MANAGING CARBON WASTE IN A DECARBONIZED INDUSTRY: ASSESSING THE POTENTIAL OF CONCRETE MIXING STORAGE

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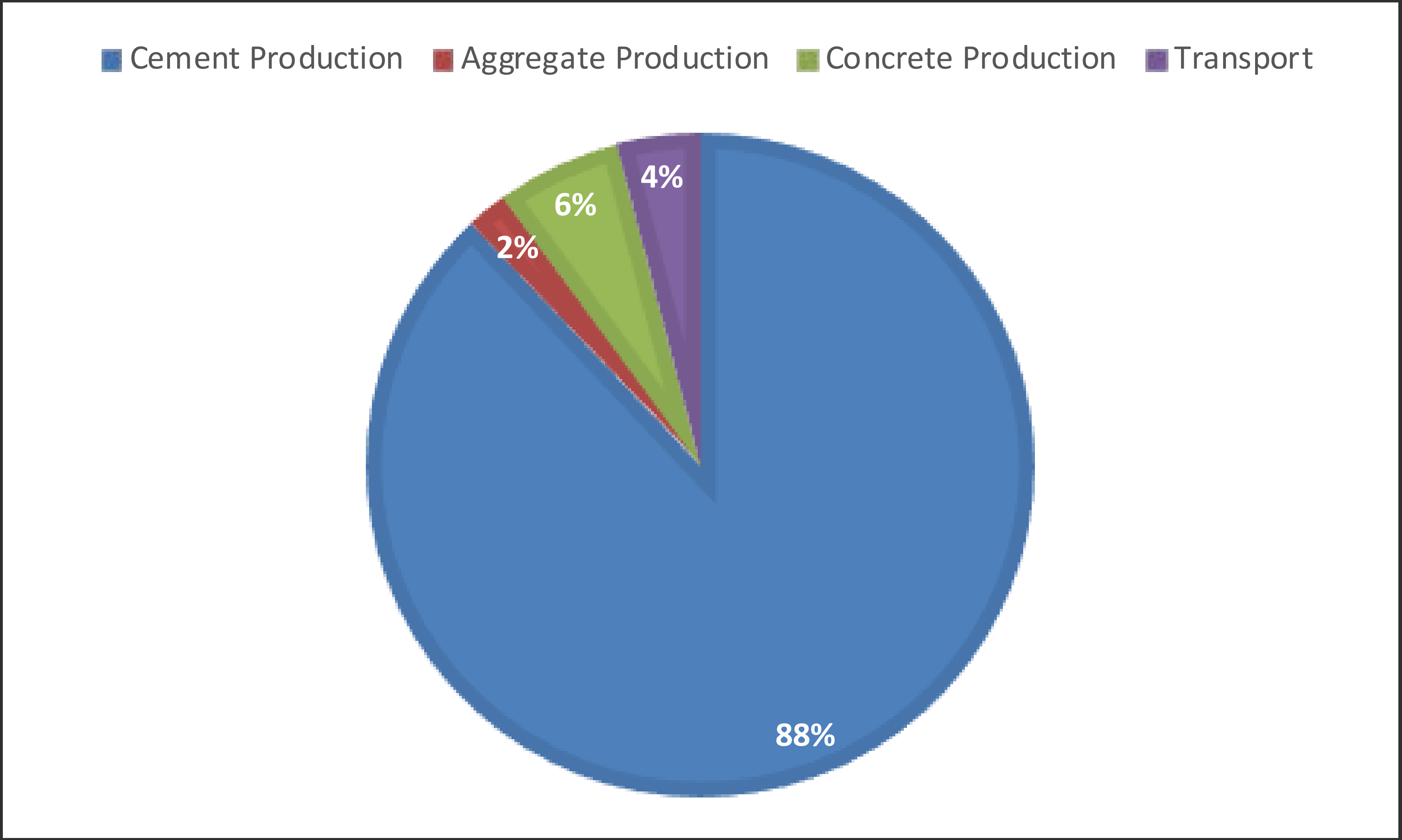
OUTLINE

1. Introduction
2. Carbon cycle in concrete
3. Materials and methods
4. Results and discussion
5. Final remarks

1. INTRODUCTION



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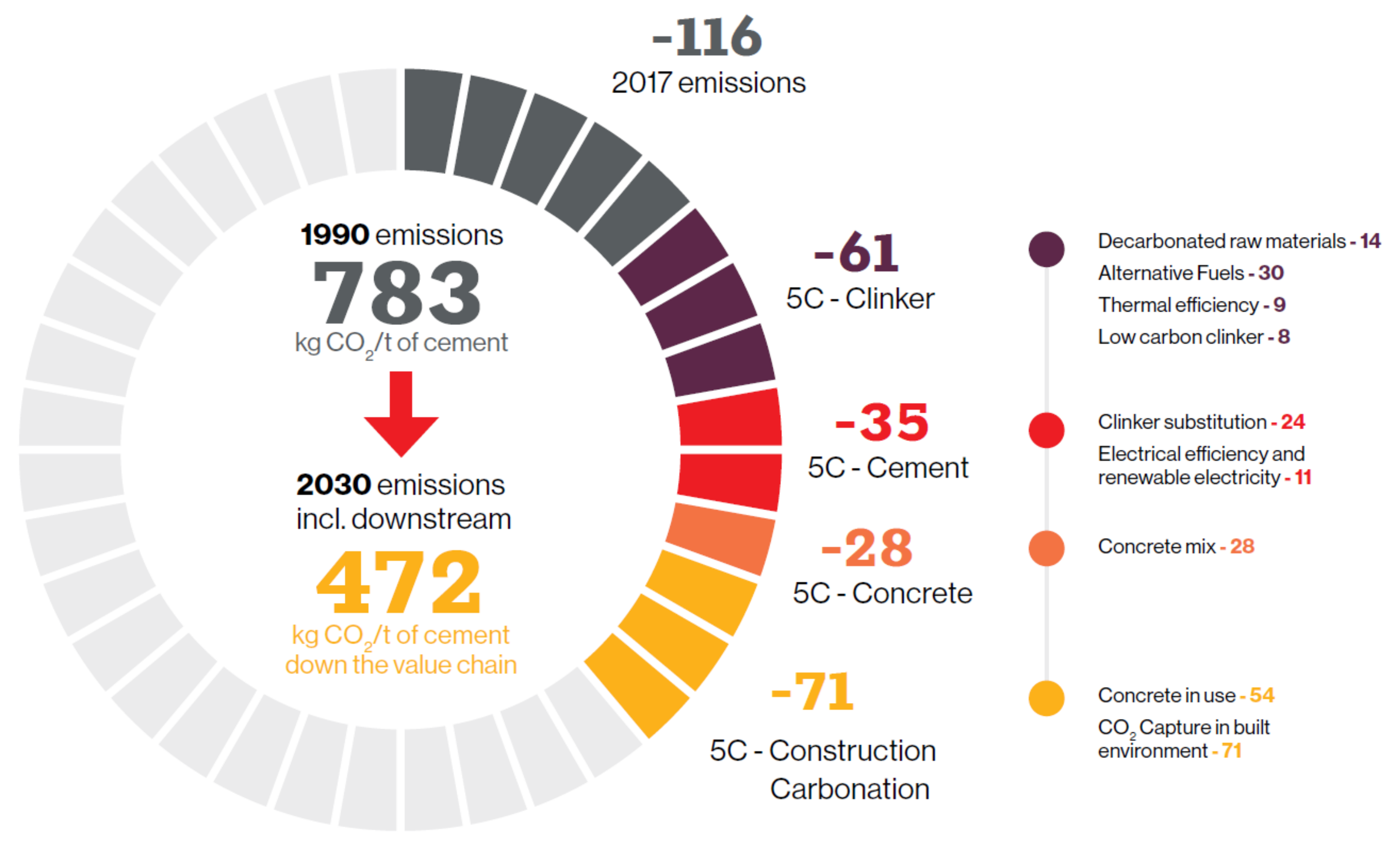
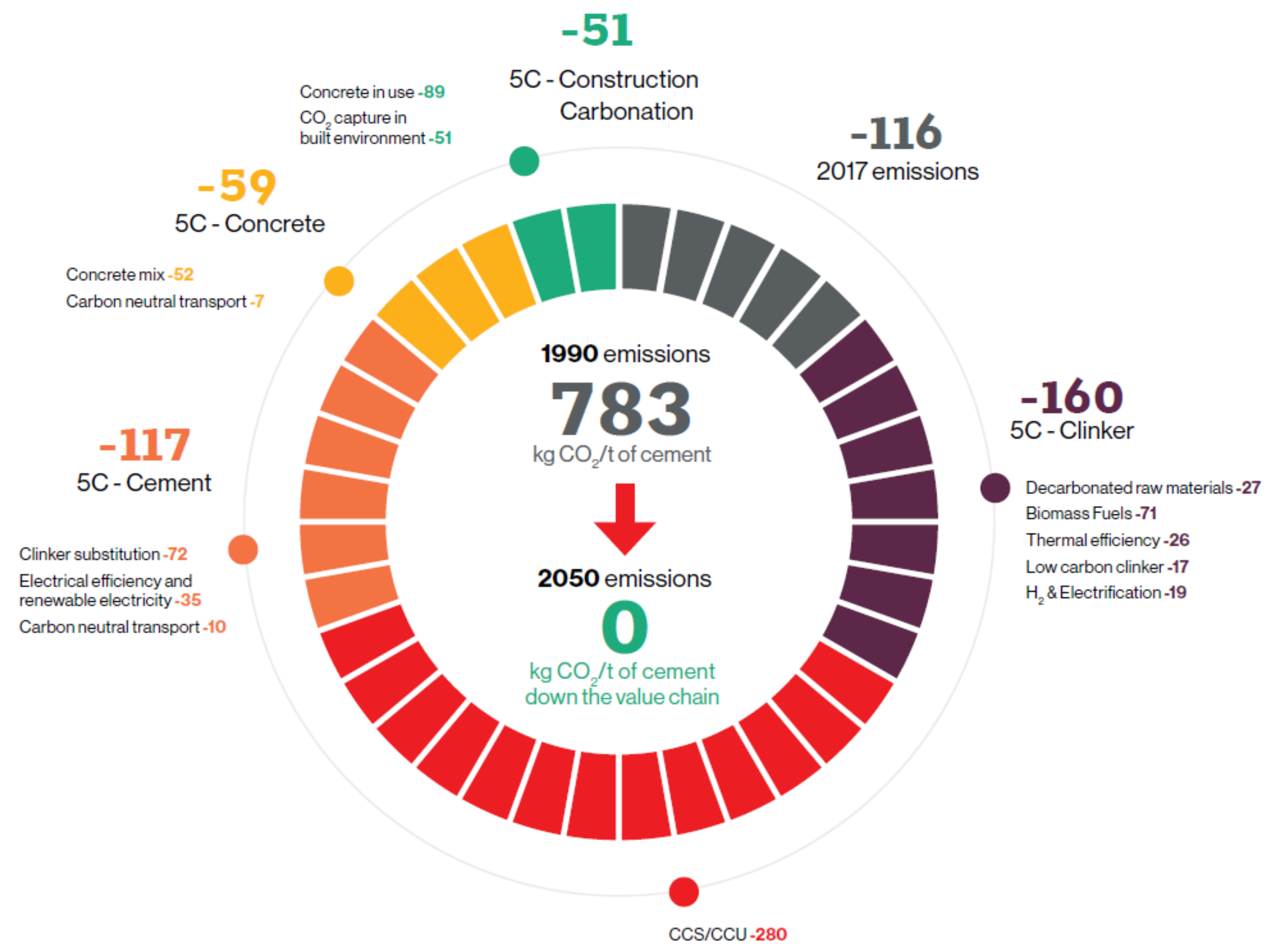
1. INTRODUCTION



https://cembureau.eu/media/kuxd32gi/cembureau-2050-roadmap_final-version_web.pdf

1. INTRODUCTION



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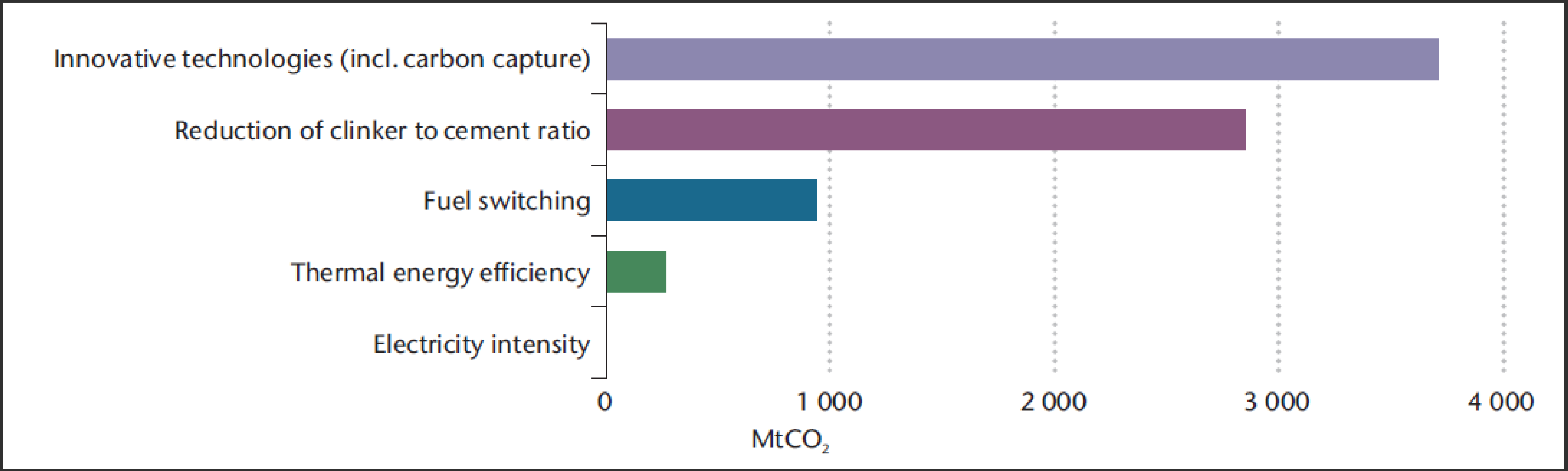
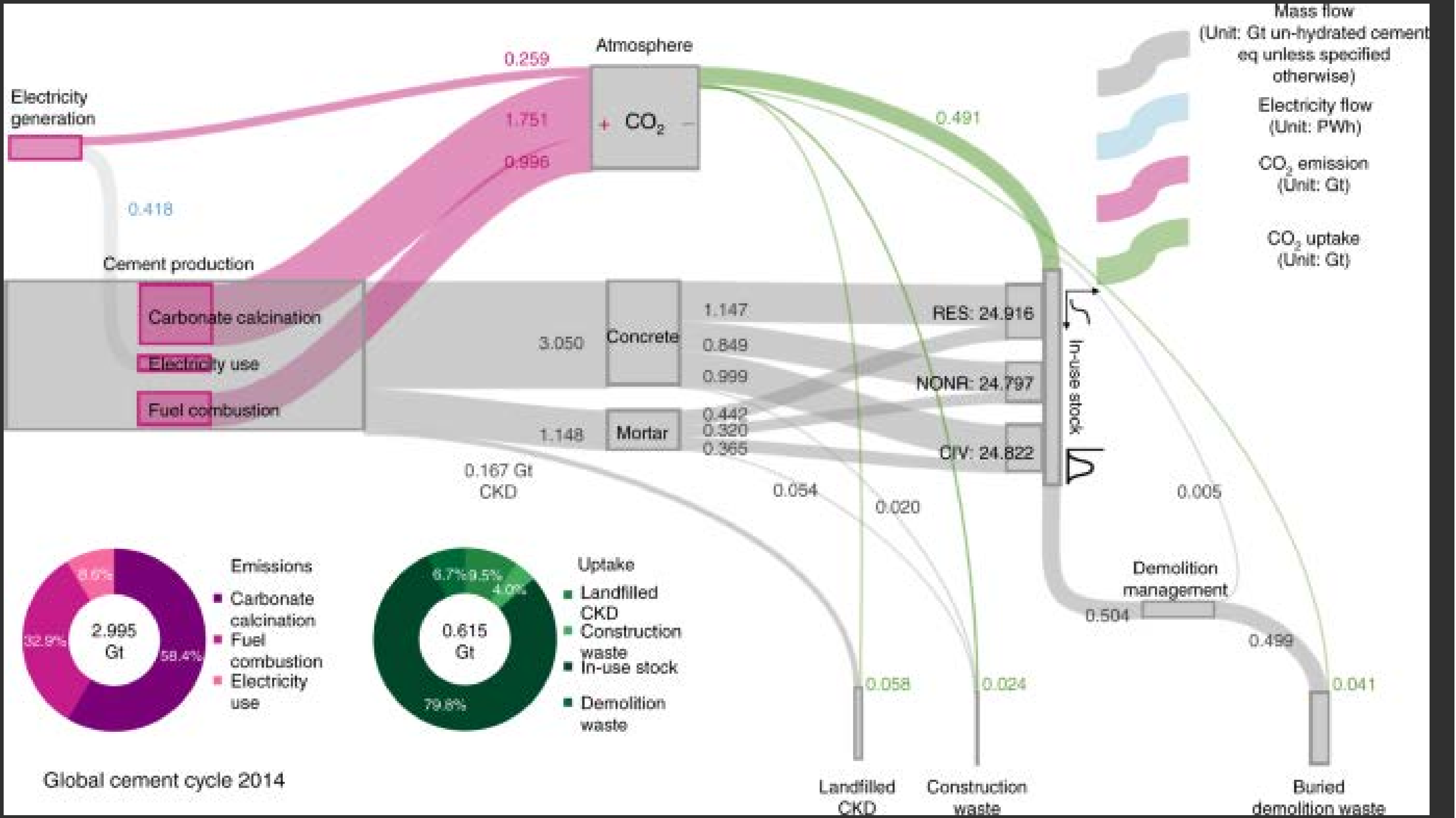
1. INTRODUCTION



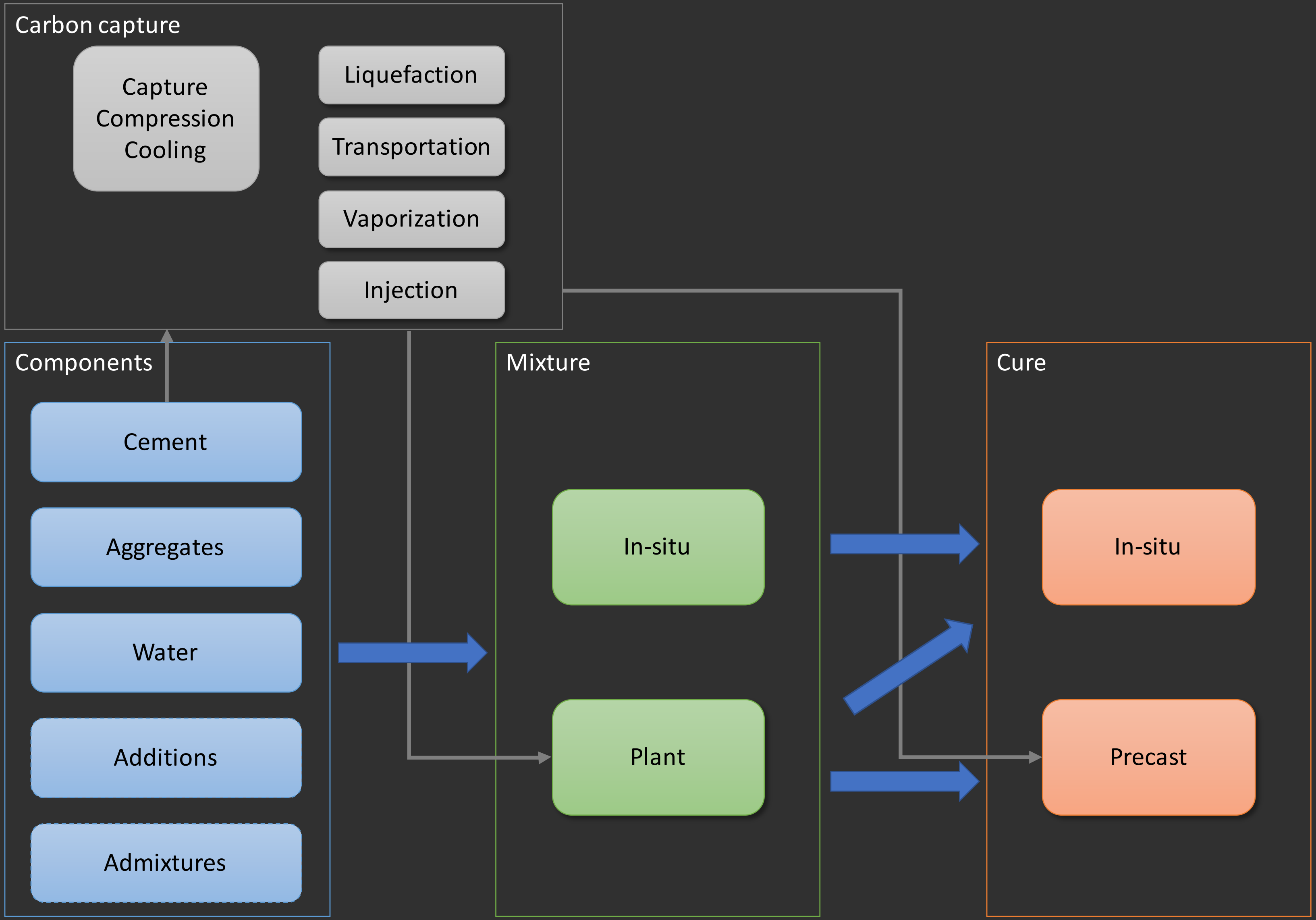
https://iea.blob.core.windows.net/assets/cbaa3da1-fd61-4c2a-8719-31538f59b54f/TechnologyRoadmapLowCarbonTransitionintheCementIndustry.pdf

2. CARBON CYCLE IN CONCRETE



https://doi.org/10.1038/s41467-020-17583-w

3. MATERIALS AND METHODS


Carbon capture

Capture
Compression
Cooling

Liquefaction

Transportation

Vaporization

Injection

Components

Cement

Aggregates

Water

Additions

Admixtures

Mixture

In-situ

Plant

Cure

In-situ

Precast

3. MATERIALS AND METHODS

VARIABLE	MODE	MAXIMUM	MINIMUM	UNITS
Specific emission	0.049	0.194	0.023	kg CO2 emitted / kg CO2 used
Liquefaction	22.60	50.88	12.98	g CO2 / kg CO2
Emission factor (electricity)	253.9	355.3	162.2	g CO2 / kWh
Electricity consumption	0.089	0.143	0.080	kWh / kg CO2
Transportation	15.14	125.87	3.42	g CO2 / kg CO2
Emission factor (fuel)	82.0	300.0	40.0	g CO2 / tkm
Distance	120.0	300.0	50.0	km
Efficiency	0.650	0.715	0.585	kg CO2 / kg transported
Vaporization	1.79	3.13	0.86	g CO2 / kg CO2
Emission factor (electricity)	253.95	355.31	162.19	g CO2/ kWh
Electricity consumption	0.007	0.0088	0.0053	kWh / kg CO2
Injection	9.40	14.46	5.40	g CO2 / kg CO2
Emission factor (electricity)	253.9	355.3	162.2	g CO2/ kWh
Electricity consumption	0.037	0.041	0.033	kWh / kg CO2

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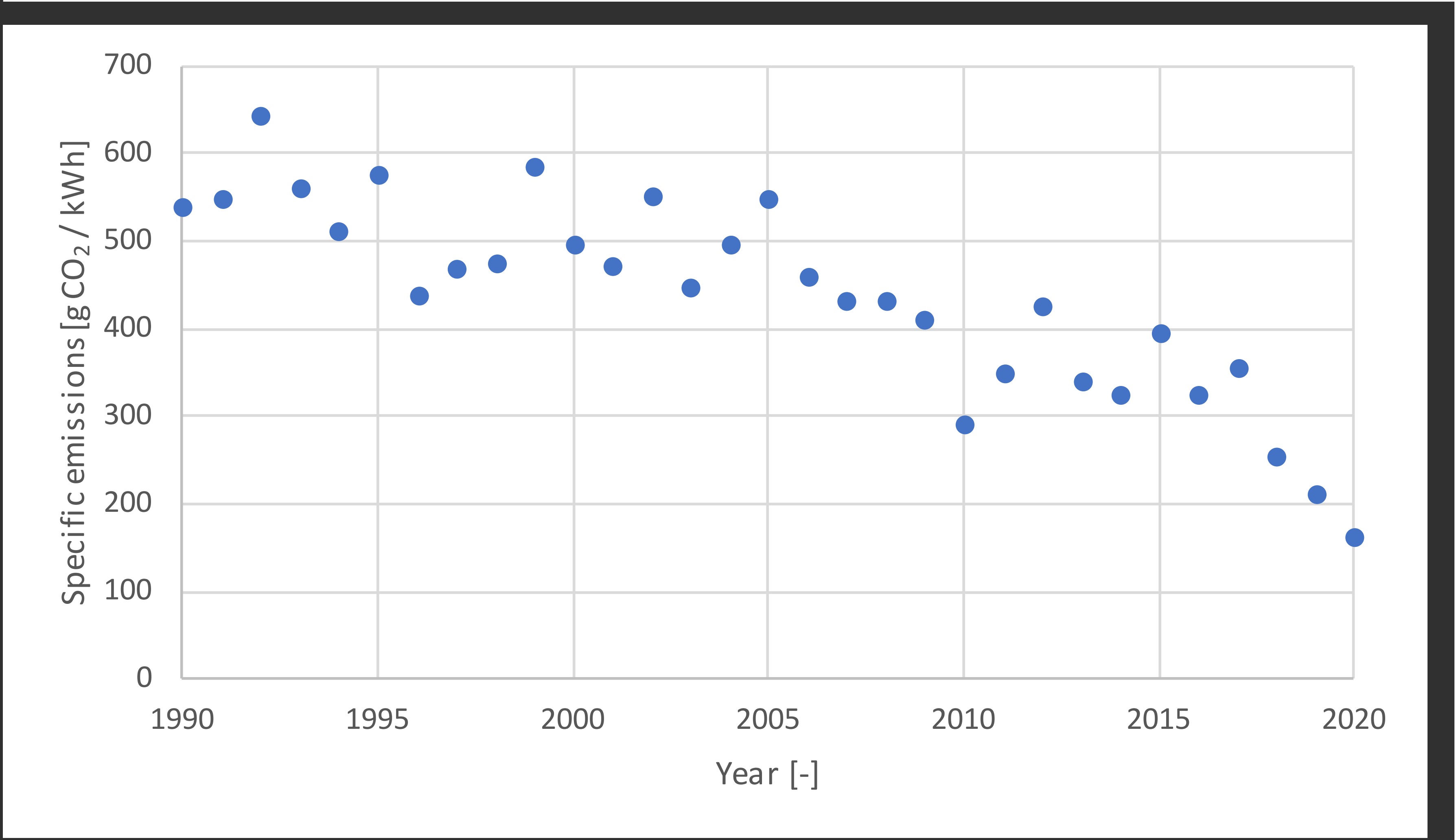
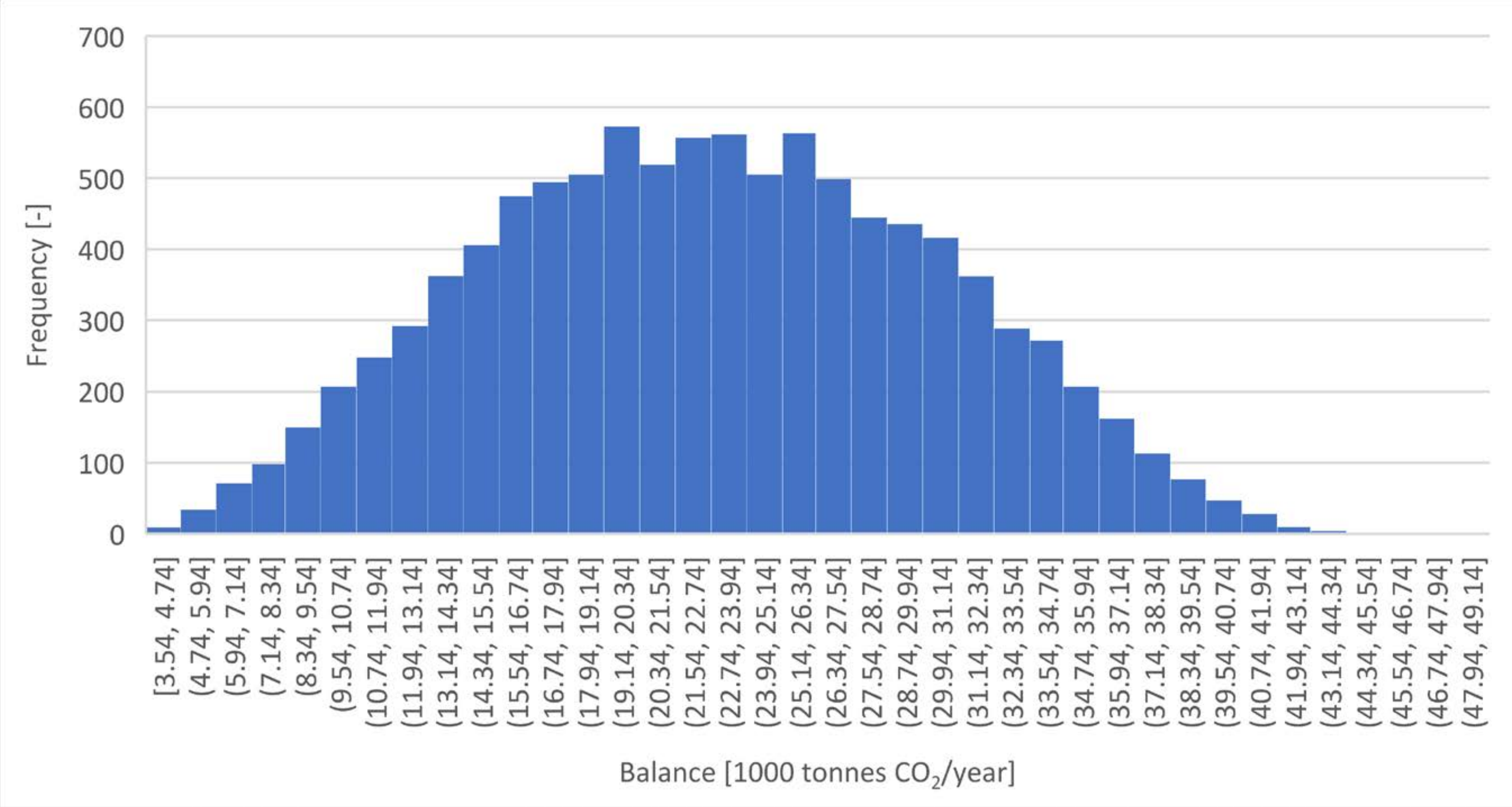


3. MATERIALS AND METHODS

VARIABLE	MODE	MAXIMUM	MINIMUM	UNITS
CO2 mixed	36 883 355	71 809 844	4 511 860	kg CO2 / year
CO2 absorbed	24 896 265	61 038 368	2 255 930	kg CO2 / year
Concrete	11 000 665	13 118 837	9 509 776	m3 / year
Ready-mix	5 700 000	6 270 000	5 130 000	m3 / year
Pre-cast	5 300 665	6 848 837	4 379 776	m3 / year
Non-structural	1 882 160	2 495 577	1 531 229	m3 / year
Structural	3 418 505	4 353 260	2 848 547	m3 / year
Cement	766	843	675	kg cement / m3 concrete
Ready-mix	287	315.7	258.3	kg cement / m3 concrete
Pre-cast	479	527	416	kg cement / m3 concrete
Non-structural	224	247	193	kg cement / m3 concrete
Structural	255	280	223	kg cement / m3 concrete
Absorption	0.0085	0.016	0.001	kg CO2 / kg cement
Mixing efficiency	0.675	0.85	0.5	kg CO2 absorved / kg CO2 mixed

4. RESULTS AND DISCUSSION



5. FINAL REMARKS

Carbon capture will be necessary to tackle emissions in various industries, namely the cement industry.

This will create a need for dispose of carbon.

Storing carbon into concrete has a positive carbon balance, since cement naturally uptakes carbon from the atmosphere.

The impacts on concrete durability, particularly reinforced concrete, needs to be assessed.

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