

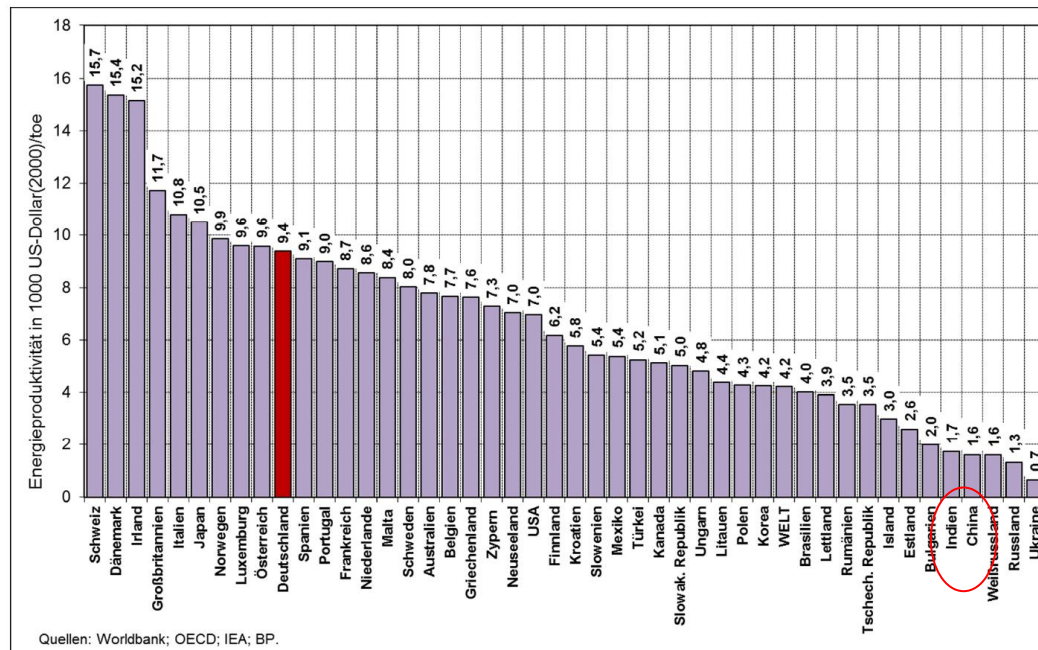


India - Laws, Actions and Reasons - Results for Energy Efficiency



Energy productivity in various countries

Energieproduktivität in der EU-28 und in weiteren ausgewählten Ländern im Jahr 2013



Industrial countries have higher GDP/toe



Germany: Targets Energiewende

	Basis	2020	2030	2040	2050
GHG	1990	-40%	-55%	-70%	-80- -95%

Renewables

Electr.-generation		35%	50%	65%	80%
EndE gross		18%	30%	45%	60%

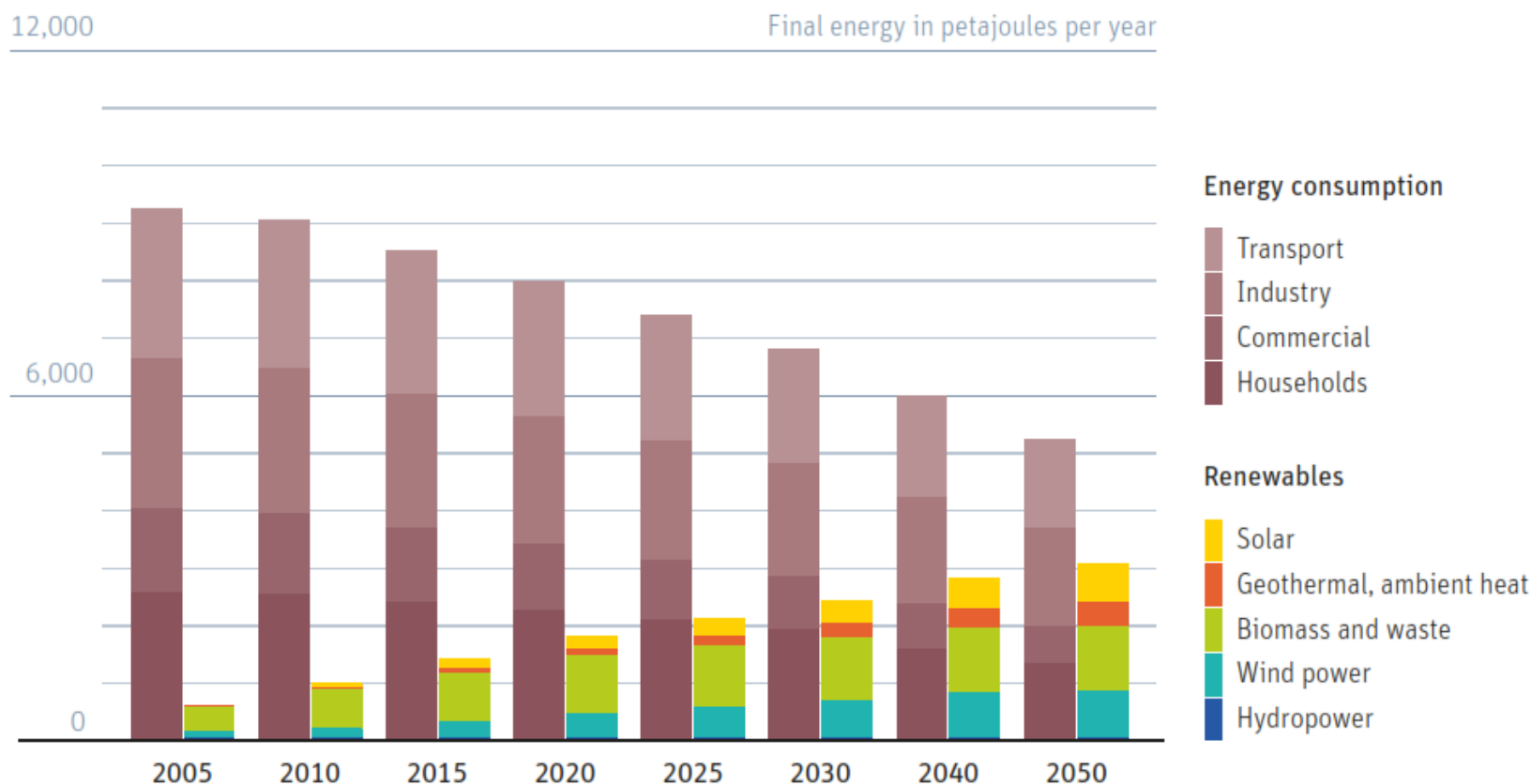
Energy Efficiency

E-demand	2008	-10%			-25%
Traffic	2005	-10%			-40%
Heating	2008	-20%			-80%
Primary E use	2008	-20%			-50%

Ambitious goals, a lot still to be done



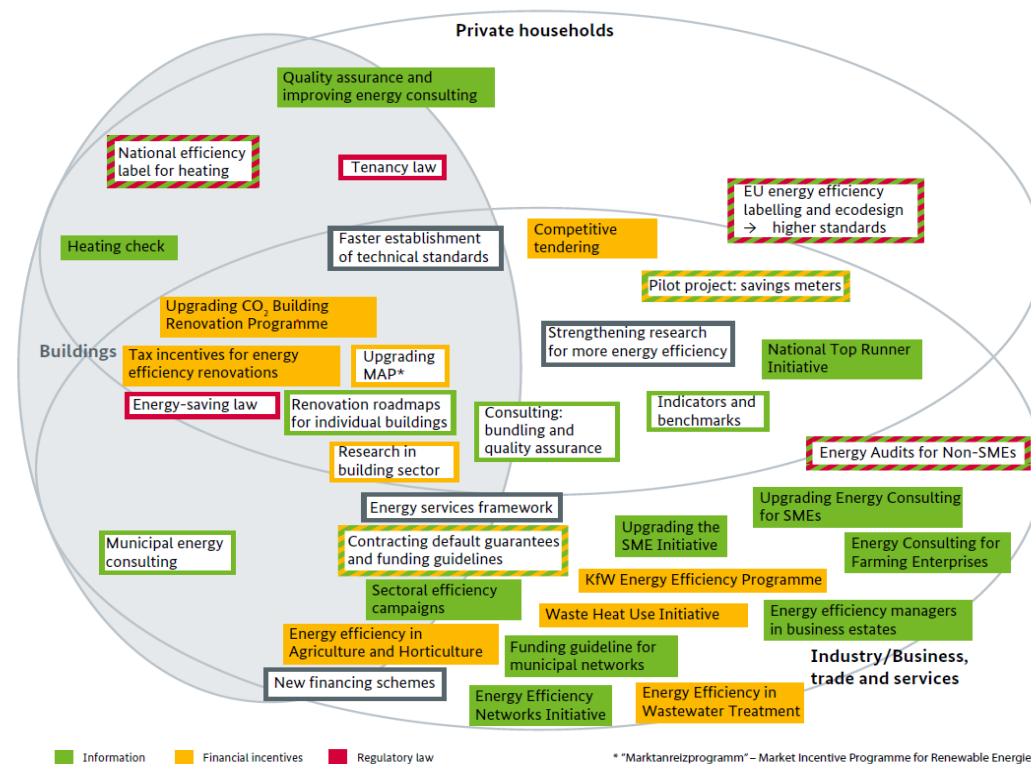
Future Plans – Increase share of RE and EE measures



Source: Energy Transition, The German Energiewende



Figure 1: Short-term measures and long-term work processes of NAPE for the 18th legislative term



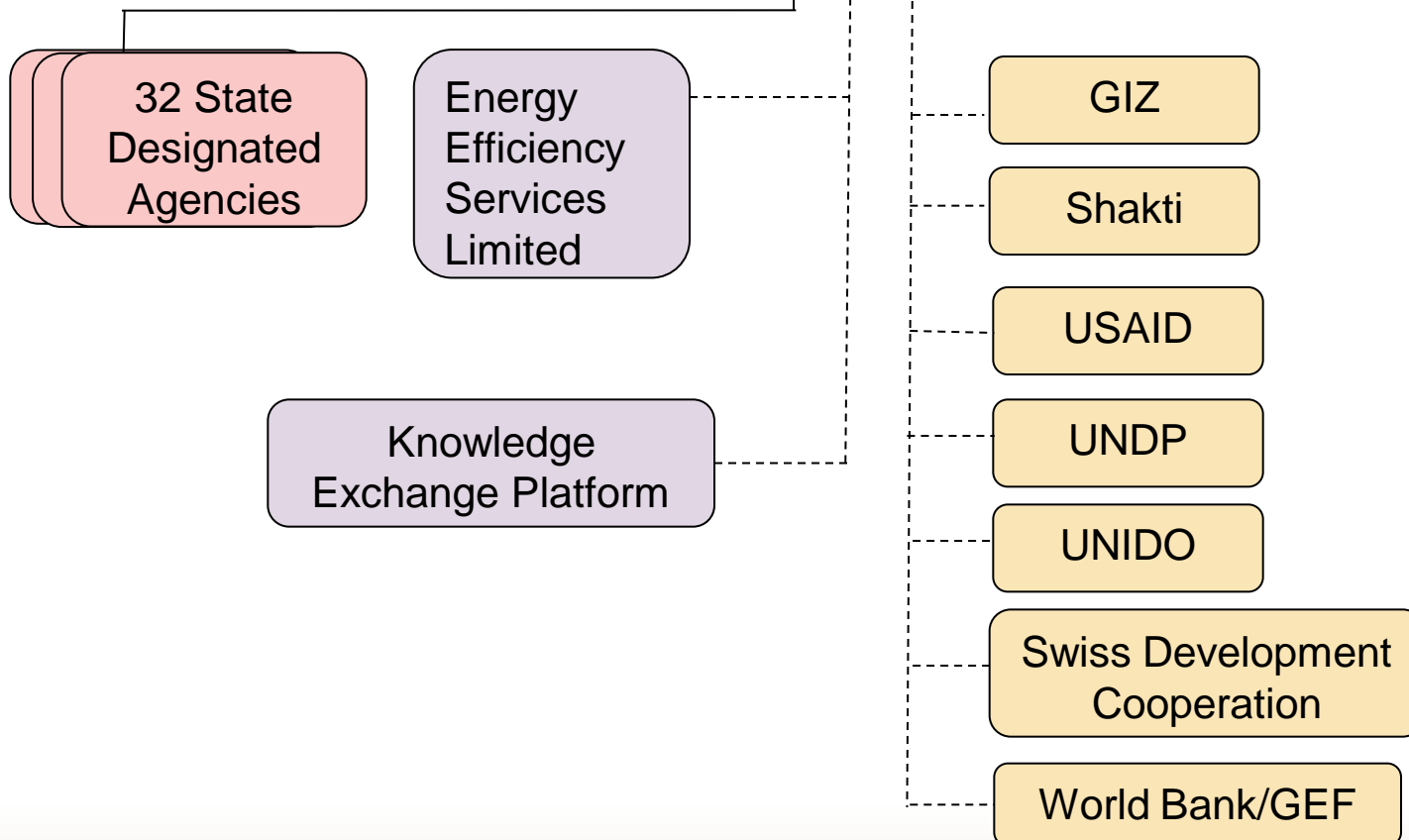
Source: Federal Ministry for Economic Affairs and Energy

National Action Plan on Energy Efficiency 2013 – 2017 in Germany

Energy Efficiency requires many instruments and various approaches

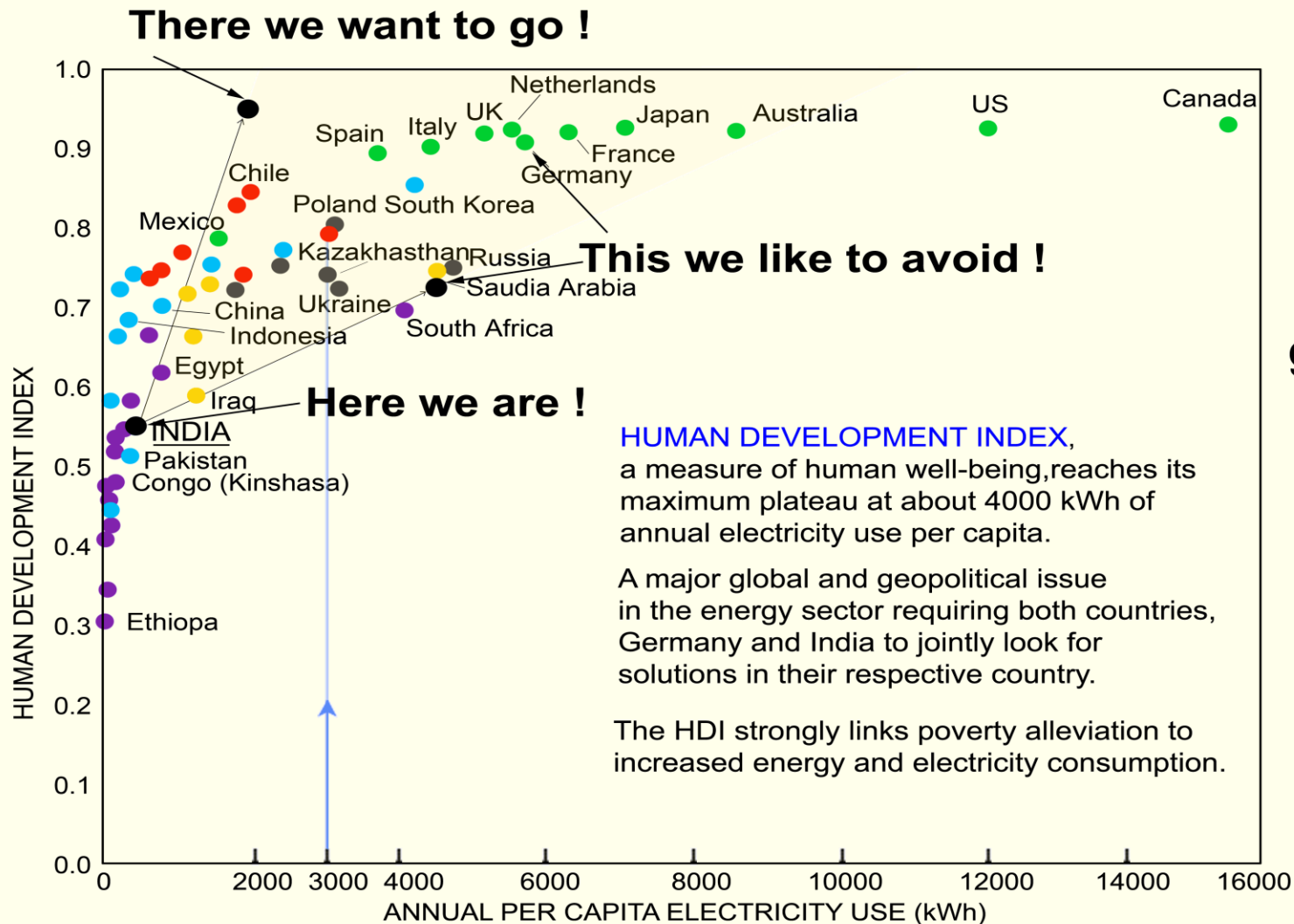
Ministry of Power

Bureau of Energy Efficiency





Energy Efficiency is essential !



**Inclusive
growth and
poverty
alleviation
options.**



Sector Wise Energy Saving Potential

(Source : Energy Conservation Guide Book, PCRA)

Sector Energy Consumption (Mtoe)		Saving Potential (%)	Realization thru Short Term Measure (%)	Energy Saving (Mtoe)	Saving in Rs. Crores
INDUSTRY	165	20-30	15	24.75	49500
TRANSPORT	60	15-20	07	4.2	8400
AGRI	29	20-25	15	4.25	8500
HOUSEHOLD	60	25-30 (K)	07	0.42	830
		10-15 (LPG)	03	0.28	550
		15-20 (EL)	05	-	1300
COMM. BLDG	30	25-30	05	0.30	660
Non-Energy Uses**	32	-	-	-	-
Others	29	-	-	-	-
TOTAL	405			34.2	69740

THE INDIAN ENERGY CONSERVATION ACT



- ❑ EC Act enacted in October 2001
- ❑ Became effective from 1st March 2002
- ❑ Bureau of Energy Efficiency (BEE) operationalized from 1st March 2002 and State Designated Agencies established in 32 States/Union Territories
- ❑ Energy efficiency institutional practices and initiatives in India are now mainly being guided through various voluntary and mandatory provisions of the Energy Conservation Act

MISSION OF BEE

Develop policy and strategies with a thrust on self regulation and market principles, within the overall framework of the EC Act with the primary objective of reducing energy intensity of the Indian economy.

THE INDIAN ENERGY CONSERVATION ACT

- The **five major provisions** of EC Act relate to:
- **Designated Consumers** (mainly energy intensive industries and buildings) to comply with the specific energy consumption norms for the manufactured products and services and establishment of energy management system,
- **Standards and Labeling** of energy consuming appliances, gadgets and equipment to ensure promotion of energy efficiency of the new stocks entering the market
- **Energy Conservation Building Code** ensuring that new commercial buildings constructed in the country have less electricity consumption
- Creation of **Institutional Set up** (Bureau of Energy Efficiency at the Federal level and State Designated Agencies at the State level) for effective coordination of the energy conservation efforts in the country and
- Establishment of **Energy Conservation Fund** at Centre and States to provide necessary financial support for energy efficiency initiatives in the country.

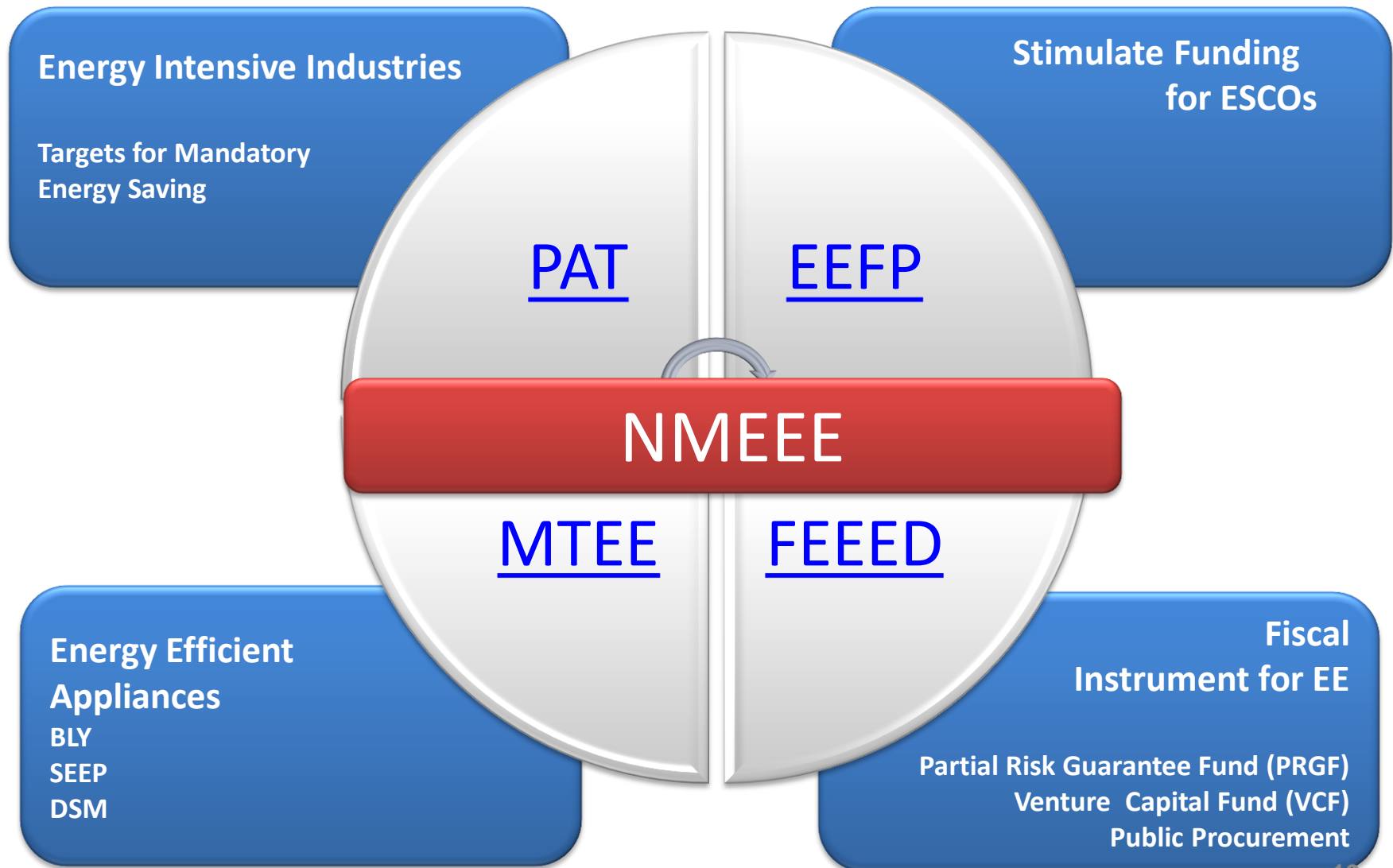


NATIONAL MISSION ON ENHANCED ENERGY EFFICIENCY (NMEEE)



- The National Action Plan on Climate Change (NAPCC) was released by Honorable Prime Minister of India in June 2008
- The Action Plan Outlines **8 Missions** including National Mission on Enhanced Energy Efficiency (**NMEEE**)
- The Mission has outlined specific goals

NMEEEE – Four New Initiatives





Standards and Labeling (S & L) of Appliances



- **Evolve minimum energy performance standards** (MEPS) for notified equipment and appliances
- **Prohibit** manufacture, sale and import of equipment and appliances not confirming to MEPS
- **Introduce Energy labeling** to enable consumers to make informed choice
- The National Energy Labeling Programme has been launched by Union Minister of Power on 18th May, 2006
 - House-hold refrigerators, fluorescent tube lights, air conditioners and distribution transformers have been included in the programme on voluntary basis; 70% of refrigerator production, 90% of tube light production; and 40% of AC production is now covered by the programme.
 - Labels for other appliances/equipment, such as general purpose electric motors, pumps, LPG and kerosene stoves, ceiling fans, geysers, and consumer electronics are under preparation



Standard & Labeling Program

EC Act, 2001 has the provision of empowering the Central Government to :

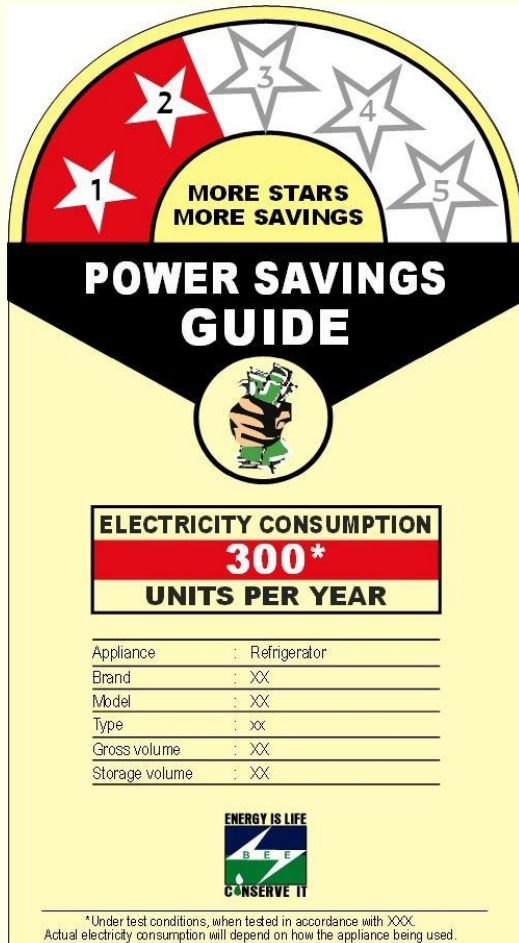
A) Direct display of labels on specified appliances or equipment (14.d)

B) Enforce minimum efficiency standards by prohibiting manufacture, sale, and import of products not meeting the minimum standards (14.c)

- | | |
|--|-------------|
| 1. Frost-free Refrigerators | : Mandatory |
| 2. Tubular Fluorescent Lamps (TFL) | : Mandatory |
| 3. Air-conditioners | : Mandatory |
| 4. Distribution Transformers | : Mandatory |
| 5. Direct cool /Frost Free Refrigerators | : Voluntary |
| 6. Motors | : Voluntary |
| 7. Pump sets | : Voluntary |
| 8. Ceiling fans | : Voluntary |
| 9. LPG Stoves | : Voluntary |
| 10. Colour TVs | : Voluntary |
| 11. Storage Water Geysers | : Voluntary |
| 12. Washing Machines | : Voluntary |



Sample Labels



Refrigerator



Tubular Fluorescent Lamp



Growth Profile of Indian Commercial Building Sector

- Demand for OFFICE SPACE in India is driven by the increasing share of the services sector in the Indian economy
 - Office space supply shifting from Central Business Districts to secondary centers (office and IT parks)
 - Modern office buildings in newly developed areas enable the higher quality standards that are essential for IT services
 - All India office market
 - 70% by IT Services companies (more than 7000 No.) in India
 - 15% by financial service providers & pharmaceutical sector
 - 15% by other sectors
 - Office stock must increase nearly 20 million sf/year in New Delhi, Mumbai, Bangalore to keep pace with growing demand
 - Conservative estimate (for India): Approx. 55 million sf/year
- SHOPPING CENTRES/MALLS
 - By the end of 2008, space of 79 million sf in 257 centers are estimated in 15 largest cities of India



Energy IN-efficiency is rampant

- Most commercial buildings have energy performance index (EPI) of 200 to 400 kWh/sq m/year
- Similar buildings in North America and Europe have EPI of less than 150 kWh/sq m/year
- Energy-conscious building design has been shown to reduce EPI to 100 to 150 kWh/sq m/year in India – development of such buildings is restricted to environmentally-sensitive corporates
- Large scale energy-efficient building design is limited due to split incentives - builders fear that they would bear the costs, while tenants would enjoy benefits



Energy Conservation Building Codes

- ECBC set minimum energy efficiency standards for design and construction
- ECBC encourage energy efficient design or retrofit of buildings so that
 - It does not constrain the building function, comfort, health, or the productivity of the occupants
 - Lifecycle costs (construction + energy costs) are minimized



Energy Conservation Building Code

- ECBC covering the following components prepared:
 - Building Envelope (Walls, Roofs, Windows)
 - Lighting (Indoor and Outdoor)
 - Heating Ventilation and Air Conditioning (HVAC) System
 - Solar Hot Water Heating
 - Electrical Systems
- ECBC finalized after extensive consultation
- Voluntary introduction of ECBC in May 2007; mandatory after capacity building and implementation experience
- Impact of ECBC - Reduced Energy Use for buildings
 - National Benchmark $\sim 180 \text{ kWh/m}^2/\text{year}$
 - ECBC Compliant building $\sim 110 \text{ kWh/m}^2/\text{year}$

National Energy Conservation Awards



- **Motivated industry and other establishment to adopt energy efficiency measures**
- **Scheme has become very popular among industries and buildings, as is evident from increasing participation level (1010 nominations in 2014 in comparison to 123 nominations in 1999)**

Painting Competition on Energy Conservation for Elementary School Students

- The scheme aims at sensitizing the children towards issues of energy conservation
- Ministry of Power and Bureau of Energy Efficiency have been organizing painting competitions on energy conservation for since 2005 for students of the 4th to 9th standards at School, State and National levels
- The scheme aims at sensitizing the children towards issues of energy conservation.
- The scheme is being executed in all the 29 States and 7 UTs of India
- In the year 2015, more than 100,00,000 students participated in comparison to about 343,000 students in 2005.



Impact of Energy Efficiency Initiatives

- Standards and Labelling of equipment and appliances programme has created a market transformation
- Energy saving targets have been fixed for 8 sectors of energy intensive industry- 6.686 million ton of oil equivalent by 2014-15, which are presently under verification
- The PAT scheme is a unique and innovative initiative, perhaps with no precedence anywhere else in the world.
- PAT would become a valuable model for other countries to adopt for their own energy efficiency programmes with a business perspective.

12th Plan(2012-17): Projected Energy Savings

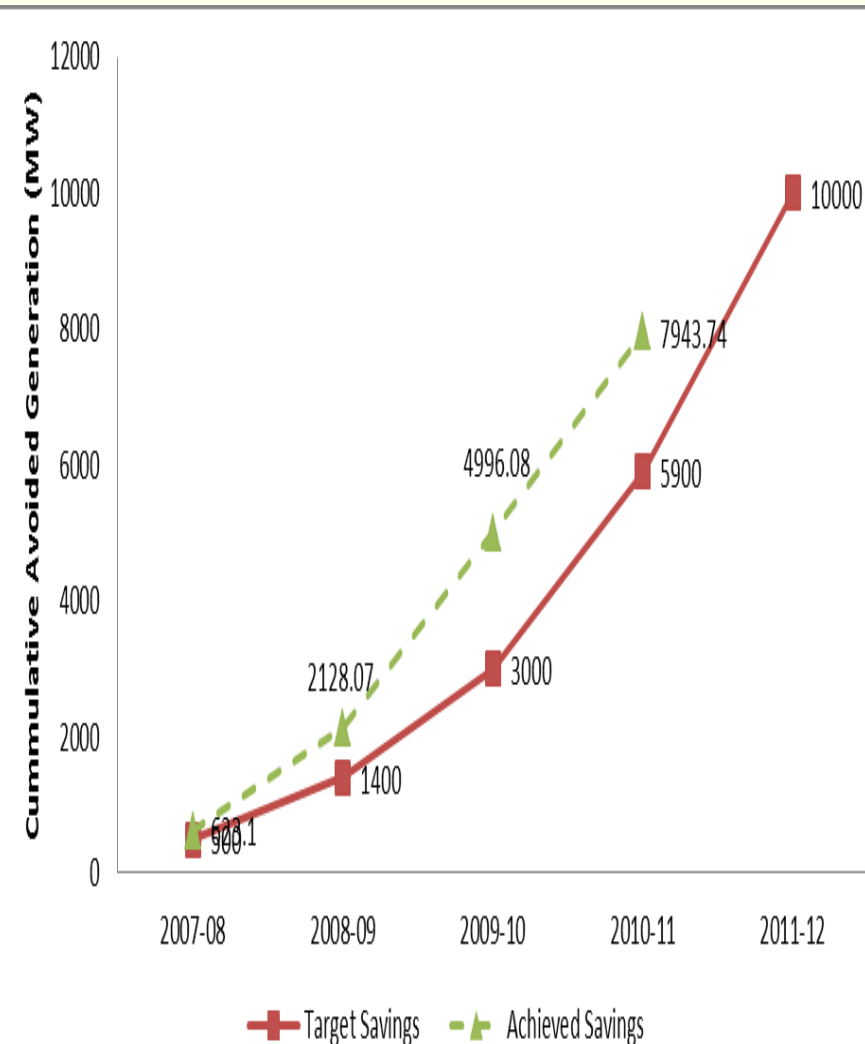
- The strategies adopted during the 11th Five Year Plan (2007-12) have showed encouraging outcomes.
- 12th Plan (2012-17) will carry forward the existing schemes as well as further strengthen the EE initiatives to accelerate the process of implementation of energy efficiency measures to achieve the desired energy savings.
- Projected Savings in Billion kWh (BU):
 - 44.85 BU (consumer end)
 - 60.17 BU (at generating side)
 - Additional thermal energy saving equivalent to 21.30 million ton of oil equivalent energy is expected to be achieved by 2016-17



Schemes Initiated by BEE.....

In order to enhance the efforts to promote energy efficiency during the XI plan period and to achieve the target of reducing consumption by 5% (equivalent to 10,000 MW of avoided capacity) by 2012, BEE has initiated several programmes /schemes as follows:

- ***Strengthening of State Designated Agencies***
- ***Standards & Labeling Scheme***
- ***Energy Conservation Building Code***
- ***Bachat Lamp Yojana***
- ***Agricultural DSM***
- ***Municipal DSM***
- ***EE in Small and Medium Enterprises***
- ***Perform Achieve and Trade under NMEEE***





Steps for Institutionalization of Energy Efficiency

- 1) Law
Aim, Rights, Tasks
- 2) Set up of Institution
Office space/building, CEO, budget
- 3) Work of Institution
Specific tasks planned, worked, executed
Monitoring & Verification
Reporting to public, parliament, ministry

Detailed regulation, schemes, enforcement

**Resources and continuously political commitment
necessary to achieve Energy Efficiency**



Thank You

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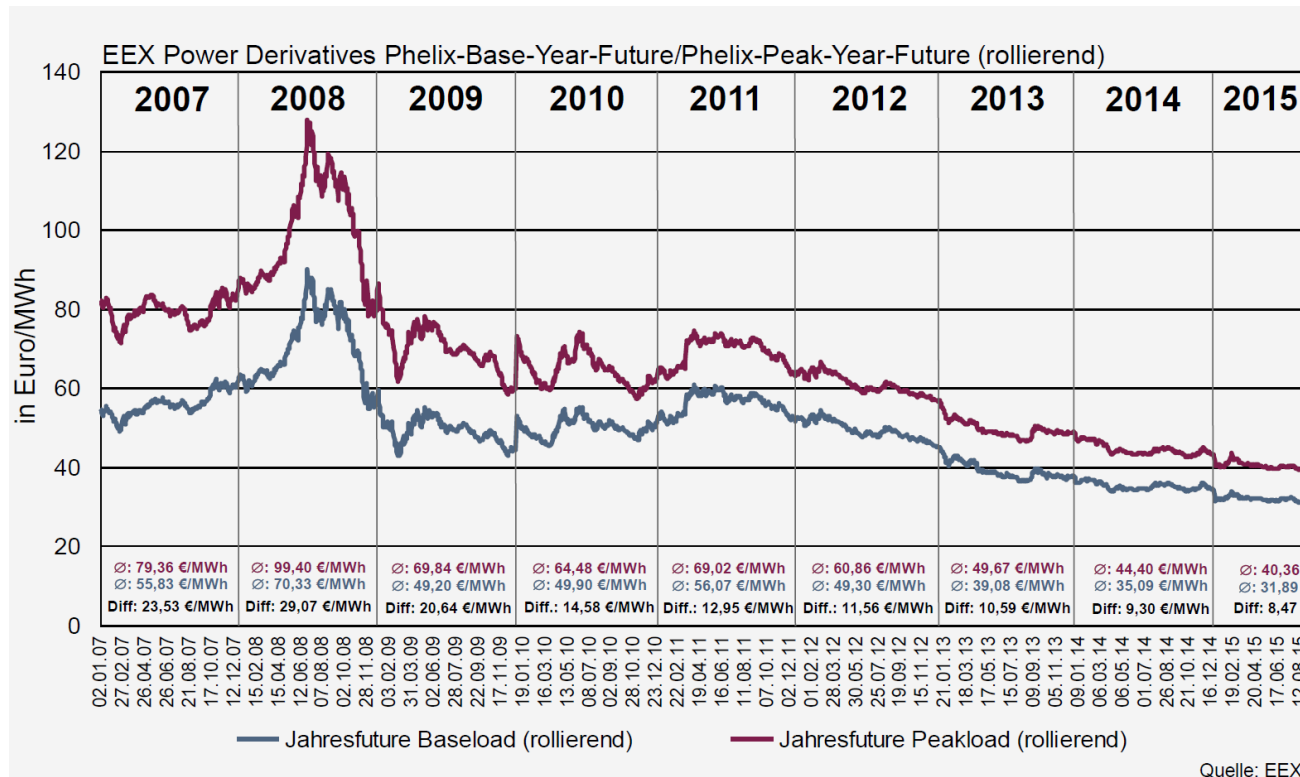
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Preisentwicklung an der Strombörse

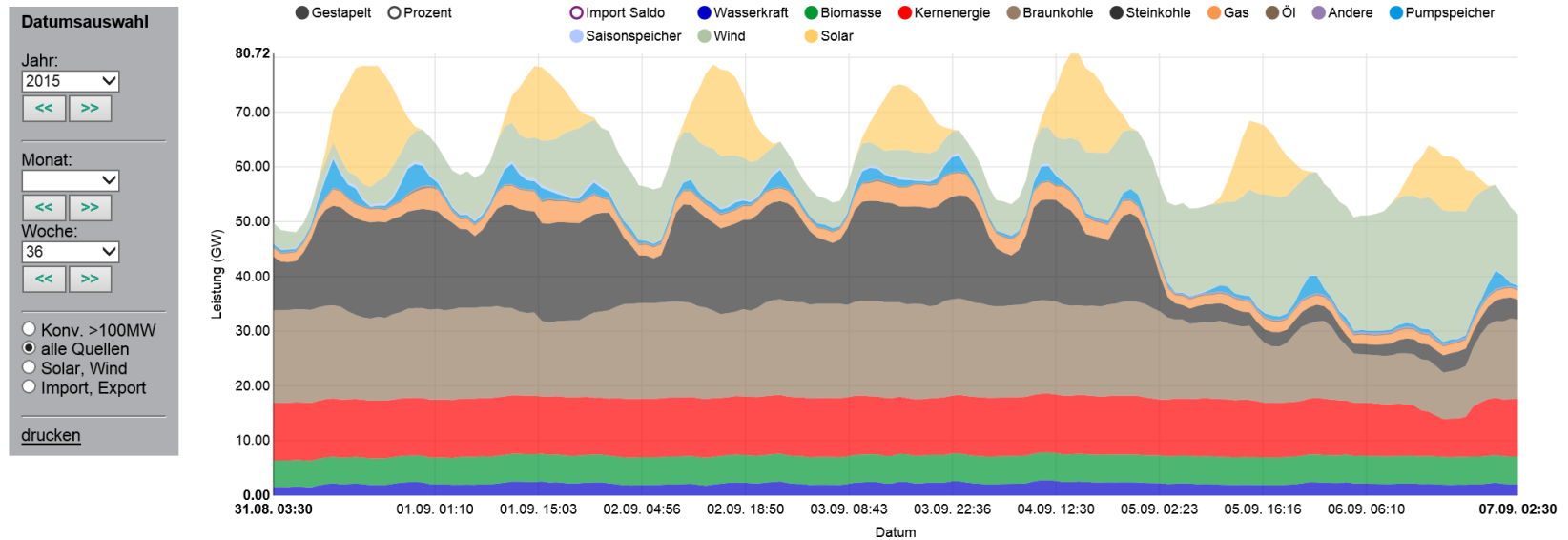
Terminmarkt Jahresfuture (01.01.2007 – 26.08.2015)





Stromproduktion in Deutschland in Woche 36 2015

i Hinweise

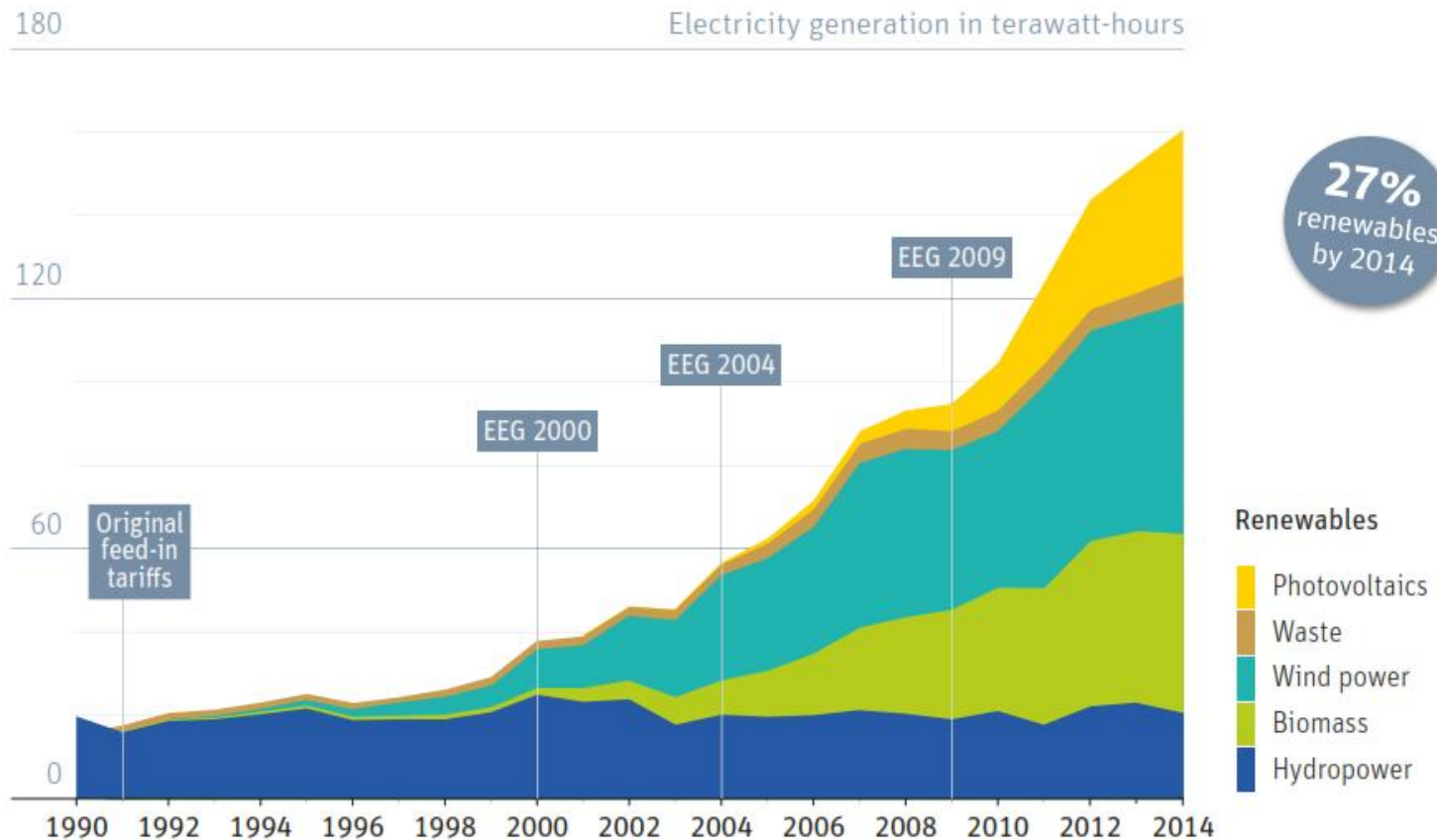


letztes Update: 11 Sep 2015 07:47

Source: Fraunhofer ISE, www.energy-charts.de



Feed-in Tariff Mechanism supported growth of Renewable Energy

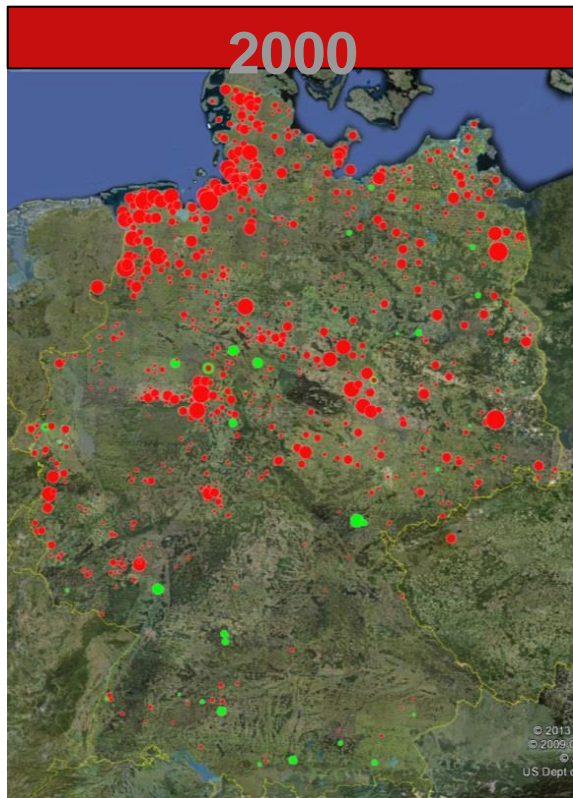


Source: Energy Transition, The German Energiewende

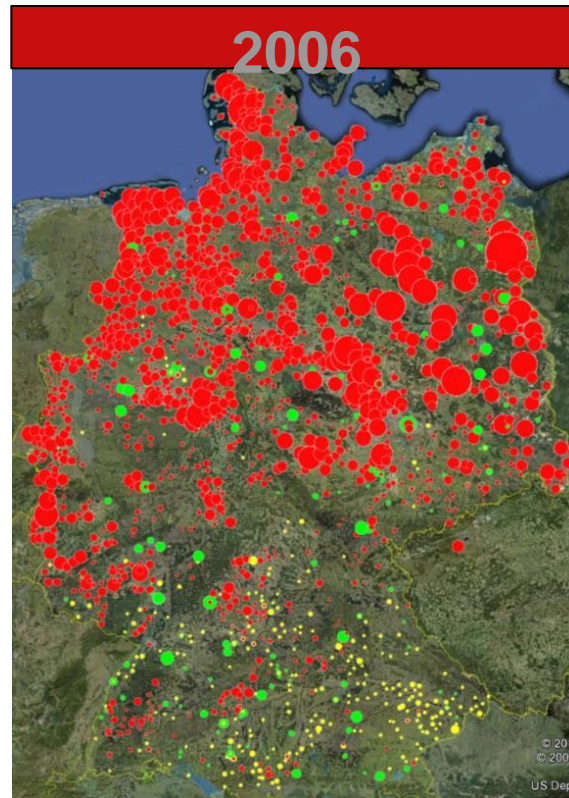
Renewable Energy generation shares 27.8% in total electricity mix



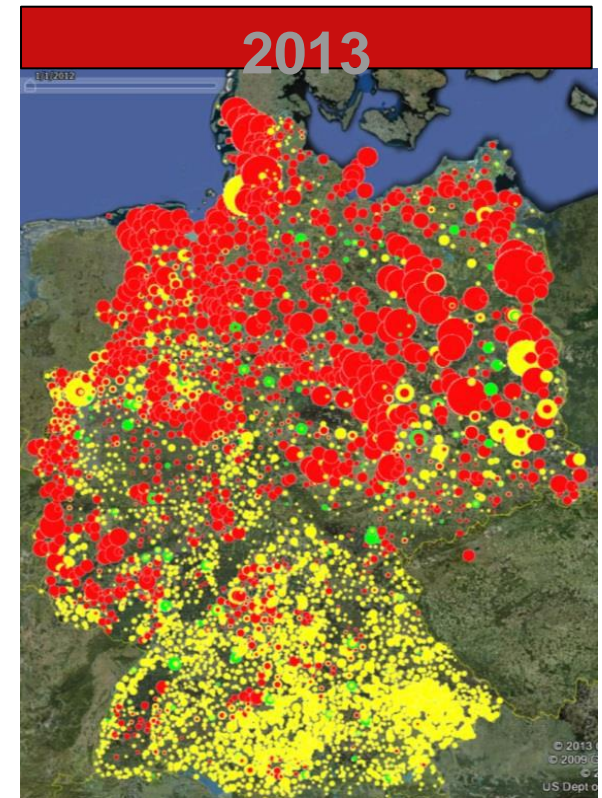
Expansion of Renewable Sources of Energy in Germany



20,000



>3,00,000



>15,00,000

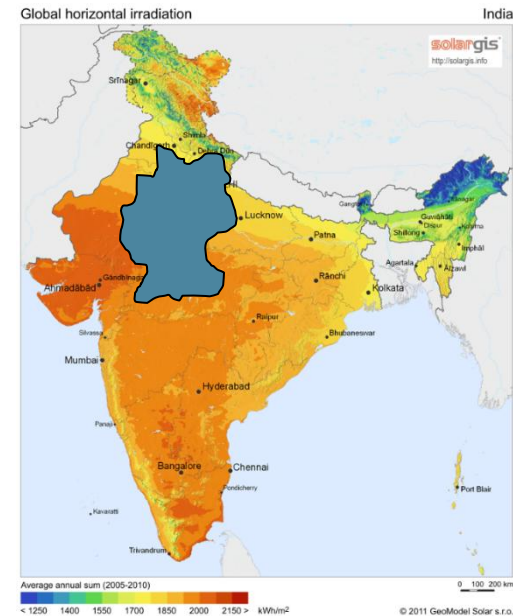
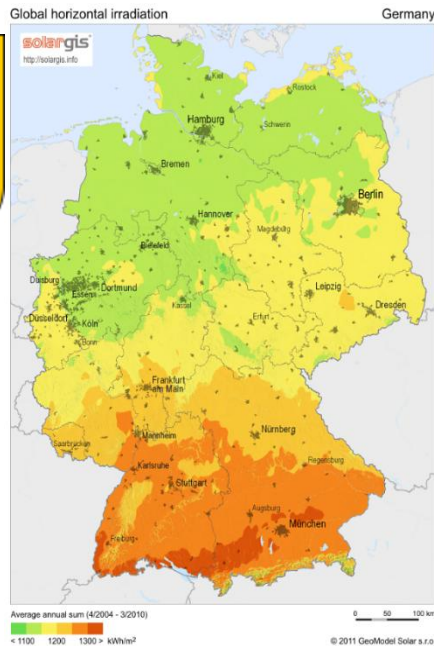
- wind
- photovoltaics
- biomass

Rapidly Increasing RE Penetration

Source: 50Hertz, TenneT, Amprion, TransnetBW, Google Earth



Germany and India : key facts



सत्यमेव जयते

Solar Radiation 900-1300 kWh/m²
Population 80.3 Million
Geography 357,021 km²

1250-2150 kWh/m²
1200 Million
3,287,263 km²