



Forschungsstelle für Umweltpolitik  
Environmental Policy Research Center



Prof. Dr.

**Martin Jänicke**

hauptman@zedat.fu-berlin.de



# „Green Industrial Policy – Forcing Green Growth and Innovation“

Paris,

30. march 2010

# „Green New Deal“. – A Dramatic Language

---

S. Gabriel (German Environmental Min.) 2006: „We need a „New Deal“ of economic, environmental and employment policy. Its core being innovations, a „third industrial revolution“.

„I believe we are now standing on the brink of a *Third Industrial Revolution: the Low Carbon Age*. Like the previous industrial revolutions, this will be driven by technology and new forms of energy. It will also transform our societies” (Barroso, 1. 10. 2007).

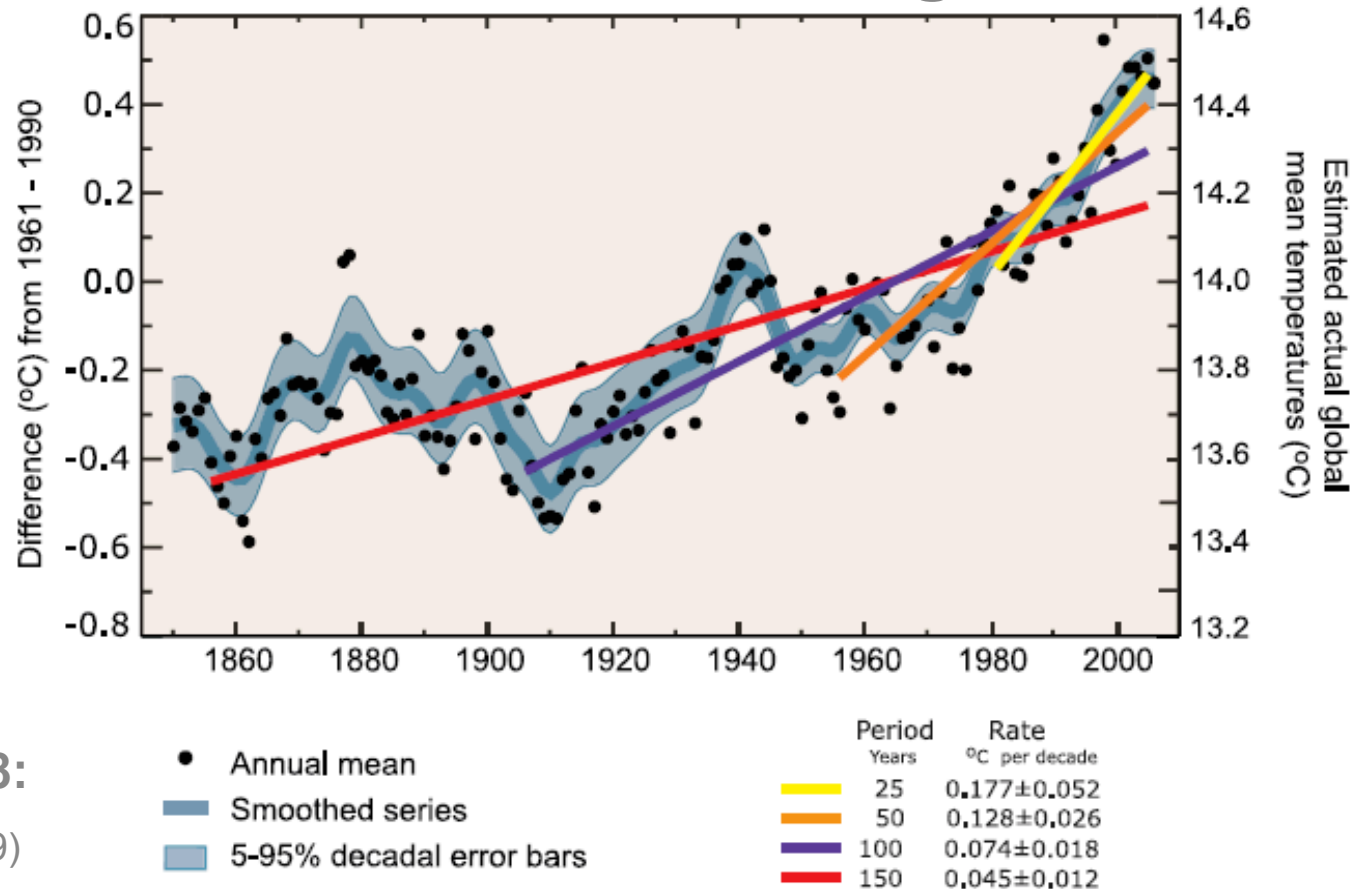


# Crises and Opportunities to Strengthen Specific Trends

	<b>Crises / Pressure for Innovation</b>	<b>Opportunities to strengthen specific trends</b>
<b>Environment</b>	Climate change, water shortages, loss of natural capital	Eco-efficiency as economic driver; improved knowledge/ increased awareness
<b>Economy</b>	End of the era of cheap resources, breakdown of traditional modes of production, water shortages	Global / future markets for eco-efficient products, eco-innovations driving productivity, knowledge-intensity
<b>Social welfare</b>	Unemployment, costs of pensions, poverty	Green jobs, enlarged eco-tax reform
<b>Governance</b>	Public dept, government failure, populist media, short-time perspective	Multi-level governance, collective action of governments, institutions with longer time perspective etc.



# Acceleration of Climate Change (IPCC 2007)



CO<sub>2</sub>: 2000-08:  
+ 29% (GCP 09)

**Figure TS.6.** (Top) Patterns of linear global temperature trends over the period 1979 to 2005 estimated at the surface (left), and for the troposphere from satellite records (right). Grey indicates areas with incomplete data. (Bottom) Annual global mean temperatures (black dots) with linear fits to the data. The left hand axis shows temperature anomalies relative to the 1961 to 1990 average and the right hand axis shows estimated actual temperatures, both in °C. Linear trends are shown for the last 25 (yellow), 50 (orange), 100 (magenta) and 150 years (red). The smooth blue curve shows decadal variations (see Appendix 3.A), with the decadal 90% error range shown as a pale blue band about that line. The total temperature increase from the period 1850 to 1899 to the period 2001 to 2005 is 0.76°C ± 0.19°C. {FAQ 3.1, Figure 1.}

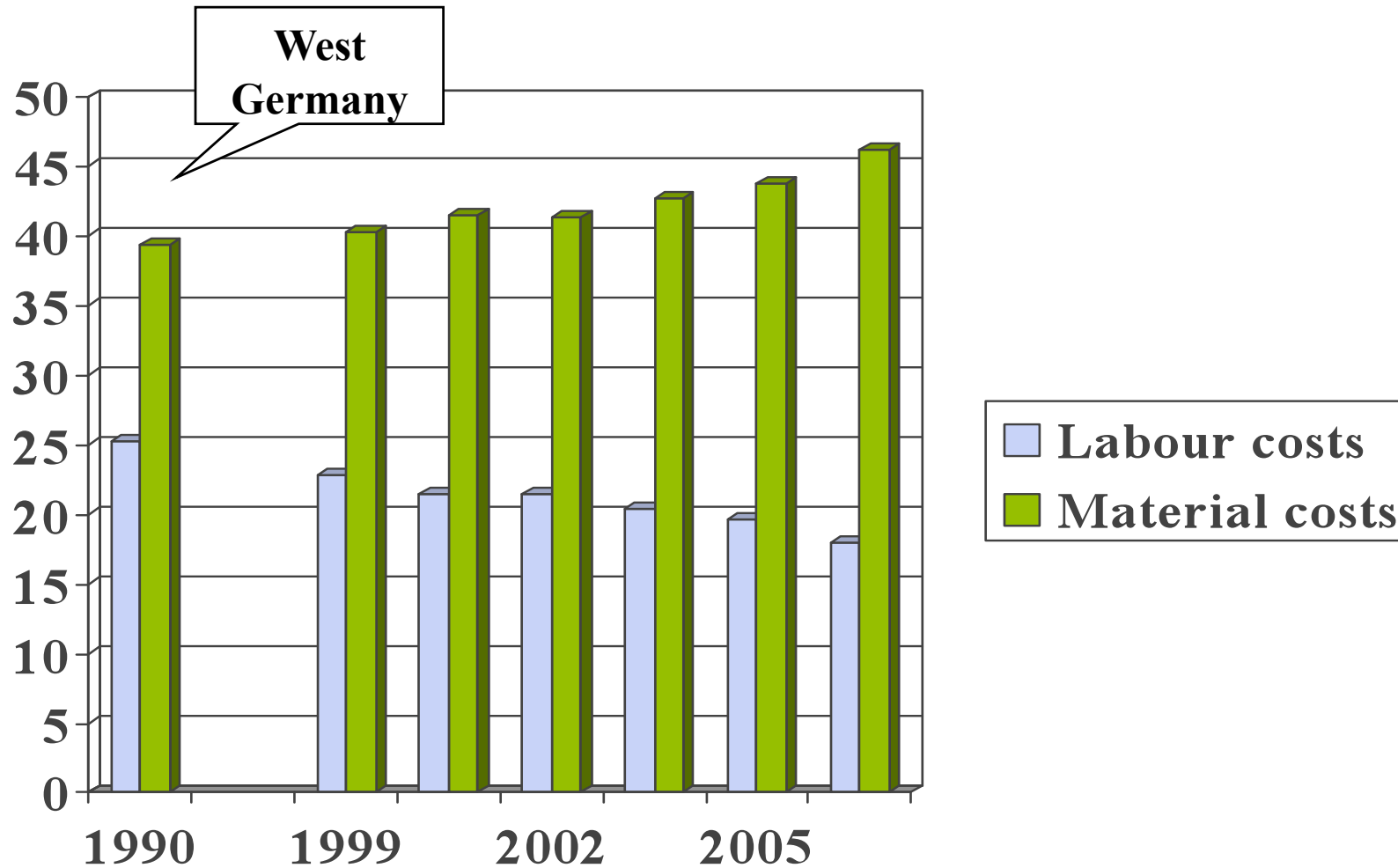
# A Wasteful Mode of Production

---

- „...more than 95% of the resources lifted from nature are wasted before the finished goods reach the market. And many industrial products – such as cars – demand additional resources while being used“. Reid, A. / Miedzinski, M.: Eco-Innovation. Final Report for Sectoral Innovation Watch, May 2008, [www.technopolis-group.com](http://www.technopolis-group.com).
- According to Gofman, Lemeshev and Reimer (1974) in the old Soviet Union even 98,6 % of the material input was wasted before consumption. (The break-down of SU was also due to an extremely inefficient use of resources. And to a certain degree was their crisis an early warning also for our resource-intensive pattern of industrial growth).

# Labour and Material Costs in the German Industry 1990-2007

(% of total Costs in %)



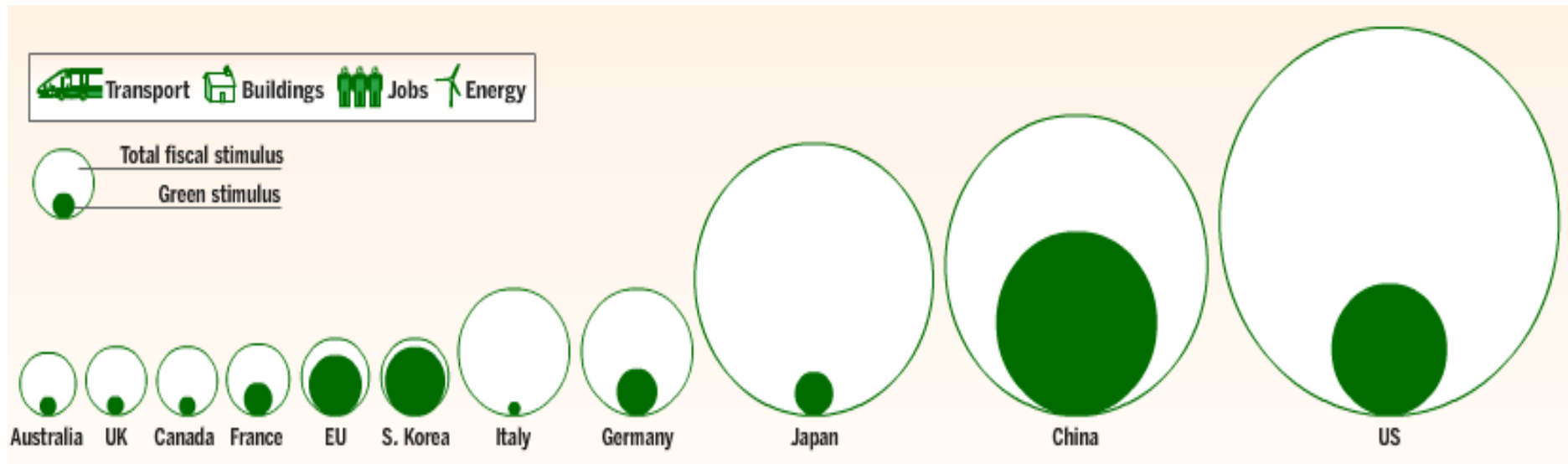
Source: Statist. Bundesamt  
2009

# Strengthening Favourable Trends



# Stimulus and Green Investment Programmes 2009

(St. Bernard et al. 2009, FT 6.3.09)



The "green stimulus" provided by the G20 so far amounts to US\$446bn, or about 16 per cent of their total economic recovery packages (ENDS 3/4/09)



# The „Climate Industry“: Global Markets

McKinsey (2009): € 500 bn. (2008)  
€ 2 100 bn. (2020)

(Demand for energy-efficient technologies in energy-intensive sectors.)

BSBC (2009): € 360 bn. (2008)  
€ 1 300 bn. (2020)

(„global climate revenue“, 13% pollution control)

**Innovas (2009): \$ 4 400 bn. (2007/8)**

(Pollution Control: 21,6 %)

(Roland Berger (2009): € 1 400 bn. (2007)  
€ 3 200 bn. (2020)

(including Water + Waste Management + Sustainable Mobility)



# Green Jobs (UNEP 2009 + other Sources)

- USA:** >**5,3 Mio** green jobs (2005).(Steiner)  
Obama (2008) proposed 5 Mio jobs more.  
**9,1 Mio. (2007):** 8,6 Energy efficiency, 0,5  
renewable energy (ASES/MISI 2008).
- EU-27:** >**3,4 Mio.** (2004)(Ernst & Young 2006)  
WWF (6-09): Additional 5 Mio. indirect jobs
- Germany:** >**1,8 Mio.** (2006)(BMU 2007)
- UK:** **0,9 Mio.** (2007/8), 1,3 planned (2017)
- Japan:** **1,4 Mio.** (Reuters 7. 1. 09),  
2,2 Mio. planned 2020 (2009)
- South Korea:** **1 Mio jobs 2012** (Green New Deal)  
(UNEP),



# Global Annual Growth of Selected Environmental Technologies

## Annual growth 2006-08:

-PV (grid-connected capacity):	60 %	
-Bio Diesel:		41 %
-Investment in renewable energies (capacity):	38 %	
-Wind energy (capacity):	28 %	

## Forecast 2020:

-Bio plastics:	35 %	
-Energy-efficient cars:	29 %	
-Automatic waste separation:	15 %	
-Energy efficiency in core sectors:	13 %	
-White biotech:	10 %	
-Water supply:	6 %.	

Source: BMU/Roland Berger 2009, REN21 2009, McKinsey 2009

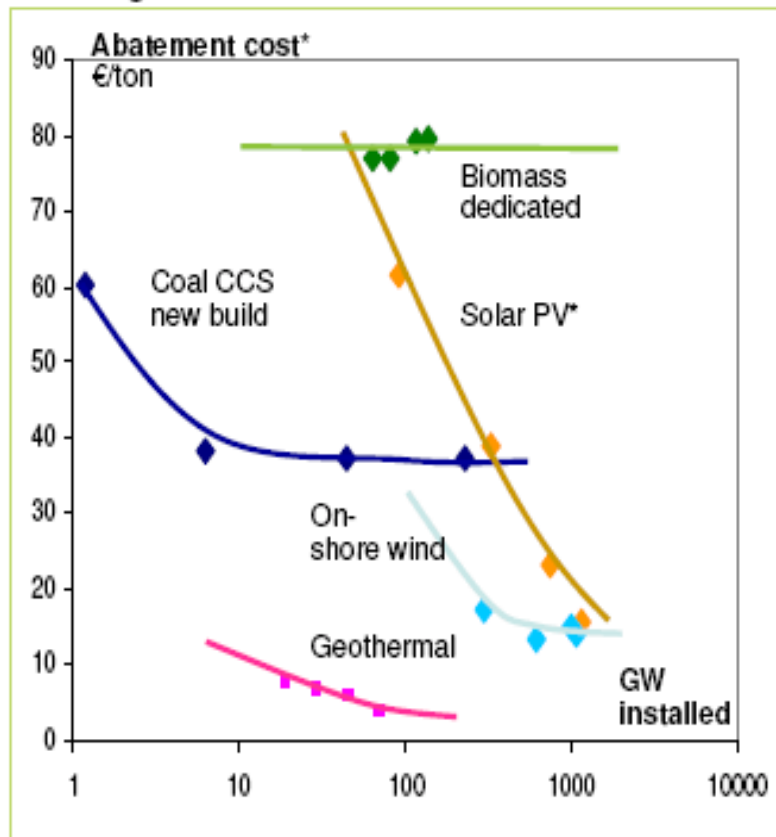
# Policies that expand low-carbon markets can help drive down low-carbon technology costs



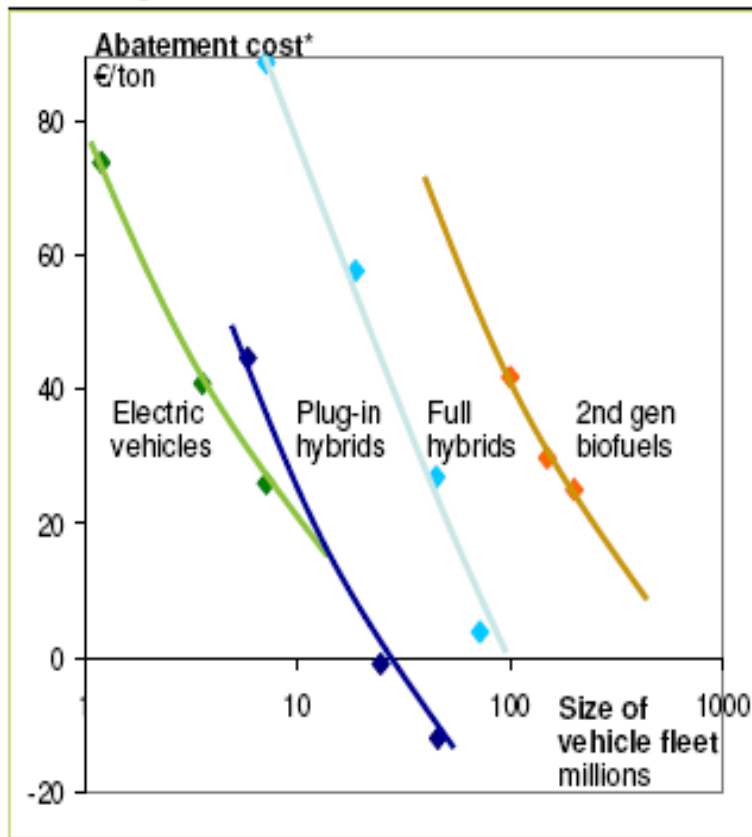
(project catalyst 2009)

project catalyst

Learning curves of selected clean power technologies



Learning curves of selected transportation technologies



Working Draft - Last Modified 11/18/2009 10:12:23 PM Printed 11/18/2009 10:12:31 PM

\* Costs shown are global weighted averages across geographies  
Source: McKinsey solar knowledge effort, Cost-curve V2.0

# Why is Eco-Innovation Essential? Three Characteristics

- \* *Environmental* innovations are a **necessary condition for long-term industrial growth**:
  - Preventing *critical external damage* and loss of welfare necessitates technological improvements at ever higher levels.
  - The end of the era of cheap resources necessitates higher resource-efficiency.
- This means **permanent pressure for eco-innovation**.
- \* This pressure however is highly advantageous:
  - creating both *future and global* markets
  - increasing **productivity**
  - providing other co-benefits: energy security, saved health and pollution costs etc.
- \* Eco-innovation is essentially “**policy-driven**”.

# German Experiences: Lessons from Climate Policy

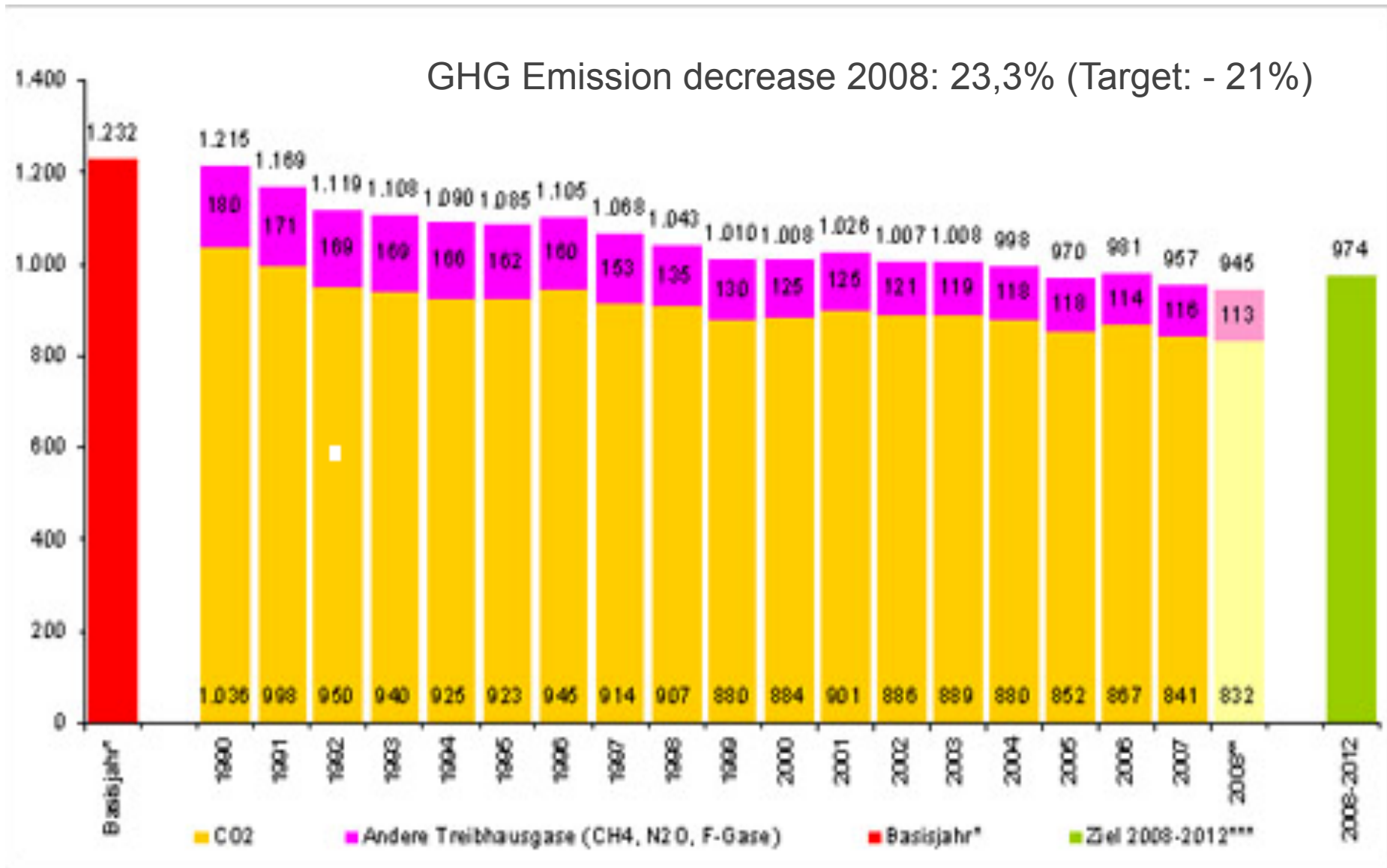
# Climate Policy as Innovation: the case of Germany (Theses)

Climate policy 1998 conceived as innovation strategy („**ecological modernisation**“, later as „ecological industrial policy“). Possible lessons:

- \* **Effectivity:** Ambitious targets can be established, implemented, achieved and even surpassed - although the potential has been not been fully exploited (utilities, cars, CHP)
- \* **Innovation:** Ambitious targets (THG plus phasing out of nuclear energy) plus market support have created high pressure for innovation („explosion“ of patents!)
- \* **Political demonstration effects** on other countries (policy diffusion, e.g. feed-in tariffs)

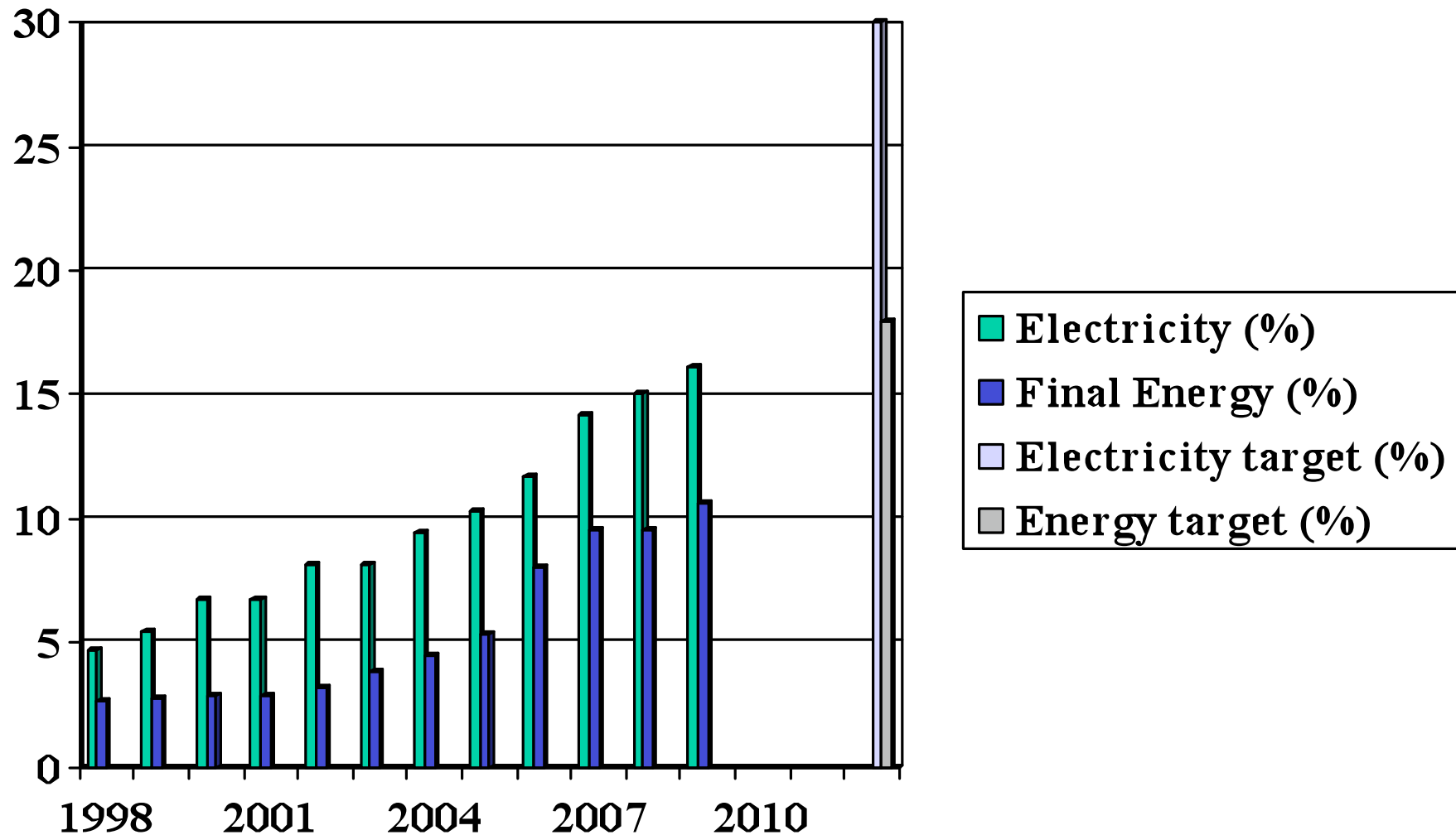
- \* **Competitive pressure on other countries**
- \* **Lead markets:** domestic market development plus active role in international climate policy (support for Irena)
- \* **Productivity:** Cost reductions and increased productivity, final surplus of the climate programme
- \* **Growth:** a booming, competitive „climate protection industry“ (2005: 5% GDP, exports, employment)
- \* **Acceleration of the innovation cycle:** By stimulating innovation, ambitious targets can enlarge the space for further climate policy action

# Basis Year, Development and Target Year of German GHG Emissions (BMU 2009)



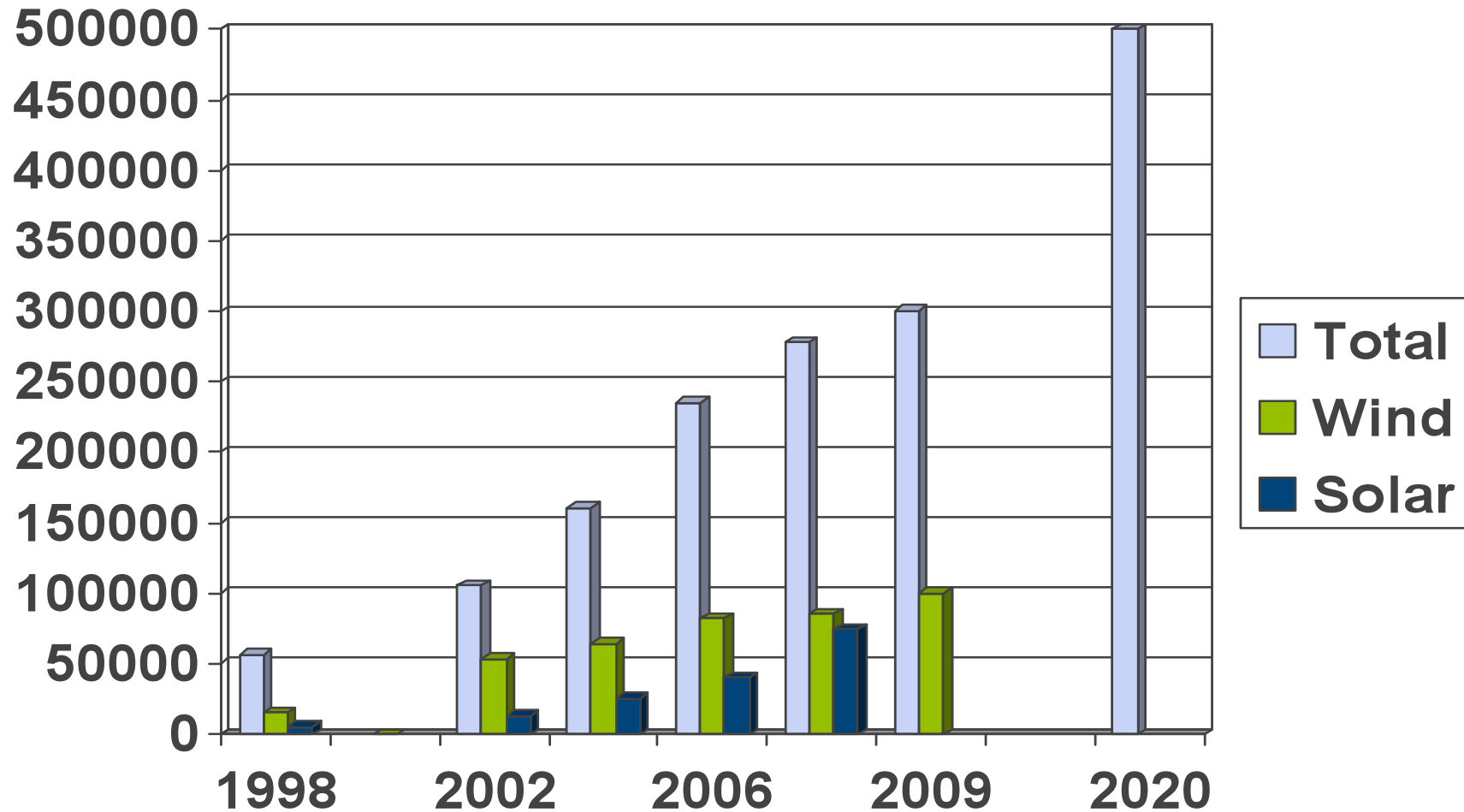
# Share of Renewable Energies in Germany 1998-2009 and Targets 2020

(Sources: BMU 2010, BSW 12-2009, BEE -2010 (2006-9))



Saved CO<sub>2</sub> Emissions 2009: 112,5

# Employment in the Renewable Energy Sector 1998-2009 and Forecast 2020 (BMU/DIW (Edler) 2010)



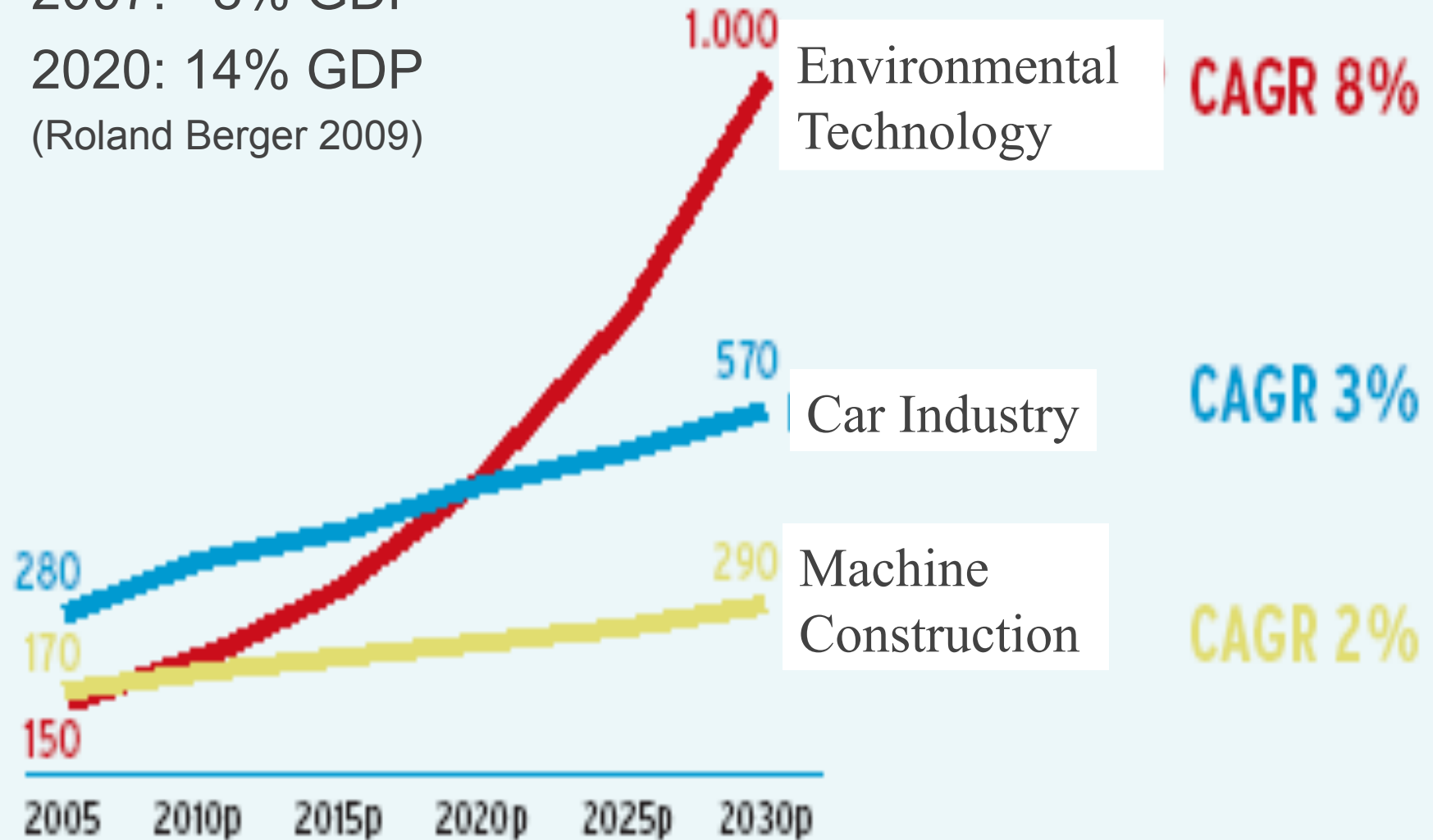
# Growth: The German „Environmental Industry“: A Forecast (turnover)

(Source: Roland Berger 2006)

2007: 8% GDP

2020: 14% GDP

(Roland Berger 2009)



# GreenTech Germany: Global Market Share and Annual Growth Rates (BMU/R. Berger 2009)



	<b>Global Market Share</b>	<b>Annual Growth 2005-2007</b>	<b>Forecast 2008-2010</b>
<b>Renewable Energies:</b>	30	29	35
<b>Energy Efficiency:</b>	12	20	22
<b>Eco-efficient Materials (bio-tech etc.)</b>	6	21	24
<b>Recycling:</b>	24	18	16
<b>Sustainable Water Management</b>	10	15	14
<b>Sustainable Mobility</b>	18	15	17

# Acceleration of the Eco-Innovation Cycle

# Acceleration of the Innovation Process in Climate Policy: Best Practice

Implementation of Kyoto targets (2010/2): D (21%/23,3)

UK: Kyoto target: - 12.5%, expected 2010: -23%.

Stricter targets for renewable energy 2020:

- D: from 20% (EEG 2000) to 30% (EEG 2009)
- China: Green power target surpassed,  
Wind energy: from 30 GW to 100 GW).
- Solar energy India: Remote village progr. (2007: 25.000)  
Oct. 2009: 20 GW 2020, 100 GW 2030, 200 GW 2050

Energy-efficiency programmes:

- J (Top Runner): several unexpected results
- UK: Energy-efficiency target 2016: 9 %, exp.18%,
- DK: Energy-eff. target: 9,2%, exp. 10,7%;
- IRL: 9%/12,5%

vgl. Böll Thema 2/2009, UK: Climate Change Levy (CCL, 2001) für die Industrie, verbunden mit der Option einer Vereinbarung mit der Regierung (CCA) zur Steigerung der Energieeffizienz bei Verringerung der CCL um 80%. Investitionshilfe. Bisher 5,4 MtC jährliche Einsparung. Teilweise Übererfüllung der Ziele.

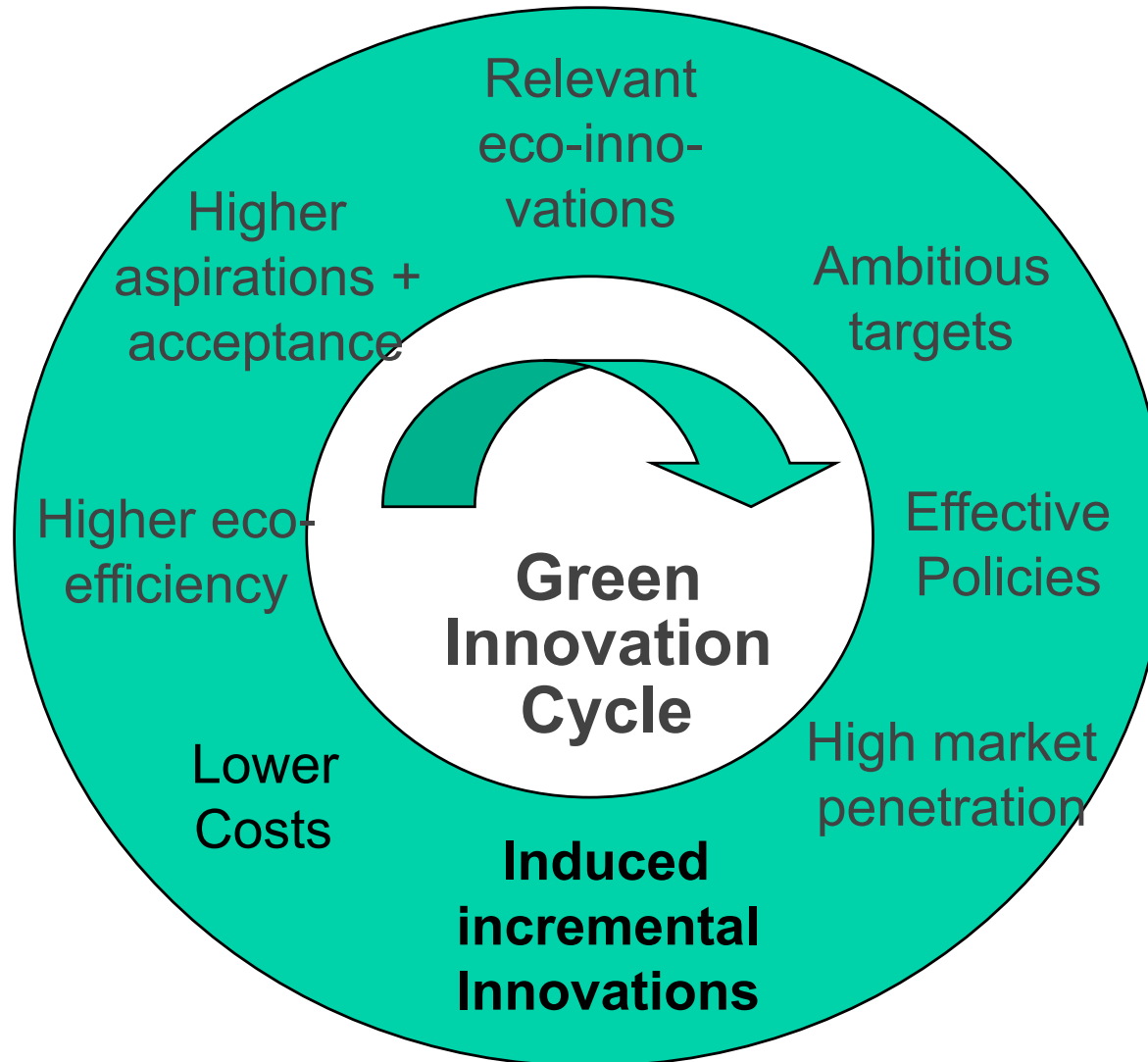
# Technology Forcing: The Top-Runner Programme

## Target Year and Energy Saving (Examples)

<b>Product:</b>	<b>Target Year (basis):</b>	<b>Expected Saving:</b>
<b>Computers:</b>	2005 (basis: 1997) 2007 (2001)	- 83% (achieved 2001) - 69%
<b>Magnetic hard-disks:</b>	2005 (1997) 2007 (2001)	- 78% (achieved 2001) - 71%
<b>Video recorders:</b>	2003 (1997) 2008 (2003)	- 59% (achieved: - 74%) - 22 %
<b>Air conditioners</b> (Heat- ing & cooling):	2004 (1997) 2010 (2005)	- 66% (achieved: - 68%) - 22 %
<b>Refrigerators:</b>	2004 (1998) 2010 (2005)	- 30% (achieved: -55%) - 21%
<b>Passenger cars</b> (gasoline):	2010 (1995) 2015	- 23% (achieved 2006) - 29%
<b>Diesel transporters</b>	2005 (1995)	- 6,5% (achieved: - 22%)
<b>TV sets:</b>	2003 (1997)	-16% (achieved: - 26)

Source: ECCJ 2008

# The Acceleration of the Green Innovation Cycle



# Green Industrial Policy

# Green Industrial Policy

---

- Environmental problems are essentially caused by technology. Technical change and innovation are therefore indispensable.
- Green industrial policy is technology-based policy
- Green industrial policy supports competition, e. g. by turning domestic markets into **lead markets**, enabling the start into the world market.
- Green industrial policy supports employment, particularly in the eco-industry.
- Green industrial policy is **structural policy**, supporting adaptation or diversification into innovative technologies (e. g. Ruhrkohle AG) or giving established sectors new functions (e. g. construction).
- Change management, transitions management.

# Policy Design and Instruments

---

Ambitious, realistic, broadly accepted and reliable **targets**

A **flexible policy mix** supporting the innovation cycle from invention to diffusion (and back to invention).

## Instruments:

- **specific, dynamic regulation** to exploit specific innovation potentials and to overcome specific obstacles and
- **general price incentives** such as taxes, targeted subsidies or ET to influence the general direction and to prevent „rebound effects“ (x).
- supporting instruments such as dynamic labelling (Top Runners!), green public procurement, EMAS etc.

Competent inclusive **networks**.

## A Strong Role of Governments

---

Green Innovation is essentially “policy-driven”  
(Ernst & Young 2006)

OECD (2007, 27): “perceived policy stringency is the single most important factor driving environmental investment, technological innovation and reported performance”.

A “Green New Deal” depends even more on government intervention

However: If governments are put into such a dominant role, mechanisms to prevent mistakes are necessary. EU: Impact assessment, stakeholder dialogues, internet consultation.

# Thank You!

See also:

M. Jänicke: Megatrend Umweltinnovation, München 2008

M. Jänicke / K. Jacob (Eds.): Environmental Governance in Global Perspective. New Approaches to Ecological and Political Modernisation, Berlin 2007.

# Eco-Modernization / Eco-efficiency: An Old Story...



Figure 1 Model and examples of environmental policy approaches (Jänicke 1984, 1995)

Curative approaches		Preventive approaches		
<i>Repair:</i>	<i>End-of-pipe treatment:</i>	<i>Ecological modernization:</i>	<i>Structural change:</i>	
Reduction / compensation of damage	Clean-up technology	Clean(er) technology / Eco-efficiency	Decrease of “dirty” industries / activities	
Examples	Payments for noise damage	Passive noise protection	Less noisy motors	Alternative traffic modes, less traffic
	Ex-post measures against forest damage	Desulfurization of coal power stations	More efficient power production and consumption; CHP; cleaner primary energy	Less power-intensive modes of production and consumption
	Measures against damage caused by industrial waste	Waste incineration	Recycling	Reduction of waste-intensive sectors