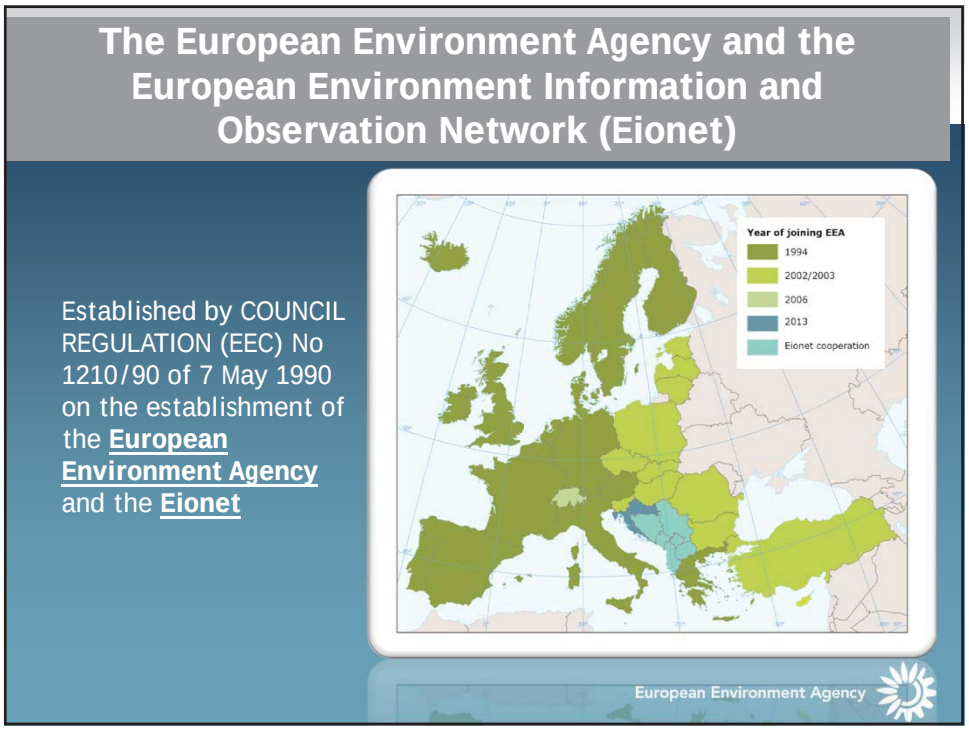
EEF.IO/2/13
4 February 2013

ENGLISH only



EEA's flagship 5-year State & Outlook report (SOER 2010): *"…there has been progress, but not enough"*

'Environmental policy has delivered substantial improvements […] however, major environmental challenges remain which will have significant consequences […] if left unaddressed. ' – SOER 2010

'What differs […] is an enhanced understanding of the links between environmental challenges combined with unprecedented global megatrends. This has allowed a deeper appreciation of the human-made systemic risks and […] insight into the shortcomings of governance.' – SOER 2010

Environment policy priority areas
- Climate change
- Nature and biodiversity
- Natural resources and waste
- Environment, health and quality of life

European Environment Agency

An (indicative) assessment progress towards improving resource efficiency

Environmental issue	EEA 38 - trend?	EU 27 target / objective - which?	EU 27 - on track?
Transboundary air pollution (NO_x, NMVOC, SO_2, NH_3)	↘	To limit emissions of acidifying, and eutrophying pollutants	☐
Greenhouse gas emissions	↘	To reduce greenhouse gas emissions by 20 % by 2020	☑
Air pollution	↘	To limit emissions of ozone precursor pollutants	☐
Maritime transport emissions	→	To reduce greenhouse gas emissions	☐
Water use	↘	N.A.	N.A.
Decoupling and recycling (decouple resource use from economic growth)	↗	To decouple resource use from economic growth; to move towards a recycling society	☐

European Environment Agency

An (indicative) assessment of progress towards ensuring ecological resilience

Environmental issue	EEA 38 - trend?	EU 27 target / objective - which?	EU 27 - on track?
Conservation status (safeguard EU's most important habitats and species)	→	To achieve favourable conservation status, set up Natura 2000 network	☐
Global mean temperature change	↗	To limit increases to below 2°C globally	☒
Air quality in urban areas (particulate matter and ozone)	→	To attain levels of air quality that do not give rise to negative health impacts	☒
Biodiversity loss (marine species and habitats)	↘	To reverse negative species abundance trends	☒
Water stress (water exploitation)	→	To achieve good quantitative status of water bodies	☐
Ecological footprint (footprint versus biocapacity)	→	N.A.	N.A.

European Environment Agency

Environmental indicators offer a basis against which to develop environmental and green economy policy

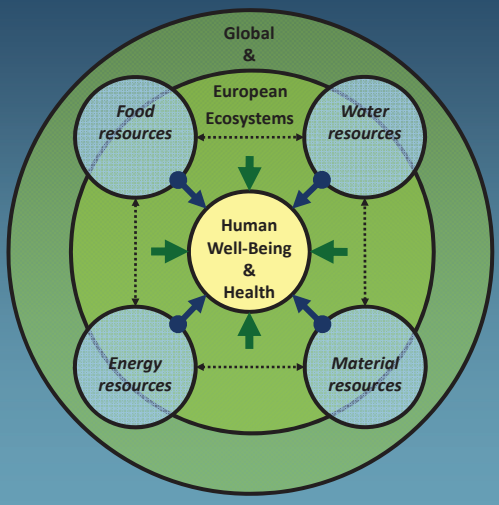
- **By and large, European environmental policies appear to have had a clearer impact on improving resource efficiency than on maintaining ecosystem resilience.**

- Environmental indicators highlight that improving resource efficiency remains necessary, but in itself may not be sufficient to ensure a sustainable natural environment.

- In a green economy policy context, there would be value in considering objectives and targets that more explicitly recognise the links between resource efficiency, ecosystem resilience and human well-being

European Environment Agency

Natural capital underpins our economies & wellbeing



Capitals

- Natural capital (i.e. air, water, land, seas, biodiversity)
- Produced capital (i.e. along resources life-cycle)
- Social and human capital

Services

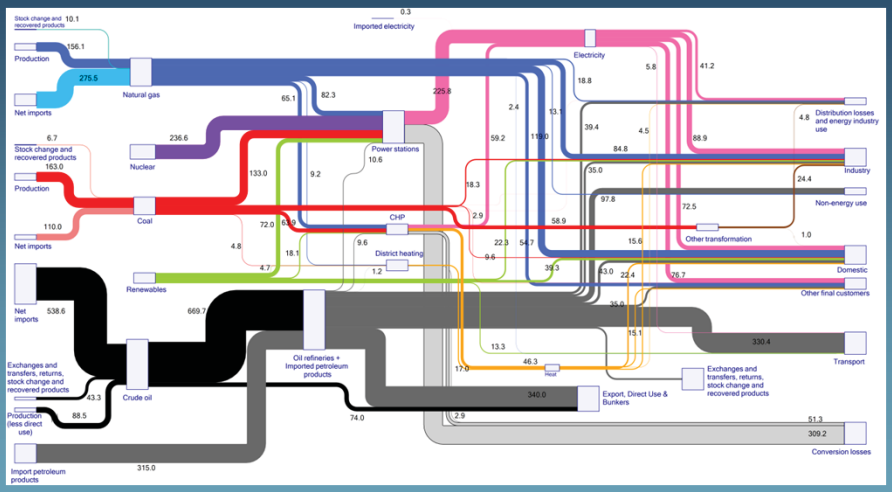
- Resource needs for consumption *(e.g. provisioning services)*
- Access and exposure to environment *(e.g. regulating and cultural services)*
- Links between resource uses *(e.g. water needed for food production)*

European Environment Agency

How sustainable is our energy system?

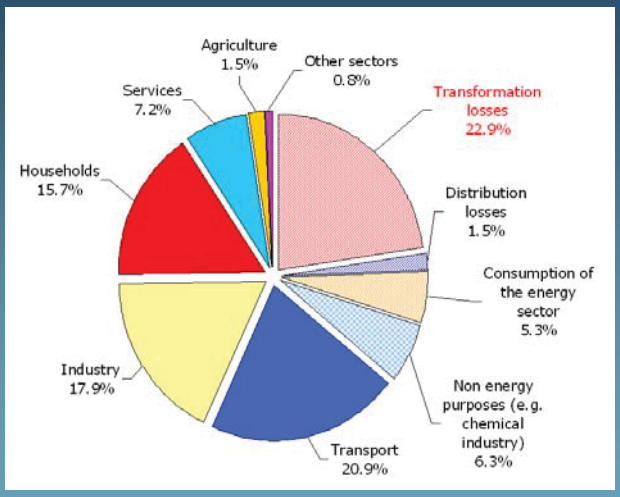
European Environment Agency

Sankey diagram: summaries the overall picture of the energy system in the EU (Mtoe)



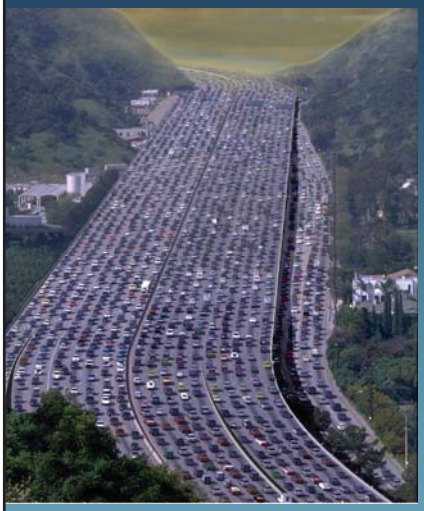
European Environment Agency

Final consumption by sector and energy losses (% of primary energy consumption)

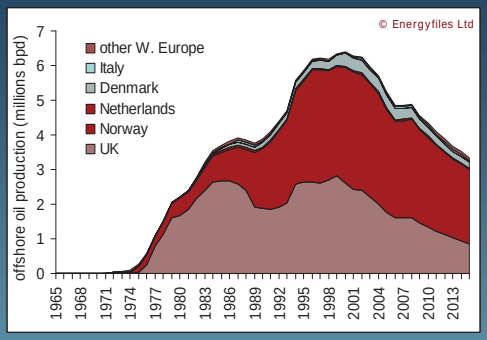


European Environment Agency

Oil is the real problem – it is the fuel of transportation



picture courtesy Transfuture.net



European offshore oil production forecast

- **Oil accounts for 32% of global energy consumption**
- **Demand is growing**
- **Non-Opec production is declining**
- **Major politically-induced constraints**

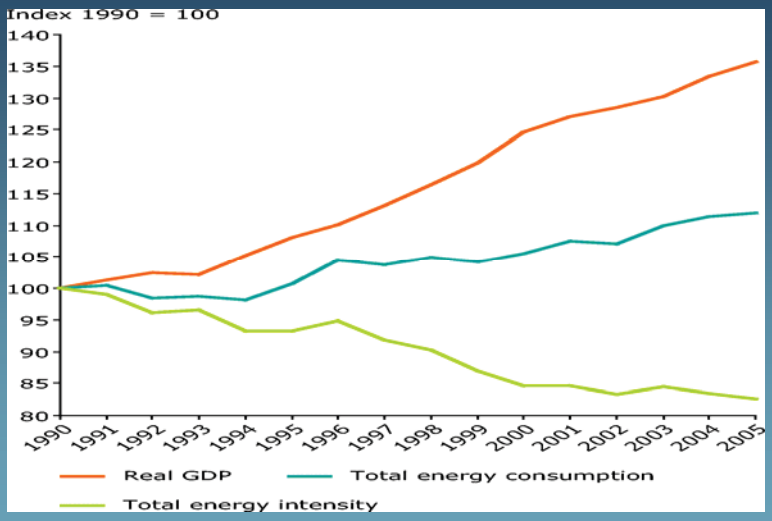
European Environment Agency

Transport: 19% of EU-GHG emissions

- Road transport was the largest emitter of nitrogen oxides and the second largest contributor of pollutants forming particulate matter
- Road traffic remains by far the largest source of exposure to transport noise.
- Freight transport growing slightly faster than the economy, with road and air freight largest increases
- Share of rail and inland waterways has declined
- Passenger transport continues to grow but at a slower rate than the economy
- Air travel within the EU remained the fastest growth area
- Car journeys remained the dominant mode of transport, accounting for 72 % of all passenger kilometres in the EU
- Germany and Sweden are on track to meet their 2010 indicative targets for biofuels use

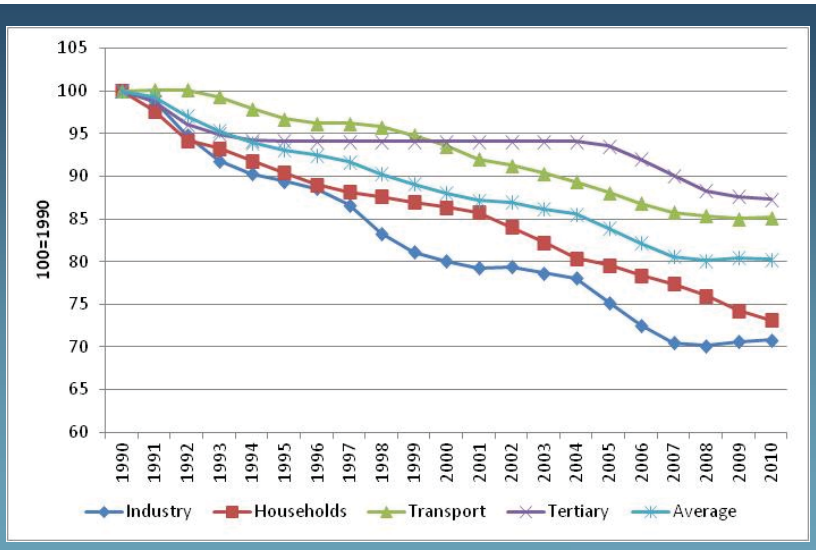
European Environment Agency

Trends in total energy intensity, gross domestic product and total energy consumption, EU-27



European Environment Agency

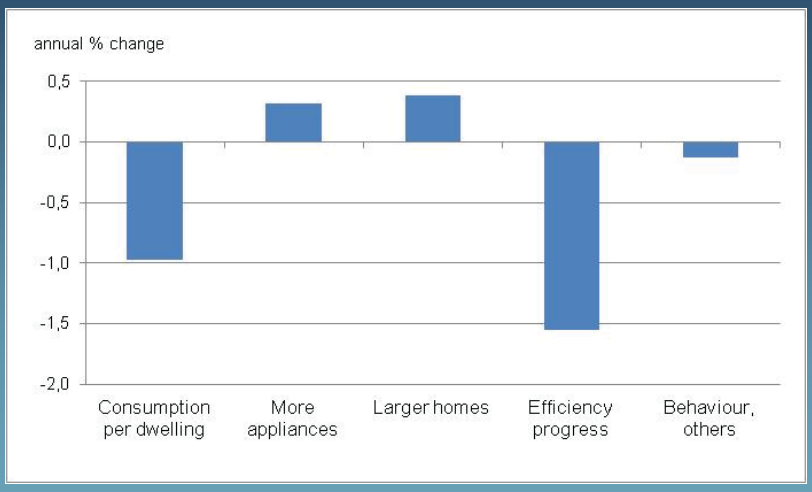
Energy efficiency index (EU-27)



Data source: Odyssee

European Environment Agency

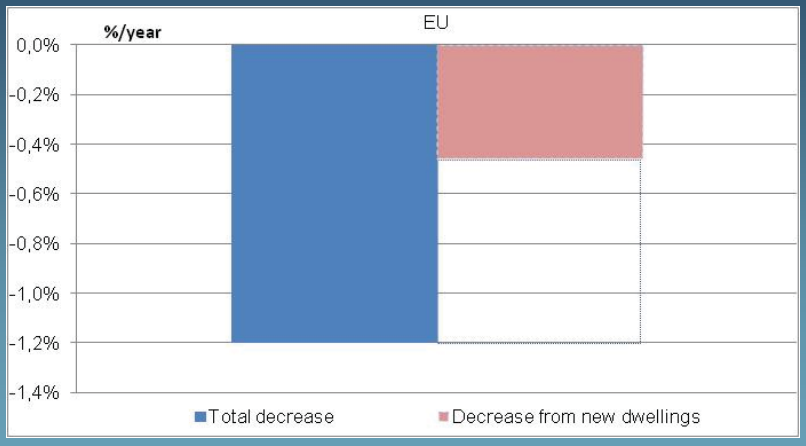
Drivers of the change in average annual energy consumption per household (EU-27, 1990 and 2010)



Data source: Odyssee

European Environment Agency

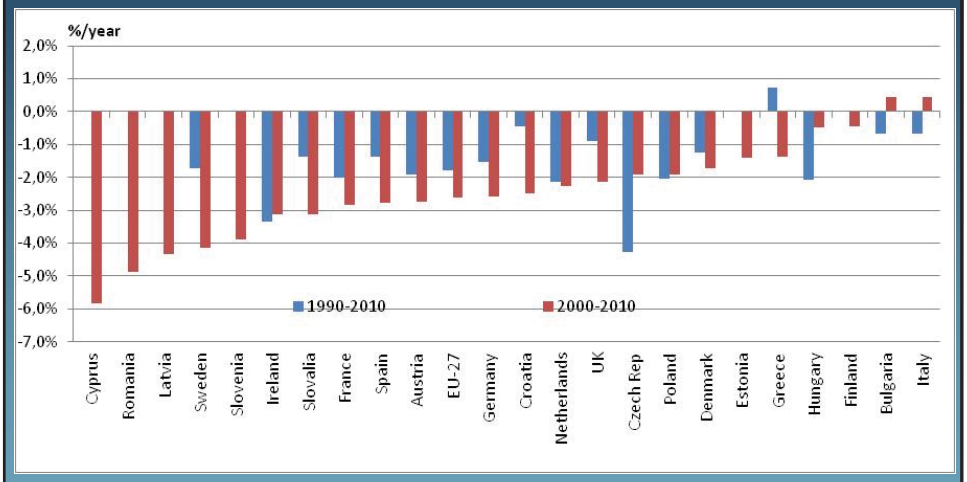
Energy efficiency gain from building standards of new buildings in the EU-27



Data source: Odyssee

European Environment Agency

Trends in household energy consumption for space heating per m2 (climate corrected)



Data source: Odyssee

European Environment Agency

Why should we care?

The real costs of pollution

European Environment Agency

Revealing the costs of air pollution from industrial facilities in Europe

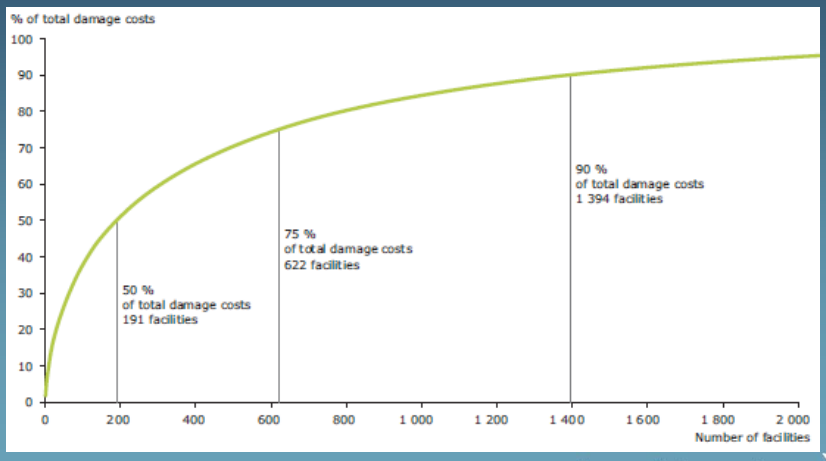
EEA Technical report No 15/2011

- Assessment of the damage costs to health and the environment resulting from pollutants emitted from industrial facilities.
- Based on the latest information (2009) publicly available through the European Pollutant Release and Transfer Register
- Certain types of impact are not quantified: ecosystem damage from acidic and nitrogen deposition and exposure to ozone, and acid damage to cultural heritage such as cathedrals and other fine buildings.

European Environment Agency

Revealing the costs of air pollution from industrial facilities in Europe

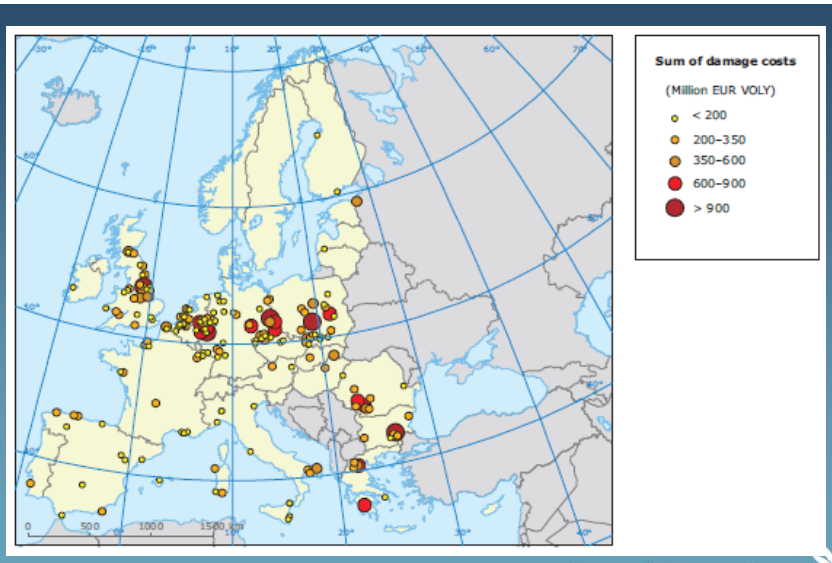
Cumulative distribution of damage costs for the 2 000 E-PRTR facilities (including CO2)



Source: EEA (2011)

European Environment Agency

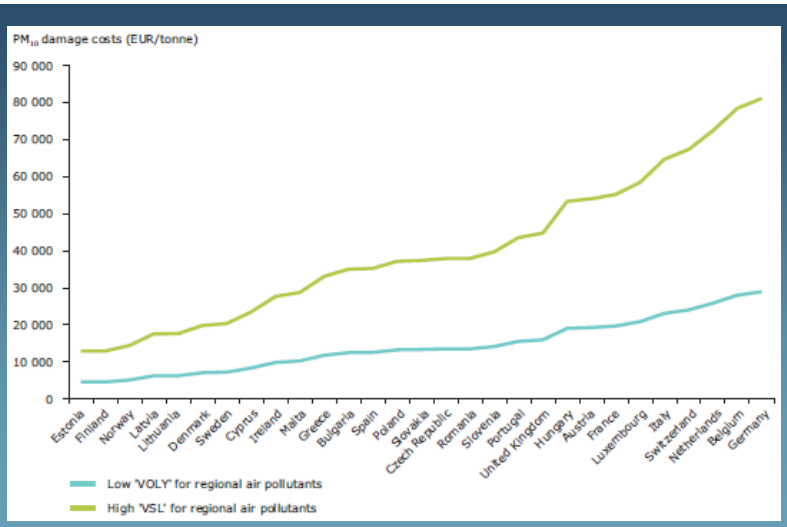
The 191 E-PRTR facilities that contributed 50 % of the total damage costs estimated for 2009



Source: EEA (2011)

European Environment Agency

Variation across Europe in national average damage cost per tonne PM10 emission



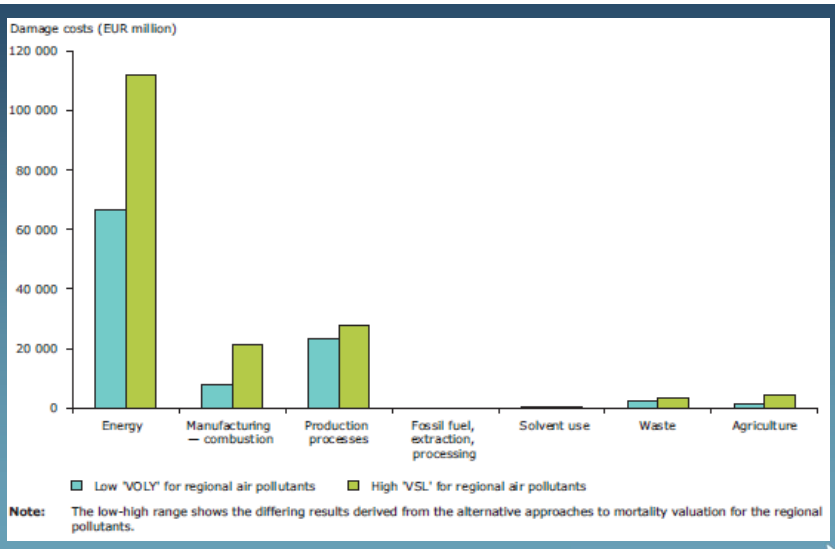
Two alternative approaches for valuing mortality:

- VOLY - value of a life year
- VSL - the value of statistical life

Source: EEA (2011)

European Environment Agency

Damage costs aggregated by sector including CO2



Source: EEA (2011)

European Environment Agency

Estimated damage costs of air pollutants

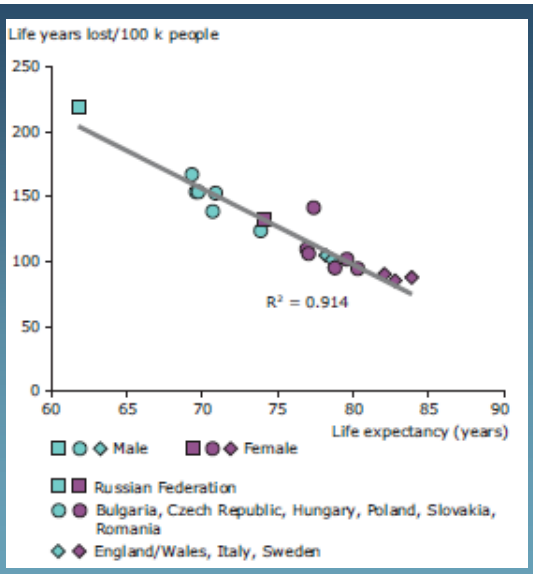
The overall cost in 2009 of damage caused by emissions from E-PRTR industrial facilities is estimated as being at least EUR 102–169 billion.

Pollutant group	Aggregated damage cost (billion EUR)
CO_2	63
Regional air pollutants (NH_3, NO_x, PM_{10}, SO_2, NMVOCs)	38–105
Heavy metals (As, Cd, Cr, Hg, Ni, Pb)	0.35
Organic micro-pollutants (benzene, dioxins and furans, PAHs)	0.13

Source: EEA (2011)

European Environment Agency

Relationship between life expectancy and life years lost
(per 100 000 people from a one-year change in exposure to PM2.5 of 1 µg.m^{-3})



Source: EEA (2011)

- The sensitivity of national populations to a unit change in exposure to fine particulate matter.
- Significantly greater benefits can accrue to the populations in Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia and the Russian Federation, for a unit change of exposure than other countries (perhaps due to differences in life expectancy).
- Results were particularly significant for the Russian Federation, reflecting especially the limited life expectancy of Russian men (top left data point).

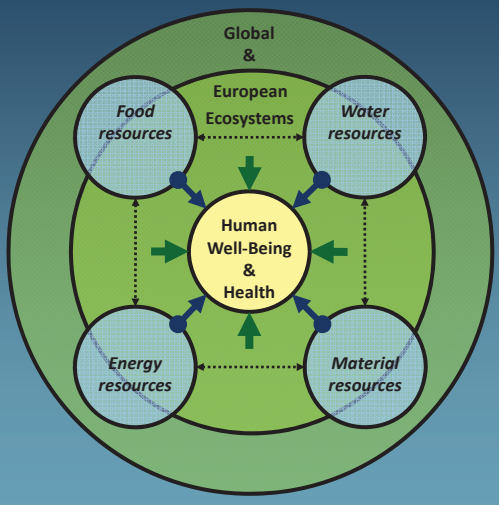
European Environment Agency

Environmental challenges and opportunities of energy resource use

1. The direct role of energy resources in underpinning well-being
2. The more indirect effects on well-being as use of energy resources results in environmental impacts (e.g. air pollution & climate change)
3. The trade-offs in the nexus between the use of water, energy, food and material resources (e.g. water for food vs water for energy; or embedded energy use in all consumption activities …).

European Environment Agency

Where natural capital is limited, trade-offs between ecosystem services, resource uses and well-being can occur



Capitals

- Natural capital (i.e. air, water, land, seas, biodiversity)
- Produced capital (i.e. along resources life-cycle)
- Social and human capital

Services

- Resource needs for consumption *(e.g. provisioning services)*
- Access and exposure to environment *(e.g. regulating and cultural services)*
- Links between resource uses *(e.g. water needed for food production)*

European Environment Agency

Shifting to biofuels will affect water use and soil productivity

To guarantee food security and meet the increasing demand for biomass to achieve the EU bioenergy targets, intensely farmed systems will need ecological infrastructure to enhance the landscape complexity combined with agricultural practices such as long and diverse rotations, more heterogeneous regional distribution of crops and better adjustment to the natural soil fertility

European Environment Agency

What to do about it?

Eco-Innovation, green technology & urban living

European Environment Agency

EU's commitment to a low carbon economy

The "20-20-20" targets - by 2020:

- Reduce EU greenhouse gas emissions by 20% from 1990 levels
- Make a 20% improvement in the EU's energy efficiency.
- Raise the share of EU energy consumption produced from renewable resources to 20%

European Environment Agency

EU's commitment to a low carbon economy

The "20-20-20" targets - by 2020:

- Reduce EU greenhouse gas emissions by 20% from 1990 levels
- Make a 20% improvement in the EU's energy efficiency.
- Raise the share of EU energy consumption produced from renewable resources to 20%

➔ **And an 80% to 95% reduction of GHG emissions by 2050**

European Environment Agency

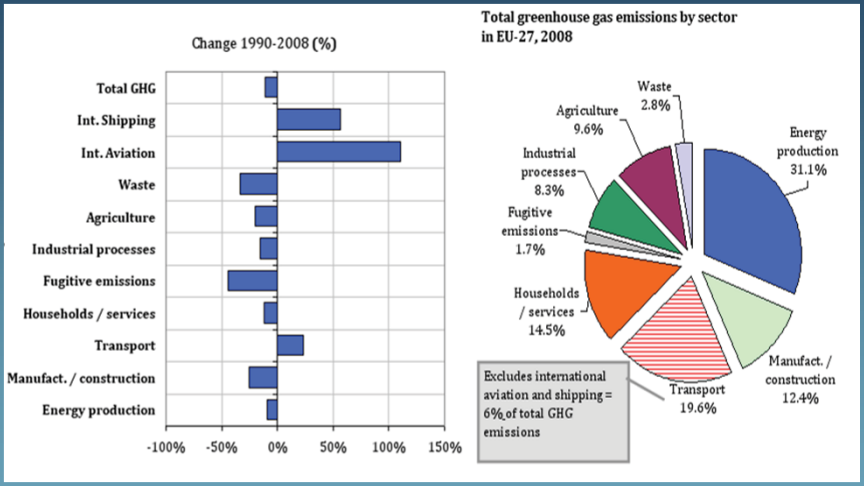
EU's commitment to a low carbon economy

The "20-20-20" targets - by 2020:

- Reduce EU greenhouse gas emissions by 20% from 1990 levels
- Make a 20% improvement in the EU's energy efficiency.
- Raise the share of EU energy consumption produced from renewable resources to 20%
- ➔ And an 80% to 95% reduction of GHG emissions by 2050

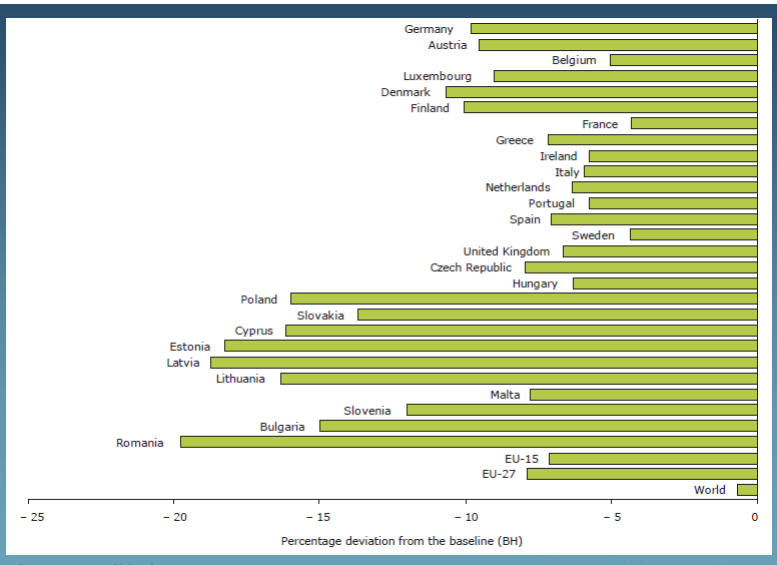
European Environment Agency

Greenhouse gas emissions in the EU-27 by sector in 2008 (right), and changes between 1990 and 2008 (left)



European Environment Agency

Energy-related CO_2 emissions in 2020
(scenario S2H — deviation from the baseline - BH)



Source: EEA (2011)

European Environment Agency

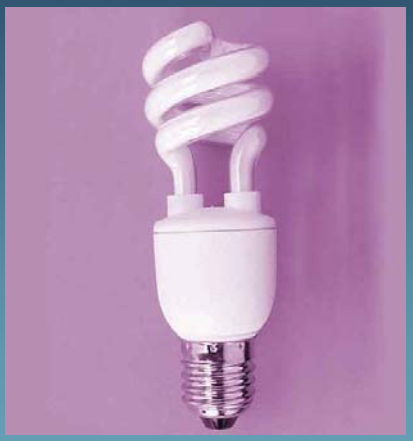
EU's commitment to a low carbon economy

The "20-20-20" targets - by 2020:

- Reduce EU greenhouse gas emissions by 20% from 1990 levels
- Make a 20% improvement in the EU's energy efficiency.
- Raise the share of EU energy consumption produced from renewable resources to 20%
- ➔ And an 80% to 95% reduction of GHG emissions by 2050

European Environment Agency

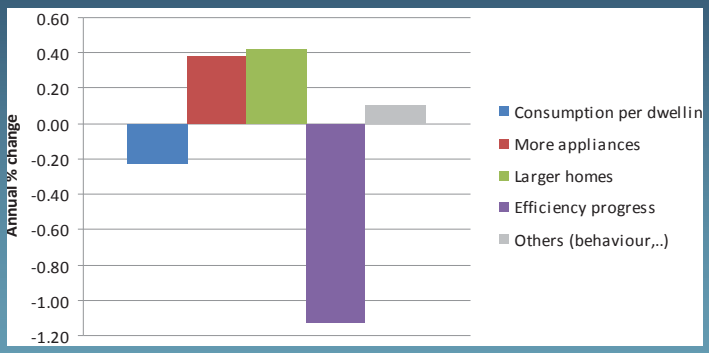
Energy Efficiency



- Major drive in Europe and elsewhere
- EU targeting 9% improvement in energy efficiency over next 6 years
- New EC Directive on Energy Performance of Buildings
- Global energy efficiency technology market currently worth $450bn

European Environment Agency

Beware: improved efficiency can be offset by changing behaviour



European Environment Agency

EU's commitment to a low carbon economy

The "20-20-20" targets - by 2020:

- Reduce EU greenhouse gas emissions by 20% from 1990 levels
- Make a 20% improvement in the EU's energy efficiency.
- Raise the share of EU energy consumption produced from renewable resources to 20%
- ➔ And an 80% to 95% reduction of GHG emissions by 2050

European Environment Agency

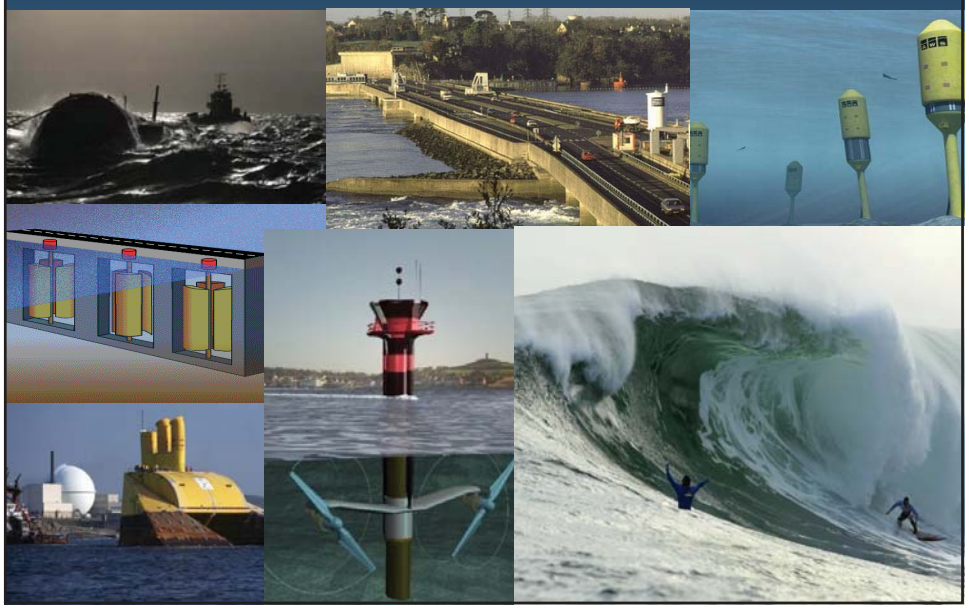
‘Achieving the 80 % reduction means nothing less than a transition to a new energy system both in the way energy is used and in the way it is produced.’

European Climate Foundation
Roadmap 2050

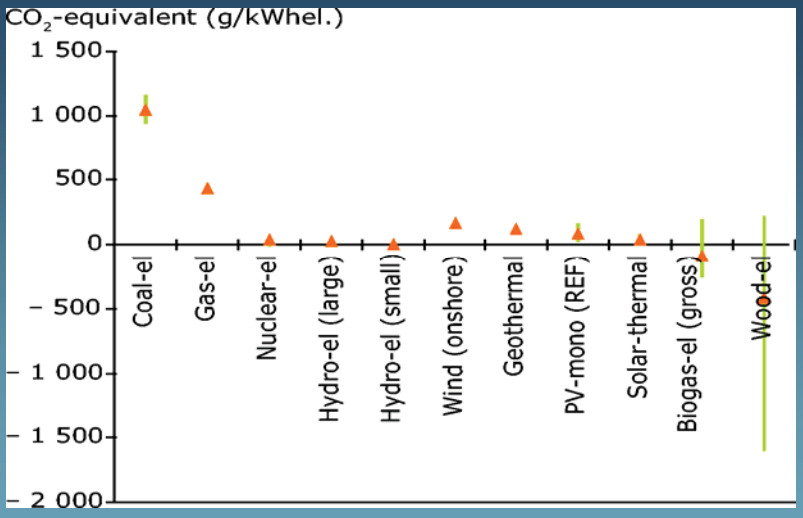
39

European Environment Agency

Vast untapped indigenous energy sources



Life-cycle GHG emissions of energy systems



Source: EEA (2008)

European Environment Agency

Scale of the renewables market

- Renewables currently provide 13% of world energy needs
  - Dominated by geothermal, hydro and biomass
- Rapid growth in other technologies
  - Solar 41% per year
  - Wind 18% per year
- Prices dropping with technological developments and economies of scale

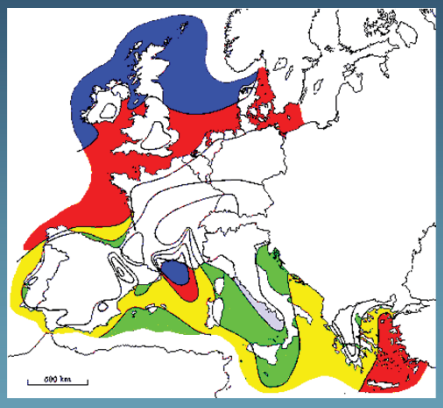
European Environment Agency

Solar Power PVs and SCP with storage

- Costs dropping rapidly with new technologies and economies of scale ($0.7/watt by 2010)
- Market growing rapidly (projected at $40bn by 2010)

European Environment Agency

Offshore wind energy potential in Europe

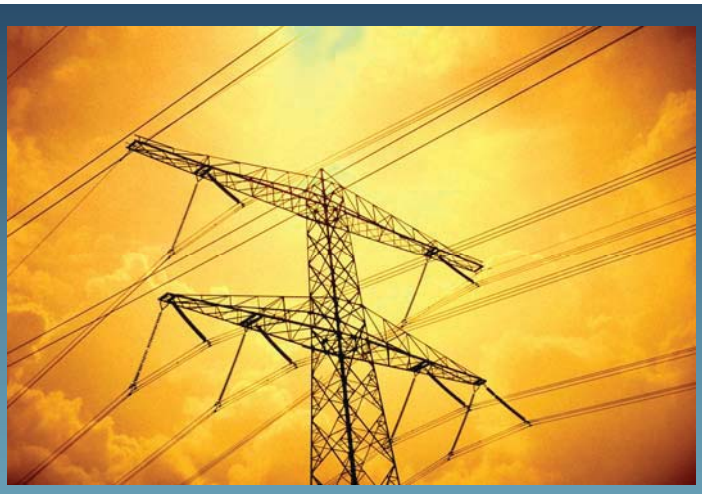


•UK has very large offshore wind energy potential – largest in Europe

© Risø

European Environment Agency

Decentralisation of power via new grid infrastructure



European Environment Agency

Smart grids can cut demand by 15 %, simply as a result of consumers learning more about their usage.

European Environment Agency

Key factors to take into account in designing the next steps

- Limits on exploitable fossil fuel resources
- Energy security concerns around non-indigenous sources
- Fiscal and legislative instability
- Incorrect price signals via subsidies
- Climate change policies and impacts on using indigenous sources

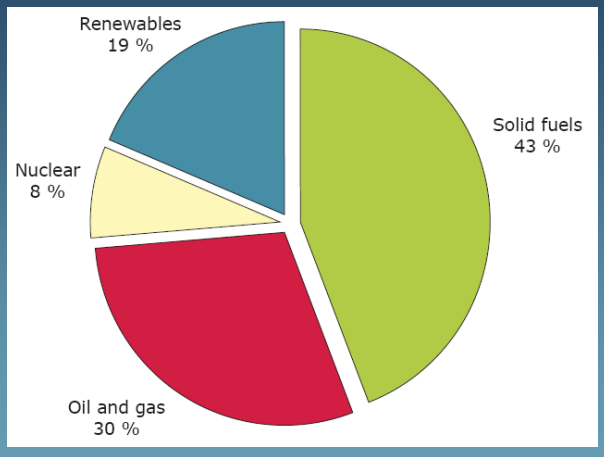
European Environment Agency

Key factors to take into account in designing the next steps

- Limits on exploitable fossil fuel resources
- Energy security concerns around non-indigenous sources
- Fiscal and legislative instability
- Incorrect price signals via subsidies
- Climate change policies and impacts on using indigenous sources

European Environment Agency

Indicative estimate of the distribution of energy subsidies in the EU15, 2001 (~30 billion euro)



Source: EEA (2004)

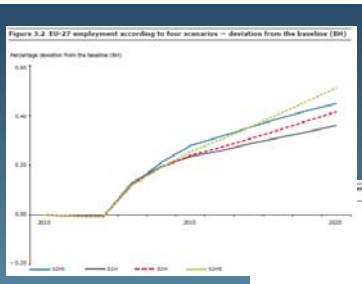
European Environment Agency

Environmental tax reform

Opportunities for eco-innovation

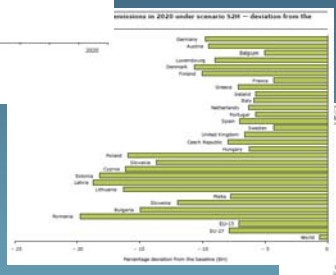
European Environment Agency

Environmental tax reform in Europe:
Opportunities for eco-innovation: (EEA, 2011)

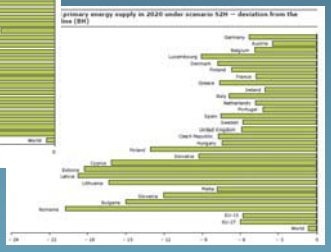


Jobs

Win-win-win
scenarios do exist



GHG emissions



Energy production

European Environment Agency

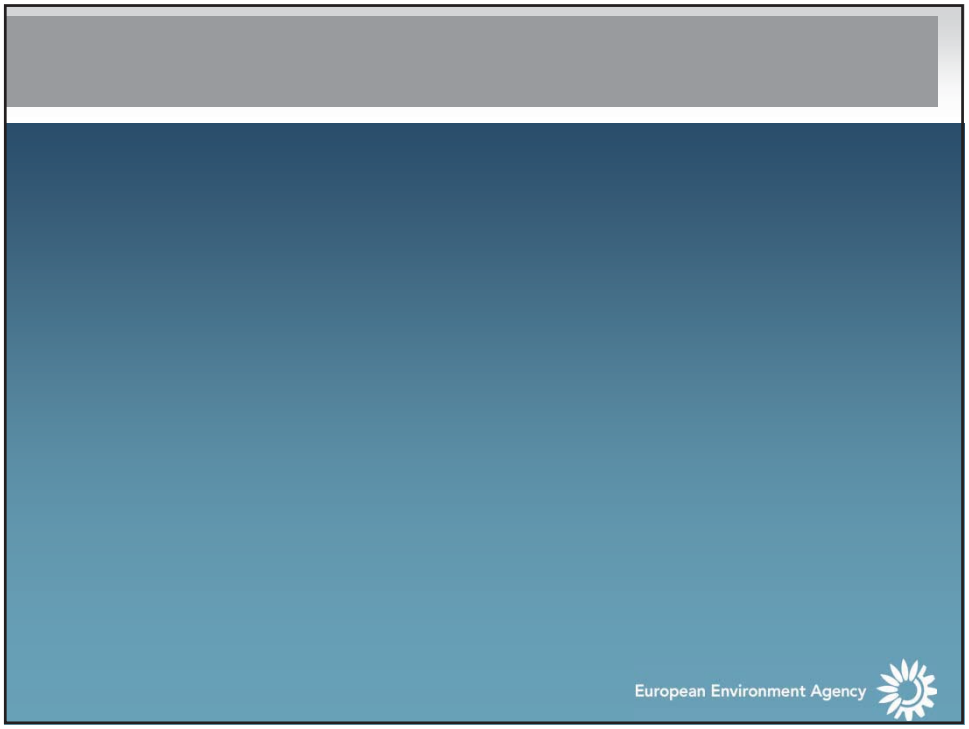
'...if ambitious targets are to be achieved, policymakers will need to employ all measures rather than just picking the best ones.'

European Environment Agency

Thank you!

For further information, please visit: www.eea.europa.eu

European Environment Agency


European Environment Agency