Sector-based analysis and post-2012 targets

How sector-based analysis can be used to inform targets

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Sector-based analysis and targets

- The costs associated with meeting a target are a key variable in assessing the comparability/fairness of the target

- Estimating these costs requires sector-based analysis of mitigation potentials within a country

- Sector-based analysis is usually addressed through the use of marginal abatement cost curves (MACCs)

Developing MACCs with indicators

- MAC curves are generally a product of models

- To enhance transparency they can be built with indicators

- Mitigation potential in a country is equal to the mitigation potential in each sector x share of emissions from sector

$$mp_i = f(mp_{energy(i)} \times \%_{energy(i)} + mp_{agriculture(i)} \times \%_{agriculture(i)} +..)$$

Developing MACCs with indicators

Approach

1) Using IPCC AR4 or other reputable data, generate a MACC for Annex 1 in 2020

2) Apply these Annex 1 aggregate potentials to each Annex 1 Party – relative to their 2020 sectoral baselines

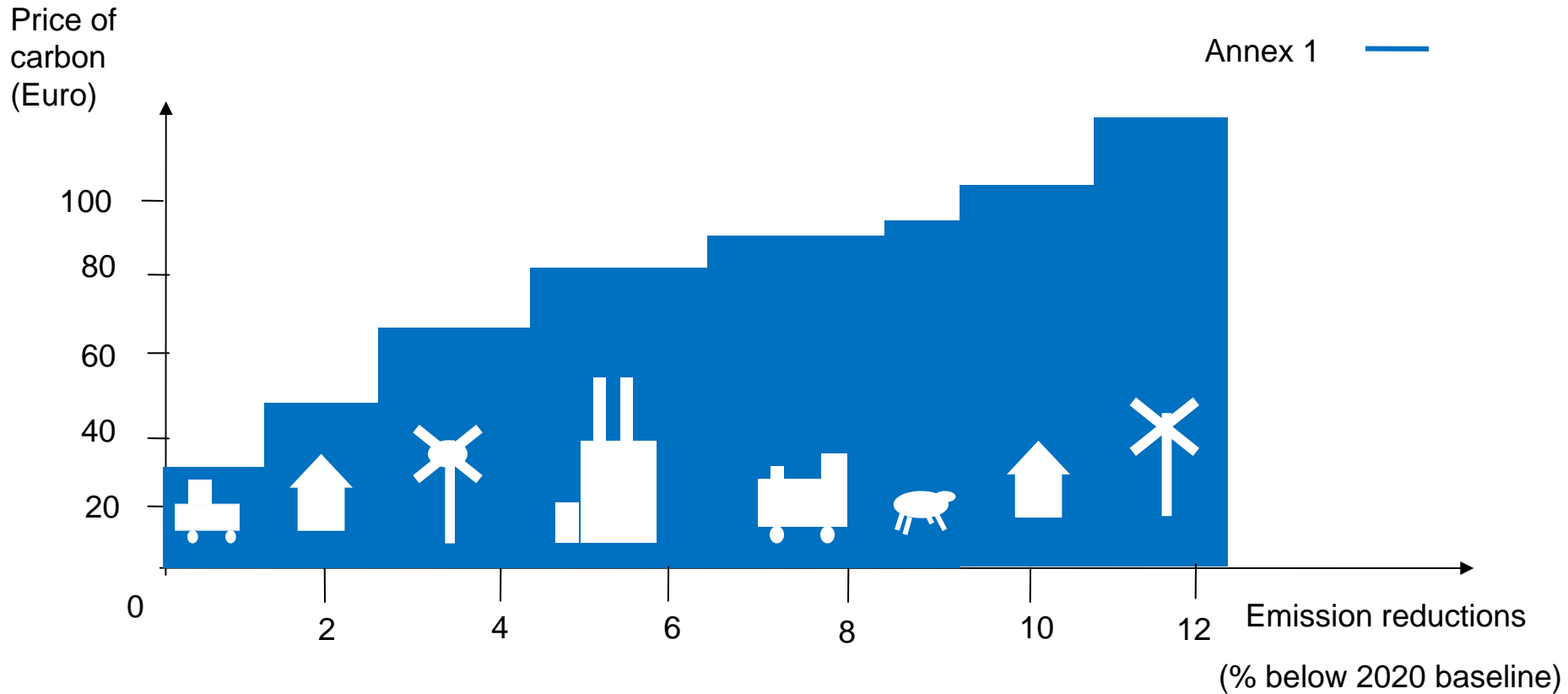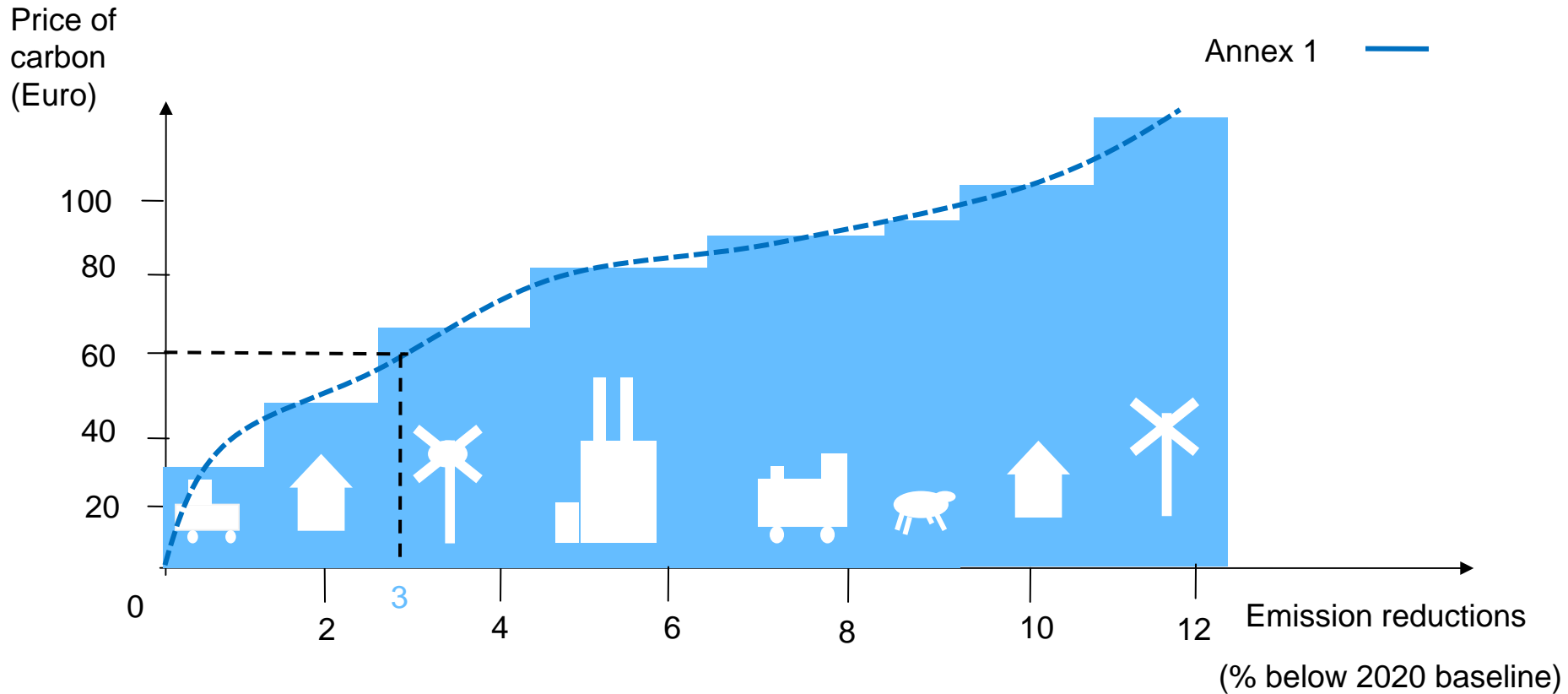3) Apply a relative efficiency factor to each sector within each country to generate a 'proxy' MACC

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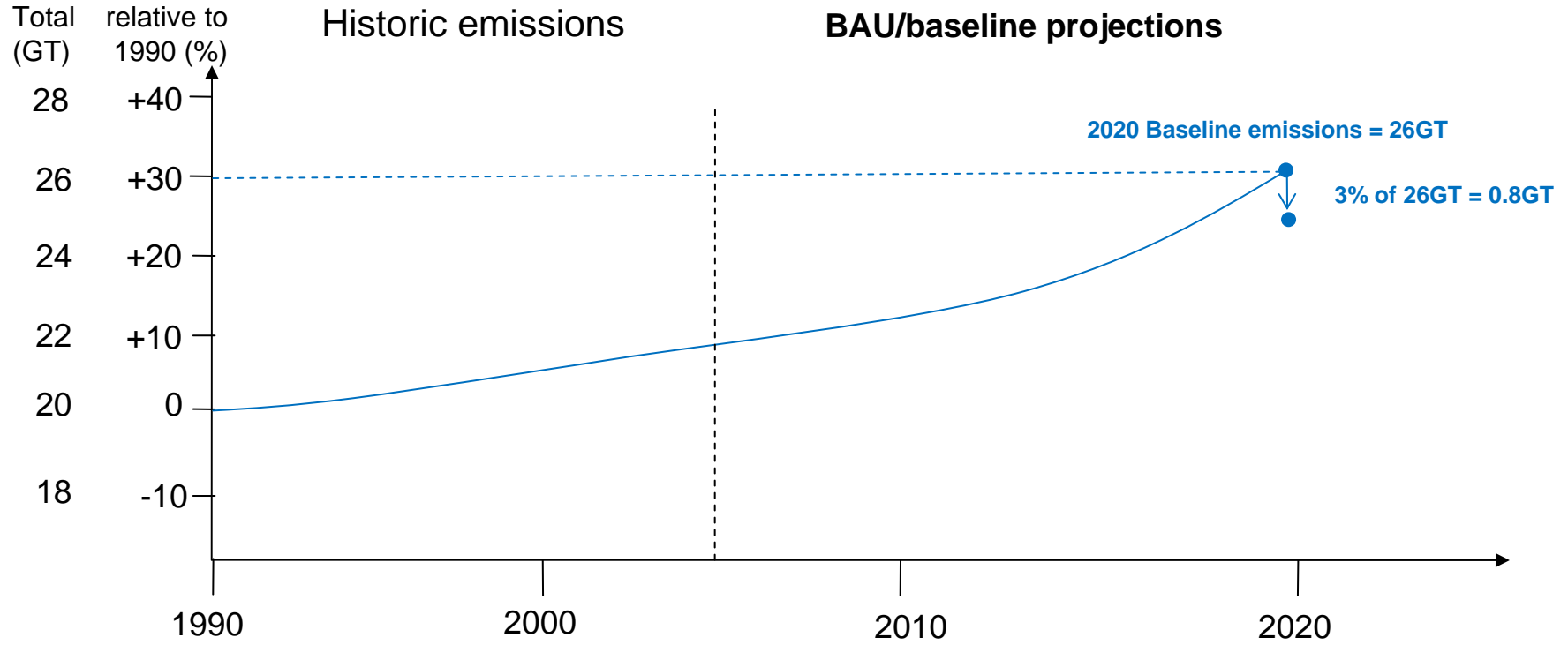
Developing MACCs with indicators

Developing MACCs with indicators
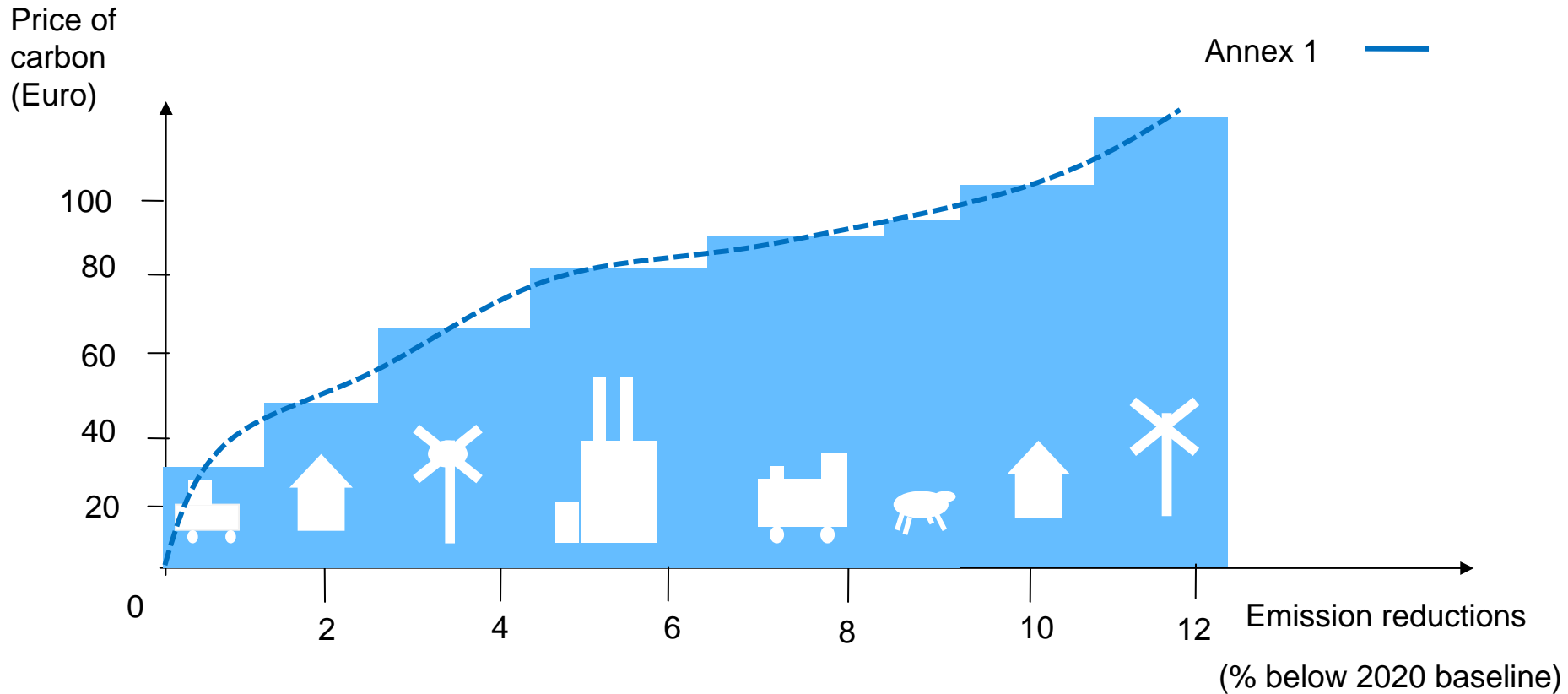
Developing MACCs with indicators

Developing MACCs with indicators

Approach
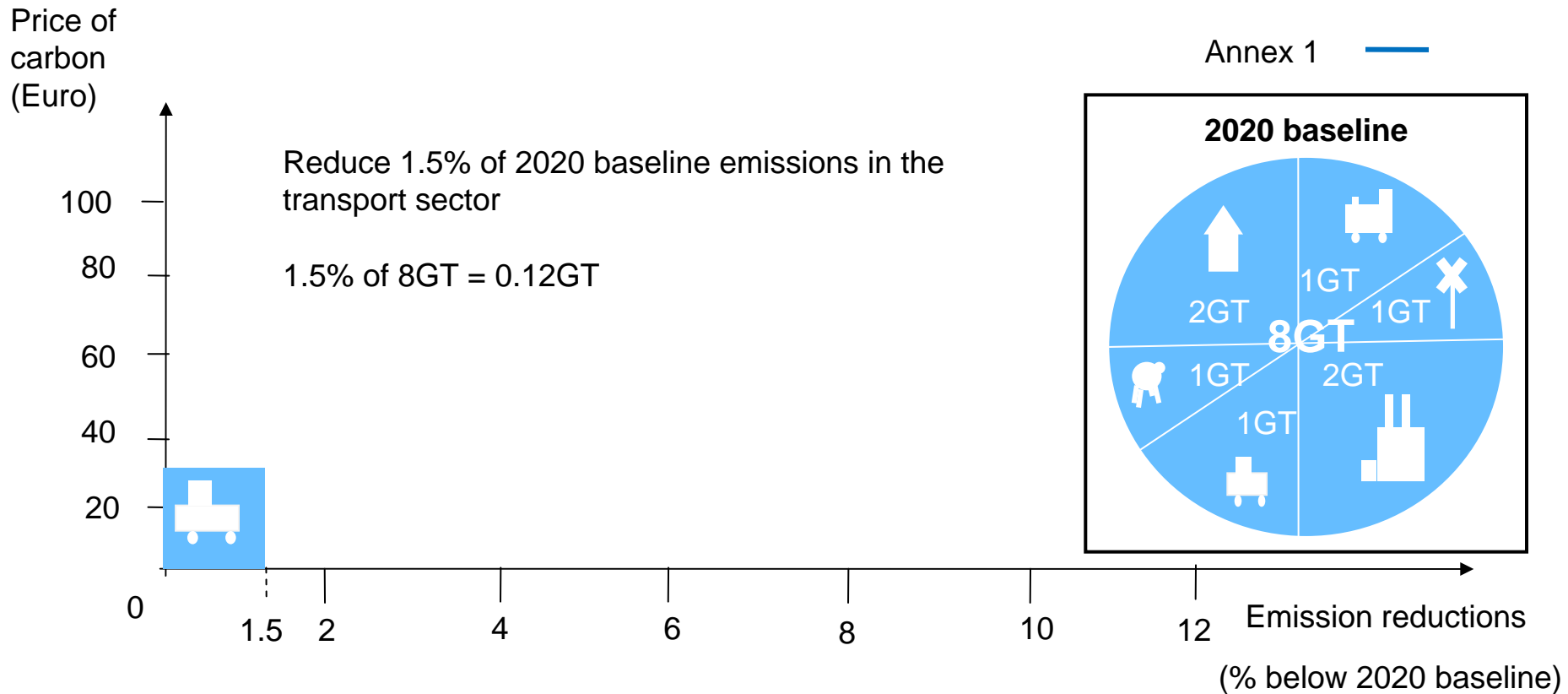
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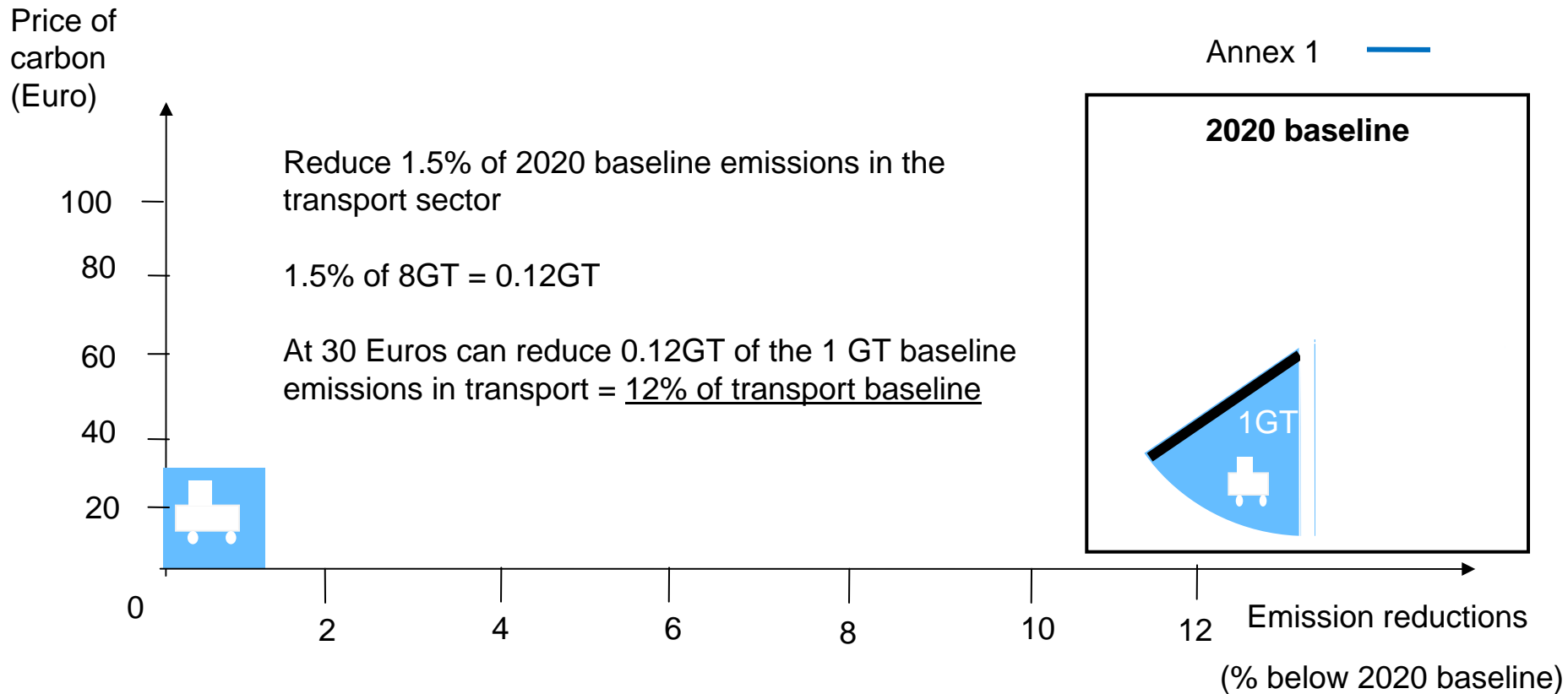3) Apply a relative efficiency factor to each sector within each country to generate a 'proxy' MACC
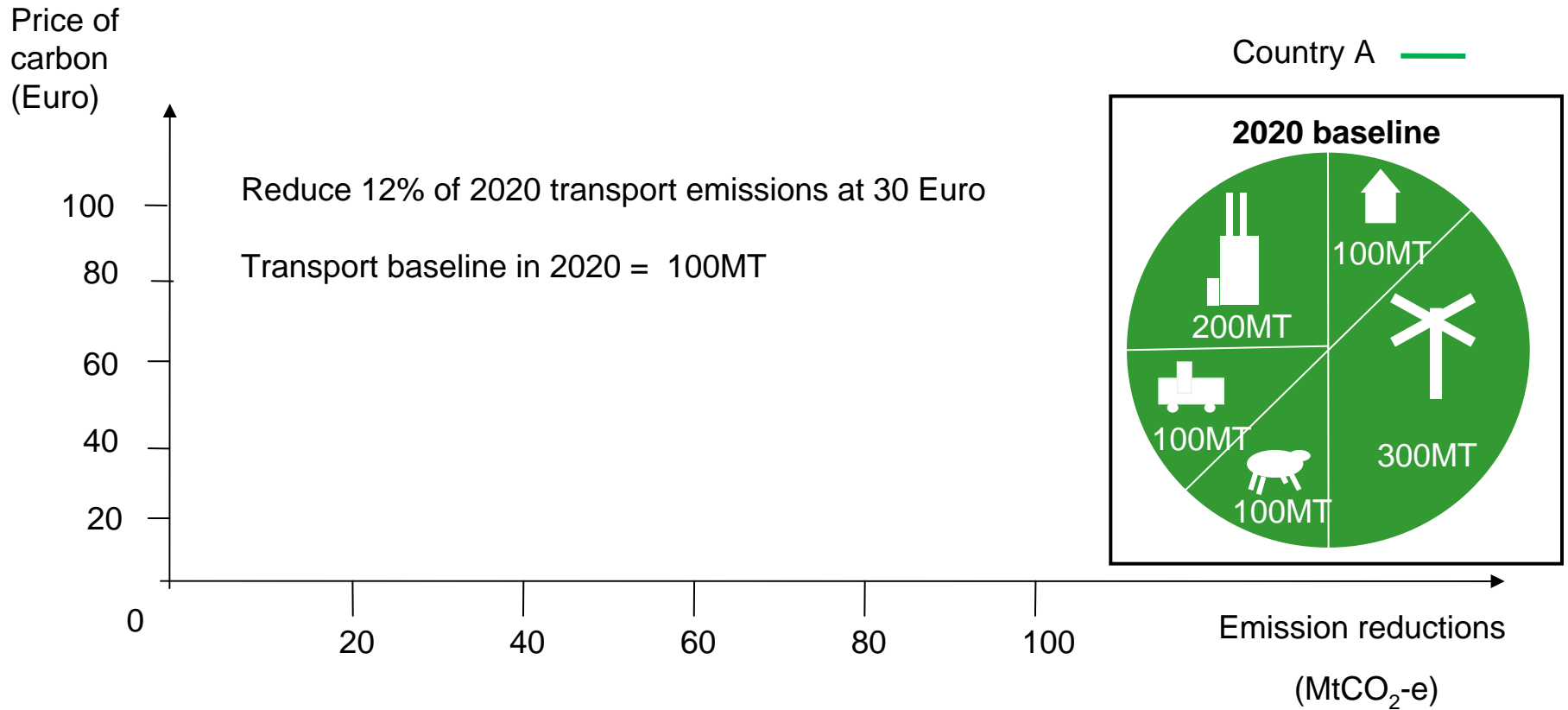
Developing MACCs with indicators

Developing MACCs with indicators

Price of carbon (Euro)

Reduce 1.5% of 2020 baseline emissions in the transport sector

1.5% of 8GT = 0.12GT

Annex 1

2020 baseline

2GT

1GT

1GT

8GT

1GT

1GT

2GT

1GT

100

80

60

40

20

0

1.5   2   4   6   8   10   12

Emission reductions

(% below 2020 baseline)

Developing MACCs with indicators

Price of carbon (Euro)

Annex 1 ⎯⎯

Reduce 1.5% of 2020 baseline emissions in the transport sector

1.5% of 8GT = 0.12GT

At 30 Euros can reduce 0.12GT of the 1 GT baseline emissions in transport = <u>12% of transport baseline</u>

2020 baseline

1GT

100

80

60

40

20

0

2   4   6   8   10   12   Emission reductions

(% below 2020 baseline)

Developing MACCs with indicators

Price of carbon (Euro)

Country A ───

2020 baseline

Reduce 12% of 2020 transport emissions at 30 Euro

Transport baseline in 2020 = 100MT

100MT

200MT

100MT

300MT

100MT

100

80

60

40

20

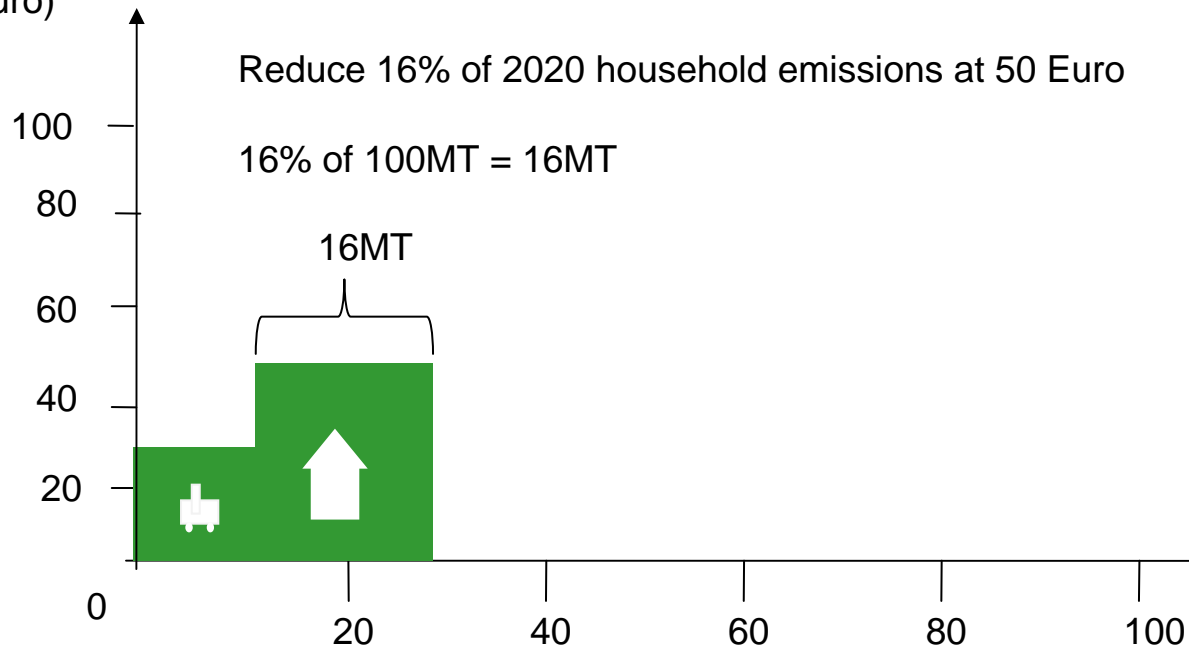0

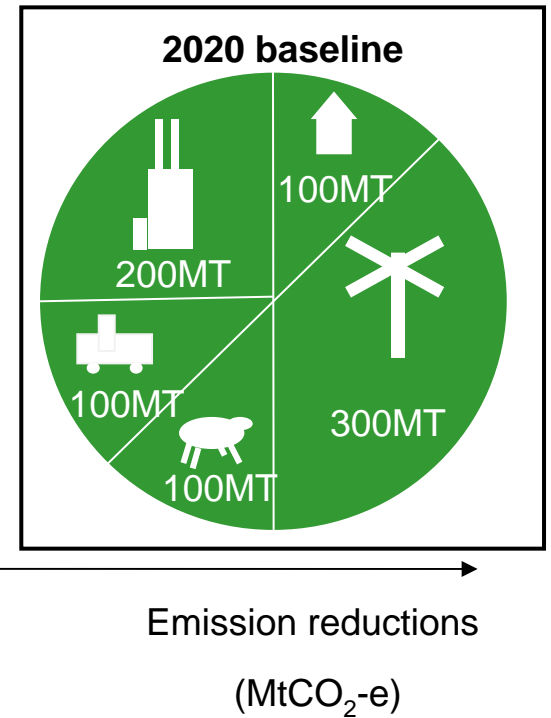20   40   60   80   100

Emission reductions

$(MtCO_2\text{-}e)$

Developing MACCs with indicators

Price of carbon (Euro)

Country A ———

Reduce 12% of 2020 transport emissions at 30 Euro

Transport baseline in 2020 = 100MT

12% of 100MT = 12MT

2020 baseline

100MT

200MT

100MT

300MT

100MT

100

80

60

40

20

0

20   40   60   80   100

Emission reductions

$(MtCO_2\text{-}e)$

Developing MACCs with indicators

Price of carbon (Euro)

Reduce about 2% of 2020 emissions at 50 Euro in the residential sector

2% of 8GT = 0.16GT = 16% of residential baseline

2020 baseline

2GT

1GT

1GT

8GT

1GT

2GT

1GT

100

80

2%

60

40

20

0

2   4   6   8   10   12   Emission reductions

(% below 2020 baseline)
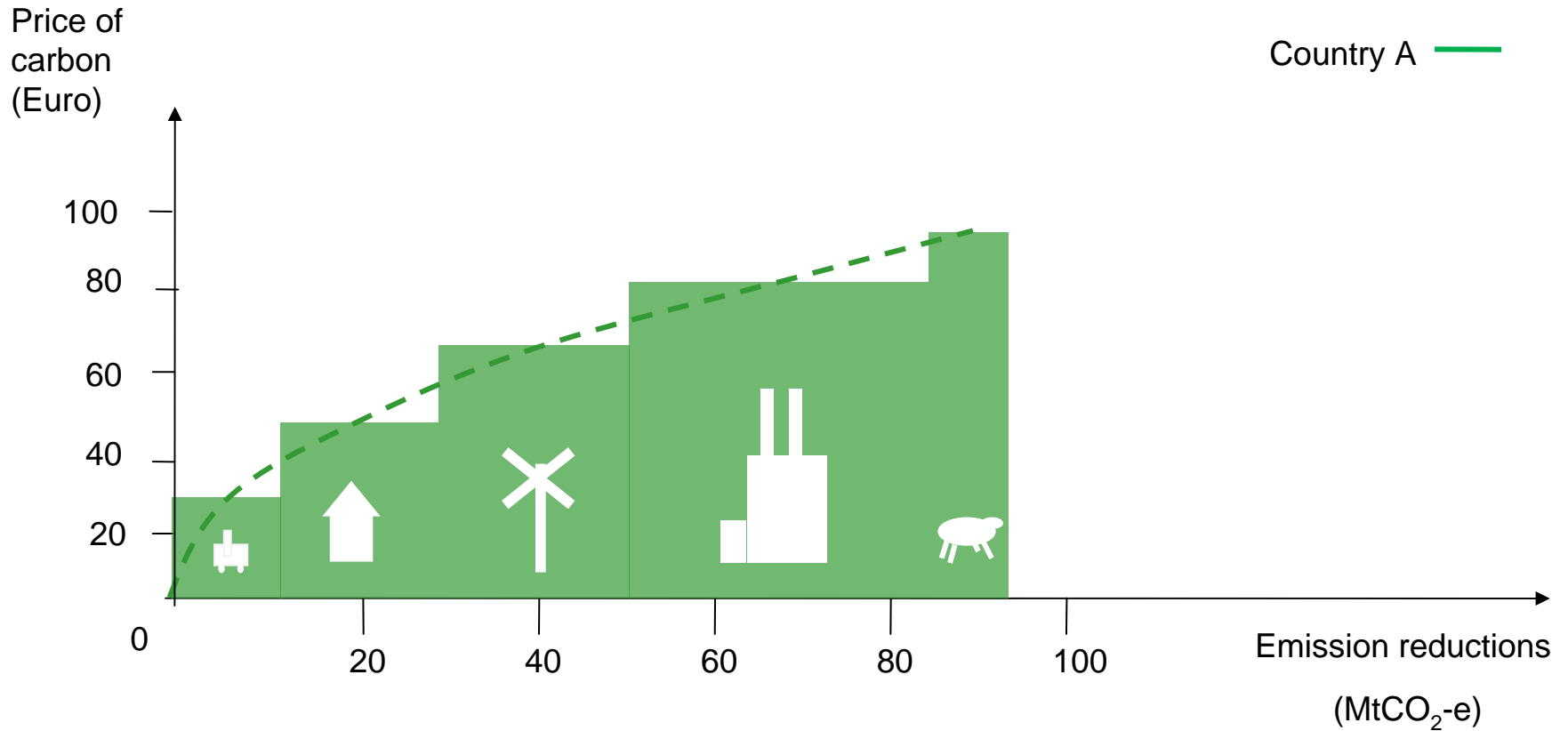
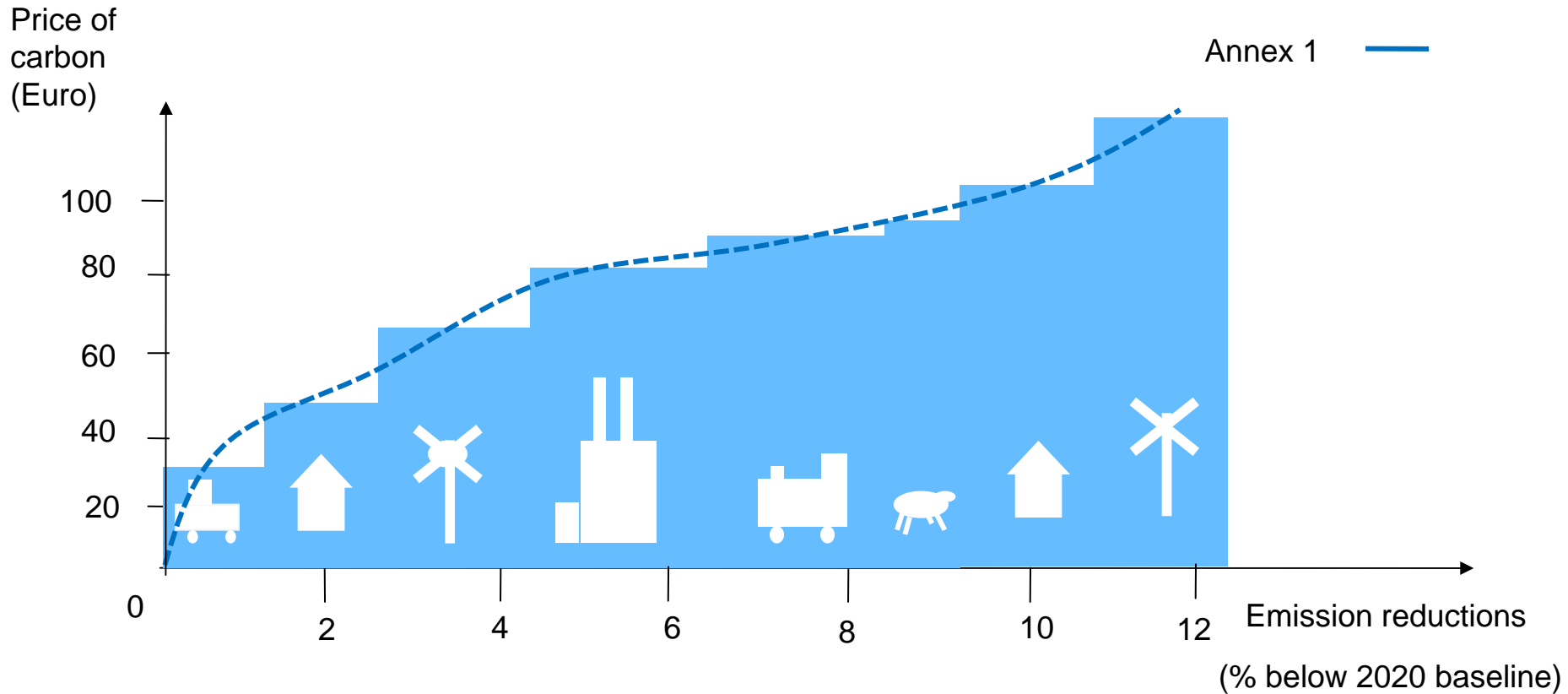# Developing MACCs with indicators

Price of carbon (Euro)

Country A ——

Reduce 16% of 2020 household emissions at 50 Euro

16% of 100MT = 16MT

2020 baseline

100MT

200MT

100MT

300MT

100MT

Emission reductions

(MtCO$_2$-e)

100

80

60

40

20

0

20   40   60   80   100

Developing MACCs with indicators

Price of carbon (Euro)

Reduce 16% of 2020 household emissions at 50 Euro

16% of 100MT = 16MT

16MT

Country A

2020 baseline

200MT
100MT
100MT
100MT
300MT

Emission reductions

$(MtCO_2\text{-e})$

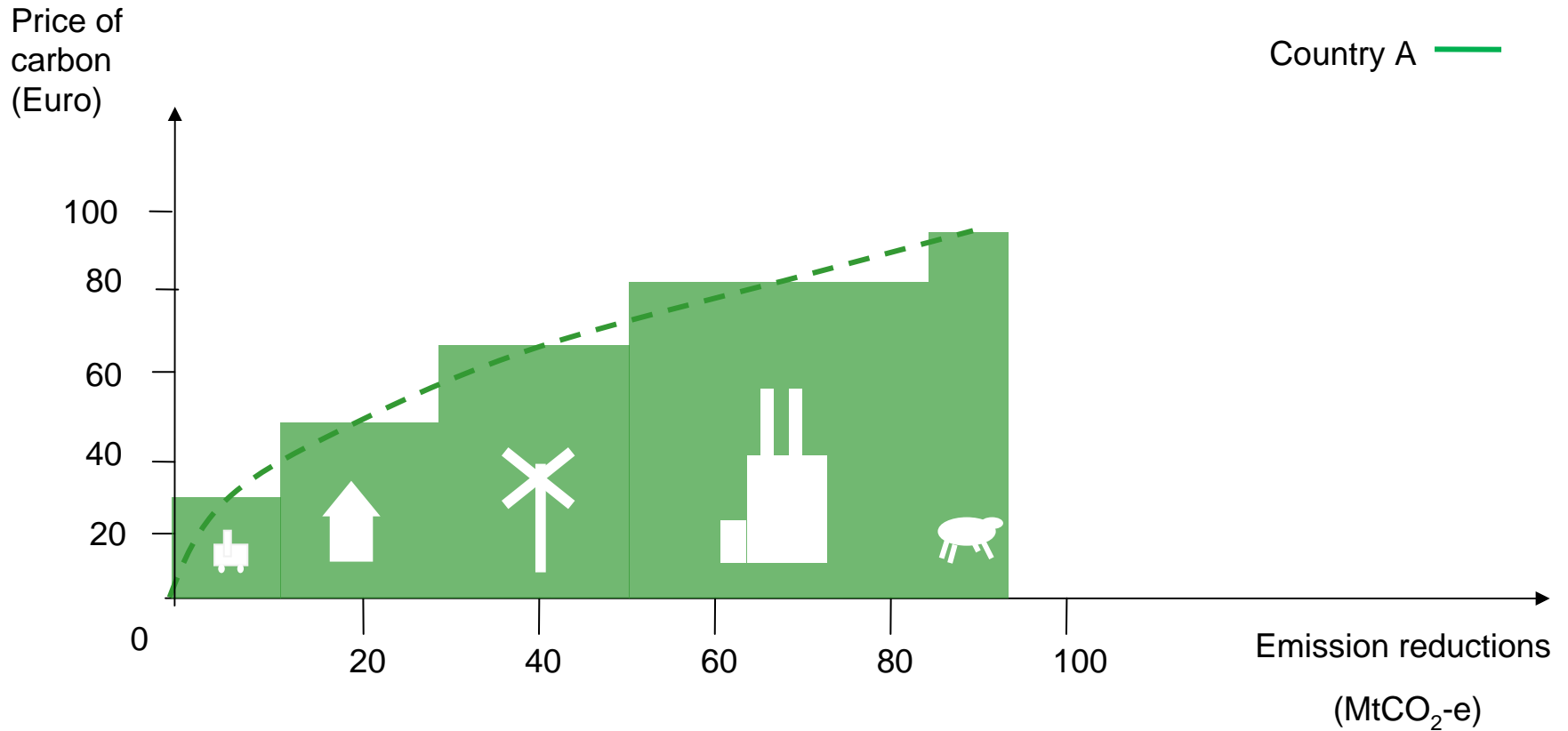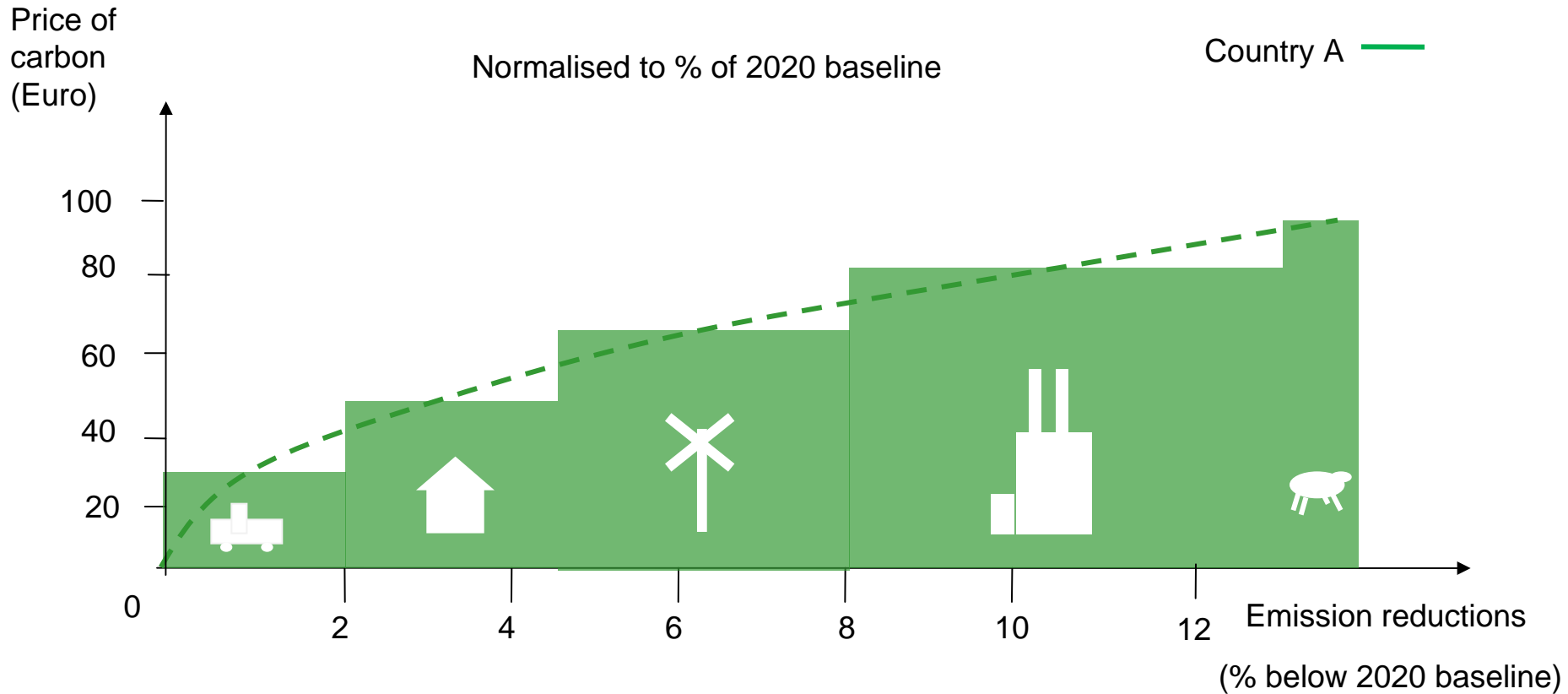100
80
60
40
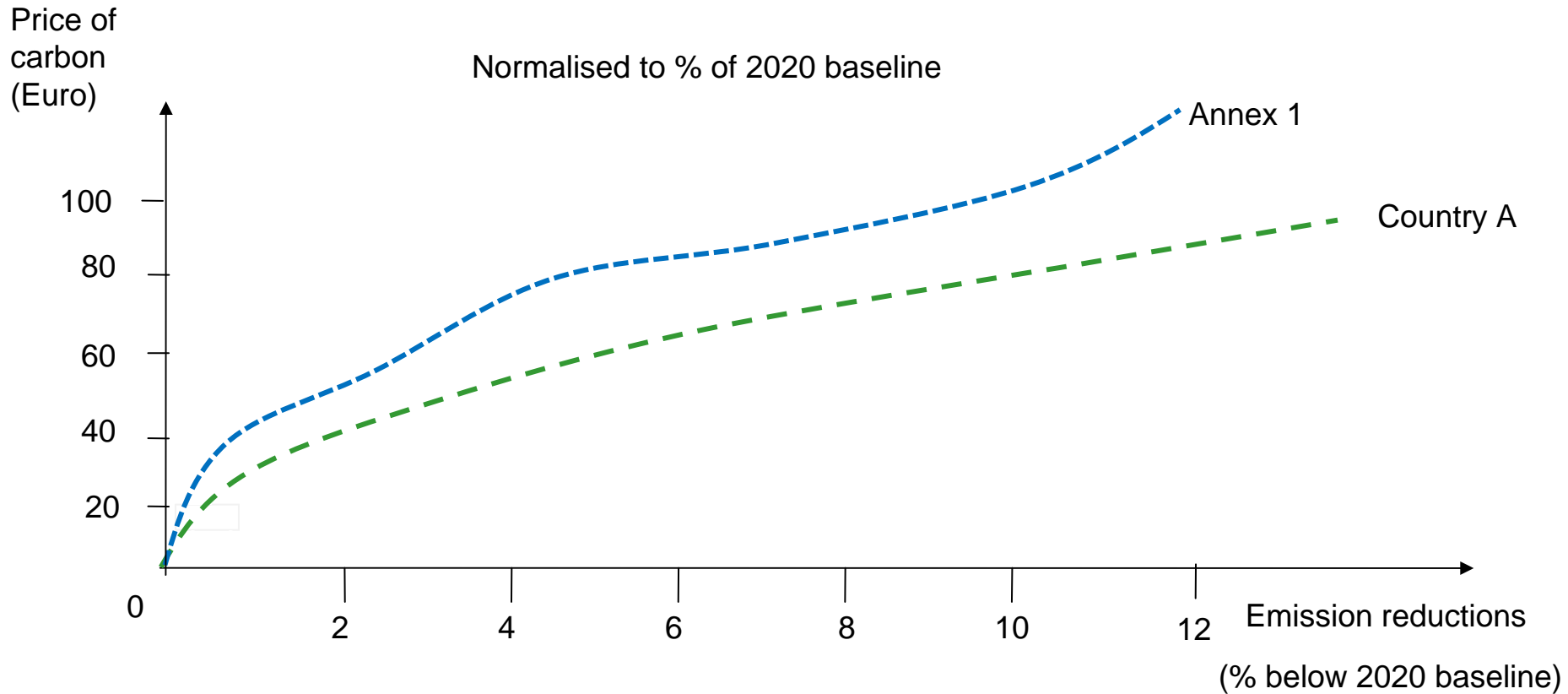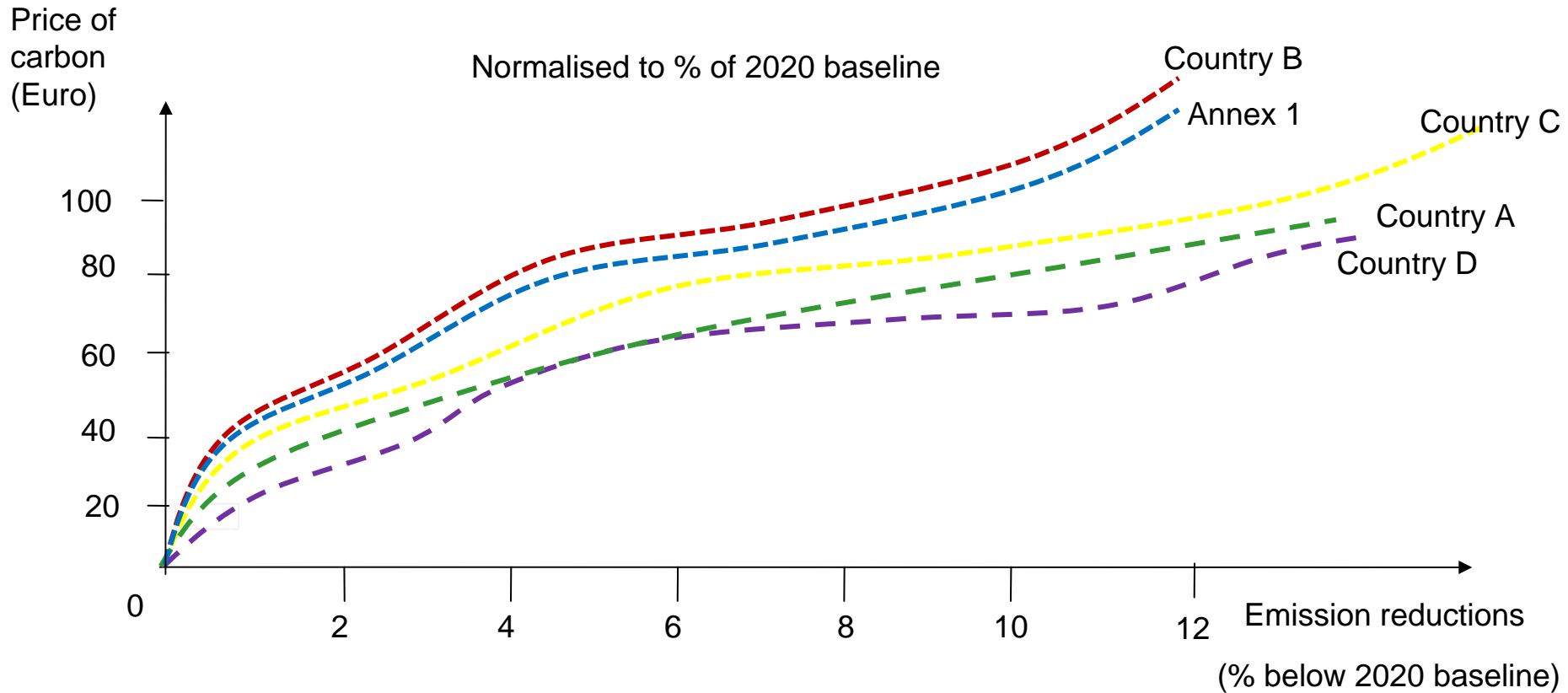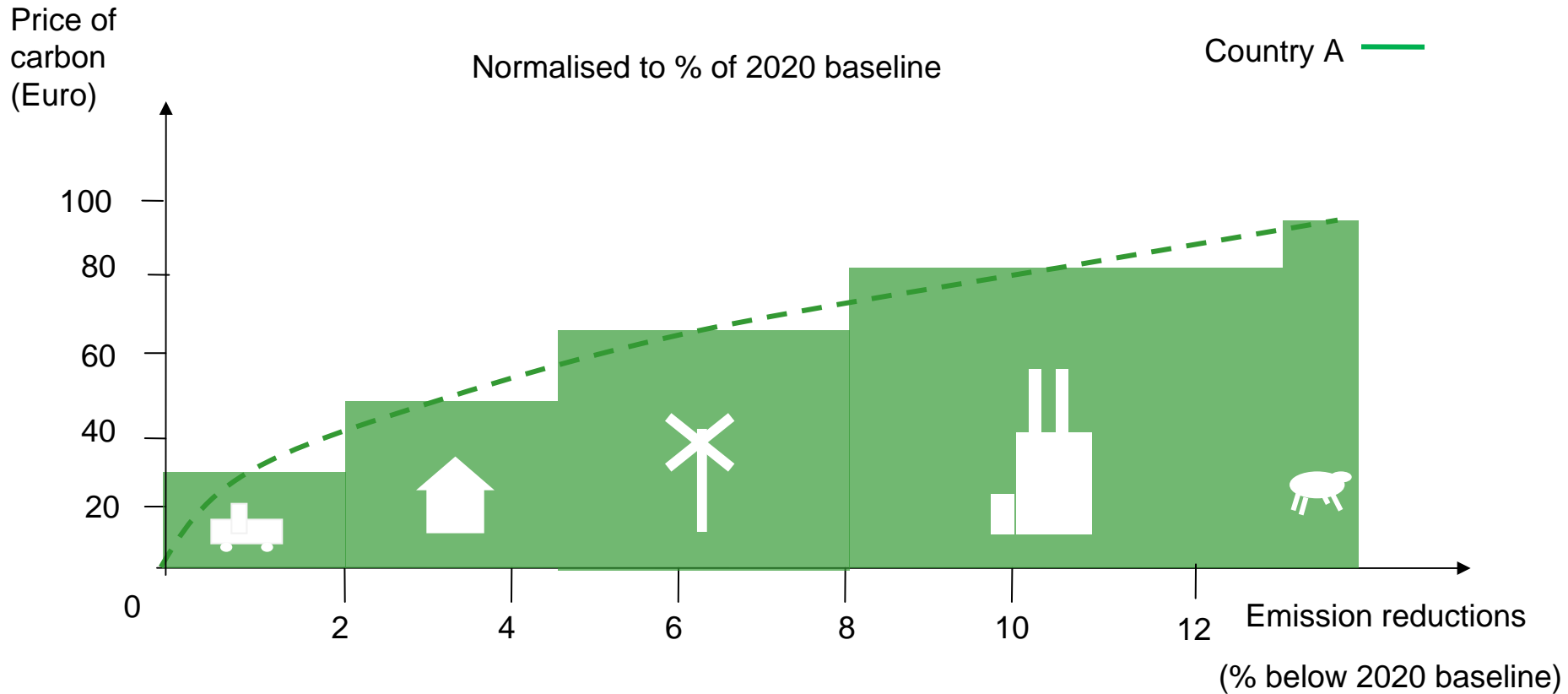20
0

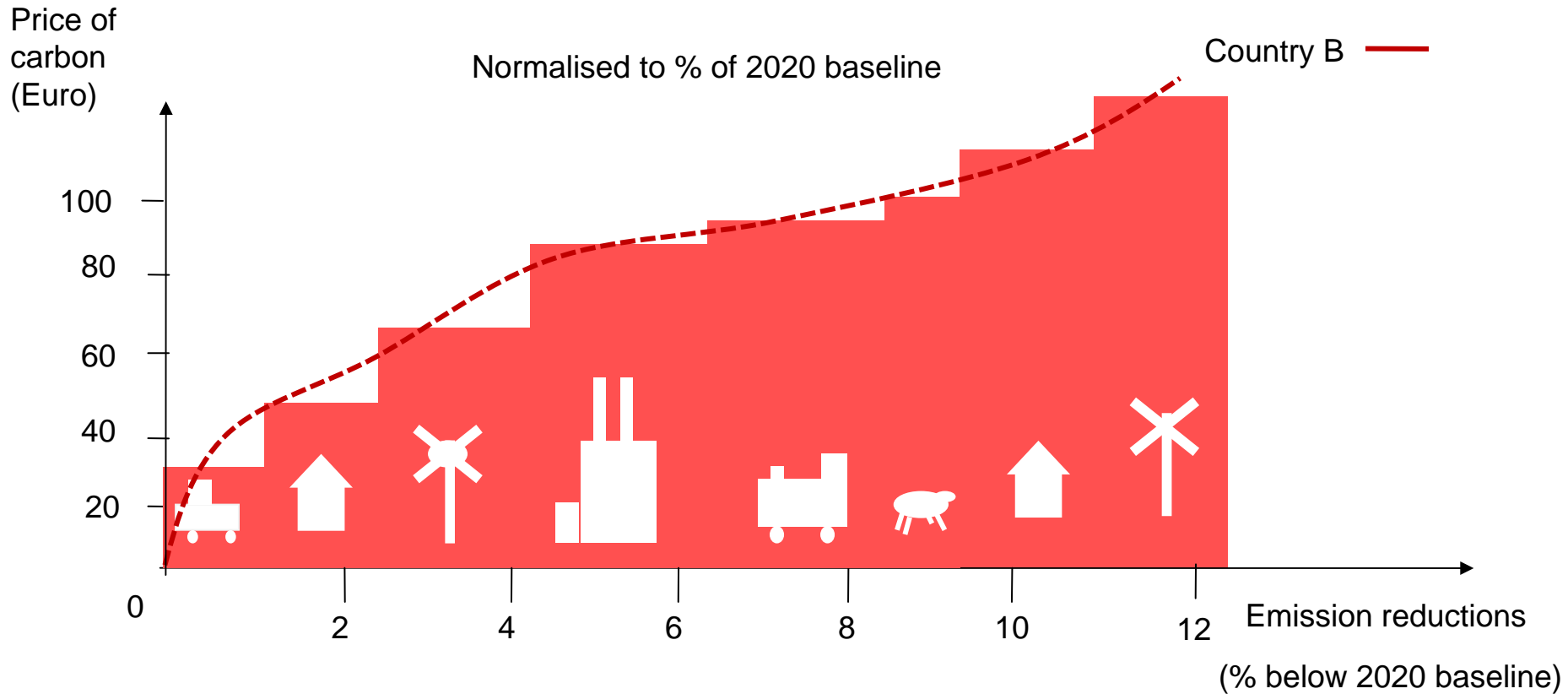20   40   60   80   100

Developing MACCs with indicators

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Developing MACCs with indicators

Price of carbon (Euro) vs Emission reductions (% below 2020 baseline). Normalised to % of 2020 baseline. Country A.

Developing MACCs with indicators

Normalised to % of 2020 baseline

Price of carbon (Euro) — vertical axis with values 0, 20, 40, 60, 80, 100

Emission reductions (% below 2020 baseline) — horizontal axis with values 2, 4, 6, 8, 10, 12

Annex 1

Country A

Developing MACCs with indicators

Price of carbon (Euro)

Normalised to % of 2020 baseline

Country B
Annex 1
Country C
Country A
Country D

100
80
60
40
20
0

2   4   6   8   10   12   Emission reductions

(% below 2020 baseline)

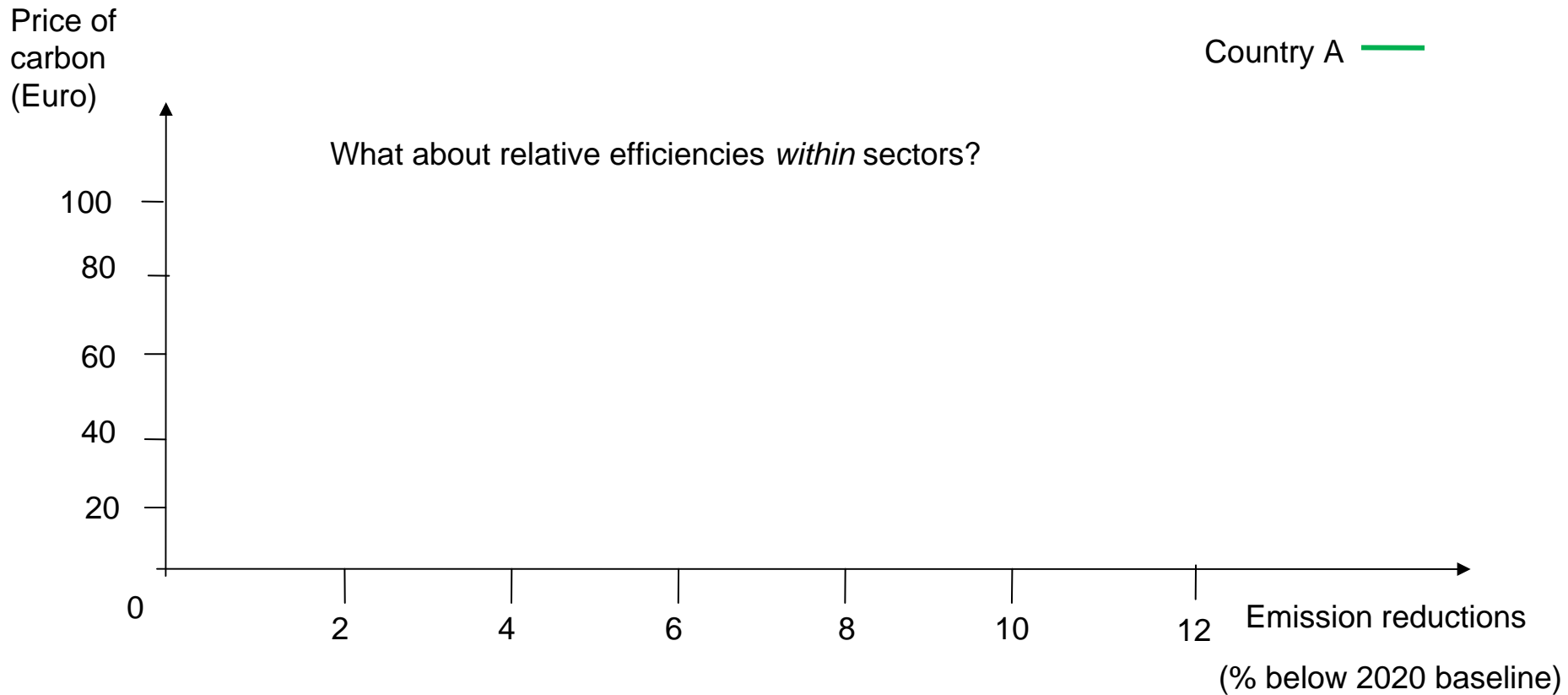# Developing MACCs with indicators

Developing MACCs with indicators
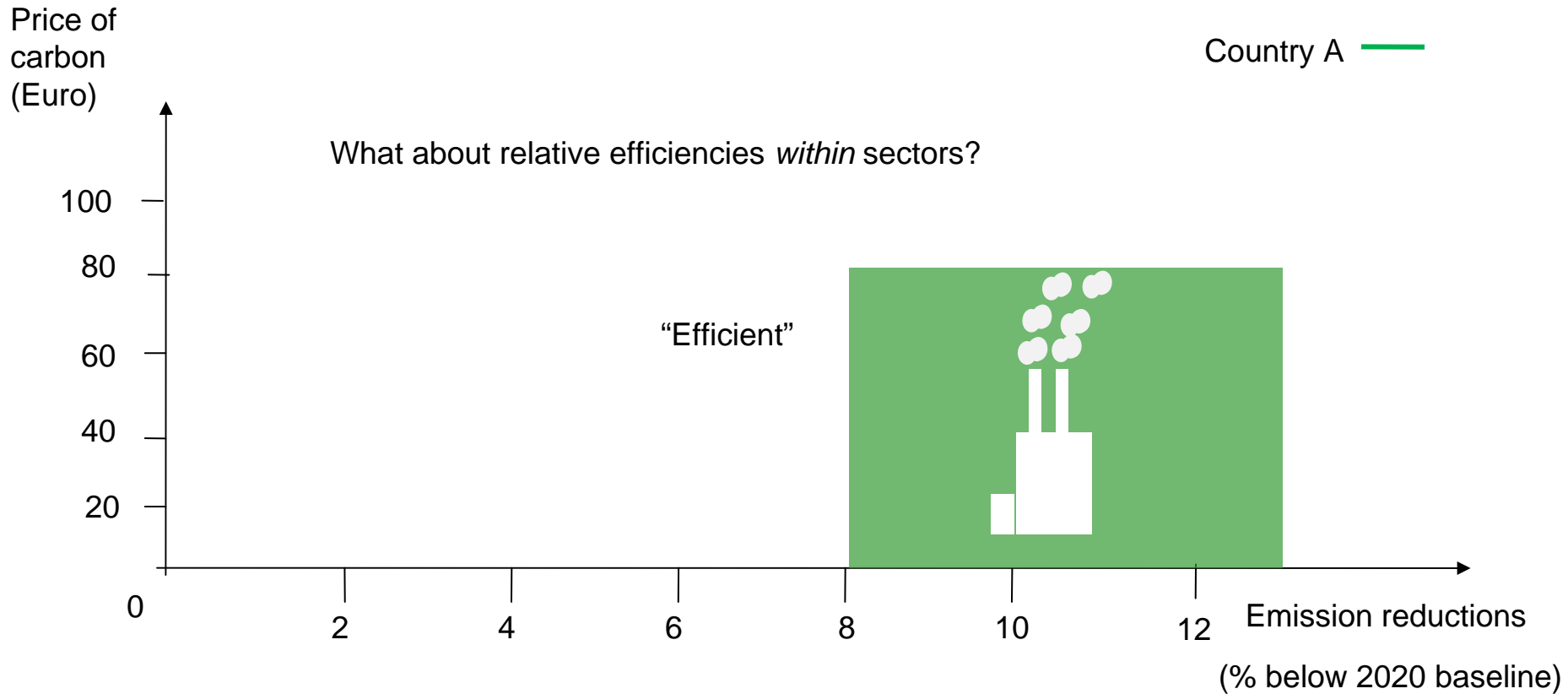
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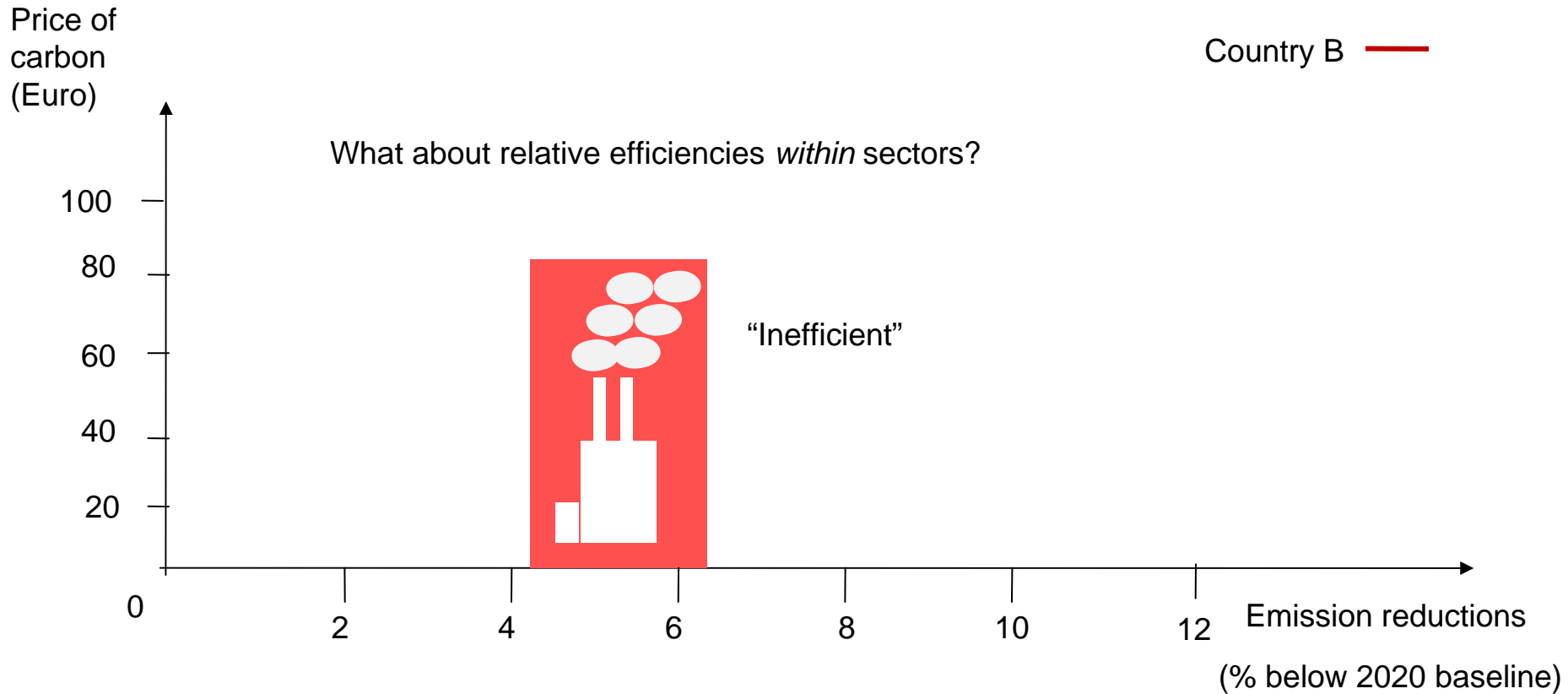3) Apply a relative efficiency factor to each sector within each country to generate a 'proxy' MACC
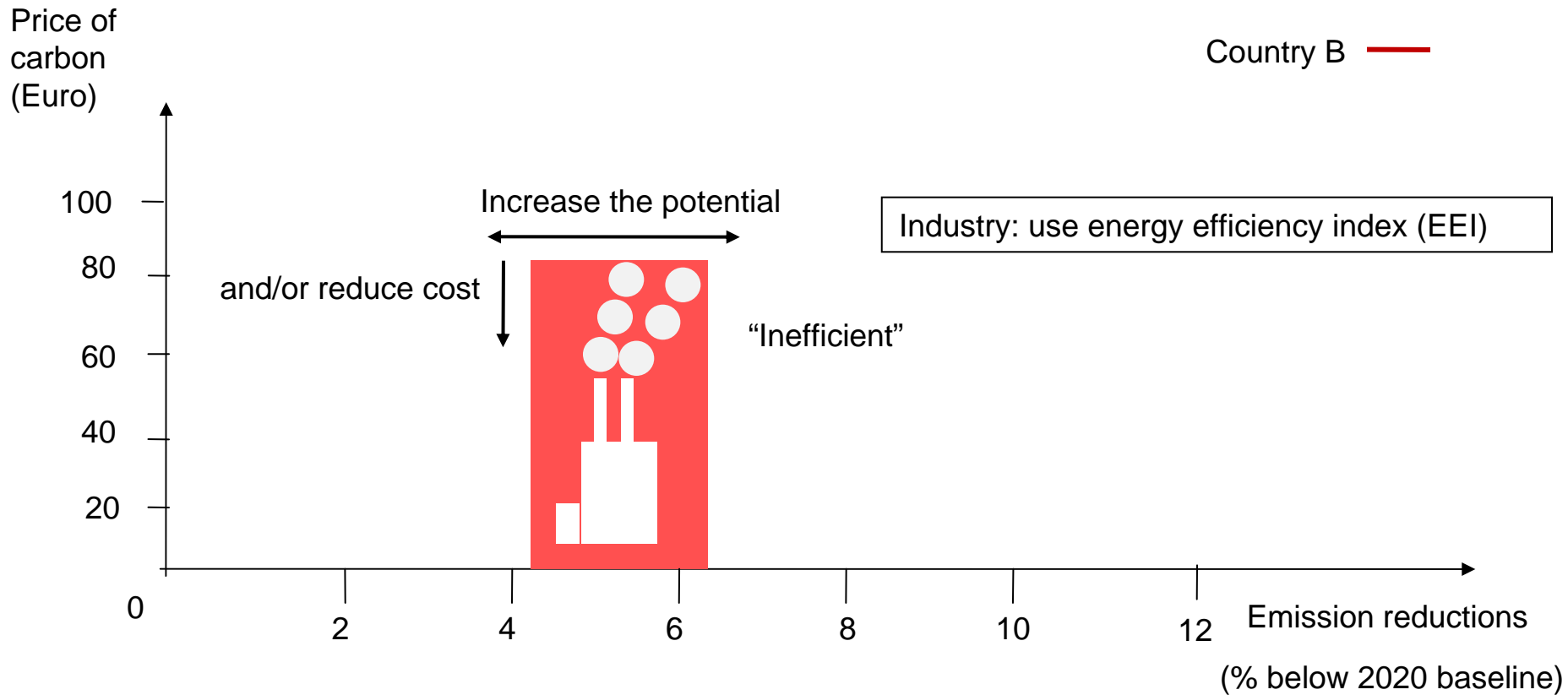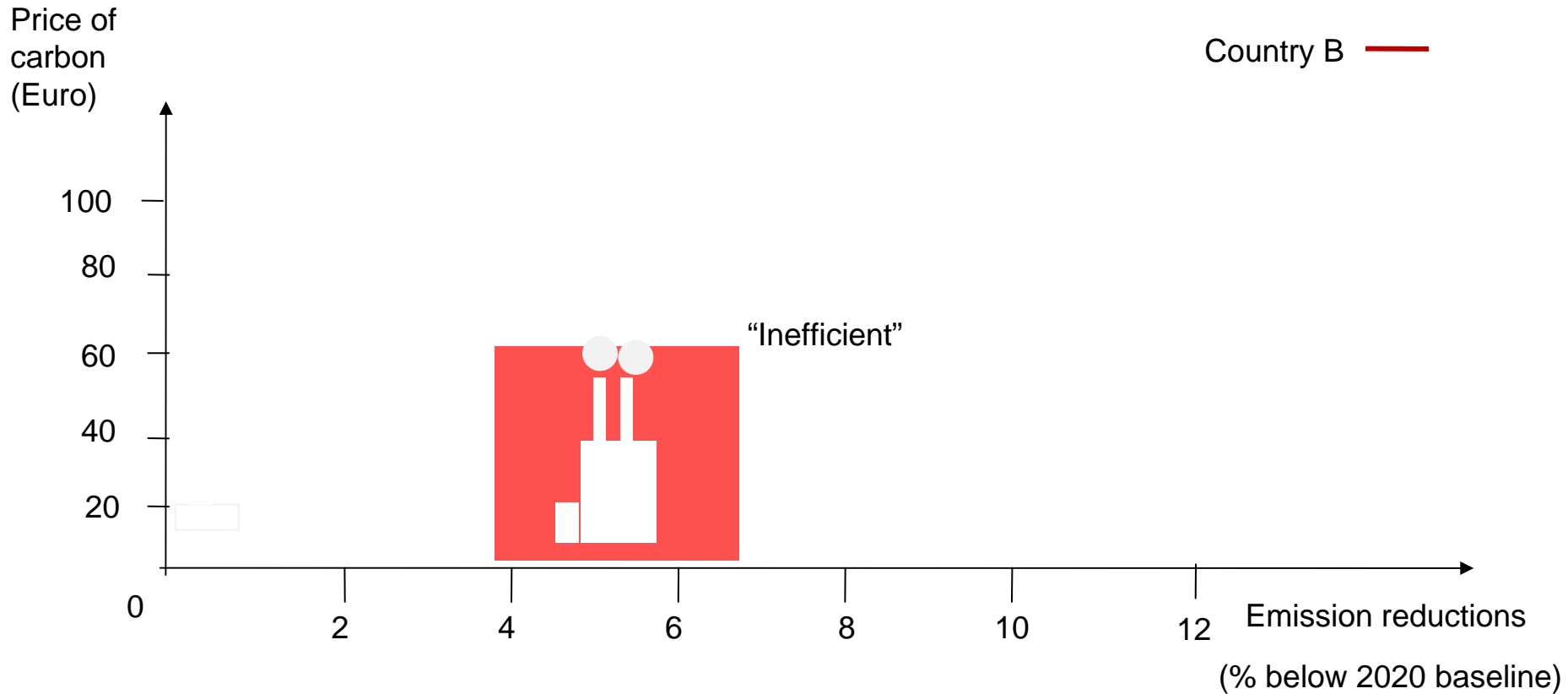
Developing MACCs with indicators

Price of carbon (Euro)

Country A ───

What about relative efficiencies *within* sectors?

100 ─

80 ─

60 ─

40 ─

20 ─

0

2   4   6   8   10   12

Emission reductions

(% below 2020 baseline)

Developing MACCs with indicators

Price of carbon (Euro)

Country A ———

What about relative efficiencies *within* sectors?

100 —

80 —

"Efficient"

60 —

40 —

20 —

0

2   4   6   8   10   12   Emission reductions

(% below 2020 baseline)

Developing MACCs with indicators

Price of carbon (Euro)

Country B ——

What about relative efficiencies *within* sectors?

"Inefficient"

100
80
60
40
20
0

2   4   6   8   10   12   Emission reductions
(% below 2020 baseline)

Developing MACCs with indicators

Developing MACCs with indicators

Developing MACCs with indicators

Price of carbon (Euro)

Country A ━━━

Reduce the potential

and/or increase cost

"Efficient"

100

80

60

40

20

0

2   4   6   8   10   12   Emission reductions

(% below 2020 baseline)

Developing MACCs with indicators

Price of carbon (Euro)

Country A ——

"Efficient"

- 100
- 80
- 60
- 40
- 20
- 0

2   4   6   8   10   12

Emission reductions

(% below 2020 baseline)

Developing MACCs with indicators

Developing MACCs with indicators

Key issues to resolve

1) Determining 2020 sectoral baseline emissions

2) Generating 2020 Annex 1 MACC

3) Developing efficiency indicators that could be applied to 2020 for all sectors

Developing MACCs with indicators

MAC curves – various models and proxies

Price of carbon (Euro) vs Emission reductions (% below 2020 baseline)

Country A (green), Country B (red)

models —
proxies – –

Assessing Comparable Effort - Interactive Support Tool (ACE-IST)
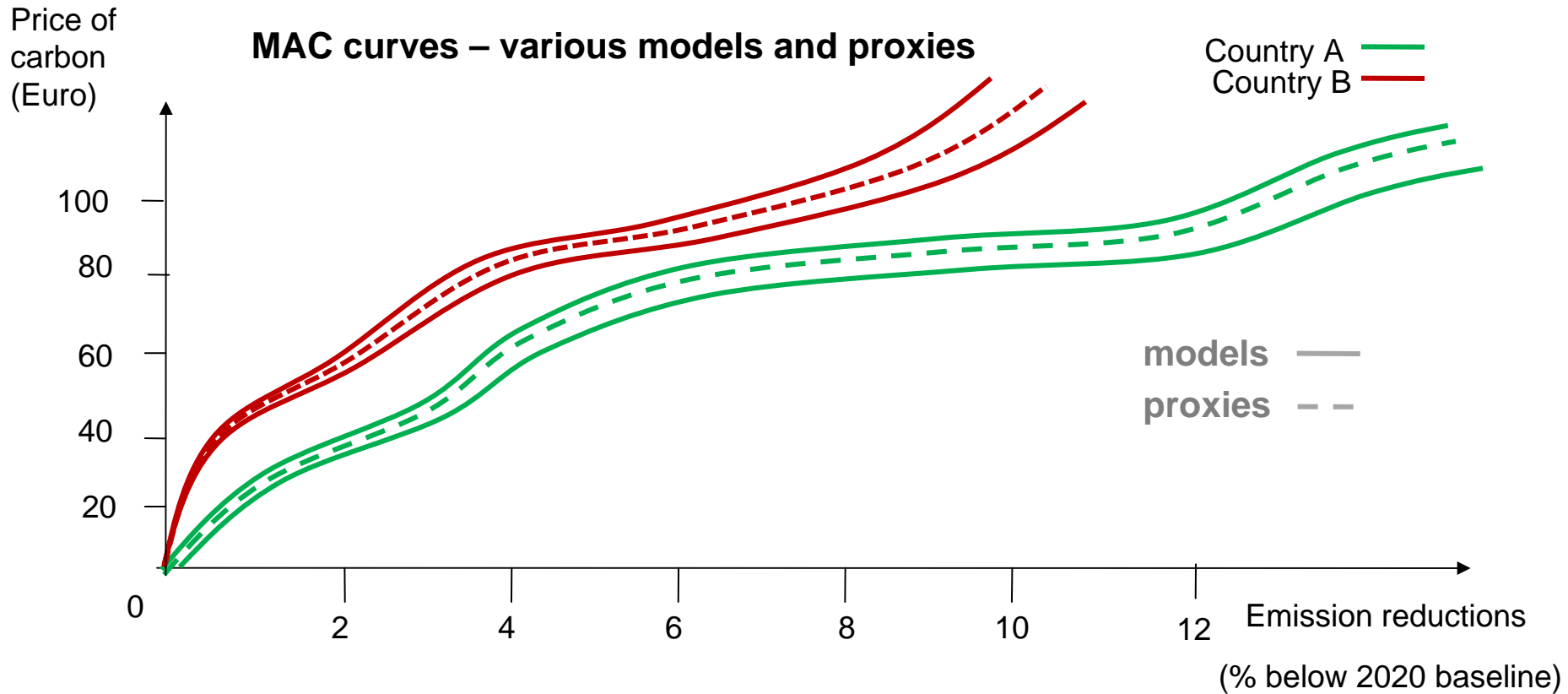
Assessing Comparable Effort - Interactive Support Tool (ACE-IST)

Baseyear	1990
A	In
B	In
C	In
D	In
E	In
F	In
G	In
H	In
I	In
J	In
ALL	In

C Price (€) No trade

BASELINE — % above/below baseyear — GAINS

90, 70, 50, 30, 10, -10, -30, -50, -70, -90
1990 1995 2000 2005 2010 2015 2020

MACCs — Euro/Tonne — GAINS

250, 150, 50, -50, -150, -250
10 20 30 40 50
reductinos below BAU as % of baseyear

TACCs — GDP Impact

0.8%, 0.6%, 0.4%, 0.2%, 0.0%, -0.2%, -0.4%, -0.6%, -0.8%
40 20 0 20 40 60 80
target as % above/below baseyear
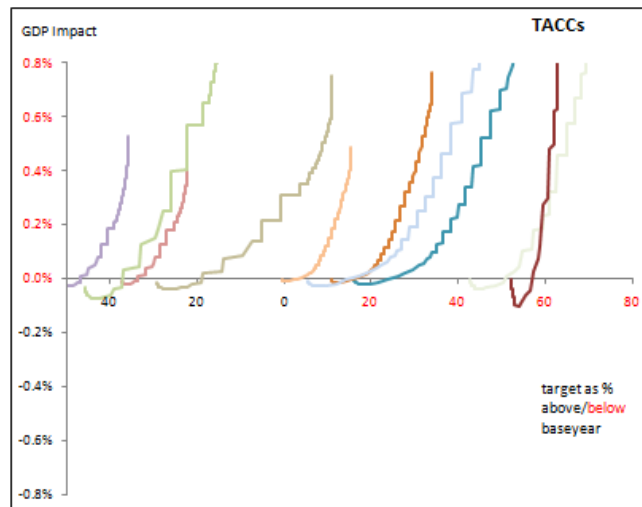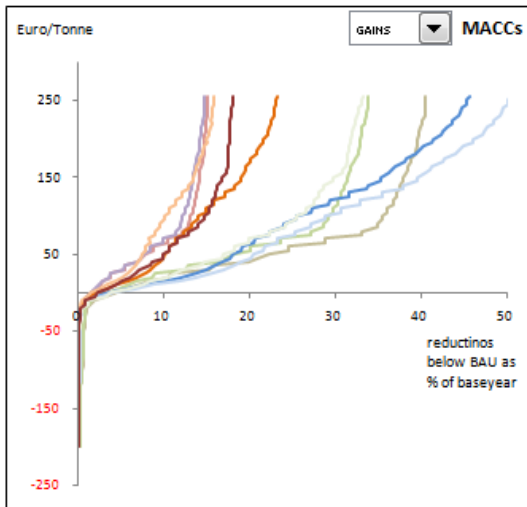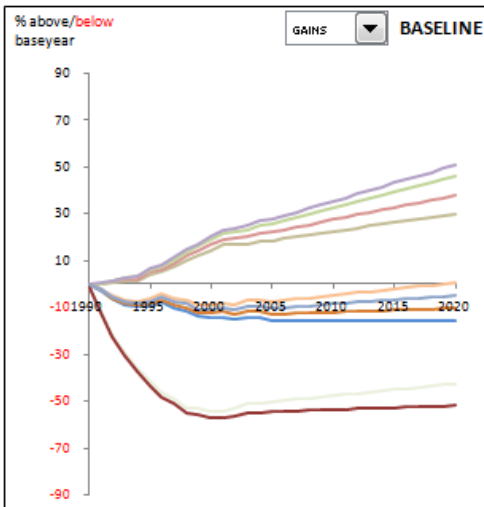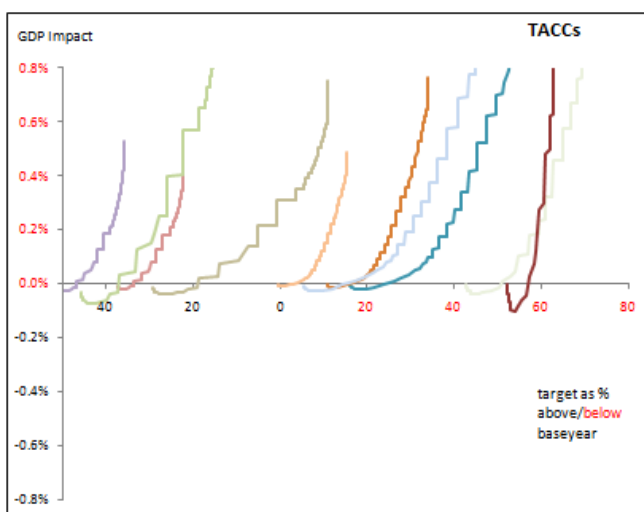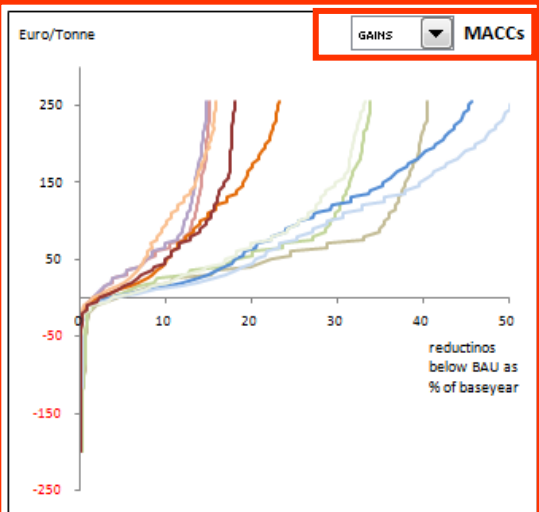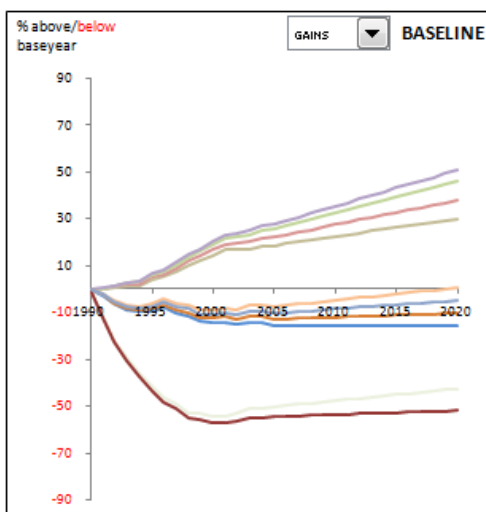
Calculate targets

GDP Impact	
A	Solve
Annex 1	-35%
Equity	
GDP/Cap 2007	
2015	2005

Equity varianace — GDP Impact

2.0%, 1.5%, 1.0%, 0.5%, 0.0%
0 10000 20000 30000 40000 50000 60000
GDP/Cap 2007

2020 Targets — % above/below baseyear

□ baseline
◇ target
+ equity target

100, 80, 60, 40, 20, 0, -20, -40, -60, -80, -100
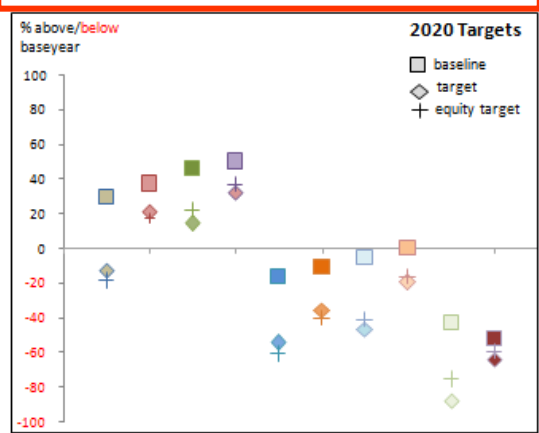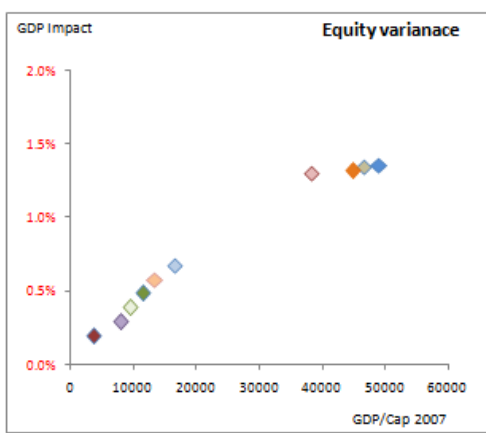
PARTY		2020 Target	2020/cap	GDP impact	2015 Target
A	☐ Fix	-18%	3%	1.35%	-6%
B	☐ Fix	18%	4%	1.31%	19%
C	☐ Fix	22%	8%	0.49%	23%
D	☐ Fix	37%	3%	0.29%	34%
E	☐ Fix	-61%	-20%	1.36%	-46%
F	☐ Fix	-40%	-13%	1.32%	-31%
G	☐ Fix	-41%	-14%	0.68%	-31%
H	☐ Fix	-16%	-6%	0.58%	-13%
I	☐ Fix	-75%	-25%	0.39%	-67%
J	☐ Fix	-59%	-20%	0.19%	-58%
TOTAL		-35%			-27%

ACE-IST: Marginal Abatement Cost Curves
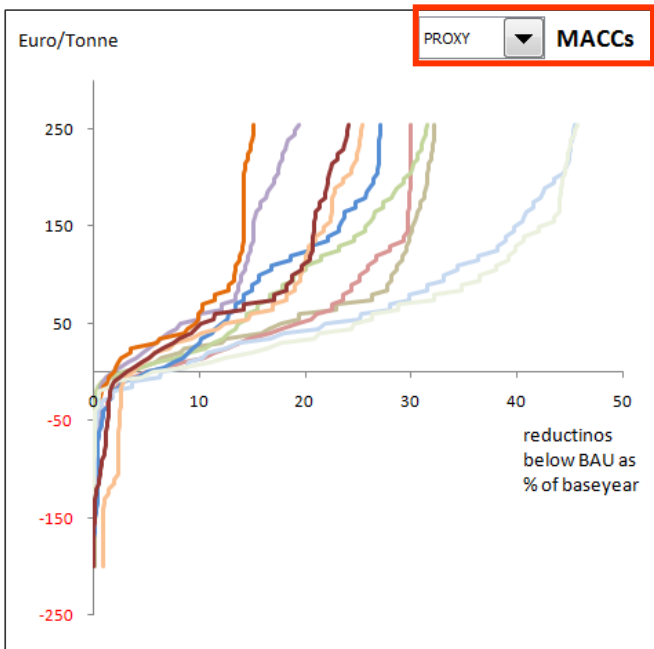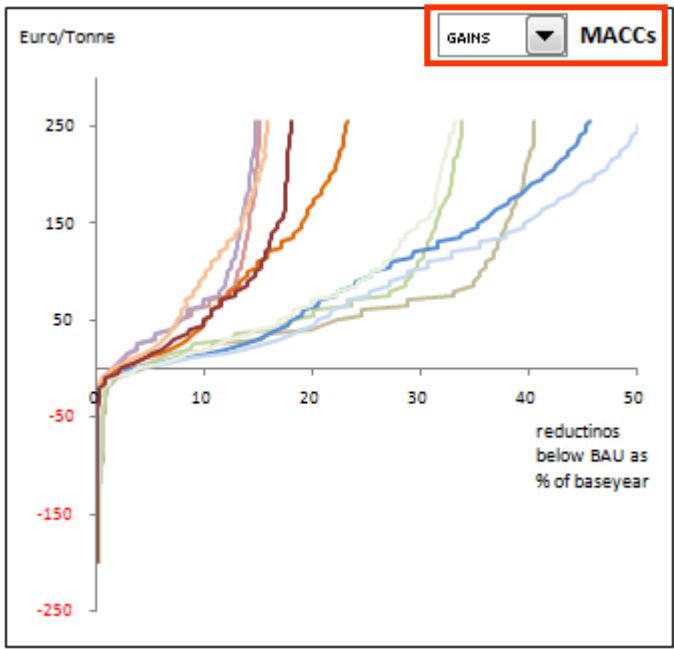
Sector-based analysis: Next Steps

n to present results from ACE-IST in June, and hope to include MACCs developed with indicators

lcome any data on
- Sectoral baseline emission projections
- Sectoral efficiency indicators

ase send this data to:

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steven.cox@maf.govt.nz
amelie.goldberg@mfe.govt.nz
daniel.twaddle@mfe.govt.nz

Thank you