How can evaluations of climate policies interact with the GHG projections exercise?

Experience from France

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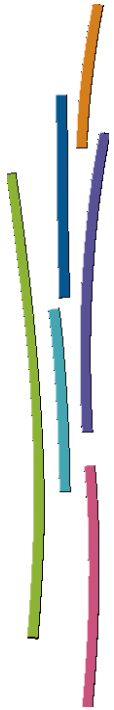
Introduction

Regulation context:

The European MMR regulation and the UNFCCC NC and BR guidelines require the reporting of:

- individual policies and measures, and where available quantitative estimates of their effects on emissions, obtained through policy evaluations
- projections of national GHG emissions, under a “with existing measures” scenario. “Without measures” and “with additional measures” projections are encouraged.



Questions:

- How these two exercises, evaluations and projections, interact with each others?

- How the evaluation can feed the scenario-making process underlying the projections?

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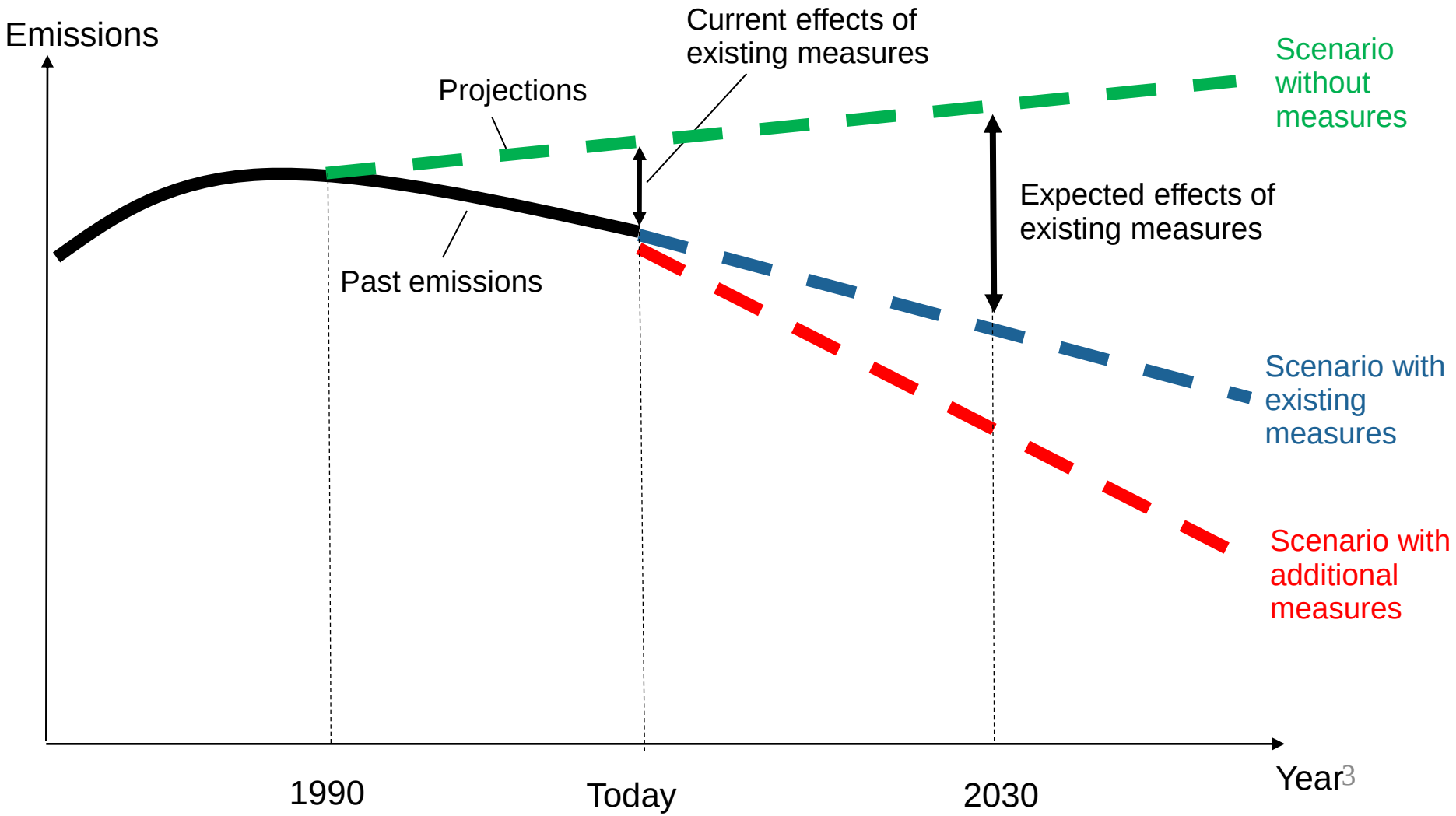
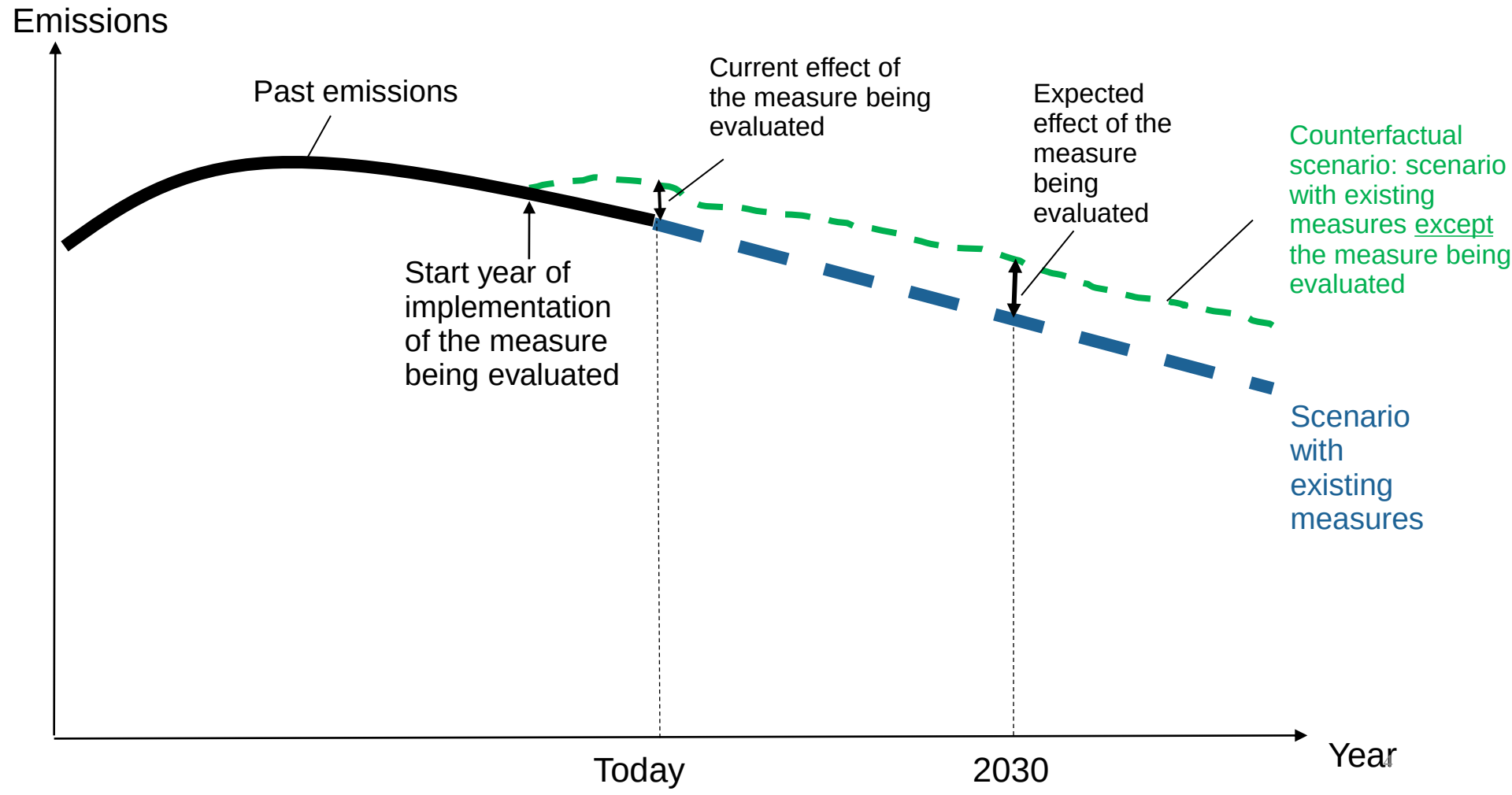
GHG emissions projections

Objective: assess the trajectory of France's emissions under different scenarios of measures. Total effect of measures can be deduced.



Evaluation of an individual measure

Objective: estimate the effect of one particular measure compared to the theoretical situation without the implementation of this measure



Comparison of evaluations and projections

Evaluations:

- Relatively light (it takes a few days to evaluate one measure)
- The result is targeted to the GHG impact of one particular measure
- Bottom-up modelling or simplified approach can be used
- Helpful to assess the impact of an adopted measure or a future measure

Projections:

- Quite heavy to implement (it takes at least one year)
- The result is global
- The use of several models is indispensable
- Helpful to assess the progress to target
- Sensitivity analyses can give information on the effects of some measures but they have to be defined in advance.

Interaction between projections and evaluations

The problem of additionality

Emissions evaluation for each individual measures cannot be added together to obtain the total reduction and cannot be directly linked to France's integrated emissions projections of the "with existing measures" scenario, given the interactive effects that occur between different measures.

This relates to the question of what would have occurred without the measure in question. The counterfactual scenarios is dependent on the measure being evaluated and is not equivalent from one measure to another.

Interaction between projections and evaluations

The problem of additionality: illustration

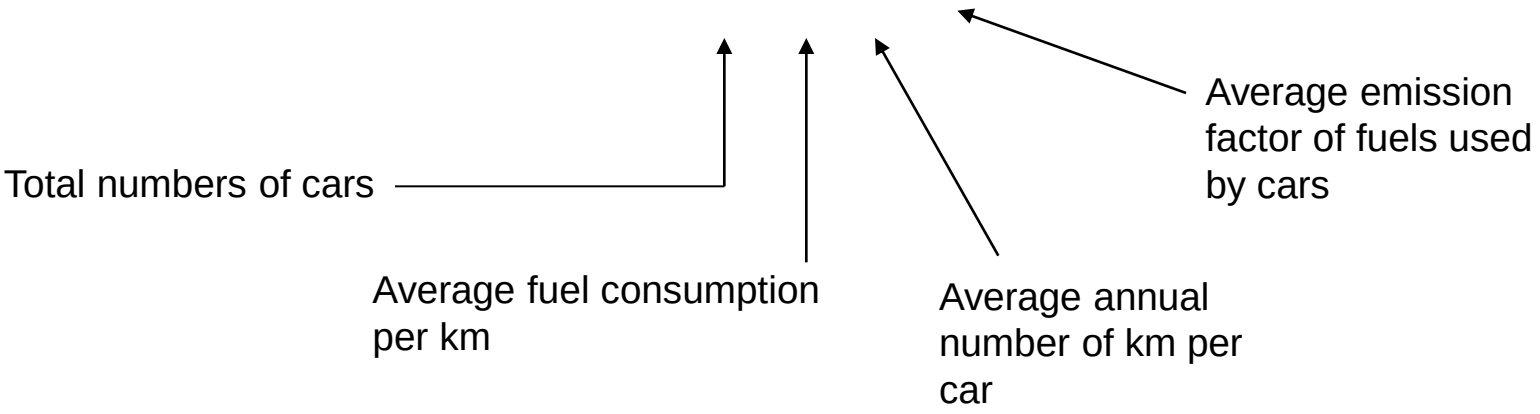
Let's illustrate this issue with a simple example of two measures in the transport sector.

Measure 1 : improvement of cars' energy efficiency

Measure 2 : decrease of the annual average distance driven by cars

Total GHG emissions of cars at a certain year:

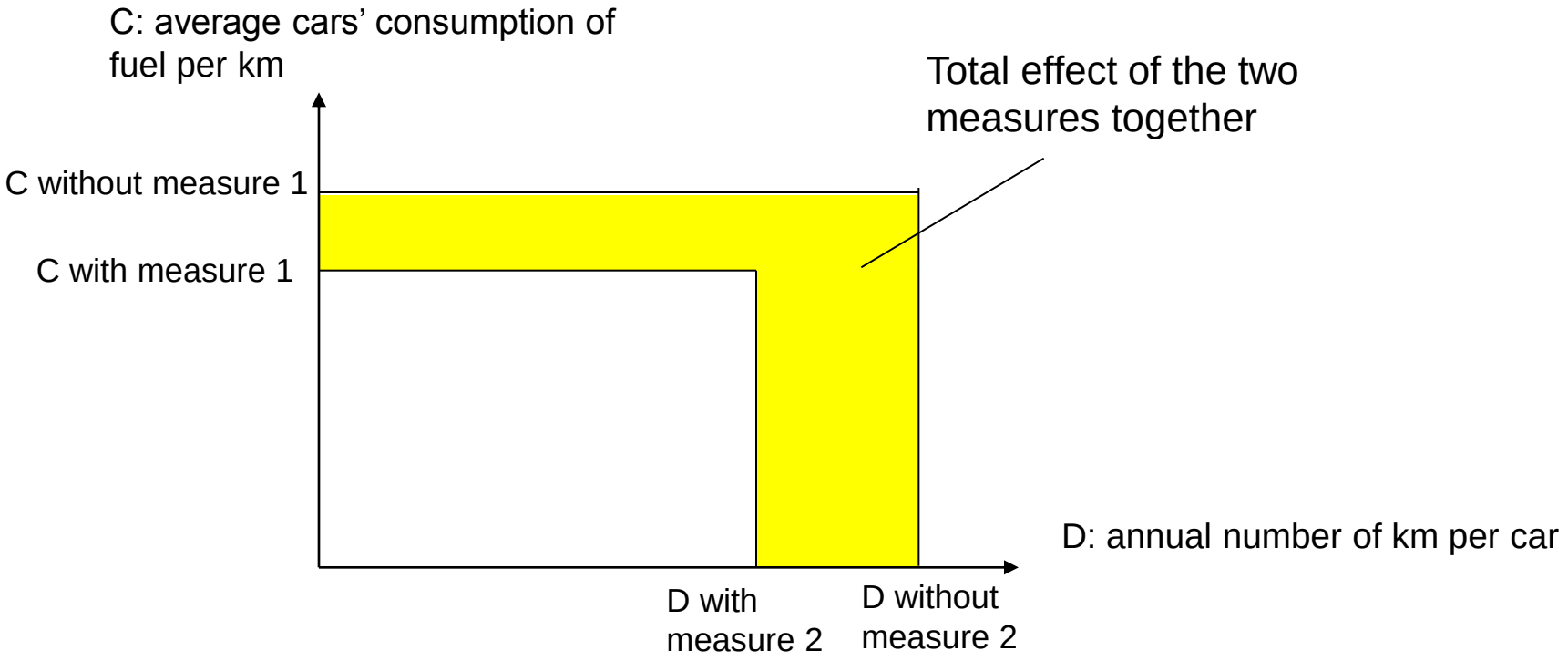
$$GHG_{cars} = NCDF$$



Interaction between projections and evaluations

The problem of additionality: illustration

Evaluation of the total effect of the two measures

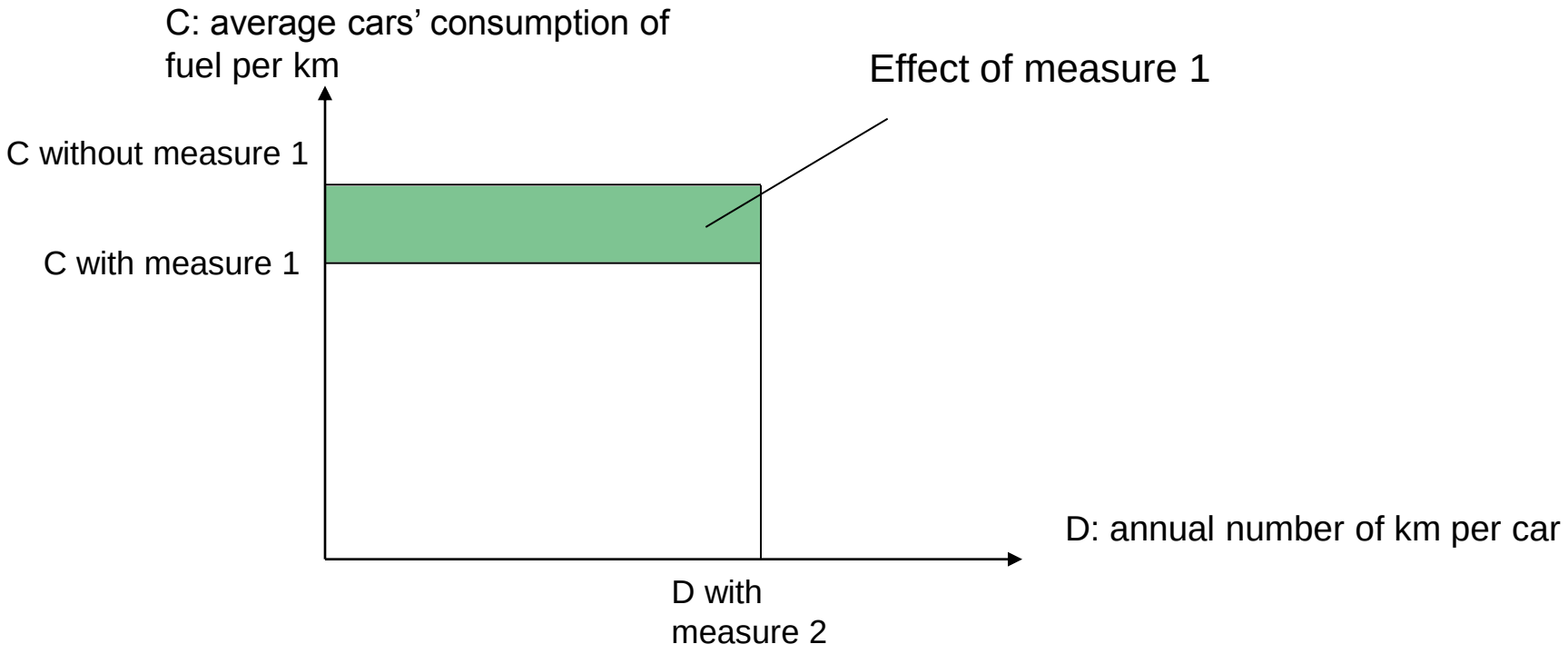


Interaction between projections and evaluations

The problem of additionality: illustration

Evaluation of measure 1: improvement of cars' energy efficiency

Counterfactual scenario: measure 2 is implemented but not measure 1

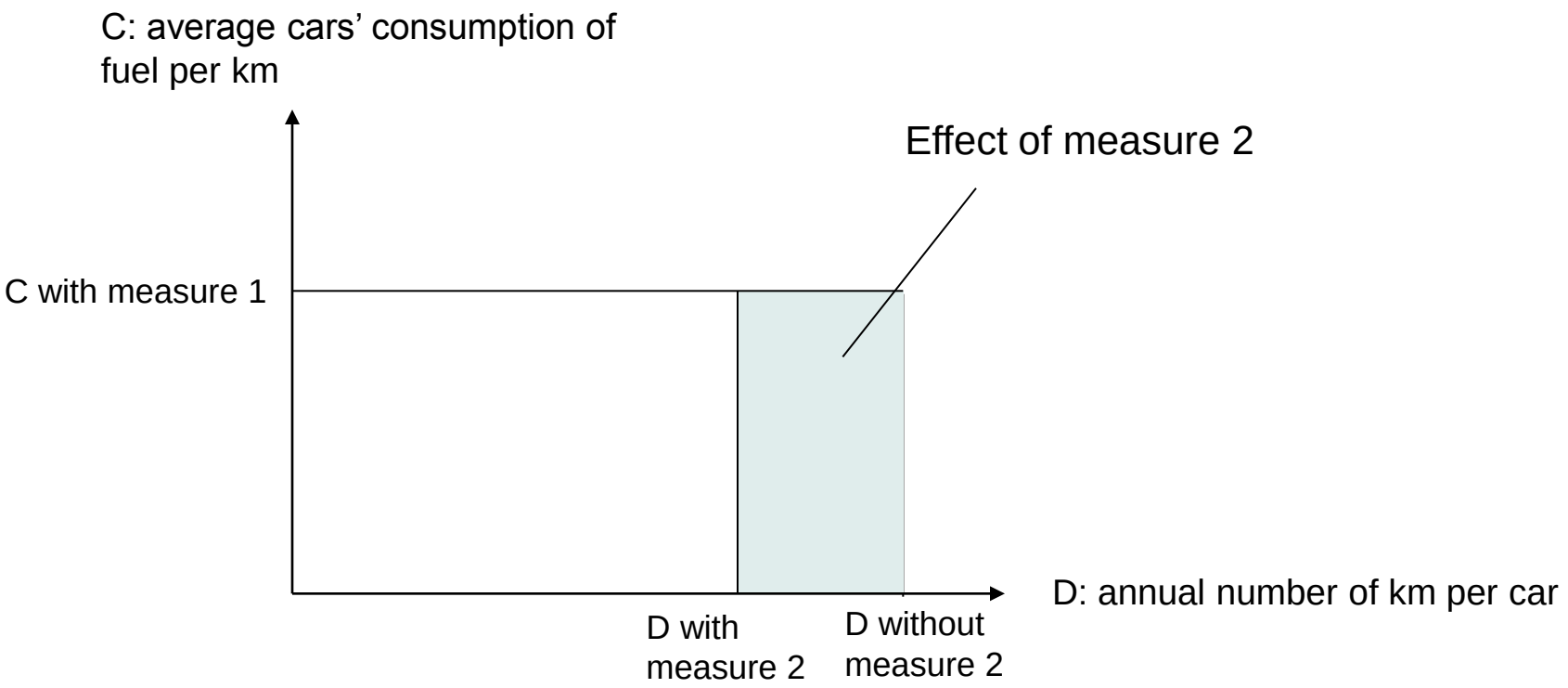


Interaction between projections and evaluations

The problem of additionality: illustration

Evaluation of measure 2: decrease of the annual average distance

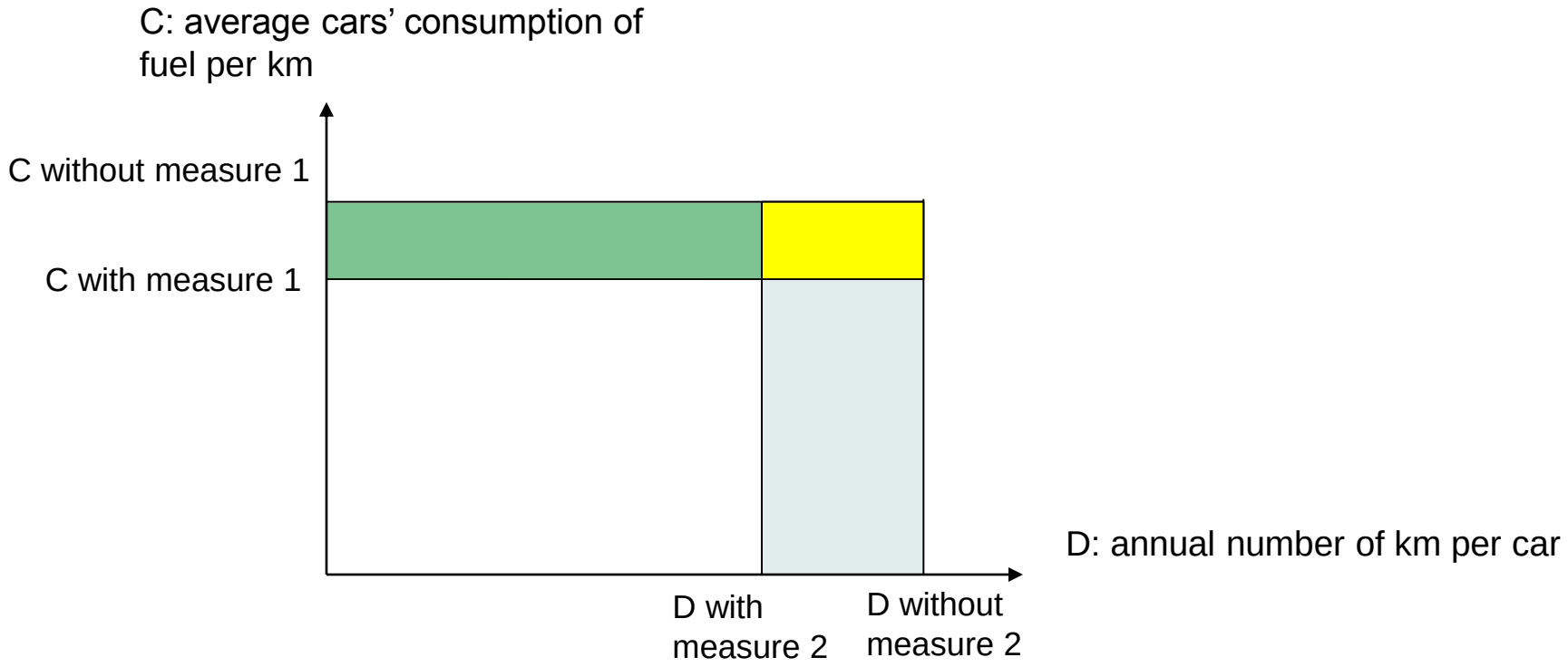
Counterfactual scenario: measure 1 is implemented but not measure 2



Interaction between projections and evaluations

The problem of additionality: illustration

The area of the sum of the two evaluations is not equivalent to the area of the effect of the two measures together. This gap comes from the definition of the counterfactual scenario.



Interaction between projections and evaluations

Decomposition analysis

It is possible to attribute the relative contribution of main aggregates to a change in emissions (like activity effect *A*, structure effect *S*, energy intensity effect *EI*, energy-mix effect *EM*, emission-factor effect *EF*), thanks to decomposition analysis methods as LMDI (logarithmic mean Divisia index).

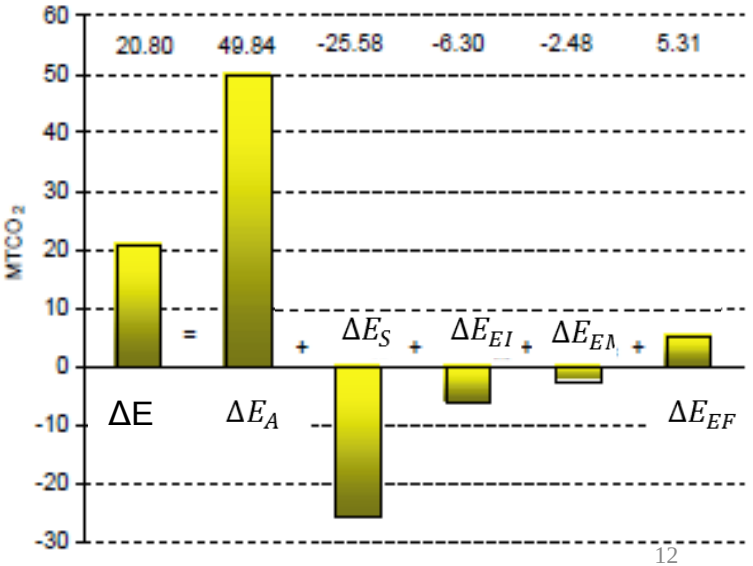
However, this does not address the question of the relative impacts of individual measures on total emissions.

$$E = \sum_{i,j} A \times S_i \times EI_i \times EM_{ij} \times EF_{ij}$$

LMDI formula:

$$\Delta E = E^T - E^0 = \Delta E_A + \Delta E_S + \Delta E_{EI} + \Delta E_{EM} + \Delta E_{EF}$$

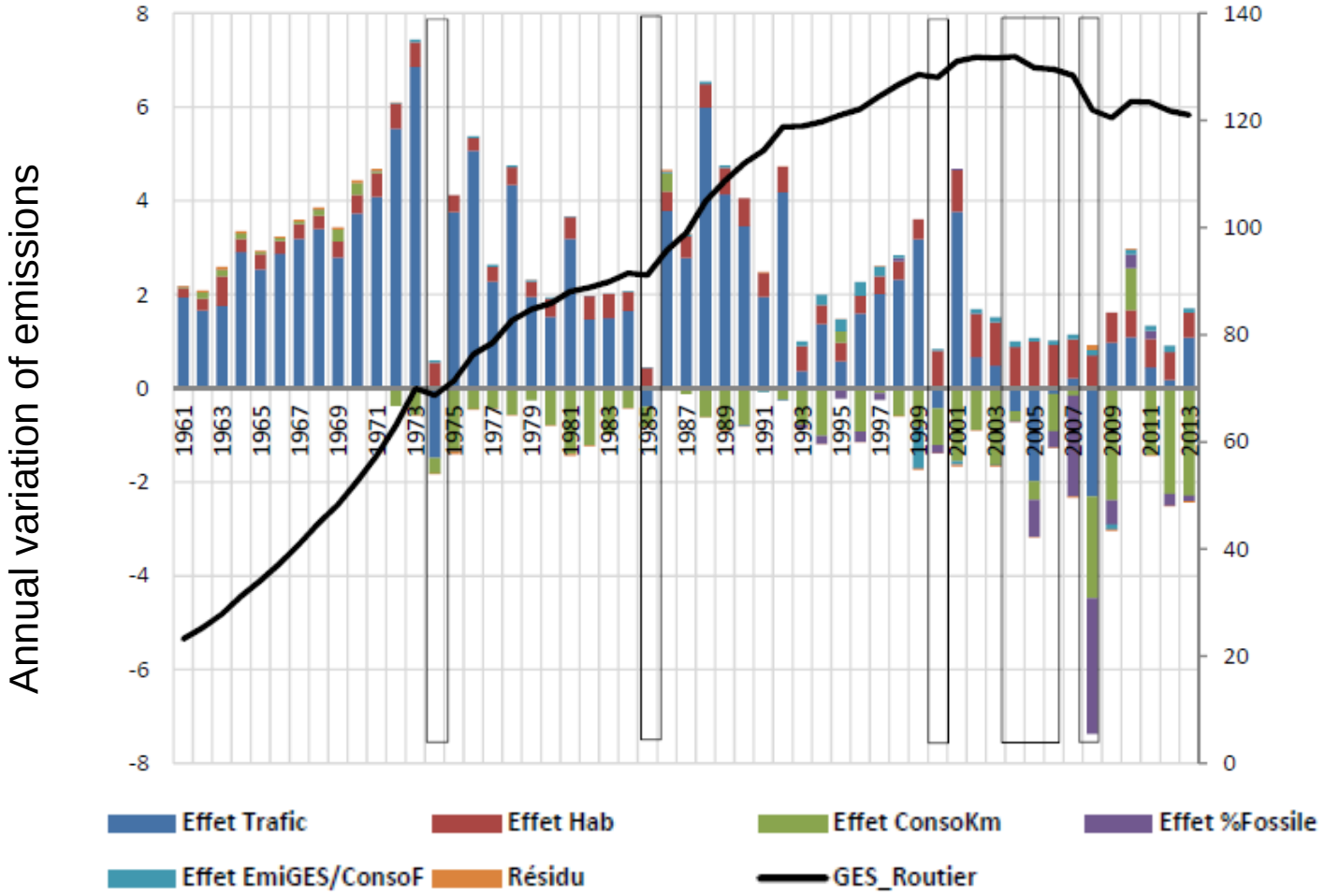
$$\Delta E_A = \sum_{i,j} \frac{E_{i,j}^T - E_{i,j}^o}{\ln E_{i,j}^T - \ln E_{i,j}^o} \ln\left(\frac{A^T}{A^0}\right)$$



Source: Ang, 2005

Interaction between projections and evaluations

Decomposition analysis for the road transport emissions in France 1960-2013



Source: CITEPA, 2015

Conclusion

Different objectives, different methods:

- Display a trajectory of emissions: projections
- Estimate total effect of measures: comparison of projections of WOM and WEM scenarios
- Overview of the relative weight of main aggregates to explain changes in total emissions: decomposition analysis
- Estimate the effect of a particular measure: evaluation of the measure compared to a counterfactual scenario, no additionality

Interaction

Interaction between evaluations and projections does not lie in a match between the result of projections and the sum of individual evaluations.

Decomposition analysis can help to attribute emissions reductions to main aggregates potentially impacted by measures.

Conclusion

The results of evaluation of individual measures are not directly comparable to the results of projections.

However, the results of evaluations provide a valuable input for the choice of additional measures to include in "with additional measures" scenario, thanks to:

- the identification of existing PAMs that can be intensified
- or through the evaluation of new promising PAMs.

The results of evaluations can thus feed the “with additional measures” scenario-making process underlying the projections.

Interaction between projections and evaluations lies in the scenario-building process.

Conclusion

On paper, the dialogue between evaluation of additional measures and elaboration of “with additional measures” scenarios looks simple.

In practice, it is not so easy because of time (projections have to be updated every 2 years), and limited resources.

However, a good coordination between evaluations and projections is essential for the making of “with additional measures” scenarios and, more generally, for the elaboration of the national low-carbon strategy with a view to reach the target.

Thank you for your attention

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