Evaluating the impact on innovation and climate policies on emissions: where do we stand?

EEEN September 2016

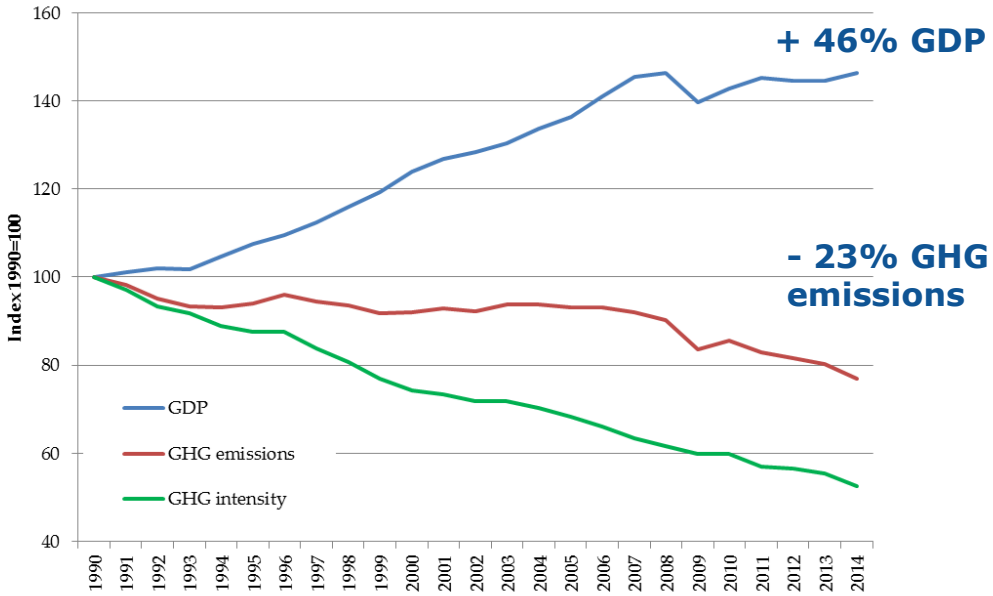
DG CLIMA

Policymakers need ex-post evaluation:

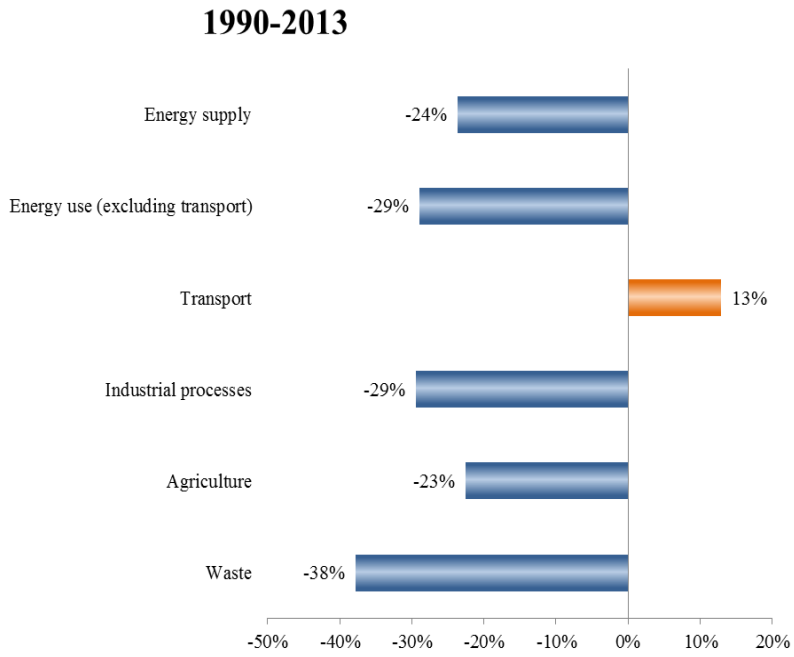
why are emissions going down?
What is the impact of climate policies on emissions?

Track progress - development of EU greenhouse gas emissions, 1990-2014

Total



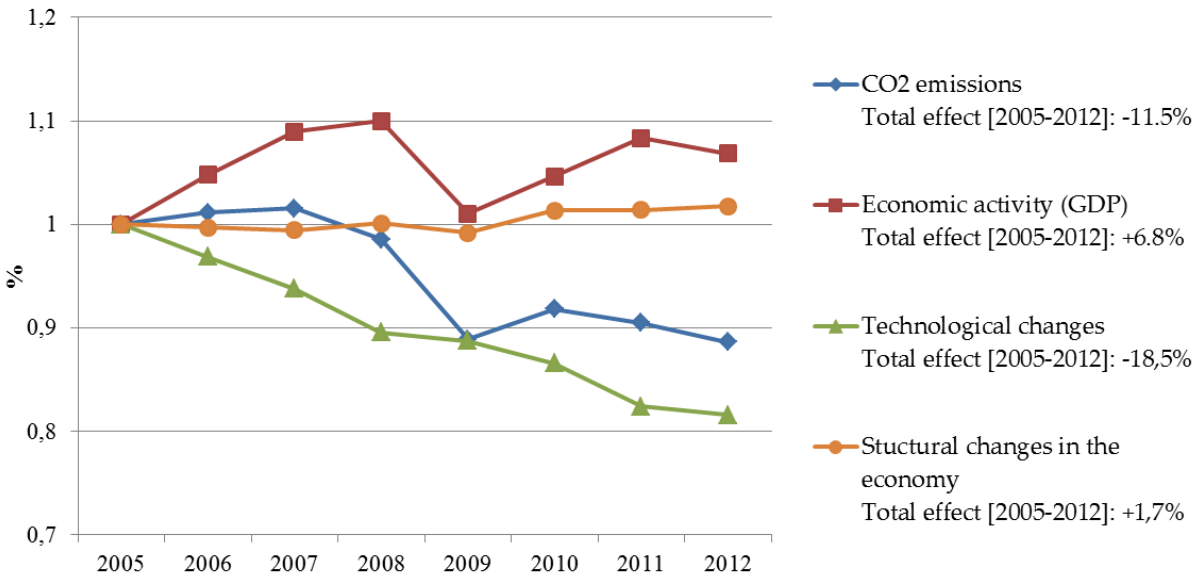
Per sector



Source: European Commission based on data compiled by EEA

Ex-post evaluation: changes in GHG emissions mainly driven by technological changes

New approach based on decomposition to explain progress in terms of GHG intensity

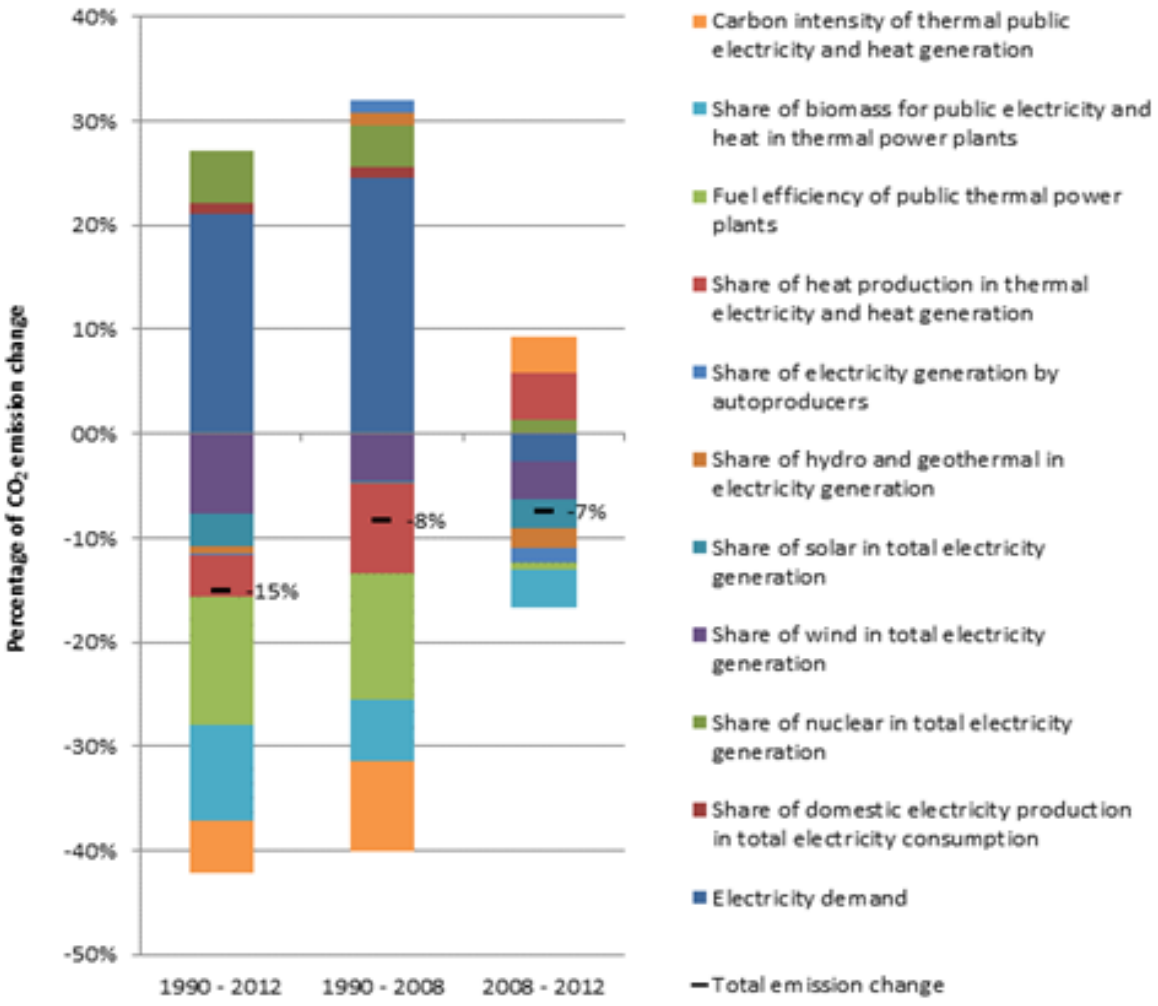


Source: European Commission

Decomposition analysis identifies:

- ***Technological improvements (shift towards less carbon-intensive technologies)*** *as main driving force behind GHG emission reduction*
- ***Small impact of structural changes in the economy***

Ex-post evaluation: electricity sector



Key drivers:

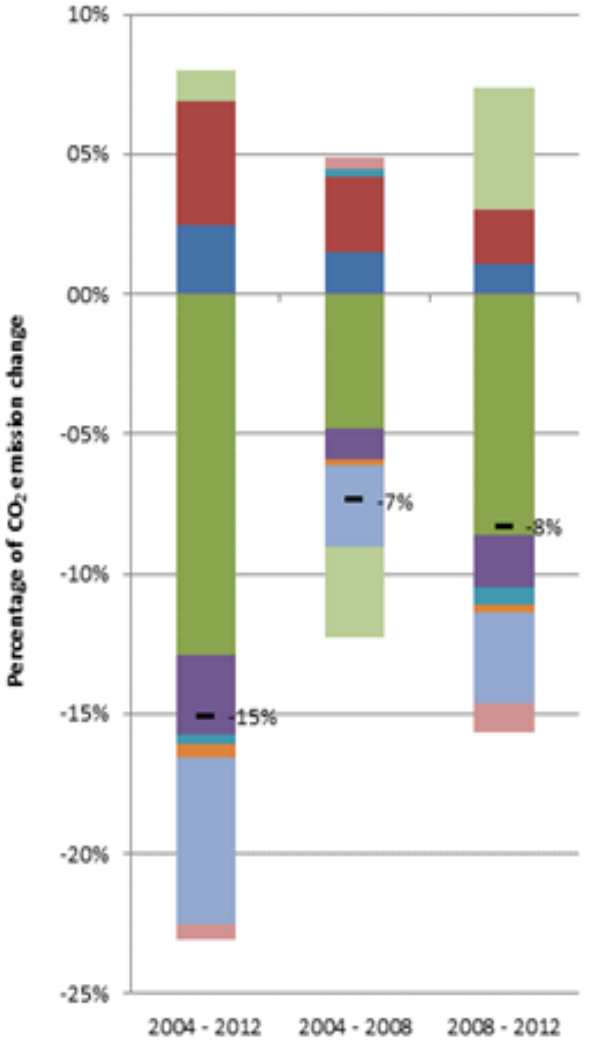
Increasing demand (+)

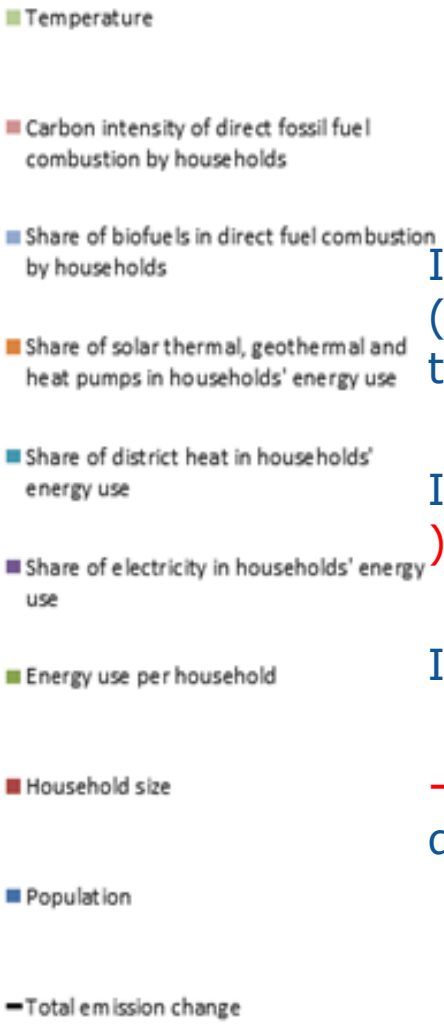
Increased share of RES: wind, solar & biomass (-)

Increased fuel efficiency (-)

→ Overall emissions have decreased (-)

Household sector





Key drivers:

Increasing demand for heating (larger houses and warmer temperatures) (+)

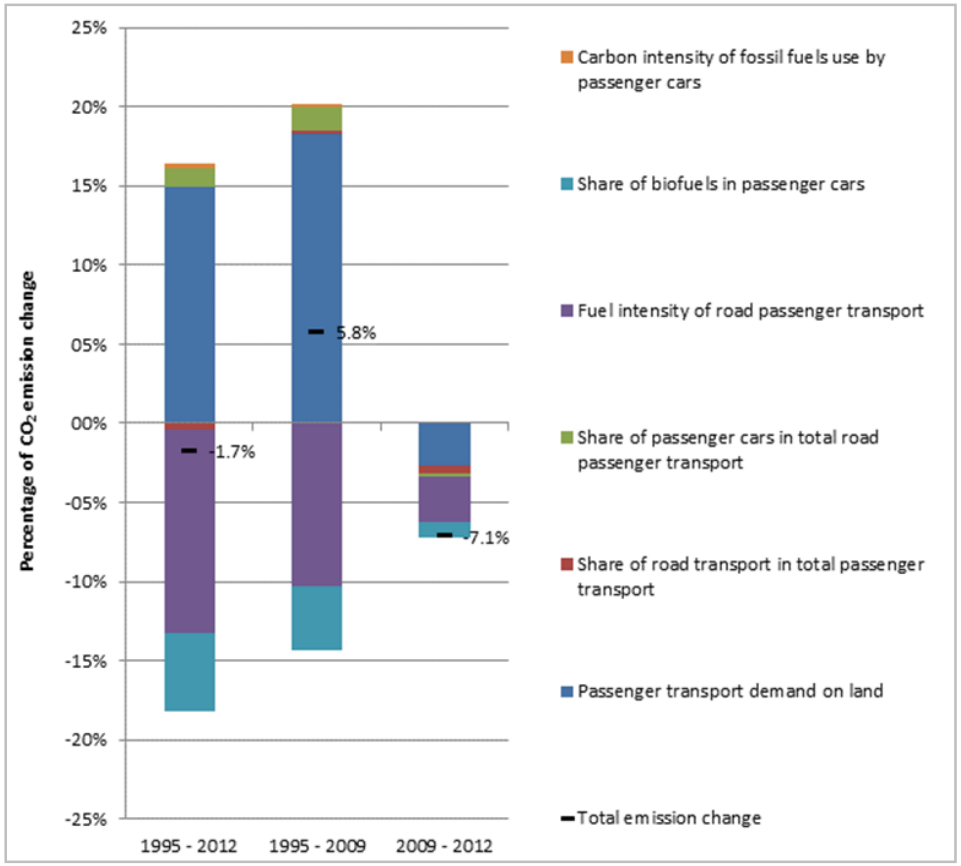
Increasing energy efficiency (-)

Increasing use of biomass (-)

→ Overall emissions have decreased (-)

Passenger transport sector

Passenger transport



Key drivers:

Increasing demand for passenger transport (+)

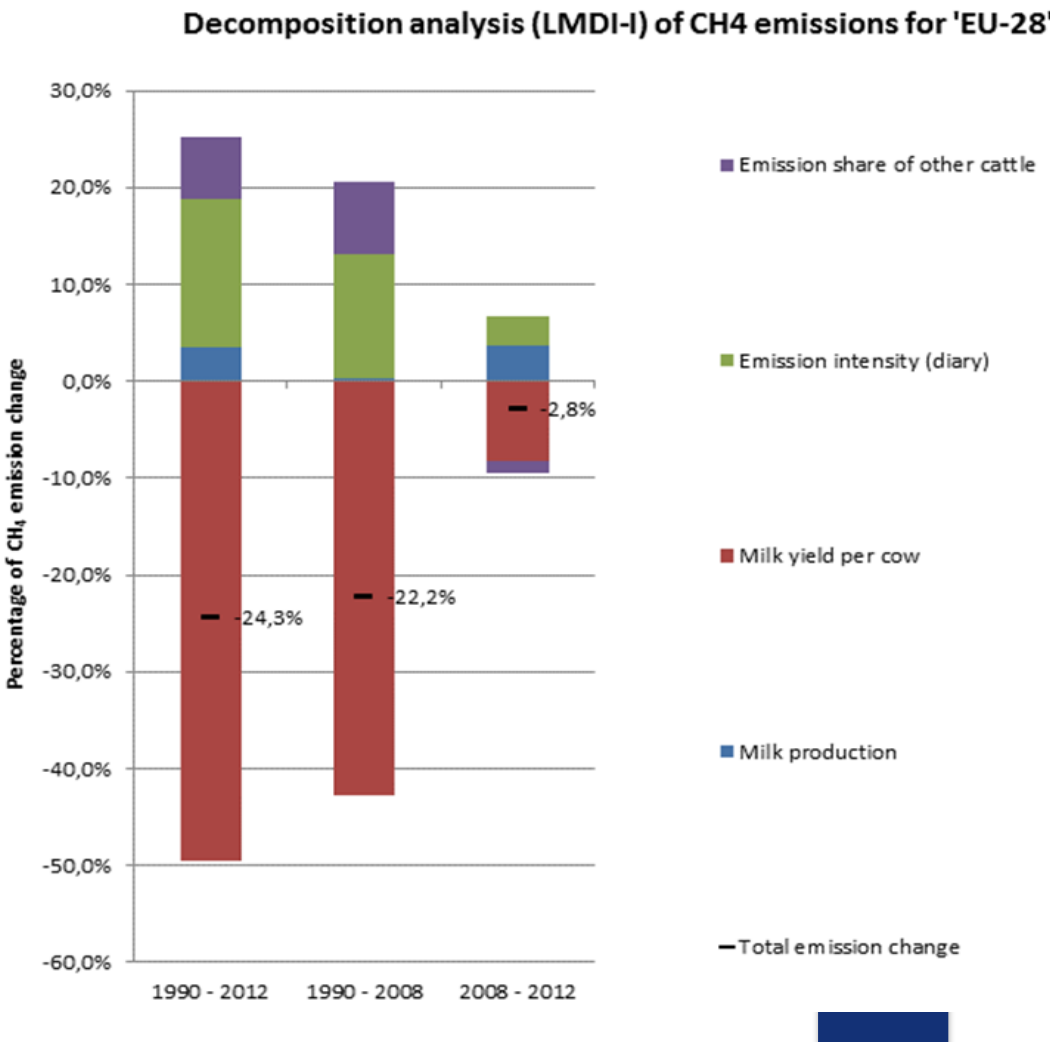
Increasing car efficiency (-)

Increasing use of biofuel (-)

Modal shift (small) (-)

→ Overall emissions have decreased (-)

Ex-post evaluation: milk sector



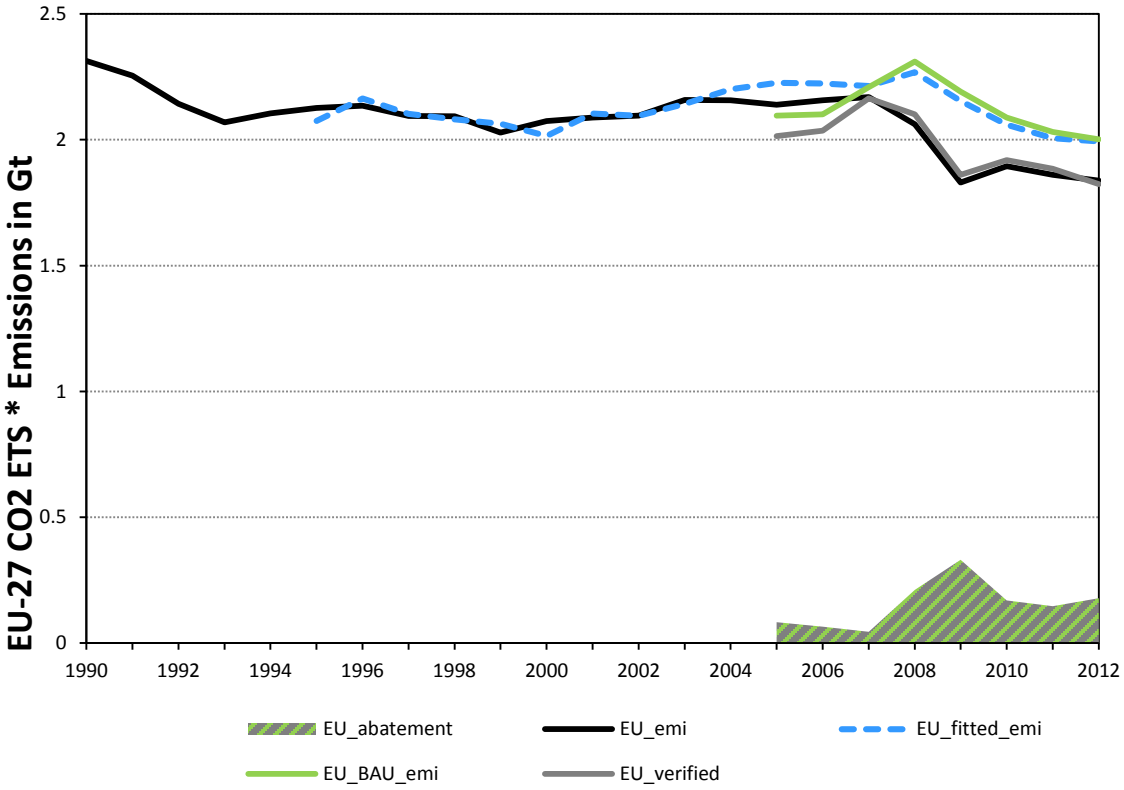
Key drivers:

Increasing milk production (small) (+)

Increasing "cow efficiency" (-)

→ Overall emissions have decreased (-)

Estimating the effect of the EU ETS on emissions



*ETS emissions are scoped or mapped using Eurostat data for the years preceding the ETS

Counterfactual scenario estimated with econometrics modelling (dashed blue)

Difference with verified emissions: 185 Mt in 2012

Estimates in line with the scientific literature

Estimating the effect of Taxation, Renewable and other policies

Name of the effect	Effect on total emissions:
Activity Effect: *+ 1% GDP*	*+ 0.22% CO_2 emissions*
Combined Intensity and Fuel-Mix Effect: *+ 1 National Climate Policy* *+ 1% (Energy Tax Revenues /GDP)* *+ 1% Share of Renewable Energy Use in Tot.* *+ 1% Others*	*- 0.02% CO_2 emissions* *- 0.09% CO_2 emissions* *- 0.15% CO_2 emissions* *0% (not significantly different from zero)*
Other Factors: *+ 1% heating degree days* *+ 1% Others*	*+ 0.20% CO_2 emissions* *0% (not significantly different from zero)*

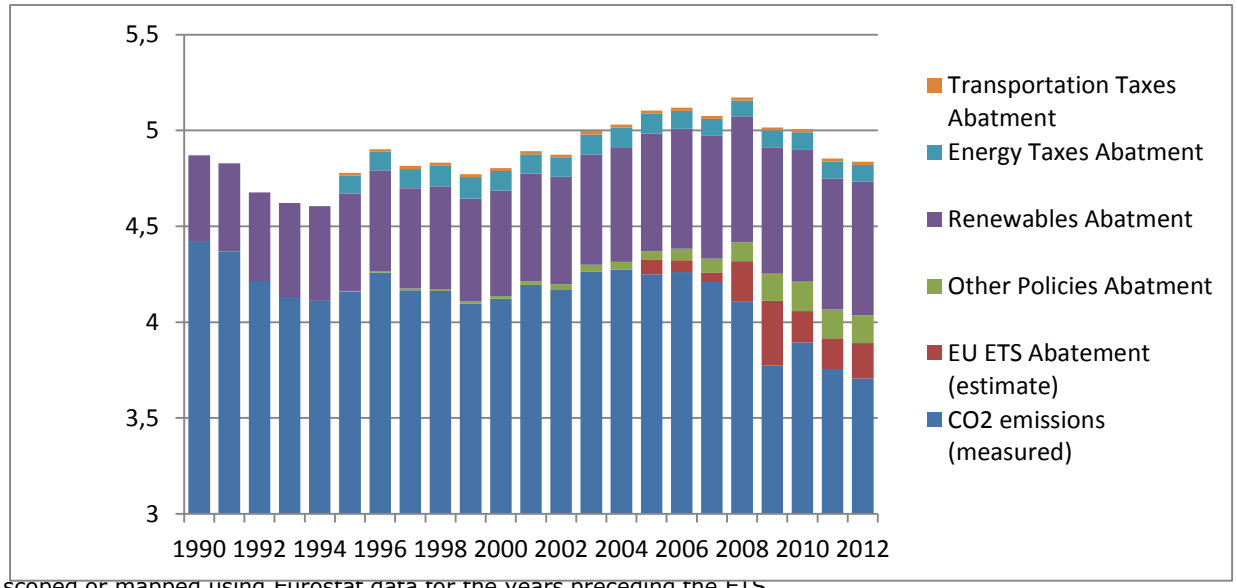
Basic Econometric Structural Decomposition Model: $\ln(\llbracket re \rrbracket\_it) = constant + \beta\_re \ln(\llbracket re \rrbracket\_(it-1)) + \beta\_nr \ln(\llbracket nonrenewable \rrbracket\_it) + \beta\_pol \llbracket Policies \rrbracket\_(it-1) + \llbracket \beta^{'} \rrbracket\_prices \llbracket Prices \rrbracket\_(it-1) + \llbracket \beta' \rrbracket\_con \llbracket Controls \rrbracket\_it + \varepsilon\_it$

Assess the impact of tax, renewable share and the number of PAMs (as listed in the *IEA Climate Policies and Measures database)* on emissions

*ETS emissions are scoped or mapped using Eurostat data for the years preceding the ETS

Estimating the effect of Taxation, Renewable and other policies (II)

- **Renewable has a large impact on emission reductions**
- **Energy taxation also contributes to emission reductions**



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Questions?

Thanks for your attention!