

The double challenge:

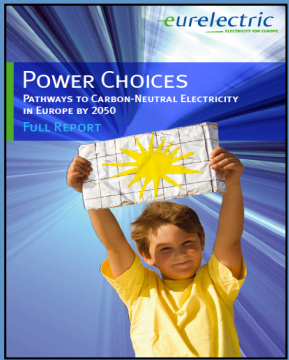

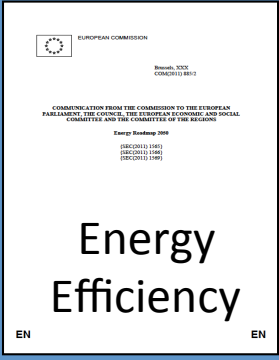
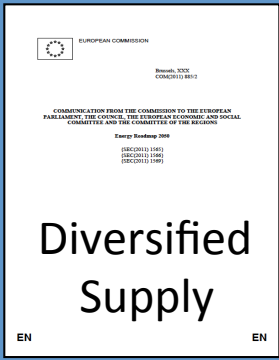
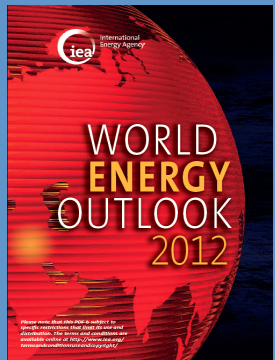
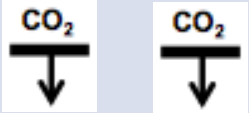

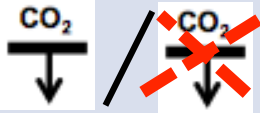




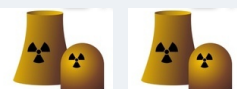
**Limiting electricity demand growth while
pushing forward electrification of energy demand**

Lessons from recent low-carbon roadmaps and scenarios
for the EU

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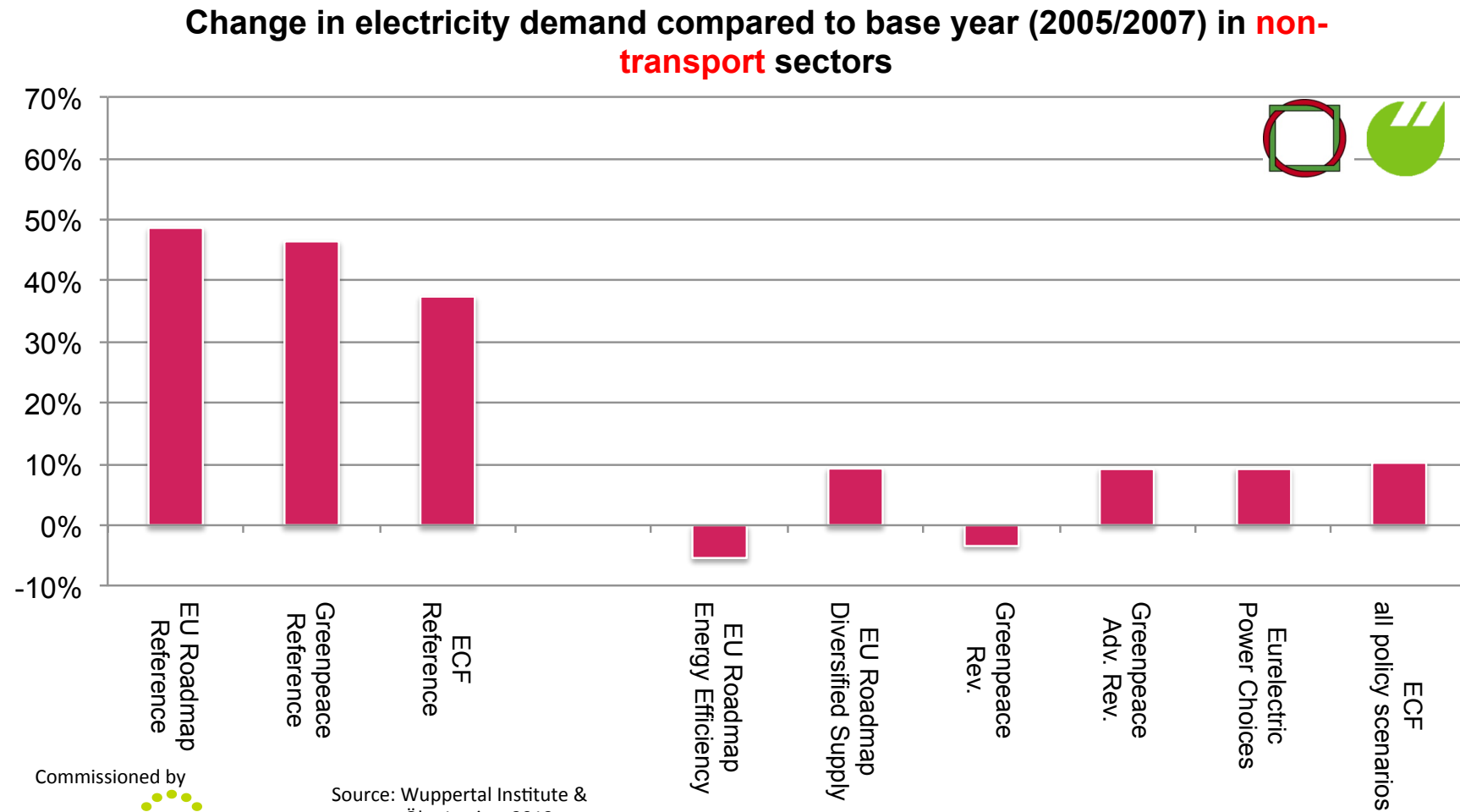
Overview

- Low Carbon Energy Roadmap Scenarios are defining the EU long term energy and (particularly) electricity strategy
- Discussion heavily focusses on the supply side
- Significant demand side challenges remain widely unnoticed:
 - 'Conventional' electricity demand to be stabilised in all low-carbon scenarios -> significant savings vs. BAU
 - 'Low carbon' electric appliances drive future electricity demand growth
 - Electric mobility as main driver
 - Fuel substitution by electric appliances in the heating sector as an additional factor
- Can these contradictory trends on the demand side go together?

					
Scenario philosophy and numbers	Find a cost-effective pathway (1)	Show that deep CO ₂ reductions are possible (2)	Explore different pathways of the energy system (5) Energy Efficiency / Diversified Supply		Global efforts to reach the 2°C target (2)
Model used/ general approach	PRIMES model (part. equilibrium, focussing on market interact.)	Simulation model, normative approach	PRIMES model (part. equilibrium, focussing on market interact.)		IEA energy model
Reliance on CCS technology					
Reliance on nuclear power					
RES-Share in electricity (2050)	38%	97%	64%	59%	67%
Energy intensity changes (% per year)	FE: -2.6 %/a EL: -0.6 %/a	FE: -2.7 %/a EL: -1.4 %/a	FE: -2.8 %/a EL: -1.4 %/a	FE: -2.6 %/a EL: -1.1 %/a	FE: -1.8 %/a EL: -1.2 %/a

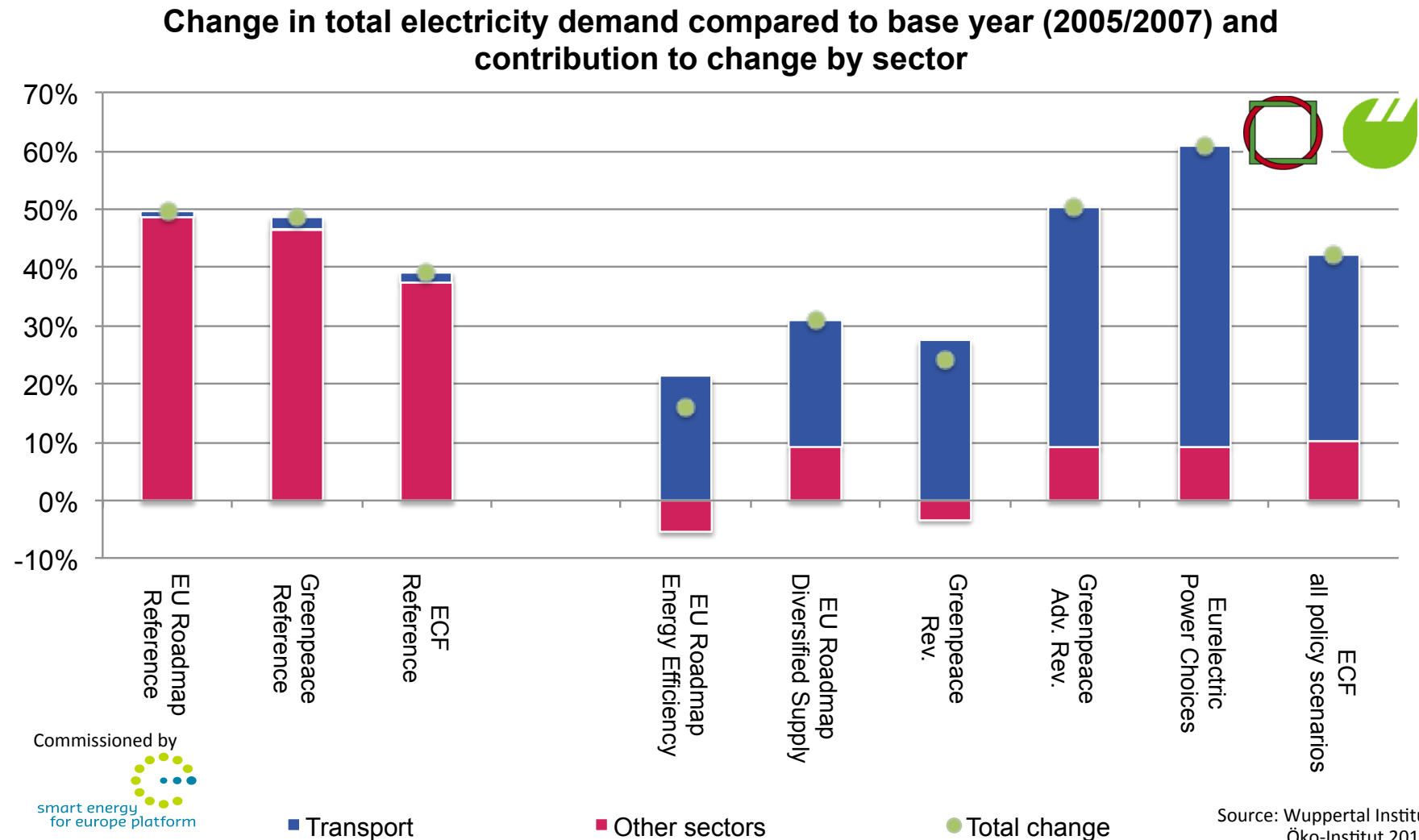
Demand Side

Mitigating strong (reference) growth in electricity demand assumed as common strategy in all scenarios



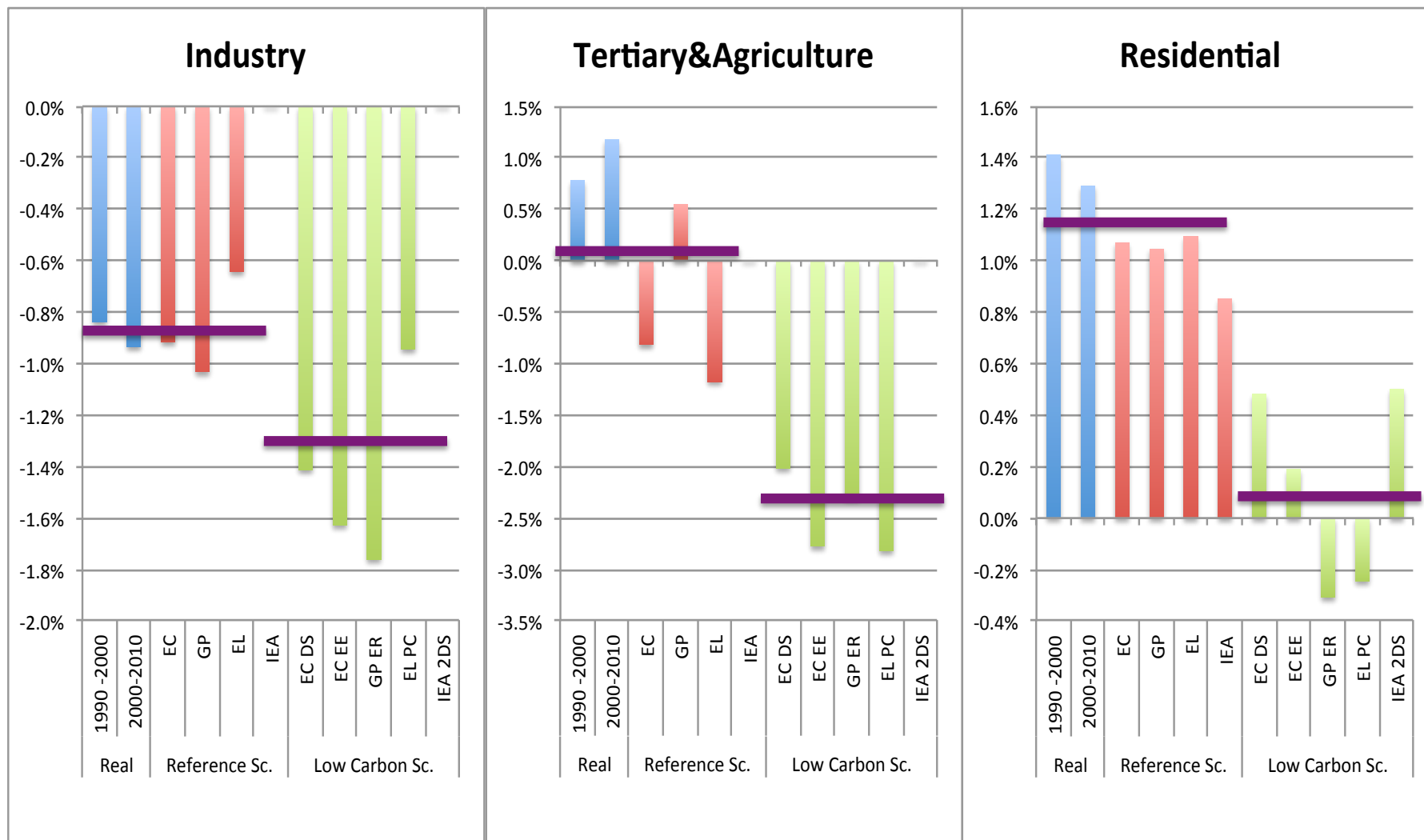
Demand Side

Net growth of electricity demand due to large penetration of electric mobility



Mitigating conventional demand growth: Needs massive efficiency efforts

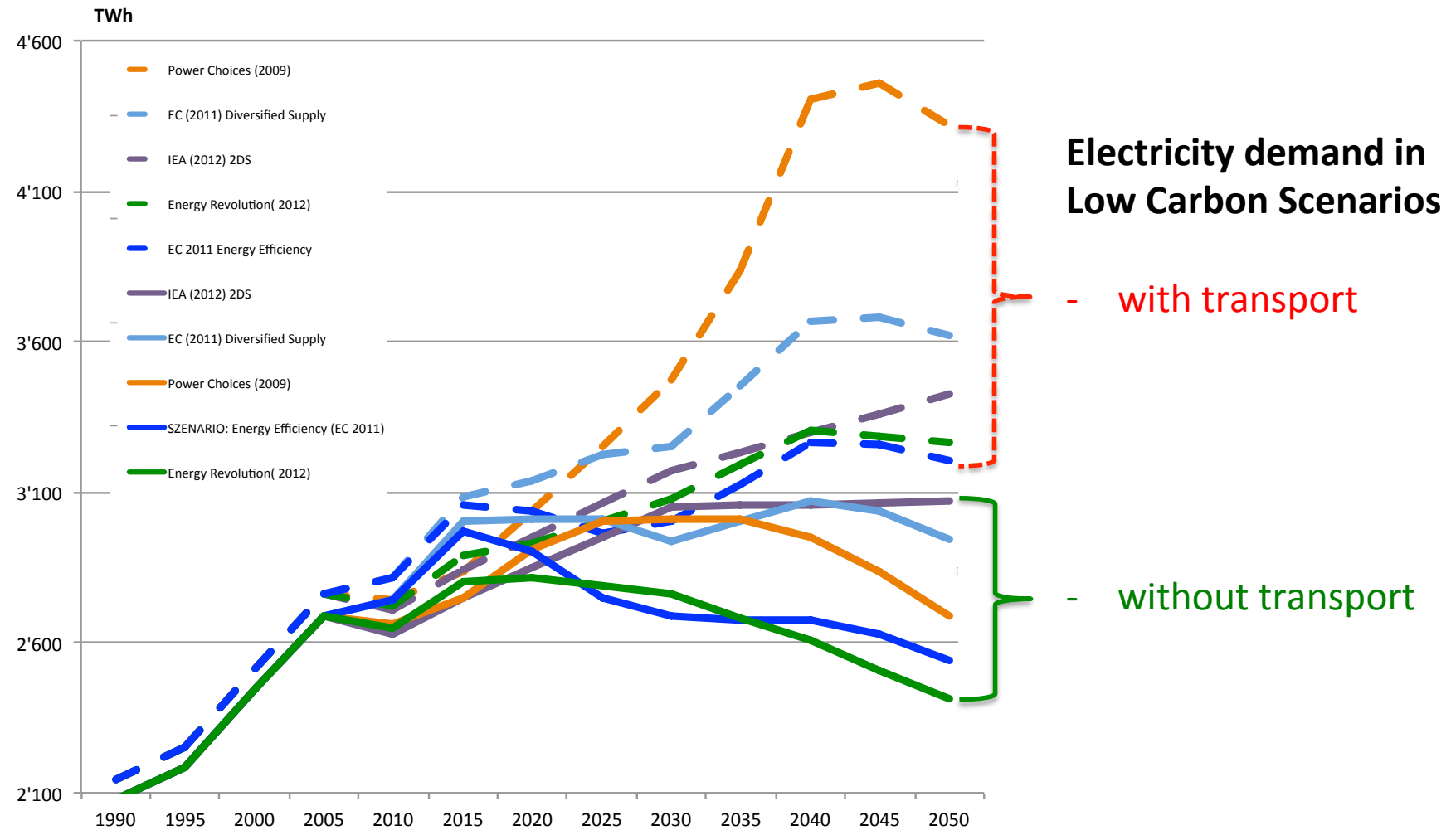
Annual change in electricity intensity*) by demand sector (EU 27)



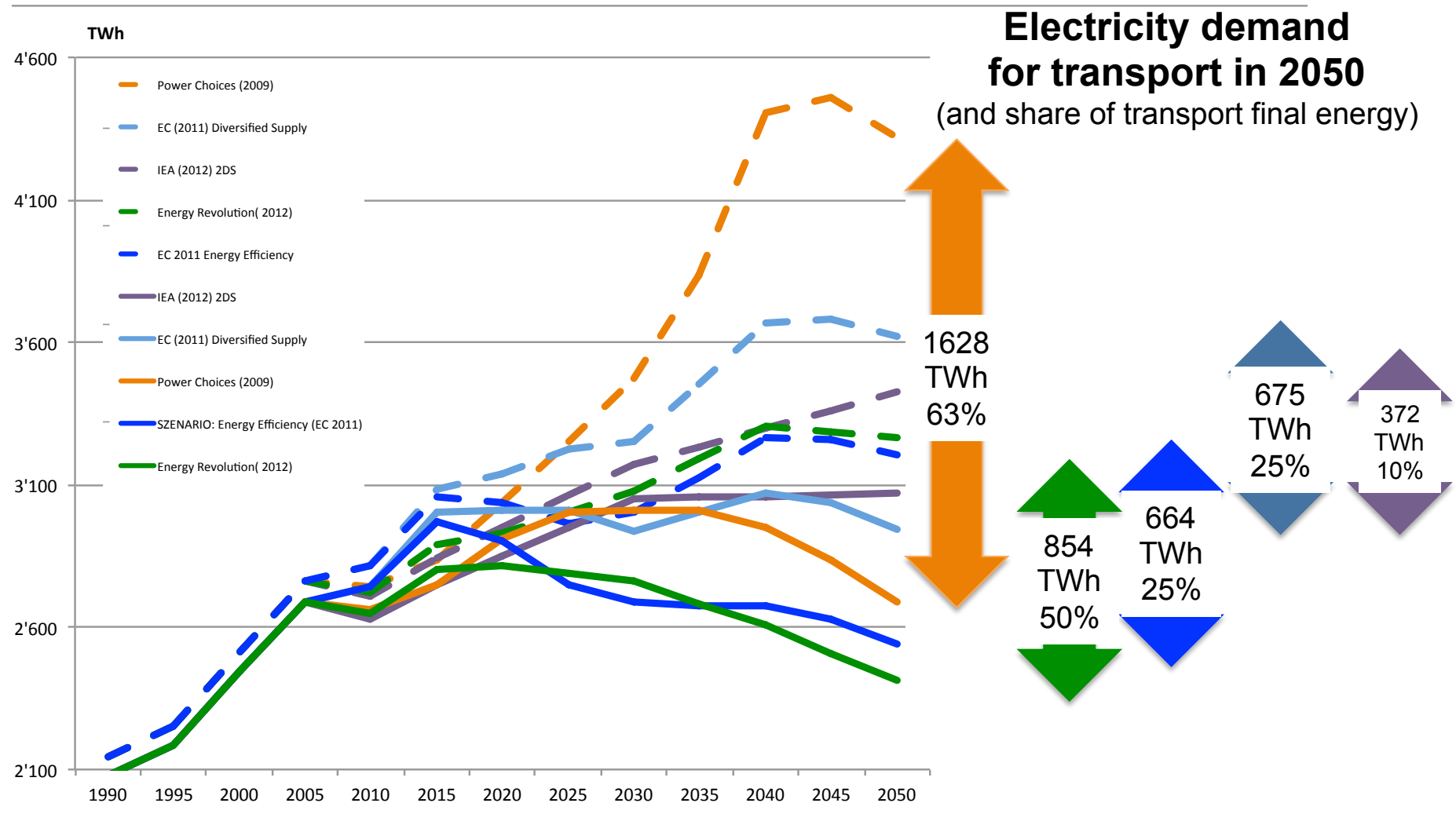
*) Industry; tertiary and agriculture: electricity use per unit of sectoral value added; Residential: electricity use per capita;

**) for GP scenarios: study does not separate residential and tertiary sectors

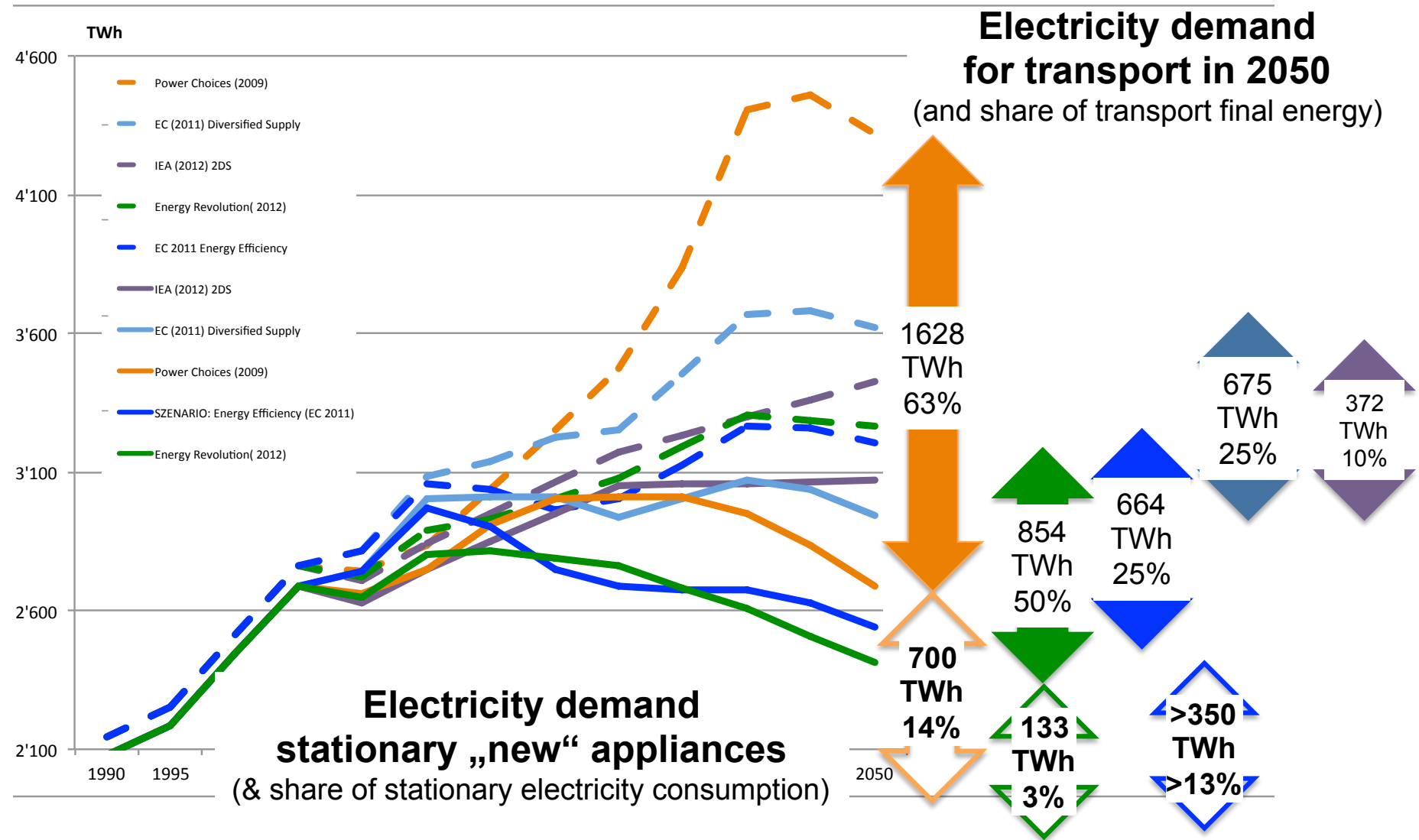
Transport sector alone drives electricity demand growth



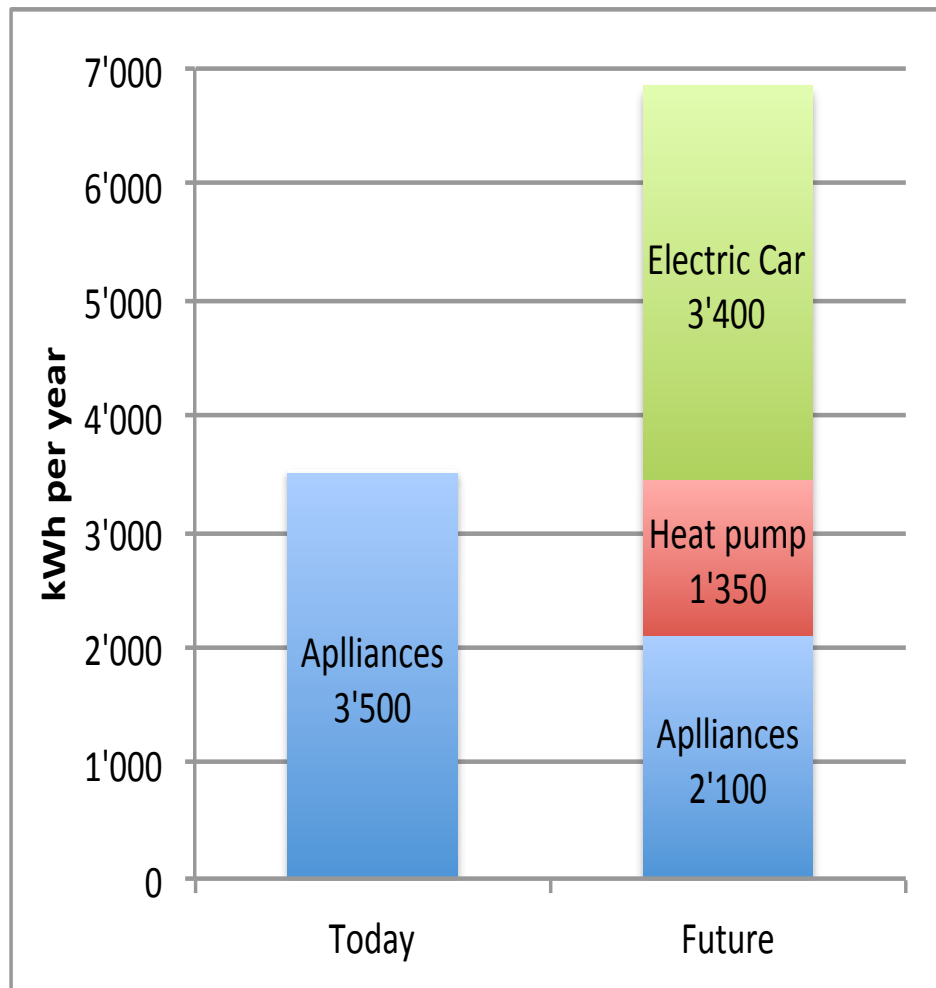
Electricity is expected to supply high shares of transport energy demand (and even higher of passenger transport volumes)



„New“ stationary appliances (heat pumps) have much lower volumes



Example

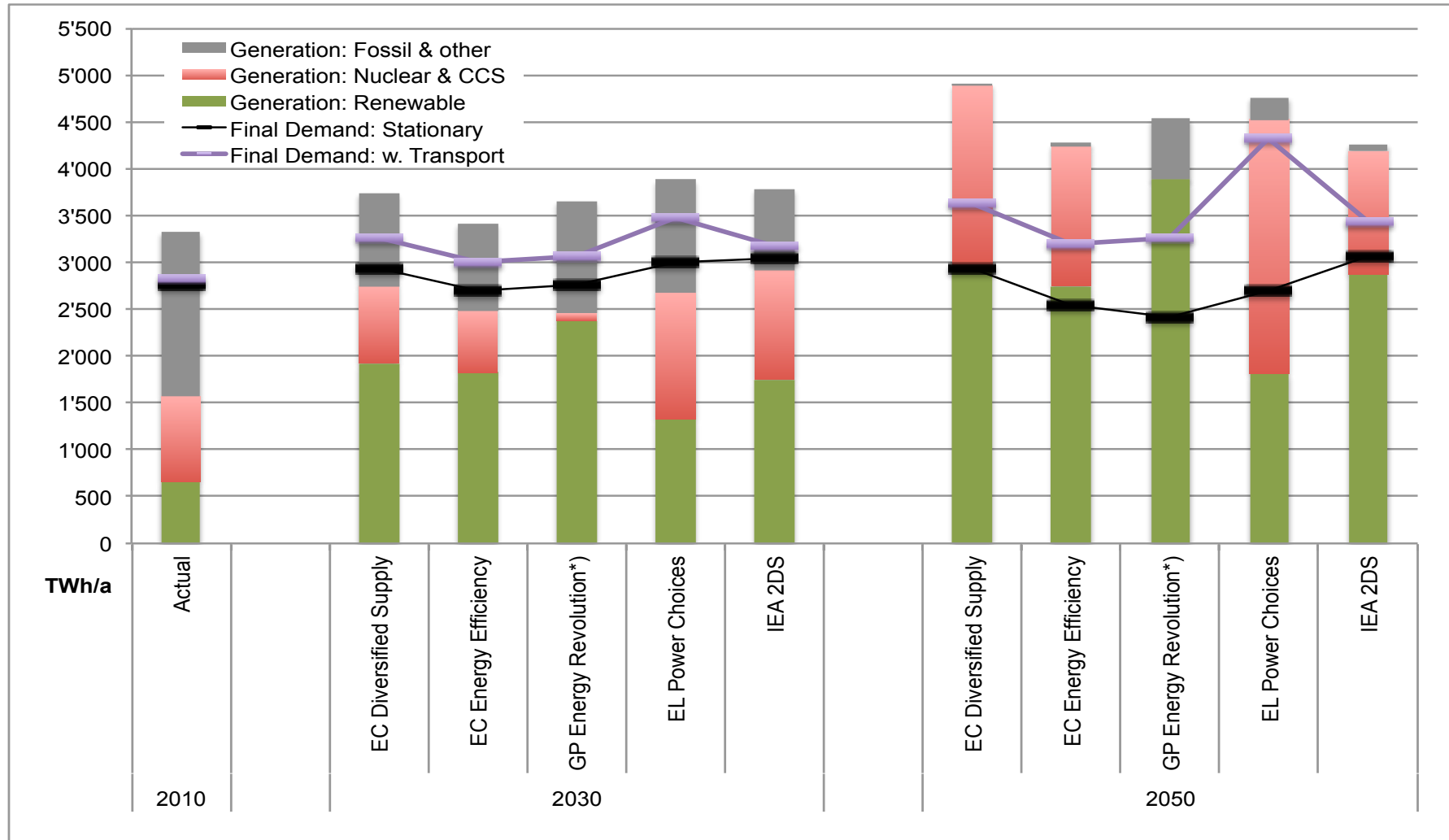


Comparison of a „typical“ residential household 2010 and 2050:

- High savings potentials in appliances (-40%)
- Compensate for heating a low energy house with electric heat pump
- Electric car doubles consumption

Relevance of demand side efficiency for the supply side

By 2050 RES will be able to almost fully supply stationary demand
Nuclear & CCS only needed for electric mobility



Conclusion 1

All Low Carbon Electricity system studies agree:

- Demand side is crucial for the successful realisation of low-carbon scenarios
- A strong integrated policy for electricity efficiency is needed for:
 - Doubling of rates of electricity intensity decreases in the *industrial* sector,
 - Reversing the trend of increasing electricity intensity in the *tertiary* sector
 - Stabilising per capita electricity use in the *residential* sector despite a significant increase in the use of electric heat pumps
- Contradictory? policy challenges
 - A) Electricity use that is *not* substituting fossil fuels should be discouraged
 - B) electricity for vehicles and heat pumps needs to be encouraged

Conclusion 2

Policy instruments for these opposing challenges could be:

- Stronger price increases for transport and heating fuels.
- Tailored legal measures such as minimum standards for all appliances.
- Specific regulation for buildings and transport in order to incentivise the (efficient) use of electricity in these sectors.
- White certificate schemes (savings obligations) which allow electricity suppliers to sell more electricity to their customers if they help customers reduce fossil fuel use.

But...



in reality often the opposite is happening

- Abolishment of electrical storage heaters (by 2020) has been cancelled in Germany
 - 1.6 Million dwellings
 - 13-14 TWh of electricity use
- Reason given:
 - Balancing of fluctuating RES power
- But:
 - Hardly any excess of RES electricity to be stored
 - Excess electricity occurs in North-Germany, storage heaters are installed in the south and West
 - German System gets increasingly thermosensitive

Thank you for your attention!



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For more scenario comparisons see:

<http://www.sefep.eu/activities/projects-studies/metastudy>

http://www.wupperinst.org/projekte/proj/index.html?projekt_id=388&bid=30