Motivation: Energy efficiency is a huge opportunity going unrealised

Energy efficiency potential used by sector in the New Policies Scenario

Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035
The Efficient World Scenario – assessing the multiple benefits of efficiency

- Changes in energy demand by sector and fuel using the World Energy Model (WEM)
- Changes in CO$_2$ emissions by sector (WEM)
- Changes in investment patterns and effects on fuel prices (WEM)
- Changes in energy expenditures by fuel and region (WEM)
- Changes in local air pollution (co-operation with IIASA Rains)
- Implications for energy poverty (WEO energy access model)
- Macroeconomic impacts (co-operation with OECD ENV-Linkages)
Economically viable efficiency measures can halve energy demand growth to 2035; oil demand savings equal the current production of Russia & Norway.
Energy efficiency can delay “lock-in” of CO₂ emissions permitted under a 2 °C trajectory – which is set to happen in 2017 – until 2022, buying five extra years.
Energy efficiency can help drive economic prosperity

Cumulative investments in energy efficiency of $12 trillion are more than offset by fuel savings & trigger economic growth of a cumulative $18 trillion

GDP in Efficient World Scenario versus New Policies Scenario, 2035

Source: OECD ENV-Linkages
Efficient World Scenario: methodology

Technology potential

Buildings
- Insulation and energy management
- Space and water heating
- Appliances
- Cooling
- Lighting
- Cooking

Average payback buildings:
OECD:
- Electricity - 3 years
- Fuels - 14 years
Non-OECD:
- Electricity - 3 years
- Fuels - 9 years

Average payback industry:
OECD - 5 years
Non-OECD - 3 years

Economic potential
- Additional investment
- Fuel cost savings over lifetime
- No discounting

Technology potential

Transport
- Road transport
- Aviation
- Navigation
- Other

Average payback road transport:
OECD - 7 years
Non-OECD - 7 years

Average payback power generation:
OECD - 14 years
Non-OECD - 7 years

Technology potential

Industry
- Iron and steel
- Chemicals
- Cement
- Pulp and paper
- Other industries

Technology potential

Power generation
- Thermal plants
The World Energy Model (WEM)

- Simulation model that allows scenario analysis
  - Detailed sectoral and regional energy demand balances
  - Regional supply of all fuels and trade matrices
  - CO₂ emissions from fuel combustion
  - Investment needs in the supply and end-use technologies

- Time horizon to 2035, with annual data
  - Complete update every year (e.g. in WEO 2012 the last data point was 2010)

- Regional resolution: 25 regional models
  - Of which 11 country models, including US, China, India, Japan, Russia, Brazil...

- Demand-side part of the model consists of eight main modules
  - Industry, Transport, Residential, Services, Agriculture, Power Generation, Heat Production, Other Transformation & Non-Energy Use

- Production-side part of the model consists of three main modules
  - Coal, Oil, Gas and Biomass supply modules

http://www.worldenergyoutlook.org/weomodel/
The World Energy Model deploys a high resolution in terms of energy demand sectors and technologies.
The transport sector in the World Energy Model

The World Energy Model deploys a high resolution in terms of energy demand sectors and technologies.

Note: PLDV = passenger light-duty vehicles; LCV = light commercial vehicle; ICEV = internal combustion engine vehicle; t = tonnes
The World Energy Model deploys a high resolution in terms of energy demand sectors and technologies.
Purpose: assess the wider economic implications of the Efficient World Scenario

WEM output as ENV-Linkages input:

- Energy prices
- Fuel demand by sector and fuel, by scenario
- CO₂ emissions by sector and fuel, by scenario
- Investment needs by scenario
- Fuel expenditures by sector and fuel, by scenario