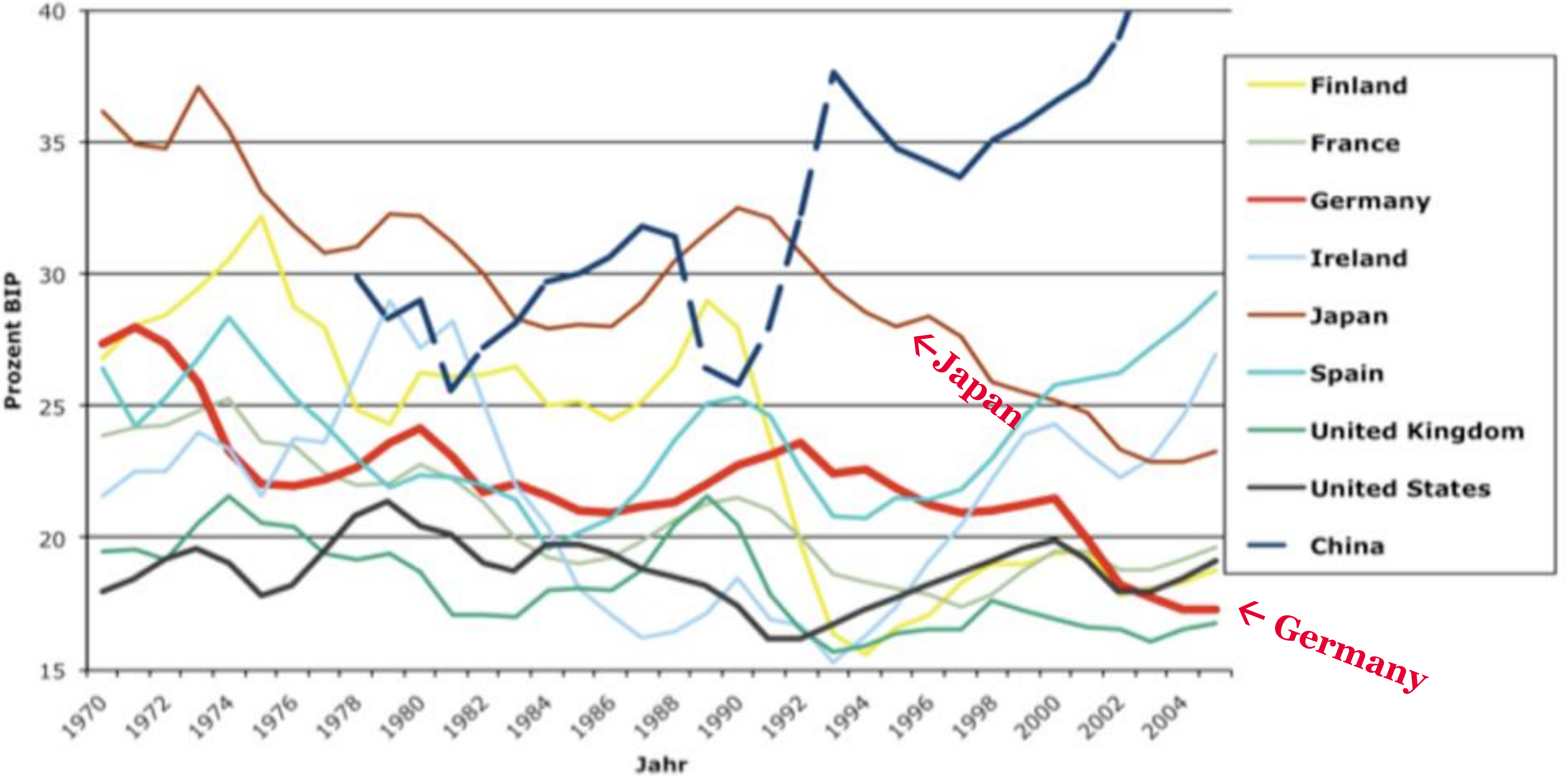


Source: BMU 2012.

Additional investments in climate and resource protection

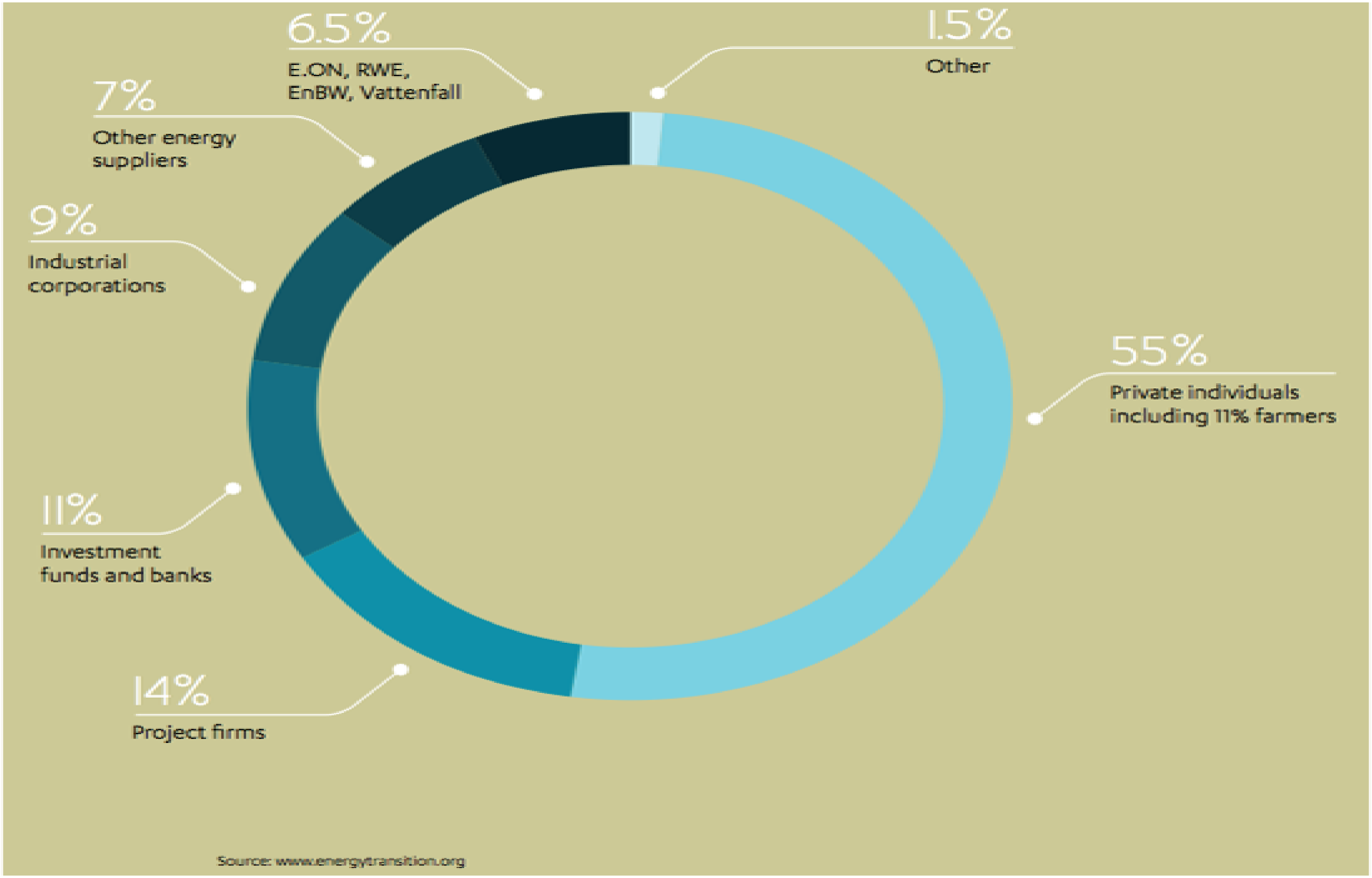
-> a core strategy to raise the investment and innovation rate

International comparison of gross investment rates (1970-2006)



Source: C. Jäger, PIK, 2009.

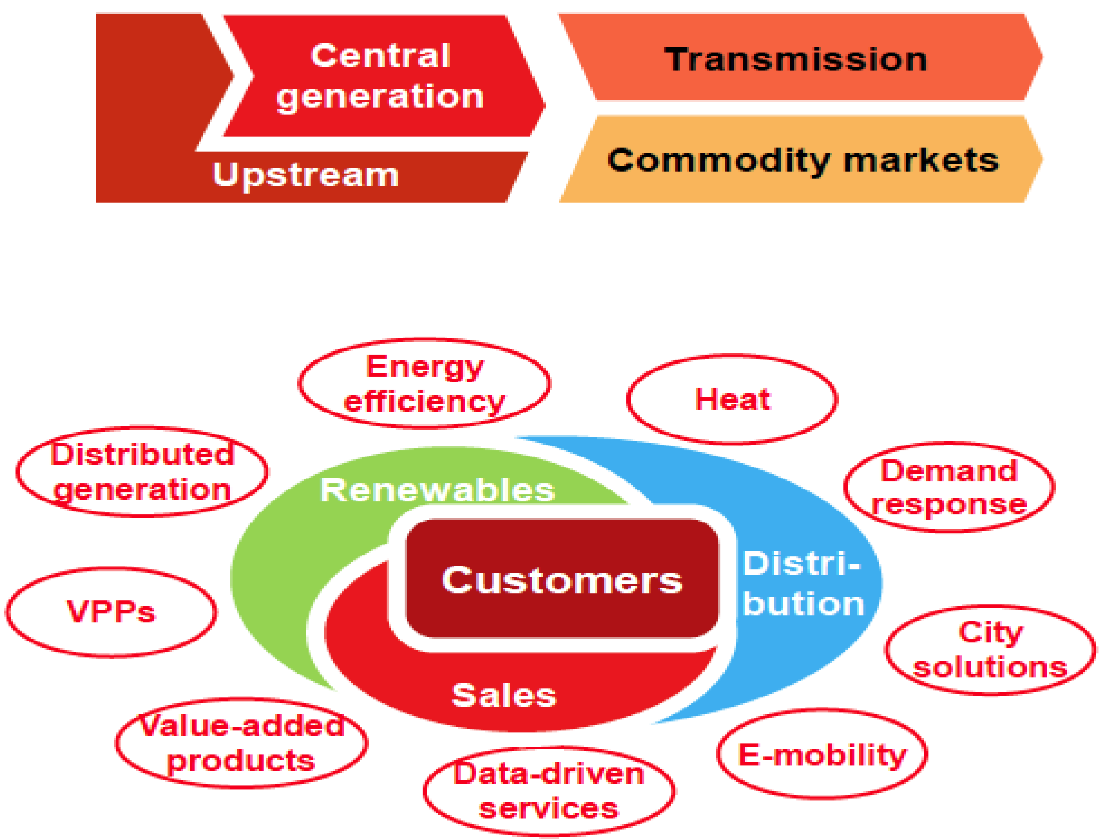
Ownership of installed renewable power capacities in Germany 2010



Source: Greenpeace International 2013.

The split of E.ON: "A matter of survival"
FR 12.03.2015: "Tottering giants. Billions of losses for RWE and E.ON"!

Two very different energy worlds emerging



Conventional energy world
- System-centric
- Security of supply
- Global/regional perspective
- Large scale, central
- Conventional technologies

New energy world
- Customer-centric
- Sustainability
- Local proximity
- Small scale, distributed
- Clean technologies

2

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Absolut decoupling of GDP from energy consumption

A success, but not sufficient

Energy Efficiency

Increase production, reduce consumption! Even today, there is hardly any other country which uses its energy as carefully as Germany. We have made surprising achievements: Whereas our economic output has increased significantly over a period of 20 years, our energy consumption has declined in the same period. With constructive political support, energy efficiency in Germany can become a real catalyst for growth and prosperity.

Source: BMWi, Green Book Energy Efficiency 2016

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"Revolutionary Targets" (Chancellor Merkel)
-> still a long way to go for energy efficiency!

Indicator	Target 2020	Target 2050	Level of implementation 2014
Primary energy consumption (compared with 2008)	-20 %	-50 %	-8.3 %
Gross electricity consumption (compared with 2008)	-10 %	-25 %	-4.2 %
Final energy productivity	2.1 % per annum (2008–2050)		1.6 % per annum (Average 2008–2014)
Primary energy consumption in buildings (compared with 2008)	–	in the magnitude of -80 %	-14.8 %
Heat consumption in buildings (compared with 2008)	-20 %	–	-12.4 %
Final energy consumption in transport (compared with 2005)	-10 %	-40 %	+1.1 %

Source: The Energy of the Future: Fourth "Energy Transition" Monitoring Report, updated.

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Regional efficiency initiatives: ProKlima Fund in Hannover

Unique in the EU , but a transferable success story for each city globally

Activities:

- Founded in 1998
- 49 million € support for CHP, passivhouses, energy saving projects, solar and biogas
- 1€ fund incentive mobilizes 12€ private investment
- 1000 jobs secured

Financing:

- Ca. 5 million € per year out of 3 sources:
  - Ca. 40% from utility profits
  - Ca. 40% fee (0.2 cts/kWh on sales)
  - Ca. 20% by the other municipalities

Comparable project discussed in

- Wuppertal
- Düsseldorf

Hannover and the involved municipalities

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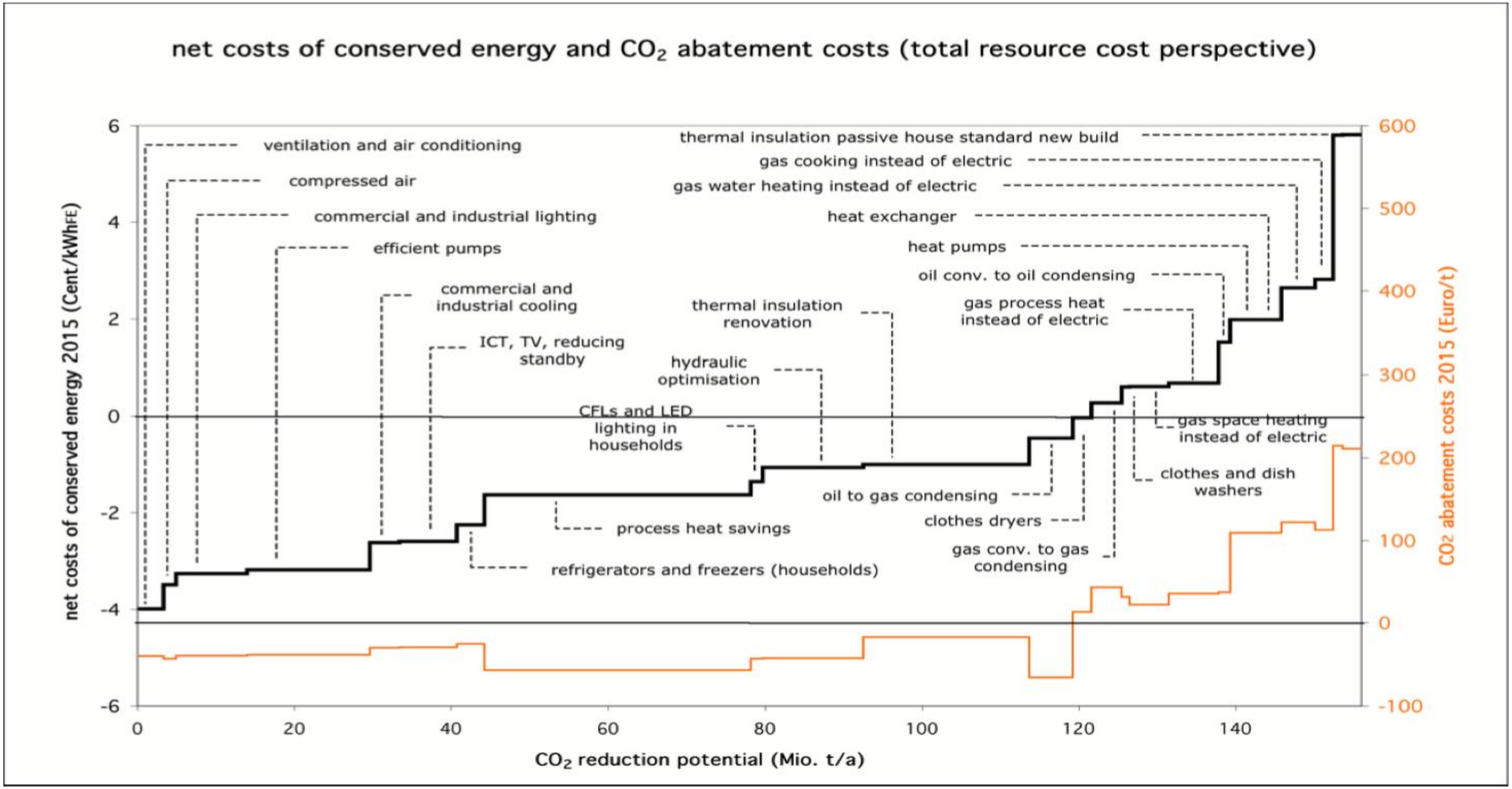
The economics of "Negawatts" compared to "Megawatts"
140 TWh can be saved with a profit – when barriers are removed!

Example for Germany



Source: Wuppertal Institute 2006

Levelised costs for electricity saving programs by sector in the US

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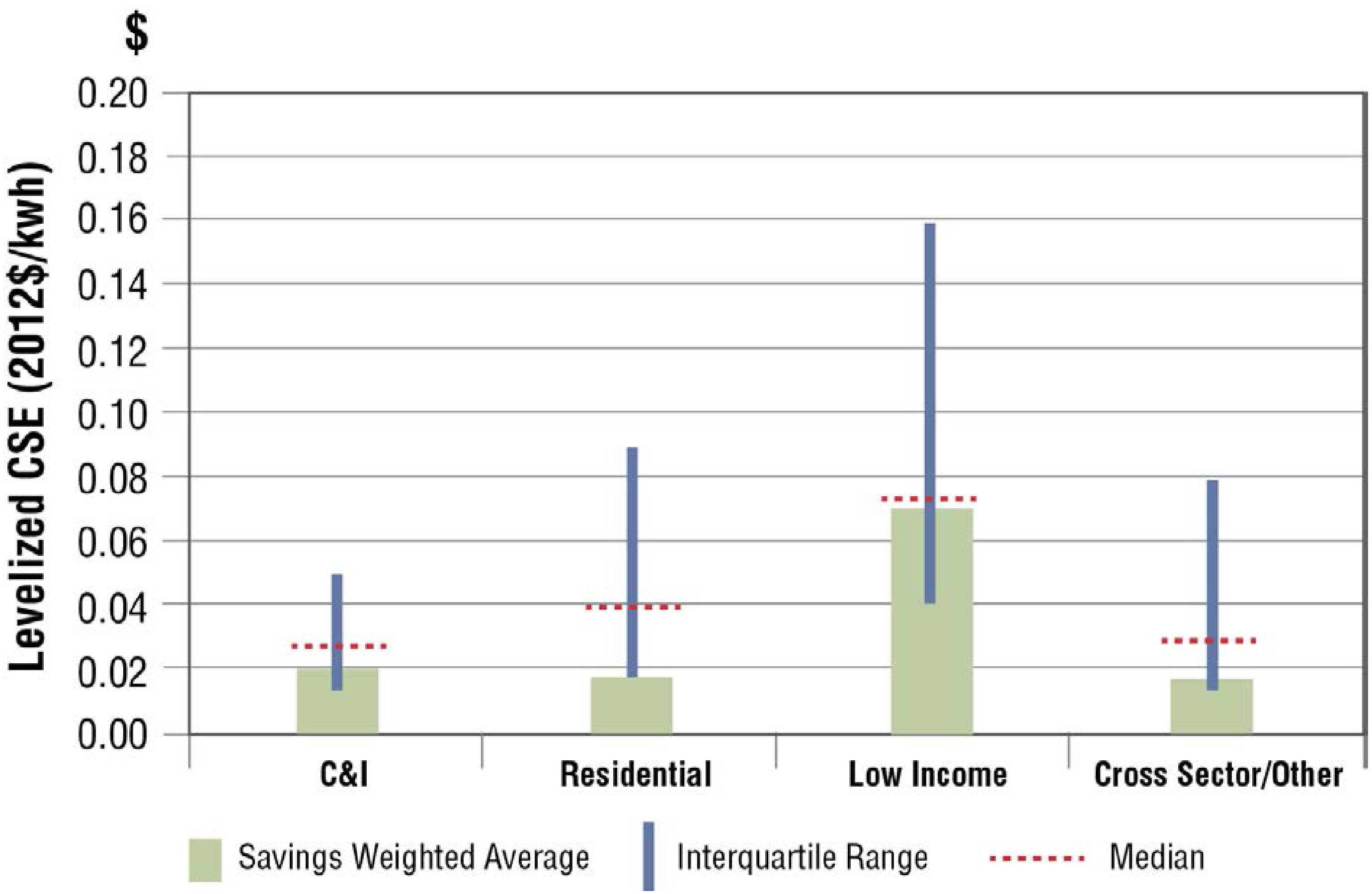

Source: LBNL 2014

- Lowest costs: residential programs with 0.018 $/kWh (0.65 ฿/kWh) due to a large share (44%) of low-cost lighting programs (0.007 $/kWh and 0.25 ฿/kWh), without lighting programs: 0.028 $/kWh (1 ฿/kWh)
- Higher costs for low-income programs: 0.070 $/kWh (2.52 ฿/kWh)
- Commercial and industrial (C&I) programs: 0.021 $/kWh (0.76 ฿/kWh)

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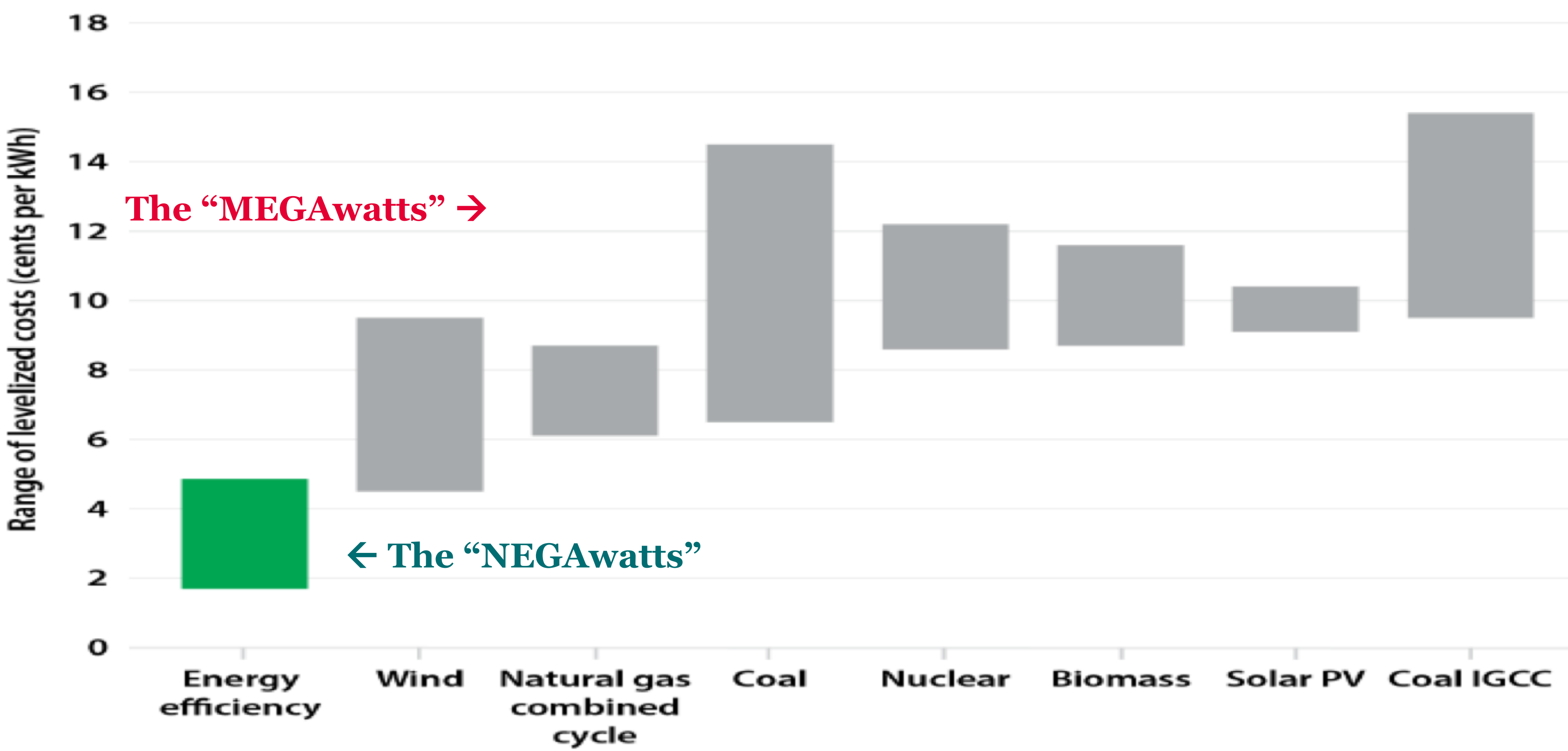
US: Cost of utility efficiency programs (average: 2.8 cents per kWh)

A factor of 50-75% less than levelized cost of new power supply



The high-end range of coal includes 90 percent carbon capture and ompression. PV stands for photovoltaics. IGCC stands for integrated gasification combined cycle, a technology that converts coal into a synthesis gas and produces steam.

Source: ACEE 2014. Energy efficiency portfolio data from Molina 2014; all other data from Lazard 2013.

Why do "often neglected, but economic potentials" exist?

Barriers and market failures to be removed by "sticks, carrots and tambourines"

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Typical barriers and market failures:

- Efficiency is not "visible", but "measurable" – embedded in appliances, building, cars ...
- No "fair level playing field" for energy services – dominating energy supply structures
- Huge subsidies for fossil and nuclear power – need for internalisation of external costs
- Higher upfront cost – no life cycle cost calculation
- Huge variety of technologies and suppliers – no market transparency
- Many information deficits and low awareness of efficiency benefits and Co-benefits
- Investor-User-Dilemma ("split incentives")
- Weak autonomous market incentive – small share of energy costs, low elasticity

Paradigm shift to binding targets
The EU Energy Efficiency Directive (EED 12/2012)

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Within the framework of the EU 20-20-20 targets:

- **Reduction of 20% primary energy not on track → main reason for EED**

Key points of the Energy Efficiency Directive (EED):

- **Binding national targets (Art. 7): 1,5% proven conservation of energy per yaer (exemptions: can be reduced to 1.25%)**
- **Energy savings fund can be installed**
  - Energy saving obligations of the power industry (sytem operator or energy provider) or
  - Alternatives are possible, e.g. existing and new promotion of policies & measures
- **ENVI, ITRE and EuP demand a 40% binding reduction target fir 2030!**

German „National Action Plan of Energy Efficiency“ - only a selection of about 100 P&M für EE

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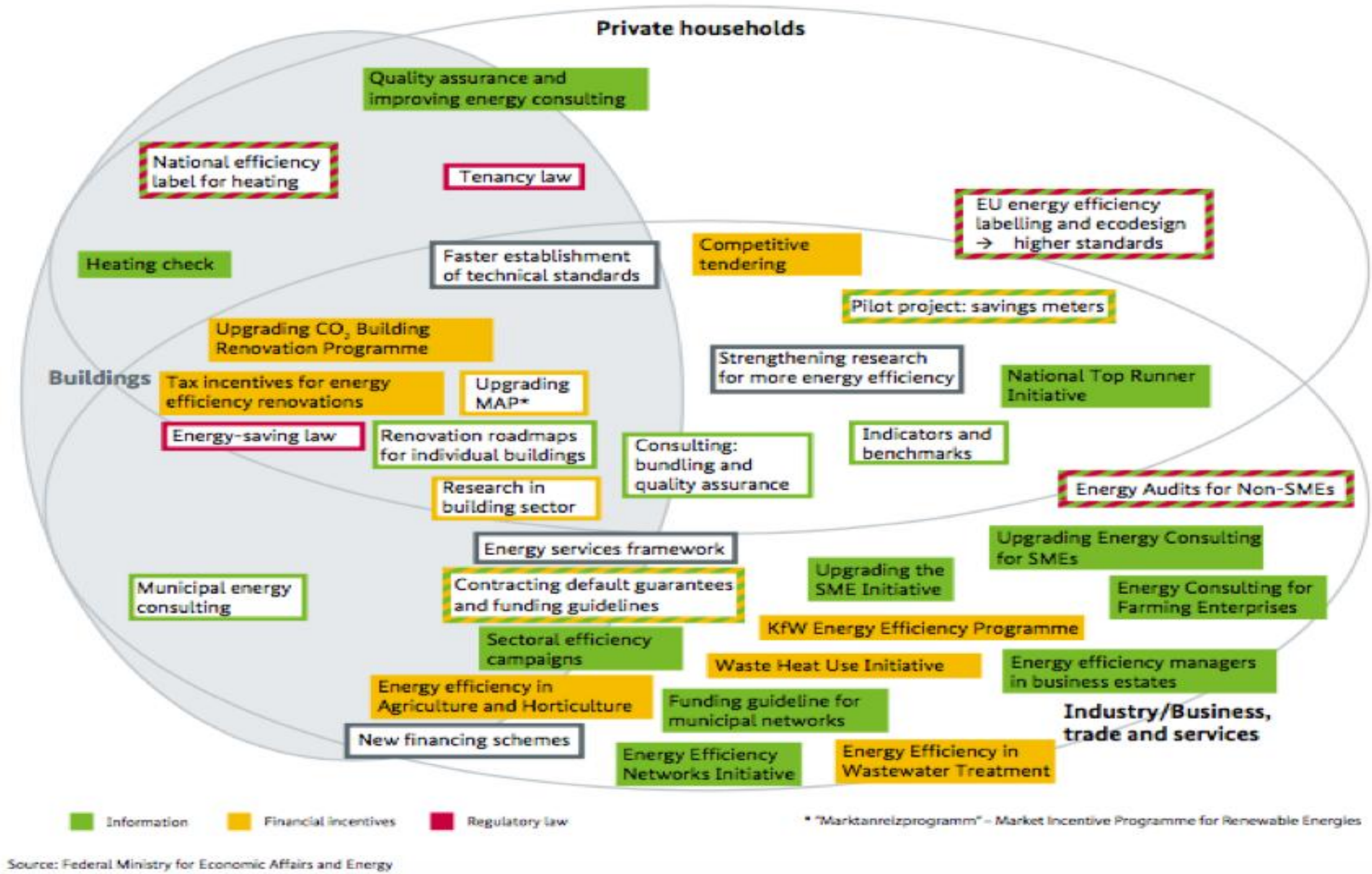
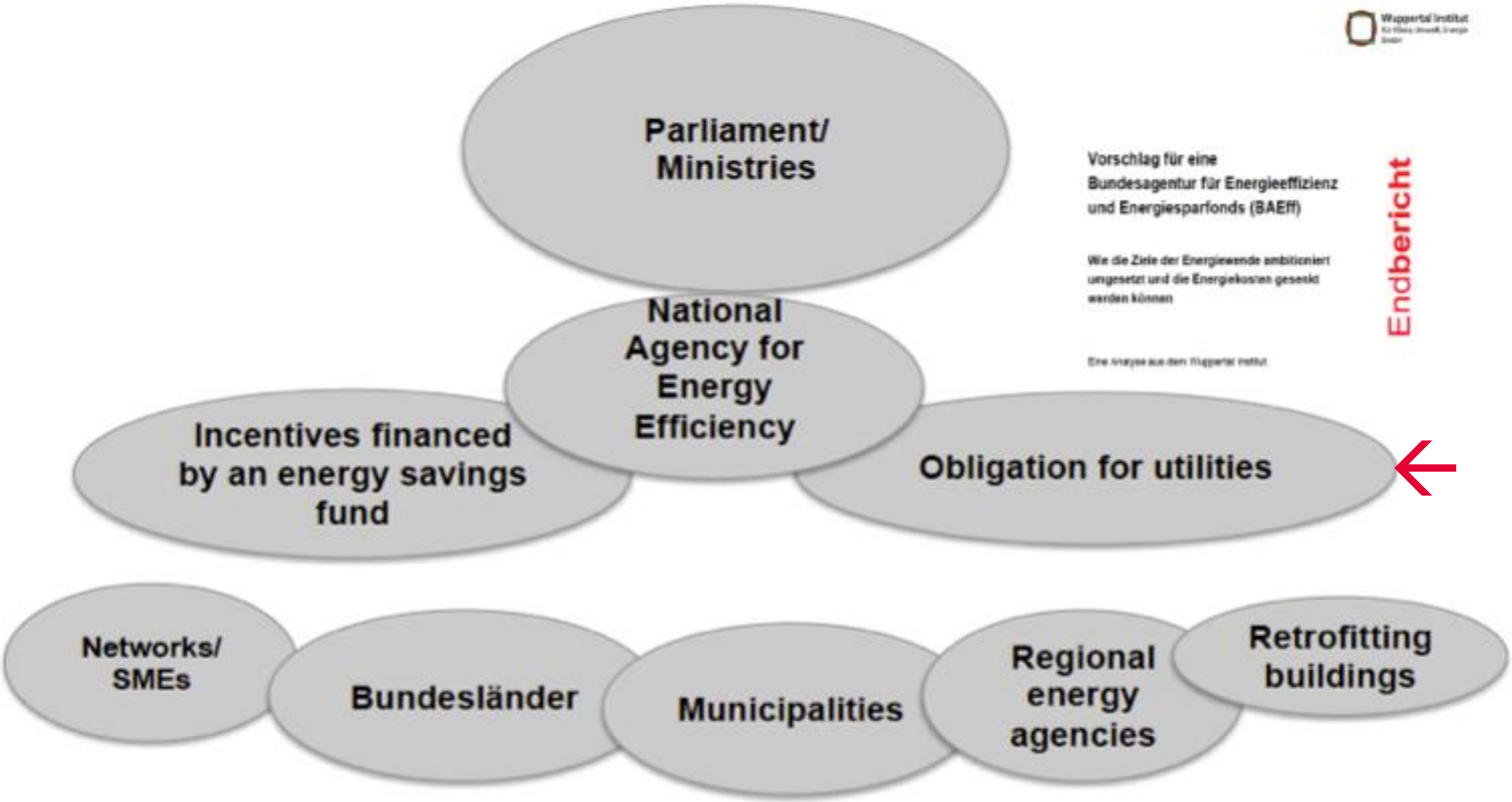


Source: BMWi, NAPE 2014

National Agency for Energy Efficiency + Savings Fund

A proposal for a new “poli-centric governance” of energy efficiency policies



Quelle: Wuppertal Institut 2014

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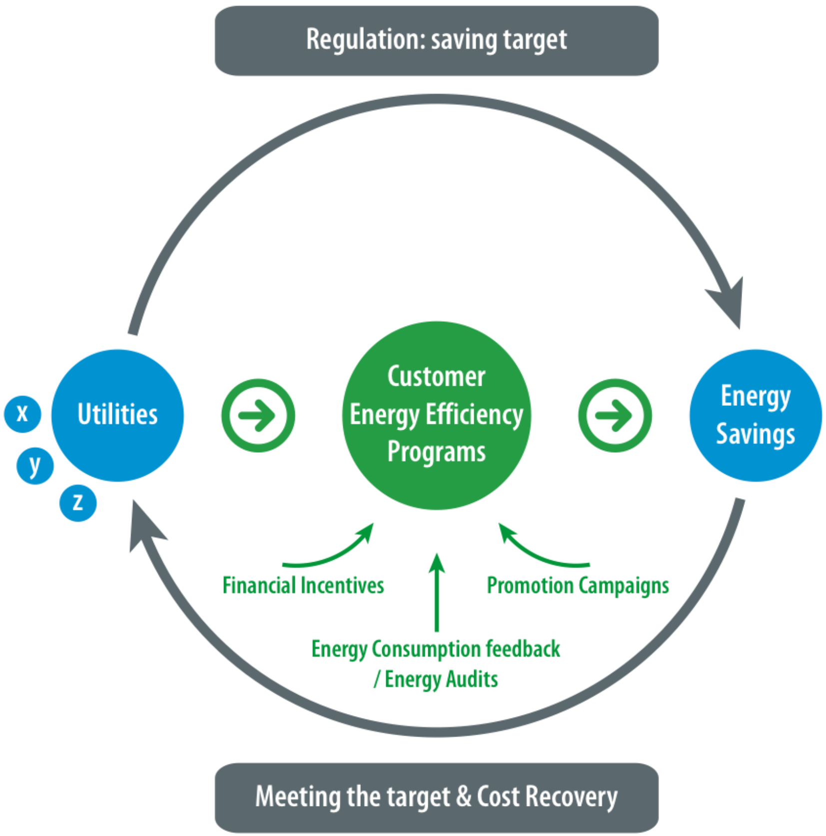
Energy Services: Fair "level playing field" by EERS

(EERS = Energy Efficiency Resource Standards)

EERS is

- A saving target for utilities (electricity and/or natural gas, oil)
- Target needs to be achieved through customer energy efficiency programs
- Adopted through legislation or regulation

EERS is also called Energy Saving Obligation or White Certificate Schemes



Why should utilities engage in efficieny?

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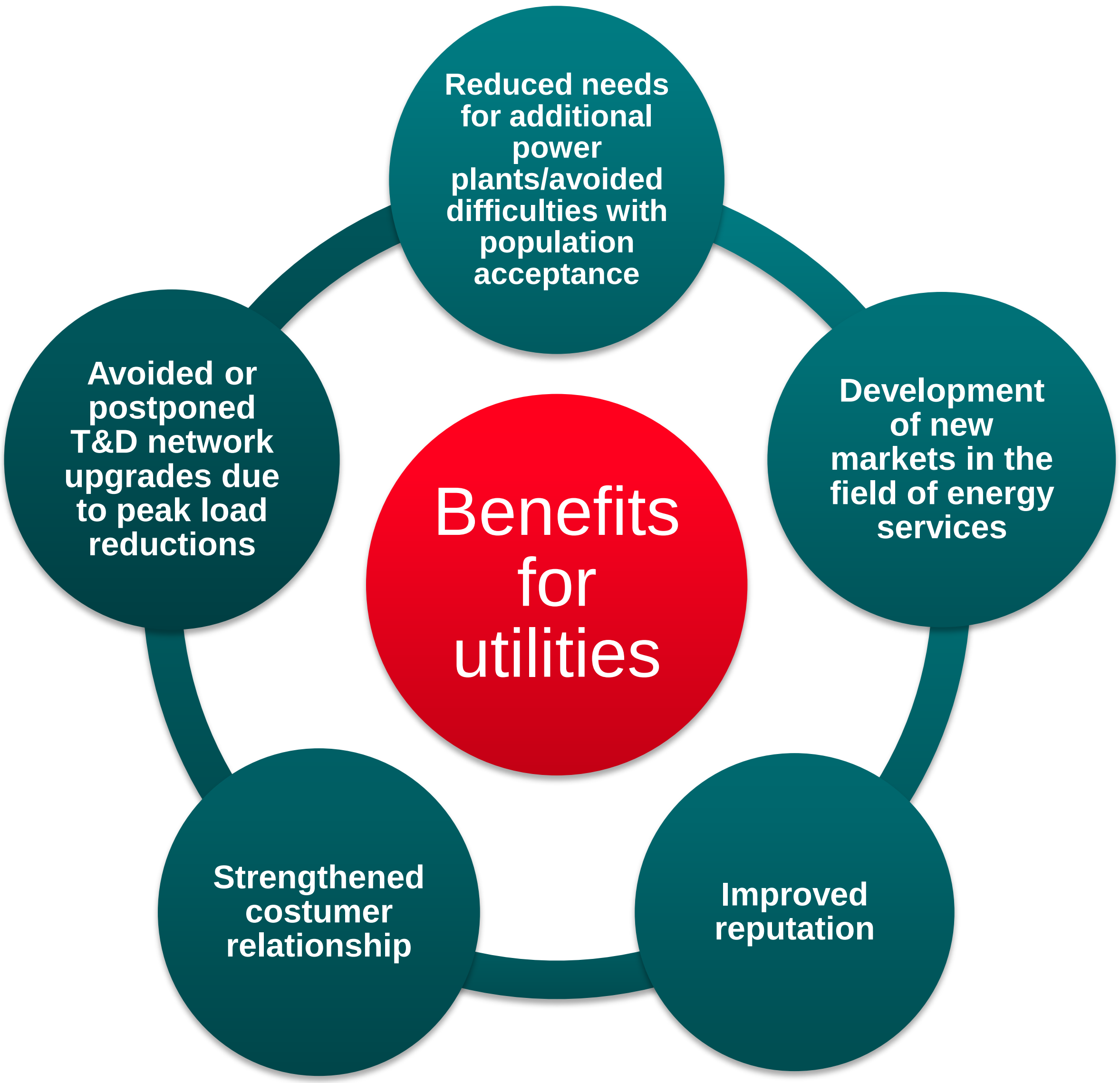
Utilities are well suited for implementing energy efficiency programs due to:

- Existing customer relations
- Availability of energy data
- Infrastructure & expertise in EE
- Integrated resource planning
- New business fields (Energy services)

- Cost recovery mechanism is crucial ("Profits from NEGAWAtts")



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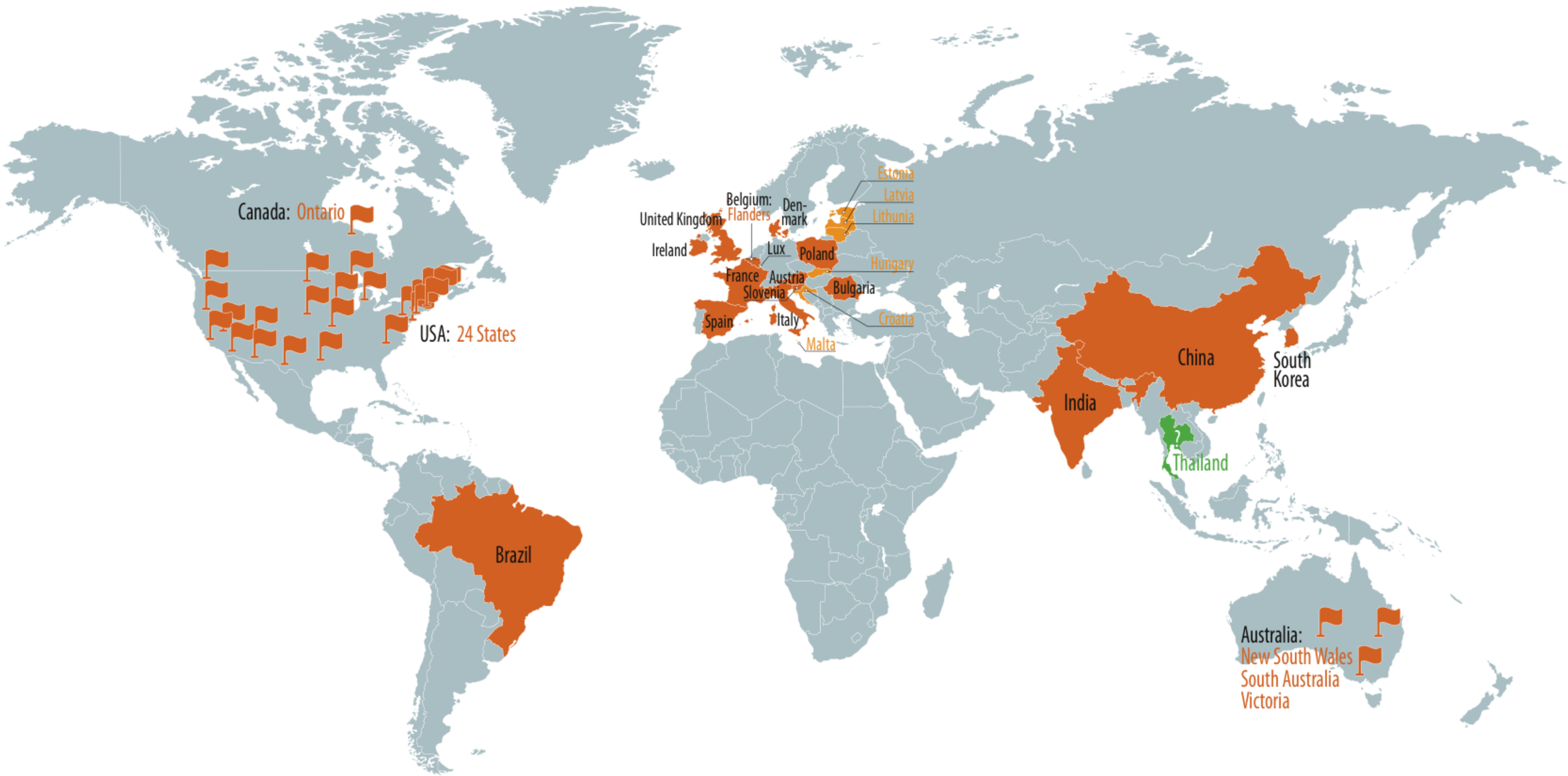
ERRS: International diffusion

EERS is a well-established policy instrument – particulary in the USA (exper-ience over 30 years). The number of countries with EERS schemes is growing.



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Utility-delivered energy efficiency activities

- Advice and assistance
- Information, education and promotion
- Financial incentives
- Direct installation
- Comprehensive implementation
- Equipment replacement
- On - bill financing
- Technology development
- Bulk procurement and distribution

Conclusions

- **After COP 22: all countries need a new governance structure for "speeding up, scaling up and tightening up" the energy system transition.**
- **International Cooperation is key: Demonstrating a successful energy transition in Japan and Germany could be global game changer.**
- **Identify and maximize the co-benefits of the energy transition: Ecological modernization, long-term competitiveness, supply security, risk minimization….**
- **Foster the "efficiency revolution" by ambitious energy efficiency policies to make climate and resource protection an economic success**
- **Create a new type of "green technological progress" - implement a "great societal transformation" to raise quality of life**
  - Avoid path dependencies and lock-in effects
  - Exchange and disseminate good practices globally

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Prof. Dr. Peter Hennicke

Thank you for your attention!

New publication: The Energiewende

Available under: www.wupperinst.org/info/details/wi/a/ad/3319/

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