



Task force CCS for industries

Current status and plans

Objectives

Show what is the role of CCUS in low carbon perspectives for large emitting industries.

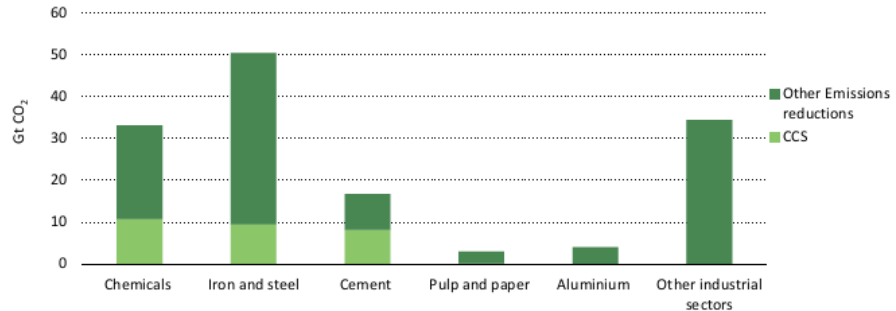
The relevant issues

- **Why CCUS for industry is an important issue**
- **Which industries to consider?**
- **What are their emissions?**
- **Potential alternatives to CCS to achieve zero emissions for the different industries.**
- **Status of CCUS developments from laboratory scale to demonstration.**

Why CCUS for industry is an important issue

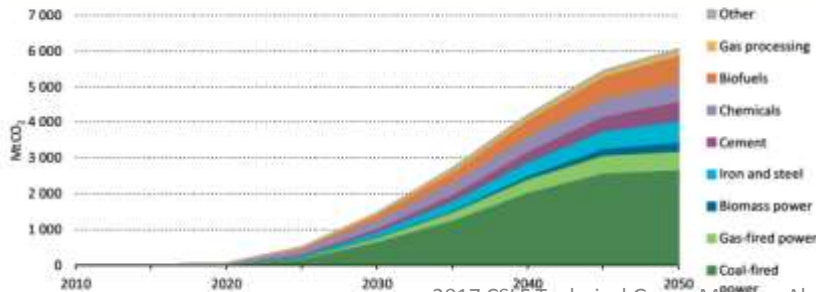


Figure 2.3 • Cumulative emissions reductions from CCS in industry (2DS relative to 6DS)



Source: Derived from IEA (2016b), *Energy Technology Perspectives 2016*.
 Note: There are 97 MtCO₂ captured from pulp and paper production

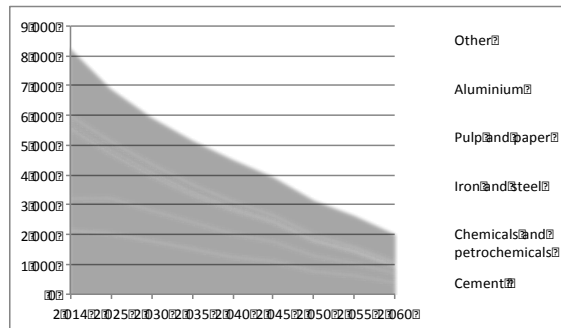
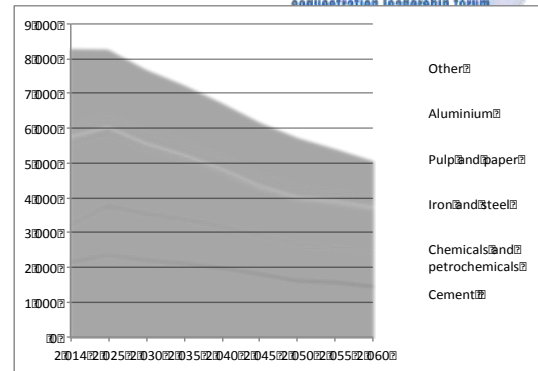
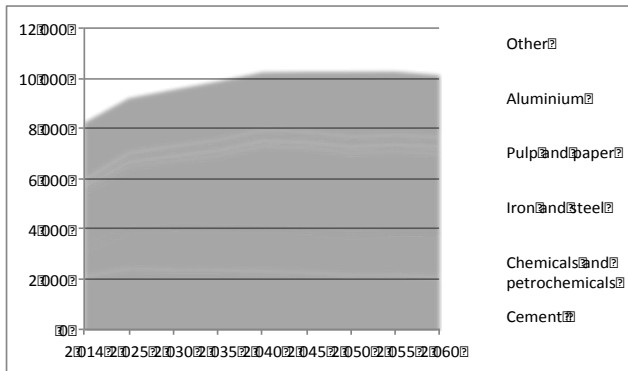
Figure 2.2 • Power and industry are the predominant sources of CO₂ captured in the 2DS



Source : IEA

Source: Derived from IEA (2016b), *Energy Technology Perspectives 2016*.

Which industries to consider?



- Cement
- Steel
- Chemicals
- Refining
- Natural gas
- Heavy oil
- Hydrogen
- Fertilizers
- Waste to energy

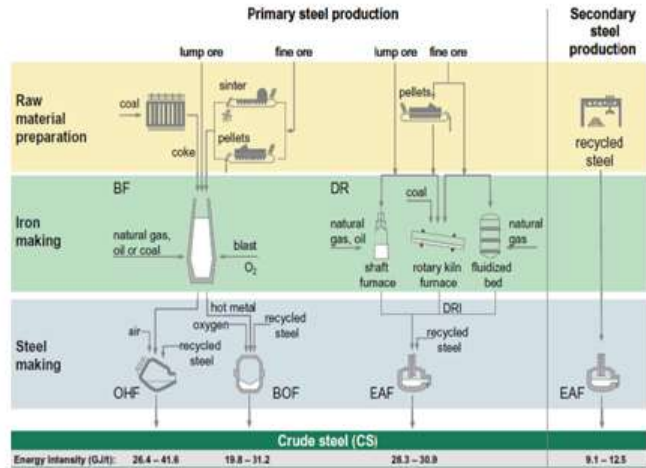
Figure 1.2. CO₂ emissions in Mt CO₂/year from industry in RTS (upper left), 2DS (upper right and B2DS (lower) scenarios (from IEA, 2017).

What are their emissions?



Example of a steel plant

	Primary energy [†] (GJ/t)	Direct energy [†] (GJ/t)	Total CO ₂ [†] emission (tCO ₂ /t)	Direct CO ₂ [†] emission (tCO ₂ /t)
Coke plant	6.827	6.539	0.824	0.794
Sinter plant	1.730	1.549	0.211	0.200
Pellet plant	1.204	0.901	0.075	0.057
Blast furnace	12.989	12.309	1.279	1.219
BOS plant	-0.253	-0.853	0.202	0.181
Electric arc furnace	6.181	2.505	0.240	0.240
Bloom, slab and billet mill	2.501	1.783	0.125	0.088
Hot strip mill	2.411	1.700	0.120	0.082
Plate Mill	2.642	1.905	0.133	0.098
Section Mill	2.544	1.828	0.127	0.084
Pickling line	0.338	0.222	0.016	0.004
Cold mill	1.727	0.743	0.075	0.008
Annealing	1.356	1.086	0.070	0.049
Hot dip metal coating	2.108	1.491	0.104	0.059
Electrolytic metal coating	4.469	2.619	0.208	0.046
Organic coating	1.594	0.758	0.074	0.003
Power Plant	12.173	12.173	1.989	1.989



	Blast Furnace	Basic Oxygen Furnace
CO ₂ concentration	25%	20%
Pressure	50mbar	20mbar
Temperature	30°C	30°C
Humidity	100%	100%
Impurities	Dust, H ₂ S,...	Dust
Others	CO (25%)	CO (60%)

Other issues

Alternatives to CCS to achieve deep emissions reduction.

- Are there any?
- Which challenges associated to these alternatives?

Development status

- From lab scale to...
- ...large scale facilities (the vast majority of the current CCUS projects are based on emissions from industries rather than from power generation).

Our team

- Commitment from :
 - Norway, Canada, France, UAE, Saudi Arabia.
- Almost all the industrial sectors are engaged either via a company of those sectors or via a professional organization.
- GCCSI has joined.

CCS for Industries Task Force

Time line



Topic	Review Status	Main Contributor
Contribution from the different sectors	In progress	Different sectors
Introduction	In progress	Norway/France
CO2 emission characterisation	In progress	Norway
Role of industry in economies	To be started	France
Alternatives to CCS	In progress	UAE/France
Project Status	In progress	Canada
Conclusions/Recommendations	To be started	All

Target Mid Year CSLF 2018

1. Contributions from the different sectors mid jan 18
2. Task force members reviewing the contributions end jan 18
3. Writing the first draft report mid march 18
4. Last draft report april 18
5. Publishing process june 18