Energy Strategy for Ireland in the context of the EU Energy and Environment Policy

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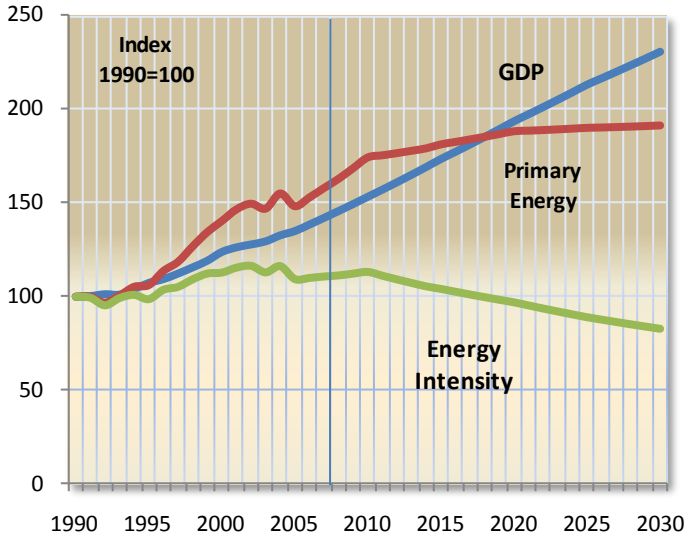
Dublin November 2008

Baseline Scenario for Ireland In the 2008 EU Energy Outlook

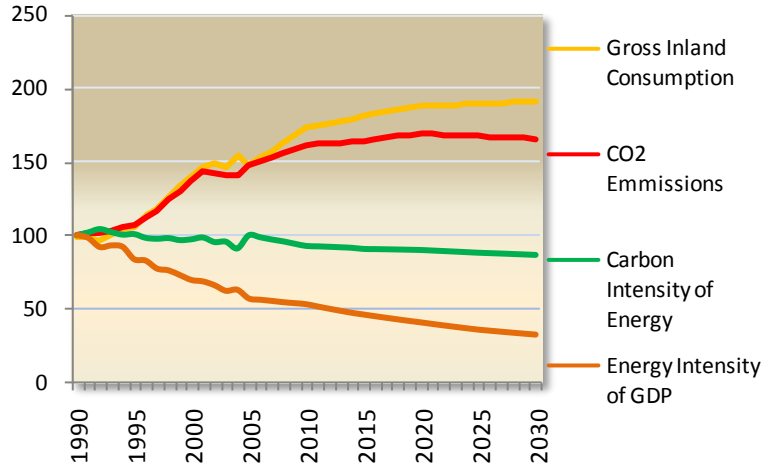
http://ec.europa.eu/dgs/energy_transport/figures/trends_2030_update_2007/index_en.htm

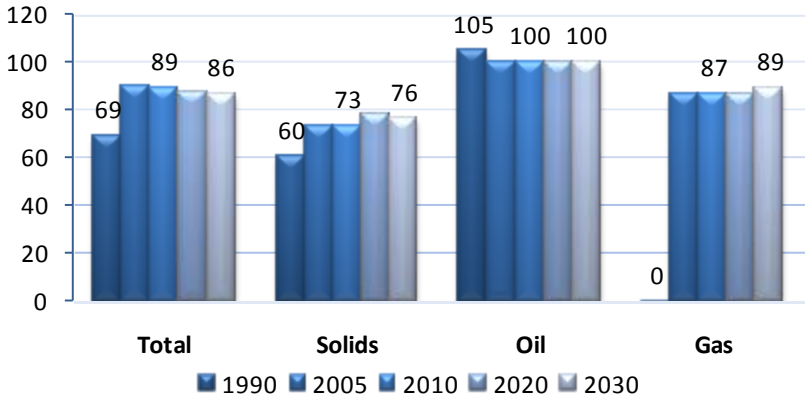
- ***Analysis carried out by NTUA by using the PRIMES energy system model***
- Assumptions
  - Strong Economic Growth
  - Moderate Oil and Gas prices
  - No new climate policies, other than Kyoto
  - Energy Efficiency driven by economics
  - Well-functioning Competition in the Internal Energy Market

Baseline Scenario for Ireland



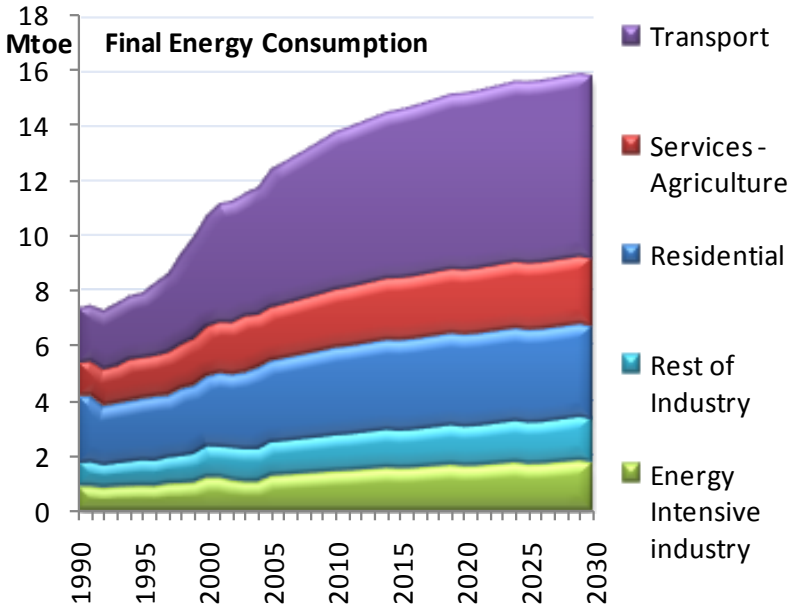
- Higher Growth than EU average (3.5% pa)
- Delayed progress in Energy Efficiency



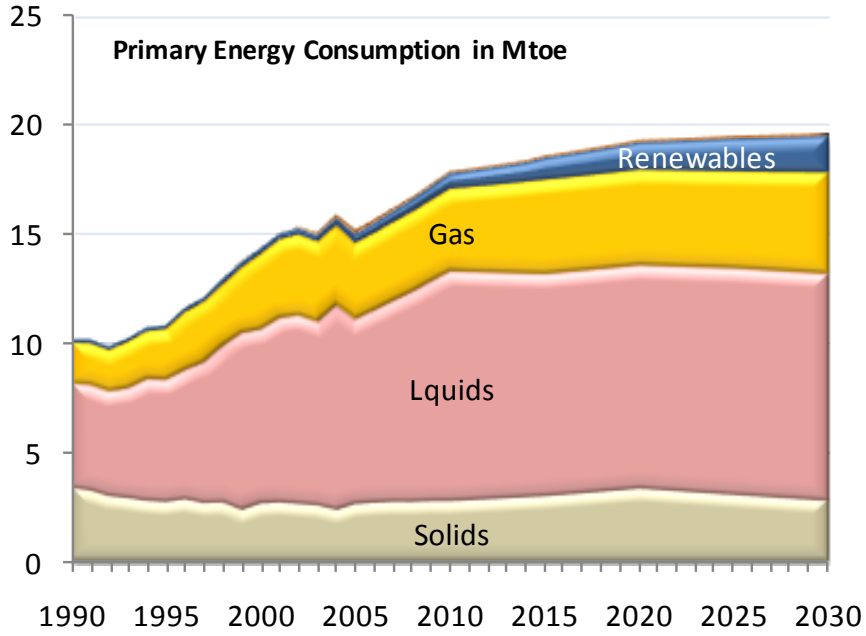


- CO_2 Emissions increase more than required under Kyoto
- Growing Dependence on Imported Energy

Baseline Scenario for Ireland



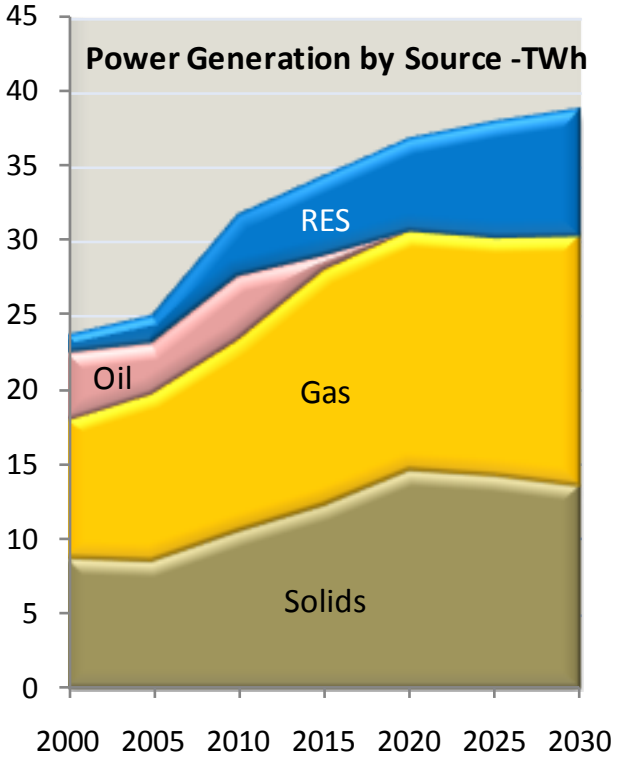
- Energy used for transportation grows faster than other sectors
- Industry becomes less depending on energy

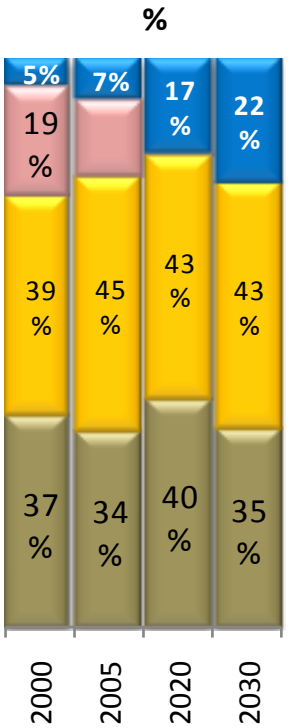


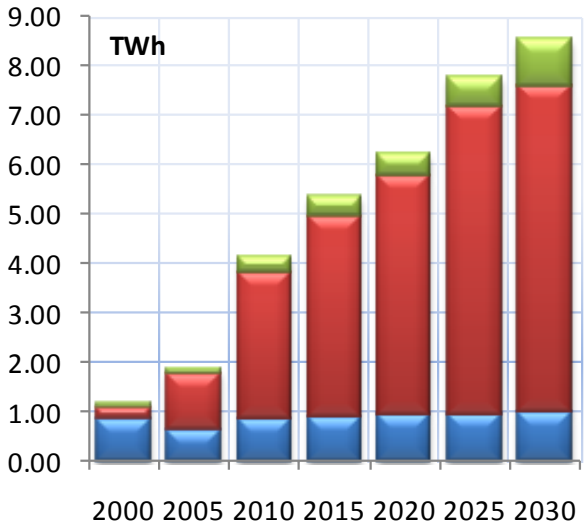
- Oil remains the dominant fuel, despite its low growth
- Gas keeps a 24% share
- RES increase fast but their share does not exceed 8%

Baseline Scenario for Ireland

- Demand for electricity grows (1.9% pa) faster than total energy
- 43-45% of electricity is produced by gas
- RES share reach 22% in power sector by 2030
- Between 2000-2030, 9.4 GW investment, of which
  - 4.7 GW gas
  - 1.5 GW solids
  - 3.1 GW RES







Origin of Gas in the Baseline Scenario

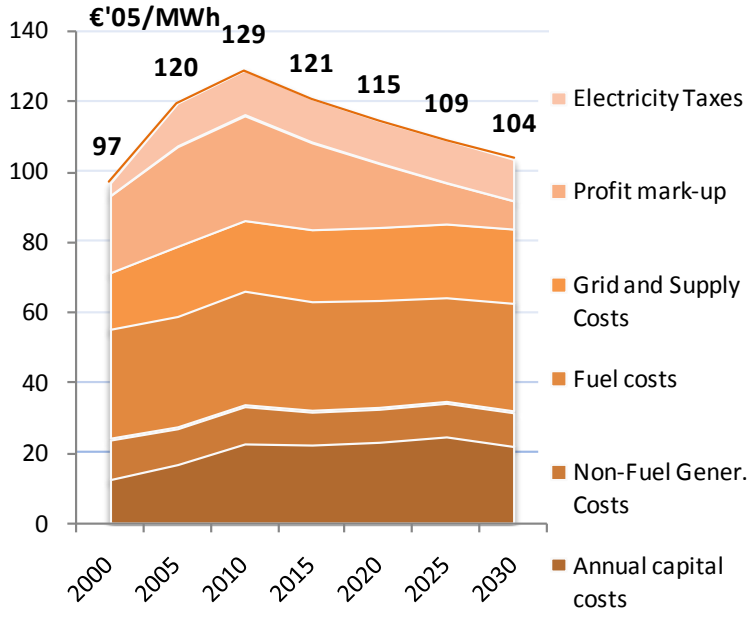
Mcm	2000	2005	2010	2015	2020	2025	2030
Gas Imports	**3,142**	**3,858**	**4,258**	**4,484**	**4,655**	**4,769**	**5,028**
Domestic	1,115	536	558	529	438	402	402
Imported Pipeline	2,027	3,321	3,700	3,405	2,677	2,415	2,272
Liquefied Natural Gas				551	1,540	1,952	2,355
Origin of Imports							
UK	2,027	3,321	3,700	2,342	2,140	1,583	1,642
Norway				1,062	537	833	630
Africa				551	1,228	1,167	1,162
Middle East and Iran					312	785	1,193

Source: Gas sub-model of PRIMES

- Significant development of LNG (45% in 2030)
- LNG could go up to 70% in a global LNG market scenario
- Competition for access to Norwegian gas is significant beyond 2015

Baseline Scenario for Ireland

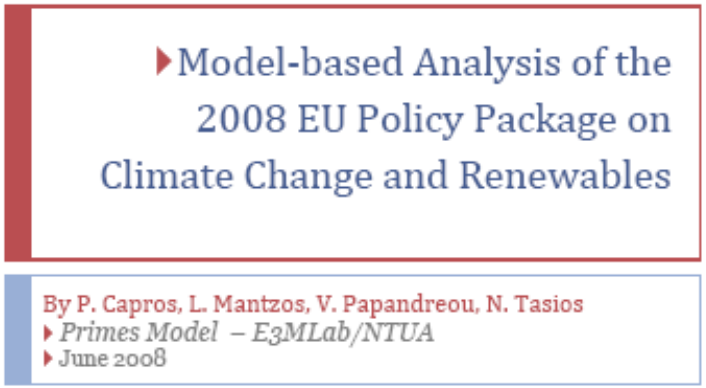
- Average electricity prices drop



- Total cost of energy as % of GDP goes down to 5% in 2030 from 7.4% in 2005
- Despite assumed carbon price in ETS sectors of 20-25 €/tCO2, emissions increase from 1990, but slowly after 2005:

GHGs Emissions (Mt CO2 eq.)	1990	2005	2020	2030
All GHGs	56.1	75.9	80.6	80.1
All CO2	33.3	50.1	58.6	58.5
energy related	30.9	45.7	52.3	51.2
non energy related	2.5	4.4	6.3	7.3
Non CO2 GHGs	22.8	25.8	22.1	21.6

New EU Policy: Climate Action and Renewables Package (20-20-20)



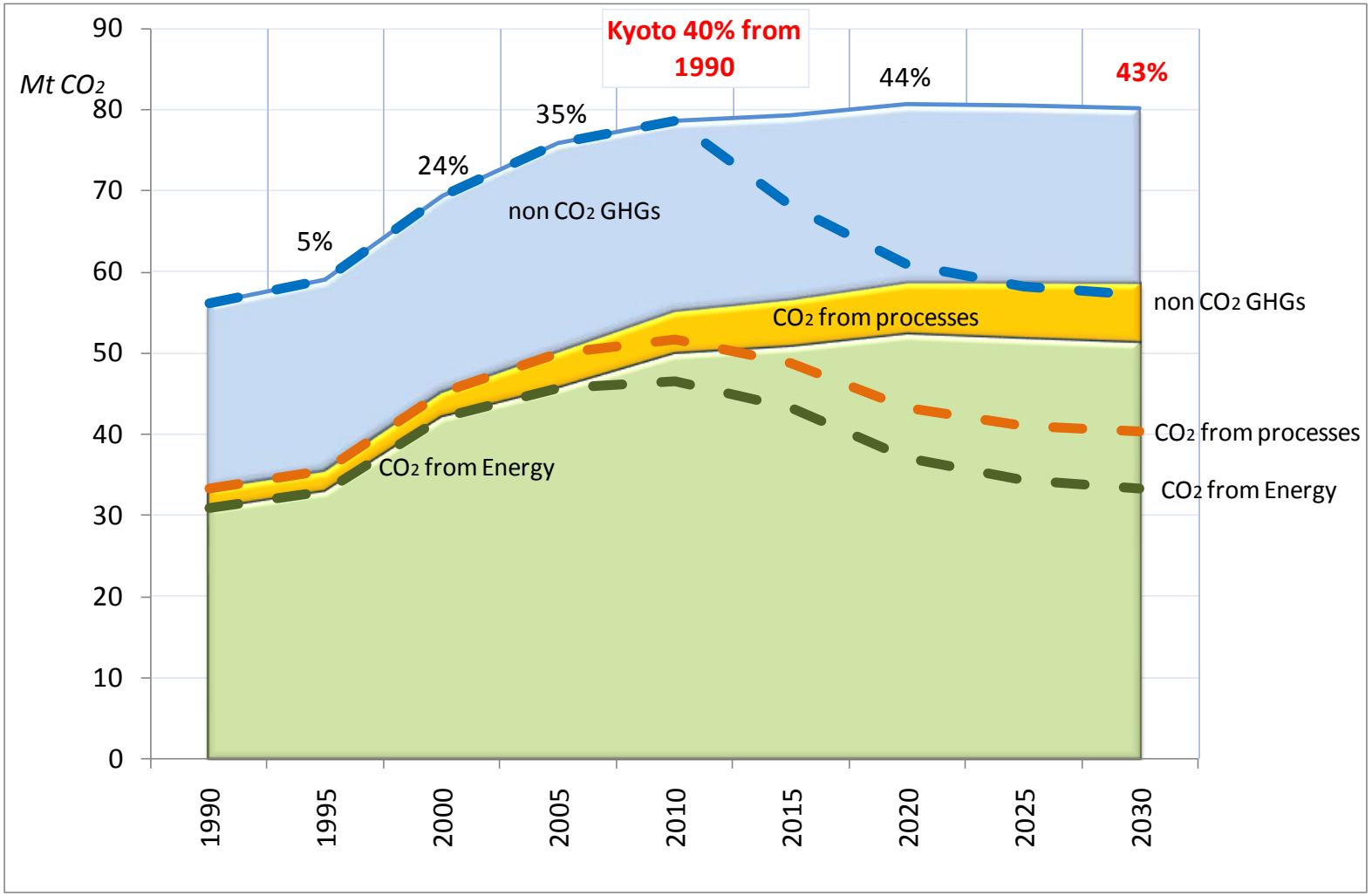
http://ec.europa.eu/environment/climat/climate_action.htm

- Targets
  - Reduction of GHG Emissions by 20% in 2020 compared to 1990
  - RES share in total energy consumption by 2020 at least 20%
  - Biofuels 10% of liquid transportation fuels
  - (Indicative) 20% Energy Efficiency
- Directives
  - EU ETS under auctioning constrained to reduce CO2 emissions by 21% in 2020 from 2005
  - Obligations per Member-State to reduce GHG in the non ETS sectors
  - Obligations per Member-State to develop Renewables

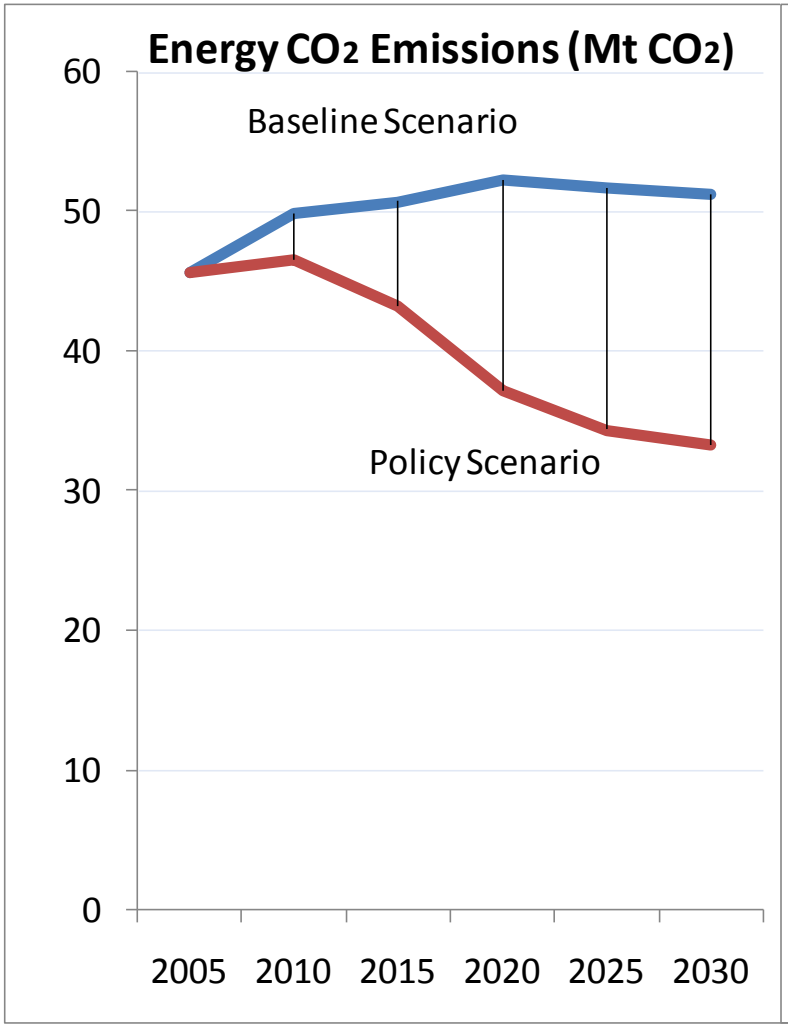
2020 Mandatory Targets for Ireland

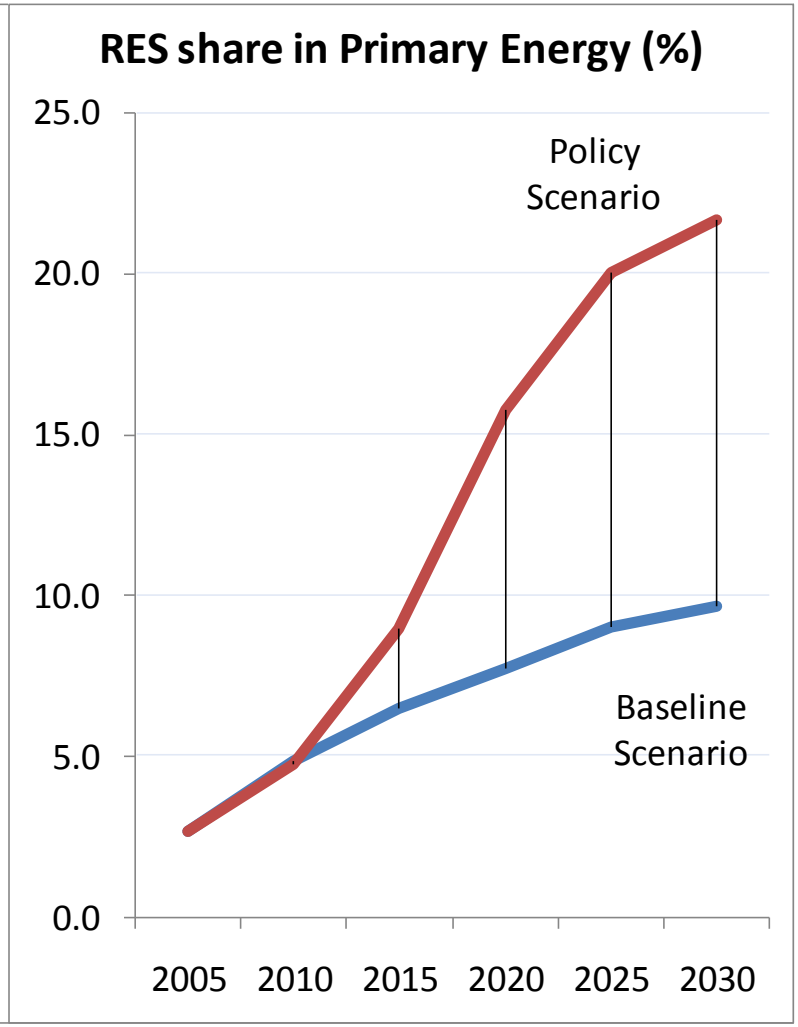
- GHG emissions from non ETS
  - **-20% from 2005 (instead of -2.1% in Baseline)**
- ETS sectors subject to acquire CO_2 allowances from auctioning which auction in 2020 some **21%** less allowances than emissions in 2005
  - instead of **23.3% (19.7% without aviation)** higher CO_2 emissions by ETS sectors of Ireland in 2020, compared to 2005
- Renewables' share have to reach **16%** in 2020, instead of **7.5%** in Baseline
- Forecasts with PRIMES model for 2020 for the EU as a whole:
  - Market Price of ETS allowance (35 – 40 €/t CO_2)
  - Marginal Value of Renewables Guarantee of Origin (50 – 55 €/MWh)

GHG Emission Trajectories for Ireland - dotted lines indicate targets

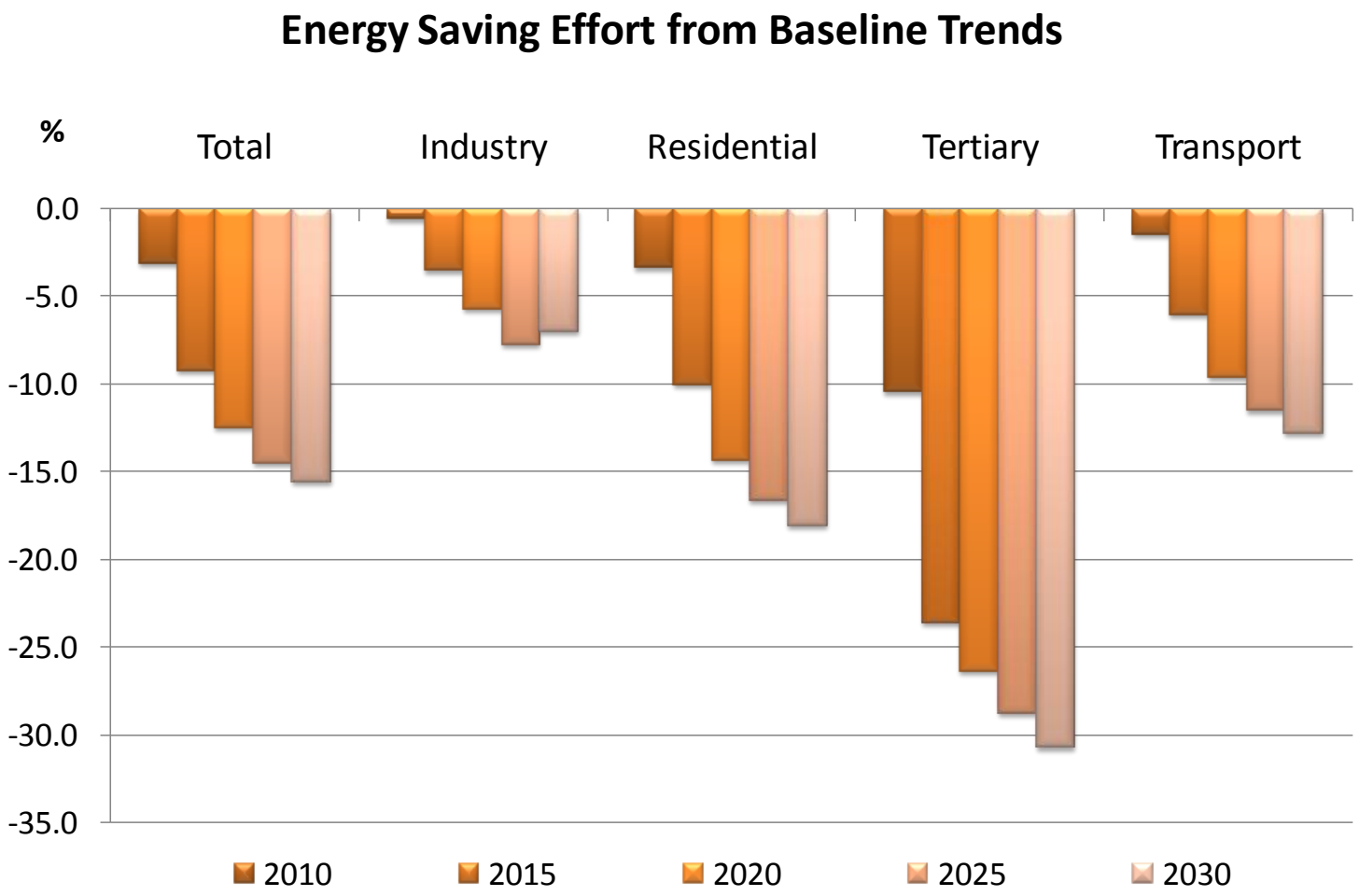


New EU Policy Targets for the Irish Energy Sector up to 2030

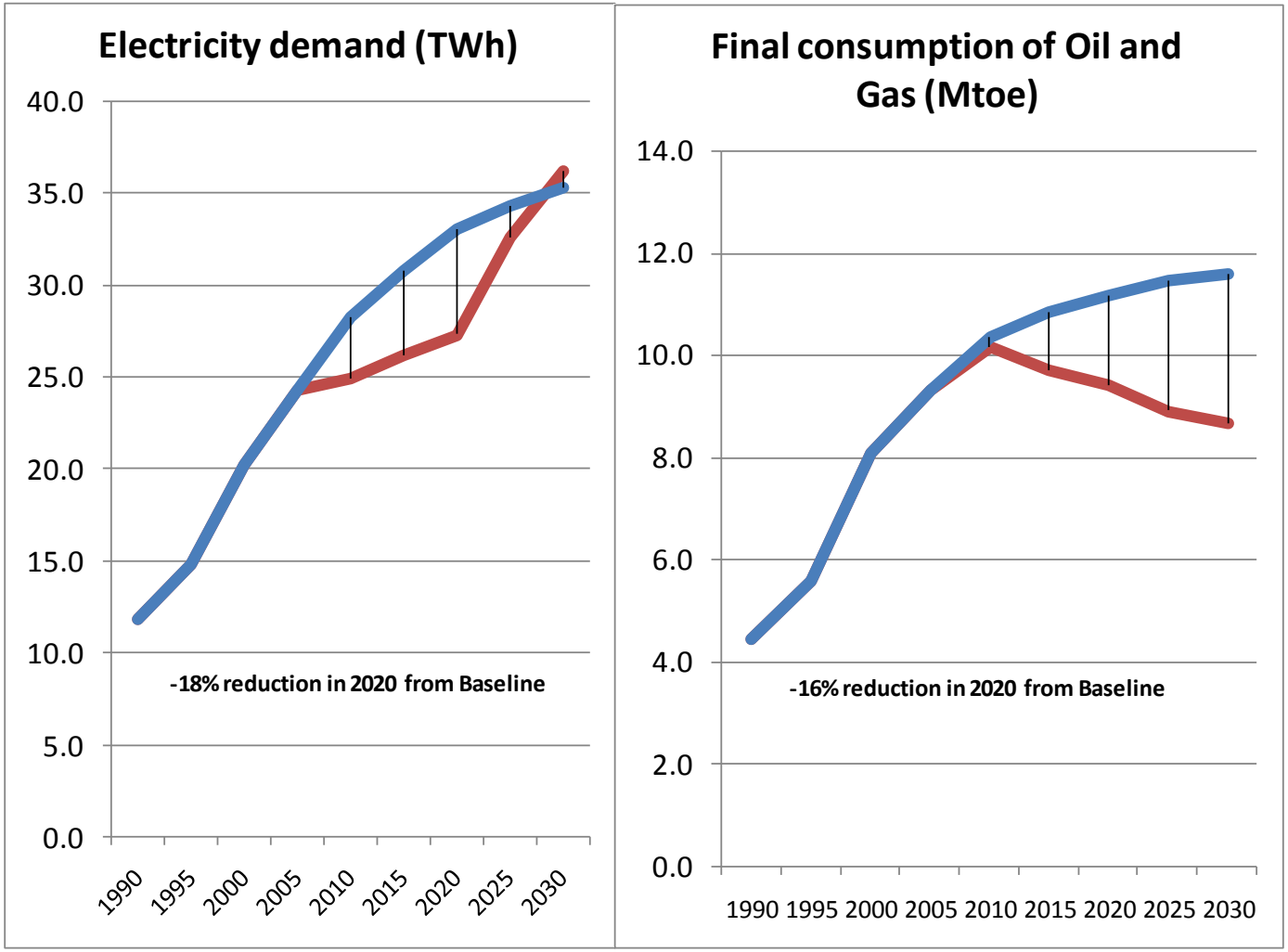




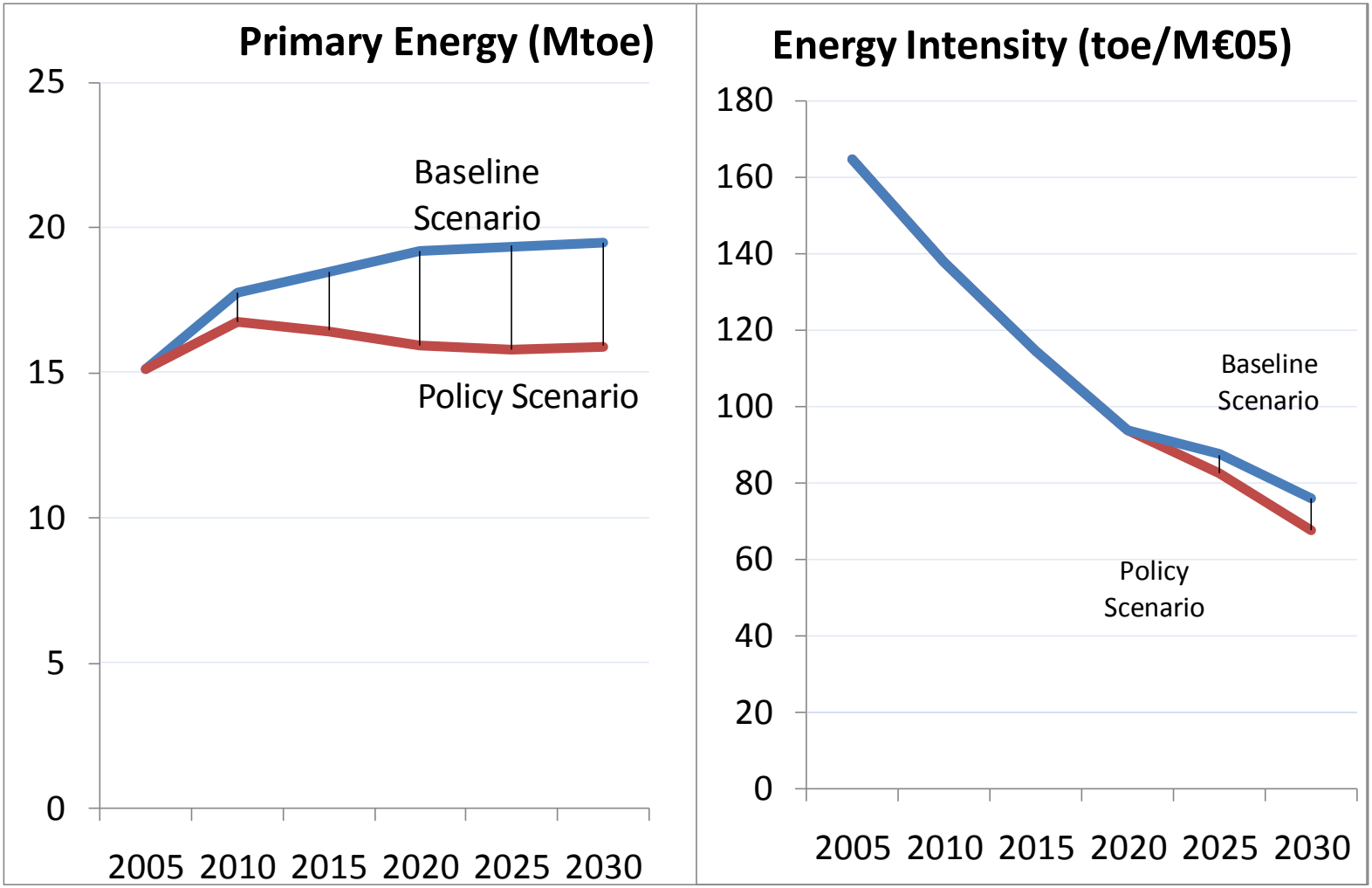
Best Adaptation of Irish Energy System: Energy Efficiency in Final Demand



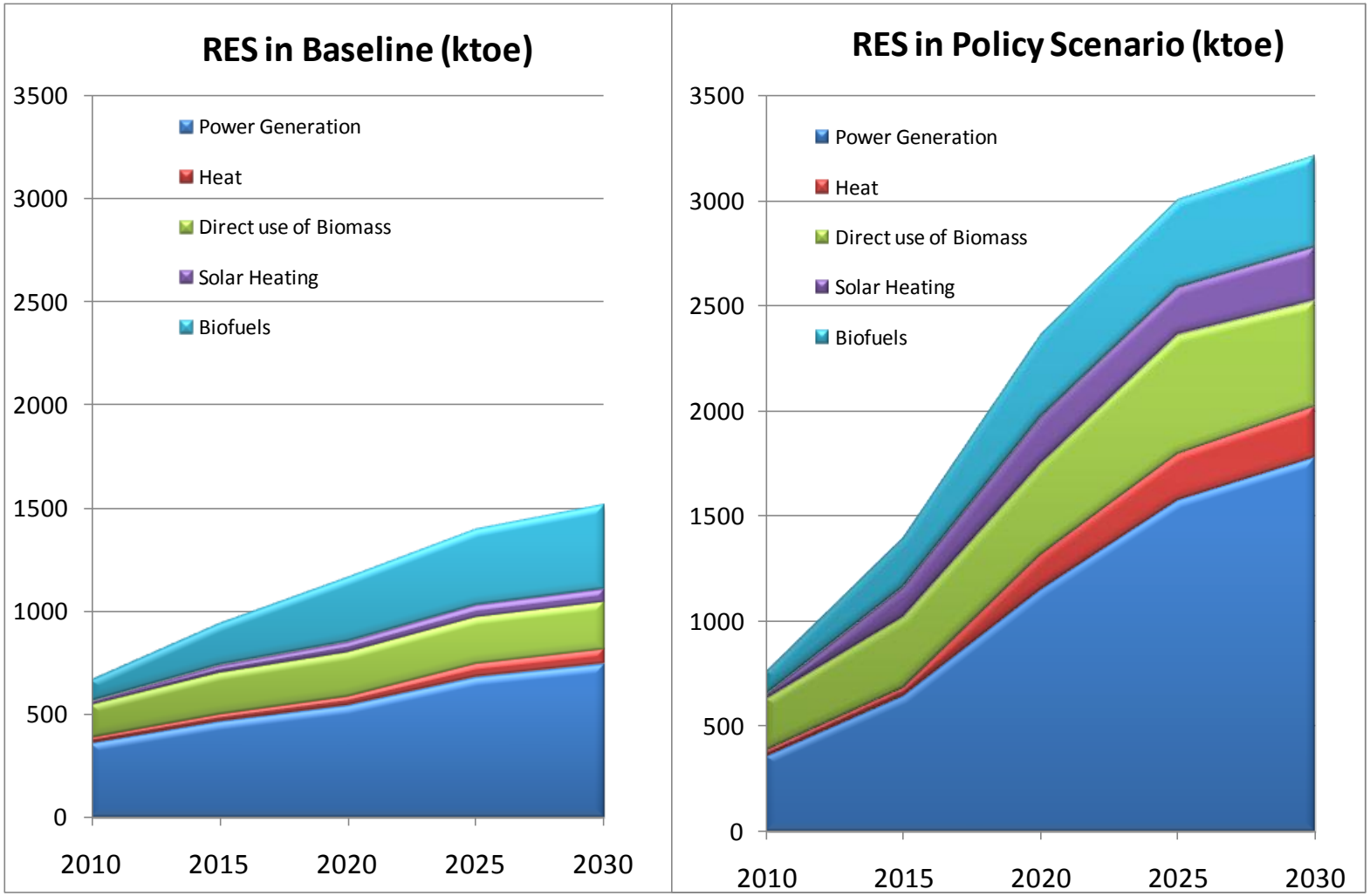
Best Adaptation of Irish Energy System: Fuel Savings in Final Demand



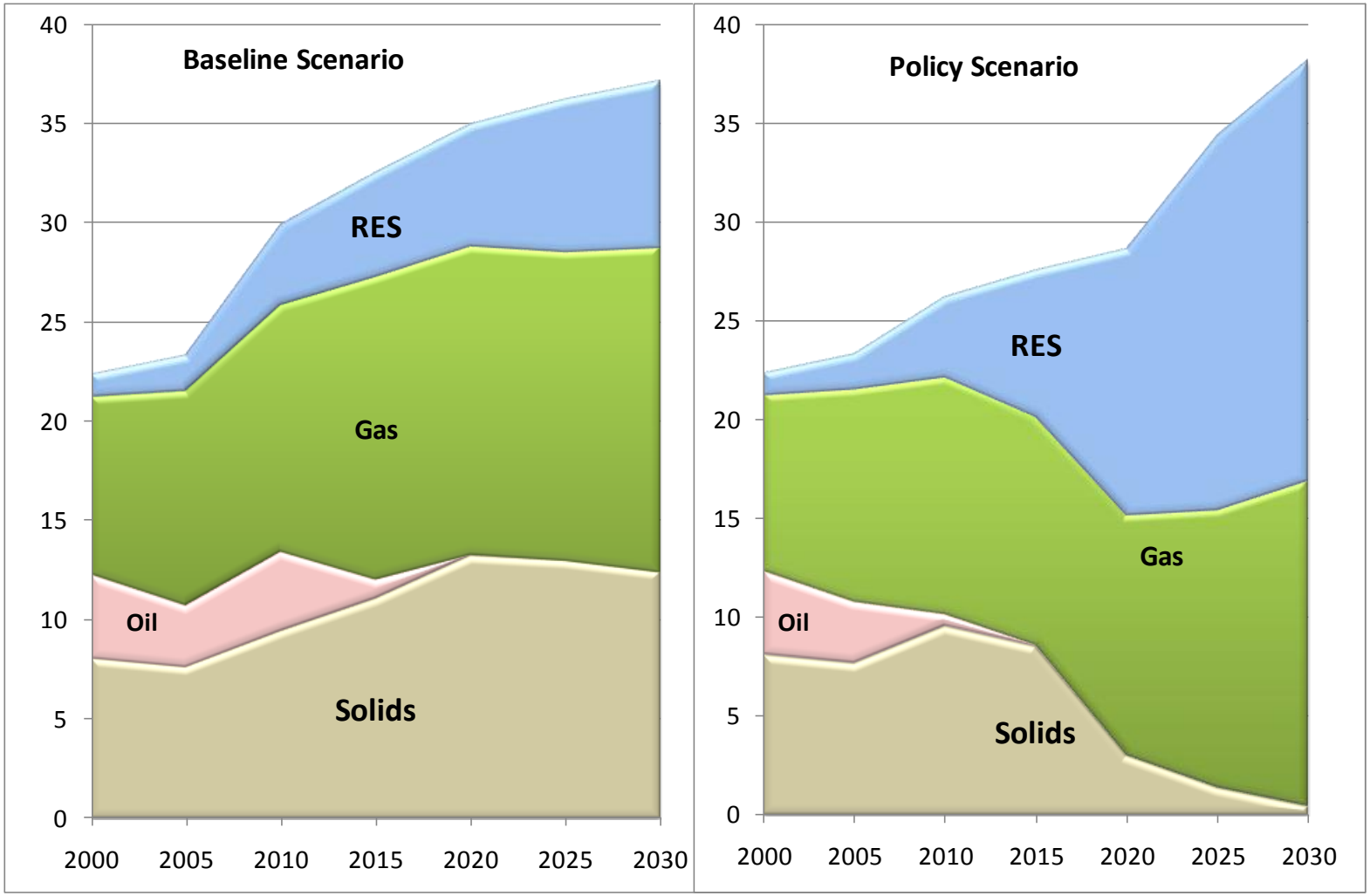
Energy Efficiency effort may lead to non increasing Primary Energy Demand



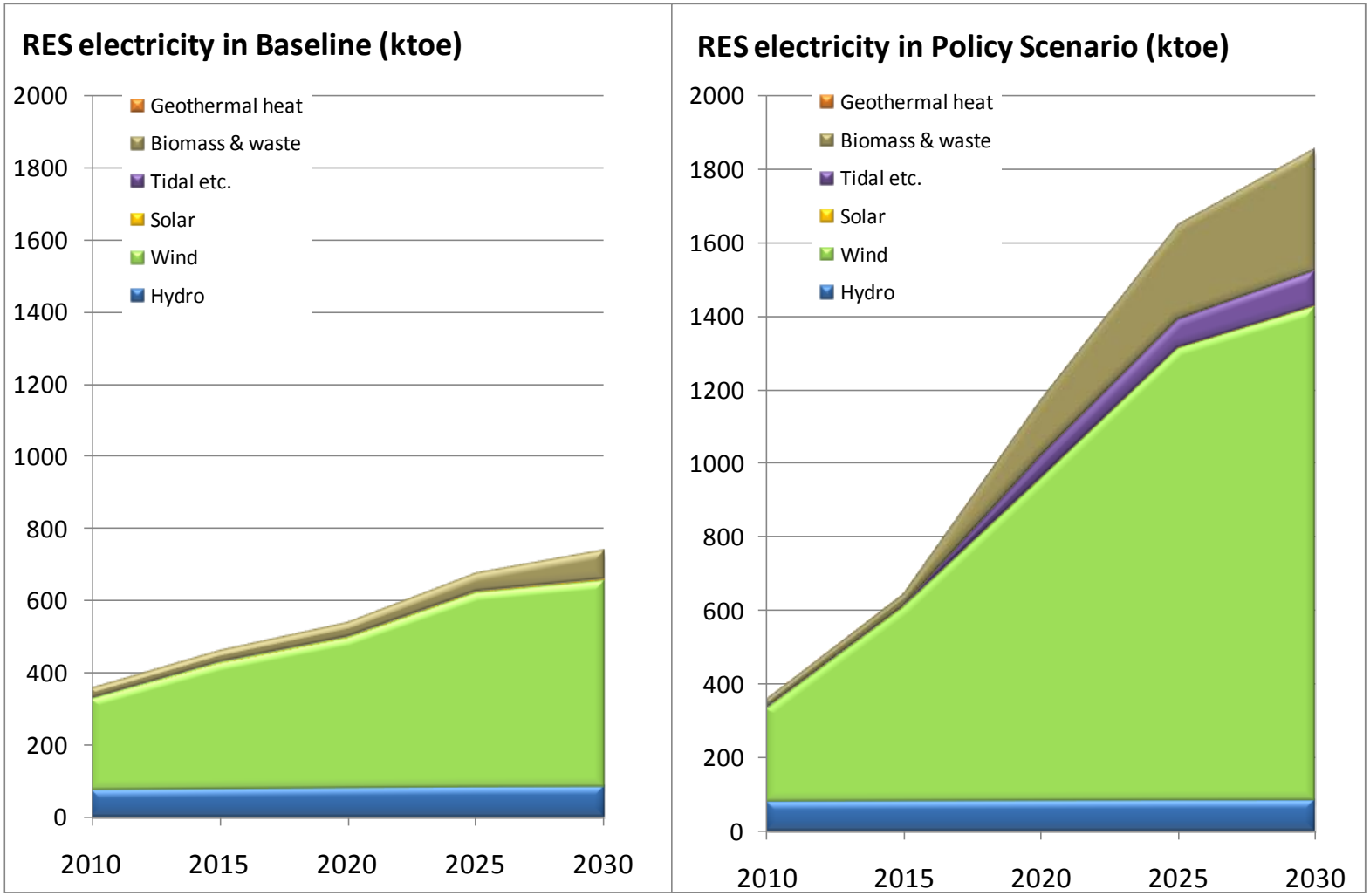
Ambitious Development of Renewables in order to meet the two targets

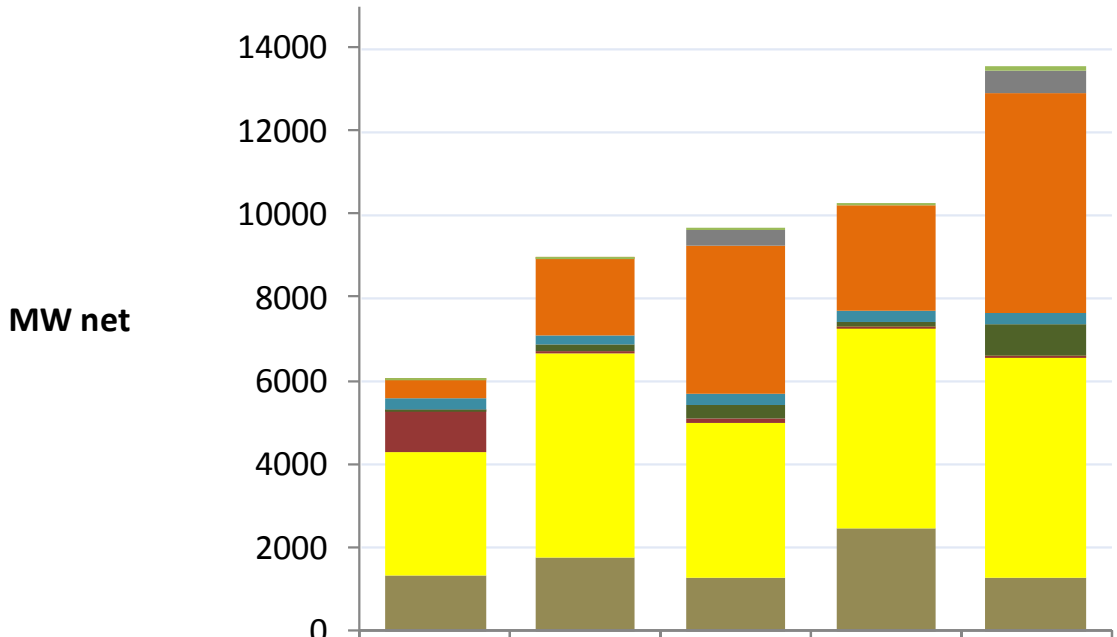


Restructuring of Power Generation
Net electricity by Source in TWh



Structure of Renewables for Power Generation





	2005	2020 Baseline	2020 Policy	2030 Baseline	2030 Policy
Solar	2	48	48	100	100
Wave-Tidal	0	0	362	0	585
Wind	480	1850	3568	2510	5258
Hydro	232	242	242	242	242
Biomass-waste fired	39	127	365	124	747
Oil fired	995	81	64	7	8
Gas fired	2937	4882	3710	4833	5314
Solids fired	1367	1774	1314	2475	1312

Power Generation Capacities in Scenarios

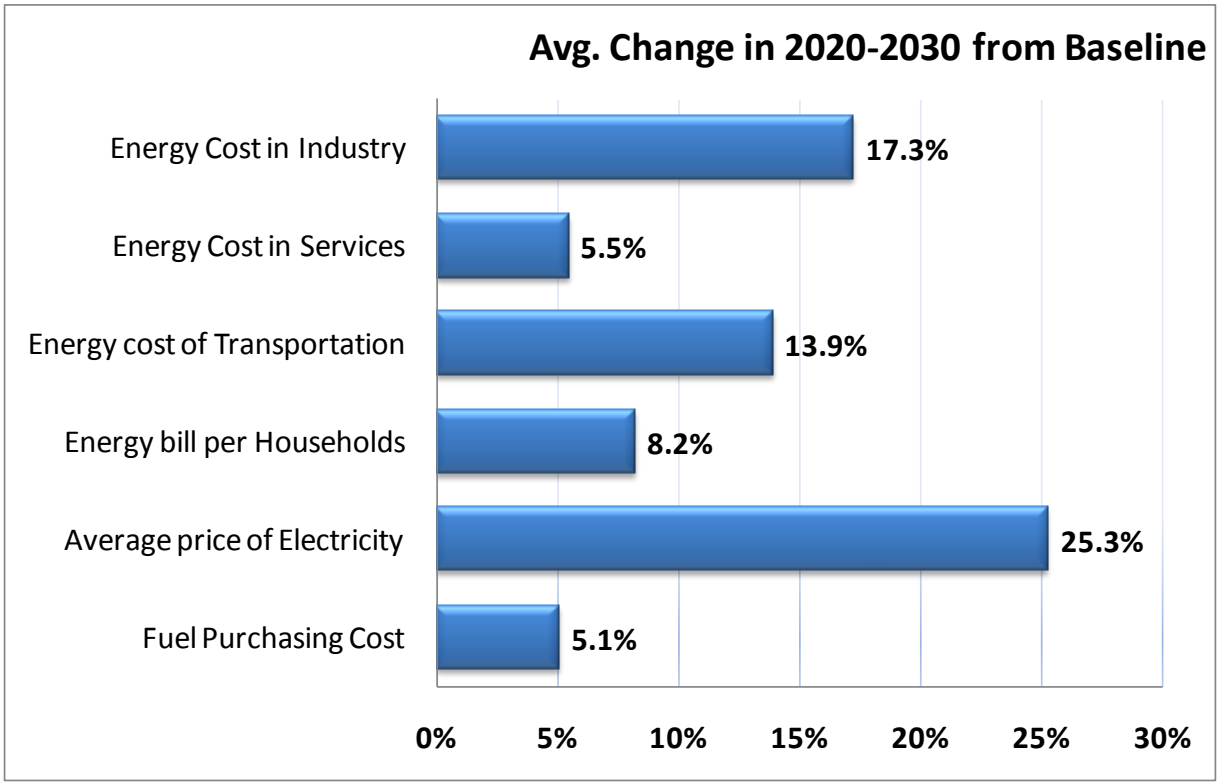
Considerable Increase of RES power capacities

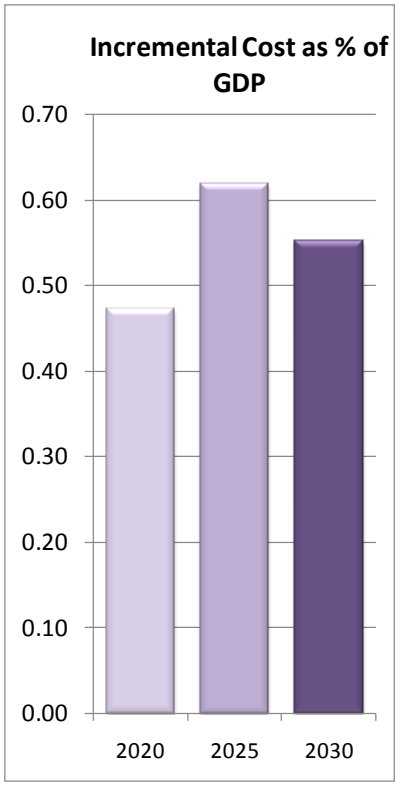
Very significant needs for reserve and balancing by using thermal power

Investment in gas plants increase however their load factor decreases

Beyond 2020 solids fired power plants stay as reserve power

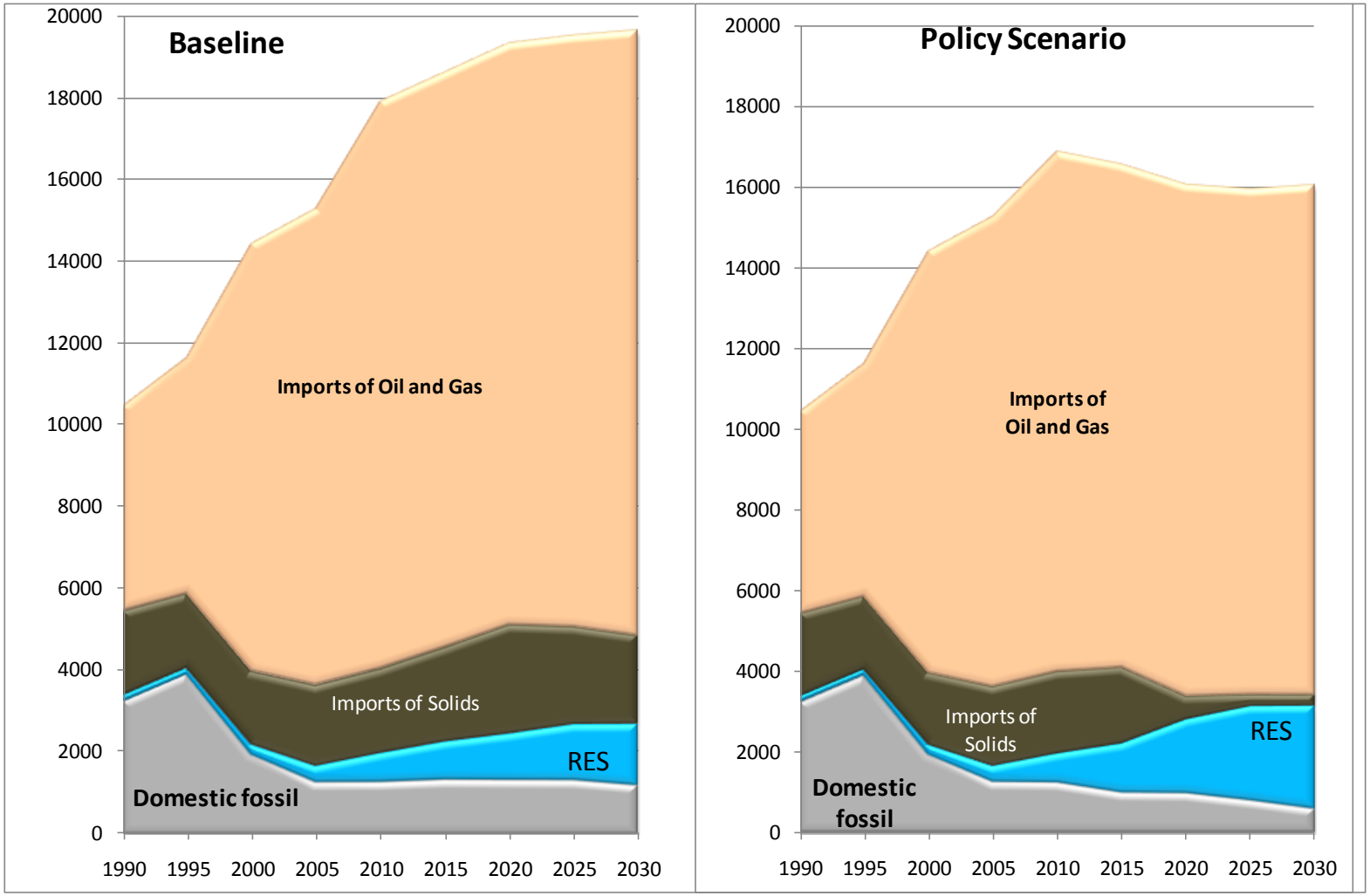
Energy system costs for Compliance





Revenues from Auctions by 2020: 500 M€/year in Policy Scenario instead of 1000 M€/year if emissions remained as in the Baseline

Lower imports of energy and less dependence



Sensitivity Analysis

- Use of flexibility instruments, such as CDM, could bring the EU ETS carbon price down to 30 €/tCO2
  - Less impacts on prices and costs
  - Higher energy demand
  - Slightly more solids in power generation
  - Higher RES (since target in % terms)
- More imports of electricity from countries (UK, France) developing nuclear power (significance after 2020)
- Few possibilities of CCS in Ireland (in any case after 2020)

- The energy strategy is dominated by the new EU climate action and RES package
- The EU policy targets induce considerable restructuring of the energy system with emphasis on energy efficiency and renewables
- Power generation sector restructuring poses challenging problems, e.g. power reserves and ancillary services
- Costs and prices tend to increase
- The restructuring for climate change mitigation and renewables targets decrease imports and dependence

E3M - Lab

References

http://www.e3mlab.ntua.gr

http://ec.europa.eu/dgs/energy_transport/figures/trends_2030_update_2007/index_en.htm

http://ec.europa.eu/environment/climat/climate_action.htm