

Martin Jänicke:

**Energy Efficiency: A Driver for
Innovation and Competitiveness**

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(vgl. Top Runner, Dresden, Klima, Env. Flows, IEA 2006
Potentiale wachsen m.techn.forcing, Ernst & Young: Export), Most difficult part of Clim-Pol-)

Main Points

1. High necessity.
2. Competition for Innovation, the Changing Global Context
 - Regulatory trends: MEPS
 - Firms and governments proclaiming technology leadership
 - Growth of selected technologies/services
 - Global Patents
3. Technology forcing necessary and possible.
4. Best practice: Top Runner Programme (J), Eco-Design (EU), Climate-Change Agreements (UK)
5. A hybrid governance pattern: Specific regulation (detail steering) plus economic “tendency steering”
6. A hare-and-tortoise-dilemma: Why should RWE support energy saving?

(1) **Energy Efficiency the Easy Idea that's all but Easy to Implement**

- 80% of total GHG reduction 2030 could be reduced by higher energy efficiency (IEA 2007)(Umwelt 7-8 / 2007, 388).
- At least 3 % annual increase of energy efficiency is necessary.
- However the present global average is 1%
- Far below earlier years (OECD: 1965-95: 2,5% !)

• Many companies achieve 8-9% (Lovins 2007), China: since more than 20 Years about 5% annually

Regulatory Drive for Energy Efficient Products

- Rapid diffusion of minimum energy performance standards (MEPS) for electric appliances. Some 77 countries already having or introducing MEPS (OECD 2006).
- Japan: Top-Runner Programme, 1999 (21 Products)
- EU: Eco-Design Directive, 2005 (14 +6 products)
- USA: Several MEPS, Energy Policy Act, 2005
- Obligatory fuel-efficiency standards for cars:
 - Japan (1999, 2006)
 - California: (2002, *Global Warming Bill*),
 - China (2004)
 - Taiwan, South Korea
 - EU (2007?)

*** Governments Claiming Leadership in Energy Efficient Technology**

- EU Commission: „to become world leader in renewable energy“ and „the world’s most energy-efficient region“ (2006)
- Japan: „Developing the world’s best energy-efficient appliances“ (Slogan of the Top Runner Programme, 2002)
- „...Norway shall be...world leading (in) environmental friendly energy“ (Minister Enoksen Nov. 2005)
- Finnish govt. commission: make the country “one of the most eco-efficient and competitive societies“ in 2025 (2005)
- Blair (2004): Britain „will take the lead“ in climate Policy, similar Germany (2005/6) and Sweden.
- Scharzenegger: California to become „world leader“ of climate policy (2006).
- PM Ahern: Make Ireland an „world leader...in the areas of renewables...and energy efficiency“ (2006).

Pressure from Innovators: Regulate Me!

- EUCETSA* (2006): “The reality is that regulation drives this industry” (*Lobby-Organisation for environmental technology)
- SUN MICROSYSTEMS (2006): “We want standards and market opportunities for companies that meet them”.
- HP (2007): “We want standards to drive energy efficiency”
- SEEEM (Electric motors, 2006): Ambitious energy standards!
- NOKIA (2006): “Better regulation...Provide incentives to front-runners”!
- EURIMA** (2006): Better insulation of houses!
(* ** European organisation for house isolation materials)
- PHILIPS (2005, 06): Regulation for better lighting!

Annual Growth of Selected Energy Technologies

(R. Berger 2006, BMU 2007)

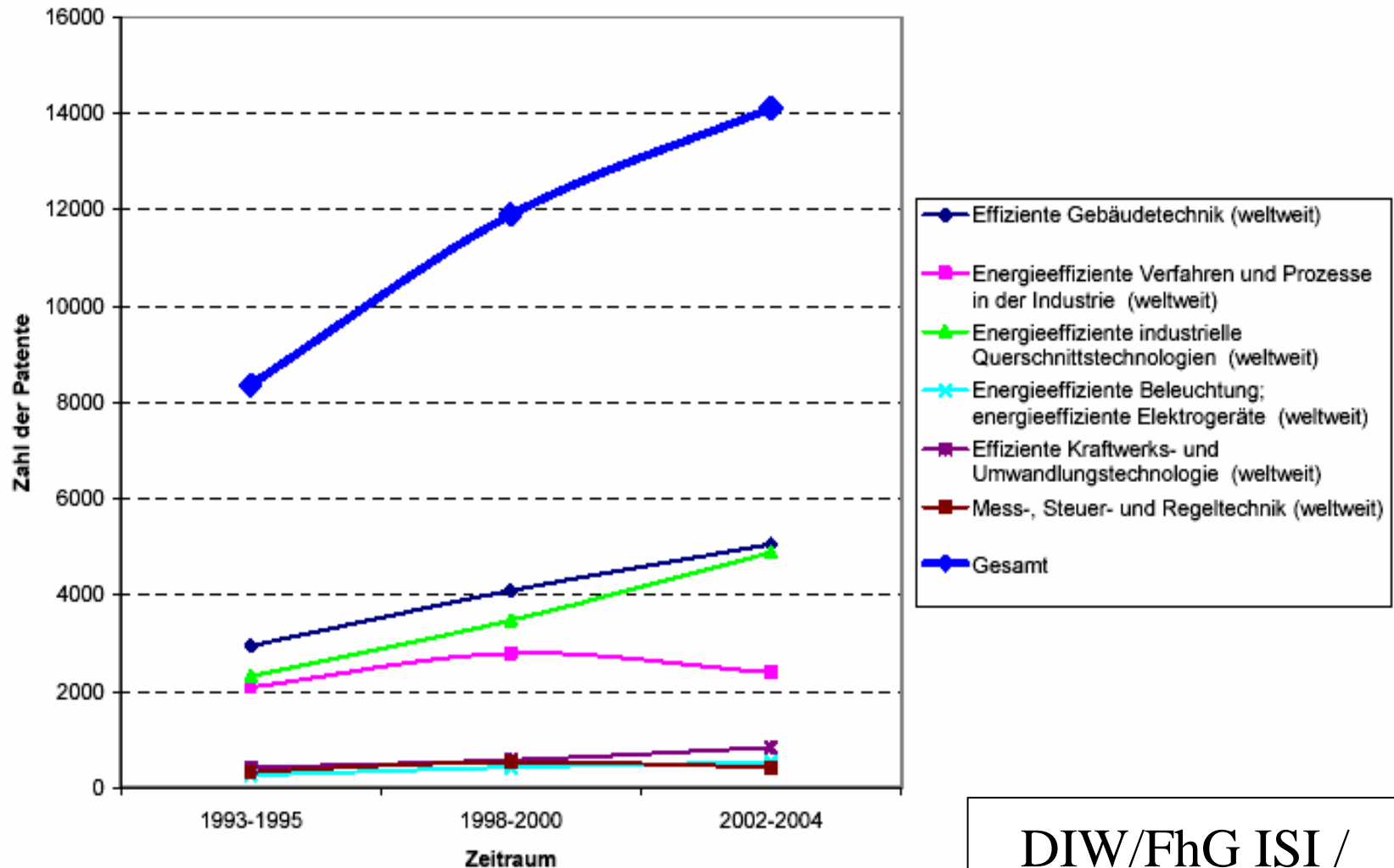
Global Growth (CAGR) 2005-20:

- Biogas: 18%
- **Hybrid cars** 17%
- Solar-thermal En.: 17%
- Bio Diesel: 16%
- PV: 15%
- Geothermal En.: 13%
- **Energy Efficiency: 9%**

Germany 2005-06

- PV: 54%
- **Heat pumps: 44%**
- Biomass Power. 38%
- Geothermal En.: 31%
- **Low energy houses: >30%**
- Bio Diesel: 22%
- **Contracting: ca. 15%**

(2) Energy Efficiency: Global Patent Dynamics 1993-2004



DIW/FhG ISI /
Roland Berger 2006

Energieplus-House (Fa. Weber)



„Loremo LS“:

4 Persons, 160 km/h, 20 PS, 1,7 l Diesel per 100 km, 450 kg.

Price: 11.000 € (50 PS, 220 km/h: 15.000 €)



⁽³⁾ A Dynamic Efficiency Potential

- Energy Efficiency Potentials are not static
EG: German Industry(2007): 25% energy saving profitable, > 31% too expensive
- The Energy Efficiency potential increases with:
 - Energy prices and
 - Economies of scale
- Ambitious policies stimulating new inventions can also increase the energy efficiency potential
- A Dynamic Innovation process has a significantly higher potential; the increase of labour productivity being the most important Model.
- Technology Forcing: Dynamic Top-Runner Standards

(3) Technology Forcing: Definition

- By technology forcing I understand policies that exert pressure for
 - radical innovation
 - and broad diffusionof a certain technology, that otherwise would not succeed.
- Examples:
 - Fuel-efficient cars in Japan (1970s)
 - EU Euro Norms, Top-Runner Prog.

(4) **Smart Environmental Regulation: the Japanese Top-Runner-Programme**

- METI regulation for more than 20 energy using products (1998-)
- The “top runner” regarding energy efficiency becomes the basis of the product standard (weighted average)
- Efficiency standard mandatory for producers and importers in the target year
- Name and shame as a intermediate instrument
- Combined regulations:
 - Green Procurement Law (2001),
 - green automobile tax,
 - annual awards for energy efficient products.
- The fulfilment of the standards “very positive” (SEPA, Sweden): several products achieve the standard before the target year (air conditioners, cars, computers, videotape recorders).
- Increased competitiveness of the products confirmed by producers.
- The potential for technological innovation and diffusion is taken into account by METI.

Technology Forcing: Target Year and Energy Saving of the Top-Runner Programme (Examples)

Product:	Target (basis) Year:	Expected Saving:
Computers:	2005 (basis: 1997) 2007 (2001)	- 83% (achieved 2001) - 69%
Magnetic hard-disks:	2005 (1997) 2007 (2001)	- 78% (achieved 2001) - 71%
Video recorders:	2003 (1997) 2008 (2003)	- 59% (achieved – 74%) - 22 %
Air conditioners (Heating & cooling):	2004 (1997) 2010 (2005)	- 66% (achieved – 68%) - 22 %
Refrigerators:	2004 (1998) 2010 (2005)	- 30% (achieved –55%) - 21%
Passenger cars (gasoline):	2010 (1995) 2015	- 23% (achieved 2006) - 29%
Photocopiers:	2006	- 30%
TV sets:	2003 (1997)	-16% (achieved - 26%)

(4) **EuP Directive 2005/32/EC**

- Product design, 14 (later 20) energy using products.
- Candidate Products: High environmental impact, potential for improvement, 200.000 units/year, transport excluded.
- Part of Integrated Product Policy (IPP), Sustainable Consumption and Production (Marrakech Process).
- *Generic* and *Specific* Eco-design requirements (GER, SER),
- Life cycle impact assessment (energy: least life cycle costs).
- SER: limit values or thresholds for selected adverse environmental impacts, legal obligations for manufacturers.
- BAT analysis: current *and* future models (e. g. prototypes), extra EU models included.
- Implementing measures adopted by the Commission assisted by a regulatory Committee, advised by the pluralistic Consultation Forum, surveillance by MS.
- Self-regulation under certain (controlled) conditions.
- “Advantaging EU competitiveness in global trade...”

(4) Top Runner and EuP Standard

	Top Runner St.	EuP Standard
Regulated Products	>20 (cars included)	14+6 (cars not included)
Integrated approach?	No, energy efficiency	Yes, IPP
LCA, Least life cycle costs	No	Yes
Economic incentives („hybrid“ instrumentation)	Weak	Strong (ET, Eco taxes..)
Strictness	High	Still Open, critical
Effectiveness	Partly very high (> 90%)	Open
Innovation effect	Strong, technol. forcing	Open
Competitiveness	High	Open
Policy process	High speed	Slow, so far
Concerned players	Limited number	Complex configuration
Transaction costs	Medium	Probably higher
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(4) EU Top-Runner Programme:

Proposal for a Pragmatic Quick Start

- **Focus on energy efficiency standards and labels** (Japanese TR standards as „soft“ benchmarks?)
- **Dynamic standard setting** (Euro Norms...)
- **Include broader eco-design criteria as a separate step** (LCA of relevant environmental impacts)
- **Introduce step by step: a combined benchmark for:**
 1. Energy use per product
 2. Material use per product
 3. Hazardous substances.
- **These 3 criteria represent the main environmental impacts.**
- **Minimum performance standards** (timeframes for the exclusion of the lower 60-80%)

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Additional Measures

- Aggressive, dynamic TR Labeling:
 - Class A for the TR (top 10 %?)
 - Public procurement: obligation to use TR
 - EMAS (ISO) with TR-obligation
 - Life cycle costs.
- Institutionalised awards for new TR in the markets (going beyond existing standards / labels)

⁽⁵⁾ Governance: A Hybrid Pattern

- **General price incentives** like taxes or ET to influence the general direction („trend steering“) plus **detailed regulation** („fine tuning“) to exploit technology-specific innovation potentials and to overcome specific obstacles.
- IEA (2007, 20): „The most effective way of encouraging investment in energy-efficiency improvements is the well-designed and well-enforced regulations on energy standards, coupled with appropriate energy-pricing policies“
- Regulation, however, should be part of a broader (supporting) policy mix and based on ambitious targets.

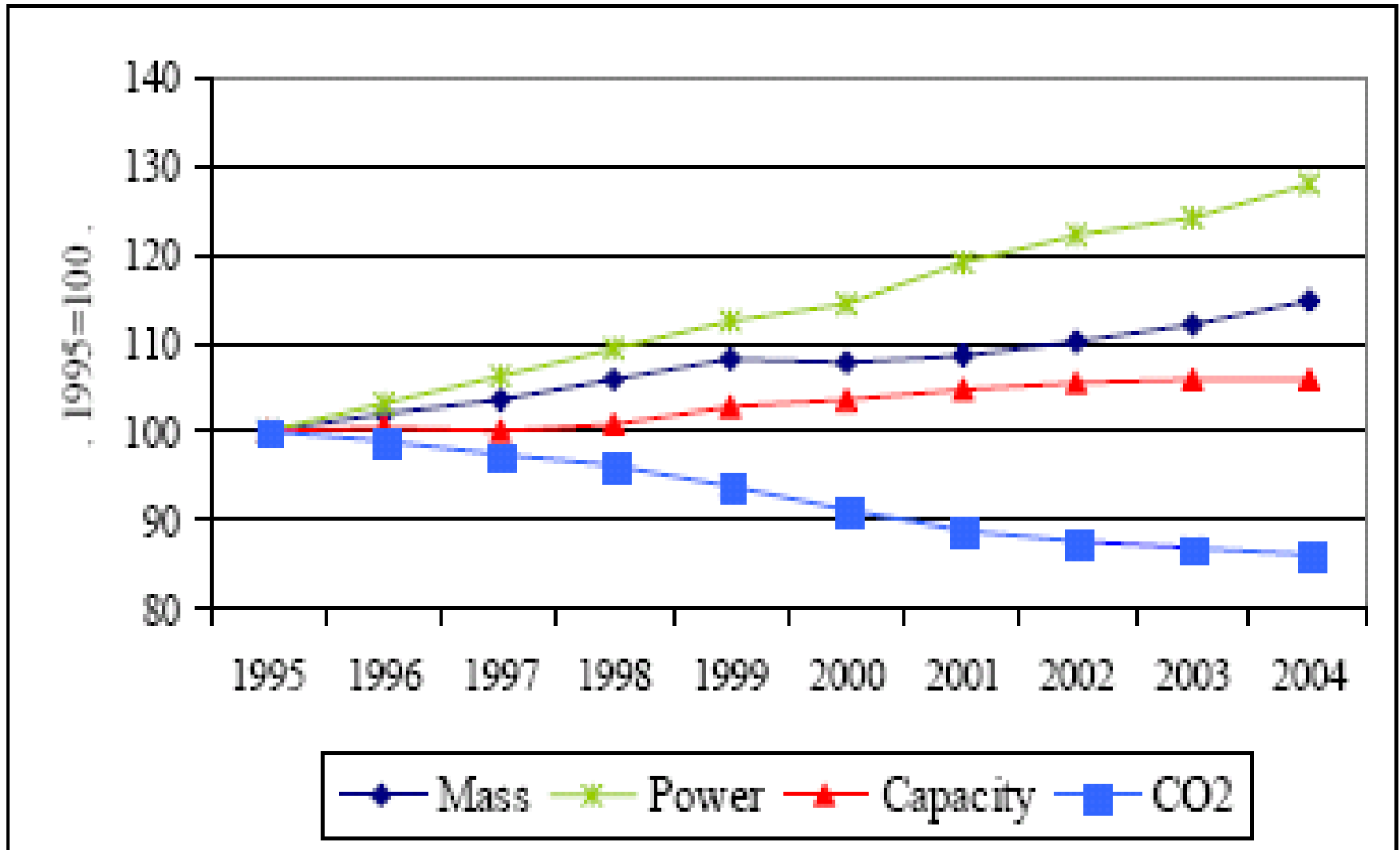
⁽⁶⁾ **The Ambivalence of Innovation: Dinosaurs and other Laggards**

- The resistance of those who are powerful enough to avoid the pressure for innovation.
- Smart resistance with symbolic participation (green rhetoric of power companies or SUV producers)
- The resistance of those who have other problems:
 - lack of capital, knowledge and time
 - lack of organisational responsibility
 - other essential priorities (KfW 2005).
- The industrial organisations typically being the lobby of losers of modernisation processes.

⁽⁶⁾ The Energy Supply Side: So far Contradicting Interests

- RWE: Happy about higher demand for electricity
(„Mehrabsatz durch langen Winter begünstigt“, Advertise 23.5.06)
- E.ON plans high investment to increase its capacity up to 67.000 MW (2007: 46.000) (tsp. 1.6.07)
- Utilities supporting electric storage heating – not only in Germany
(1995-2004: +6%, tsp. 25. 8. 07).
- Why should the power sector be interested in efficient end-use of energy? So far they have been strong enough to *expand* their market.

Climate-friendly Cars? (COM 2006)



(6) Change the Interests of the Supply Side!

- The necessity to change the logic of energy supply: End-use efficiency needs different incentives for suppliers.
- Otherwise the race between hare (energy saving policy) and tortoise (increased supply) will go on.
- The crucial question: How can Utilities make profits with reduced demand?
- White certificates (F, I) and energy efficiency commitments (UK) are only first steps.
- Higher tax rates for increased supply (sold kWh per household or customer) as additional incentive?
A new role for grid companies?
- Progressive tariffs (Japan)?
- Long-term Change Management: Creative solutions instead of “creative destruction” (Schumpeter).

Thank You!