



How LCA Handles Wood

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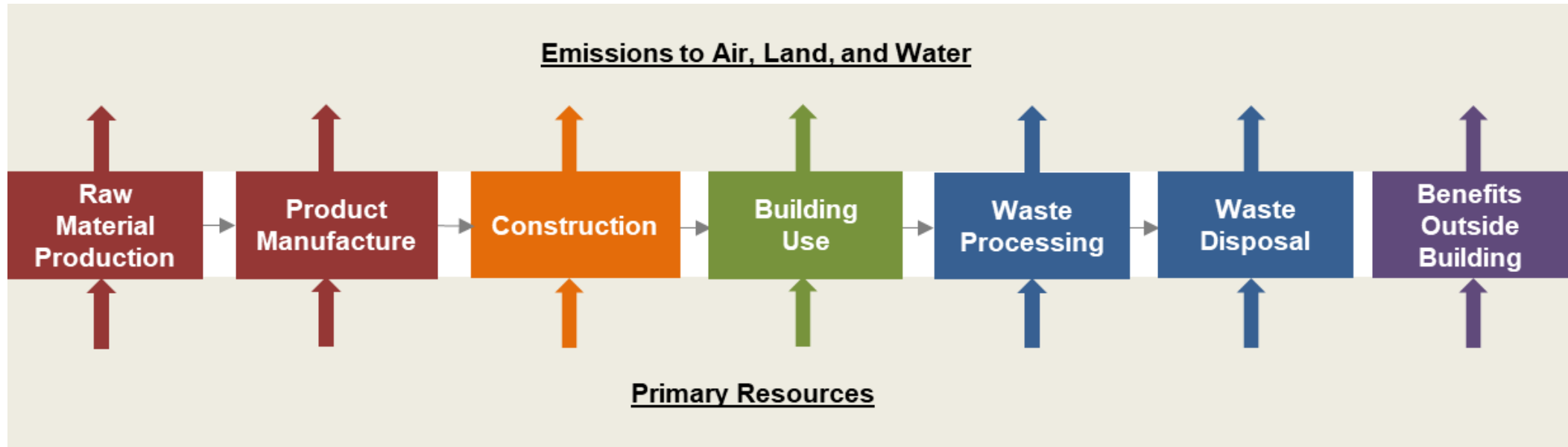
May 7, 2020

Outline of Presentation

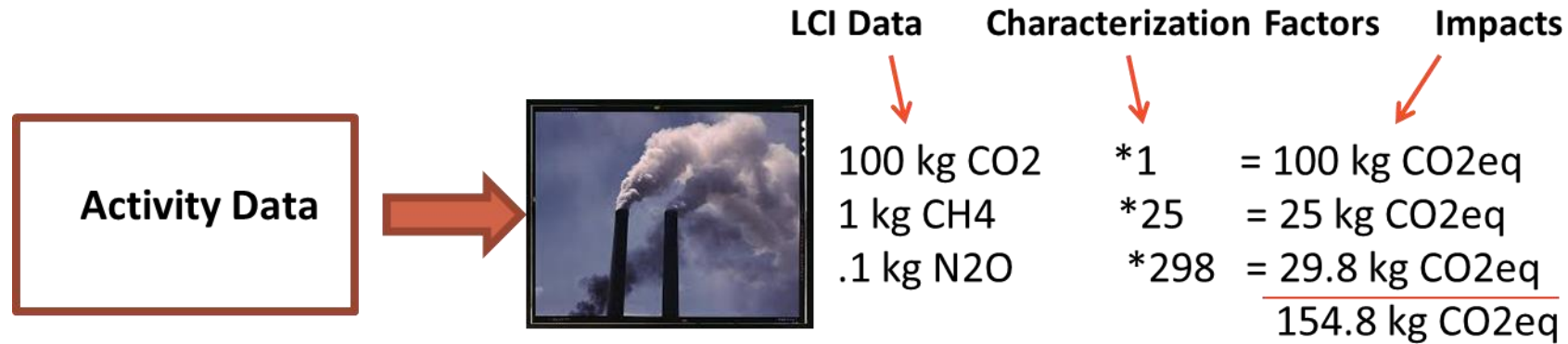
- LCA and EPD Methodology for Biogenic Carbon
- Biogenic Carbon in LCA and EPDs

LCA and EPD Methodology for Biogenic Carbon

Life Cycle of a Construction Product



LCA Calculation



Total Global Warming Potential is 154.8 kg CO₂eq

LCA Results



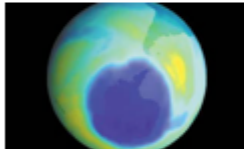
Global warming



Acidification



Eutrophication



Ozone depletion

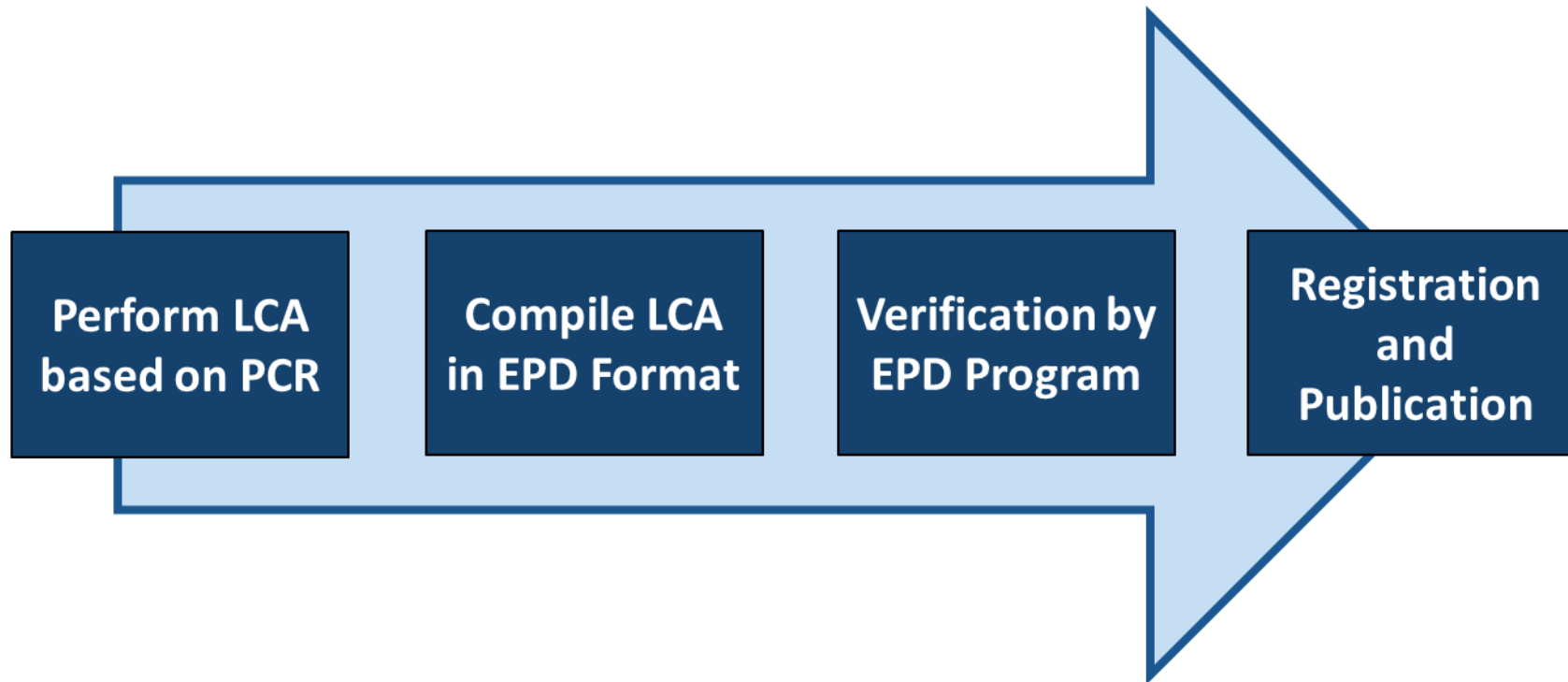


Smog

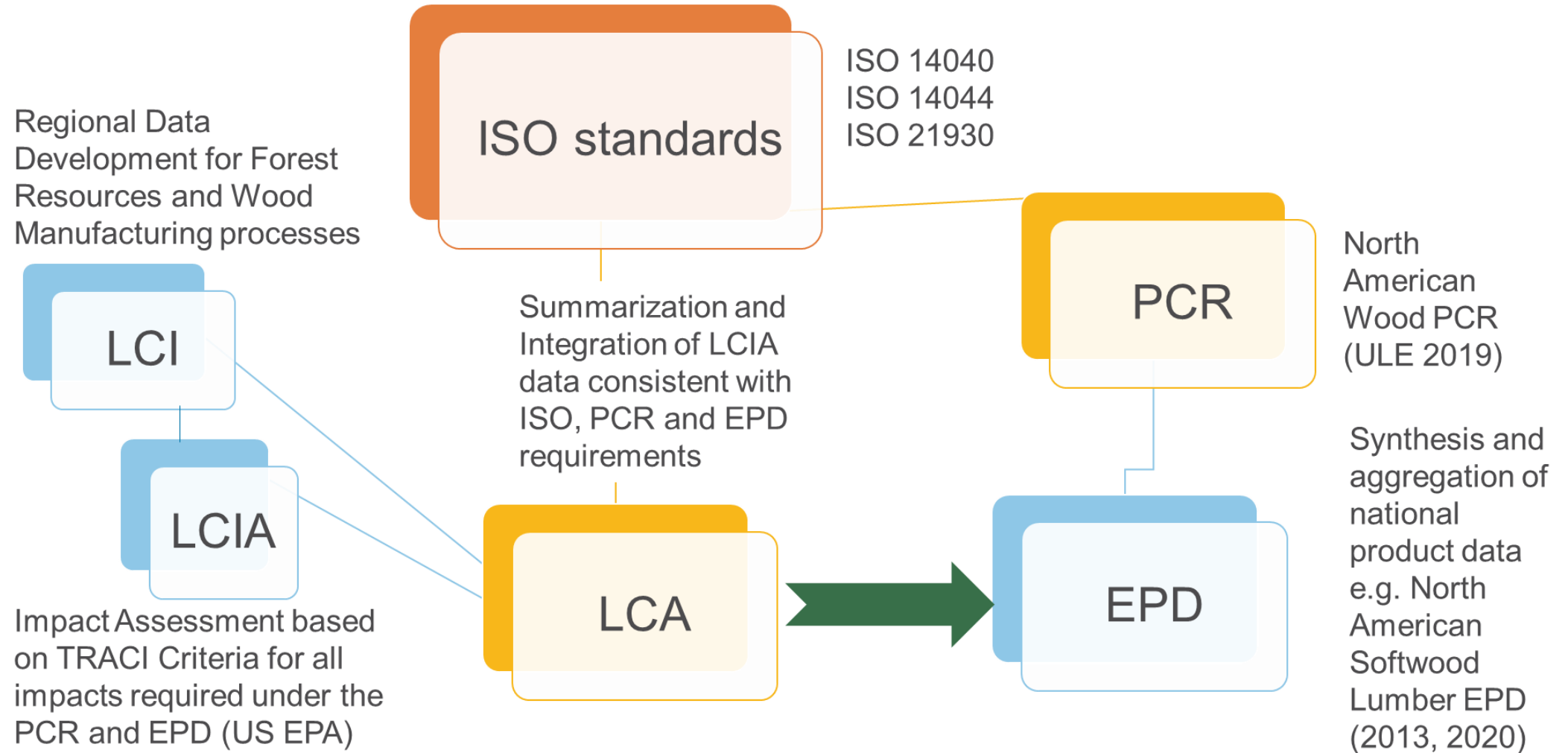


Fossil fuel consumption

EPD Process



Standards Governing Wood Product EPDs



Biogenic Carbon Accounting in Wood EPDs

ISO 21930: Section 7.2.7

- Biogenic C enters system: Global warming factor -1 kg CO₂e/kg CO₂*
 - Virgin wood
 - Recycled wood
 - Biofuel
 - Biogenic C leaves system: Global warming factor +1 kg CO₂e/kg CO₂
 - Combustion emissions
 - Sold biofuel
 - Sold coproducts
- 1 kg CO₂e/kg CO₂ only when “wood originates from sustainably managed forests”

“Sustainably Managed Forests” for Biogenic C ISO 21930: Section 7.2.11

- Option 1: Certified Wood Products
 - Canadian Standards Association - CSA
 - Forest Stewardship Council - FSC
 - Sustainable Forestry Initiative - SFI
- Option 2: National Reporting per UNFCCC
 - United Nations Framework Convention on Climate Change - National Inventory Reports
 - Stable or Increasing Forest Stocks

“Sustainably Managed Forests” for Biogenic C

ISO 21930: Section 7.2.11

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UNFCCC USA

Table 6-1: Net CO₂ Flux from Land Use, Land-Use Change, and Forestry (MMT CO₂ Eq.)

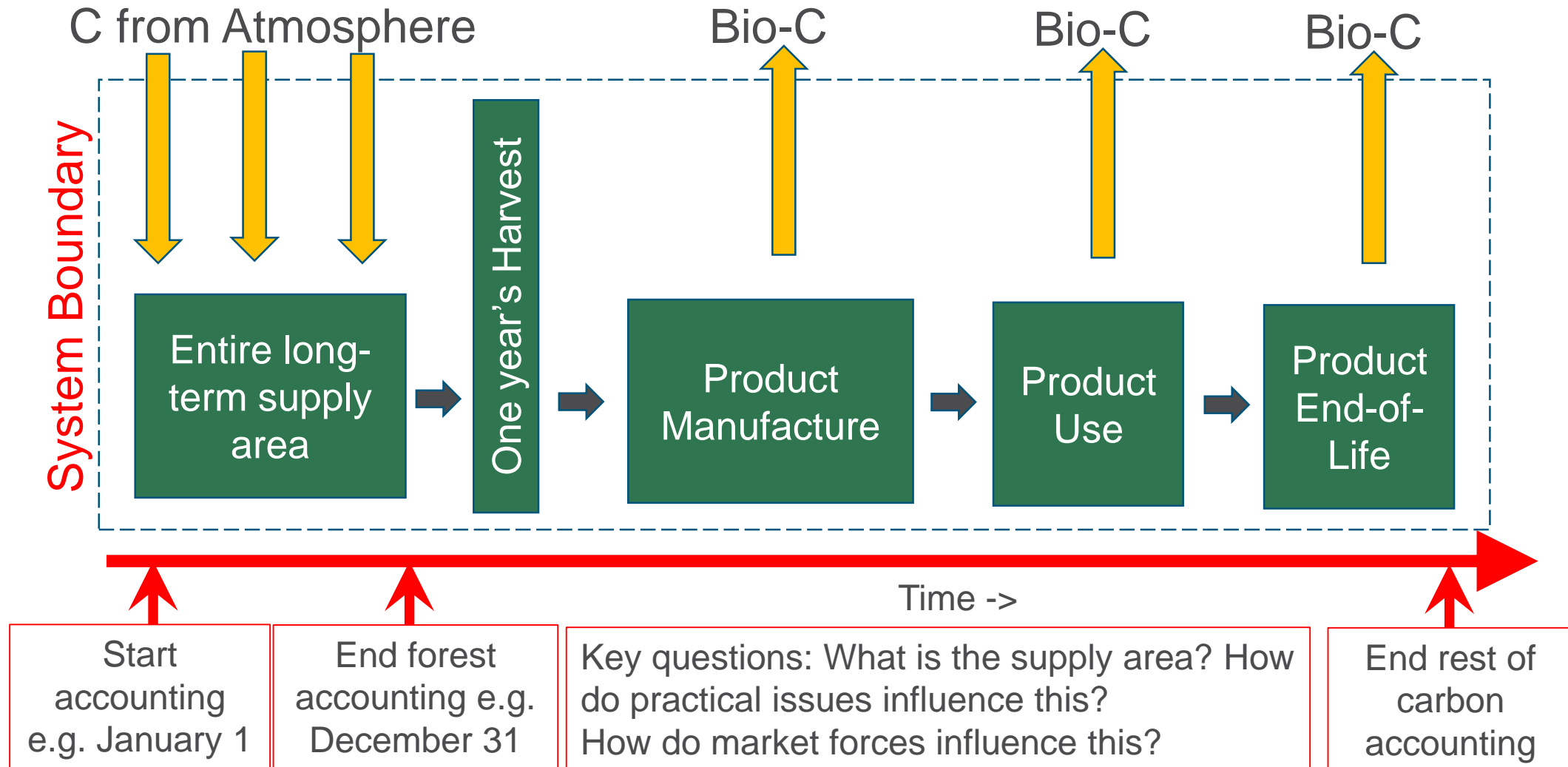
Land-Use Category	1990	2005	2014	2015	2016	2017	2018
Forest Land Remaining Forest Land	(733.9)	(678.6)	(618.8)	(676.1)	(657.9)	(647.7)	(663.2)
Changes in Forest Carbon Stocks ^a	(733.9)	(678.6)	(618.8)	(676.1)	(657.9)	(647.7)	(663.2)
Land Converted to Forest Land	(109.4)	(110.2)	(110.5)	(110.6)	(110.6)	(110.6)	(110.6)
Changes in Forest Carbon Stocks ^b	(109.4)	(110.2)	(110.5)	(110.6)	(110.6)	(110.6)	(110.6)
Cropland Remaining Cropland	(23.2)	(29.0)	(12.2)	(12.8)	(22.7)	(22.3)	(16.6)
Changes in Mineral and Organic Soil Carbon Stocks	(23.2)	(29.0)	(12.2)	(12.8)	(22.7)	(22.3)	(16.6)
LULUCF Carbon Stock Change	(860.7)	(831.0)	(739.6)	(802.9)	(801.7)	(790.0)	(799.6)

UNFCCC Canada

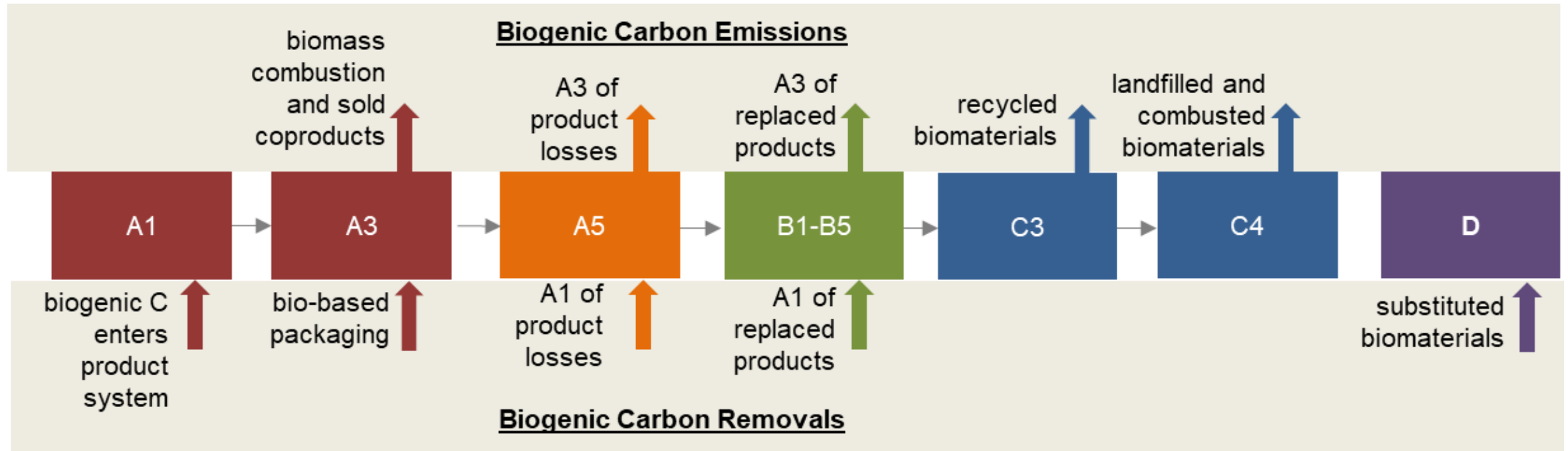
Table 6–1 LULUCF Sector Net GHG Flux Estimates, Selected Years

Sectoral Category		Net GHG Flux (kt CO ₂ eq) ^b							
		1990	2005	2013	2014	2015	2016	2017	2018
Land Use, Land-Use Change and Forestry TOTAL^a		-60 000	-13 000	-25 000	-25 000	-18 000	-19 000	-16 000	-13 000
a.	Forest Land	-200 000	-150 000	-150 000	-150 000	-140 000	-140 000	-140 000	-140 000
	Forest Land remaining Forest Land	-200 000	-140 000	-150 000	-150 000	-140 000	-140 000	-140 000	-140 000
	Land converted to Forest Land	-1 100	- 950	- 590	- 540	- 500	- 440	- 390	- 330
b.	Cropland	8 100	-11 000	-10 000	-9 500	-8 600	-7 700	-6 800	-6 200
	Cropland remaining Cropland	-1 300	-15 000	-13 000	-12 000	-11 000	-10 000	-9 700	-8 800
	Land converted to Cropland	9 500	3 900	2 700	2 800	2 700	2 800	2 900	2 700
c.	Grassland	0.6	0.9	1.9	0.8	1.2	1.2	1.2	1.2
	Grassland remaining Grassland	0.6	0.9	1.9	0.8	1.2	1.2	1.2	1.2
	Land converted to Grassland	NO	NO	NO	NO	NO	NO	NO	NO
d.	Wetlands	5 300	3 100	3 100	3 100	2 900	2 900	3 000	2 600
	Wetlands remaining Wetlands	1 500	2 600	2 400	2 400	2 500	2 600	2 600	2 400
	Land converted to Wetlands	3 800	480	670	710	410	330	350	210
e.	Settlements	2 100	2 100	2 300	2 300	2 200	2 100	1 900	1 800
	Settlements remaining Settlements	-3 900	-4 100	-4 100	-4 100	-4 100	-4 100	-4 100	-4 100
	Land converted to Settlements	6 000	6 100	6 400	6 400	6 400	6 200	6 000	5 900
f.	Other Land	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
g.	Harvested Wood Products	130 000	140 000	130 000	130 000	130 000	130 000	130 000	130 000
	<i>Forest Conversion^c</i>	<i>21 000</i>	<i>16 000</i>	<i>15 000</i>	<i>15 000</i>	<i>15 000</i>	<i>15 000</i>	<i>14 000</i>	<i>14 000</i>
	<i>Indirect CO₂^d</i>	<i>790</i>	<i>820</i>	<i>630</i>	<i>560</i>	<i>570</i>	<i>530</i>	<i>510</i>	<i>490</i>
	<i>Natural Disturbances^e</i>	<i>-22 000</i>	<i>46 000</i>	<i>43 000</i>	<i>160 000</i>	<i>240 000</i>	<i>120 000</i>	<i>220 000</i>	<i>250 000</i>

Approach 3: CO₂ is removed from the atmosphere in the year of harvest by non-harvested trees growing across the supply area

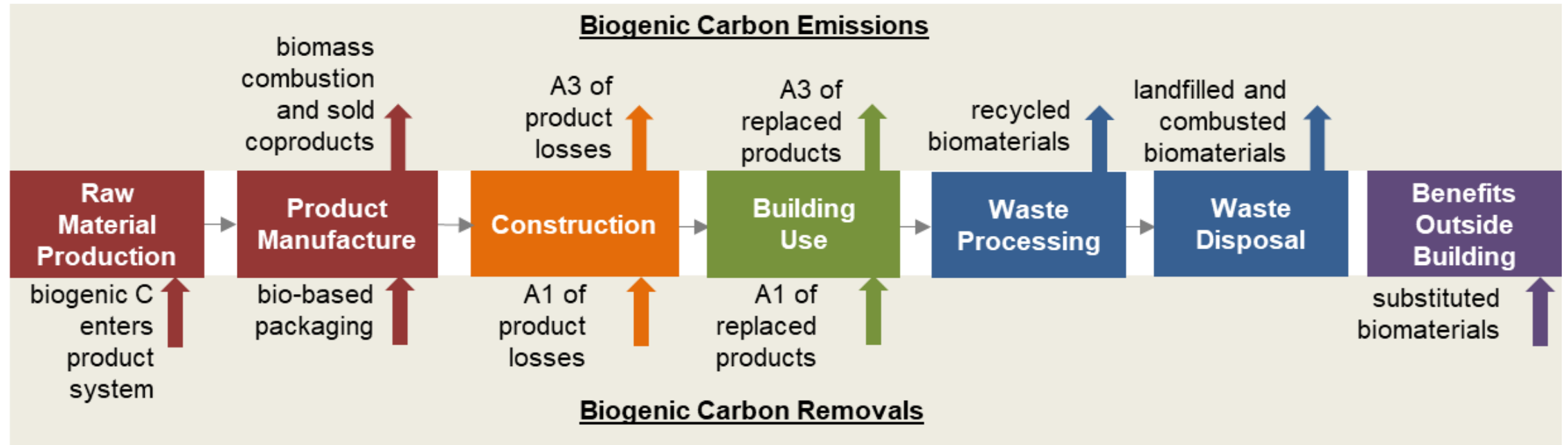


Biogenic Carbon Accounting per ISO 21930

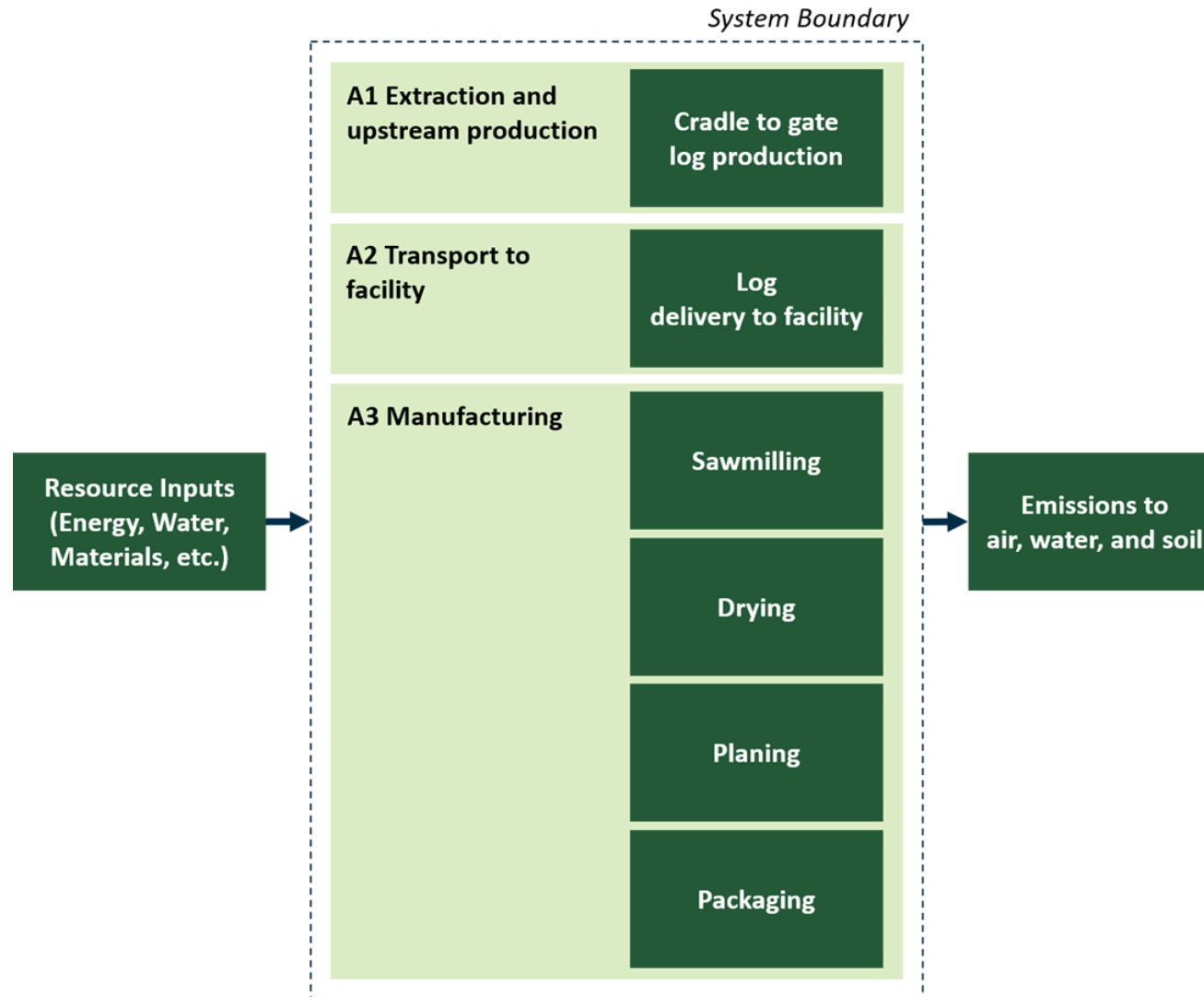


Biogenic Carbon in LCA & EPD

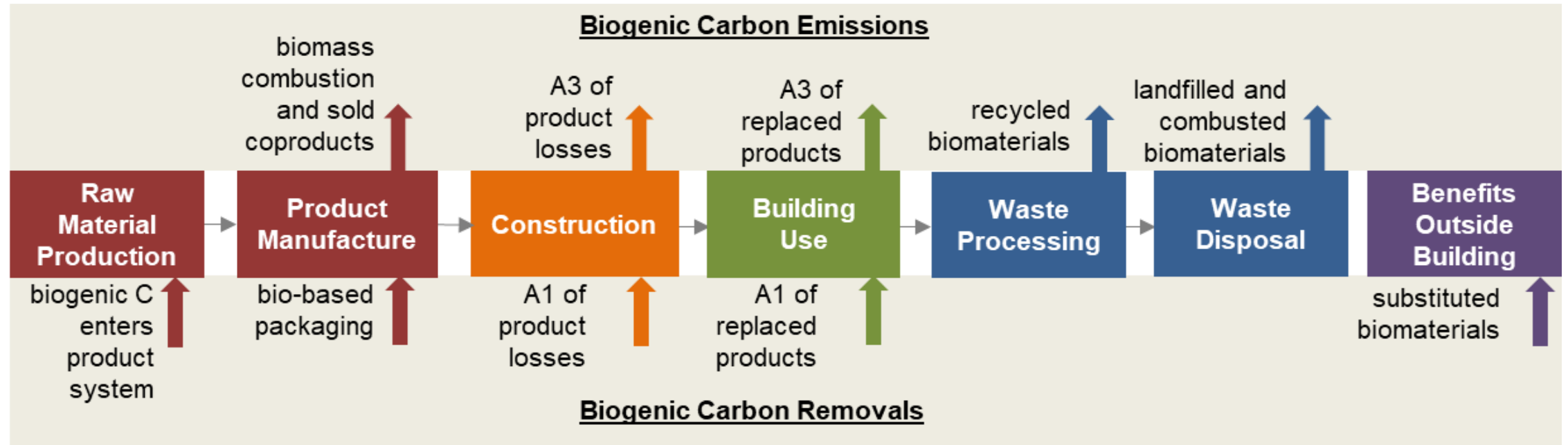
Cradle-to-Gate Biogenic Carbon Accounting



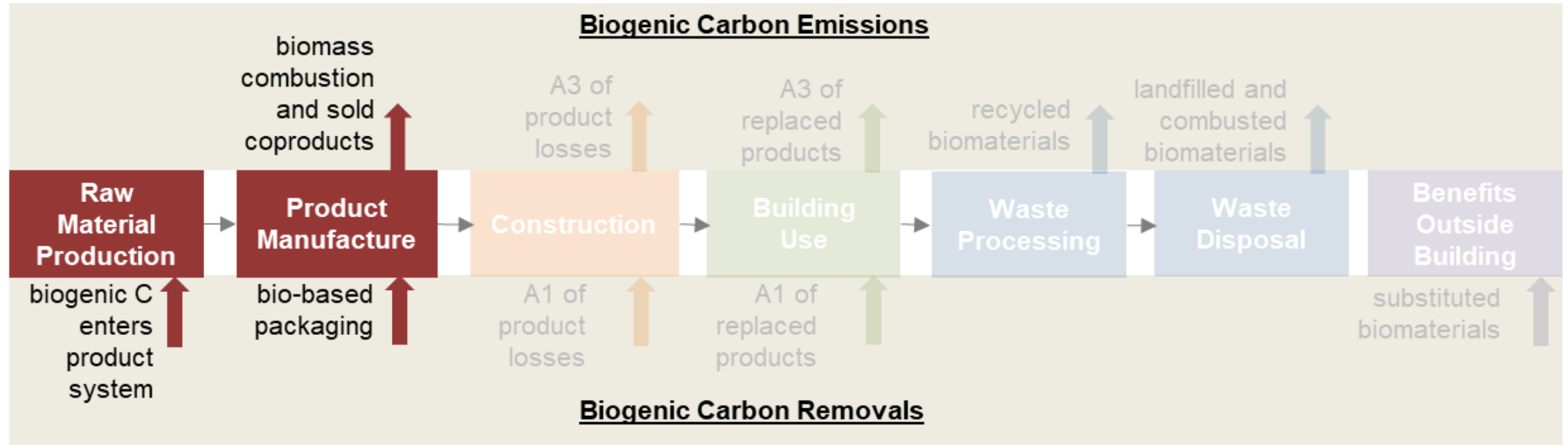
Cradle-to-Gate Wood Product System



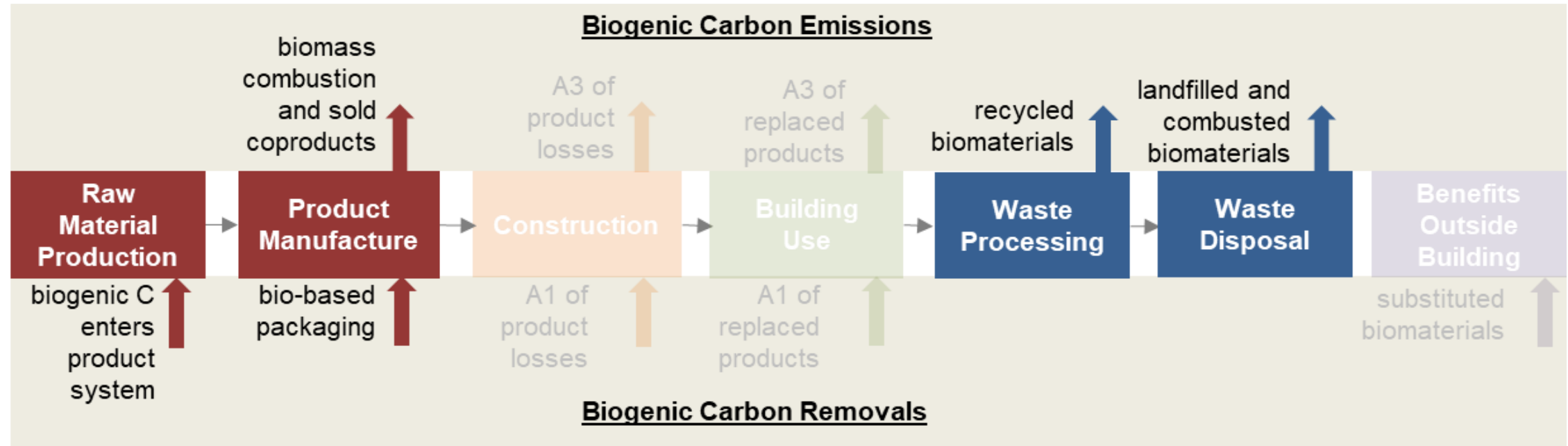
Cradle-to-Gate Biogenic Carbon Accounting



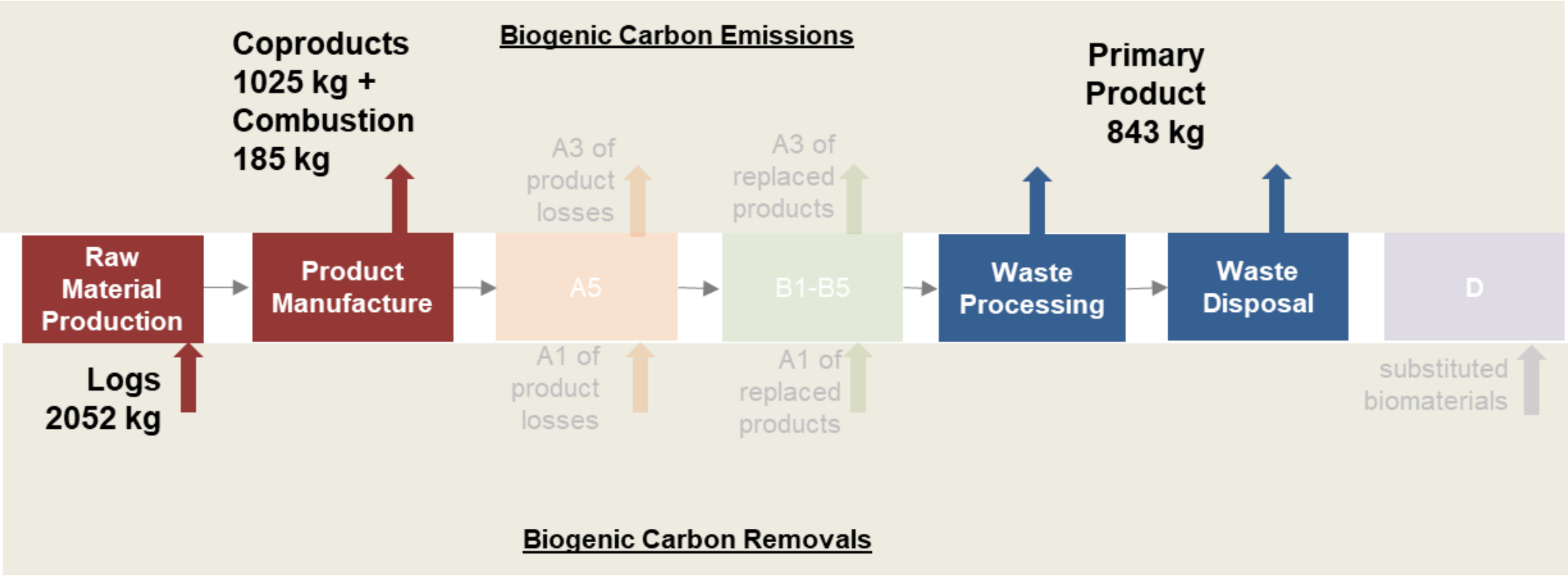
Cradle-to-Gate Biogenic Carbon Accounting



Cradle-to-Gate Biogenic Carbon Accounting



Cradle-to-Gate Biogenic Carbon Accounting



Cradle-to-Gate Biogenic Carbon Results

PARAMETER	TOTAL	A1	A2	A3	A5	C3/C4
Biogenic Carbon Removal from Product	(2,052.87)	(2,052.87)	0.00	0.00	0.00	0.00
Biogenic Carbon Emission from Product	1,868.67	0.00	0.00	1,025.02	0.00	843.66
Biogenic Carbon Removal from Packaging	(1.35)	0.00	0.00	(1.35)	0.00	0.00
Biogenic Carbon Emission from Packaging	0.75	0.00	0.00	0.00	0.75	0.00
Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production	184.80	0.00	0.00	184.80	0.00	0.00

Zero Net Biogenic Carbon Sequestration in Cradle-to-Gate LCA