Energy efficiency as a strategic tool to meet energy, climate and economic challenges in the Baltic Sea Region

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Facts and trends in global energy and climate scenary

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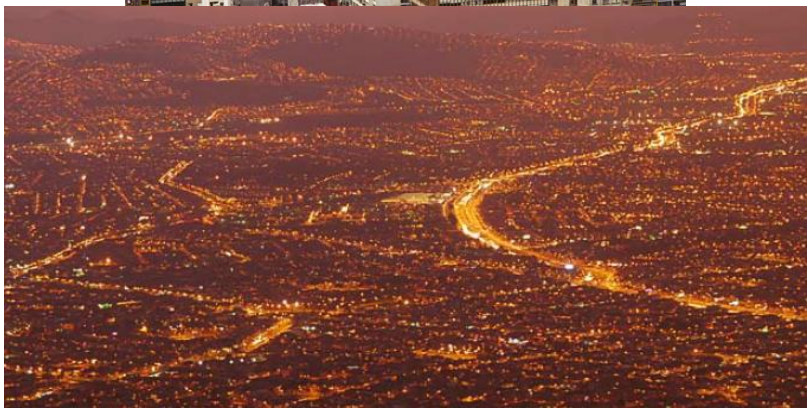
- Fossil fuels >80% of energy, Oil >95% of transport fuels
- Coal and Oil stands for 80% of all CO_2 emissions
- CO_2 down 60% by 2050, >80% in industry countries
- 50% of world population lives in cities (70% by 2040)
- 65% of energy is consumed in cities (80% by 2040)



UNEP 2010

European energy and climate policy roadmap toward 2050

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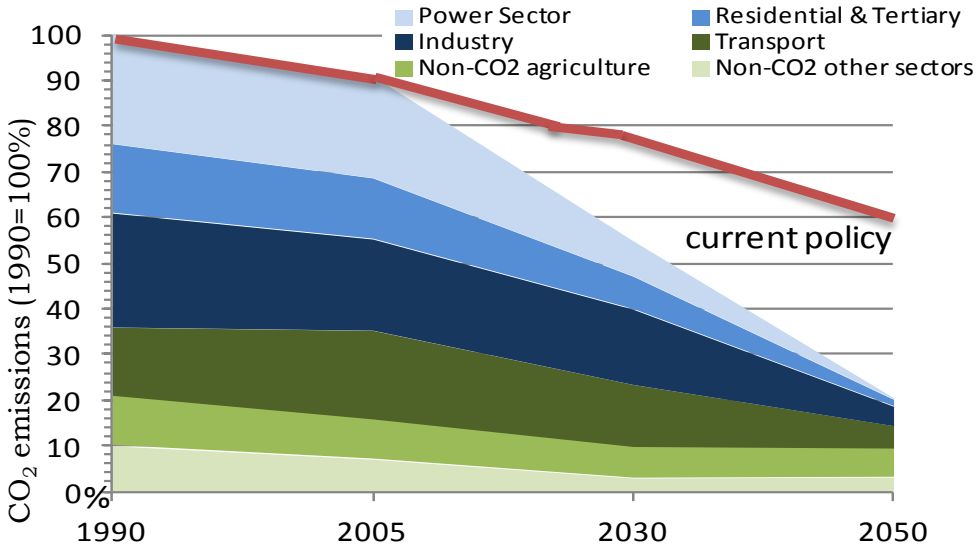


- By 2020:
  - ”20-20-20 directives” in energy efficiency, renewables and emissions
- Roadmap 2050 (Dec 2011)

Table 1: Sectoral reductions

GHG reductions compared to 1990	2005	2030	2050
Total	-7%	-40 to -44%	-79 to -82%
Sectors			
Power (CO_2)	-7%	-54 to -68%	-93 to -99%
Industry (CO_2)	-20%	-34 to -40%	-83 to -87%
Transport (incl. CO2 aviation, excl. maritime)	+30%	+20 to -9%	-54 to -67%
Residential and services (CO_2)	-12%	-37 to -53%	-88 to-91%
Agriculture (non-CO_2)	-20%	-36 to -37%	-42 to -49%
Other non-CO_2 emissions	-30%	-72 to -73%	-70 to -78%

Example of costs with 2 tCO_2/capita (EU) emission targets

	Carbon emissions		CO_2 reductions by 2050	
	CO_2 (kg/cap)	$MtCO_2$	max 2tCO_2/cap	cost (€billion/yr)
EU-27	9327	4568	79 %	143.6
DK	10916	59	82 %	1.9
EE	14073	19	86 %	0.7
DE	11188	922	82 %	30.3
PL	8565	327	77 %	10.0
LV	3584	8.3	44 %	0.1
LT	4046	14	51 %	0.3
FI	13733	72	85 %	2.5
SE	7055	63	72 %	1.8
NO	9552	44	79 %	1.4
IS	9281	2.7	78 %	0.1
RUS	11880	1696	83 %	56.4

Less is More – focus on energy efficiency

- Efficiency may stand for 50% of the emission reductions
- Energy efficiency has often negative costs

FIGURE 3: GLOBAL COST CURVE OF GREENHOUSE GAS ABATEMENT OPPORTUNITIES COMPARED TO BUSINESS AS USUAL IN 2030

Source: The initial data collection for the cost curve was conducted by Vattenfall together with McKinsey and Company. Conclusions based on the work are the responsibility of Vattenfall.

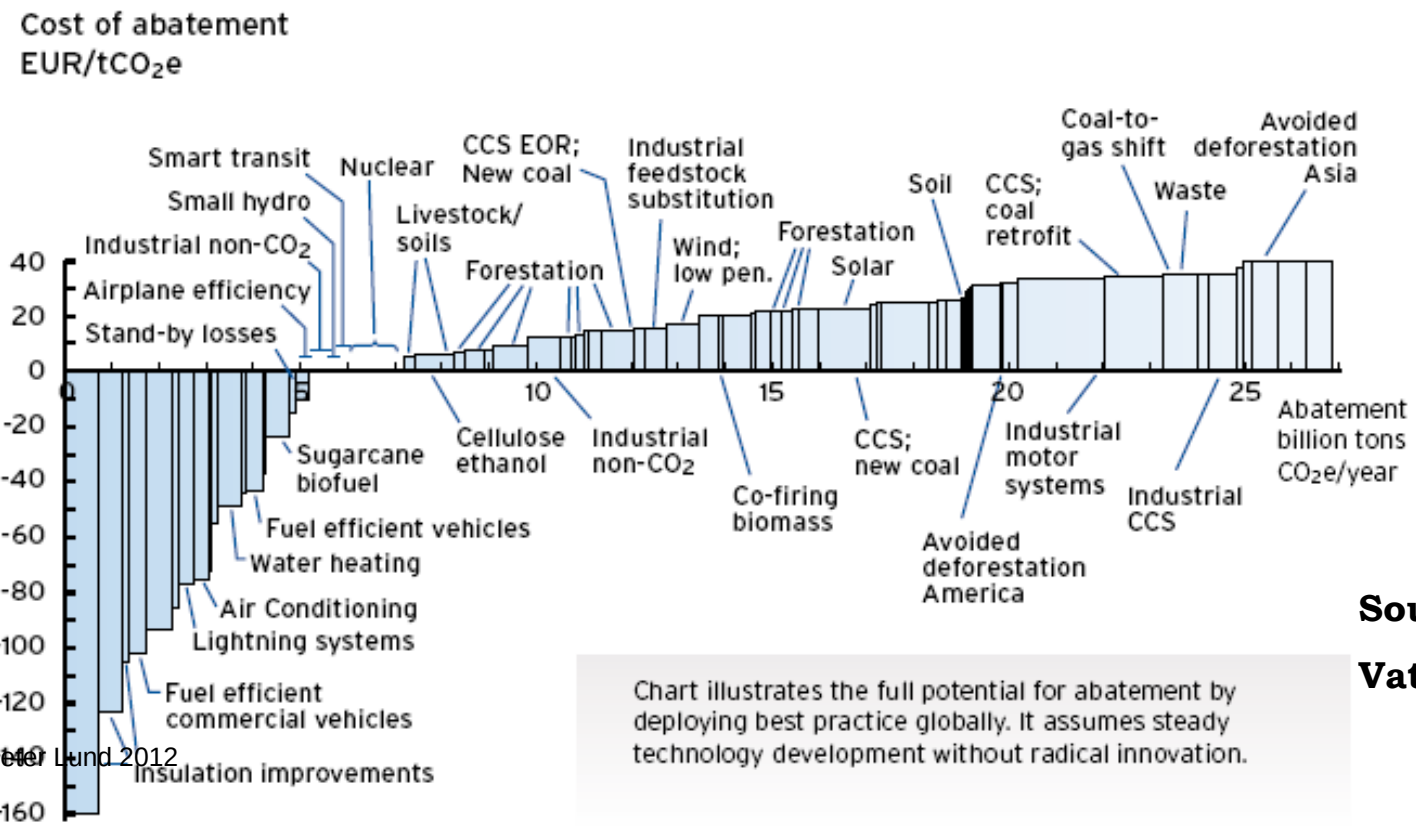
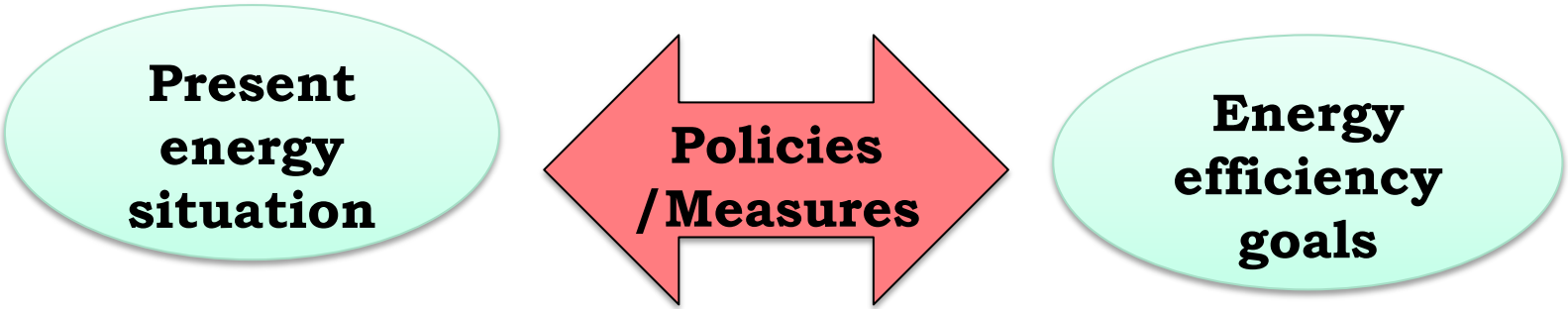


Chart illustrates the full potential for abatement by deploying best practice globally. It assumes steady technology development without radical innovation.

Source:

Vattenfall, McKinsey

How to capitalize on the energy efficiency opportunities?

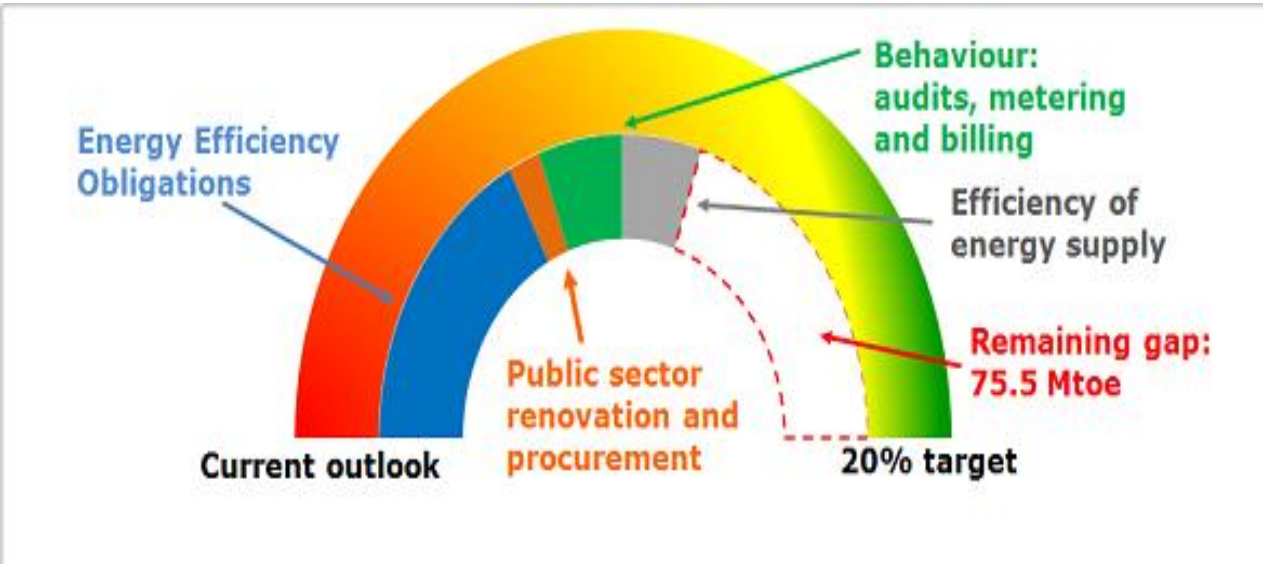


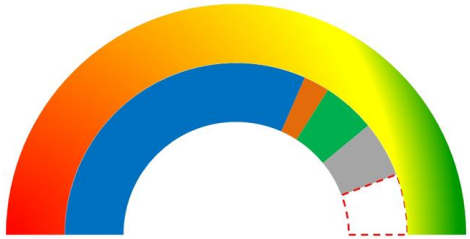
European Energy Review (March 2012):

1 Establish binding targets, they're more flexible than binding measures
2. Make sure utilities become energy savers instead of energy sellers
3 Establish energy efficiency standards for products and equipment
4 Set binding targets for retrofits of existing buildings
5 Put financing mechanisms in place

How to reach the 20% energy efficiency target in EU?

- EU energy efficiency potential 20% by 2020 (390 Mtoe/yr)
- Commission proposal: remaining gap of 75.5 Mtoe
  - Energy Efficiency Obligations (Article 6 of the Directive)
  - Public sector obligations (Articles 4 and 5)
  - Measures prompting changes in Energy use behaviour (Articles 7 and 8)
  - Efficiency in energy supply (Articles 11 and 12)





Parliament

Council

Coalition

Seeing societal challenges as a whole (Green Economy)

Europe 2020 strategy: a social, smarter and greener economy

- Focus on innovation, knowledge society, and better resources use
- Combining energy, climate, innovations and industry competitiveness into one policy

"By moving towards a more sustainable economy, we will unleash a surge of innovation and investment in clean technologies and products. New sectors will provide 'green collar' jobs and become sources of sustainable growth for the future," said Barroso.

Doubling the use of renewable energy to 20 % by 2020 could generate €90bn of additional investment, and 700,000 new jobs.

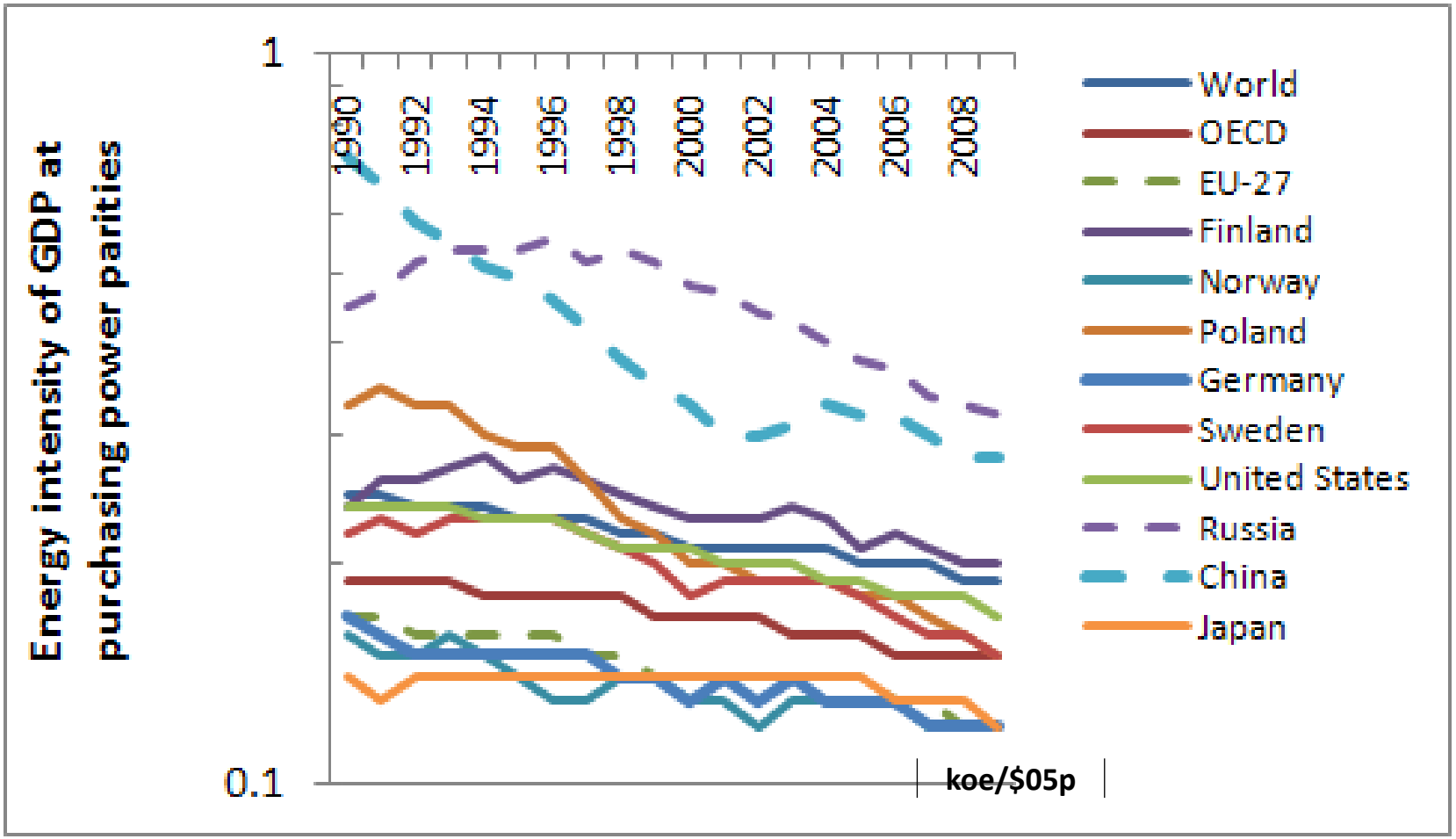
Source: European Commission, 2011

Energy in the Baltic Sea Region (BSR) context

- **BSR is a major energy user in Europe**
  - energy consumption 20% of EU energy, electricity 30%
  - imports 45% of its energy, high dependency on oil&gas (excl. Russia and Norway)
- **BSR is a major energy producer for Europe**
  - Russia and Norway supplies 45% of EU oil and 70% of EU natural gas
  - Russia and Poland supplies 25% of EU coal
- **Strong in renewable energy and cogeneration**
  - 40-45% of EU's renewable energy
  - RES share in energy >20% (2.5x EUavg), in electricity 23% (1.7x EUavg)

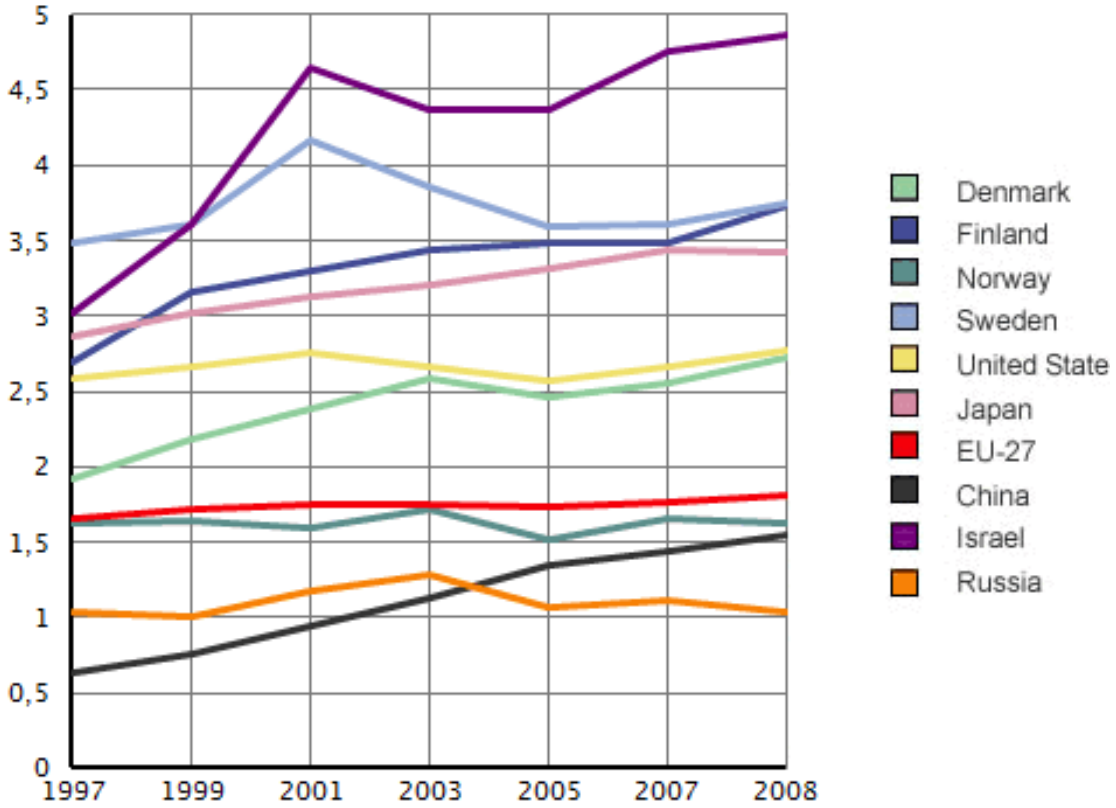
Energy efficiency trends in the BSR (energy intensity)

- Energy intensity (toe/M€) is on average higher in BSR than in EU-27



Innovation trends (R&D intensity)

- R&D is on average higher in the BSR than in EU-27



GDP share of R&D expenditure
in certain countries
Ref: OECD

How to measure energy efficiency?
- a macroeconomic view

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- Energy demand is considered as a whole

$$\text{Per capita energy use} = \frac{\text{Primary energy demand (toe)}}{\text{Capita (cap)}}$$

$$\textbf{Energy intensity} = \frac{\text{Country's primary energy demand (toe)}}{\text{GNP(\$)}}$$

How to measure energy efficiency? - a microeconomic view

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- Energy demand is split into major sectors
- Energy demand in each sector influenced by 3 factors: Economic **Activity, Structure, Intensity**

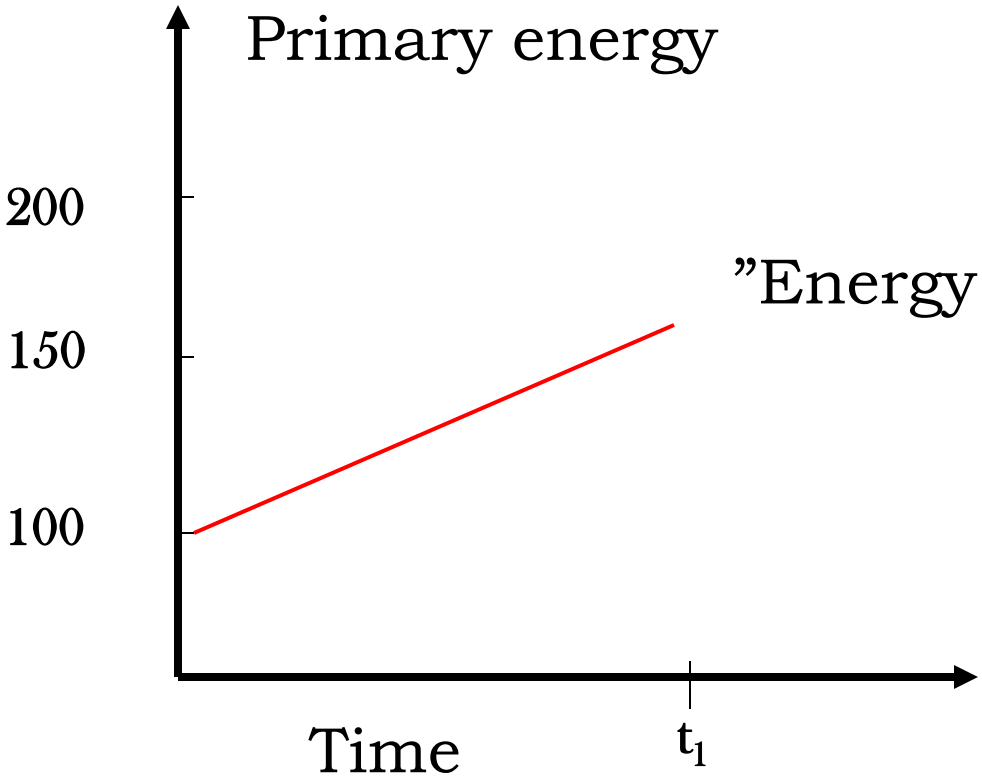
  - A: Economic activity; sector A_i ; A= sum of all subsectors
  - S: Structure of activities; one sector $S_i=A_i/A$; sum of all =100%
  - I: Energy intensity (=Energy/Activity); defined for each sector I_i

- Total energy use =

  ”Activity × Structure × Intensity”

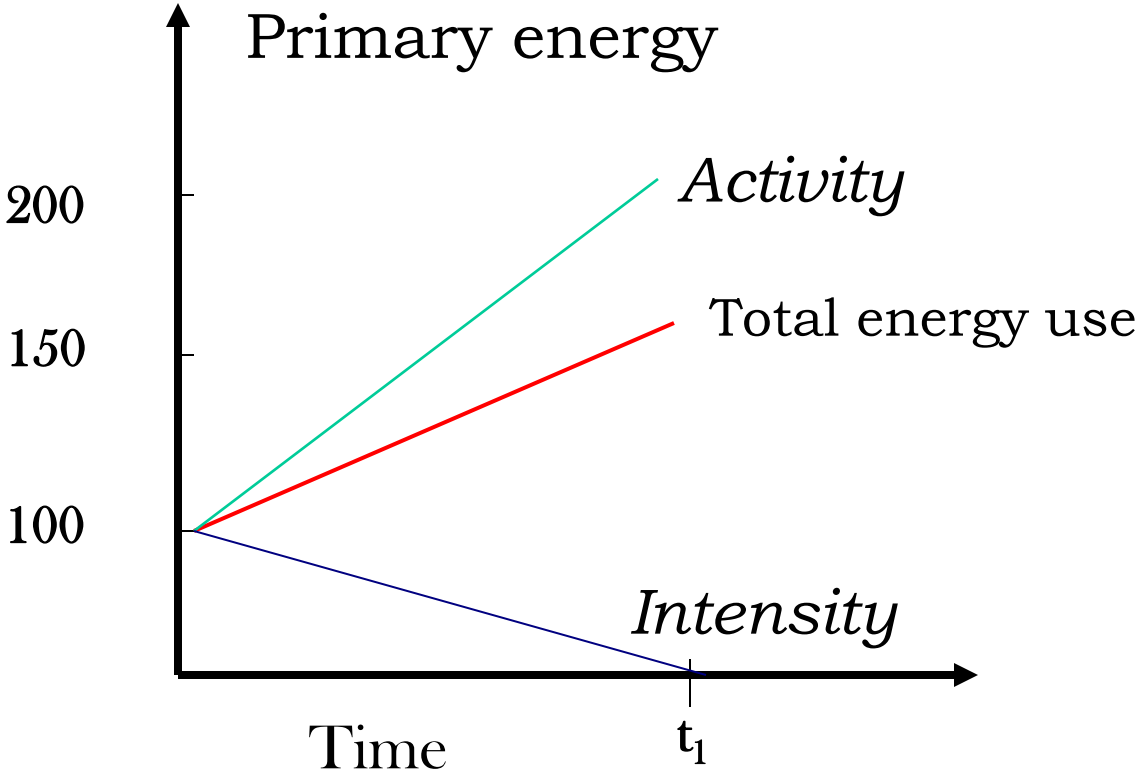
  - $E = A \times SUM \{ S_i \times I_i \}$; i=subsector

How to interpret increasing energy demand in terms of energy efficiency (demonstration of the microeconomic view)?



”Energy use grows by 50 %”

Total energy use grows 50%
Economic activity grows 100%
Energy intensity improves 50%



Lahti City – clean tech cluster

- Municipality owned utility
- 2.5 TWh/yr, $220 million
- 80% fossil fuels, 20% bioenergy
- Waste-to-energy schemes
- Strong clean tech cluster

Picture: Lahti City

Lahti Green City Plan

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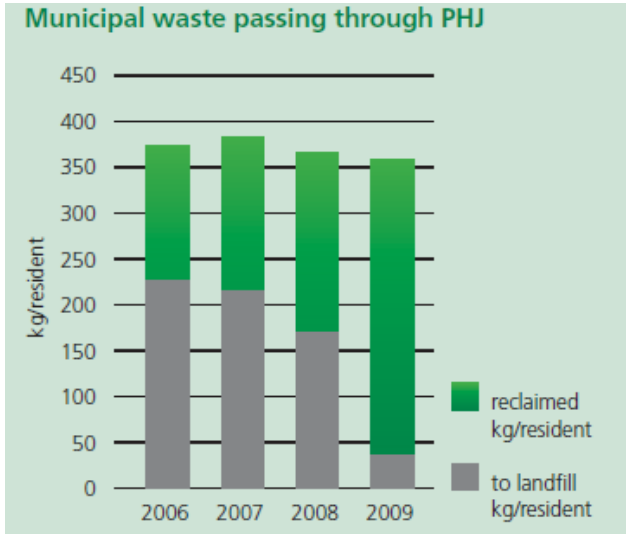
- **Goal: 15-25% less energy by 2015; by 2025 halving CO_2 emissions**
- **How: RES, eco-efficient urban structures; public transport**
- **Economy : supporting local energy and clean tech cluster; technology development and piloting**
- **Examples: Waste-to-energy services**
  - **96% of urban waste recycled**
  - **advanced gasification technology (CFB, multi-fuel160 MW, $240 mn)**
  - **90% of city connected to DH**
- **Clean tech jobs: national cluster coordination (+500 new jobs)**



Photos: Lahti City, Päijät-Hämeen JäteHuolto Ltd

Concluding remarks (Green Energy including Energy Efficiency as a Strategic Tool)

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