A low-carbon future for EU industry
‘fostering corporate co-benefits and innovative business models’

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2050 decarbonisation trajectory for industry and current status of emissions
Industrial decarbonisation

-~1-2 investment cycles

- Develop, Pilot & Demo

- EU ETS Innovation Fund

Industrial pathway source: EC 2011

Questions:

1. What is the primary focus of the graph?
2. How many investment cycles are estimated for the industrial decarbonisation process?
3. Which investment cycle phases are highlighted?
4. What is the significance of the EU ETS Innovation Fund?
5. What year marks the beginning and end of the industrial pathway from 1990 to 2050?
Chemicals industry

80% reduction ref. 1990
Steel industry

- 80% reduction ref. 1990
Cement industry

- 80% reduction ref. 1990

Graphs showing emissions from EU Cement industry and EU production volume of cementitious.
2050 decarbonisation strategies & examples
Steel industry

- Multi-purpose integrated steel plant: producing steel, cement, concrete aggregates (CCUS), high value chemicals (CCU) and/or electricity
- Higher levels of Re- and up-cycling steel through electric arc furnaces
- CCS with other operational co-benefits
- (renewable) Hydrogen steelmaking
- Product and business model changes: specialisation, product-service hybrid, leasing, …
Examples

Hlsarna (ULCOS/Tata)

Steelanol (CCU)(ArcelorMittal)

steel slag + CO2 → concrete (CCUS Blue planet/Carbicrete)

Re/upcycling steel technologies (source Allwood 2016)

Hydrogen based steel production (SSAB, Voestalpine)
Chemical industry

- Bio-based chemistry (intra-EU supply chain) gradually replacing petrochemicals (processes and products)
- Higher level of re/up-cycling (plastics)
- Further (renewables based) electrification of processes (e.g. H2, NH3)
- Product and business model changes (e.g. chemical services, leasing of chemicals)
Examples

- €3.7 billion investments in bio-based innovation from 2014-2020
- Deliver bio-based products that are comparable and/or superior to fossil-based products in terms of price, performance, availability and environmental benefits.
- On average reduce CO2 emissions by at least 50% compared to their fossil alternatives.

Source: http://www.frontiersin.org

from: Horizon 2020, NER300

Solid State Ammonium Synthesis

Utilisation of CO(2) from other industries e.g. steel industry
Cement industry

- Modernisation and efficiency gains (site + sector level)
- More clinker substitution (alternatives beyond BF slag and fly ash)
- CCS, but with co-benefits to clinker production process
- Alternative concrete formulas (physical/chemical)
- Concrete and cement re/up-cycling
Examples

Aether© cement (partial clinker replacement)

Calcium looping CCS

re/up-cycle concrete to cement

Landfill-mining; plasmakarok
Examples in other industries

- Aluminium: Advanced Green Aluminium Anode (AGRAL H2020), process demand response, selective recycling technologies
- Paper: Deep Eutectic solvents (pulping), waterless paper production, supercritical CO2, process electrification
- Ceramics: microwave assisted heating/gas-firing
Designing the Innovation Fund as part of a low-carbon investment and industrialisation strategy
Parameters for selection of projects

CO$_2$ abatement potential: e.g. using EU ETS benchmarks as a reference and CAPEX+OPEX per tonne

But other criteria essential in evaluation:

- higher productivity
- higher value added products
- better economic/process resilience (wider range of input materials, resource efficiency more diverse outputs)
- specialisation (new markets)
- efficient integration of different processes (incl. IT tech. I4.0)

Lowers risk of ‘white elephants’ and higher deployment/commercialisation rates of technology
Innovation Fund: a one stop shop?

- Innovation Fund a (project) finance toolbox
- (most) projects with high technology/construction risk will need (part) grant based finance (e.g. linked to TRL)
- Results based finance but milestone based (not 100% ex post)
- I.F. can enable/provide next layers of finance (equity, mezzanine, senior & minor debt, guarantees)
- Expand I.F. with participation of National Promotional Banks (NPBs) and private investors and use of ‘EU guarantee’: i.e. Investment Platform
- Projects could in principle be fully financed through I.F. (combination of finance tools, a one stop shop)
- Lean but professional management structure/administration of fund (see also Business Europe position paper ‘Making innovation fund fit-for-purpose’)

Innovation Fund: a one stop shop?
EU and national industrial strategies

Essential that I.F. becomes part of broader EU and national industrial(isation) strategy

At National/Member State level:
- R&D support
- industrial infrastructure support, zone planning (promoting industrial symbiosis)
- Tax breaks for low-carbon investments
- public procurement
- enhanced role of national promotional banks

At EU level:
- mission oriented industrial policy: linking H2020, EFSI, I.F. …
- procurement of low-carbon products under EU funds
- flexibility for Member States under SGP macro-economic imbalance/Eurostat ESA2010
- State Aid rules flexibility/transparency
- protection against dumping
“The EU finds itself at an important moment in the history of its industrial development.

Ongoing and future process, product and business model innovations, will make deep emission reductions possible over the next decades.

But public policy needs to play a catalysing role.”