
Mitigation targets & carbon value: insights from TIMES-FR

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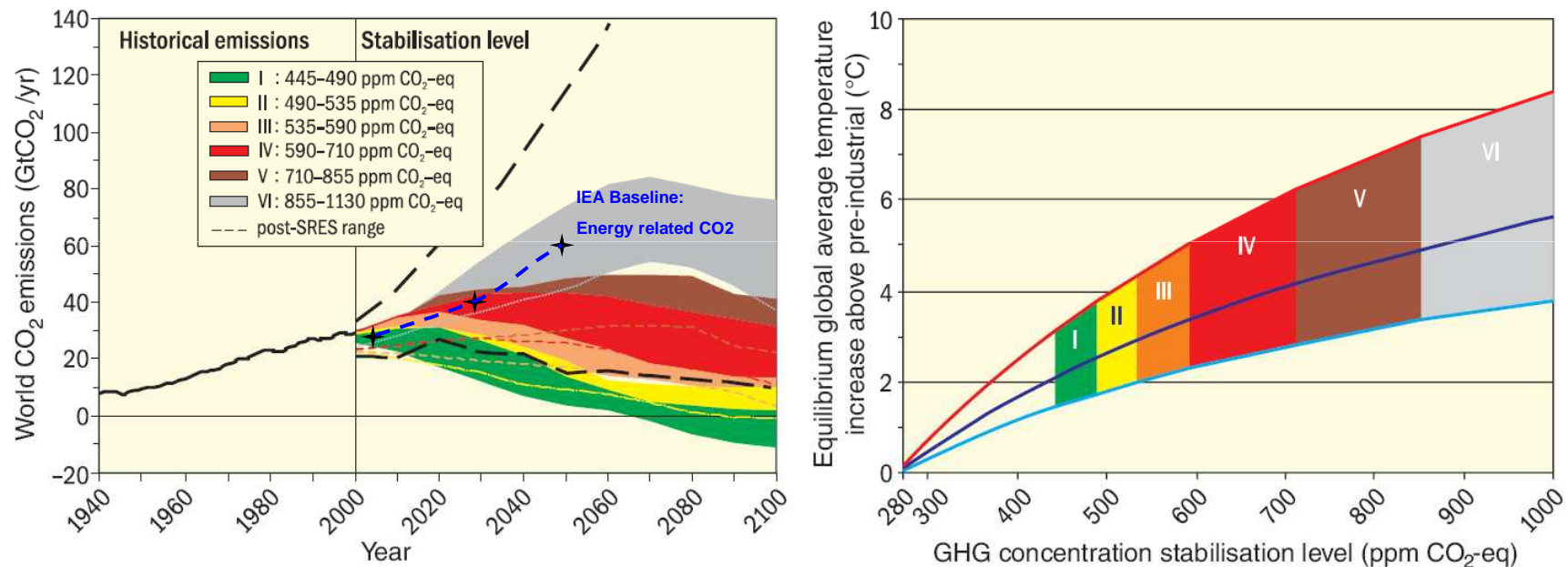
« Carbon and prospective », Sophia Antipolis 2008



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From worldwide awareness to stronger targets: mitigation levels and costs?

CO₂ emissions and equilibrium temperature increases for a range of stabilisation levels



Sources: IPCC Fourth Assessment report & IEA ETP08

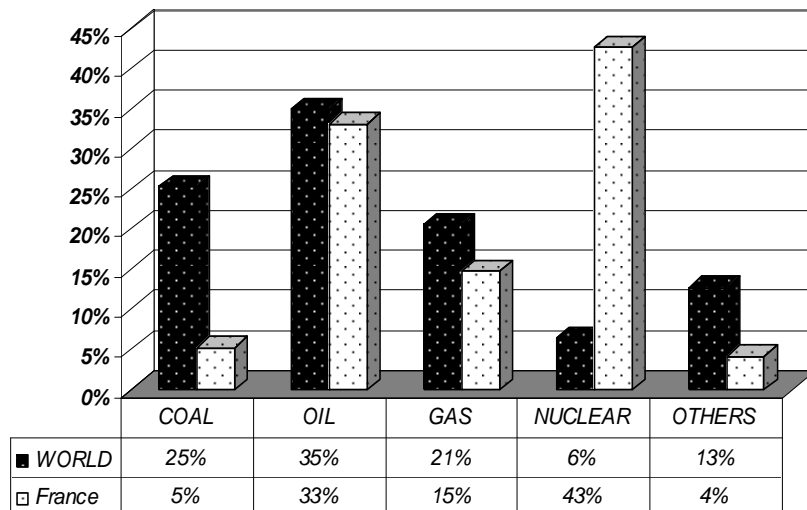
- Usefulness of the carbon value as synthetic cost indicator



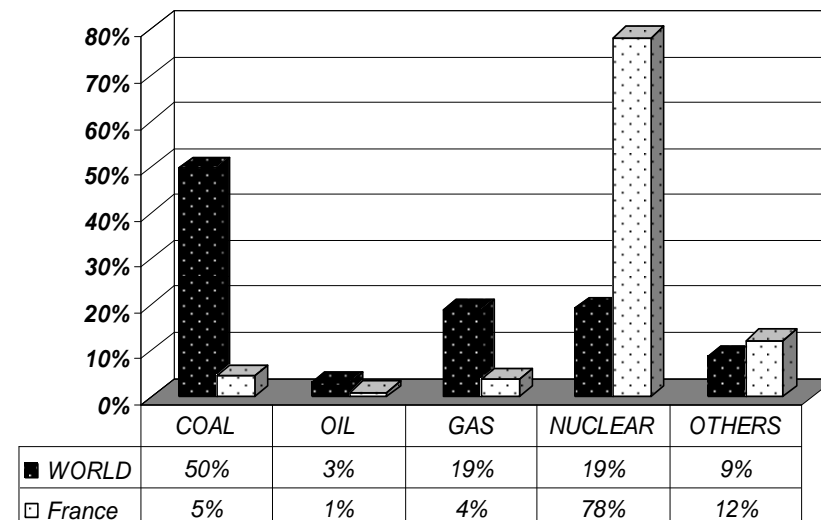
Country specificities matter

- Sovereignty and differences in opportunities

SHARES OF TOTAL PRIMARY ENERGY SUPPLY



SHARES OF NET ELECTRICITY PRODUCTION



- Constraints on technologies and trades expansion
- All targets ... end-up as country level ones

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French GHG emission targets

- 2008-2010-Kyoto: In the good direction for stabilization

GHG level vs Kyoto	1996	1998	2000	2002	2004	2005	2006
UE (15 pays)	107%	106%	105%	105%	107%	107%	106%
France	101%	102%	99%	97%	98%	98%	96%

- 2020-EU Energy and climate package
 - EU mitigation target: -20% CO₂eq vs 1990
 - 2008 burden sharing FR: -14% CO₂eq vs. 2005
- 2050-FR
 - Factor 4: Energy orientation law
 - Factor 2 to 2.5: F4 review by the Energy commission 2007



Carbon value assessment with TIMES-FR

- A resource allocation model to investigate energy resources and technology choices for supply and demand in France
- Analysis of the abatement cost of carbon:
 - “Benchmark” scenarios: Baseline, Low demand, -50%
 - Taxes scenarios: predefined profiles
 - Sensitivity analysis
- Energy related CO2 only

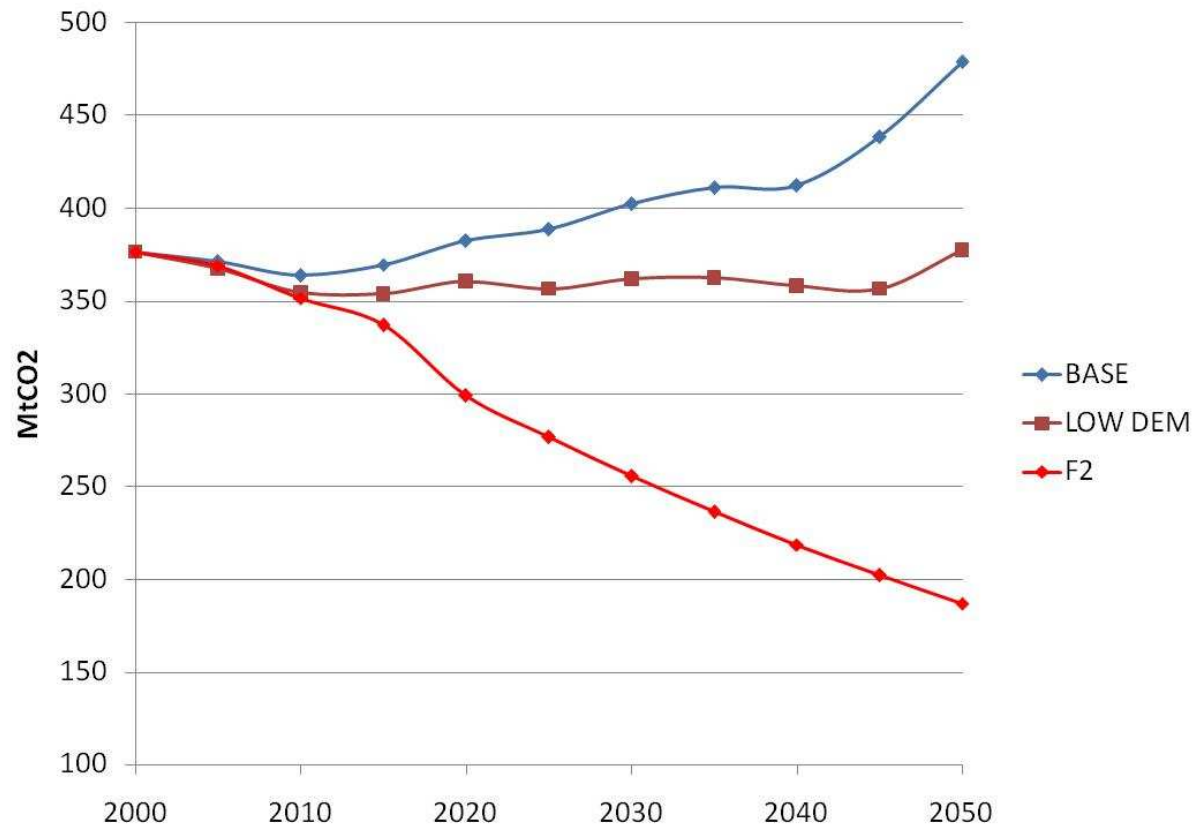
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Scenarios for an exploration

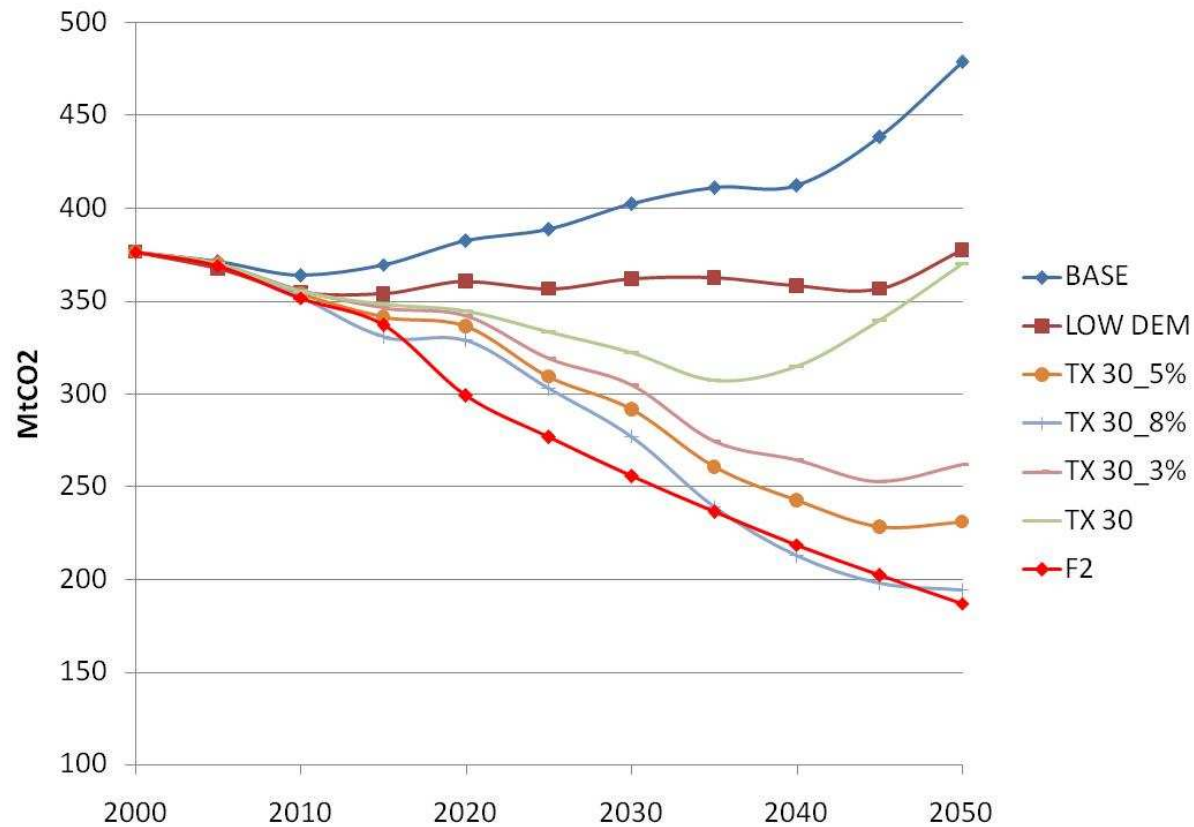
- 3 “benchmarks”: Base, low demand, Factor2
- 7 tax profiles
 - Initial values 2010: 30€/tCO₂, 100€/tCO₂
 - Yearly growth rate: 0%, 3%, 5%, 8%
- What we want to understand:
 - Resulting abatement level
 - Time dependency of the carbon value: taxes or dual values

Results on CO2 emissions



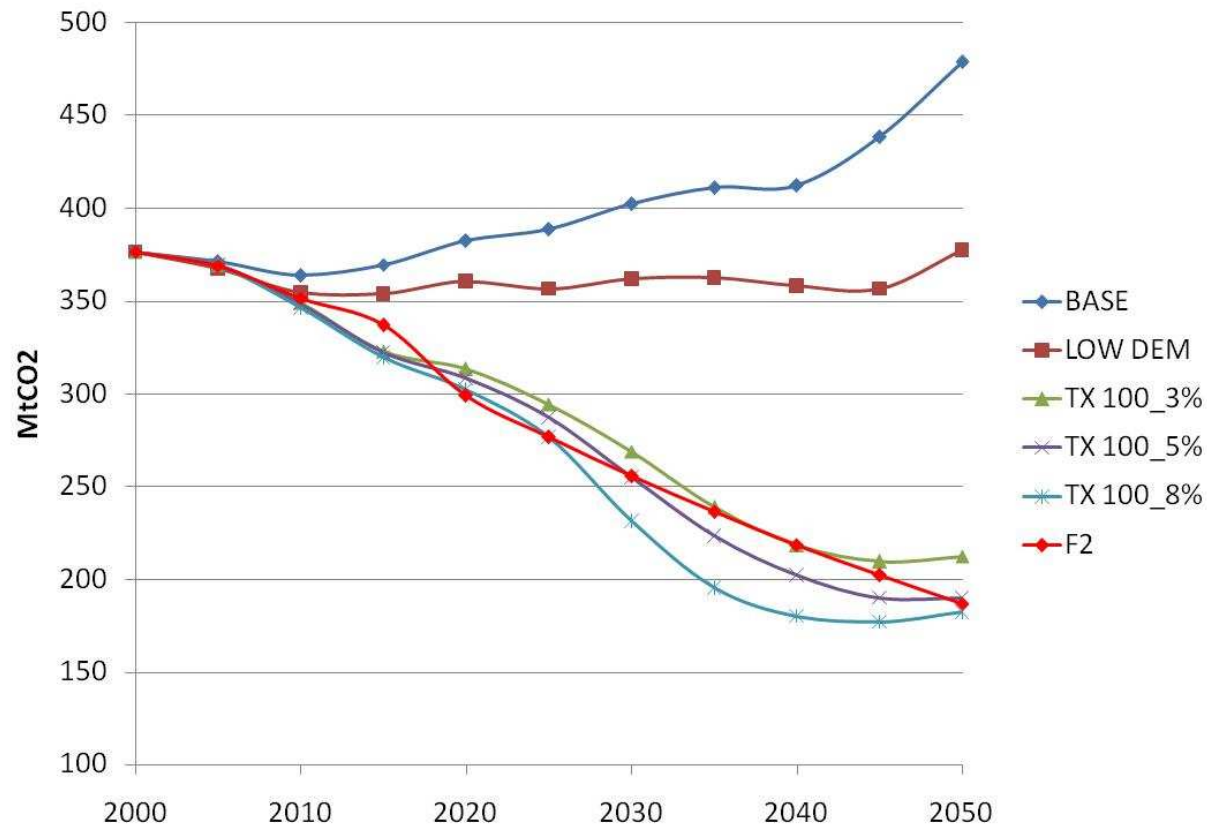
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Results on CO2 emissions



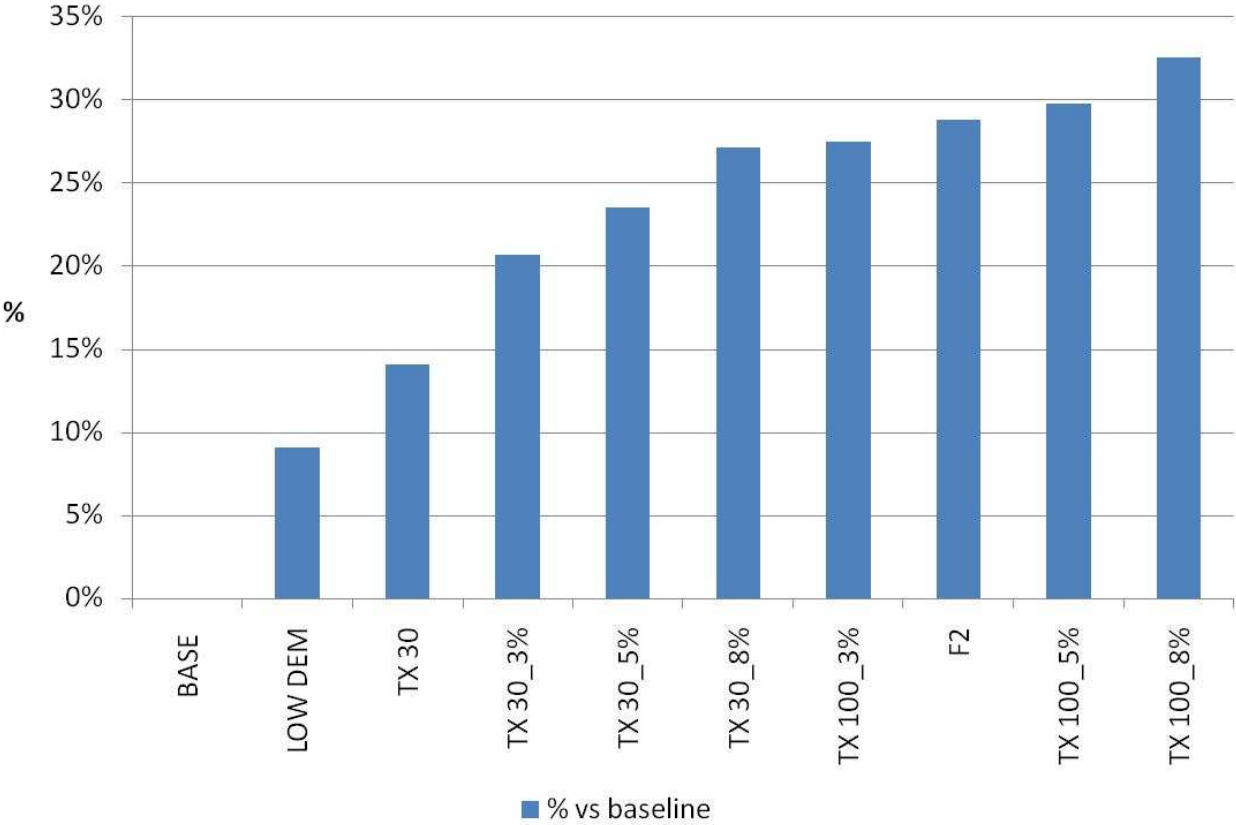
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Results on CO2 emissions

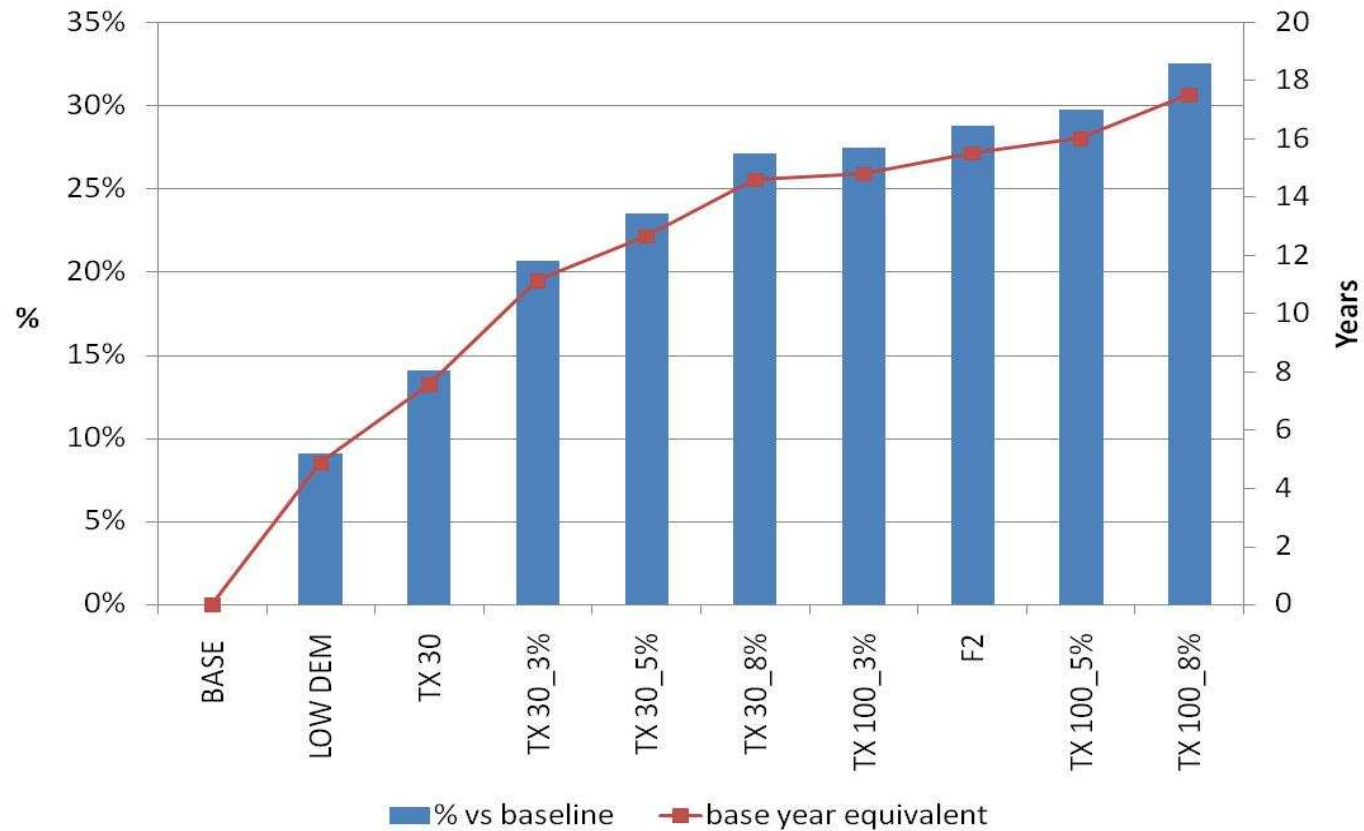


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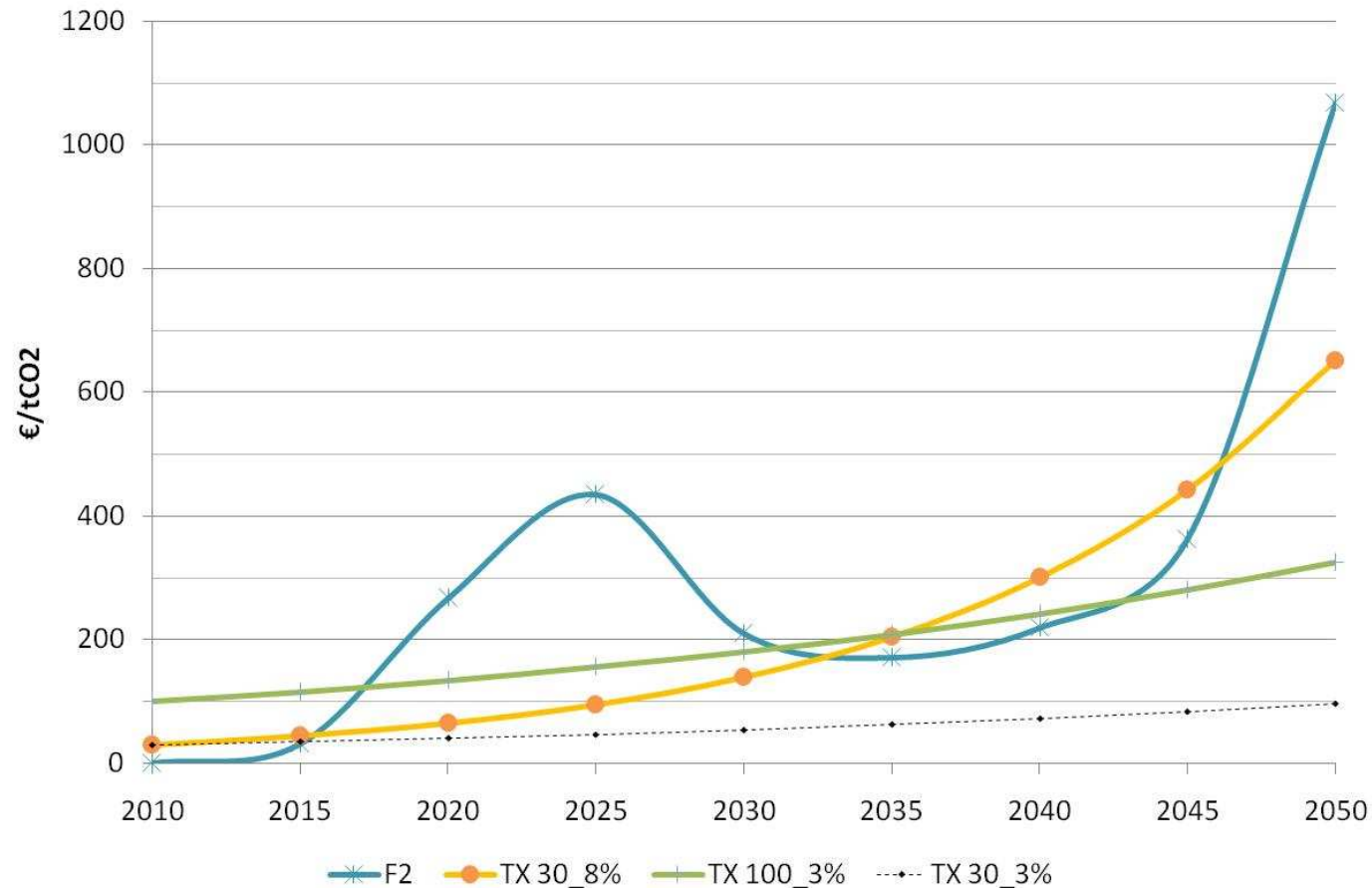
Cumulative CO2 emissions



Cumulative CO2 emissions



Carbon values



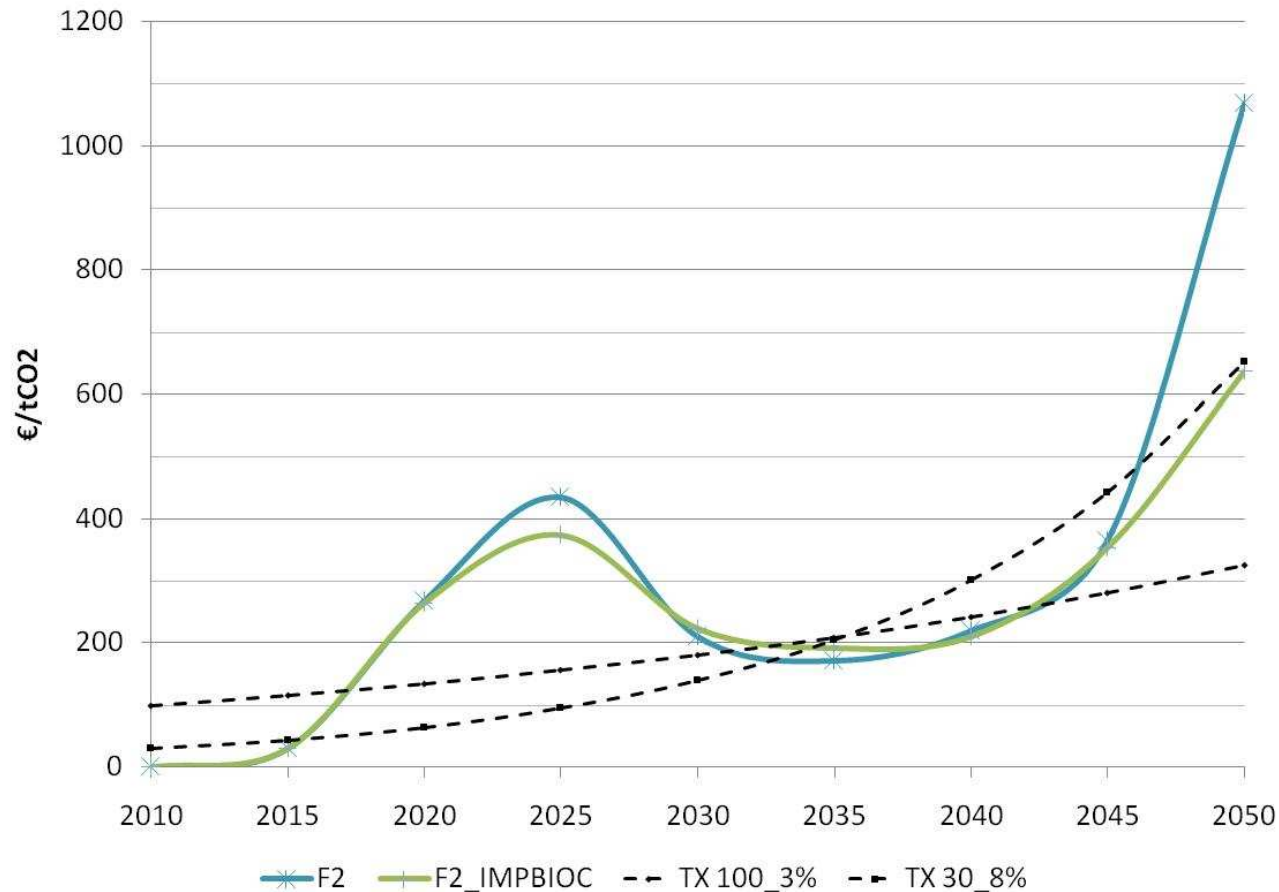
Scenarios for sensitivity analysis

- 3 types of sensitivity
 - Trade: importation of biofuel
 - Technology: nuclear development, CCS
 - Future useful energy service demand
- What we want to understand: How these factors influence the carbon value level and its time dependency?

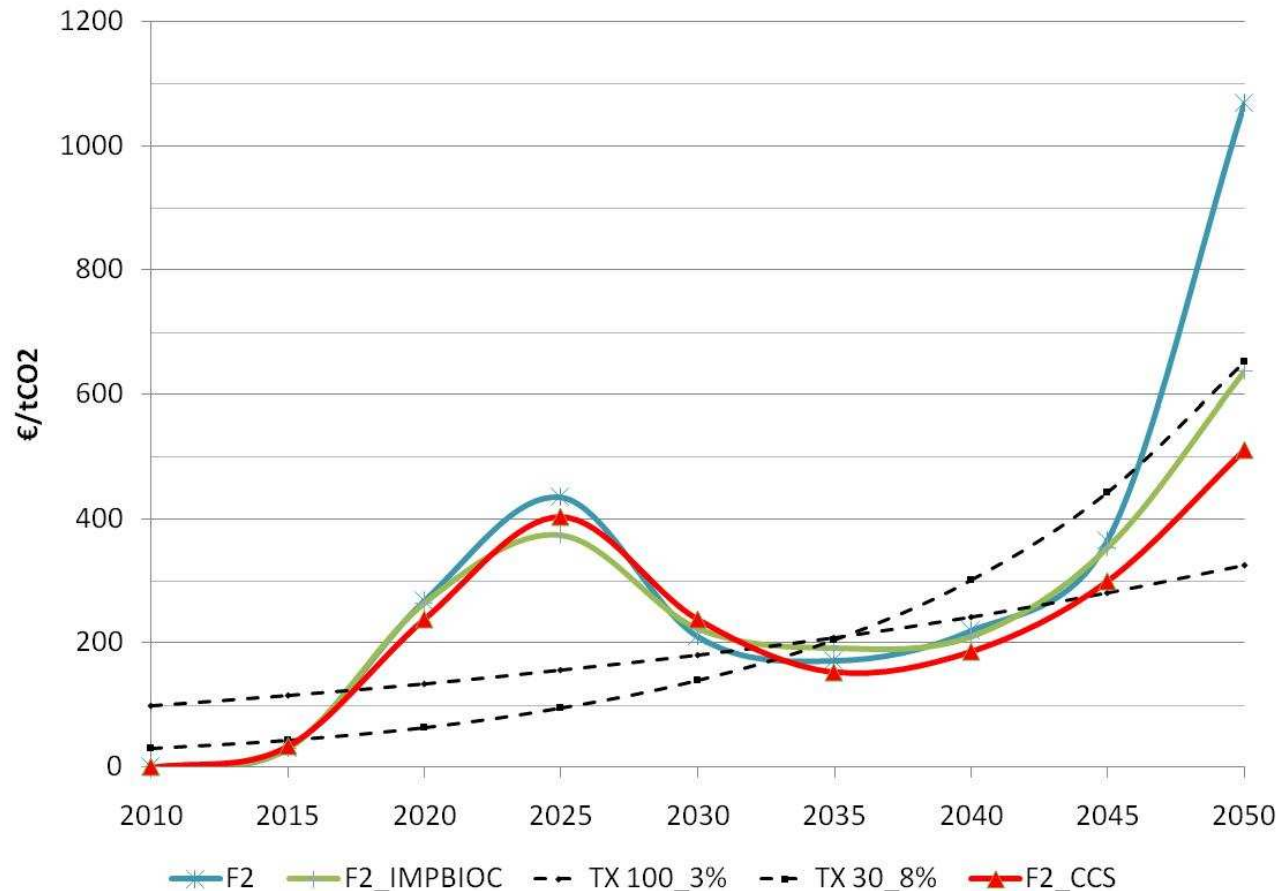
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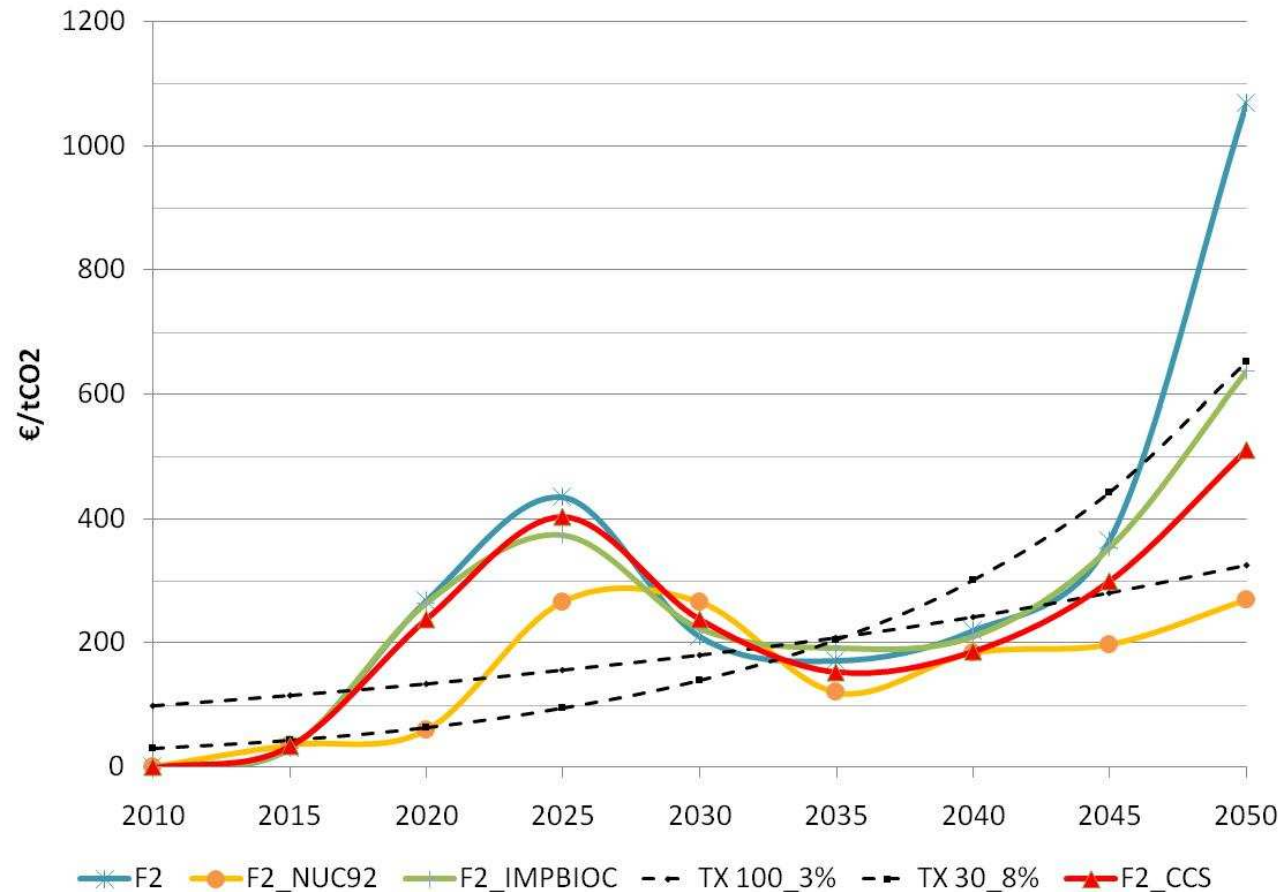
Sensitivity analysis: Trade and technology



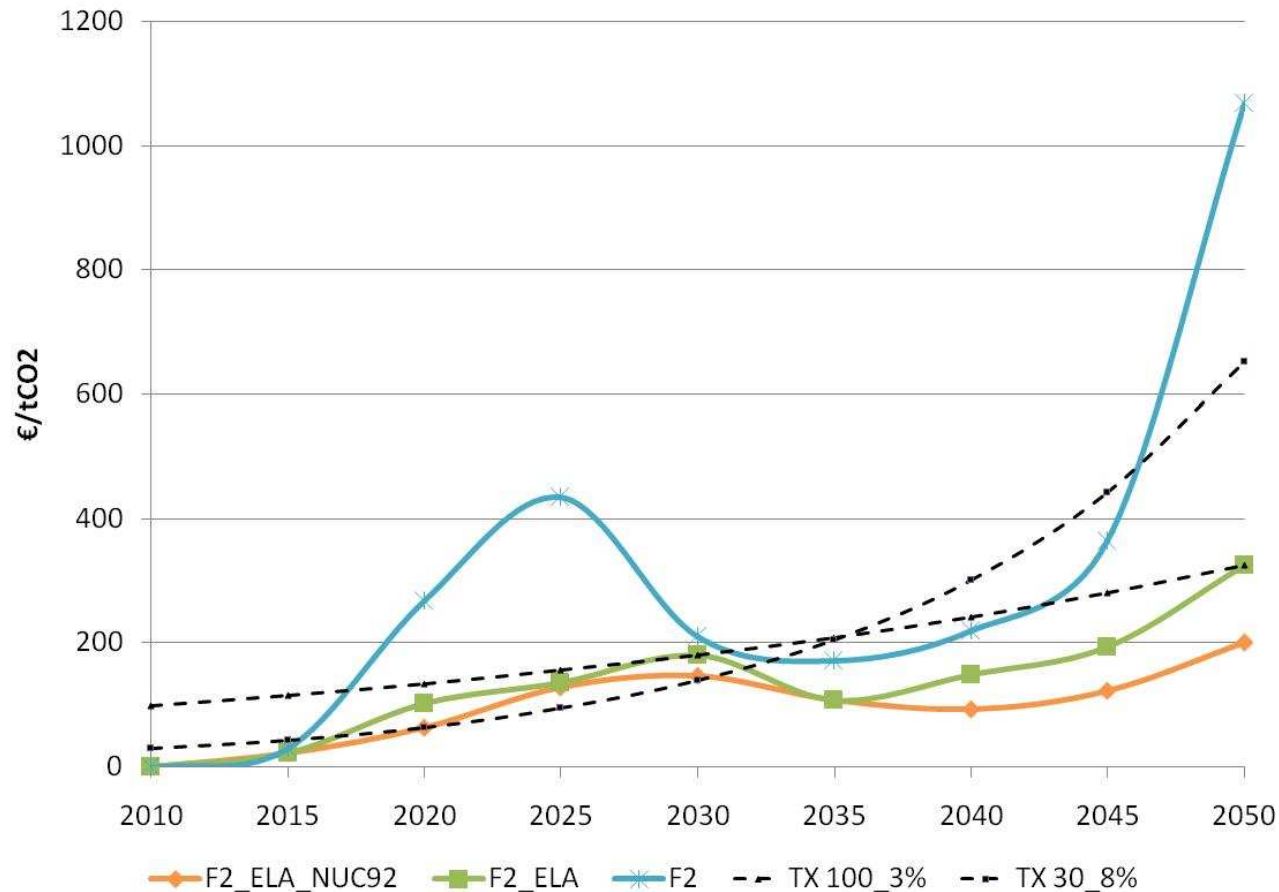
Sensitivity analysis: Trade and technology



Sensitivity analysis: Trade and technology



Sensitivity analysis: demand levels



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Concluding remarks

- Predefined tax profiles can be effective to achieve the mitigation target but they provide very few information about the tightness of the target. Proxy WTP and no unicity.
- Marginal value gives such information. It shows that carbon value does not necessarily increase and can capture the impact of intermediate targets such as the 2020 objective. The time dependency is in turn more contingent.

Concluding remarks

- For France the sensitivity analysis quantifies some important factors affecting the level and shape of the carbon value: biofuel import, nuclear expansion and demand “sobriety”
- Interest of a country scale study through TIMES-FR: Is the value high or low? The answer in both cases is yes. Taking this value with explicit understanding of underlying conditions is indeed more **value added**.

Thank you!

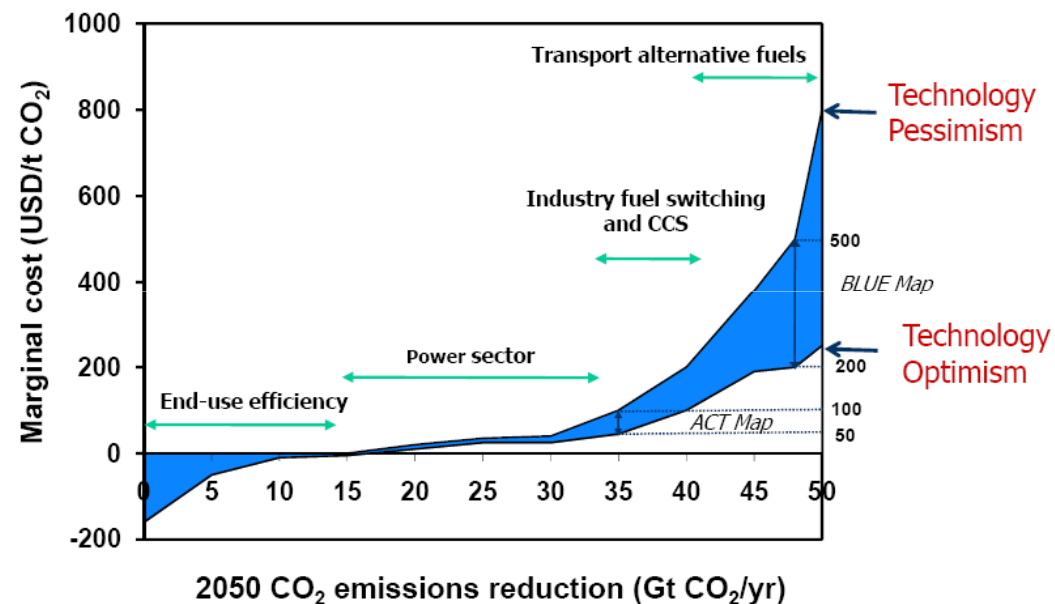


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Additional illustrations 1

Cost of Emissions Reductions

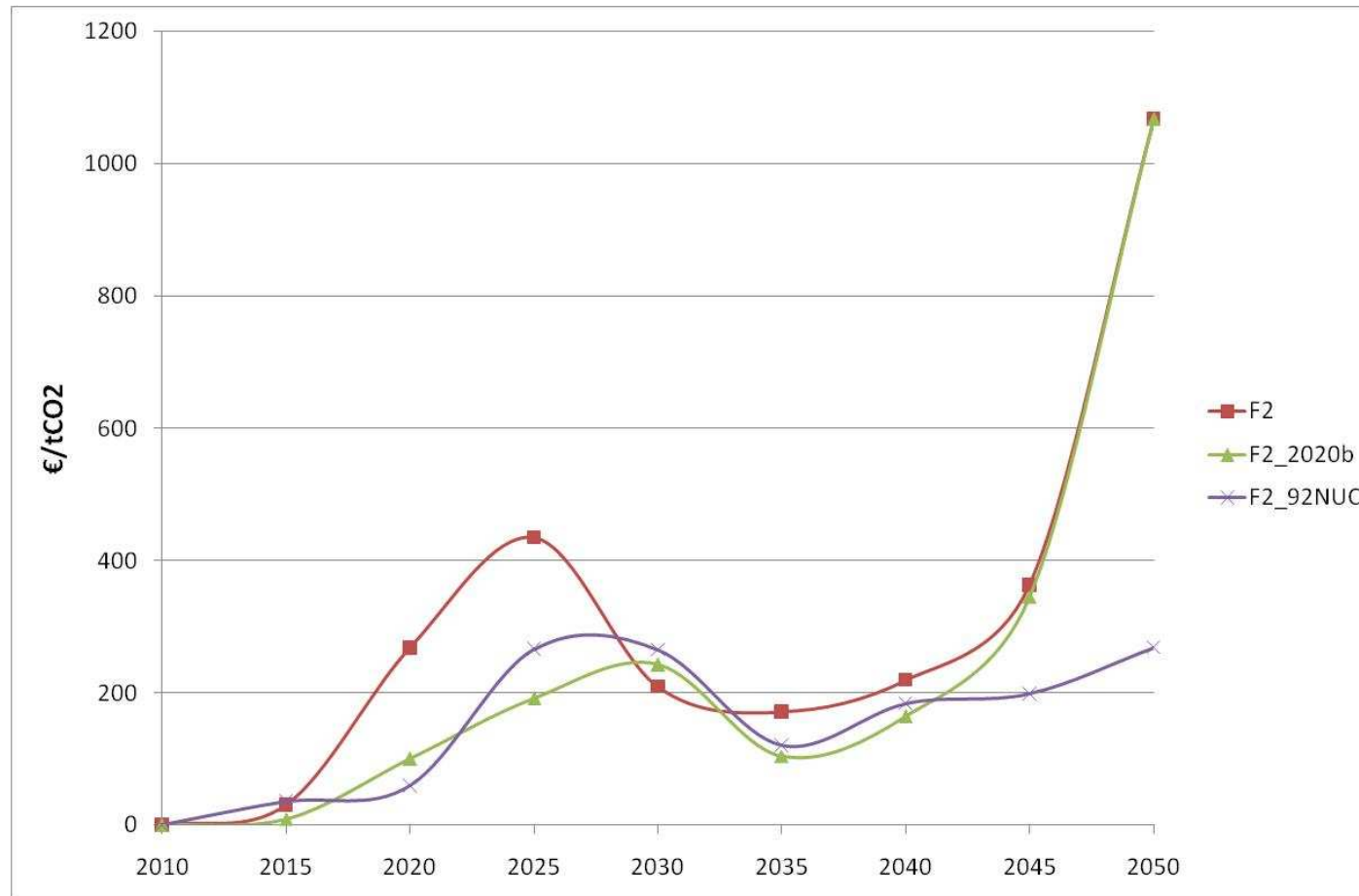


To bring emissions back to current levels by 2050 options with a cost up to USD 50/t are needed. Reducing emissions by 50% would require options with a cost up to USD 200/t, possibly even up to USD 500/t CO₂.

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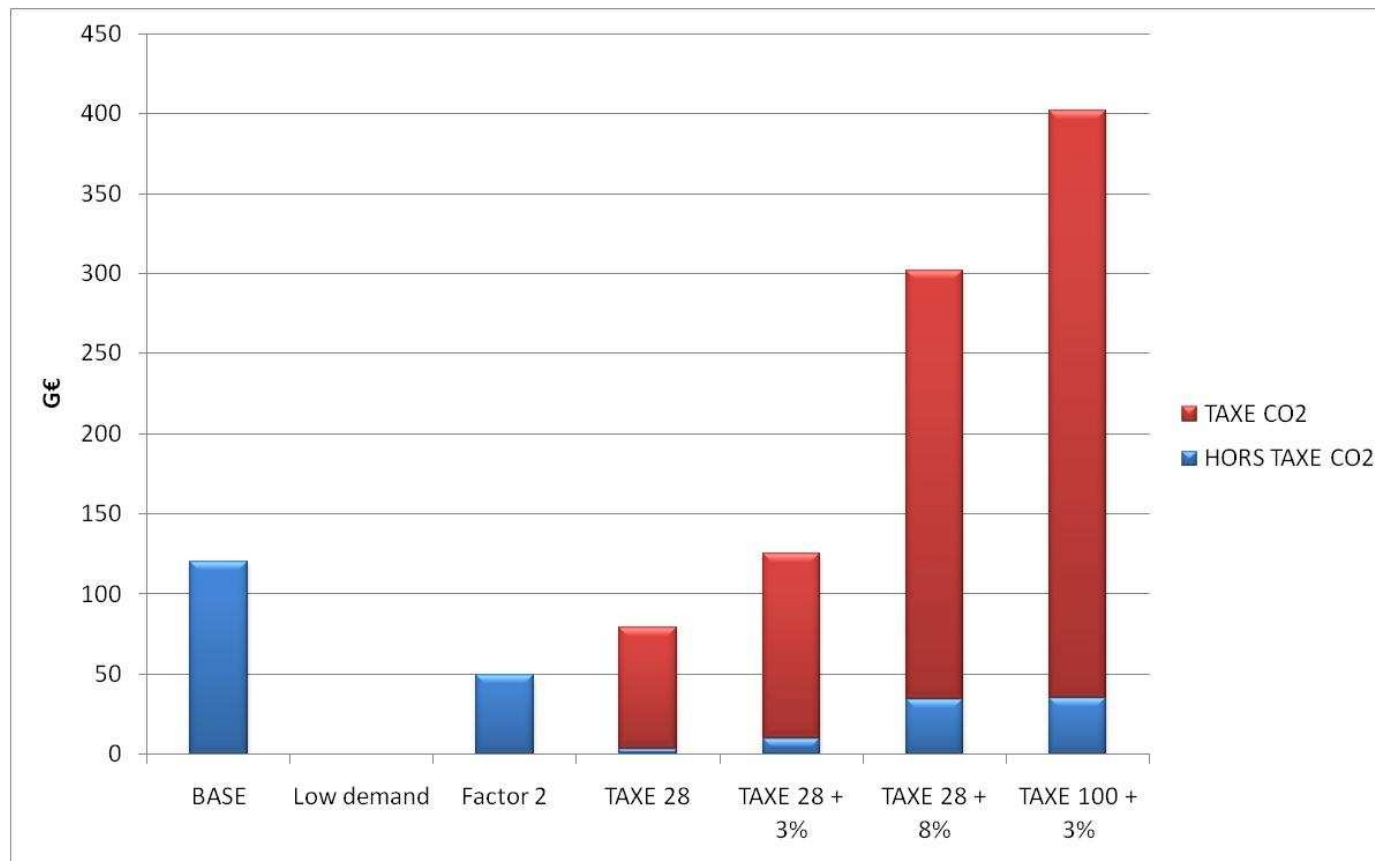
14% 2020



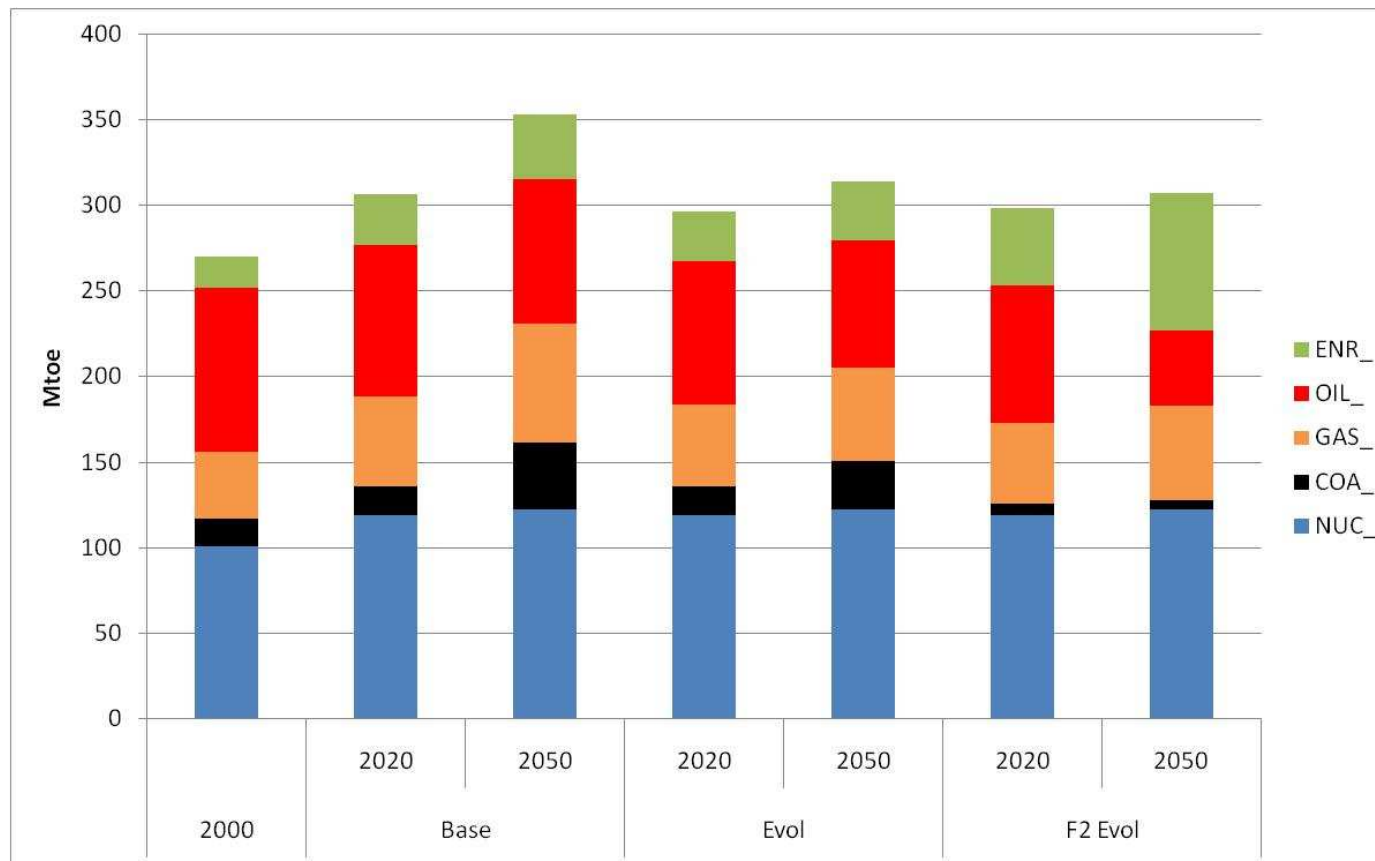
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Fiscal reform!

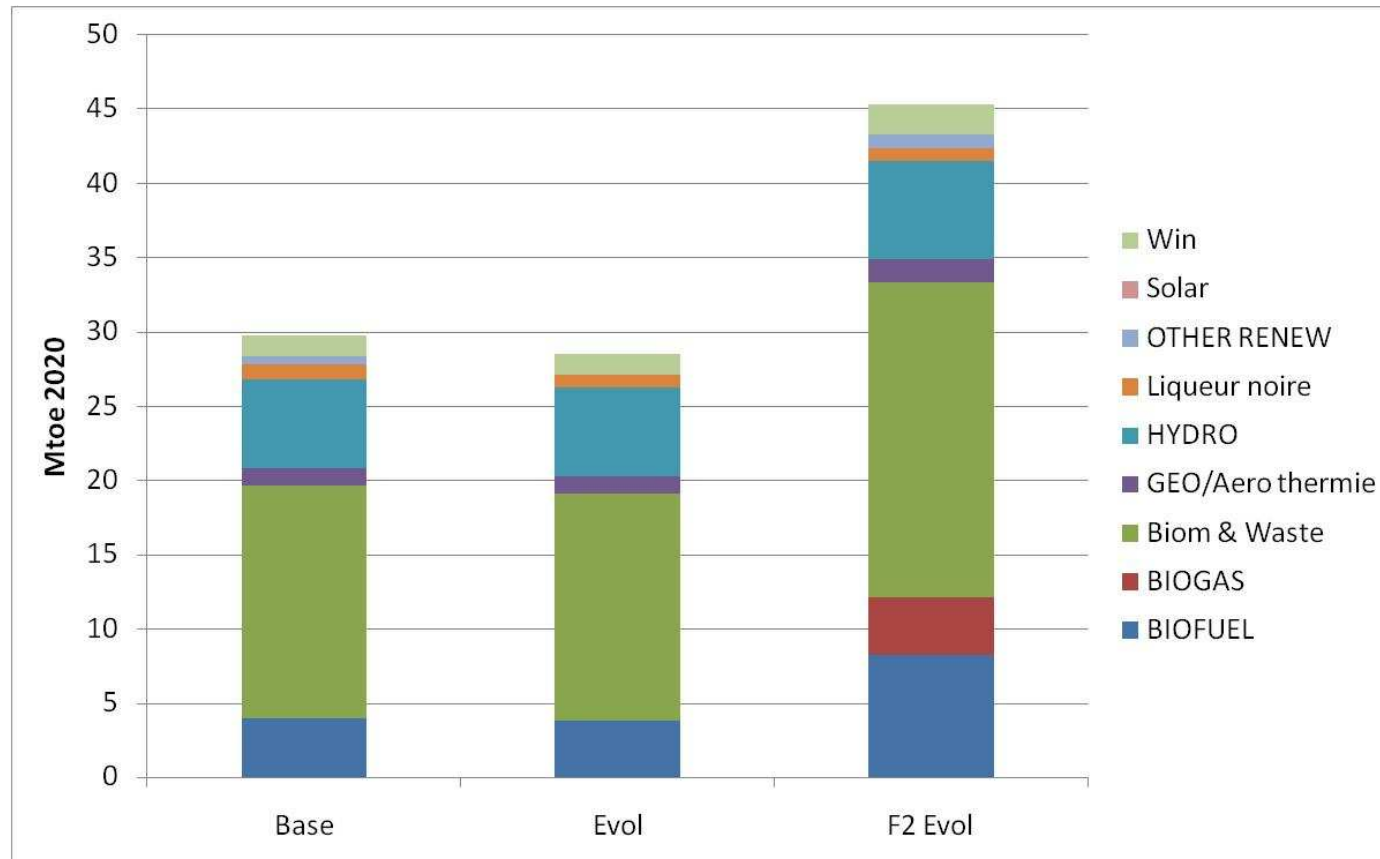


Benchmark: there are feasible energy mixes!



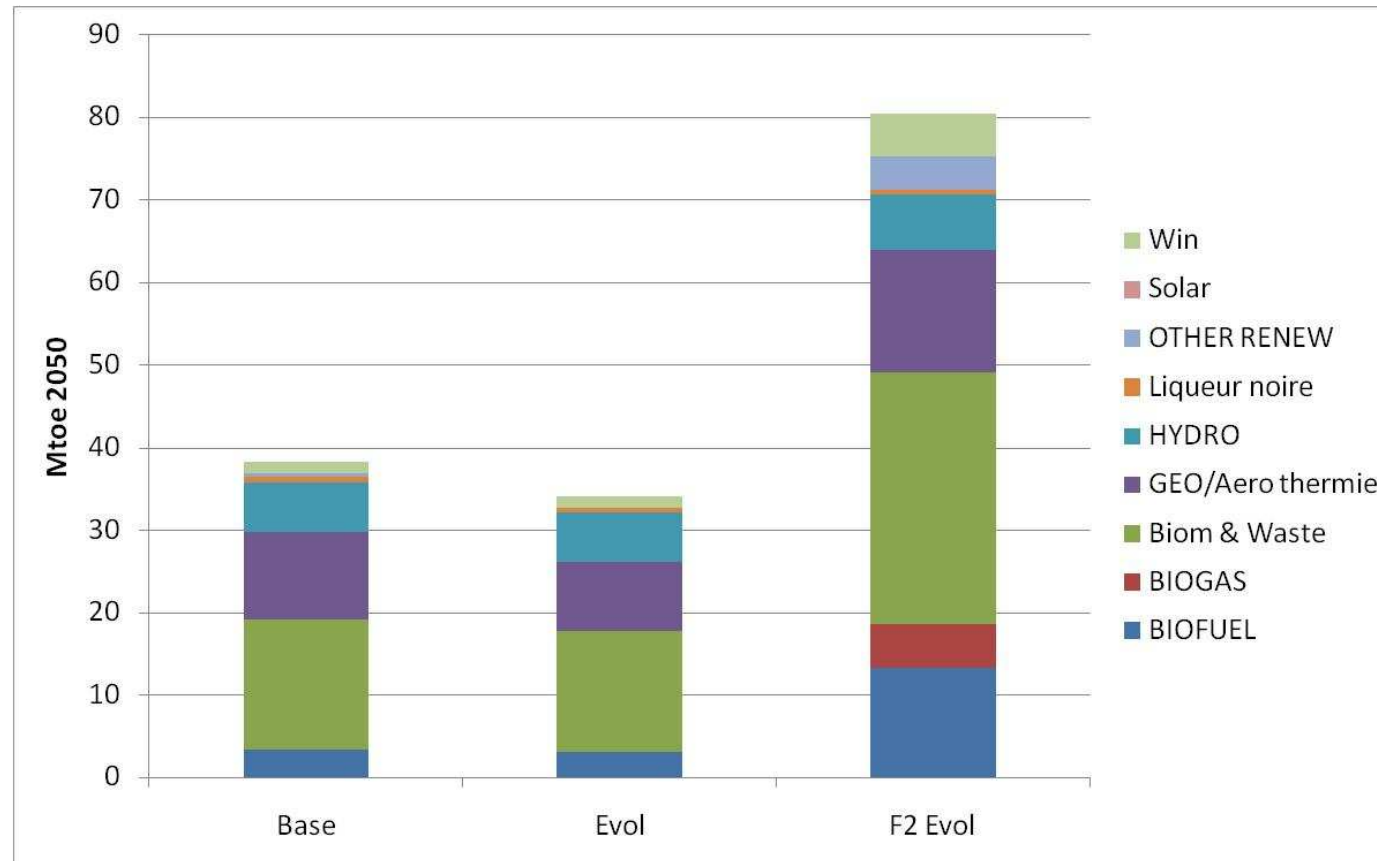
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Benchmark: there are feasible energy mixes!



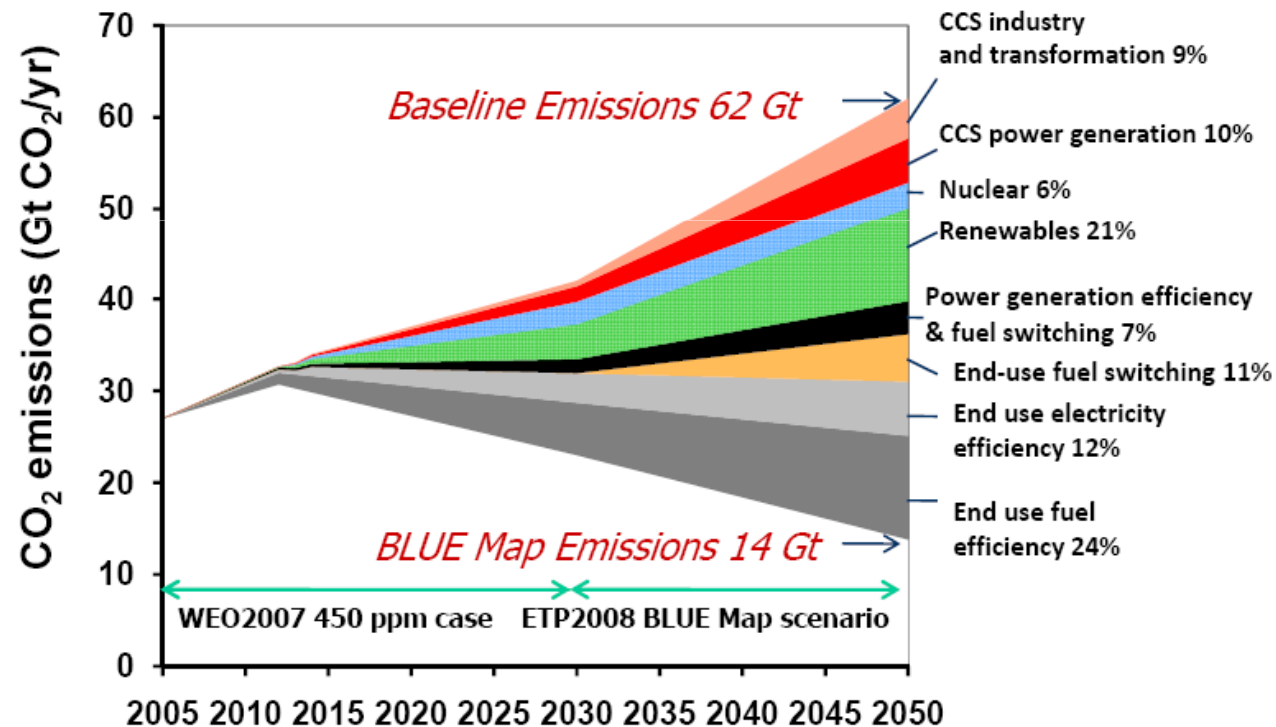
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Benchmark: there are feasible energy mixes!



Additional illustrations 1

A New Energy Revolution: Cutting Energy Related CO₂ Emissions



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