

# Key insights from the CECILIA2050 project

## Recommendations for current and future EU climate policy

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## Key insights from the CECILIA2050 project

- **Who are we, and what did we set out to do?**
- Which insights from the status quo of existing climate policy instruments in the EU?
- What do we see as the main challenges for EU climate policy towards 2030 and 2050?
- What are the options for the short term: how could EU climate policy be improved?
- How could the climate policy instrument mix evolve in the long term?

## Tackling the 2050 policy mix – the CECILIA2050 project

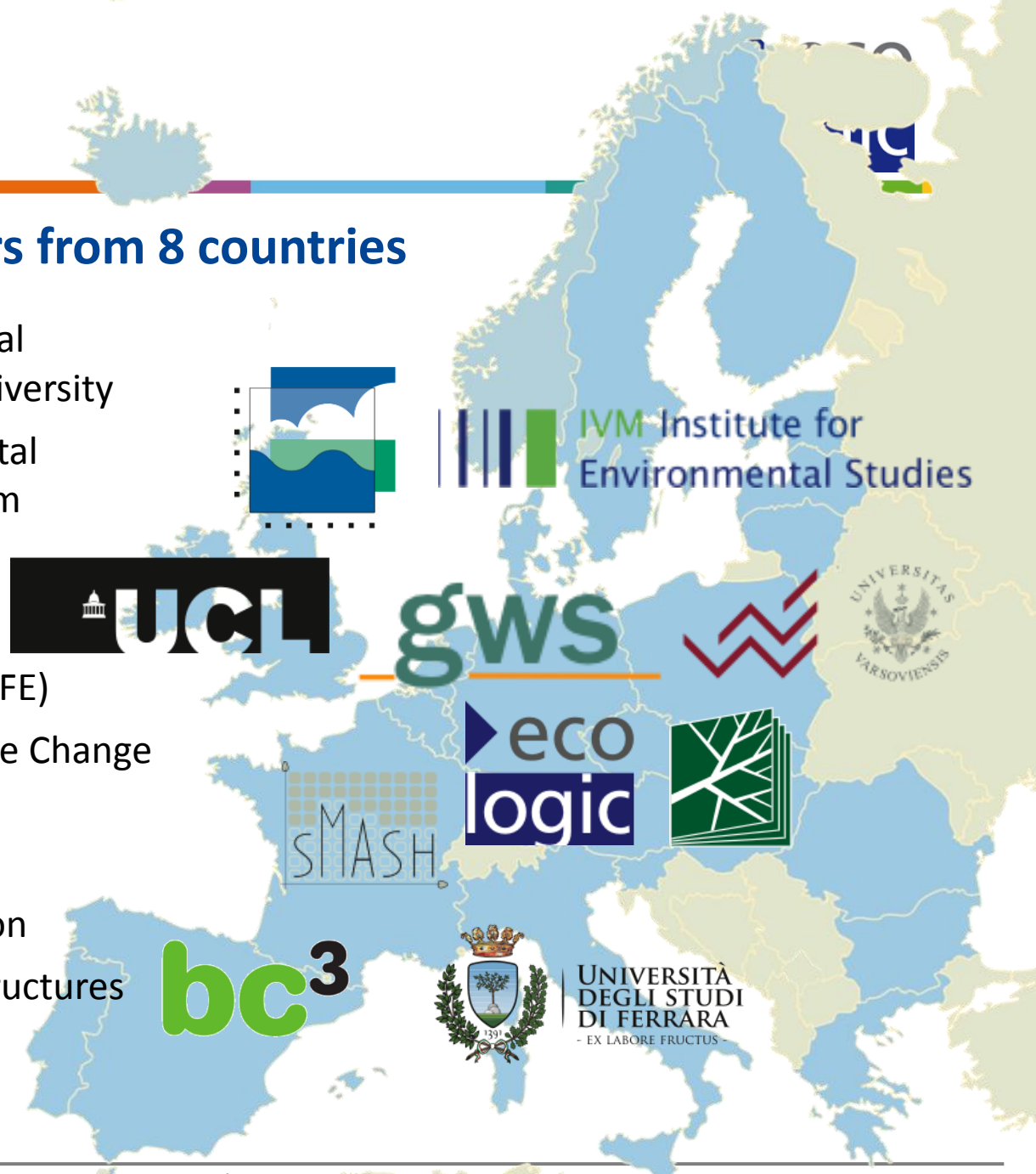
**C**hoosing  
**E**fficient  
**C**ombinations of Policy  
**I**nstruments for  
**L**ow-carbon development and  
**I**nnovation to  
**A**chieve Europe's  
**2050** climate targets



Funded by the European Union

## Who we are: 10 partners from 8 countries

- **NL:** Institute of Environmental Sciences (CML) at Leiden University
- **NL:** Institute for Environmental Studies (IVM), VU Amsterdam
- **PL:** WOEE, Warsaw
- **CZ:** CUNI, Prague
- **IT:** University of Ferrara (UNIFE)
- **ES:** Basque Centre for Climate Change (BC3), Bilbao
- **F:** SMASH-CIRED, Paris
- **UK:** University College London
- **DE:** Institute of Economic Structures Research (GWS), Osnabrück
- **DE:** Ecologic Institute, Berlin



## What did we set out to do?

- Exploiting **the full potential of economic instruments** to contribute to achieving the EU's greenhouse gas emissions reduction objectives for 2050
  - What is the current climate policy mix at EU level and in the Member States, and what role do economic instruments play in this mix? What could an “optimal” policy mix for Europe look like, and how close are we to it?
  - How is the current mix performing in the different sectors (in terms of emission reductions achieved, economic effects, innovation, competitiveness, etc.) – and where it is not performing well, which barriers and constraints are in its way (legal, institutional, financial, social ...)?
  - Where do we need to be in 2050 – what can models tell us about what the low-carbon economy will look like, and what are (techno-economic) scenarios for getting there?
  - What are the next steps for how EU climate policies can be reformed and improved; how can barriers and constraints be resolved, bypassed or overcome? What are possible policy pathways leading towards a European climate policy “fit for 2050”?

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- Who are we, and what did we set out to do?
- **What are the key lessons from the performance of existing climate policy instruments in the EU?**
- What do we see as the main challenges for EU climate policy towards 2030 and 2050?
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## Impact of Carbon Pricing and Renewable Support in the EU

- Climate policies in Europe have achieved their main objective: to reduce emissions. Without environmental tax reform, EU ETS and renewable support schemes, CO<sub>2</sub> emissions in 2008 in selected EU countries would have been up to 12-13% higher than actually observed. Most of this is from renewables support – less from pricing
  - Impacts on GDP have been modest overall: slightly negative for environmental tax reform and ETS, probably positive for renewable support measures
  - Impacts on employment were equally modest: slightly positive for the environmental tax reform, slightly negative for EU ETS, undecided for renewable support
  - On balance, if the analysed policies had *not* been implemented, we would probably have lower – but certainly not higher – figures for GDP and employment



## Impact of selected climate policies: a macroeconomic view

GDP impacts of different instruments (% deviation)

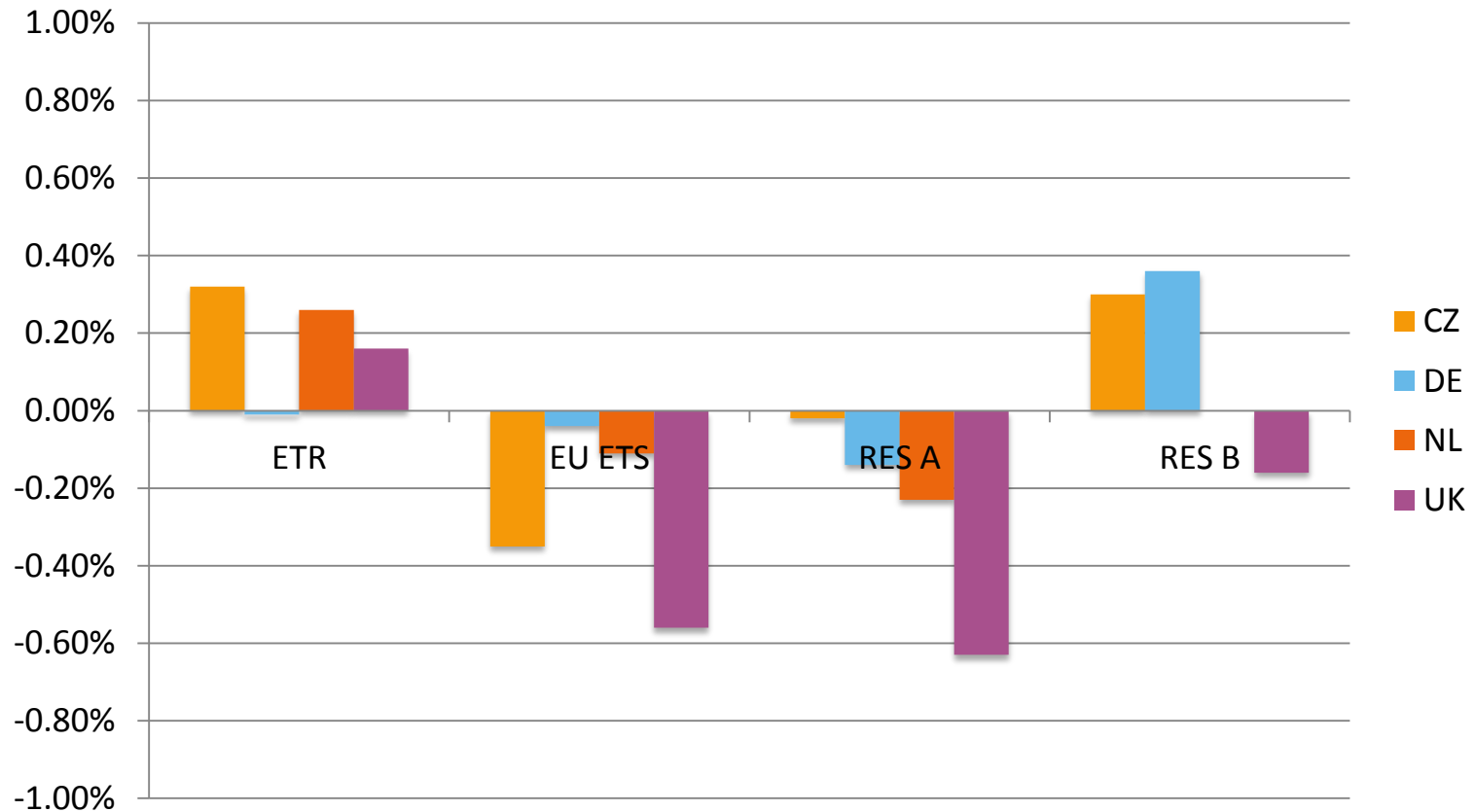


Source: Meyer et al. 2013, CECILIA D2-2a



## Impact of selected climate policies: a macroeconomic view

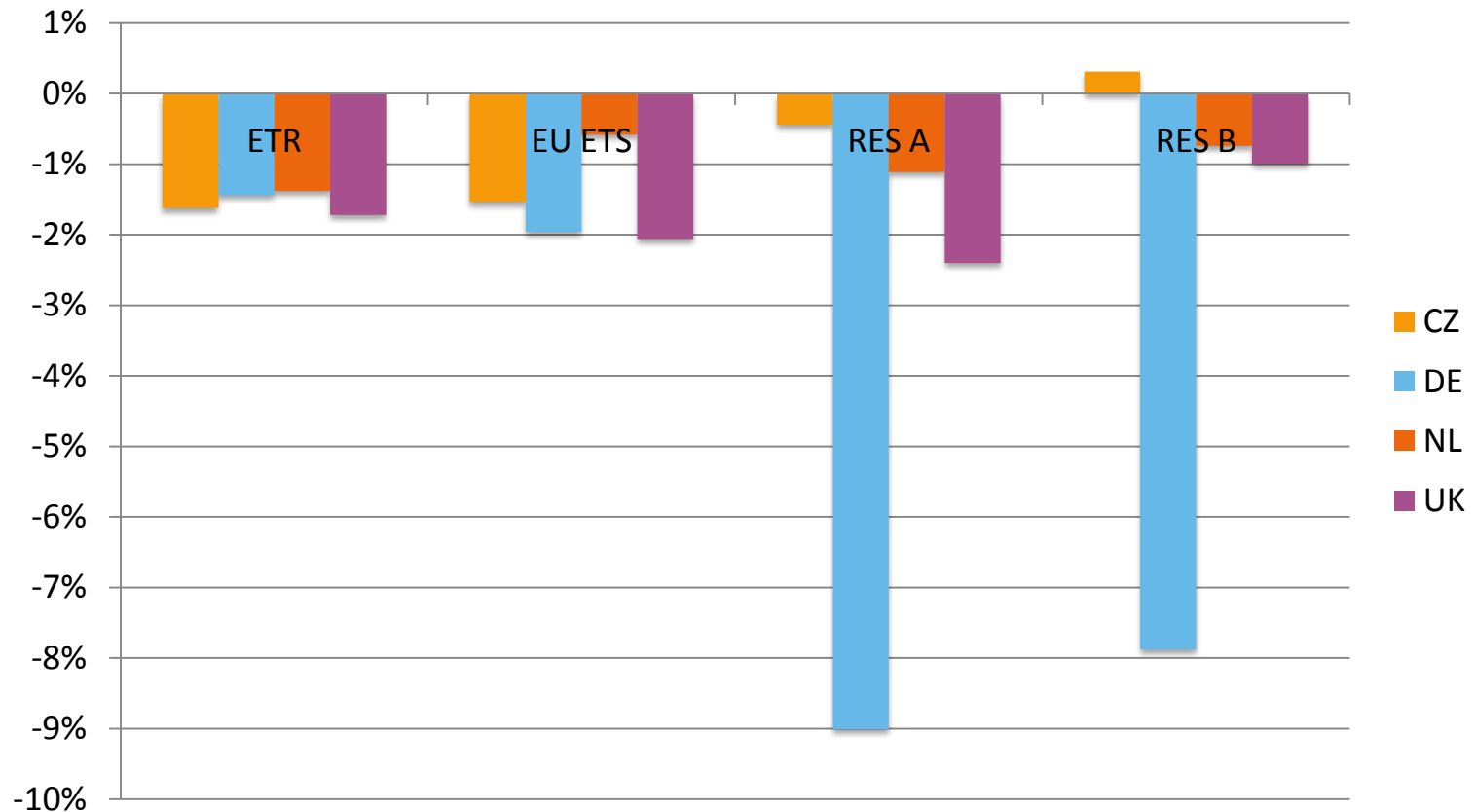
Employment impacts of different instruments (% deviation)



Source: Meyer et al. 2013, CECILIA D2-2a

## Impact of selected climate policies: a macroeconomic view

CO2 impacts of different instruments (% deviation)



Source: Meyer et al. 2013, CECILIA D2-2a

## Five key lessons from existing climate policies in Europe

### 1. The climate policy mix is not well balanced.

- The Climate policy mix is not coherent, both between sectors and Member States. There are plenty of overlaps and redundancies, and several cases where climate and other policies conflict. Also, climate policy tends to focus on energy and industry – whereas other sectors, lack policy attention, ambition, innovative instruments, and a coherent strategy. Particularly for agriculture, there is no climate policy to speak of at the EU level.

## Five key lessons from existing climate policies in Europe

1. The climate policy mix is not well balanced.
2. **Carbon pricing tools work, but they are not exploiting their full potential.**
  - The existing pricing tools have had some effect – reducing emissions at negligible cost to the economy, but they offer more potential to reduce emissions. Exploiting this potential requires not only a reform of pricing tools themselves – but also setting the right framework conditions, and removing contradictory incentives.

## Five key lessons from existing climate policies in Europe

1. The climate policy mix is not well balanced.
2. Carbon pricing tools work, but they are not exploiting their full potential.
3. **Markets have worked very effectively as a tool for climate policy.**
  - While the record of carbon pricing is mixed, tapping into the potential that markets offer has worked well for climate policy. In particular in the field of renewable support policies, we have seen strong competition, a rapid decline in prices, and deployment rates exceeding all expectations. In other cases – in particular energy efficiency – we are still searching for the right model to make markets work.

## Five key lessons from existing climate policies in Europe

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2. Carbon pricing tools work, but they are not exploiting their full potential.
3. Markets have worked very effectively as a tool for climate policy.
4. **There is plenty of diversity in European climate policies.**
  - ... and less harmonisation than one might expect. Market integration increases the pressure to harmonise policies (electricity market, fuel tourism). Going forward, the challenge is to leave room for national and regional climate leadership, so that the diversity of European countries and regions can serve as a laboratory for new policy approaches.

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3. Markets have worked very effectively as a tool for climate policy.
4. There is plenty of diversity in European climate policies.
5. **Fears of negative impacts of climate policies have not materialised**
  - Fears of the negative impacts of climate policies have not materialised: the effects of main climate policy instruments on GDP and employment have been neutral to mildly beneficial. Also, there are no signs of carbon leakage yet.

## Key insights from the CECILIA2050 project

- Who are we, and what did we set out to do?
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- **What do we see as the main challenges for EU climate policy towards 2030 and 2050?**
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## Main Challenges for EU Climate Policy for 2030 and beyond

### Establish a Meaningful Carbon Price

Reform and Integrate  
Electricity Markets EU-  
wide

Make Sound  
Infrastructure Choices  
Despite Technological  
Uncertainty

Encourage Low-Carbon  
Lifestyles

Provide Finance and  
Mobilise Investments

Tackle the Energy  
Consumption of the  
Housing Stock

Address non-CO<sub>2</sub> GHG  
emissions (particularly  
from Agriculture)

Cross-cutting challenges

Stimulate Radical Low-  
Carbon Innovation in  
Industry

Facilitate Low-Carbon  
Mobility

Setoral challenges

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## Short-term improvements to EU climate policy

### 1. The design of individual instruments must become 'smarter'.

- This includes **effective targeting** of the instrument, a better **sectoral balance** of the mix, effective **monitoring and compliance mechanisms**, the use of design features that allow for **flexibility in the face of changing circumstances**, and the inducement and promotion of positive '**co-benefits**'.

## Short-term improvements to EU climate policy

1. The design of individual instruments must become 'smarter'.
2. **Sound infrastructure choices must be made under uncertainty**
  - Uncertainty is inevitable regarding availability and cost of key technologies, and other relevant developments (e.g. global economic development, societal trends, urban and spatial development, demographic change etc.).
  - At the same time, there are some infrastructure choices – such as the increased interconnection of European electricity grids – that would seem sensible under any scenario of how decarbonisation may be achieved.

## Short-term improvements to EU climate policy

1. The design of individual instruments must become 'smarter'.
2. Sound infrastructure choices must be made under uncertainty.
3. **A new electricity market design, including greater interconnection of national grids to complete the single market, to be implemented by 2030**
  - ... by which time power generation must be substantially advanced towards decarbonisation. This means that the new electricity market design must be capable of dealing with a high share of **intermittent, near-zero-marginal-cost supply from renewables**, providing incentives for either **back-up capacity** or for **storage and flexible demand response**, possibly including some kind of **capacity mechanism** – and all this in an EU-wide integrated way.

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3. A new electricity market design, including greater interconnection of national grids to complete the single market, to be implemented by 2030.
4. **Key market distortions must be tackled, or their effects reduced.**
  - For example, company car taxation arrangements and energy consumption subsidies. More fundamentally, it must be ensured that **instruments, strategies and initiatives introduced for purposes other than emission reduction do not counter the low-carbon transition, and support it where possible.**

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4. Key market distortions must be tackled, or their effects reduced.
5. **Incentives for innovation, and targeted funding to support it, must be stepped up**
  - Particularly in the industrial sector, in order to work towards the technological advances that will allow industries to prosper in a carbon-constrained economy

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6. **Existing Information instruments should be improved, and introduced where their potential has been thus far underexploited**
  - ... particularly in the residential and transport sectors. Information sharing, regarding both technologies and public and private operations, but also policy design and implementation.



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6. Existing Information instruments should be improved, and introduced where their potential has been thus far underexploited.
7. **A meaningful carbon price must be established**
  - ... particularly through the EU ETS, in order to prevent investment in high-carbon infrastructure (esp. fossil fuel plants) and encourage fuel-switching in the short-term, and promote low-carbon technologies in the long-term. This includes changes that allow market participants to form more stable expectations about the long-term carbon price.

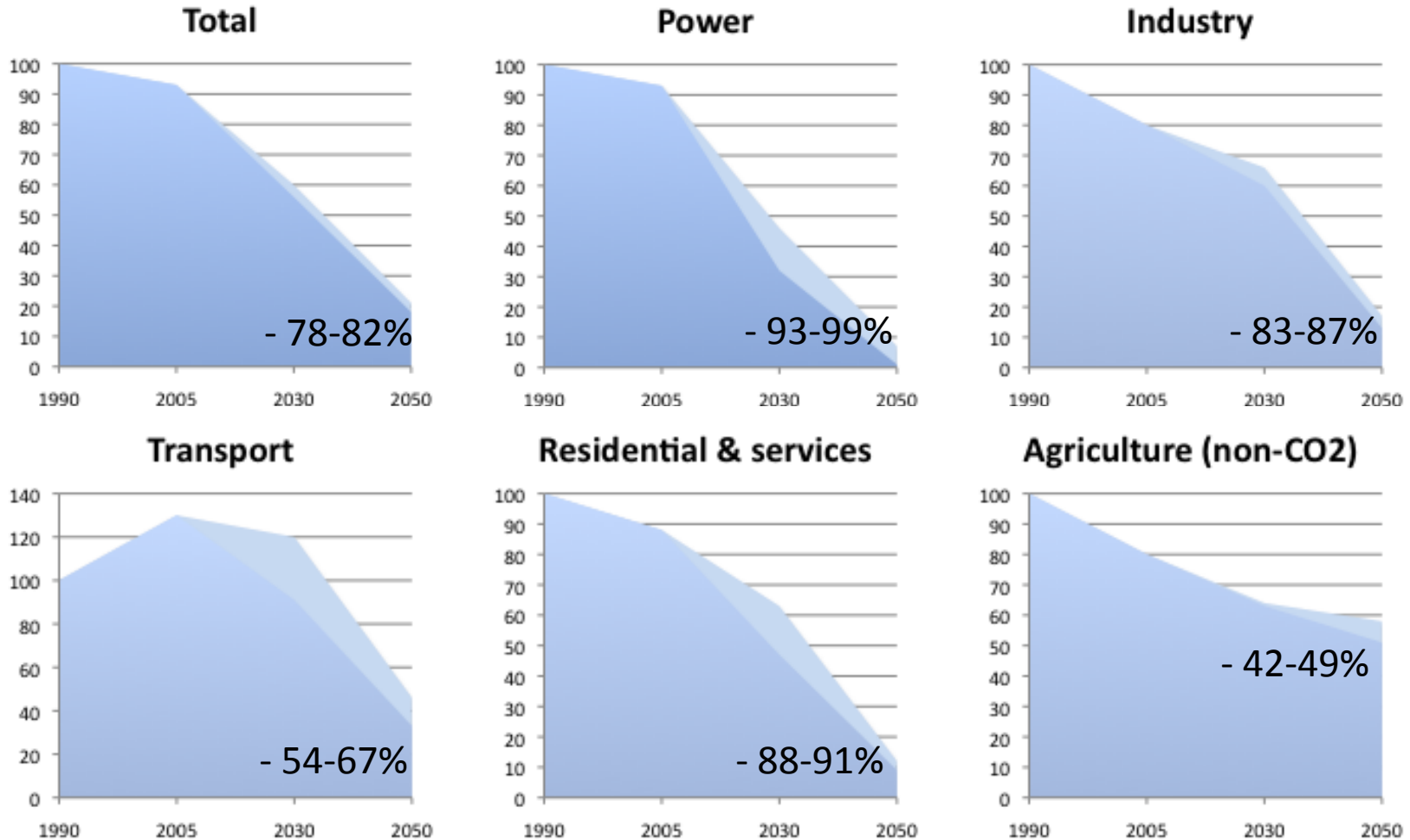
## Short-term improvements: Establish a Meaningful Carbon Price

- A brief reminder: why do we need a carbon price?
- Going forward: what models tell us about the transformation to a low-carbon economy
- Looking forward to 2030 and beyond: will the carbon price be too late to have an effect?

## A brief reminder: why do we need a carbon price?

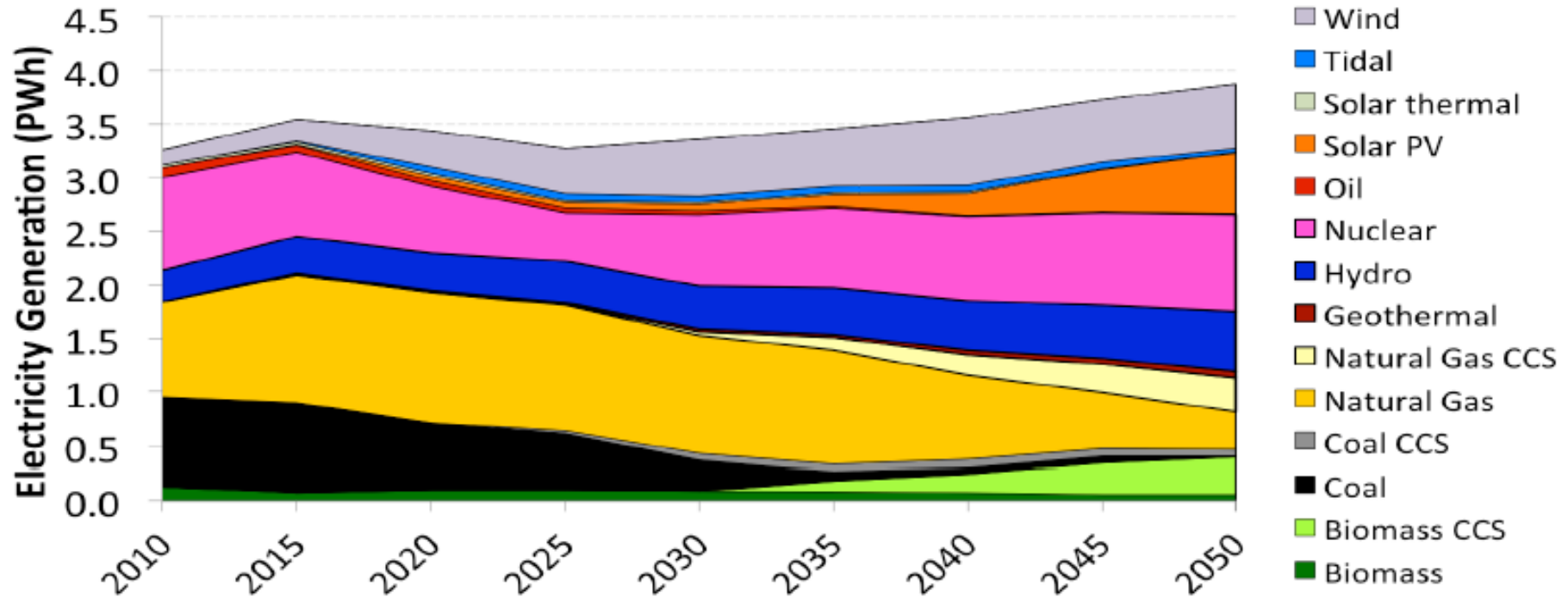
- Carbon pricing should be the cornerstone of any emission reduction strategy: prices need to tell us the “Ecological Truth” about the consequences of our decisions
  - Coordinate emission reduction efforts across emitters, across sectors, across countries, so that overall the cheapest abatement potentials are realised, and the overall cost of emission reduction is minimised
  - Change existing trajectories of economic development: encourage low-carbon investment, avoid carbon lock-in and stranded assets
  - Harness the power of the market for the discovery and selection of new technologies
- If all this can be achieved, the economic burden of decarbonising the EU economy will be moderate, or even positive (against a baseline of continued economic growth)

# What models can tell us about the low-carbon transformation



Source: Roadmap Impact Assessment SEC(2011) 288

## What models can tell us about the low-carbon transformation



gCO <sub>2</sub> /KWh	2010	2015	2020	2025	2030	2035	2040	2045	2050
Reference	348	344	342	453	520	554	574	600	612
Fragmented Policy	348	327	283	248	199	171	132	96	-19
Policy Success	348	326	285	264	170	63	-12	-132	-190

Source: Solano & Drummond 2014  
(CECILIA2050  
Deliverable 3.1)

## What models can tell us about the low-carbon transformation

- Power sector (and energy use in industry) will need to reduce emissions faster than the overall economy
  - Overall economy: -40 to -44% below 1990 by 2030
  - Power sector: -54 to -68% below 1990 by 2030
  - Industry: -34 to -40% below 1990 by 2030 – but including process emissions
- By 2030, the power sector will have to be largely decarbonised to keep a realistic chance of meeting the EU's long-term decarbonisation targets (also considering the pivotal role of the power sector for transport and heating)
- One implication: need for a reformed electricity market, capable of dealing with a high share of renewables
  - Intermittency and need for back-up
  - Incentives for demand response and storage
  - Zero marginal cost – low wholesale prices

## What role for carbon pricing in the low-carbon transformation?

- The current outlook for carbon pricing in the EU is bleak:
  - EU ETS is paralysed by a surplus of >2 bn allowances for the coming years – despite the MSR, and depending on growth rates, it could take another decade before scarcity is re-established and a substantial carbon price emerges
  - Discussions on taxation at EU level have not been going anywhere, only few national initiatives (France, Ireland, Sweden)
- If the carbon price should rebound in ~2030, the EU economy may look different:
  - Electricity sector already well progressed on the route to decarbonisation – driven by renewable support (and possibly national policies to phase out fossil fuels)
  - Different design for the electricity market, including some kind of capacity mechanism
  - Most of the “heavy lifting” will need to happen in transport, housing, agriculture (as well as process emissions in industry. But these sectors that are not very amenable to pricing – and may require a stronger price signal than industry would be able to bear
- **By the time the carbon price rebounds, its golden opportunity to have an effect may have passed**

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## Long-term options for EU Climate Policy: instrumentation storylines

### Technology stimulation and forcing

A suite of instrument is applied to promote particular technologies (renewables, energy efficiency, low-carbon mobility) and to encourage behavioural change, based on some kind of technology-specific roadmap. Generic carbon pricing continues to exist, but only serves as a backstop in case other, technology-specific technologies fail or underperform, and to compensate against rebound effects.

### Transformation through changing prices

Pure ETS: coverage of the EU ETS expanded to transport and heating fuels (upstream). Cap directly derived from the emission target. All related markets (in particular energy market) liberalised to enable cost pass-through. Complementary policies exist only where they are economically justified and implemented in a market-compatible way.

EU ETS evolves into a fixed-price regime (i.e. tax), first through a price collar, eventually a fixed price, offering the advantage of greater price certainty. Rising carbon price is defined in advanced, and revised periodically to ensure emissions stay on path. Complementary policies exist only where they are economically justified and implemented in a market-compatible way.

## Long-term options for EU Climate Policy: instrumentation storylines

### Technology stimulation and forcing

- + More targeted, sector-specific responses possible
- + Could & should use markets as a tool
- + National, subnational and sectoral initiatives possible

- Picking winners involves risk of failure / unnecessarily high cost

### Pure ETS

- + Transparent cap-setting
- + Target achieved by definition
- + In theory high efficiency
- + Can accommodate structural change in the energy sector

- Lock-in risk
- Requires functioning markets throughout
- Not much room for national-level policies, overachievement of targets

### Fixed-price ETS / tax

- + Predictable carbon price, long-term rising trajectory
- + More forgiving for national-level initiatives, imperfect or missing markets

- Compatibility with current EU decision making rules questionable
- Target achievement requires periodic adjustment of C price

## Summary: Four key insights from the CECILIA2050 project

### 1. We cannot afford not to use market-based mechanisms and pricing tools.

- But: currently carbon pricing as a tool is underutilised, and could achieve more. In particular the “flagship” EU ETS has rarely ever left the harbour.
- While carbon pricing is underutilised, policies that make use of market forces have delivered good results in some cases: particularly in the case of renewables support – less so for energy efficiency.

## Summary: Four key insights from the CECILIA2050 project

1. We cannot afford not to use market-based mechanisms and pricing tools.
2. **There is a lot that carbon pricing can do – but also a lot that it cannot do.**
  - To exploit the full potential of economic instruments, we need a) a higher carbon price, and b) we need to overcome constraints (e.g. access to finance, transaction cost), remove distortions, and create acceptance. One without the other will not achieve much.
  - As the emission profile of Europe changes over time, so does the scope for carbon pricing. Unfortunately, the sectors where most mitigation will need to happen in the 2030s and 2040s are less amenable to pricing. At the same time, the role conventionally foreseen for the EU ETS may become less relevant over time.
  - Different policy mixes are conceivable, with different roles for carbon pricing. But whatever the mix: pricing should play an important role, at least as a backstop to address the rebound effect from greater efficiency, as well as falling prices for fossil fuels.





