UNIVERSIDAD PONTIFICIA ICAI ICADE COMILLAS MADRID

INSTITUTO DE INVESTIGACIÓN TECNOLÓGICA - IIT

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Potential options for mitigation of climate change from the energy and transport sectors

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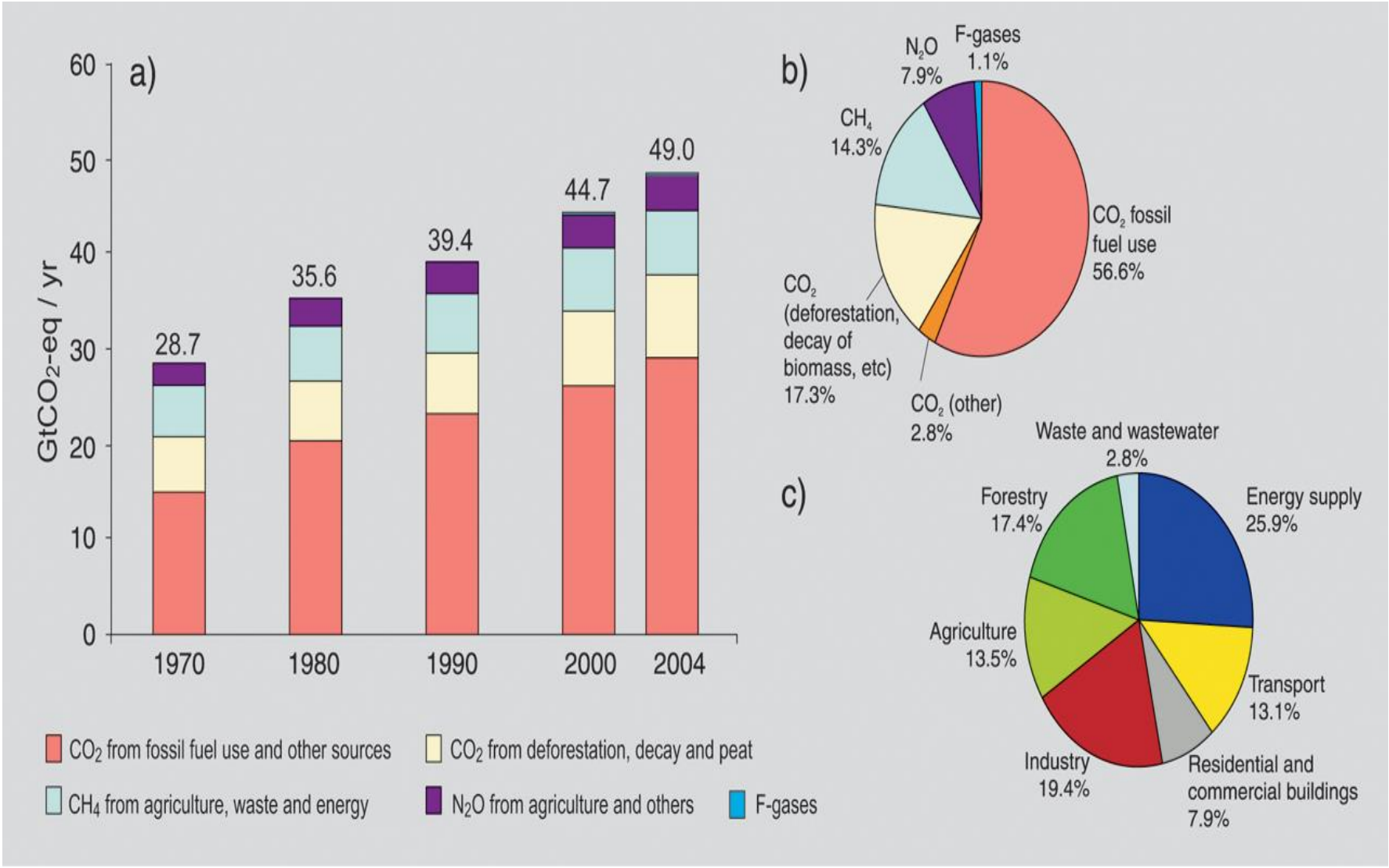
Global GHG emissions



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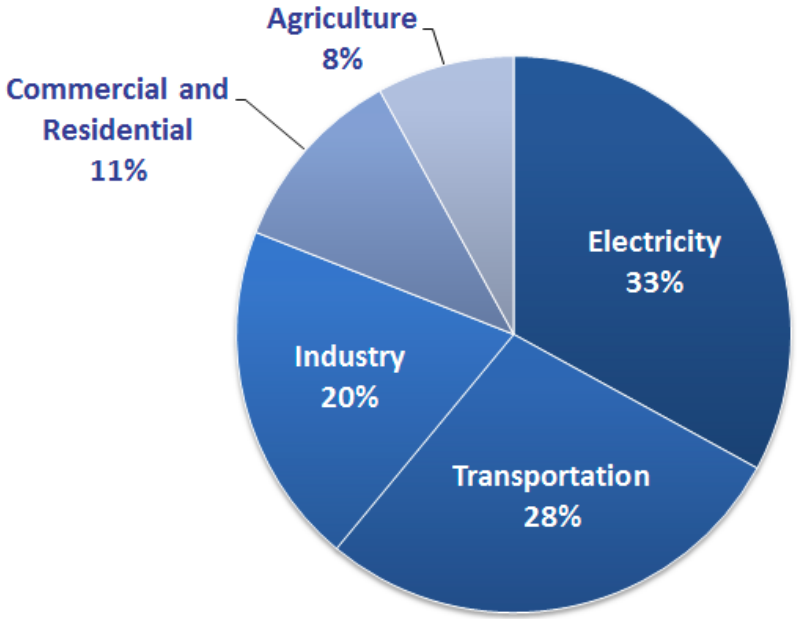
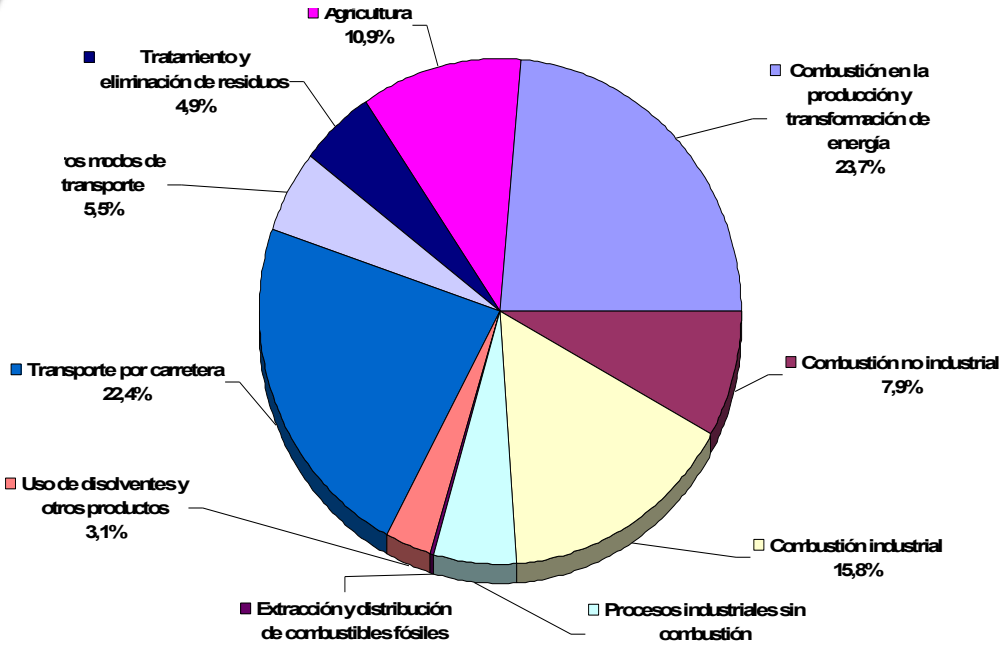
Spain and the US, 2011





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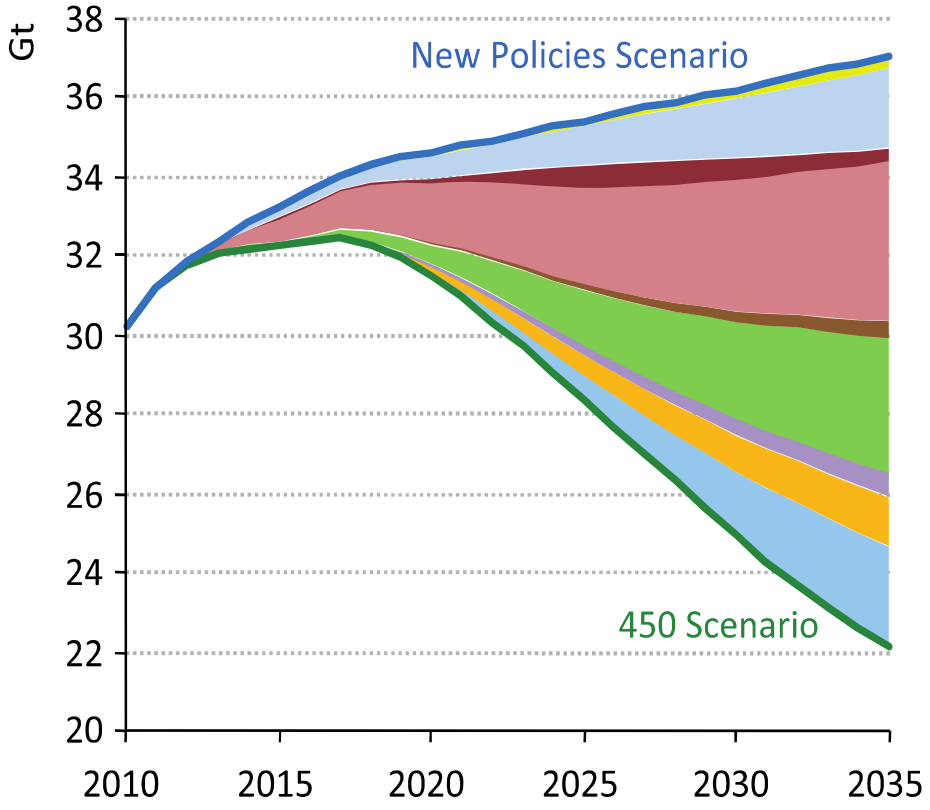
Mitigation options

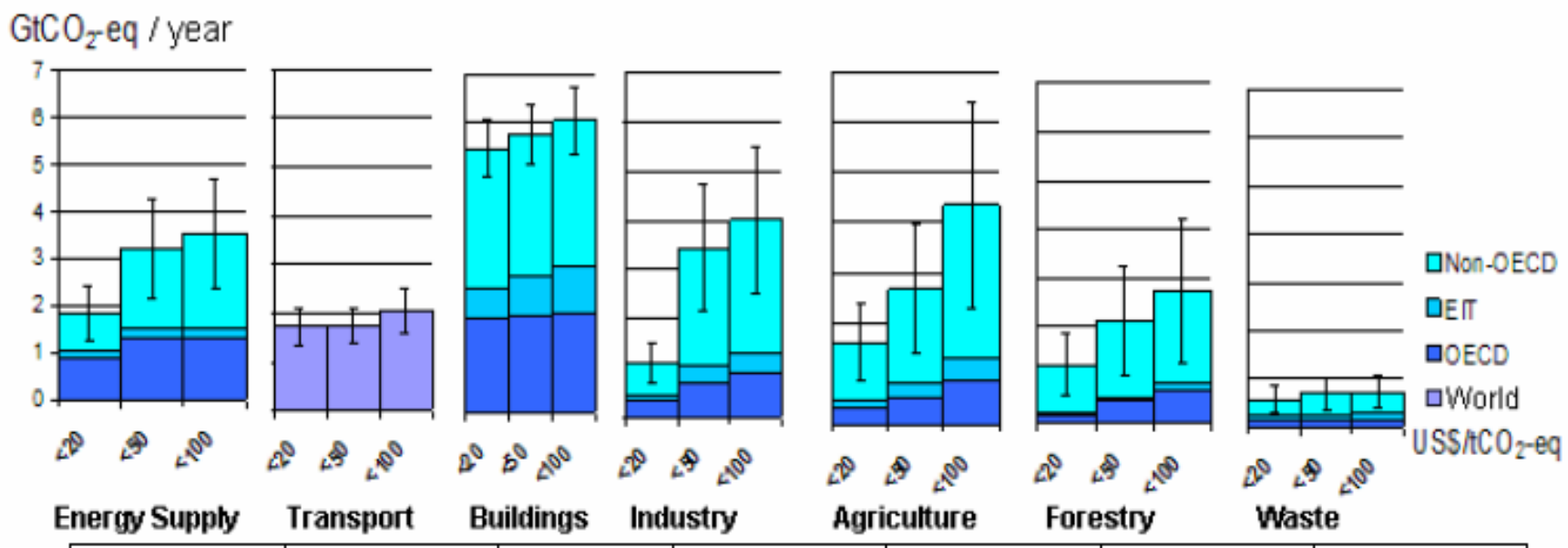


Source: IEA World Energy Outlook 2012

CO_2 abatement	2020	2035
Activity	2%	2%
End-use efficiency	18%	13%
Power plant efficiency	3%	2%
Electricity savings	50%	27%
Fuel and technology switching in end-uses	2%	3%
Renewables	15%	23%
Biofuels	2%	4%
Nuclear	5%	8%
CCS	4%	17%
Total (Gt CO_2)	**3.1**	**15.0**

Behavioral vs Technological

Potentials and carbon prices



(potential at <US$100/tCO$_2$-eq: 2.4 - 4.7 Gt CO$_2$-eq/yr)	*(potential at <US$100/tCO$_2$-eq: 1.6 - 2.5 Gt CO$_2$-eq/yr)*	*(potential at <US$100/tCO$_2$-eq: 5.3 -6.7*	*(potential at <US$100/tCO$_2$-eq: 2.5 - 5.5 Gt CO$_2$-eq/yr)*	*(potential at <US$100/tCO$_2$-eq: 2.3 - 6.4 Gt CO$_2$-eq/yr)*	*(potential at <US$100/tCO$_2$-eq: 1.3 - 4.2 Gt CO$_2$-eq/yr)*	*(potential at <US$100/tCO$_2$-eq: 0.4 - 1 Gt CO$_2$-eq/yr)*

Figure SPM 6: *Estimated sectoral economic potential for global mitigation for different regions as a function of carbon price in 2030 from bottom-up studies, compared to the respective baselines assumed in the sector assessments. A full explanation of the derivation of this figure is found in 11.3.*

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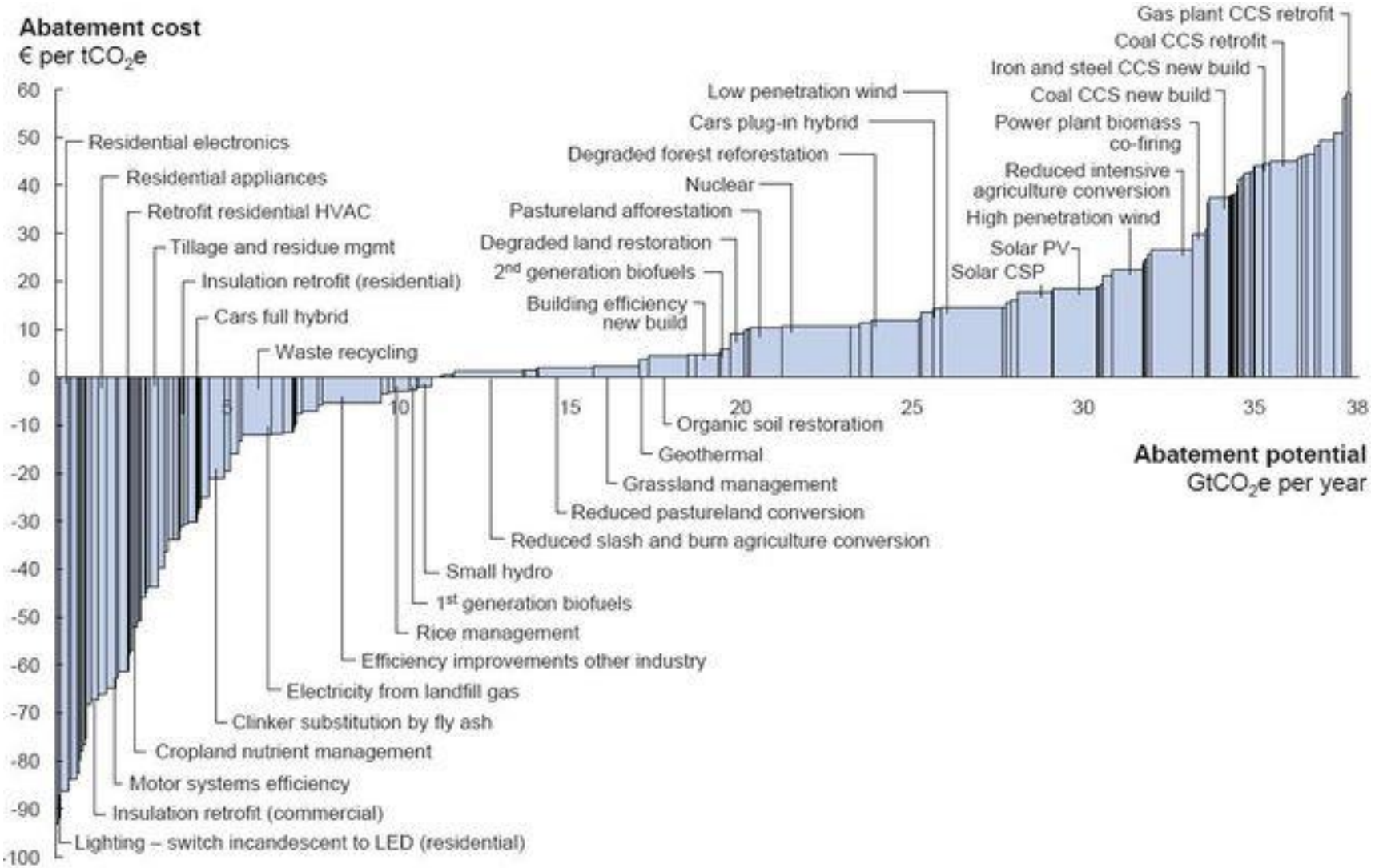
Assessing costs and potentials

- It is easy to overestimate potentials and underestimate costs

- Counterfactual scenarios
- Public vs Private perspectives
  - Discount rates
  - Taxes
- Interactions between options
- Rebound effect
- Bottom-up vs. Top-down

The McKinsey curve



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

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The Economics for Energy curve

- Expert-based
- Only technological changes
- Interaction between options
- Private and public perspectives
- 80% of energy consumption in Spain
- How to translate energy into GHG mitigation?
  - Electricity: 0.3 tCO2/MWh
  - Transport: 0.25 tCO2/MWh

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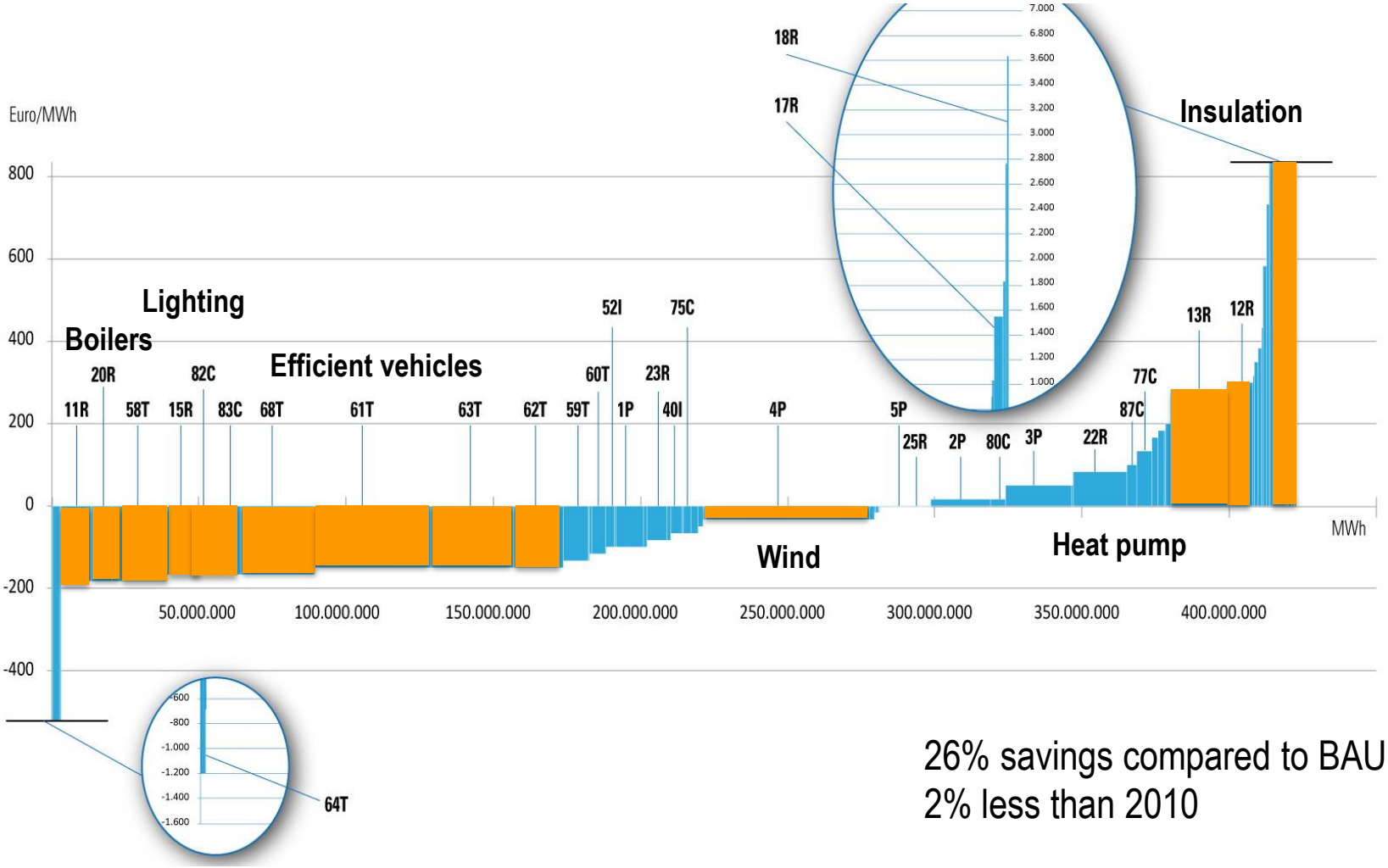
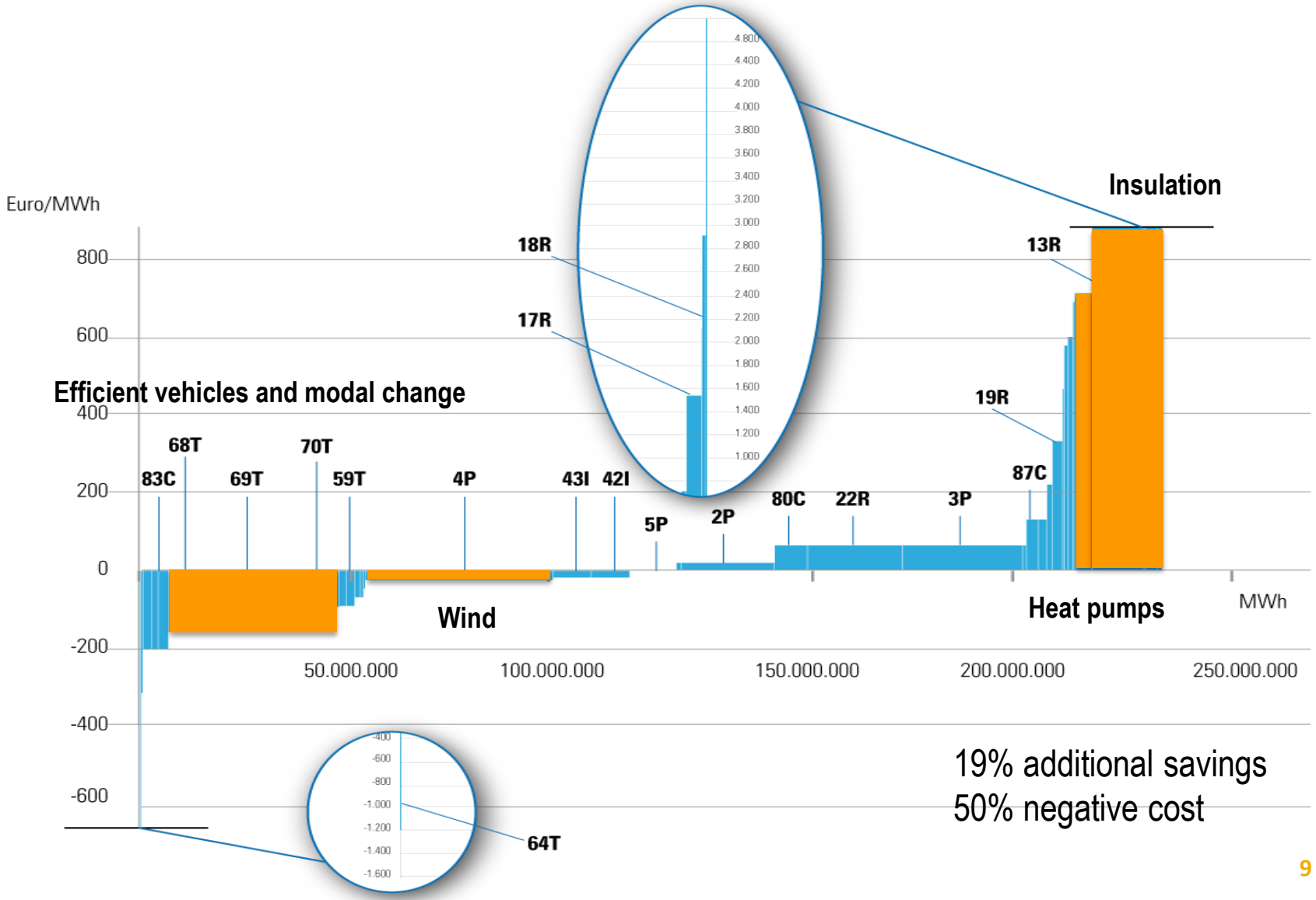
Counterfactual scenario



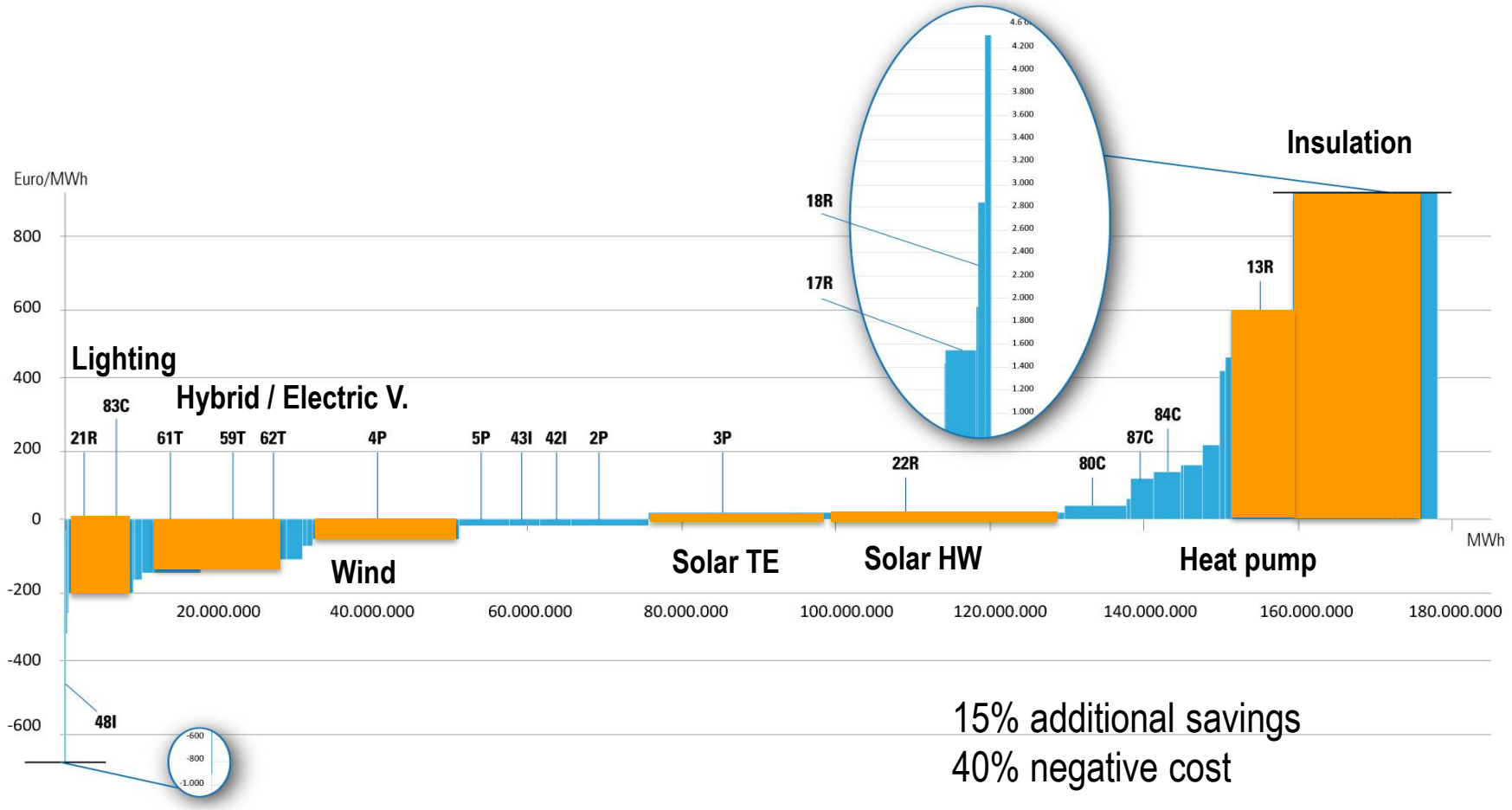
26% savings compared to BAU
2% less than 2010

“Strong policy” scenario



19% additional savings
50% negative cost

“Advanced technology” scenario



15% additional savings
40% negative cost

Why don’t we use negative cost measures?

- The energy-efficiency paradox
- Non-monetary barriers
  - Hidden or transaction costs
  - Lack of awareness
  - Inertia
  - Risk premium
  - The problem is not economic: subsidies may be useless

Why do some measures look so expensive?

- Lack of the right information
  - Very difficult to get reliable data (non-ETS)
  - Data aggregation: there may be niches
- Multiple objectives (e.g., buildings)
  - How to allocate the costs?
- Interaction between measures

Priority options

- Efficient / Hybrid vehicles
- Efficient lighting
- Modal change in transport
- Efficient heating & cooling
- Solar water

- Heat pump results are questionable
  - Other studies get much better results
- Rehabilitation of buildings might be interesting if other factors are considered (and also its great potential for reduction)

Conclusions

- Large abatement potential in the energy and transport sector
  - Technology change has a limited range
  - We need behavioral changes
- The cost may be very low, even negative
- In other cases, the cost is very high
  - But other factors can be considered
- Results depend very much on fuel prices
- General lack of data for these analyses

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Thanks!

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