Impact of Harvested Wood Products Consumption Strategies on British Columbia's Greenhouse Gas Emissions

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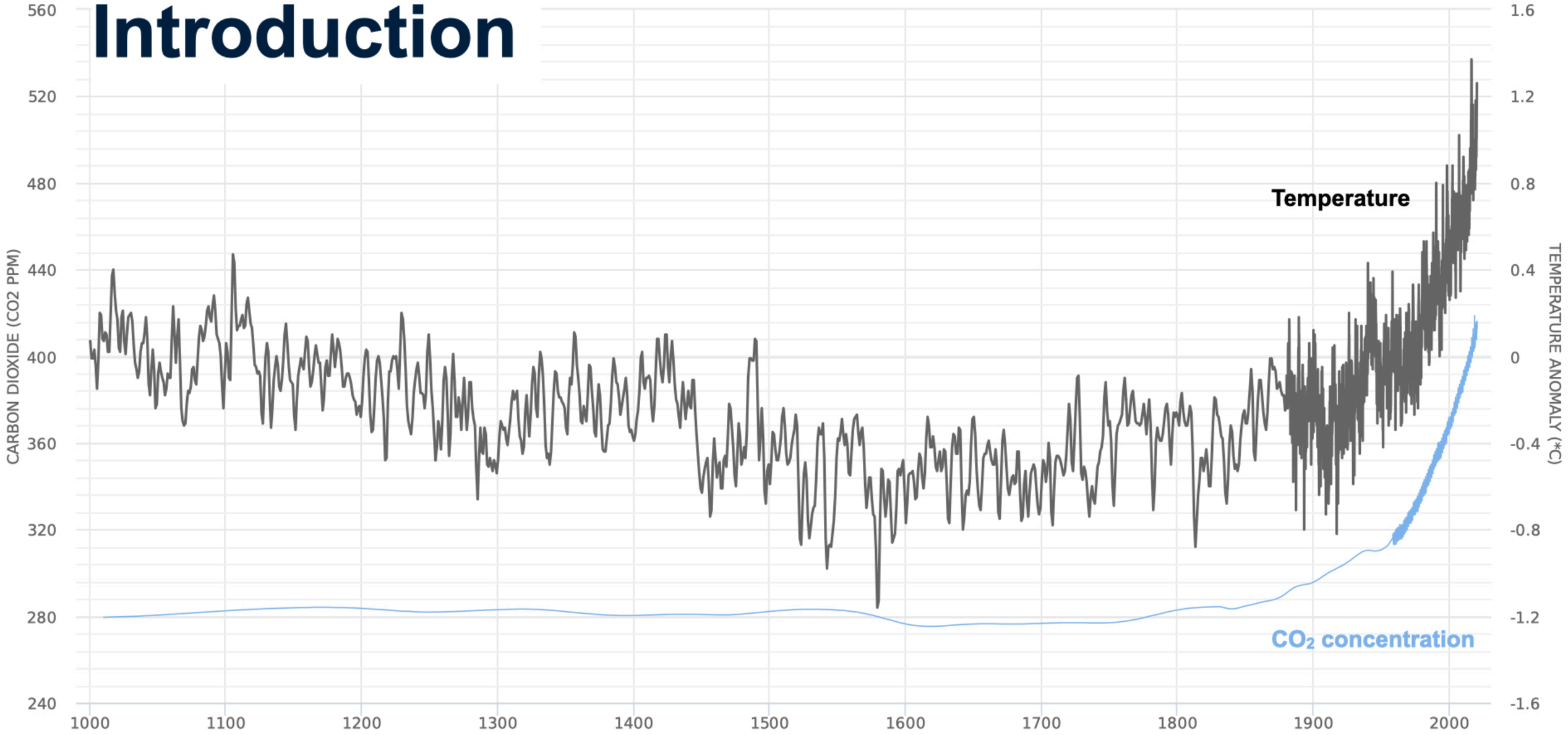
Outline

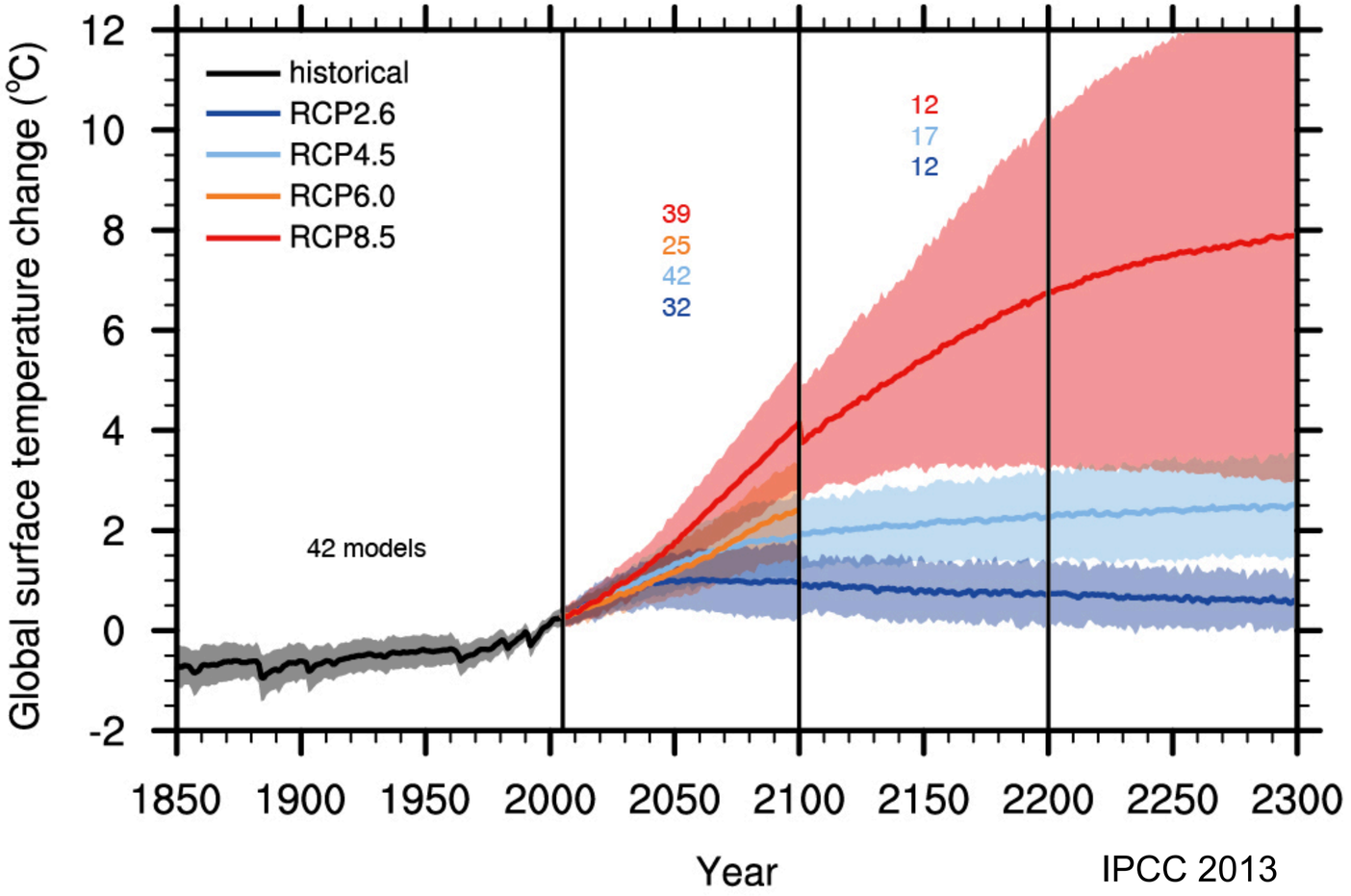
- Role of forest products in carbon cycle
- Mitigation options using forest products
- Results and highlights
- Conclusions

Introduction

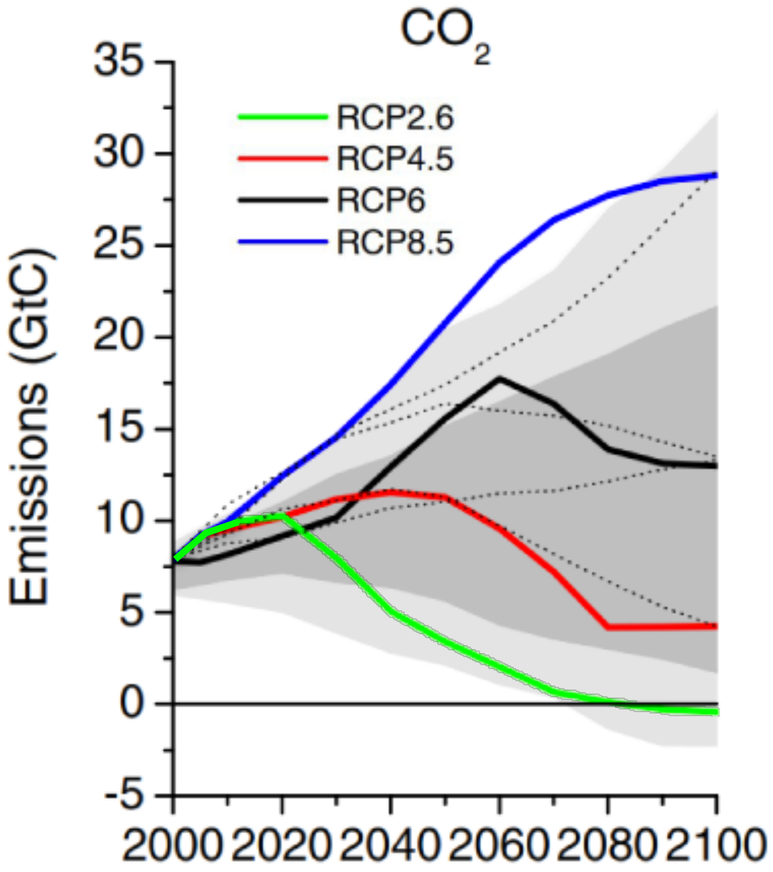


Temperature anomaly data (base period: 1951-1980): Snyder 2016, Marcott et al. 2013, Shakun et al. 2012, Moberg et al. 2005, NOAA 2020
CO_2 concentration data: Bereiter et al. 2016, Etheridge et al. 1998, NOAA 2020
Data visualization: 2° Institute

Introduction



IPCC 2013



van Vuuren et al. 2011

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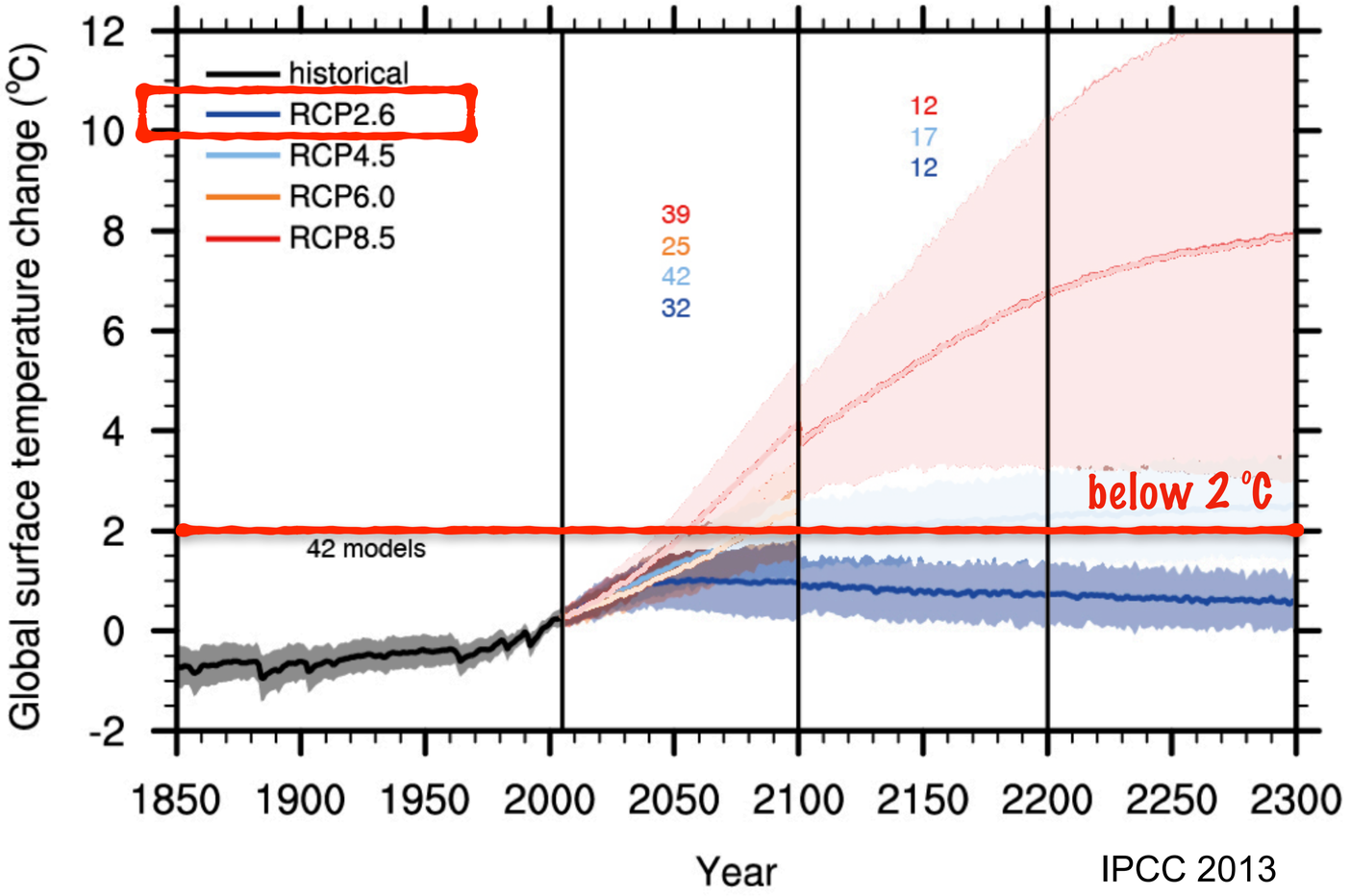

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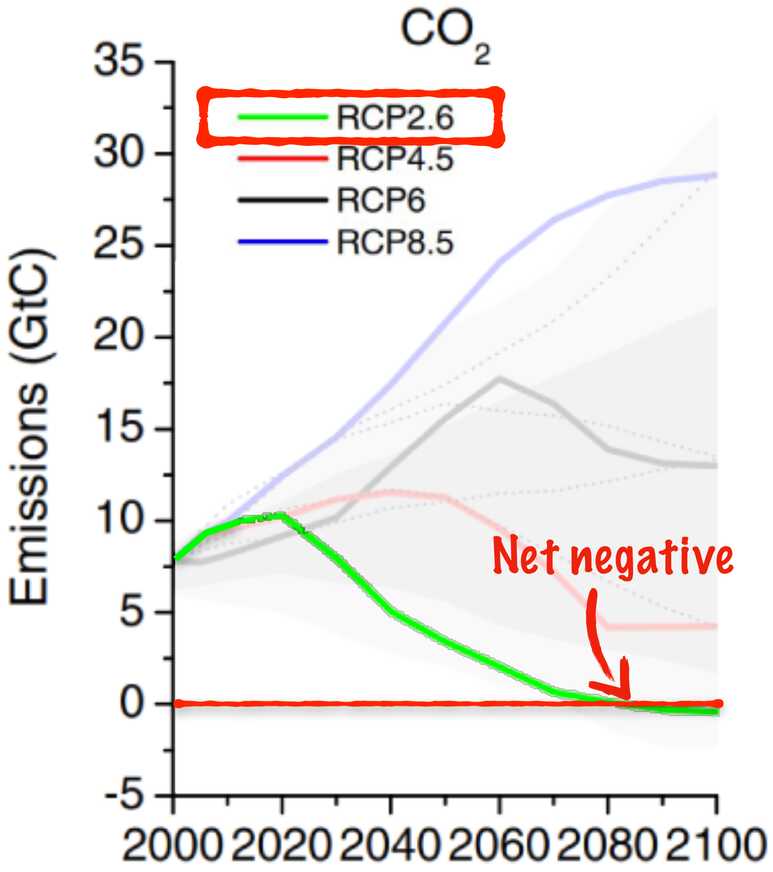

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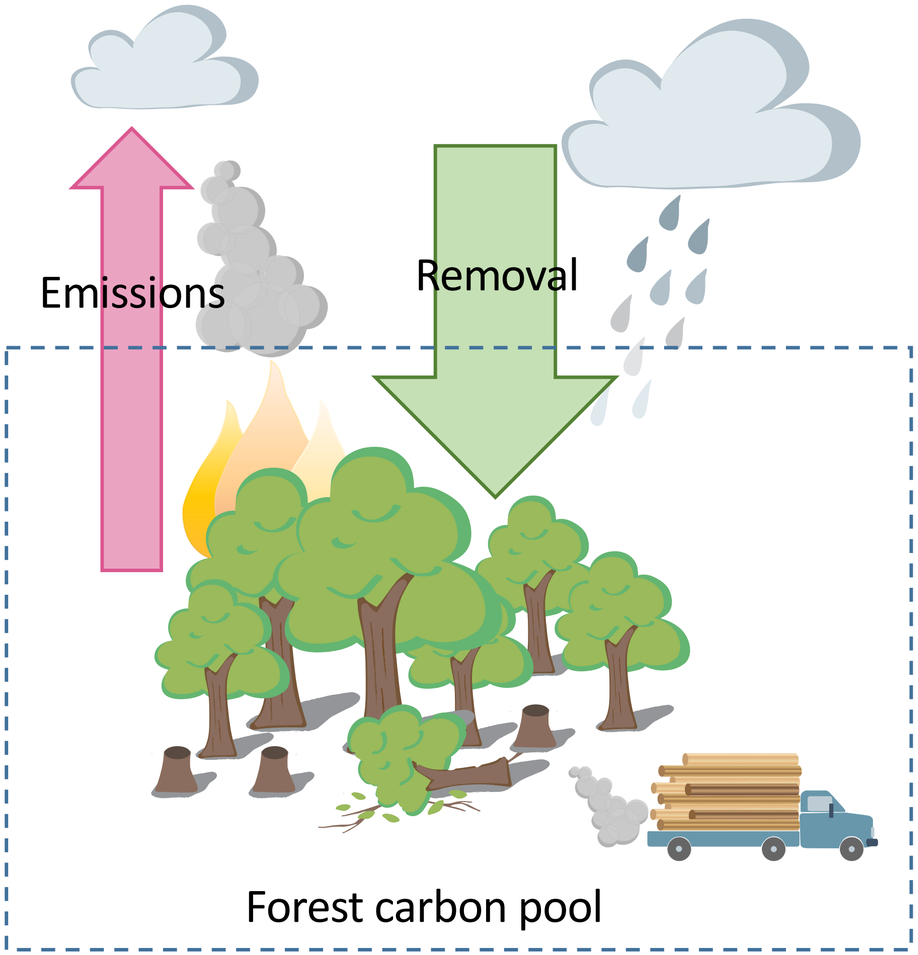
Role of forest products in carbon cycle



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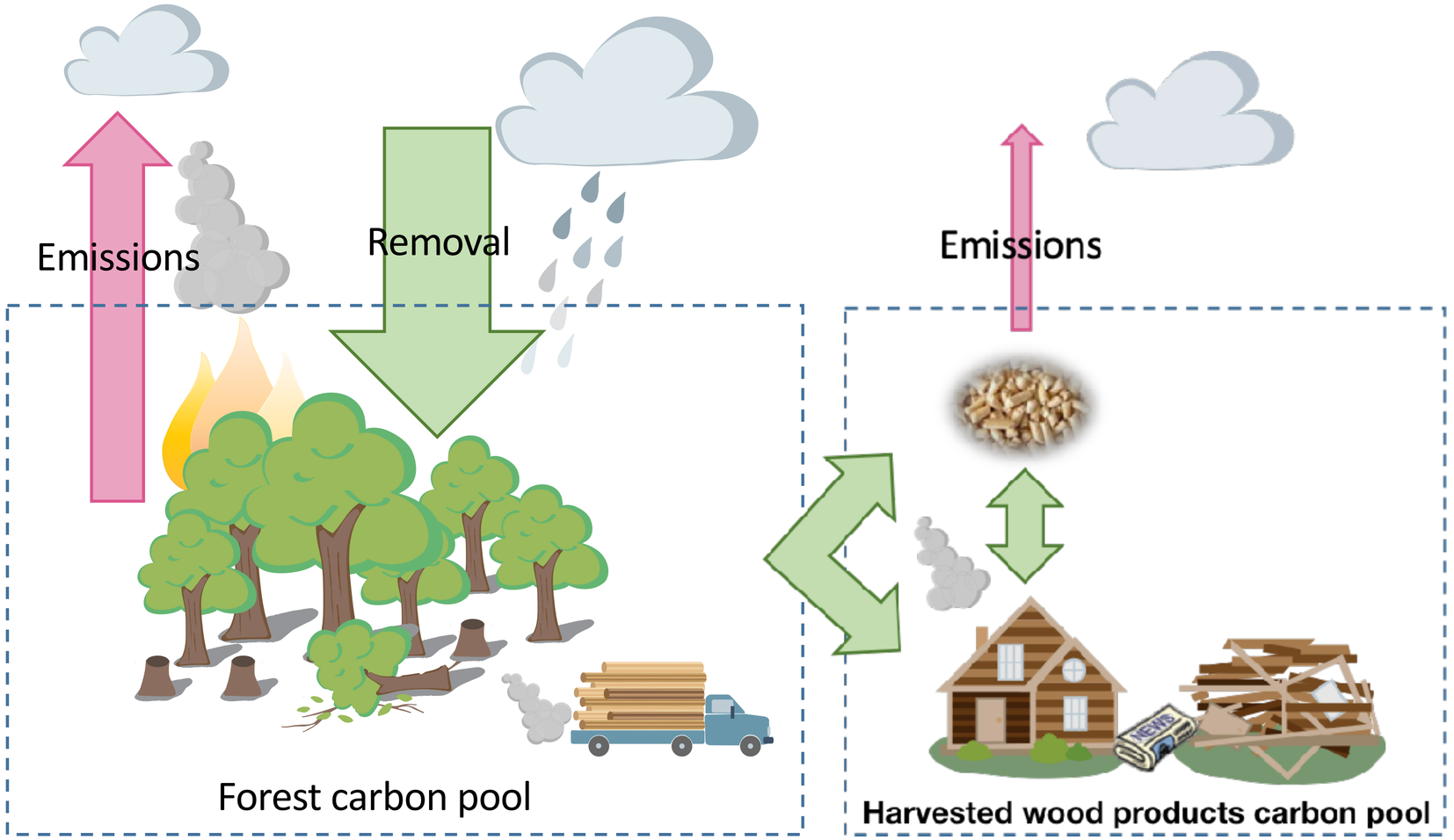

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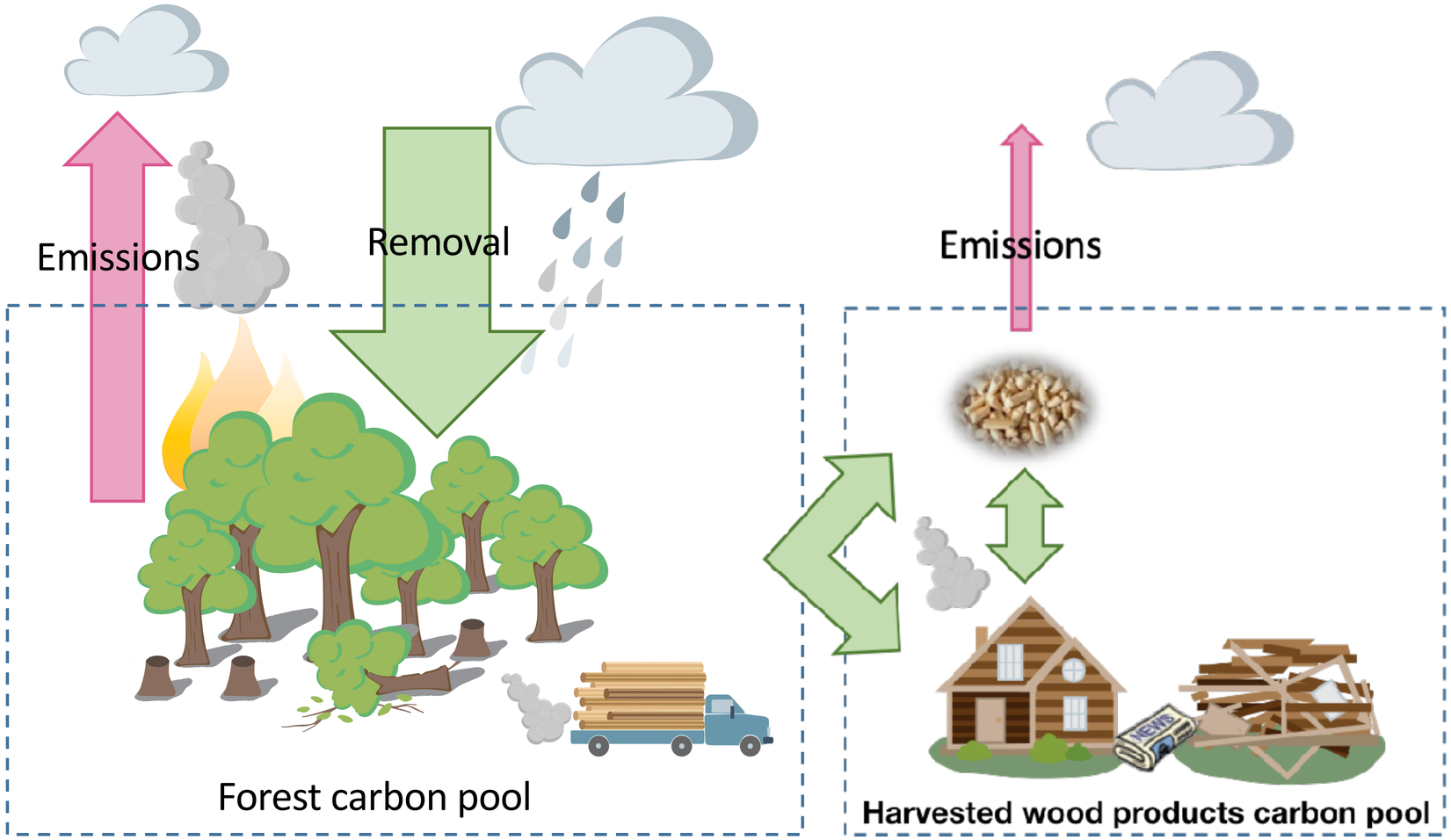

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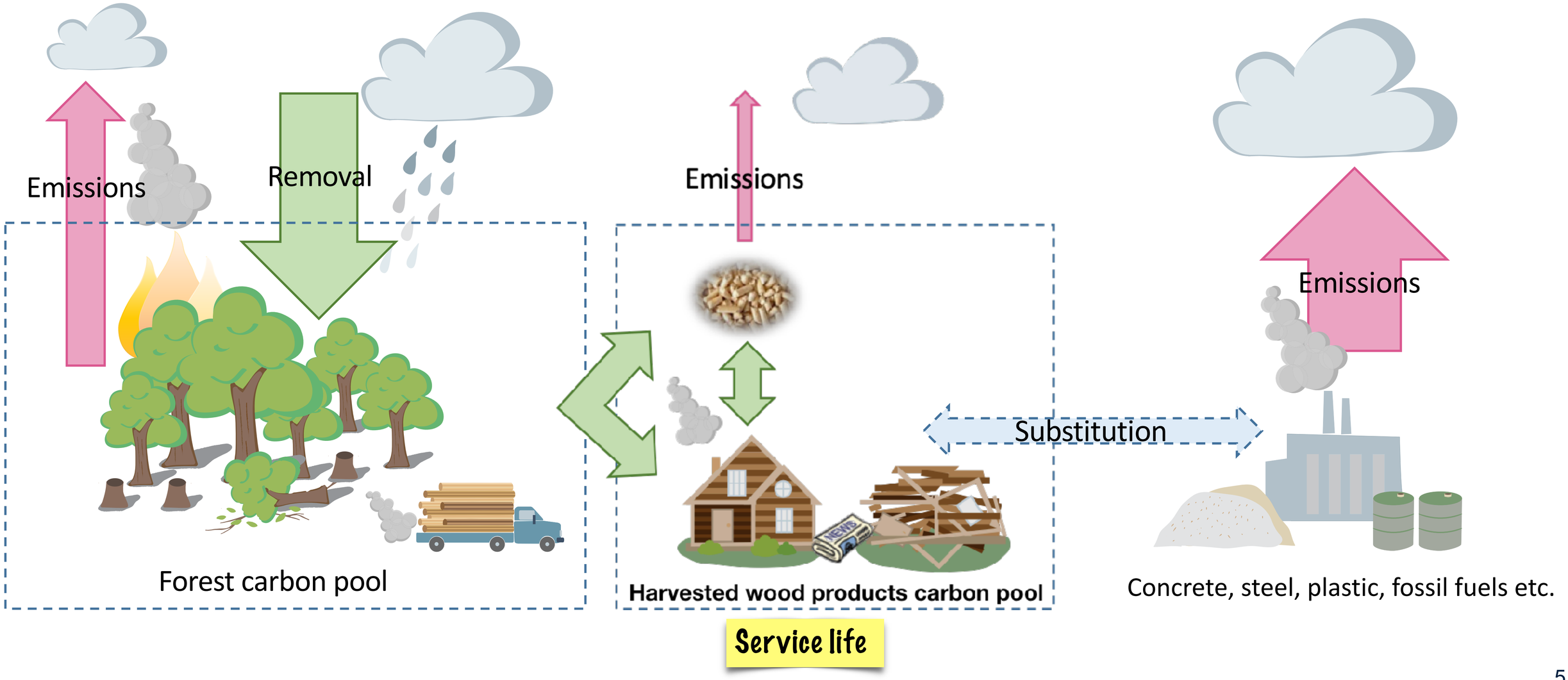

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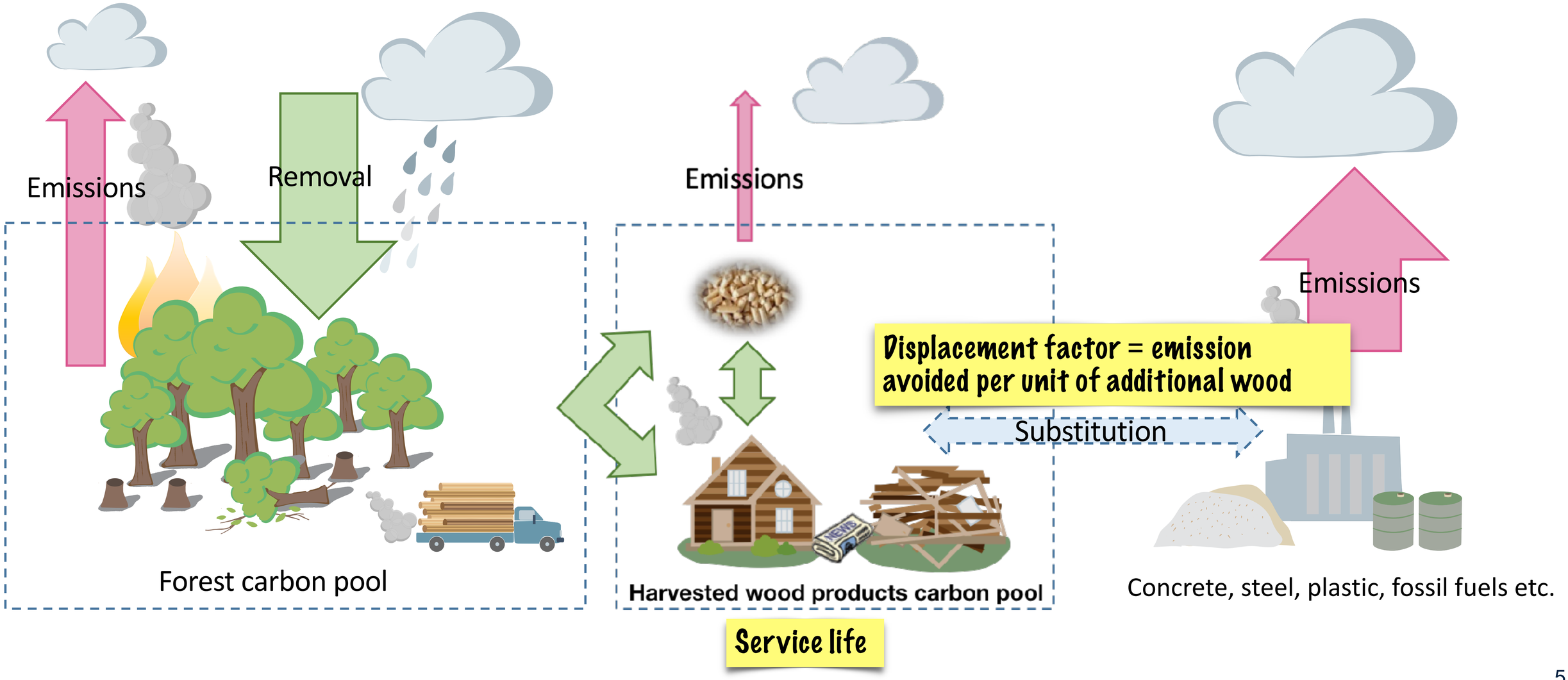

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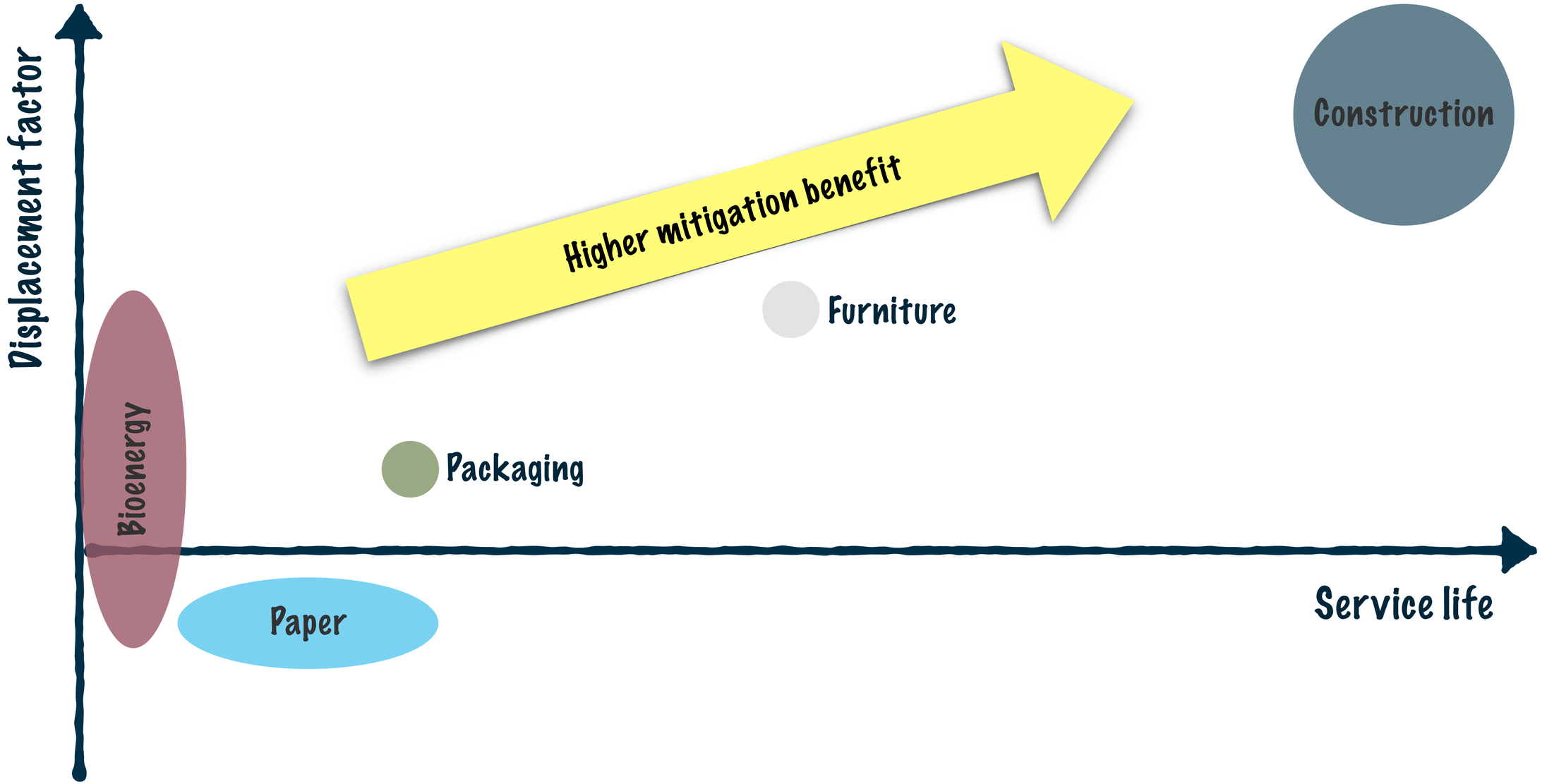

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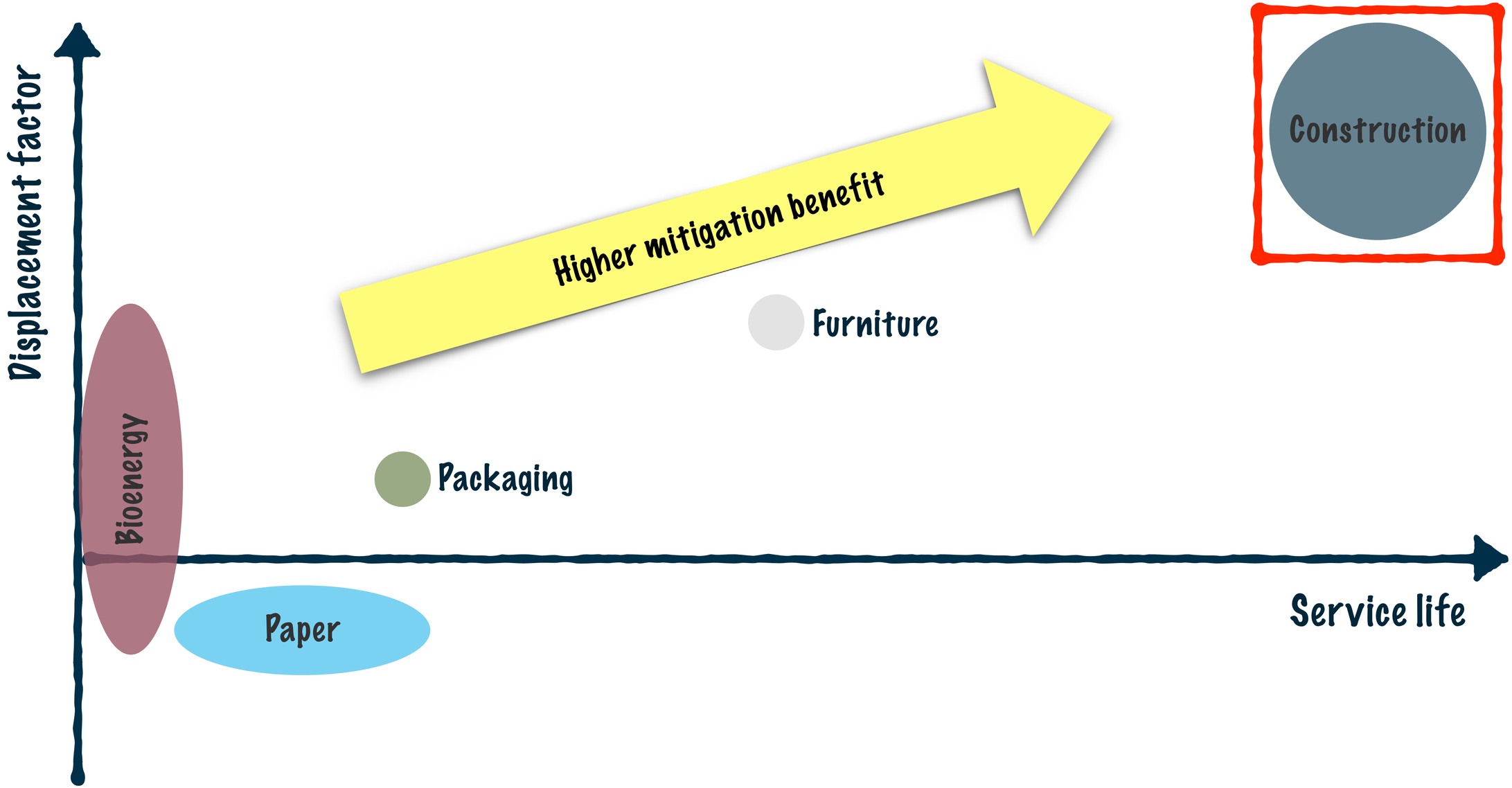

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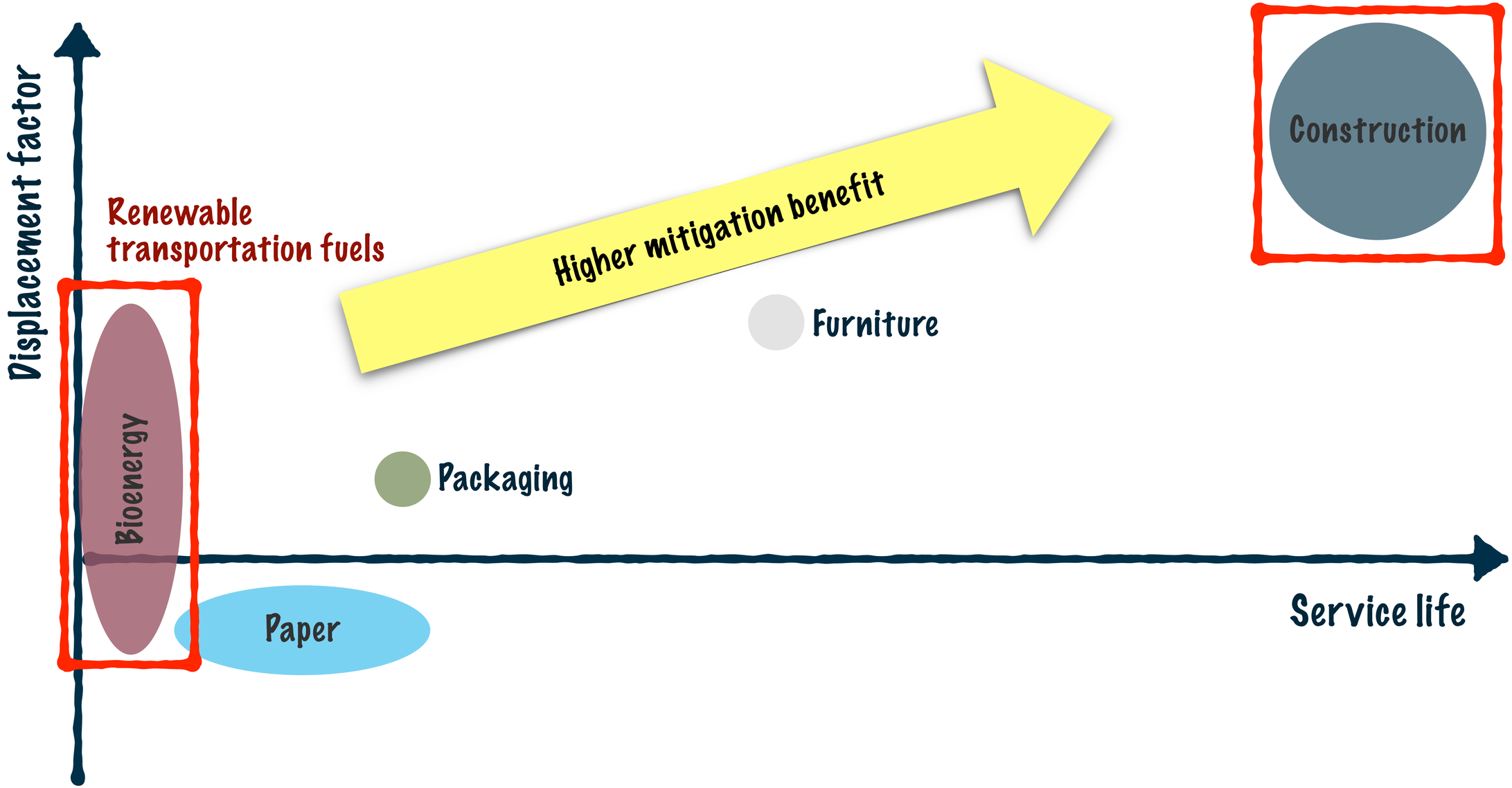
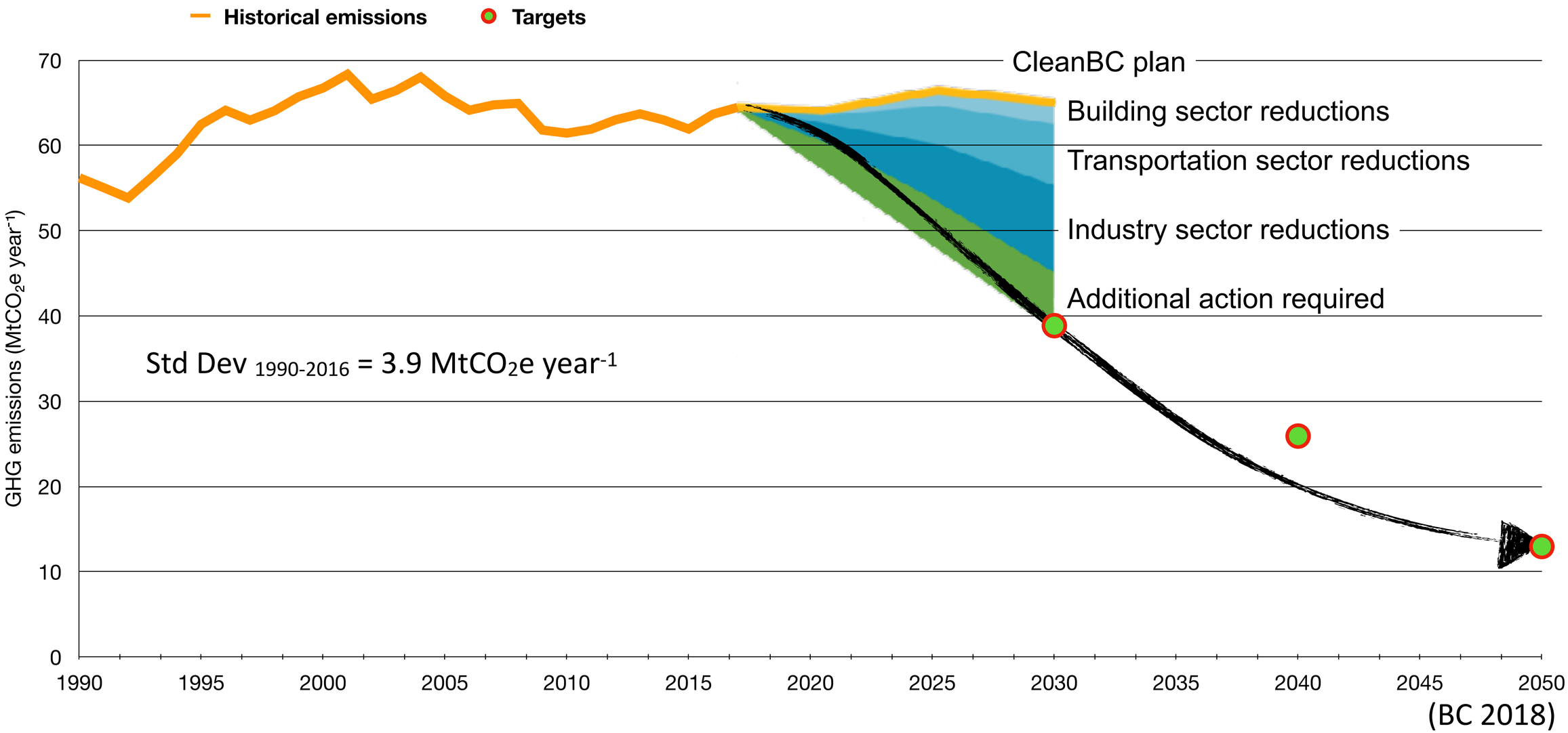


Emissions and targets of British Columbia (other sectors)



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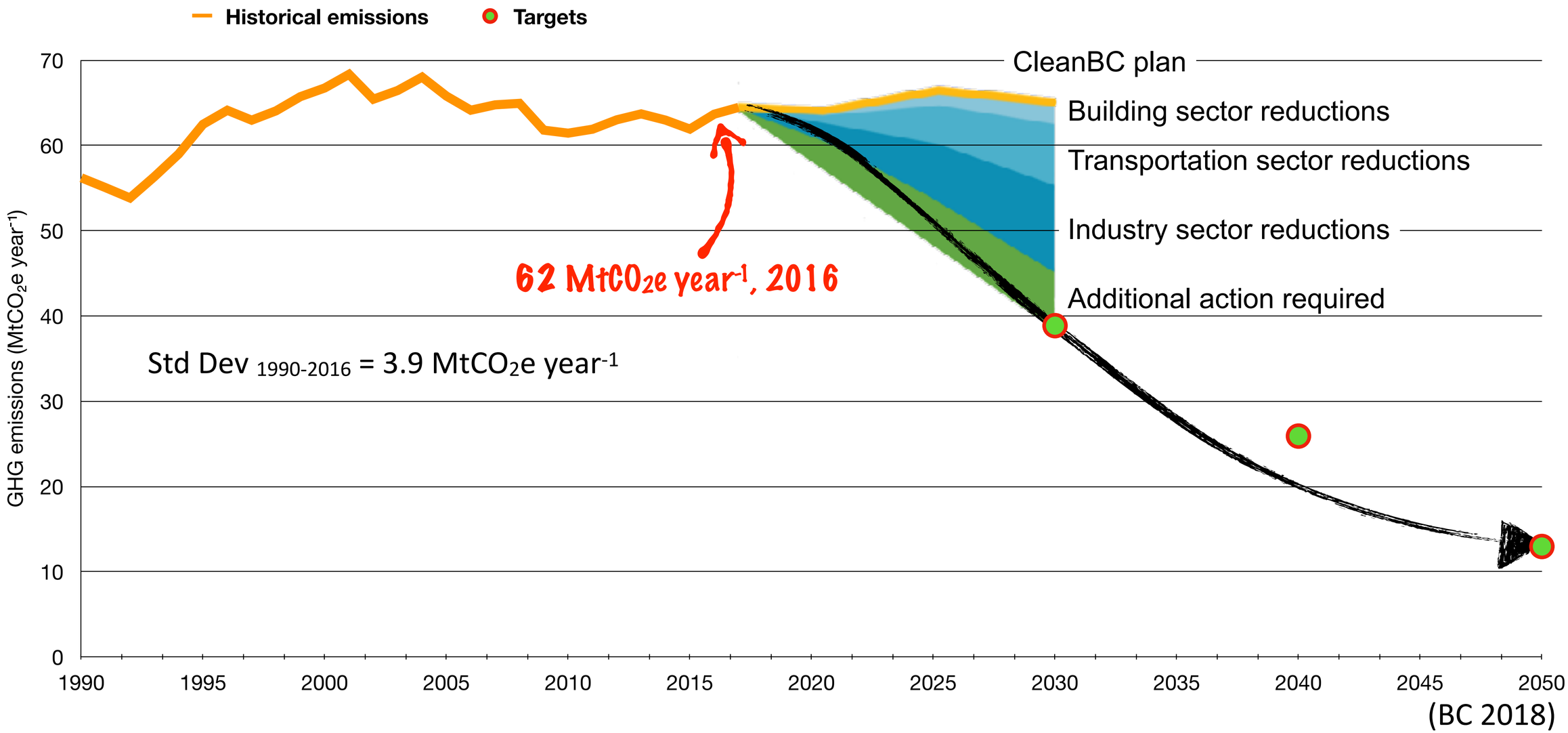

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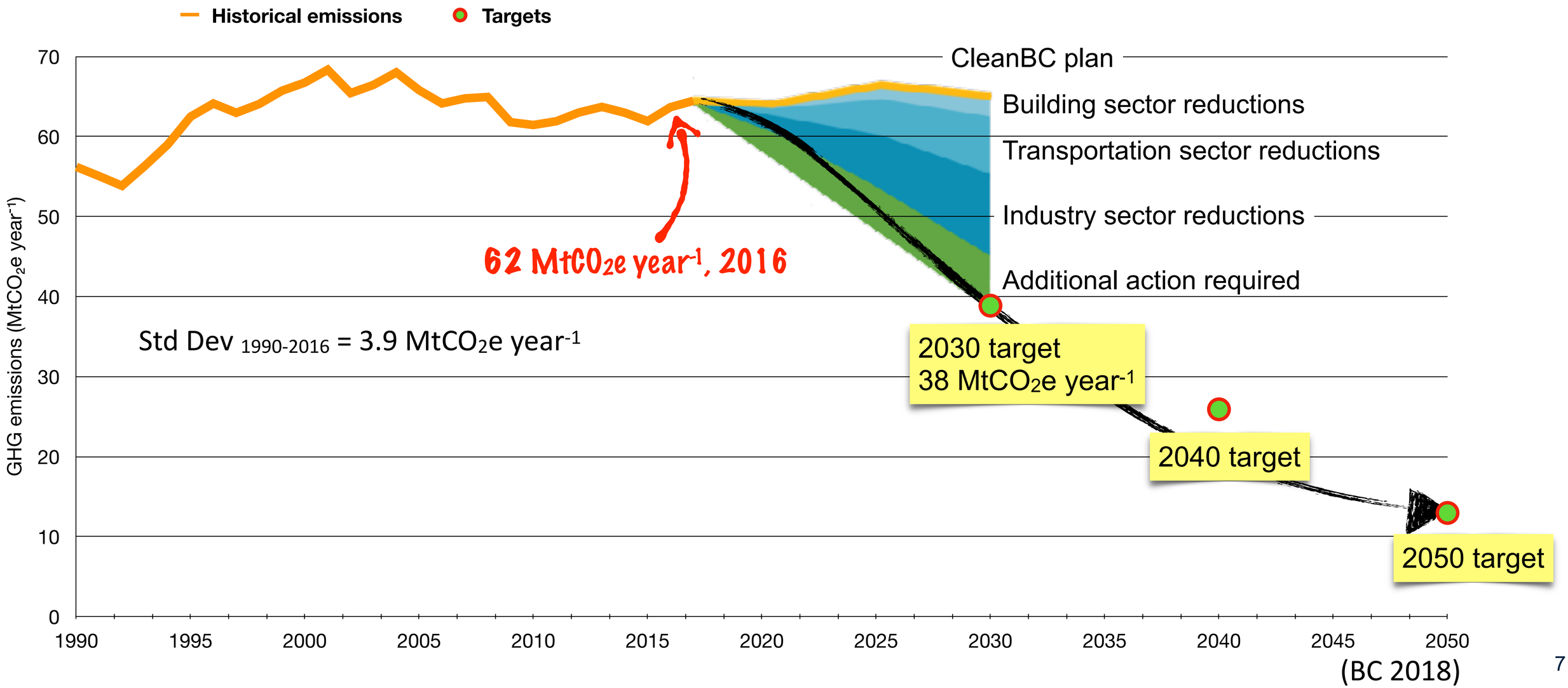

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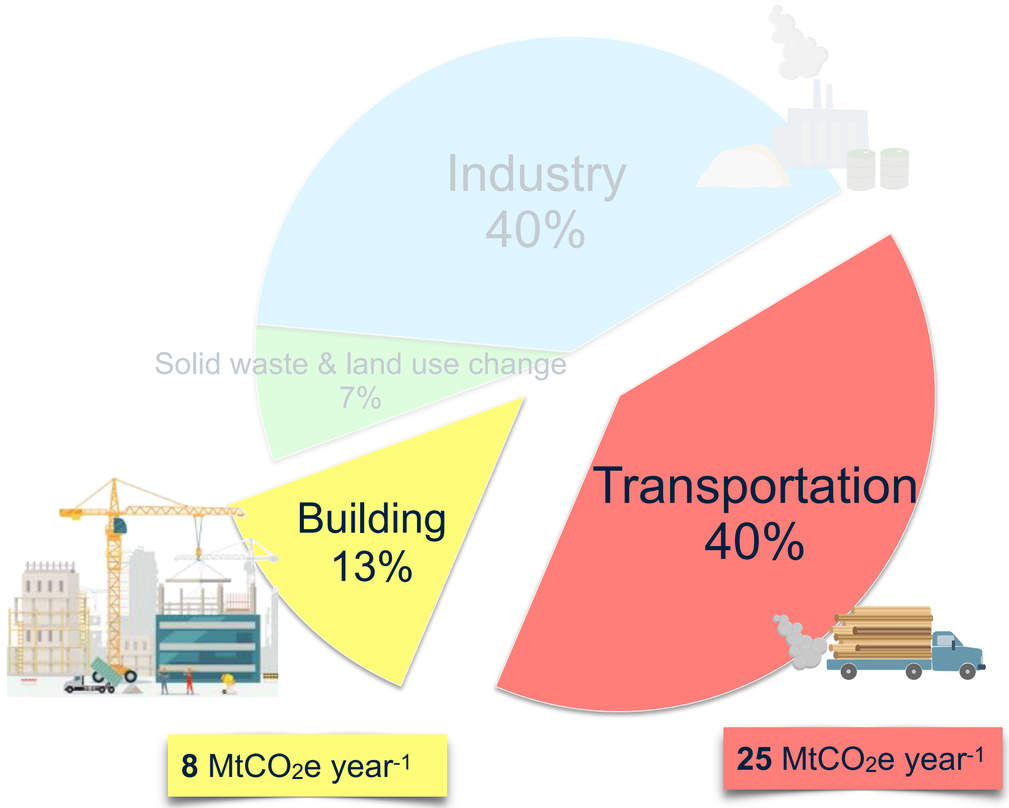

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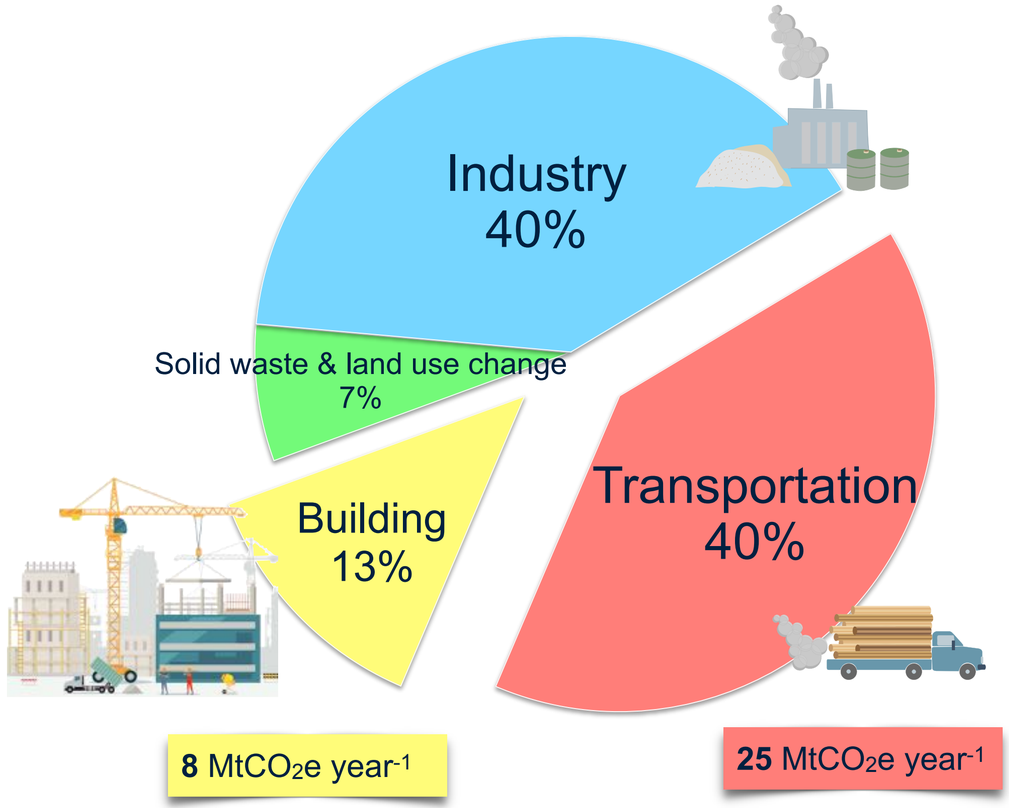

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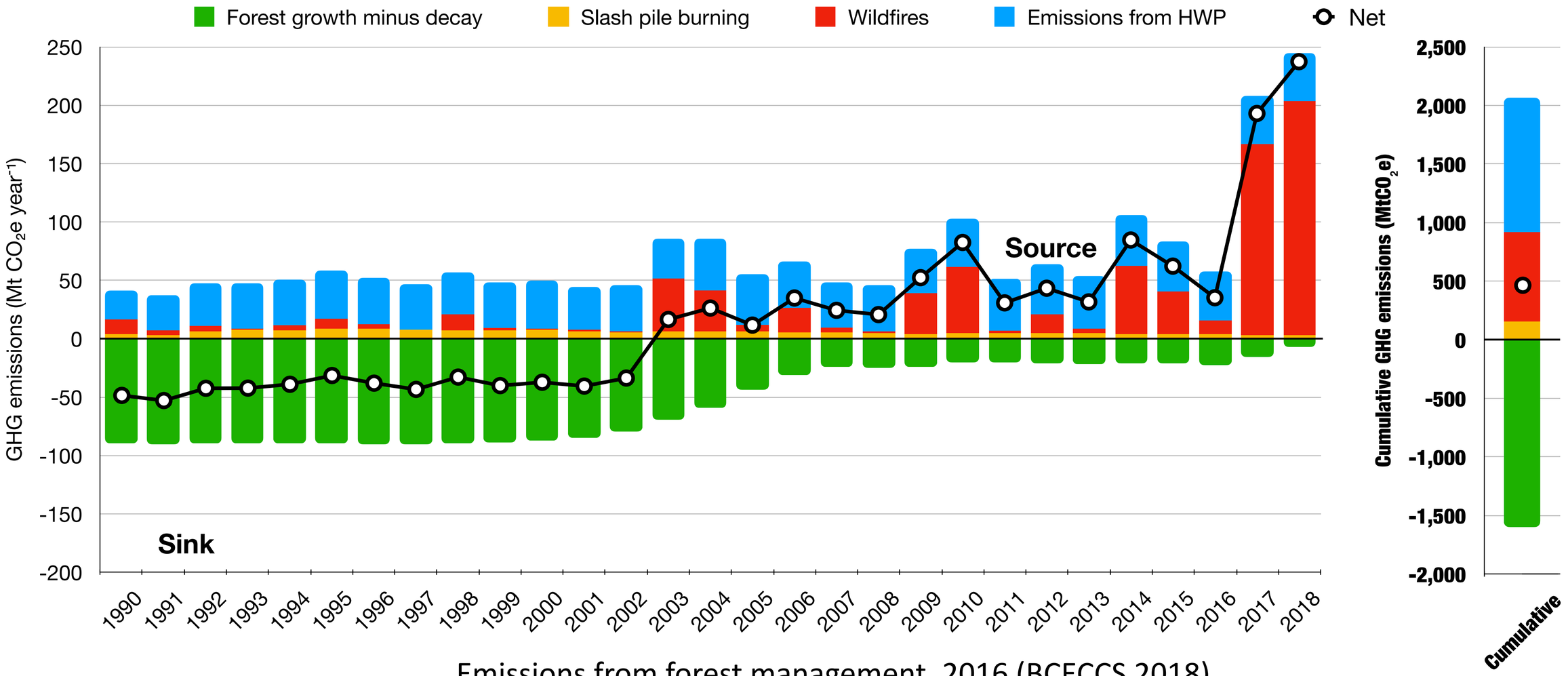

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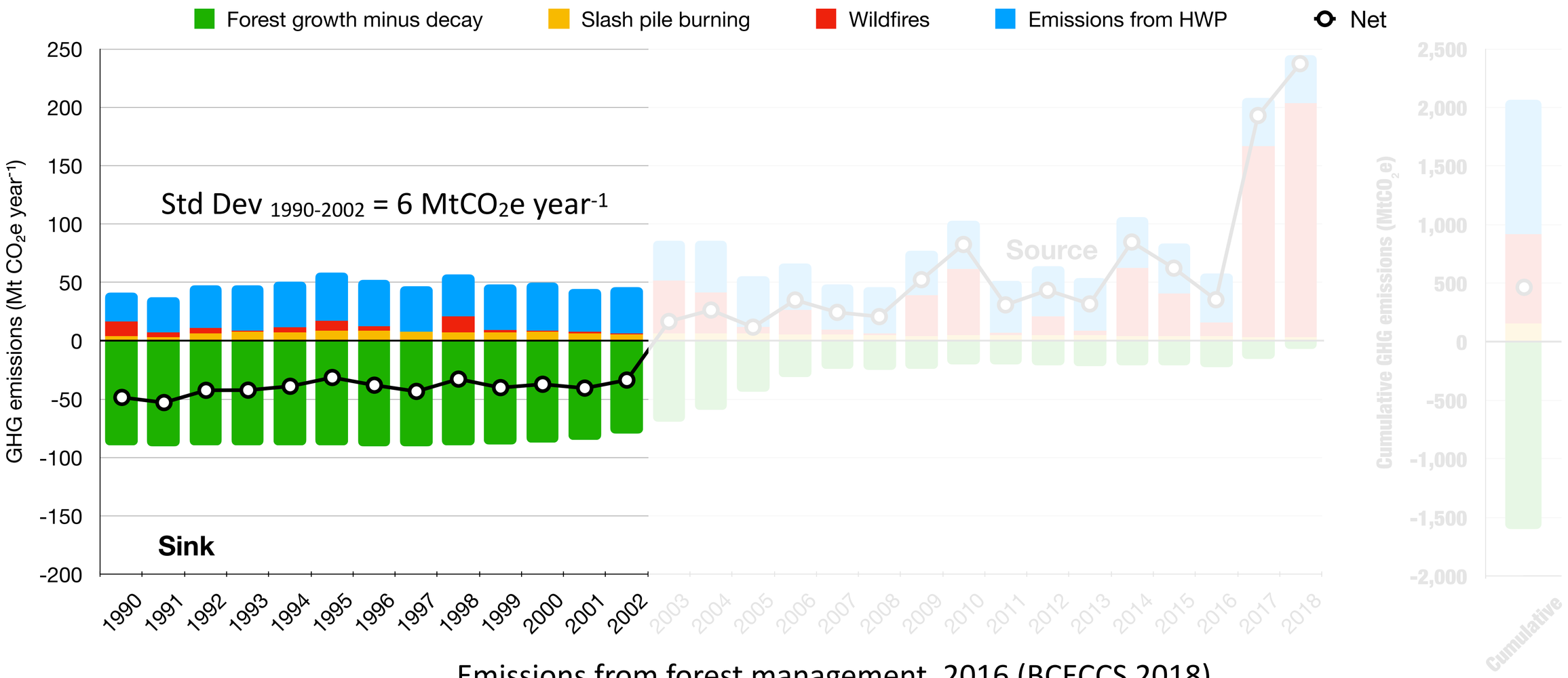

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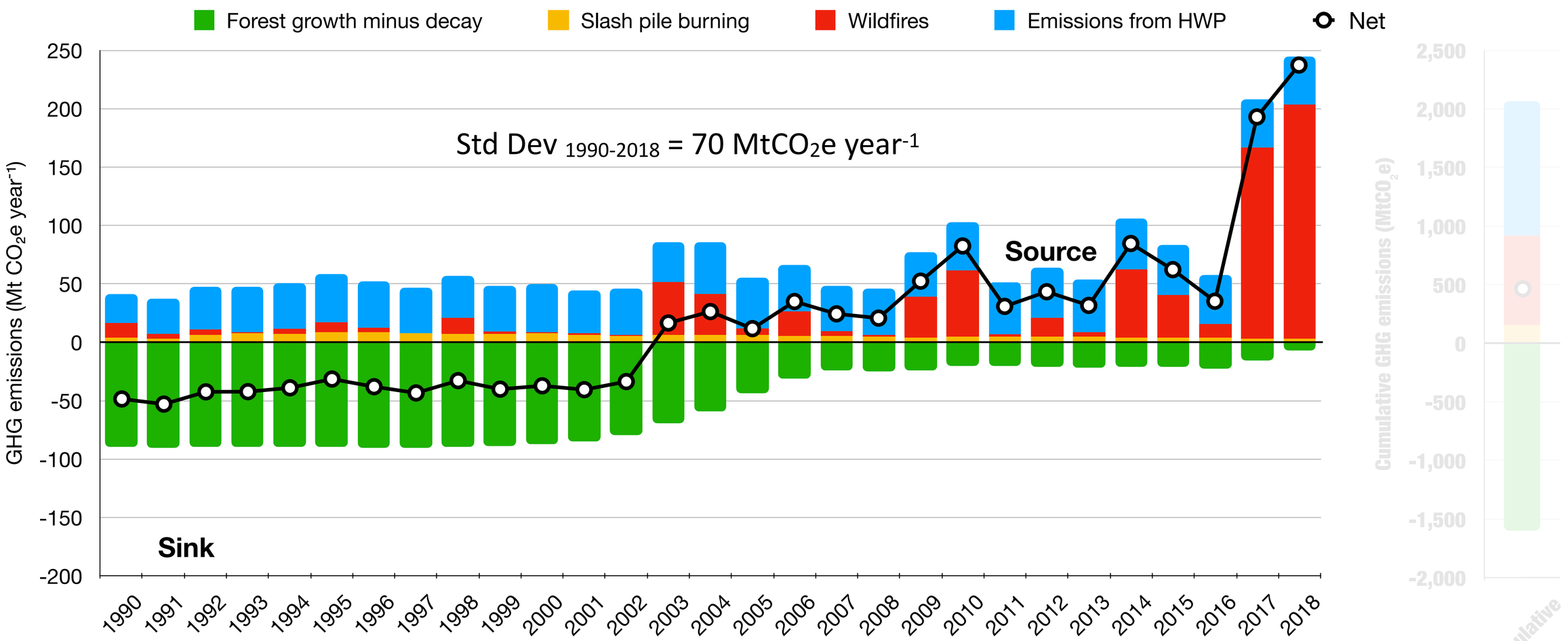

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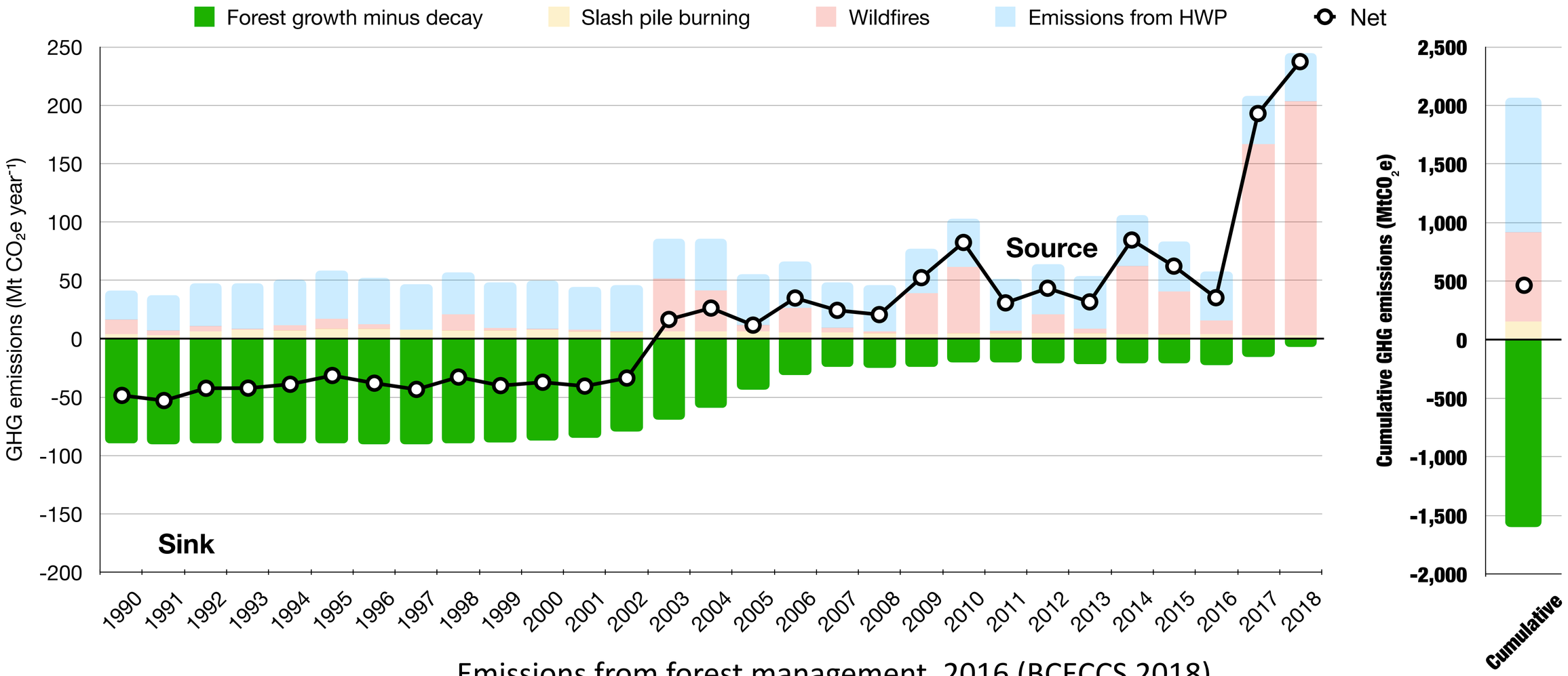

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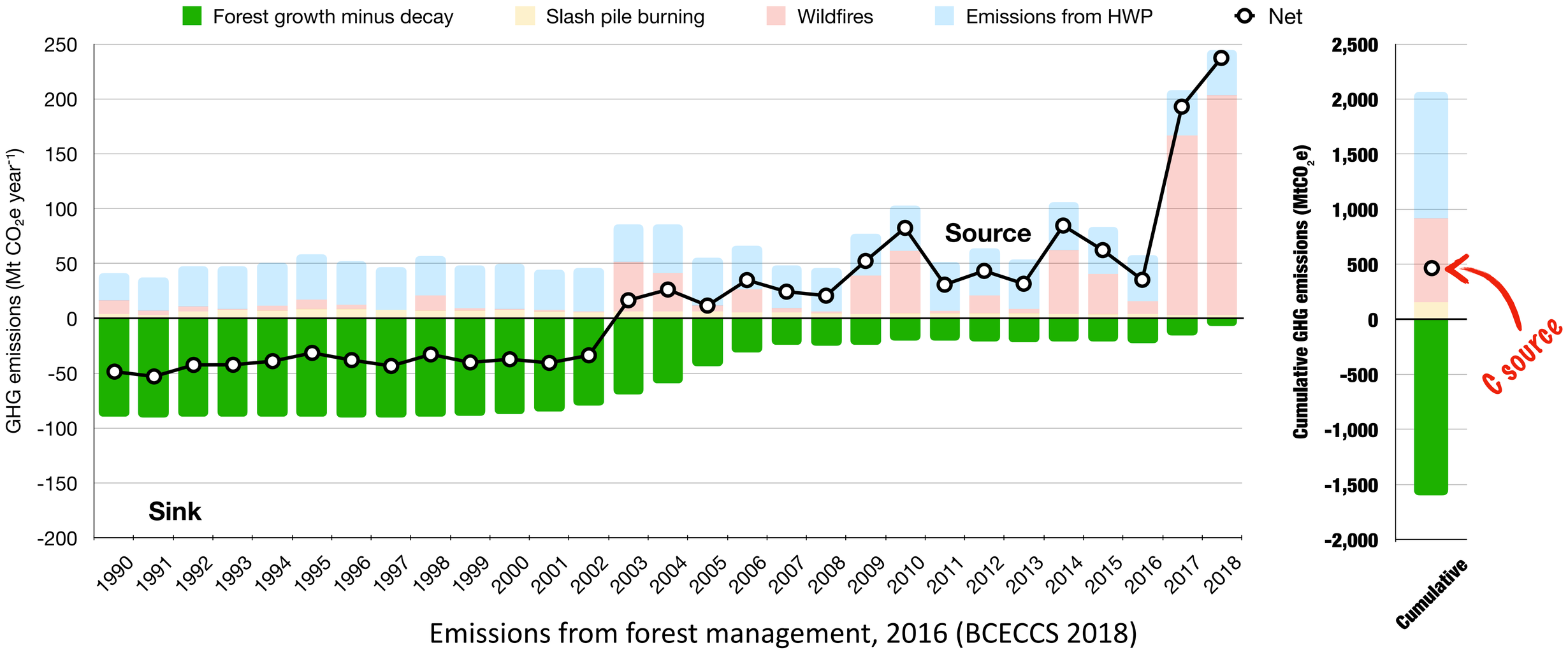

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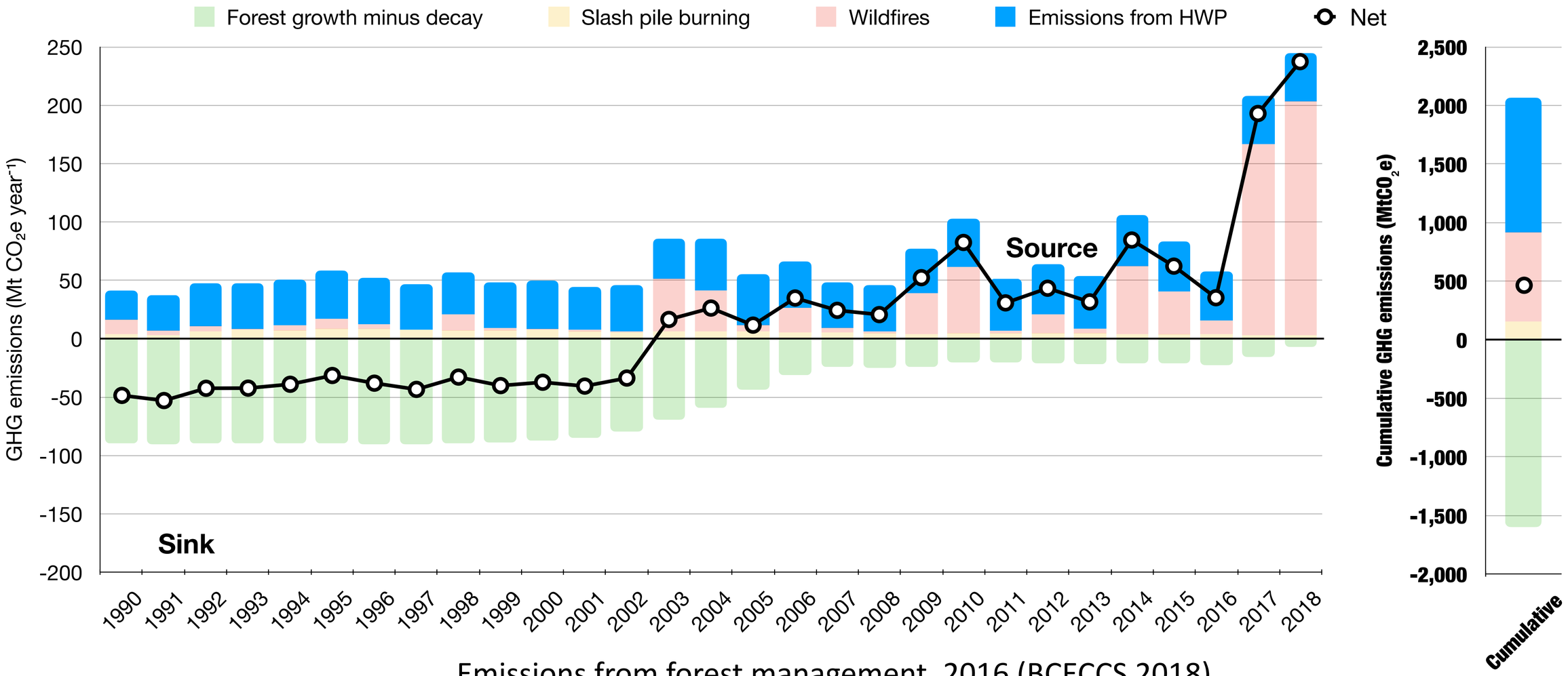

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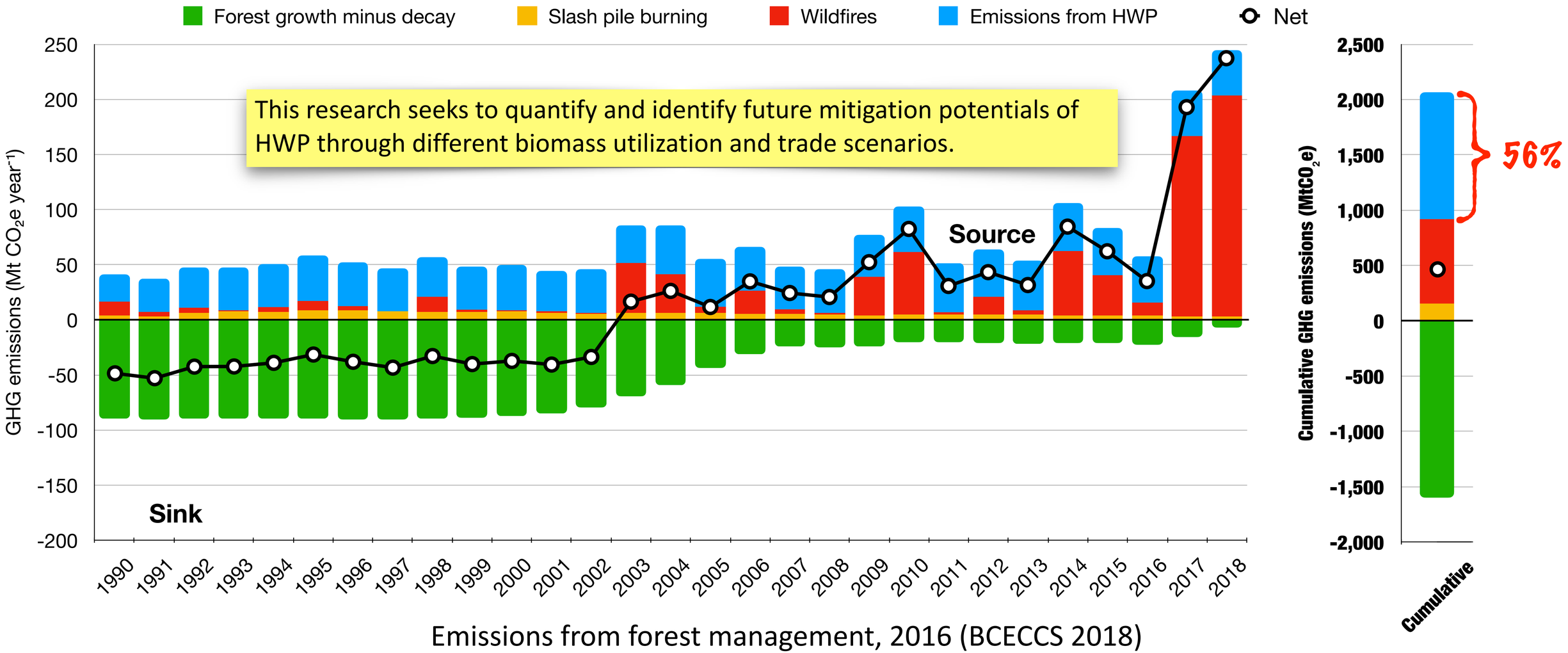

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BC’s forest and industry

(FII 2018)

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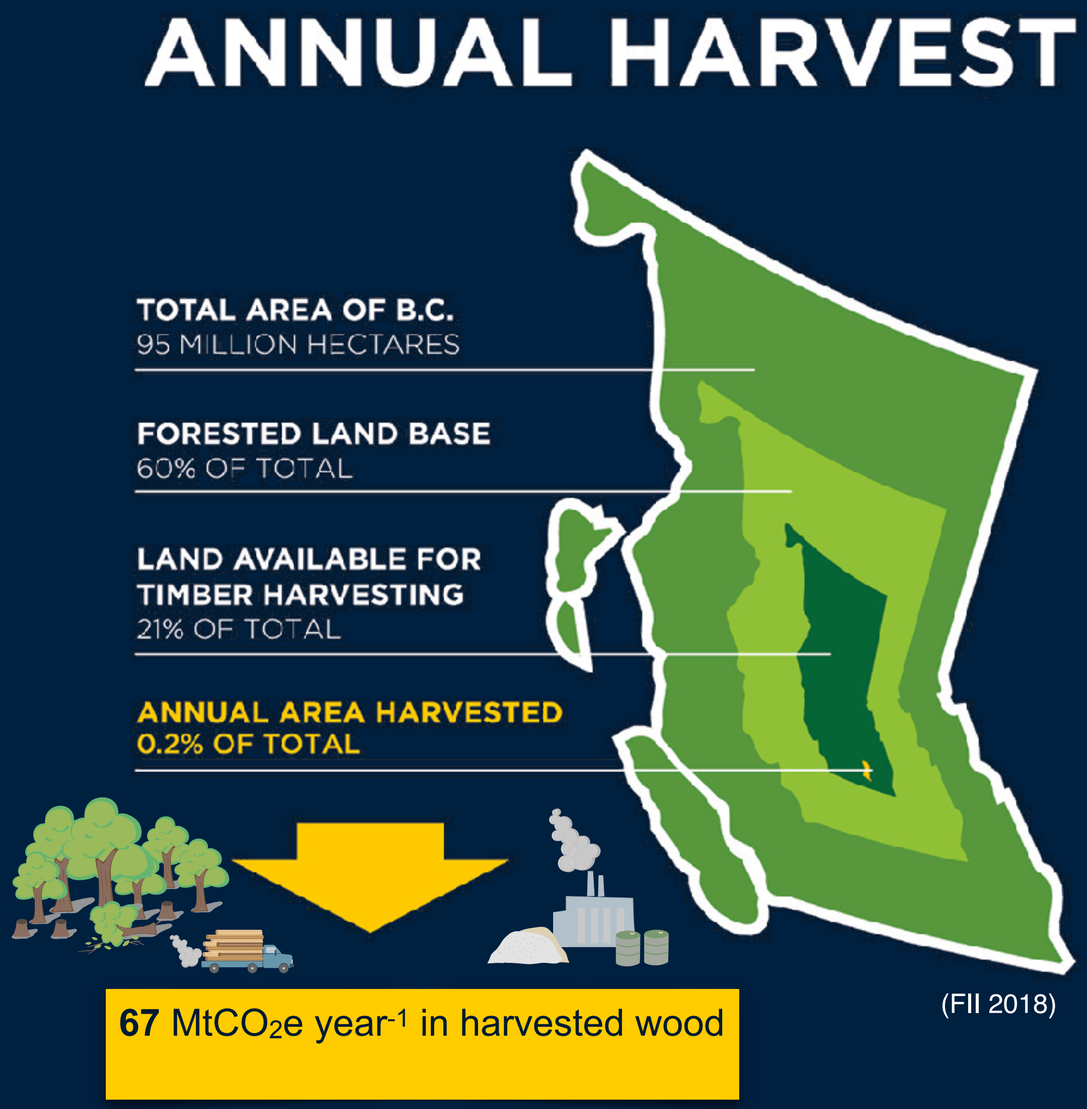

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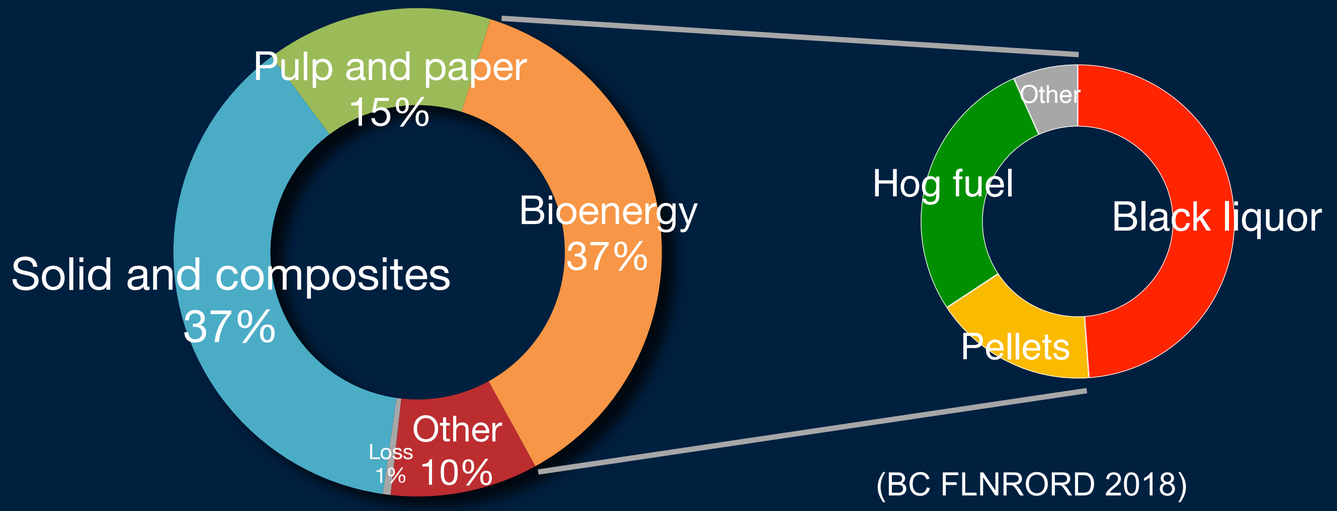

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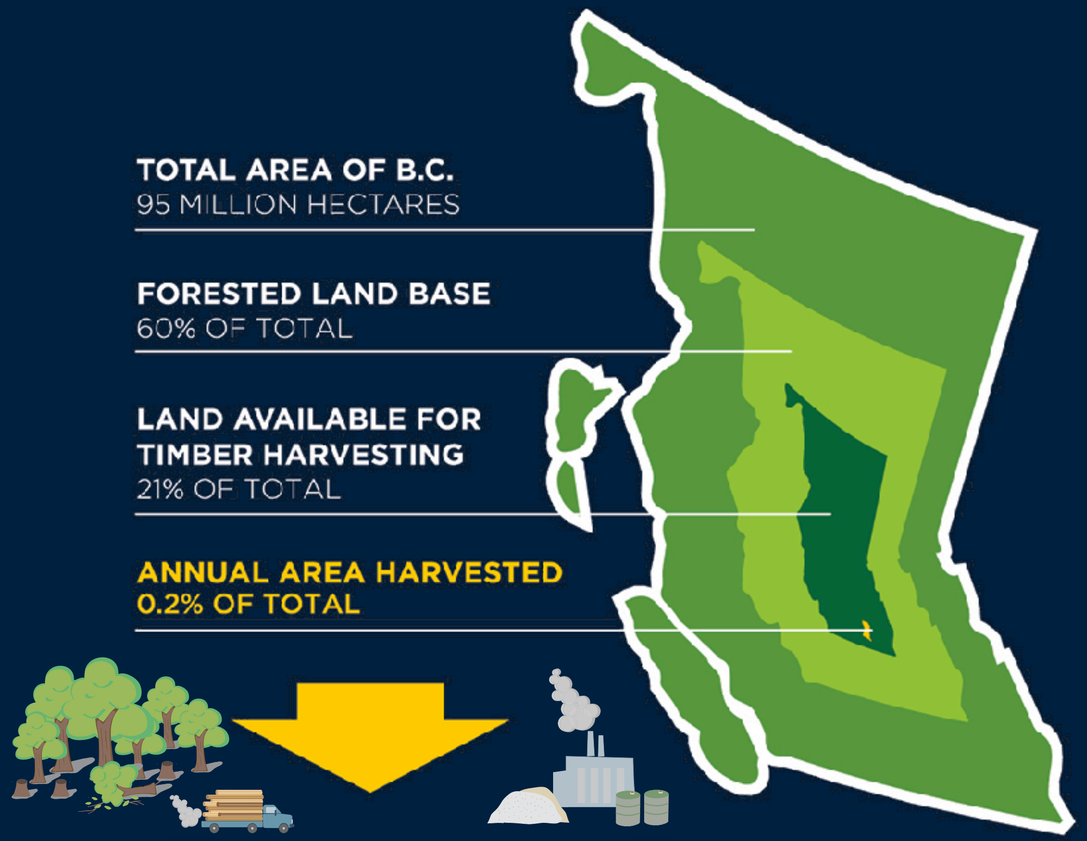
ANNUAL HARVEST



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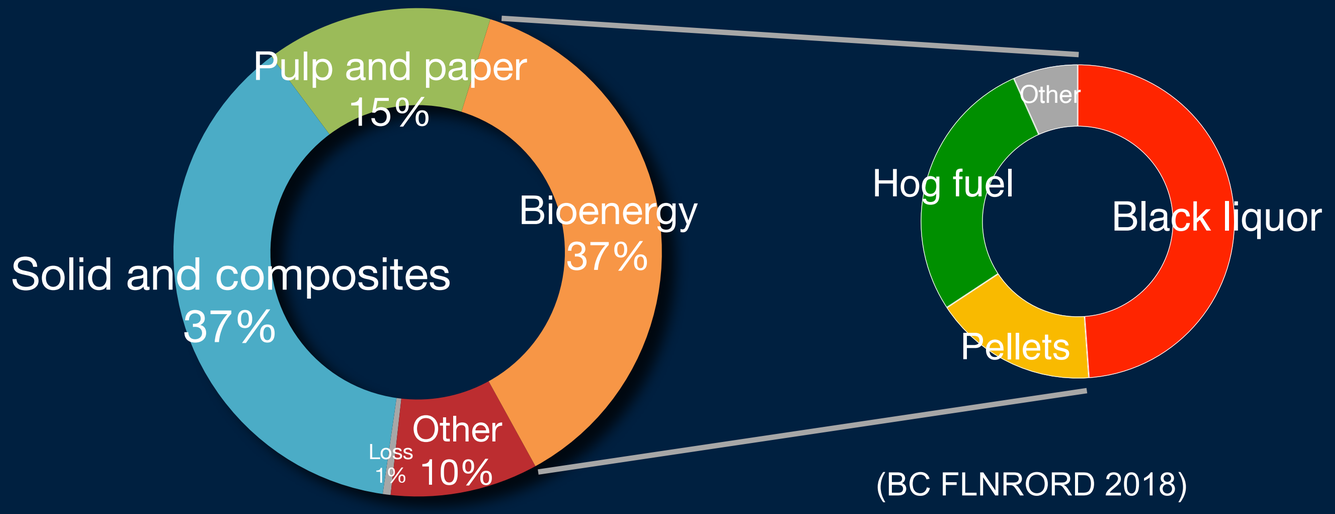
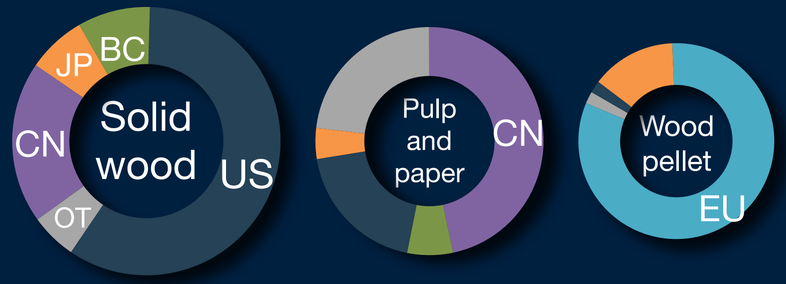


(BC FLNRORD 2018)

Commodity trade

B.C. SELLS **90%** OF ITS FOREST PRODUCTS TO INTERNATIONAL MARKETS



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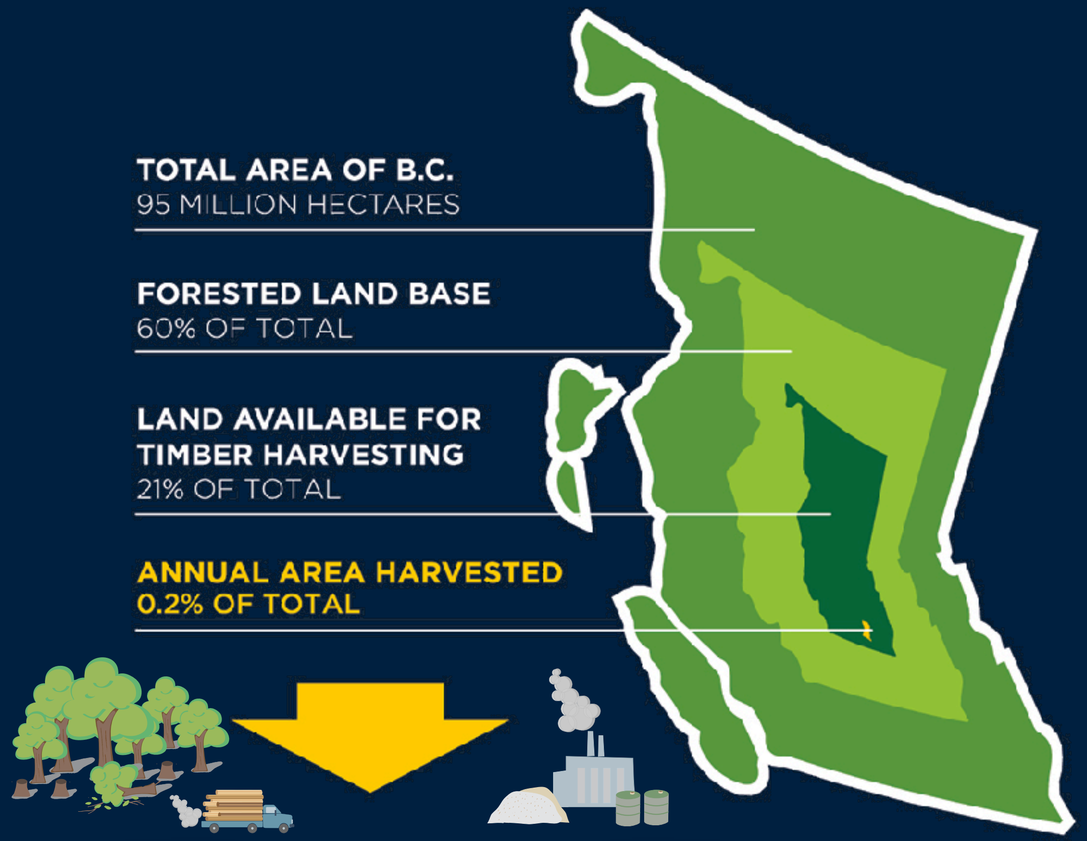

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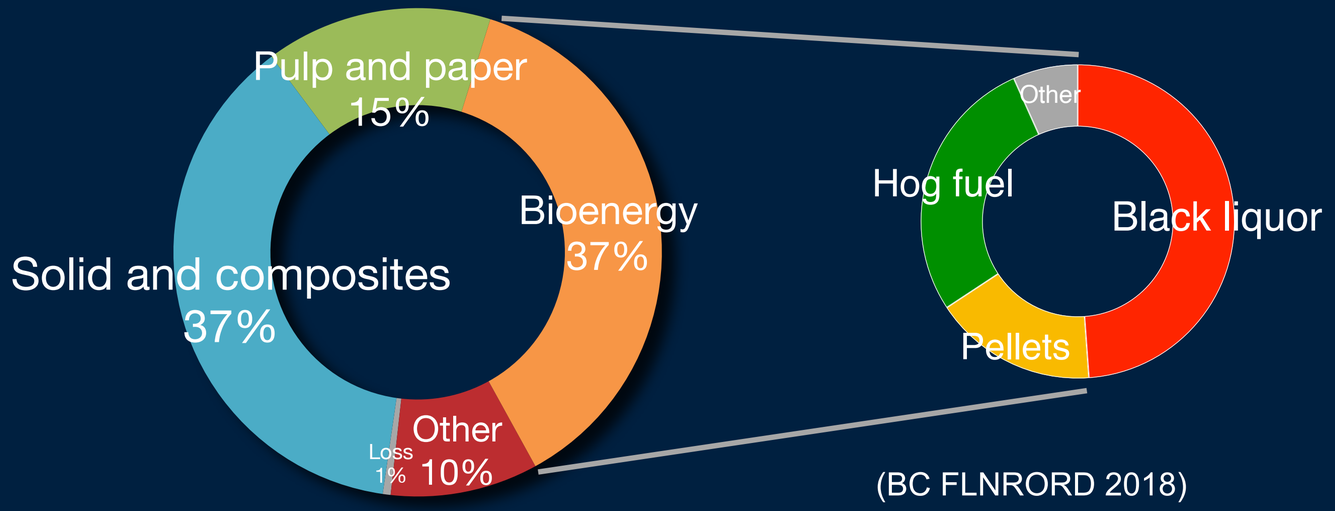

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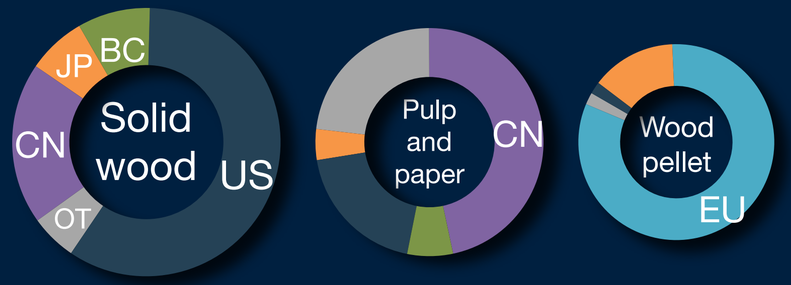

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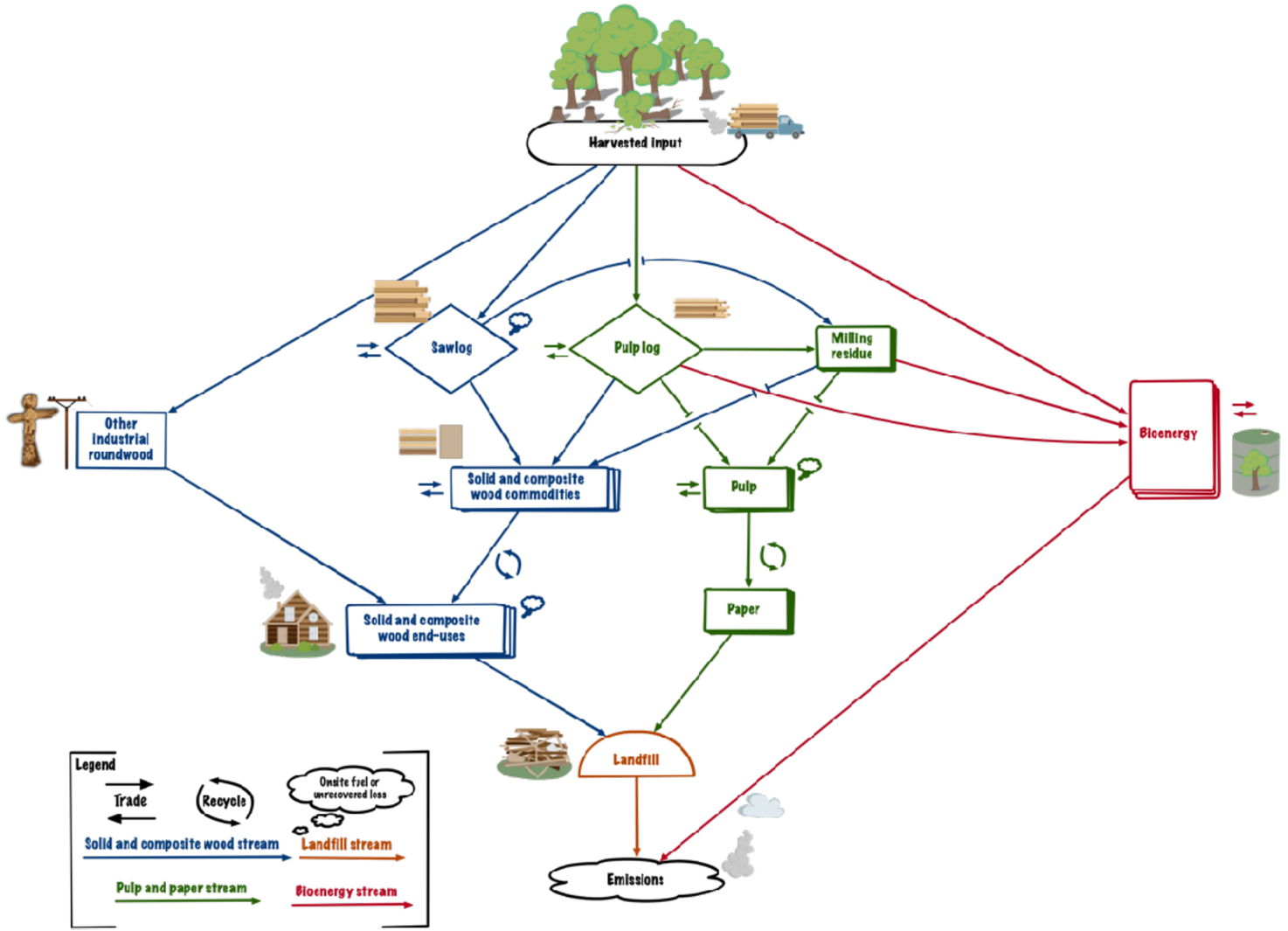
HWP Emissions: **33** (immediate) + **16** (delayed) $MtCO_2e$ $year^{-1}$

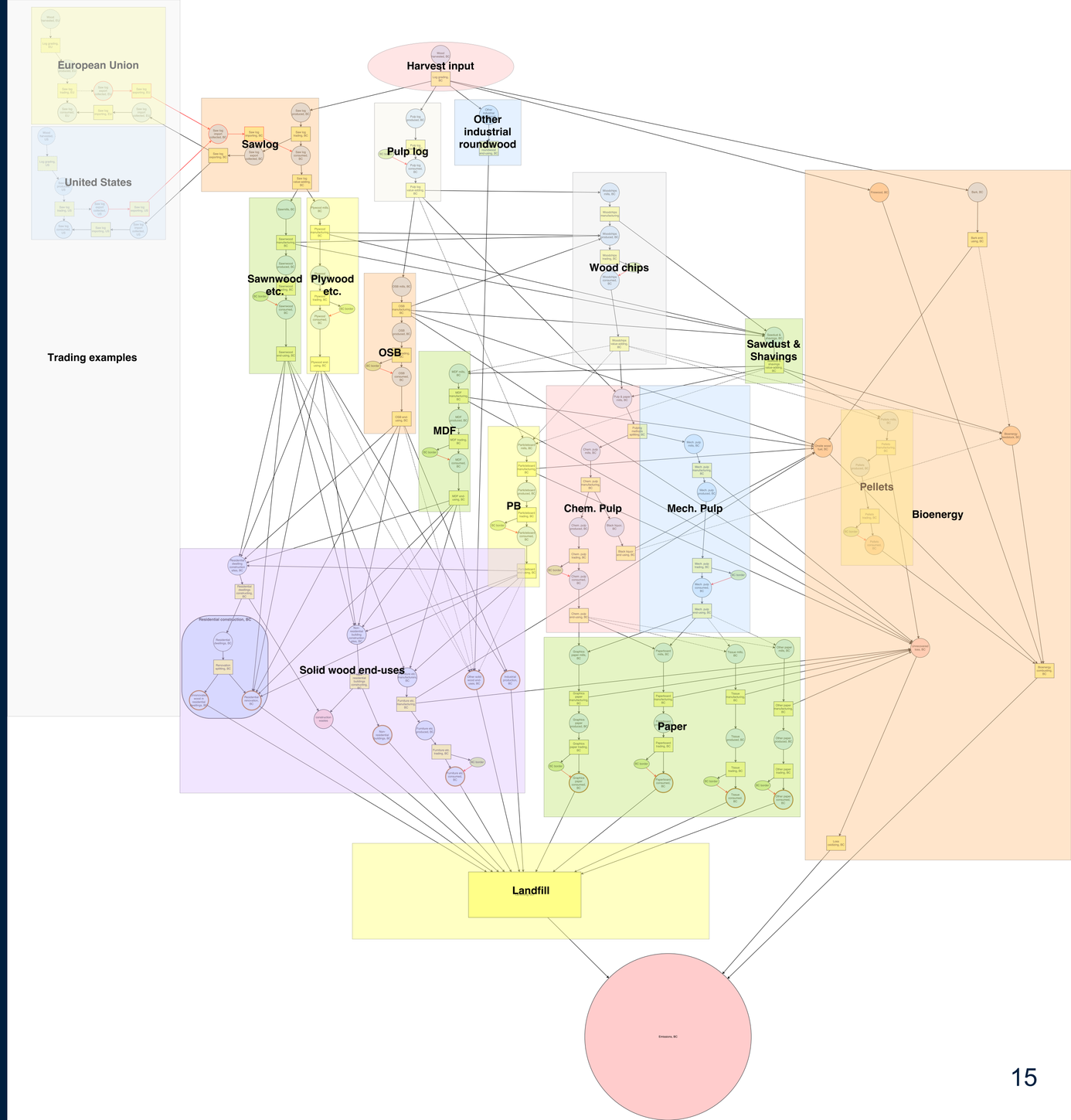
Harvested wood products carbon dynamics model



MitigAna structure

An example:

1 out of 6 jurisdictions



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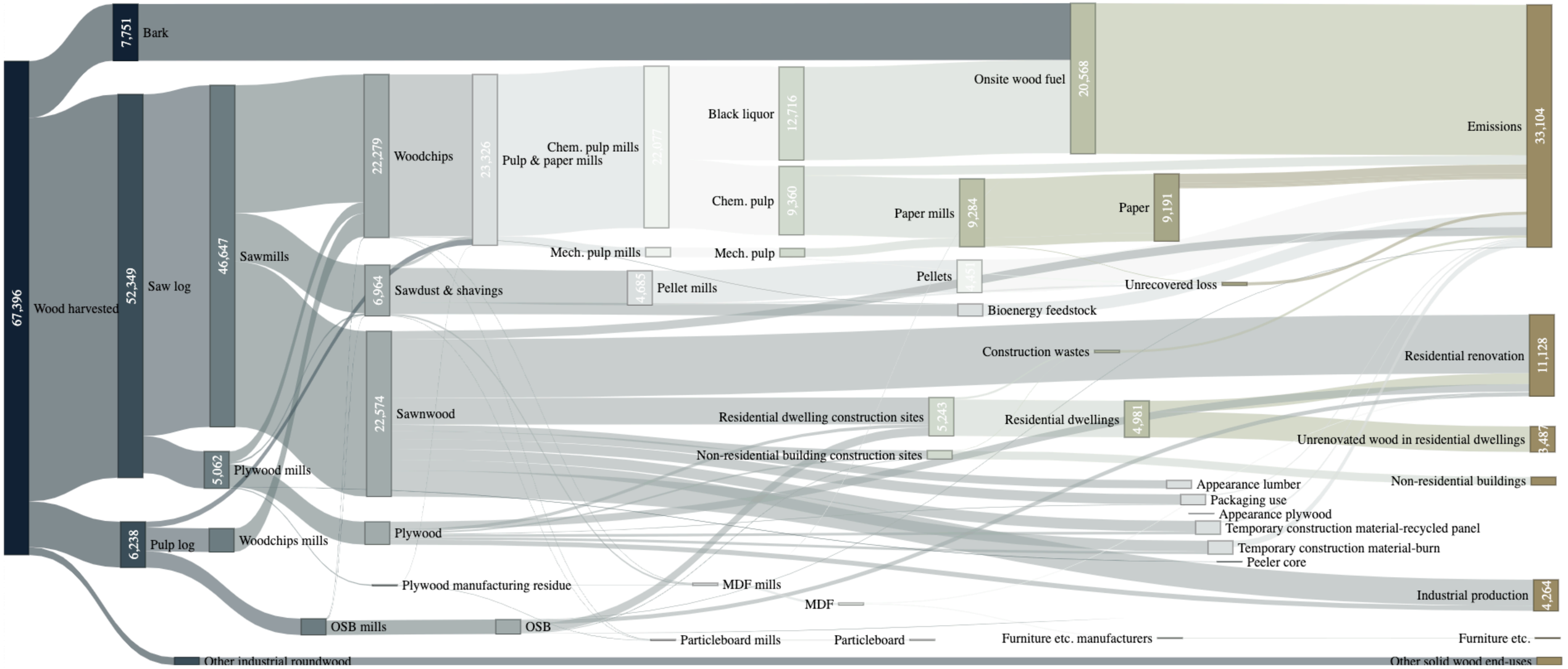


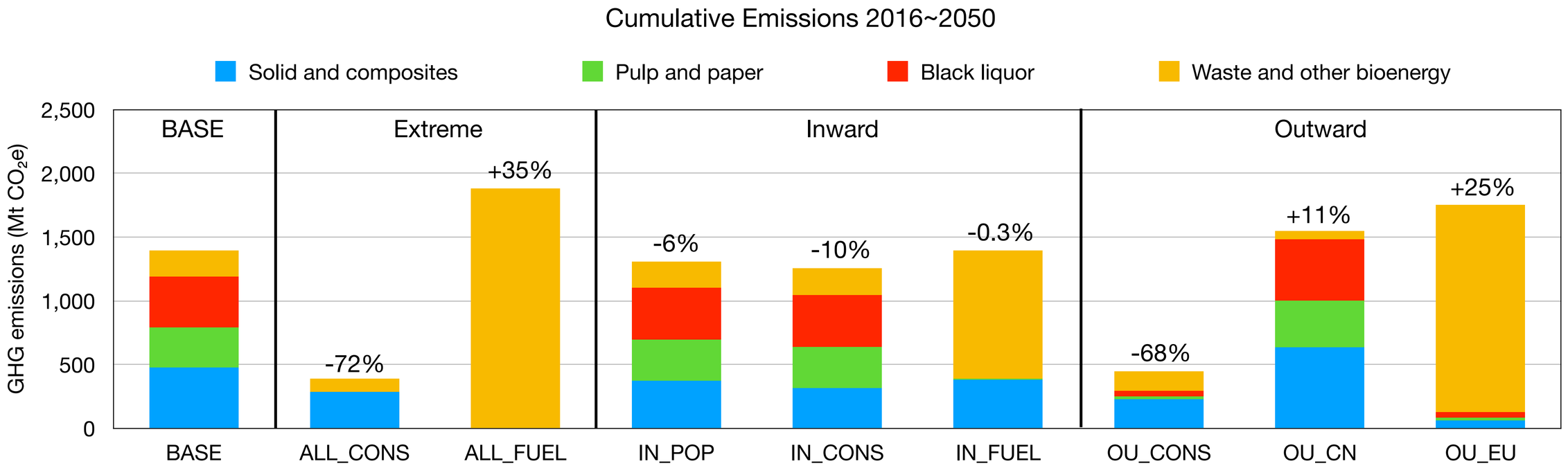
Unit: $ktCO_2e\ year^{-1}$

MitigAna output, 2016 flux in supply chain, w/o geo locations

Purpose

Quantitative assessment of alternative wood use scenarios

Results highlights: carbon emission and storage



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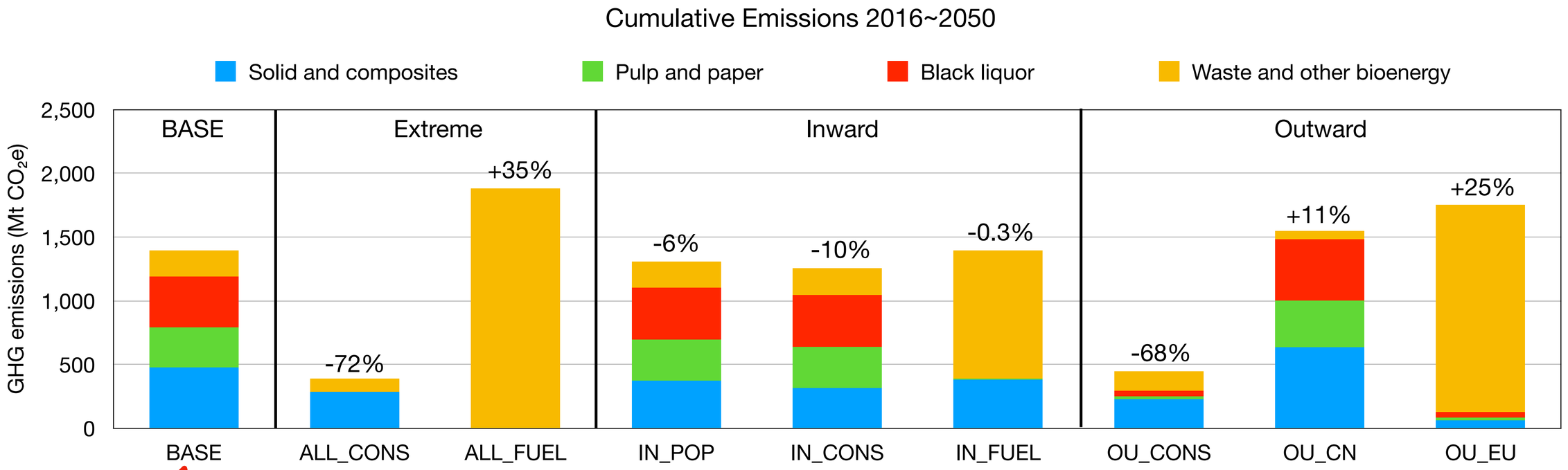
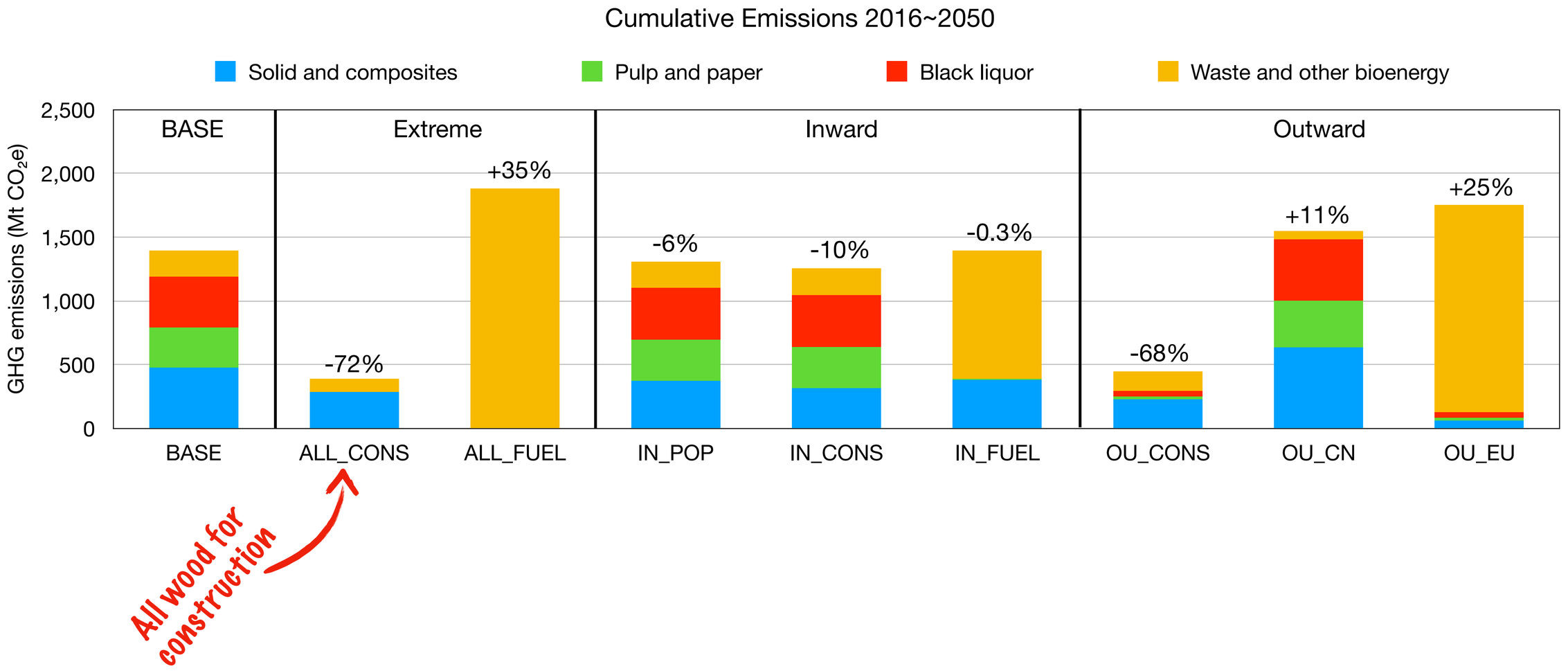


Business-as-usual baseline scenario

Results highlights: carbon emission and storage



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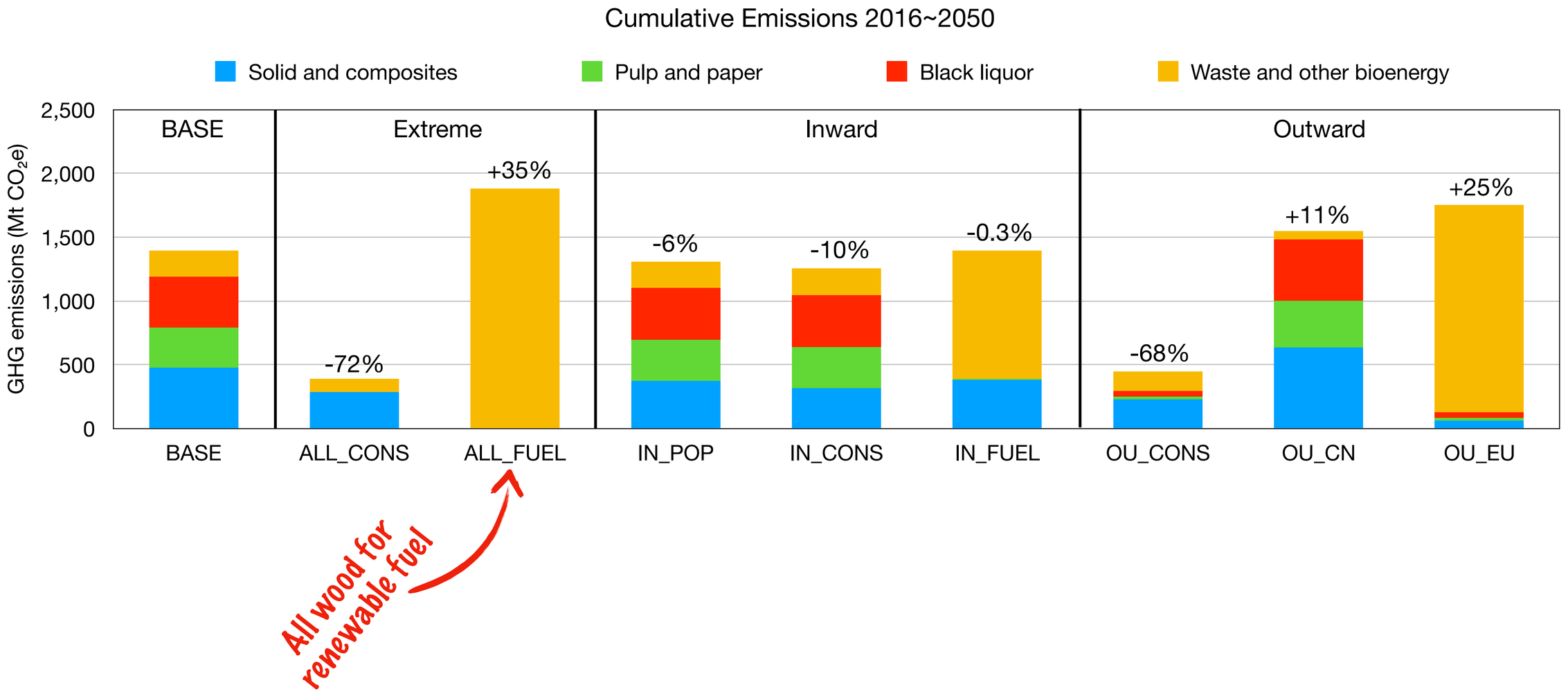

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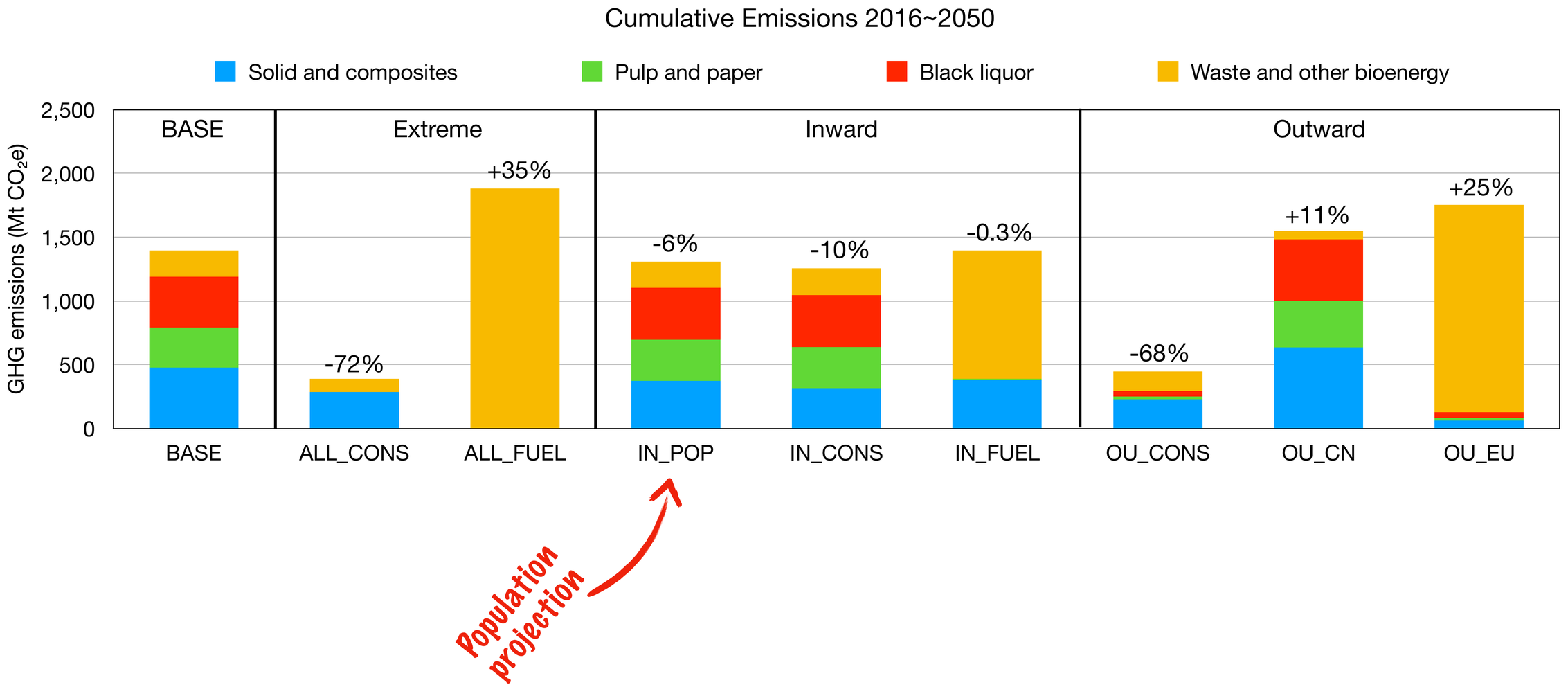

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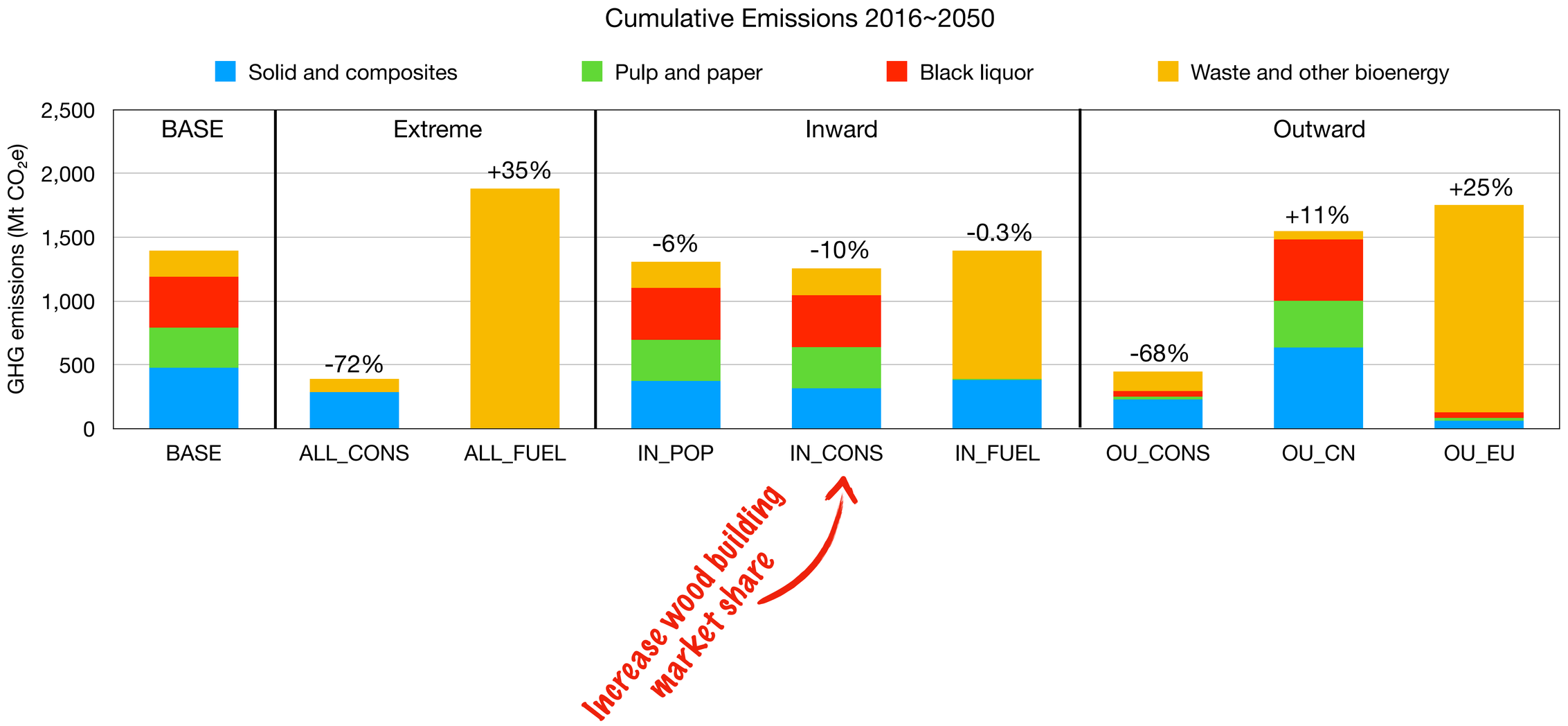

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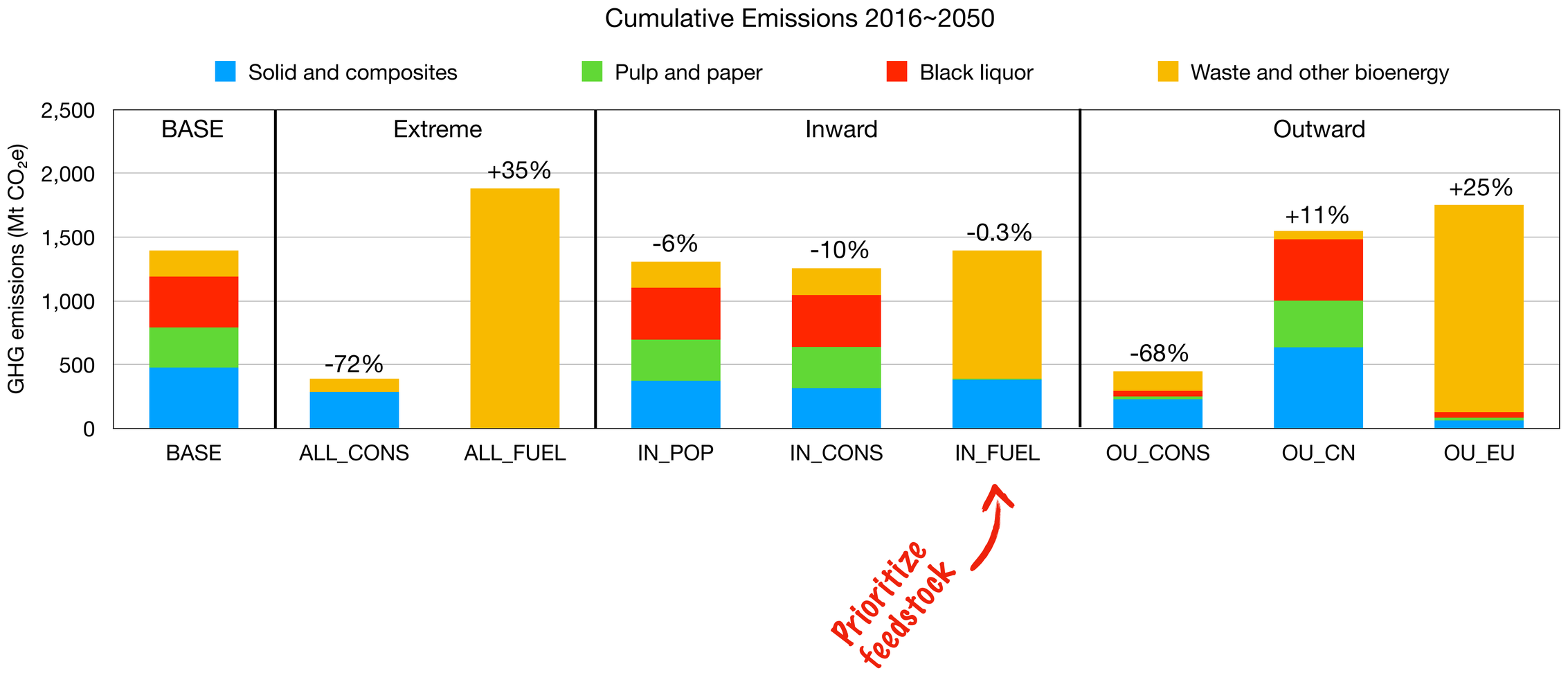

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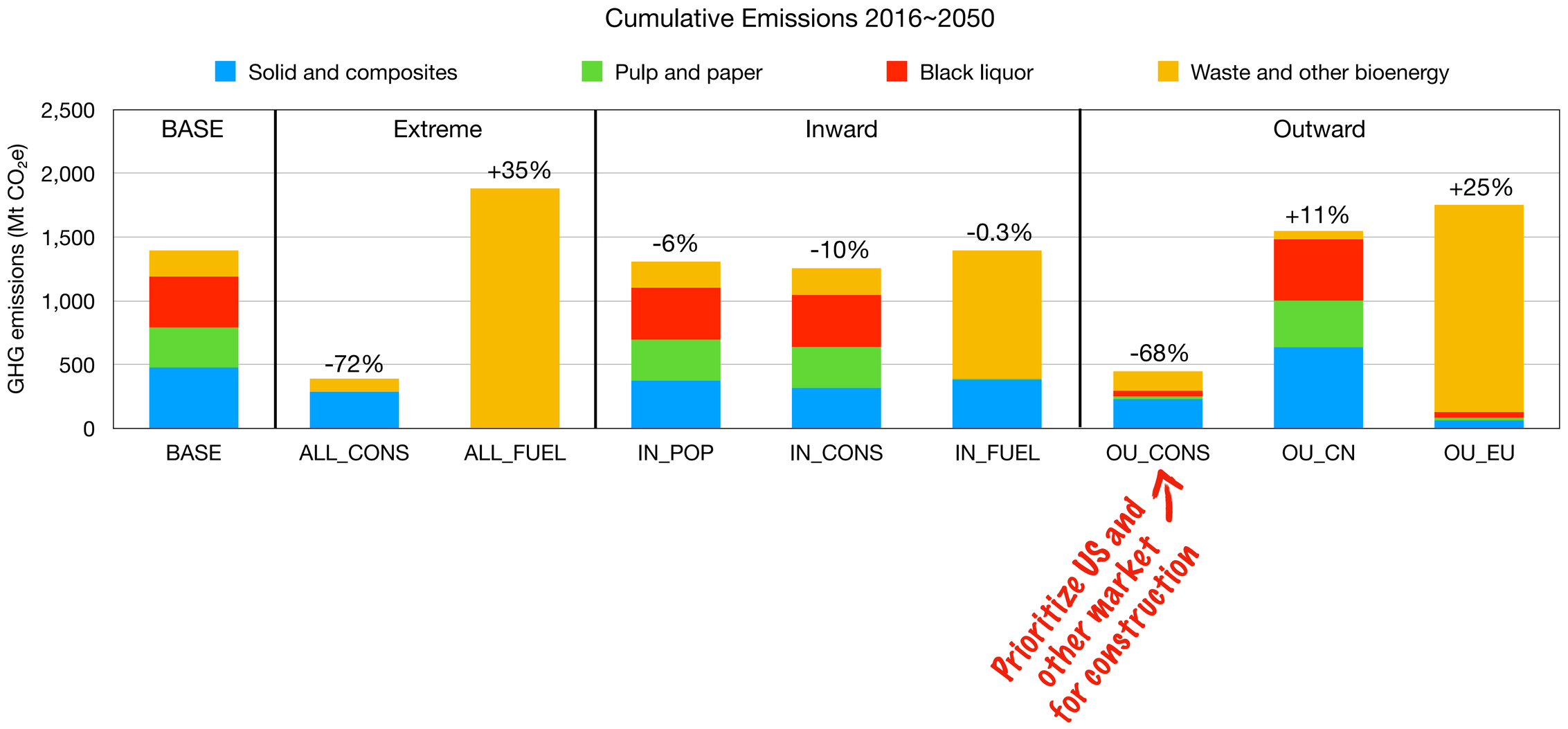

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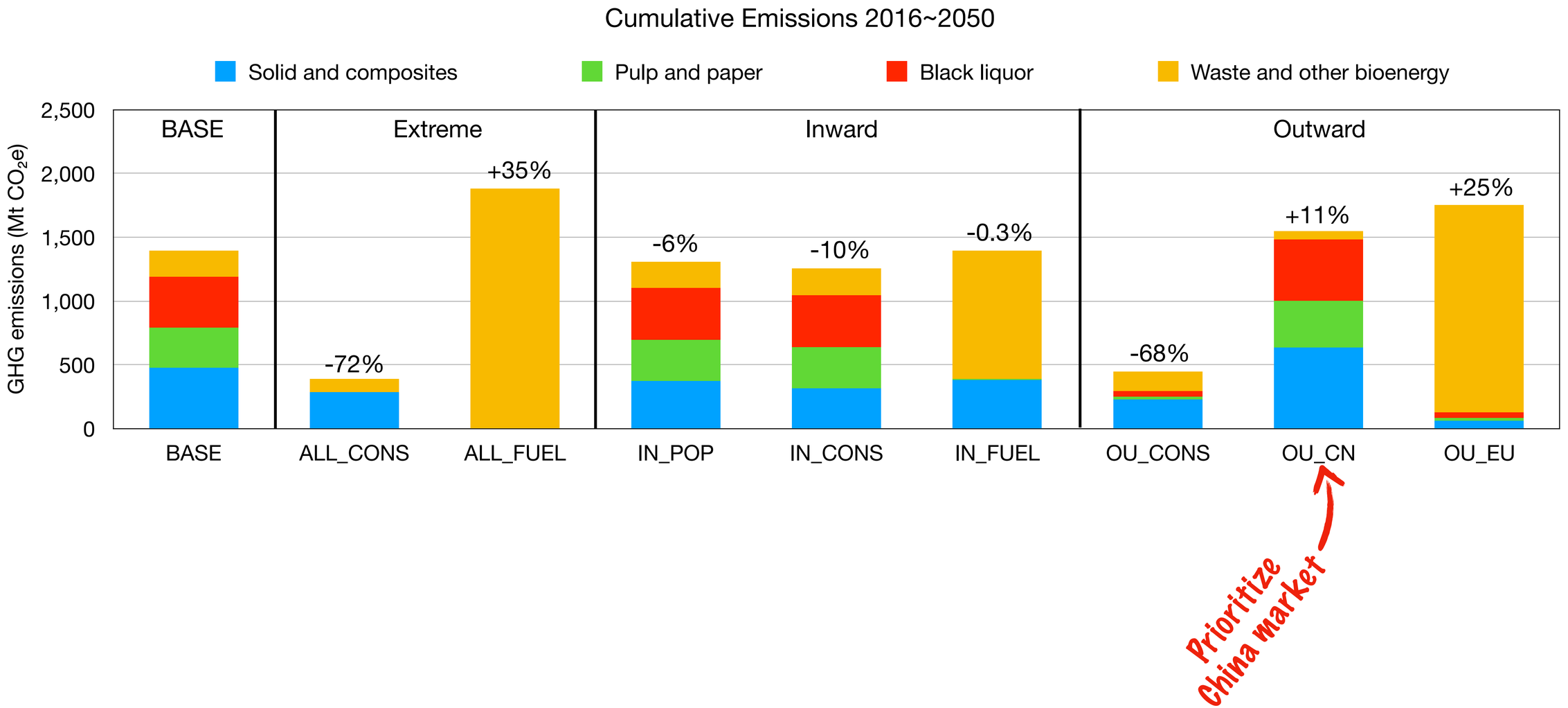

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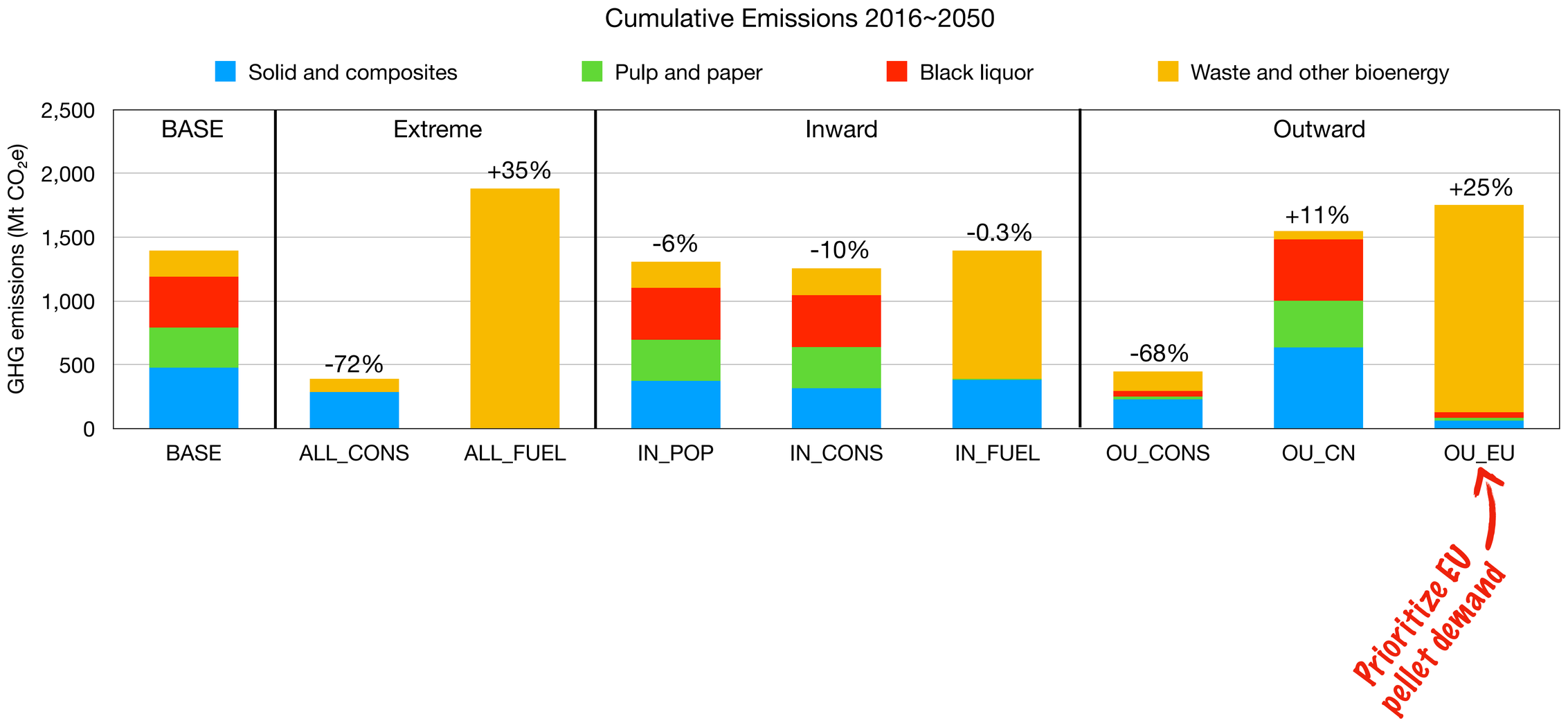

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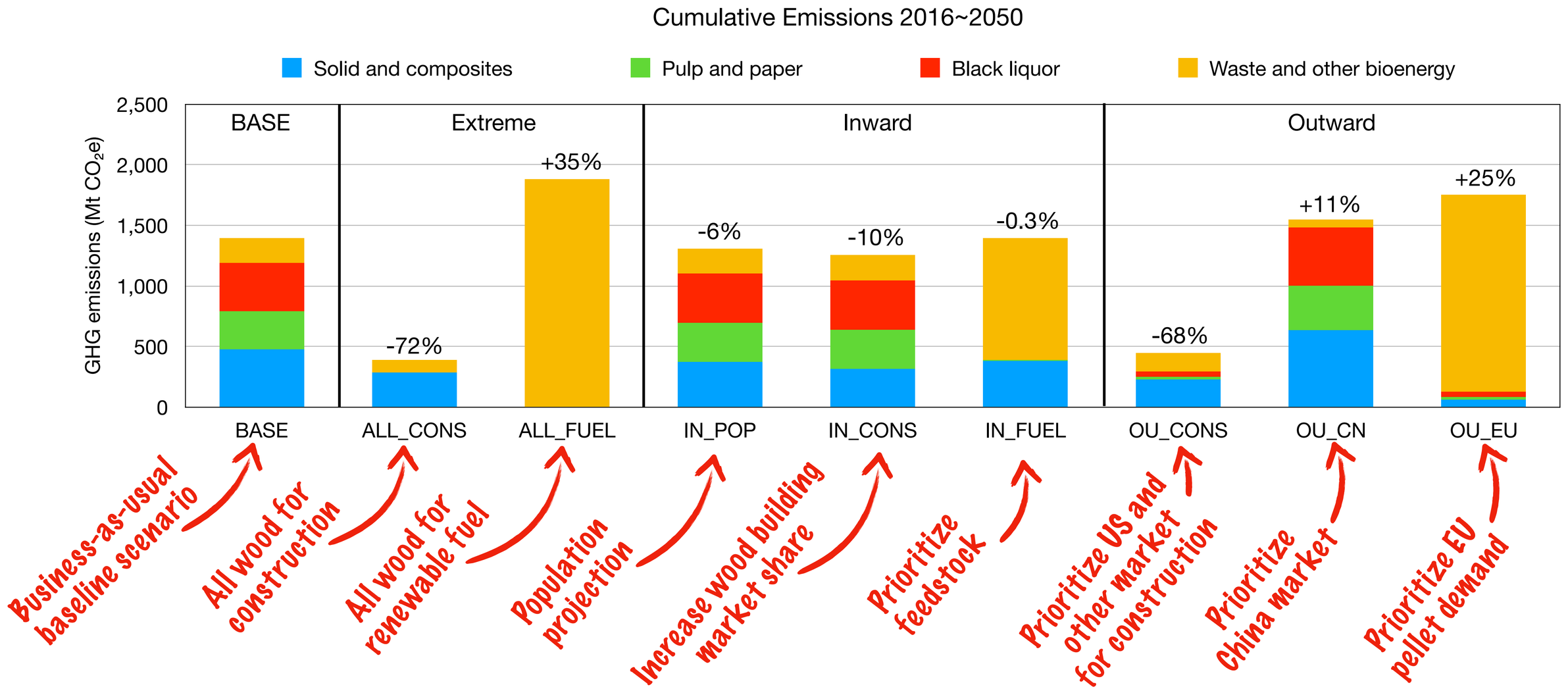

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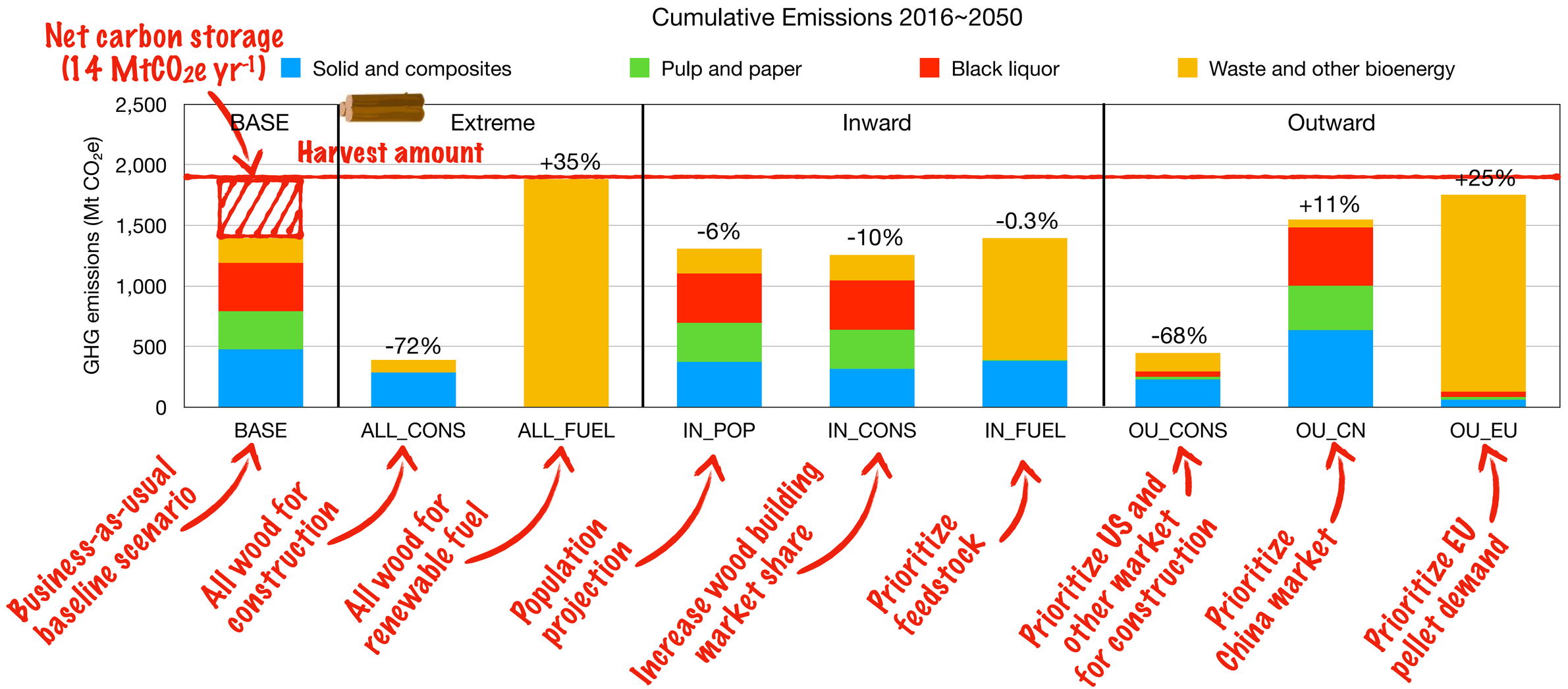

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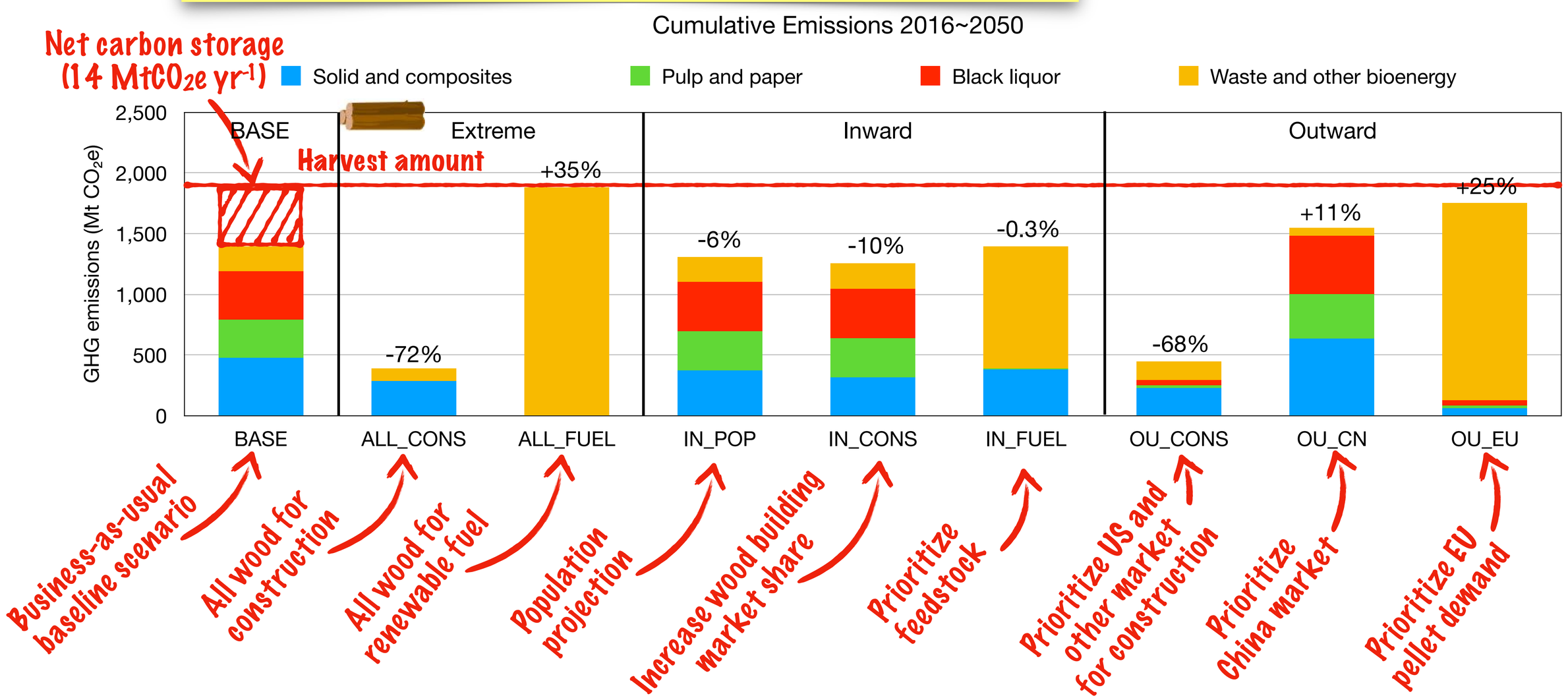

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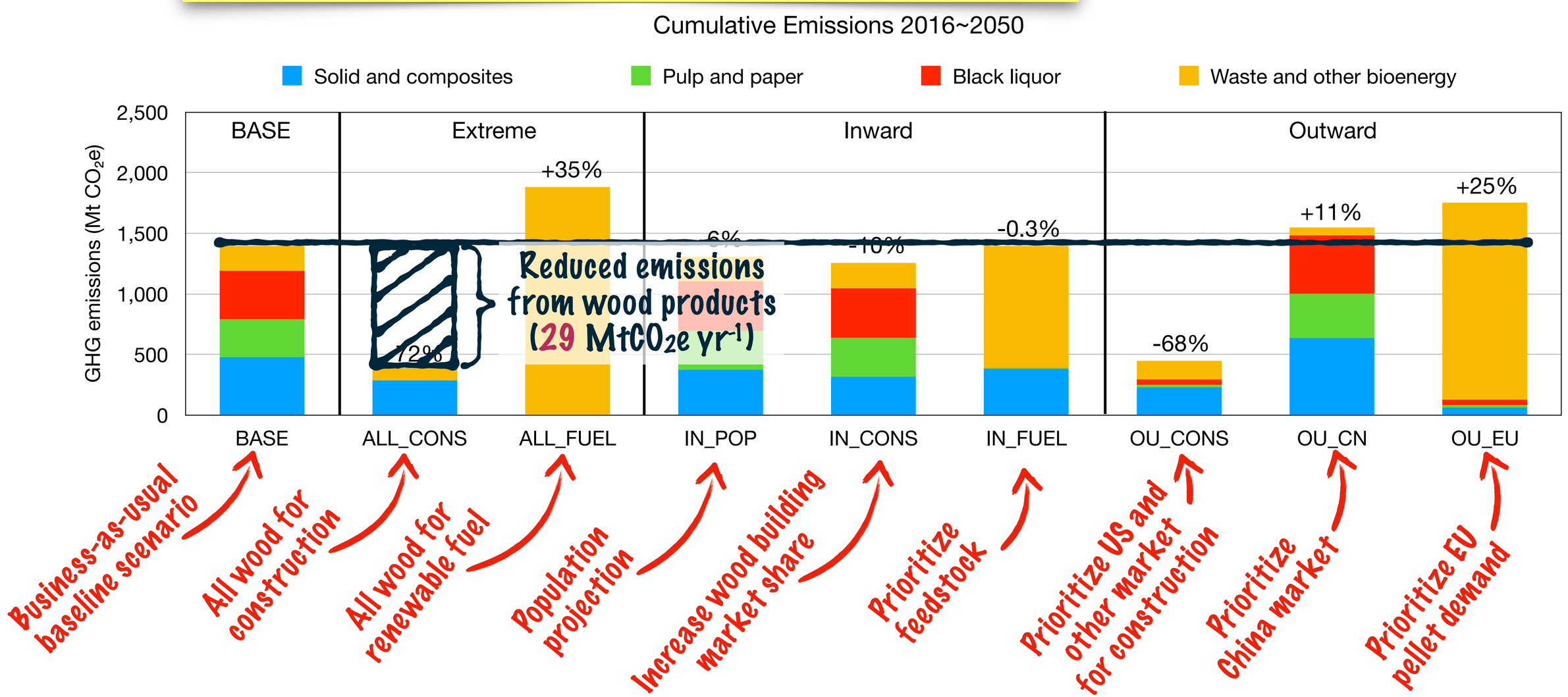

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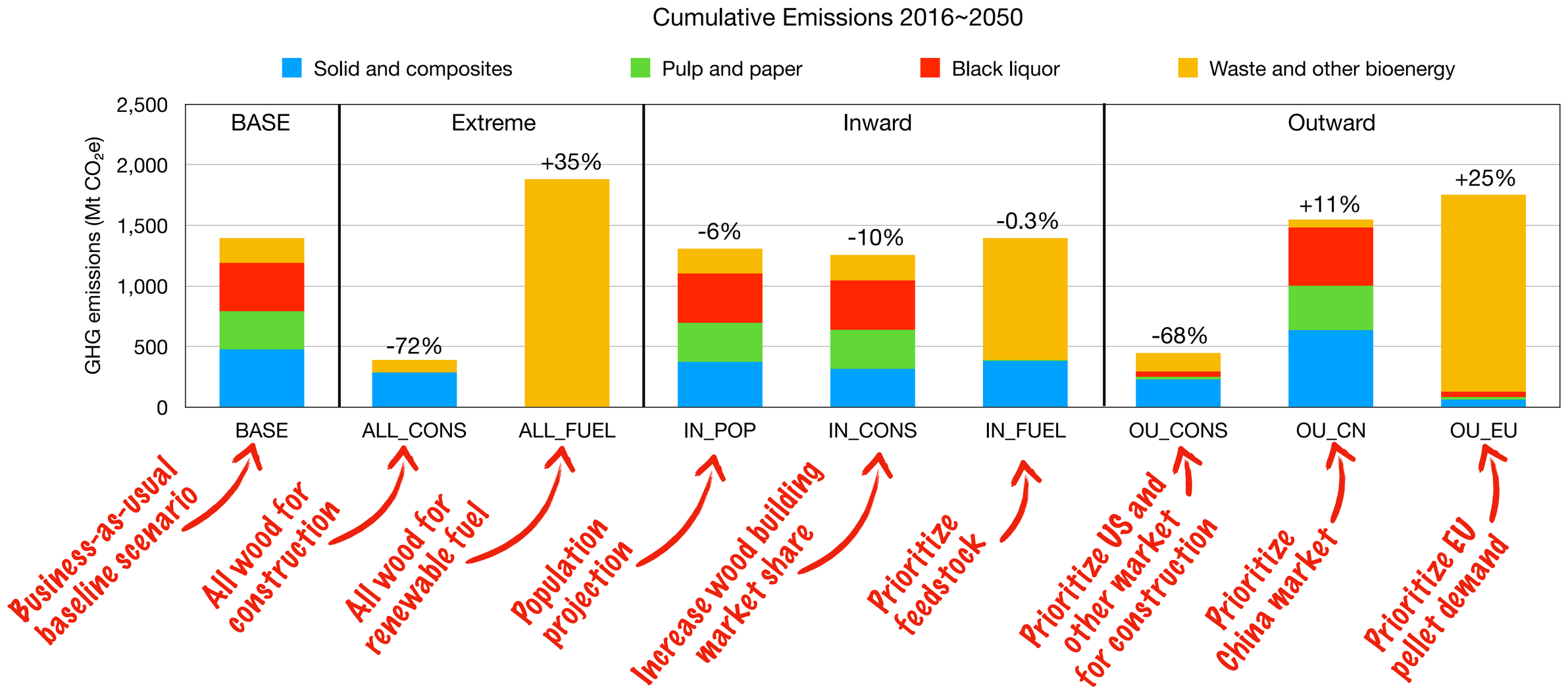

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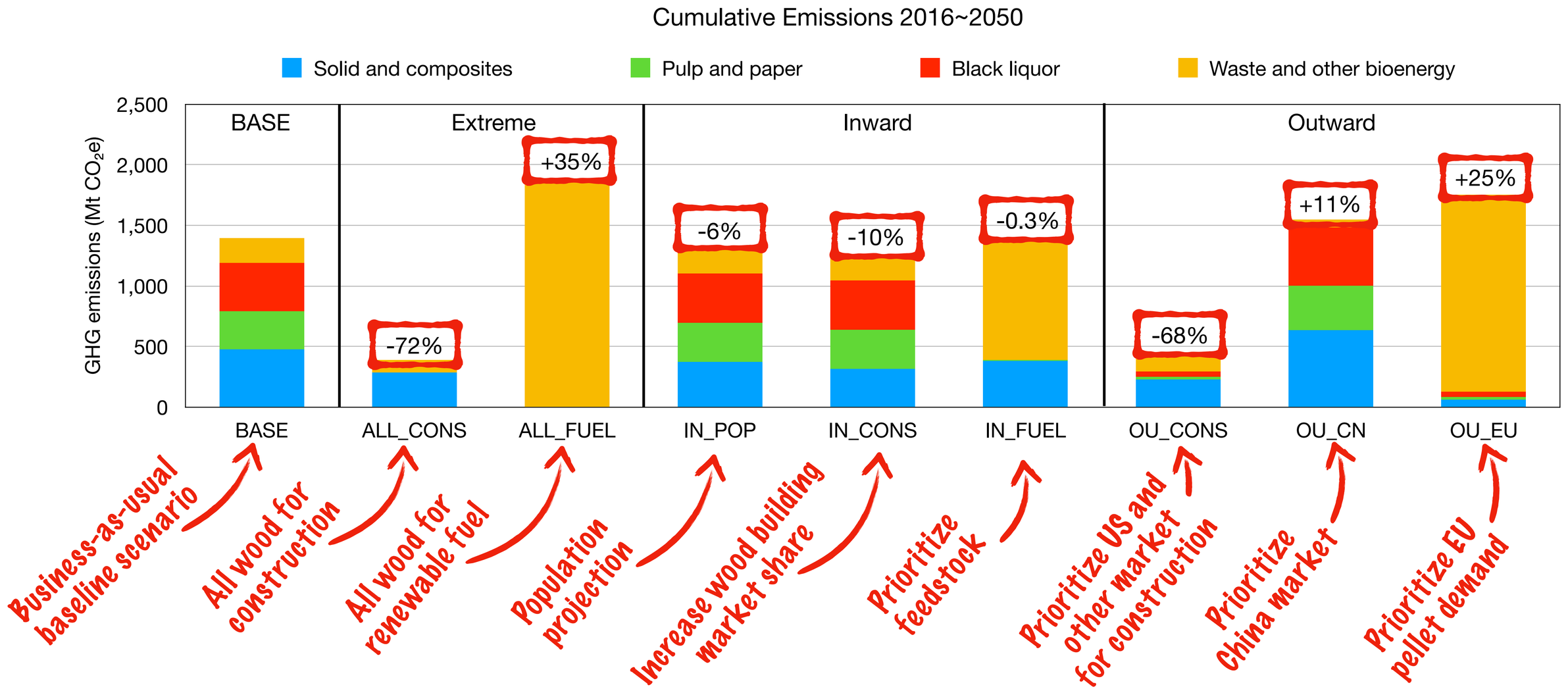

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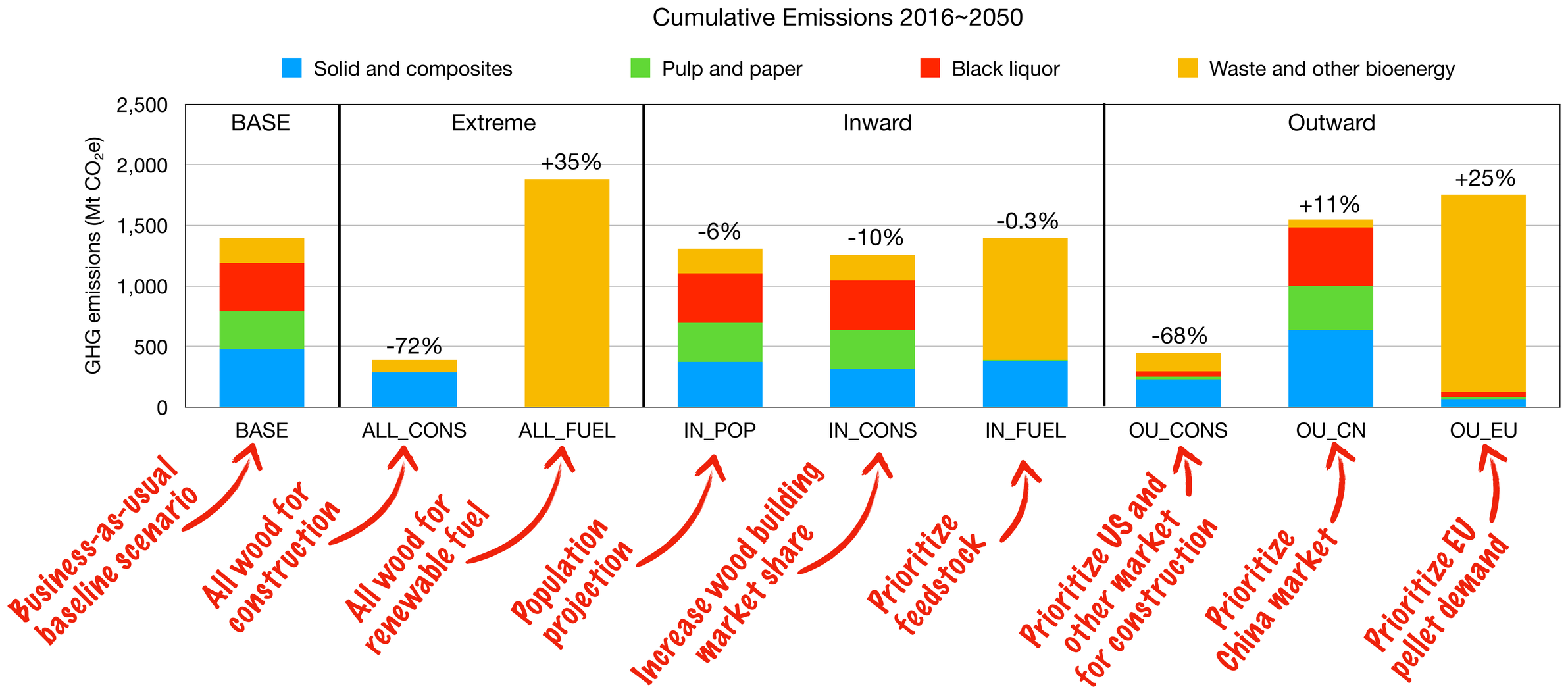

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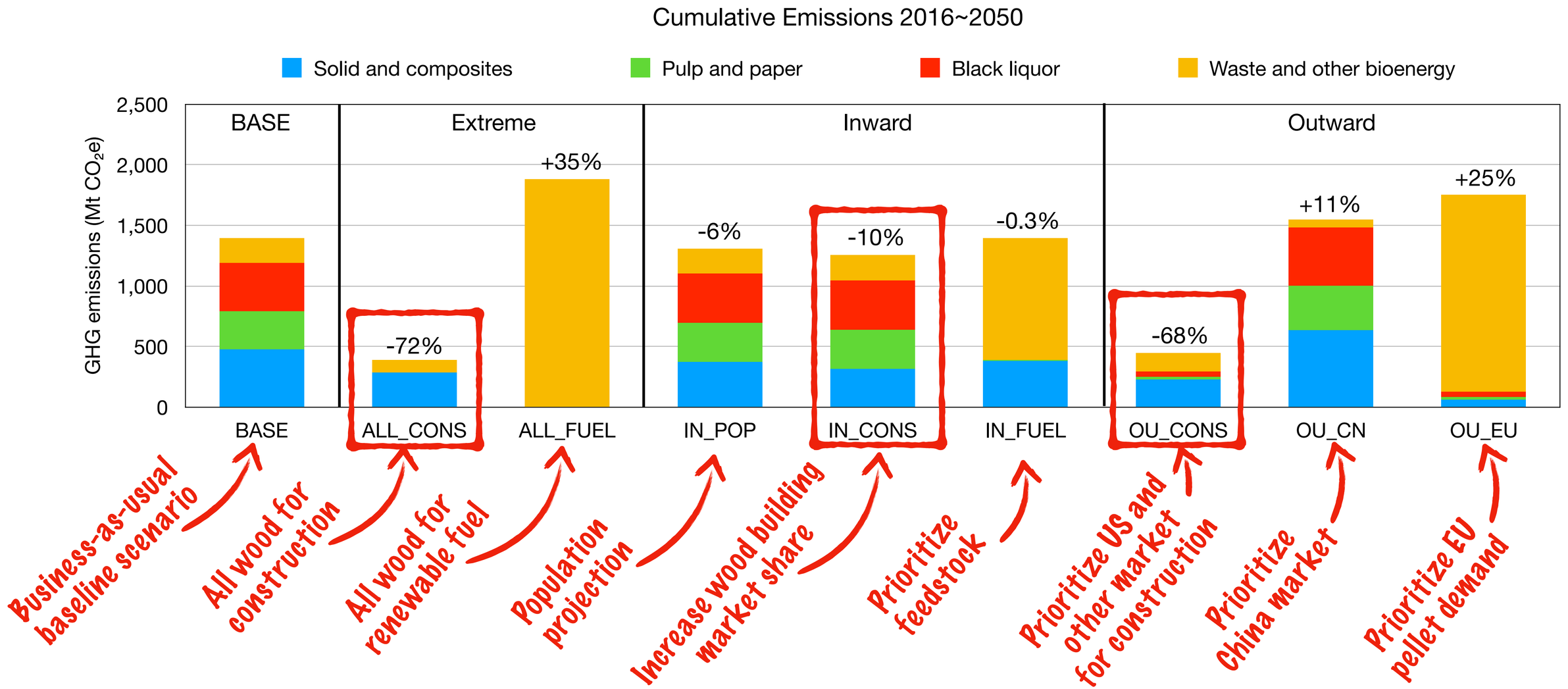

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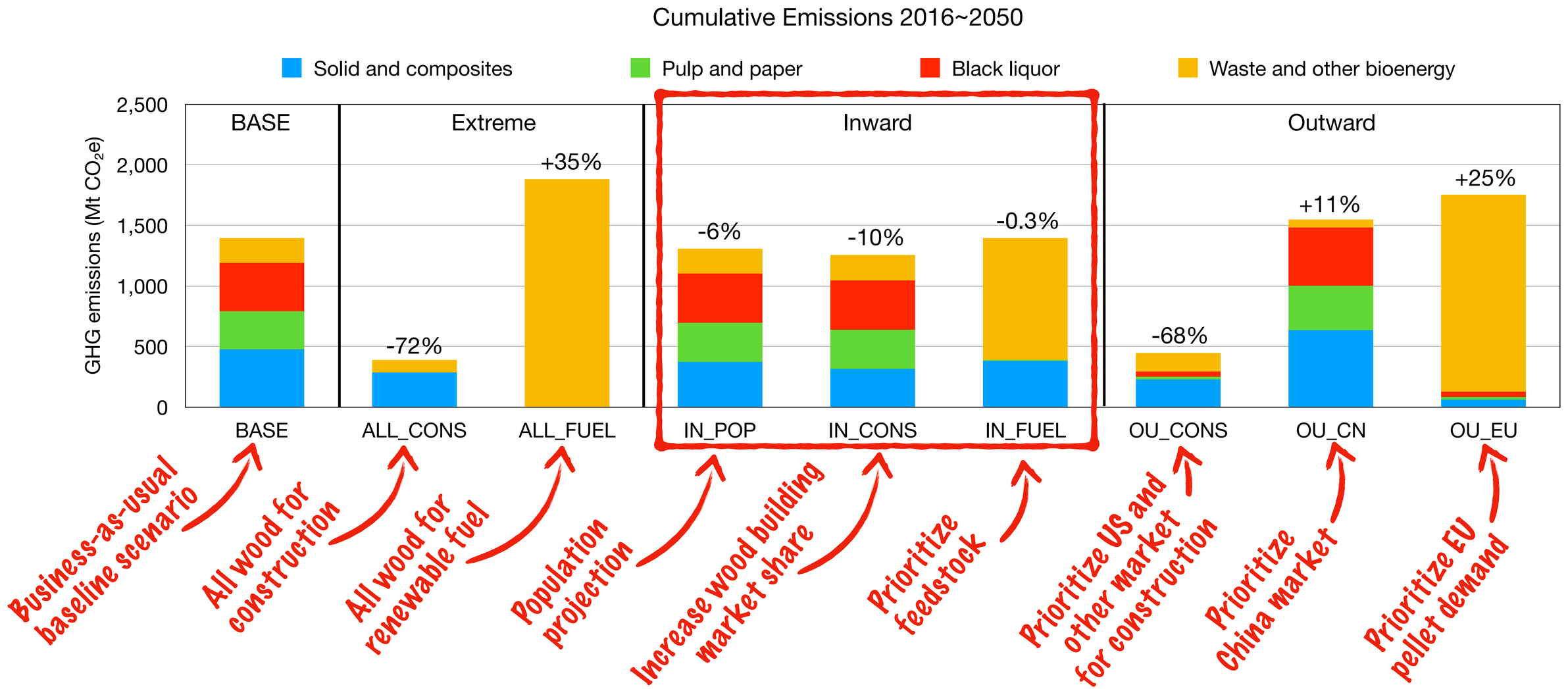

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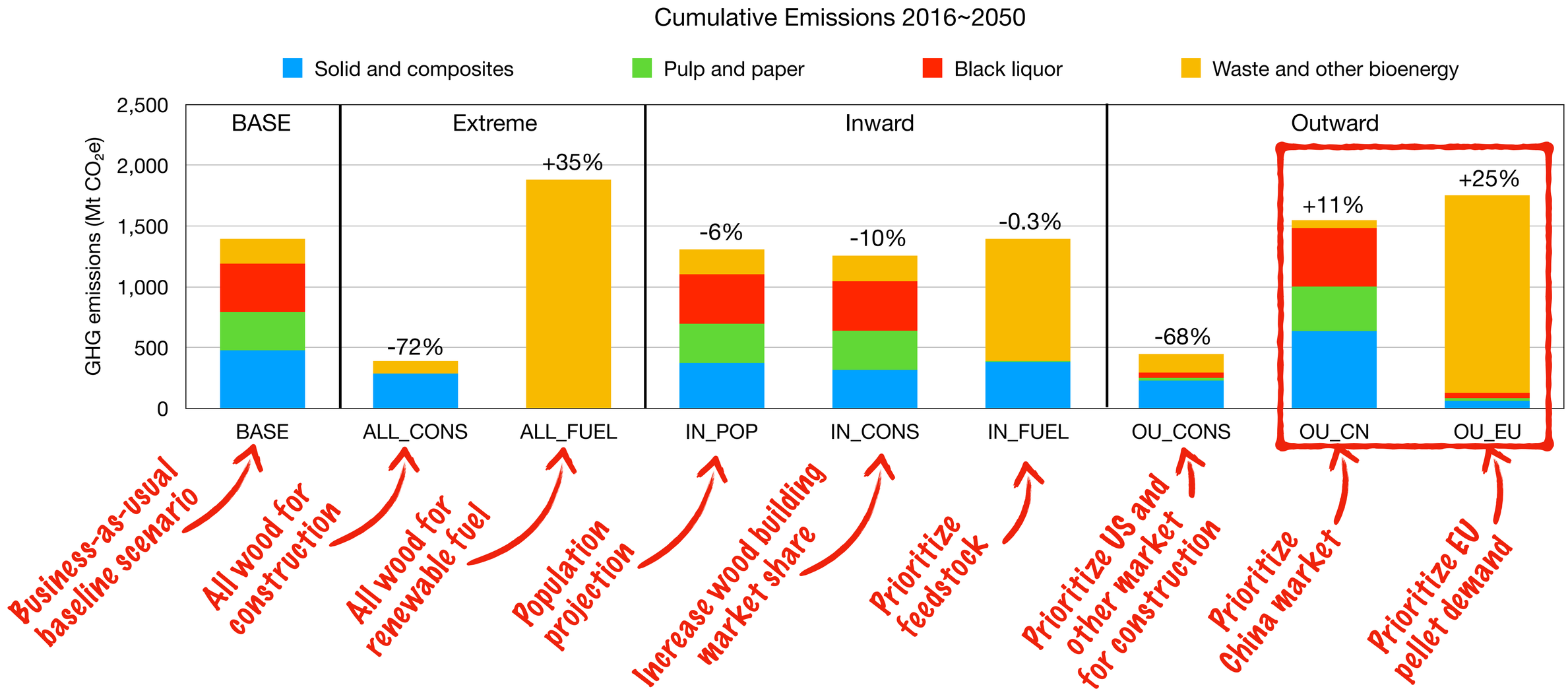

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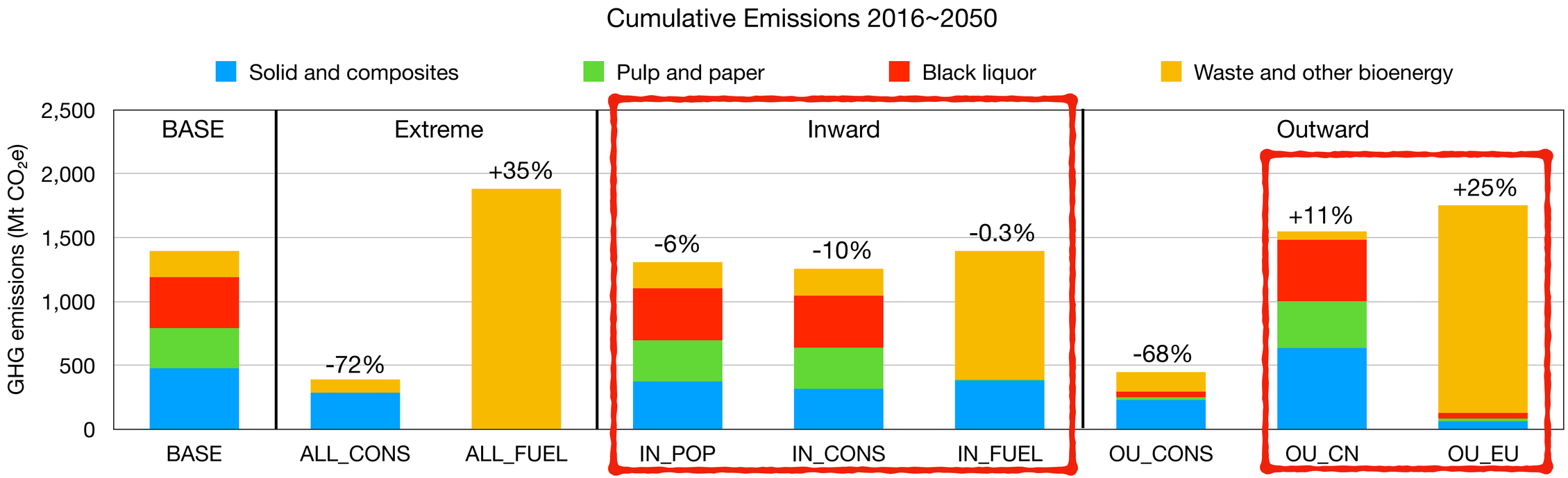
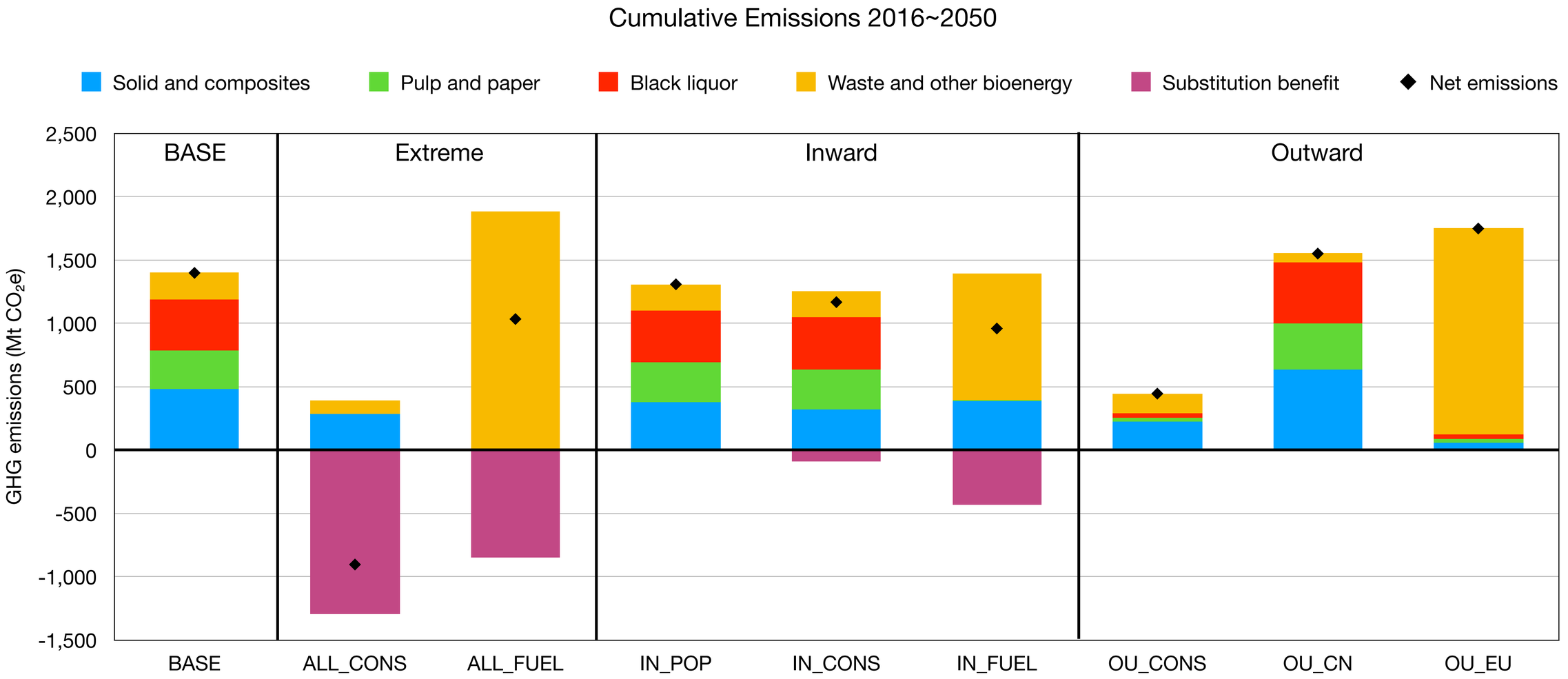


» Construction-focused bioeconomy: highest biogenic emission reductions in HWP

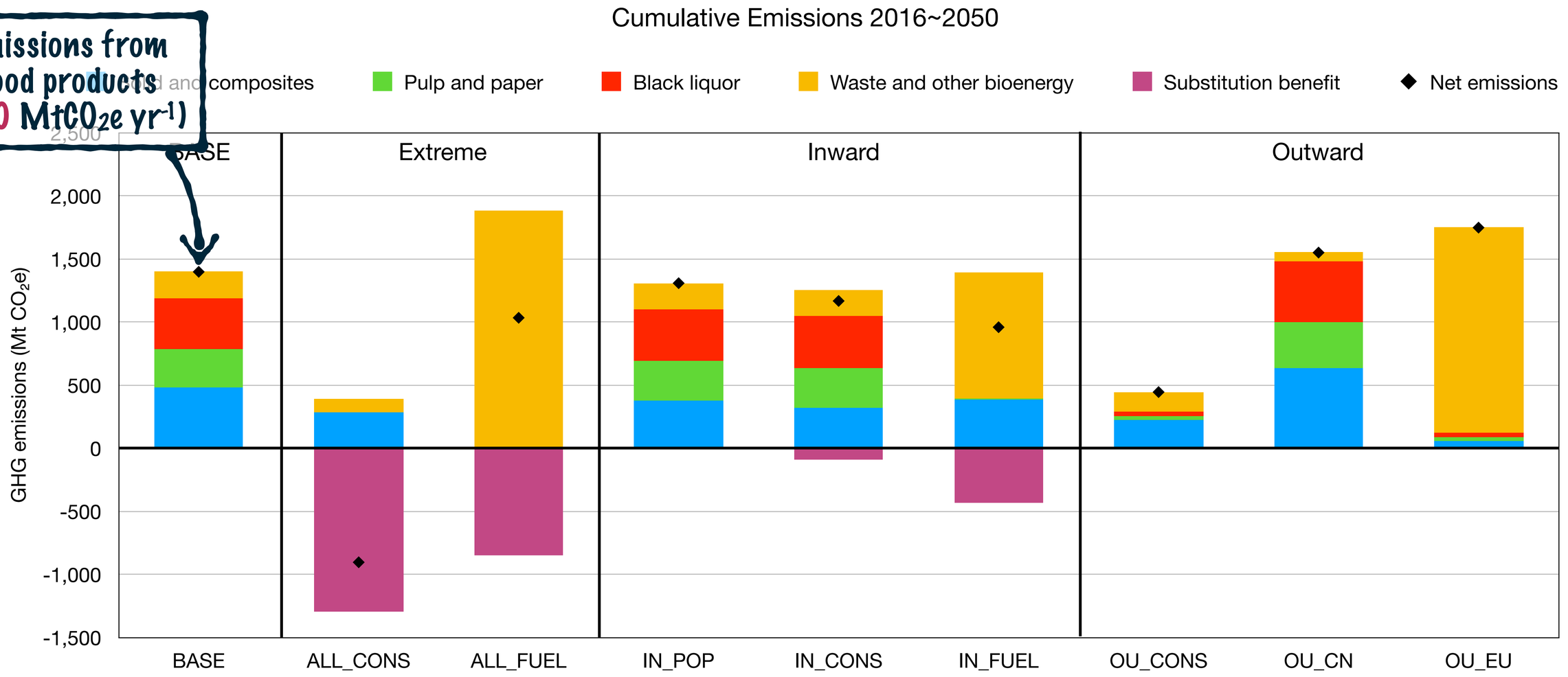
» Consume biomass domestically and only export wood for long-lived purposes, rather than short-lived applications

Results highlights: C emission, storage and substitution



Results highlights: C emission, storage and substitution

Emissions from wood products (40 $MtCO_2e\ yr^{-1}$)



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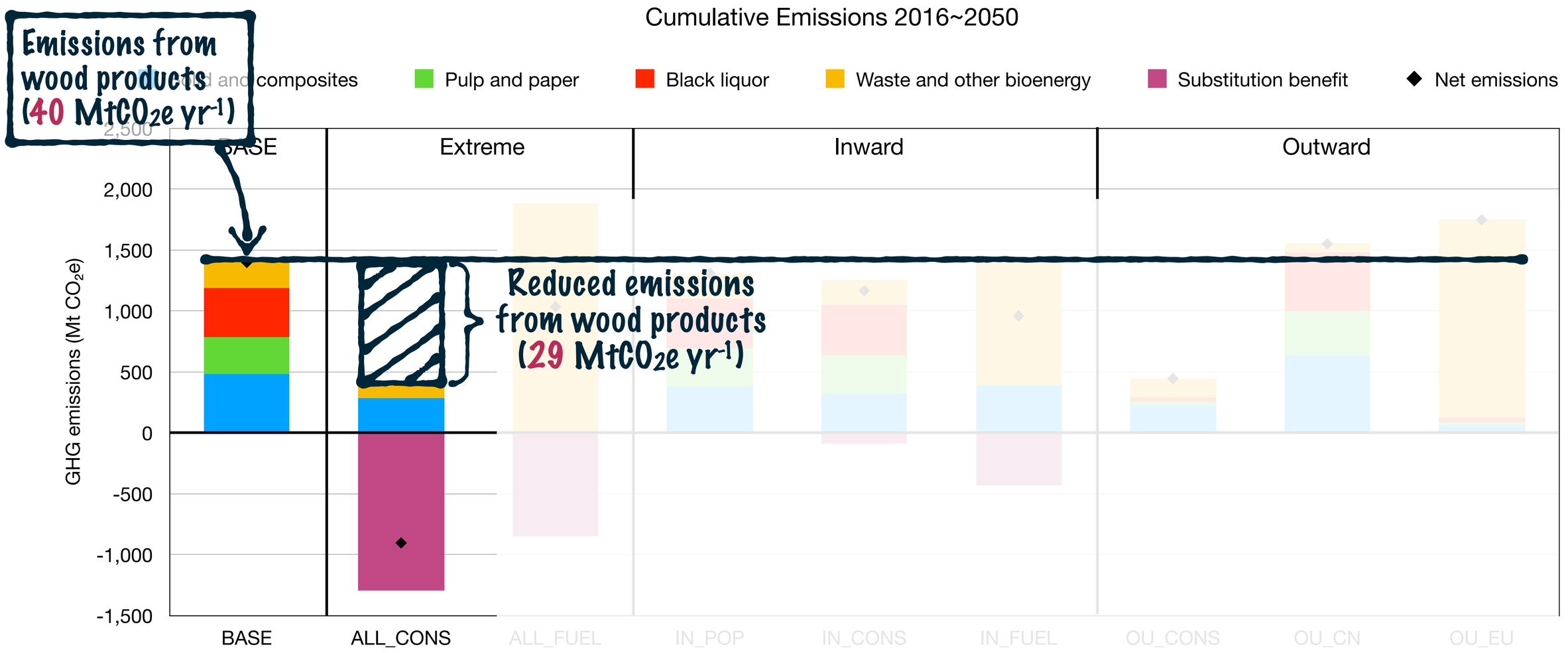

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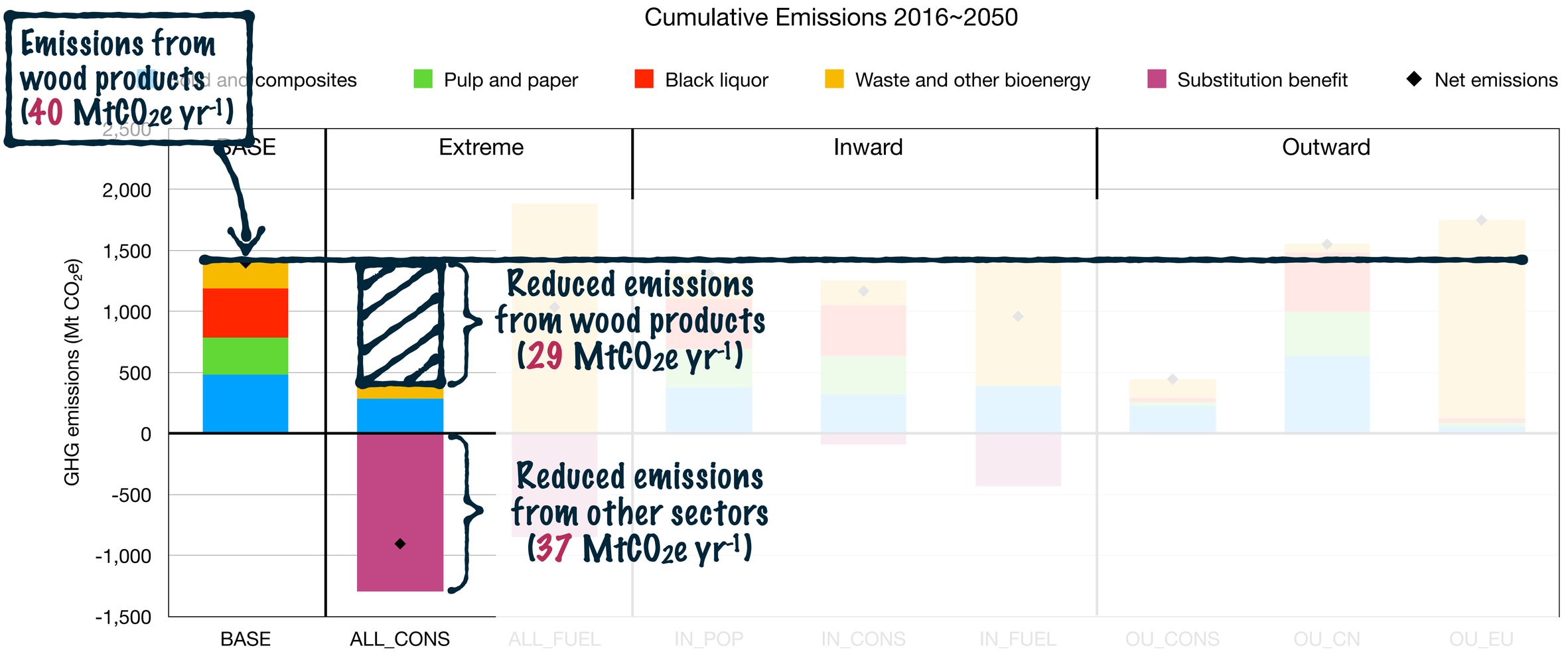

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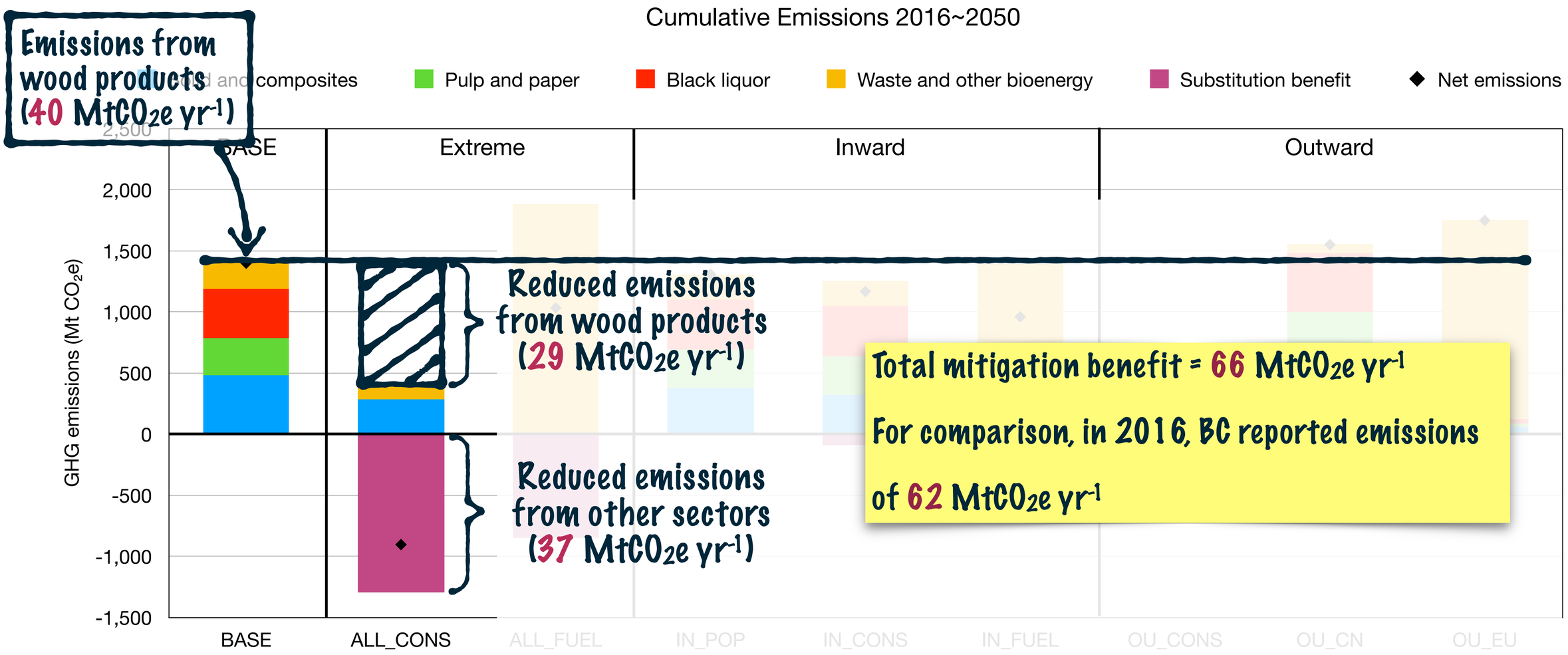

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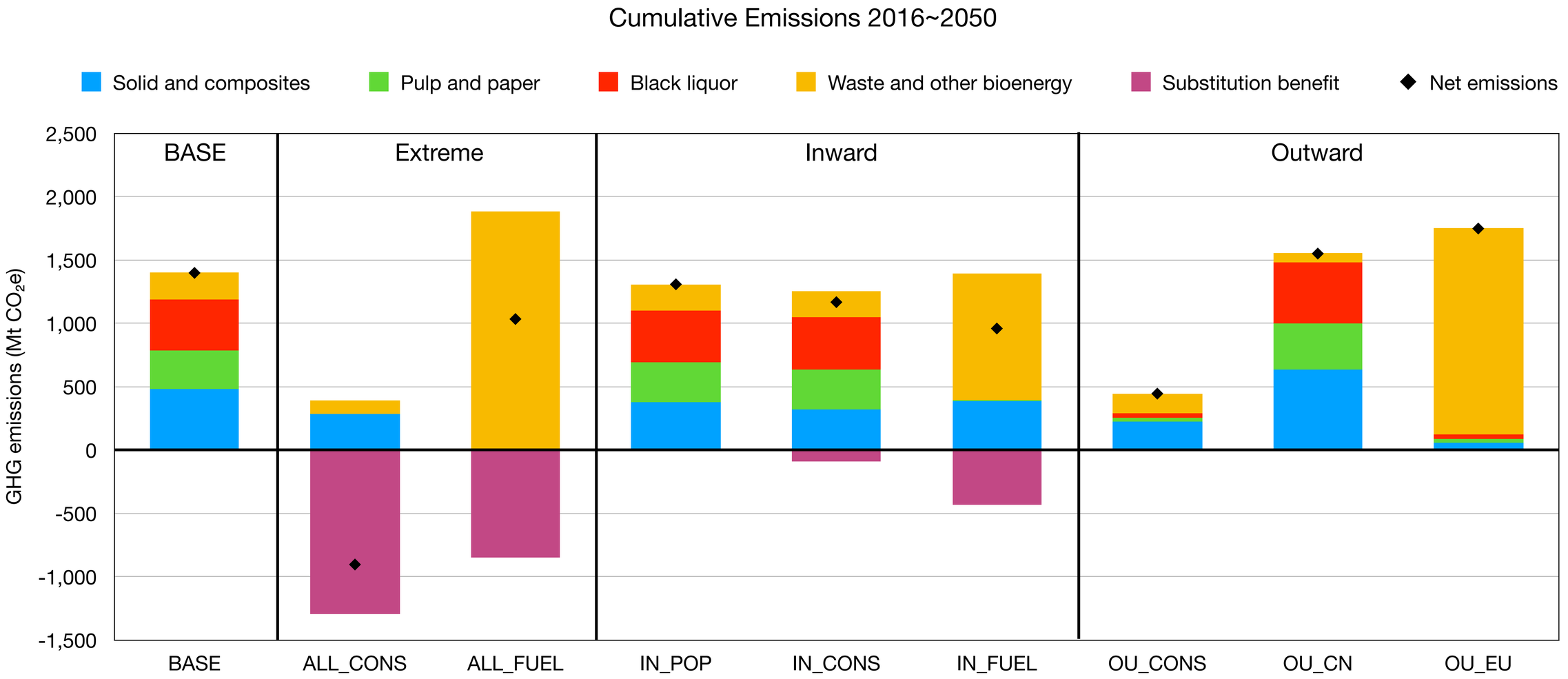

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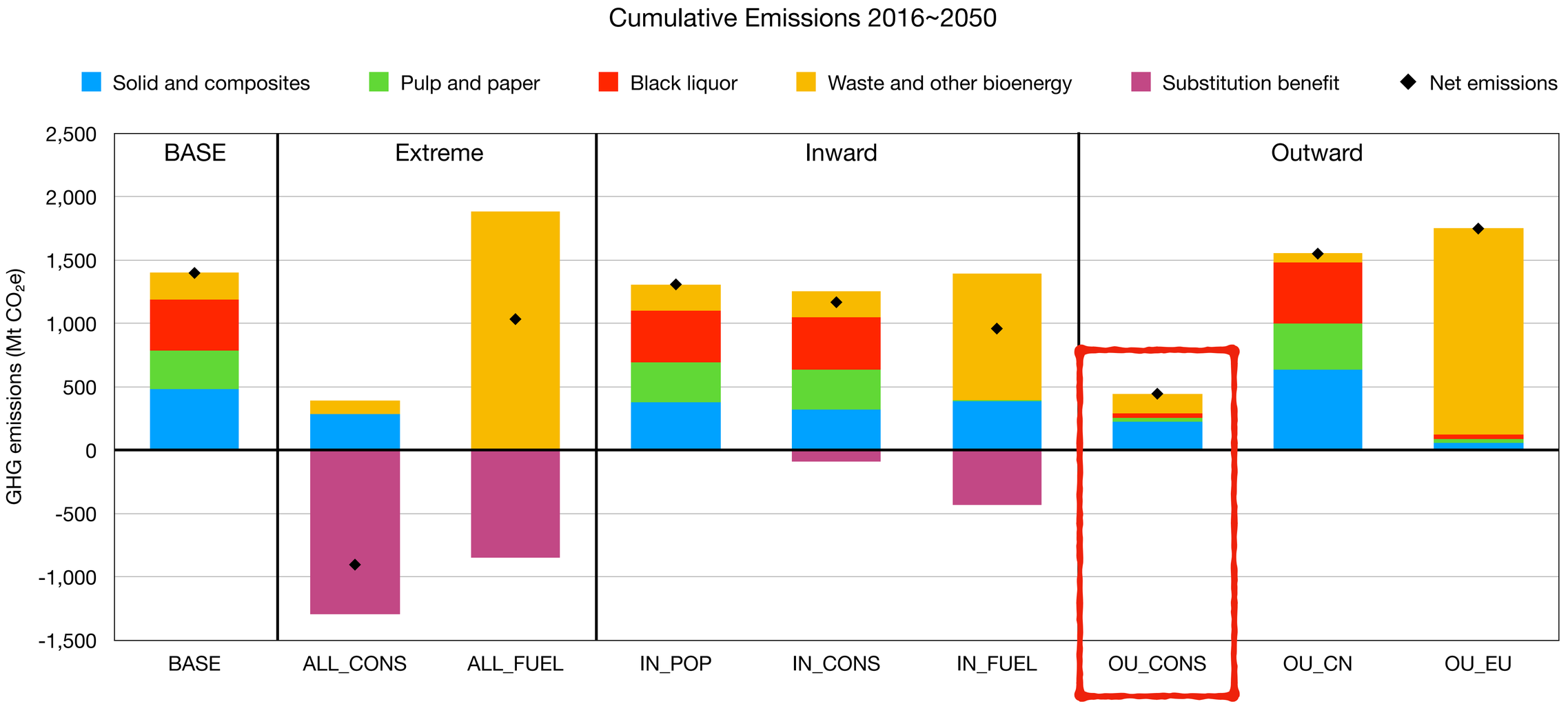

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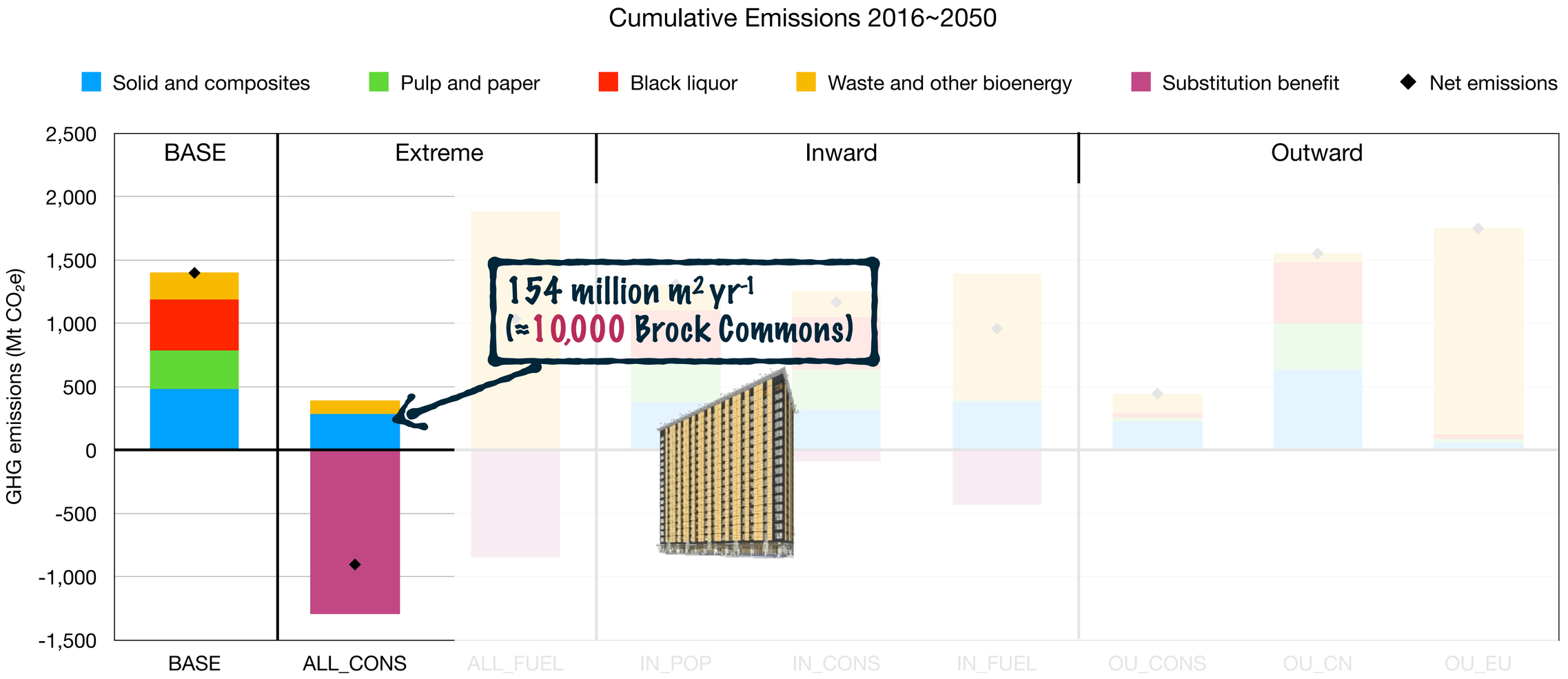
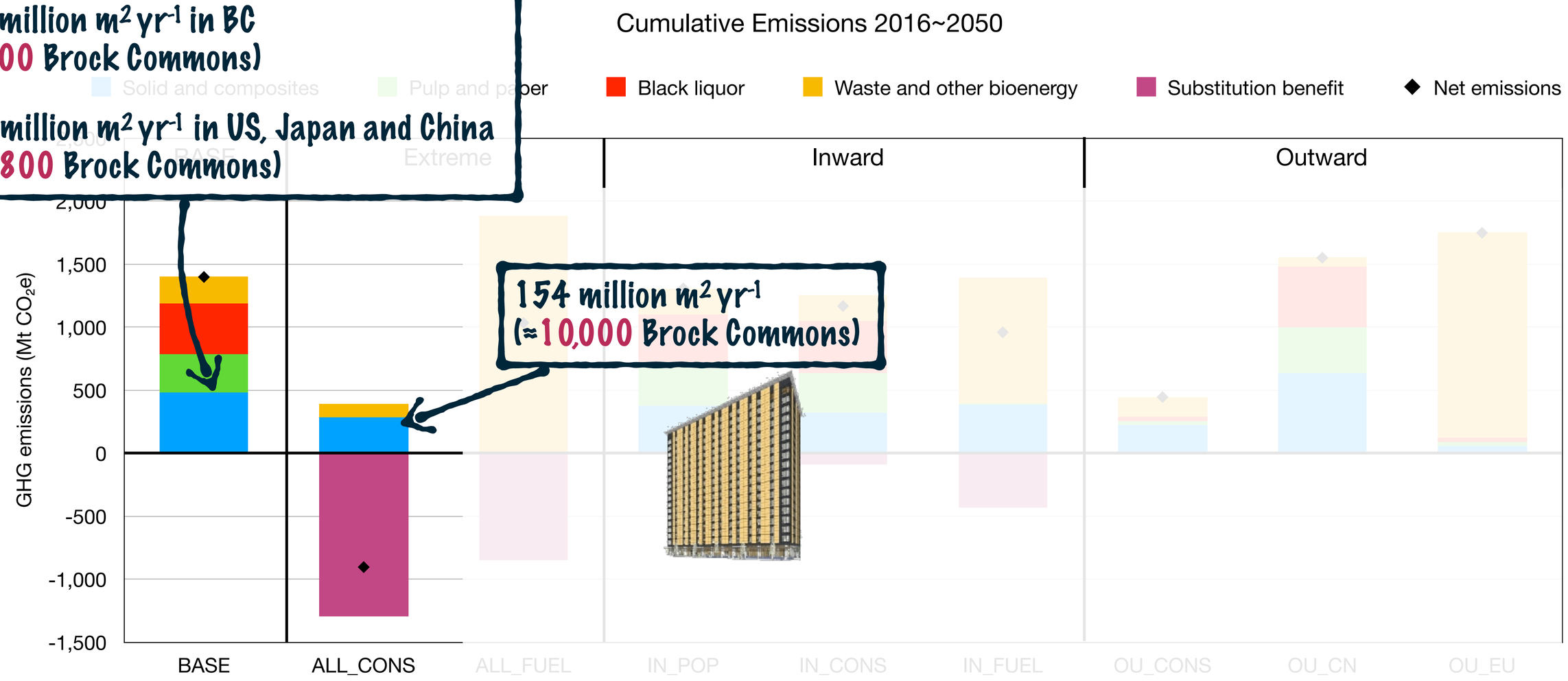


Results highlights: C emission, storage and substitution

3.4 million $m^2\ yr^{-1}$ in BC
(≈200 Brock Commons)

27 million $m^2\ yr^{-1}$ in US, Japan and China
(≈1,800 Brock Commons)



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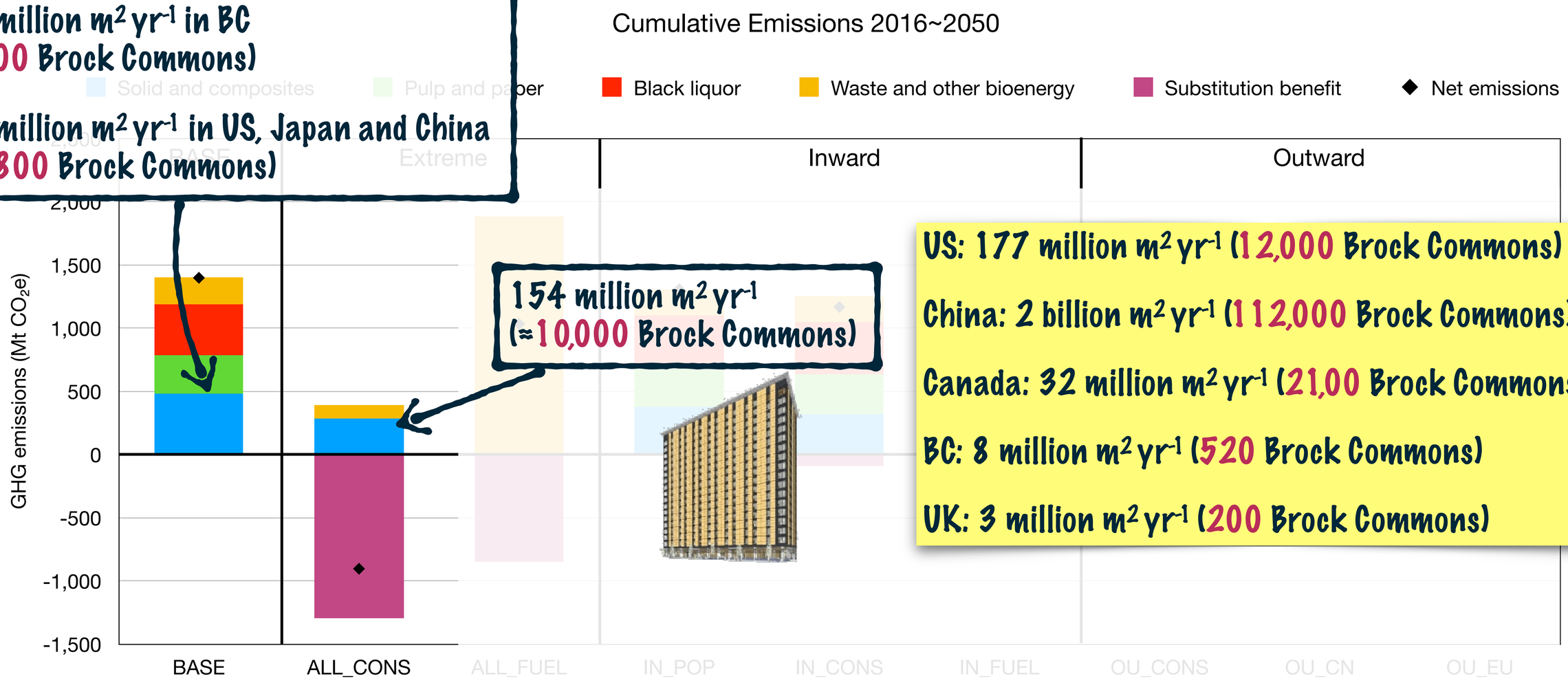

154 million $m^2 yr^{-1}$
(≈10,000 Brock Commons)

US: 177 million $m^2 yr^{-1}$ (12,000 Brock Commons)

China: 2 billion $m^2 yr^{-1}$ (112,000 Brock Commons)

Canada: 32 million $m^2 yr^{-1}$ (2100 Brock Commons)

BC: 8 million $m^2 yr^{-1}$ (520 Brock Commons)

UK: 3 million $m^2 yr^{-1}$ (200 Brock Commons)

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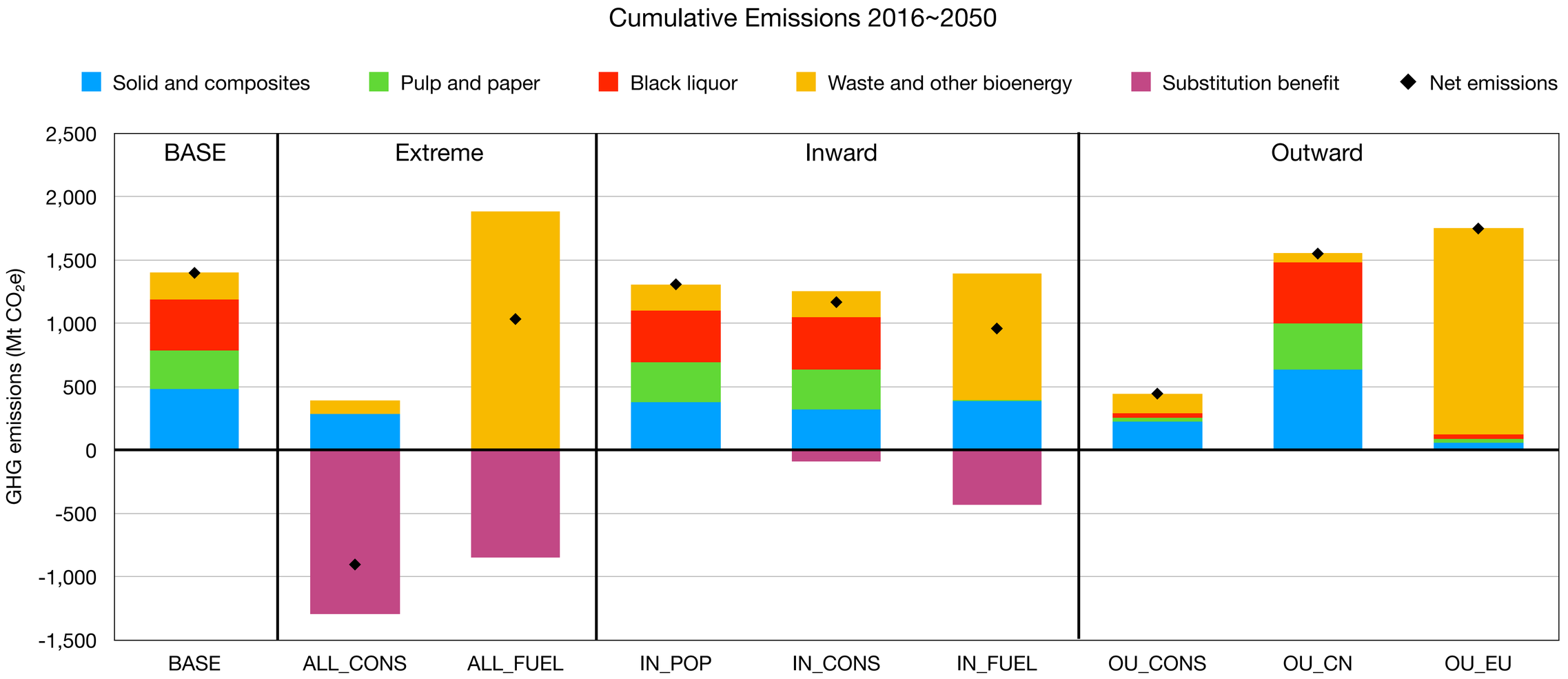

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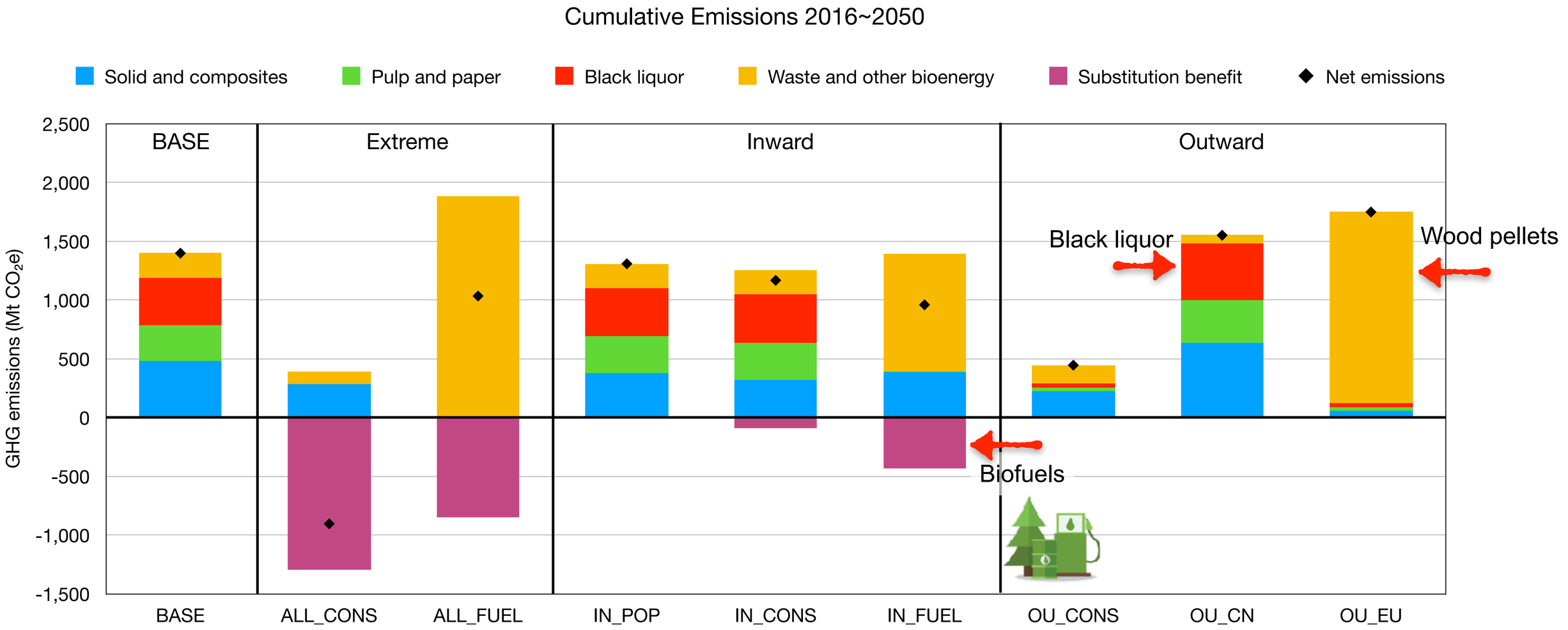

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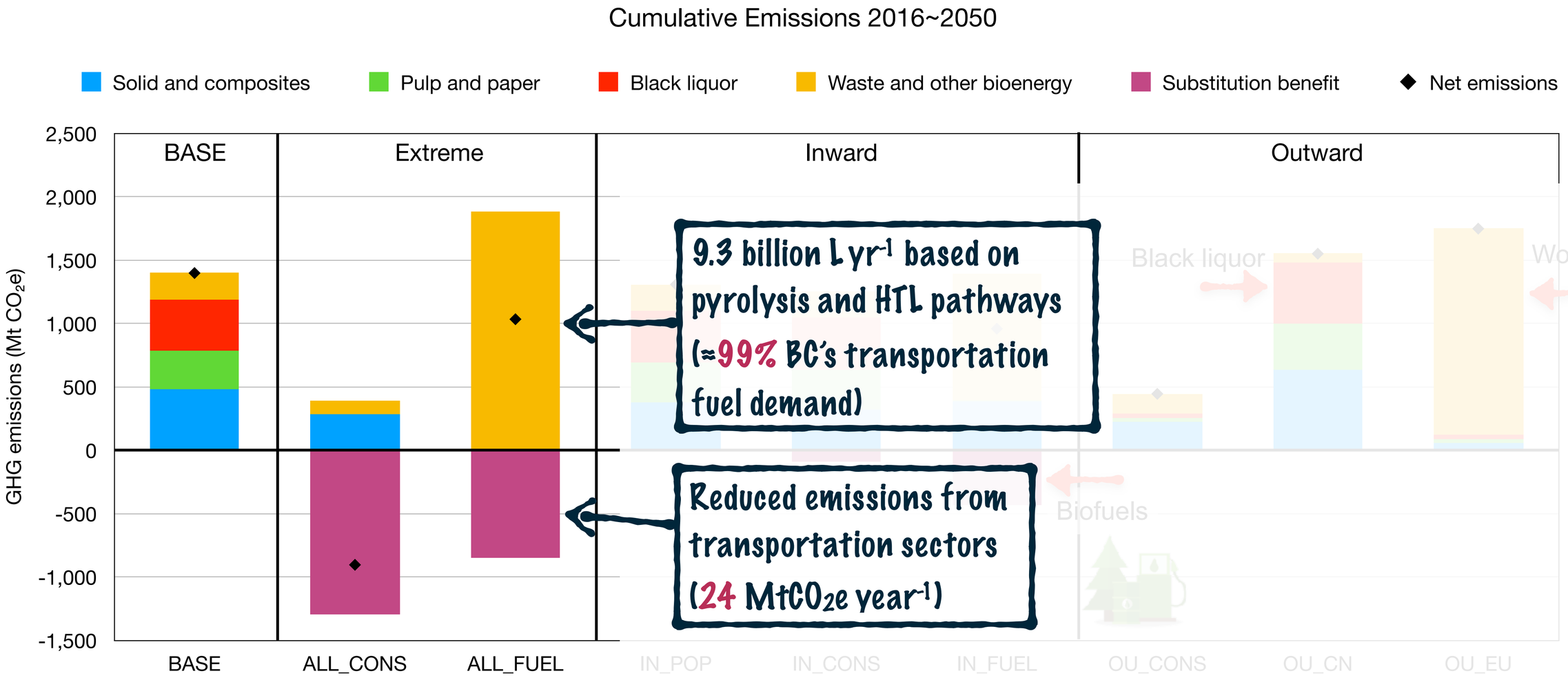

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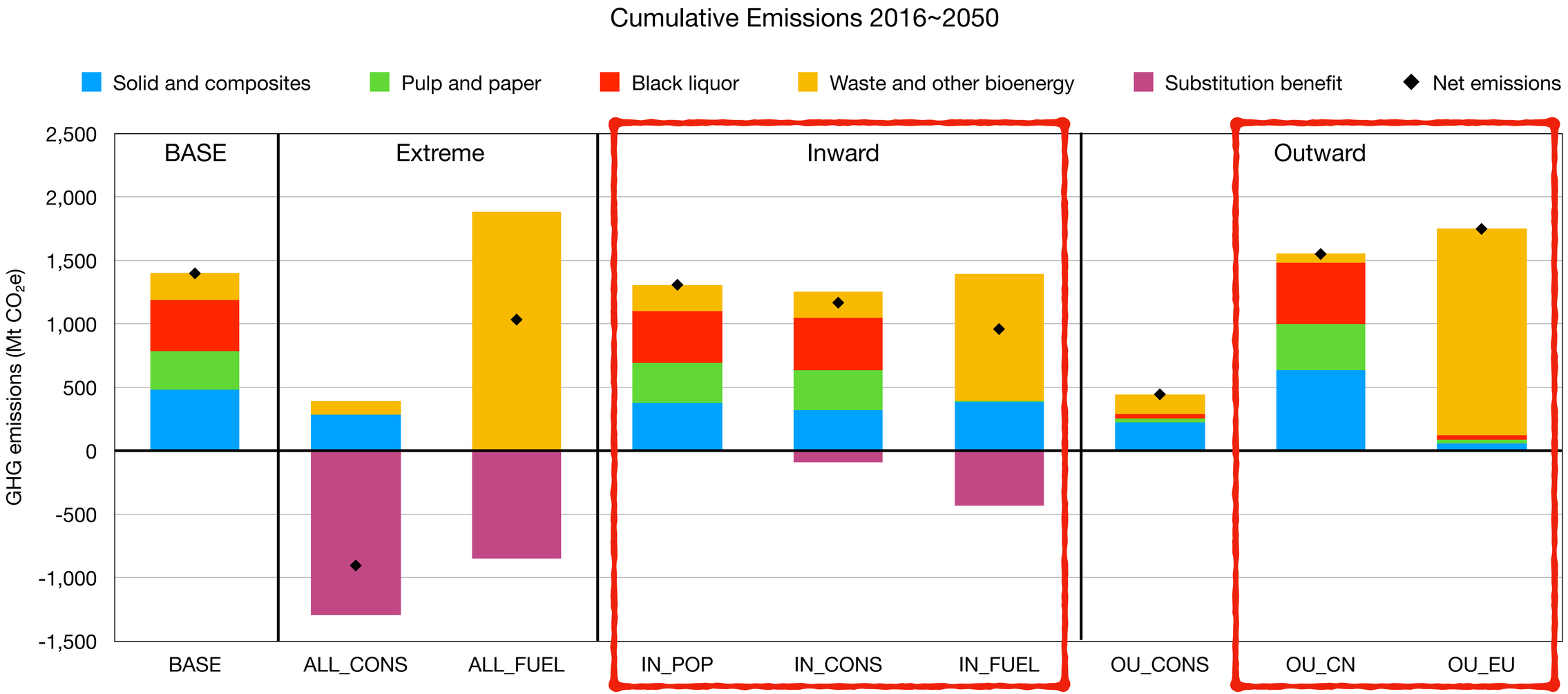

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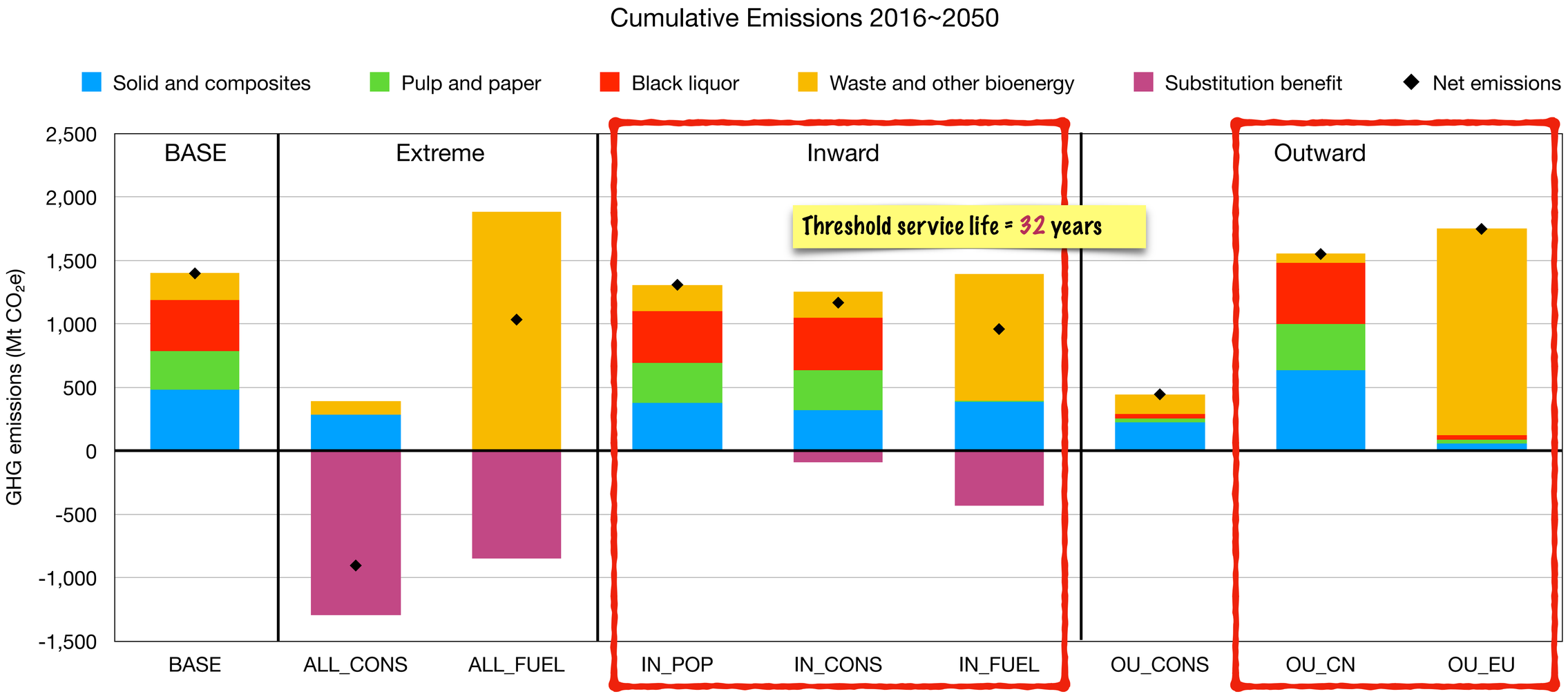

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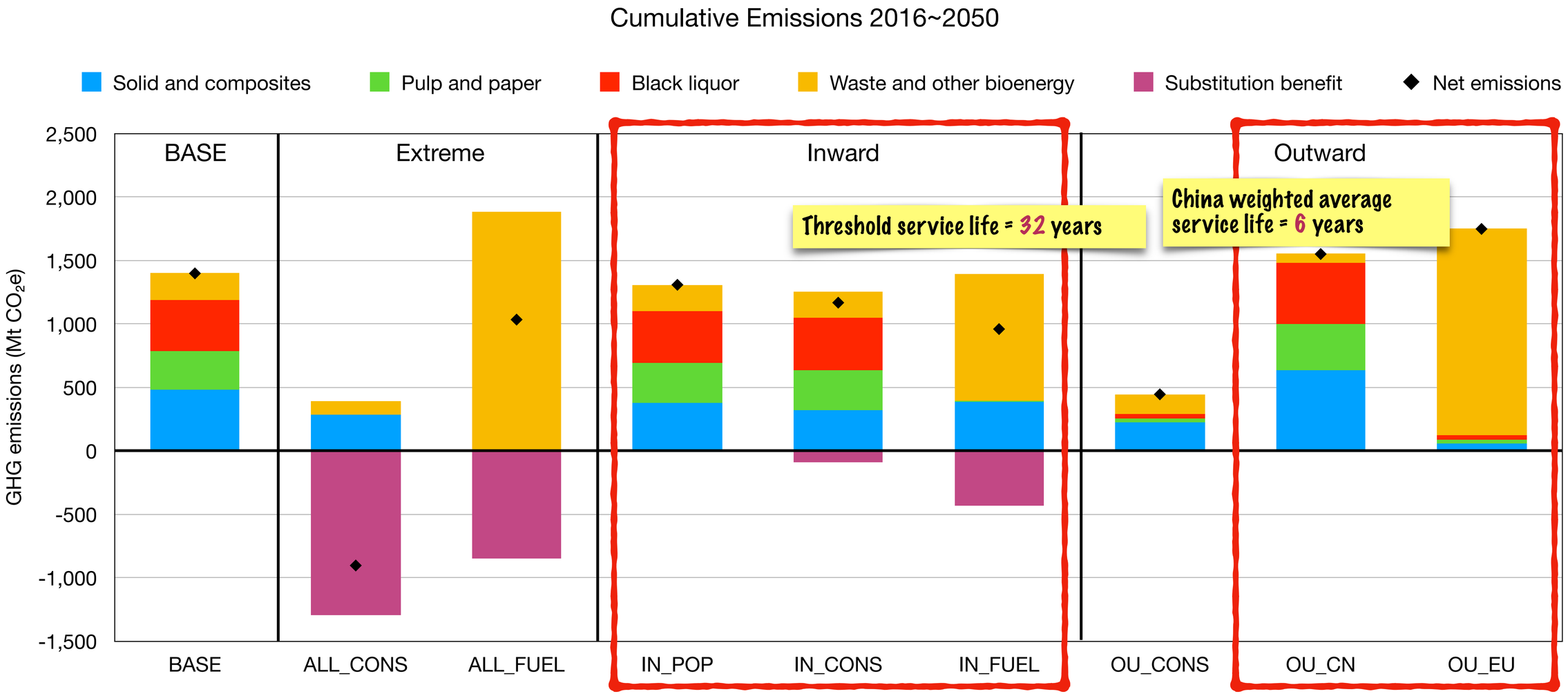

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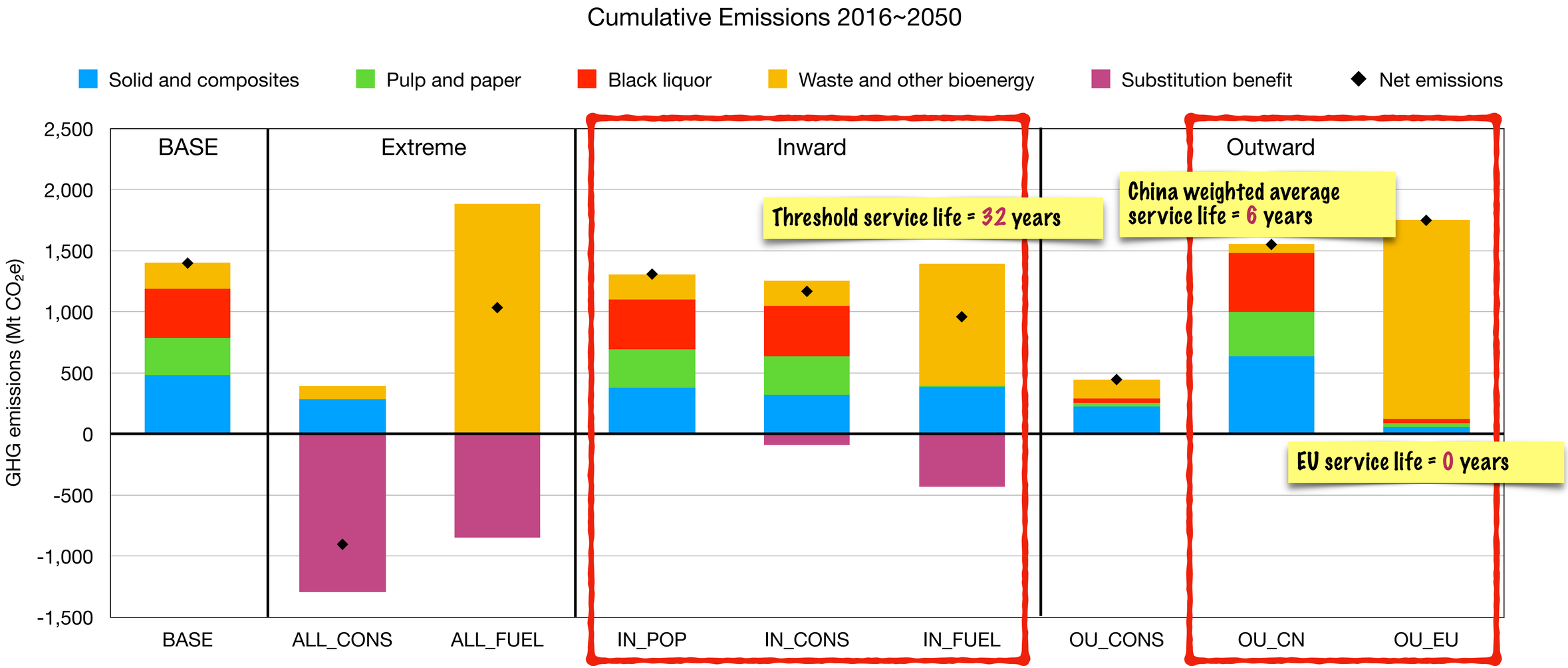
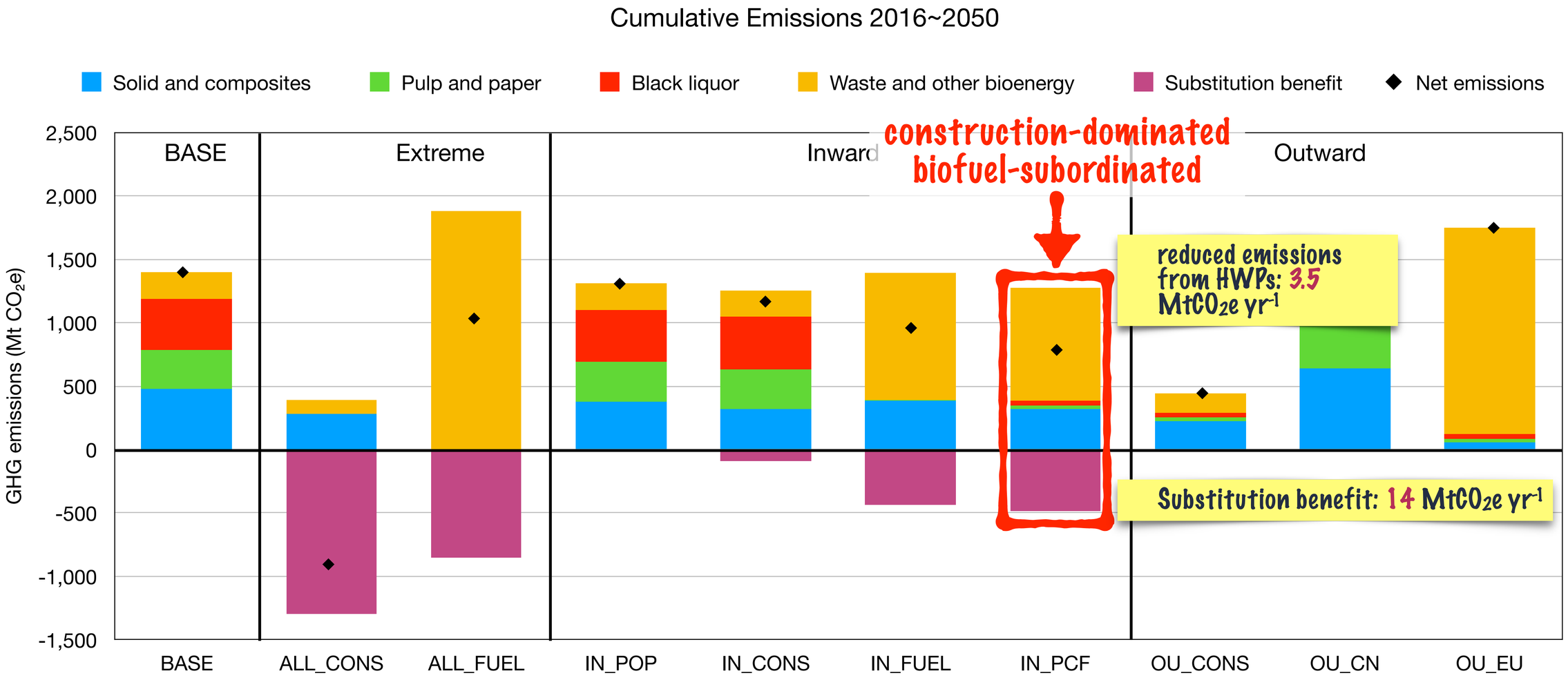


Results highlights: construction + biofuel strategy



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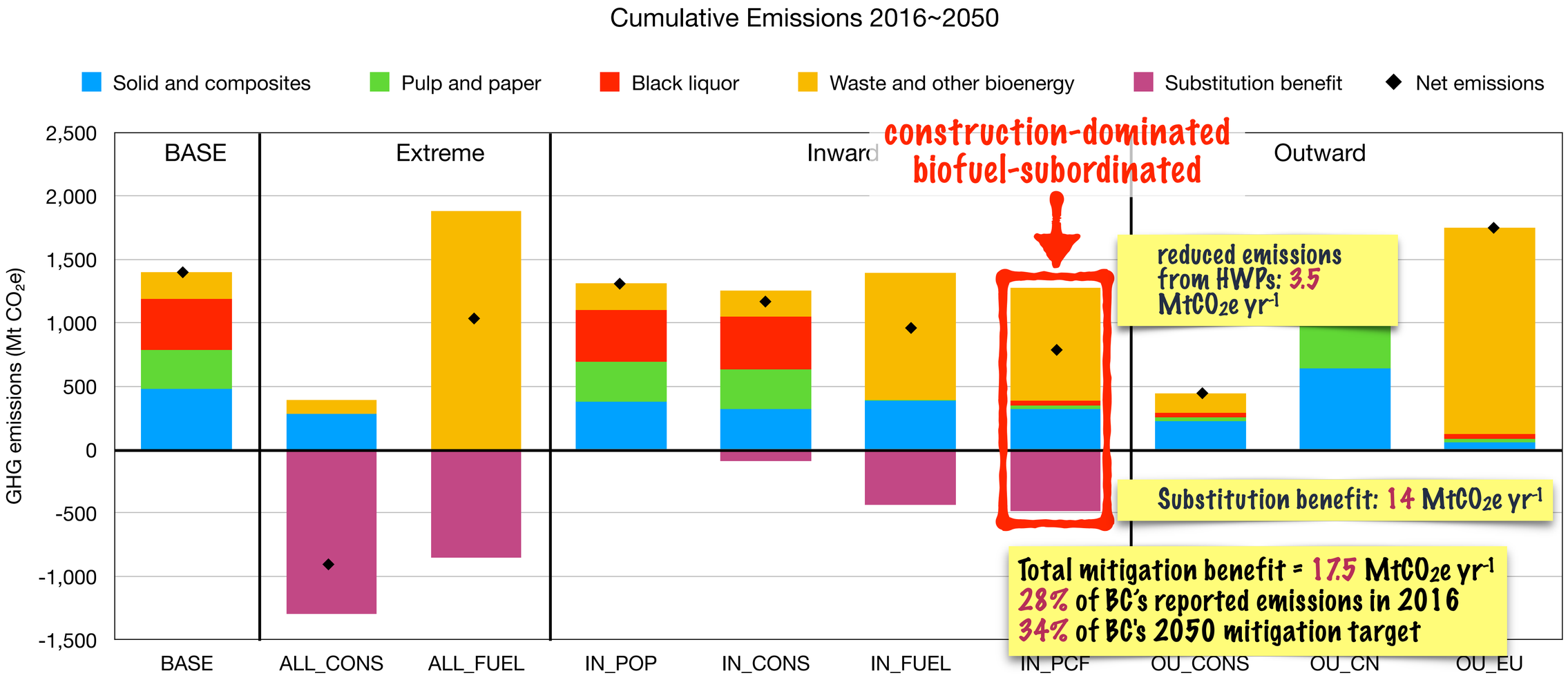

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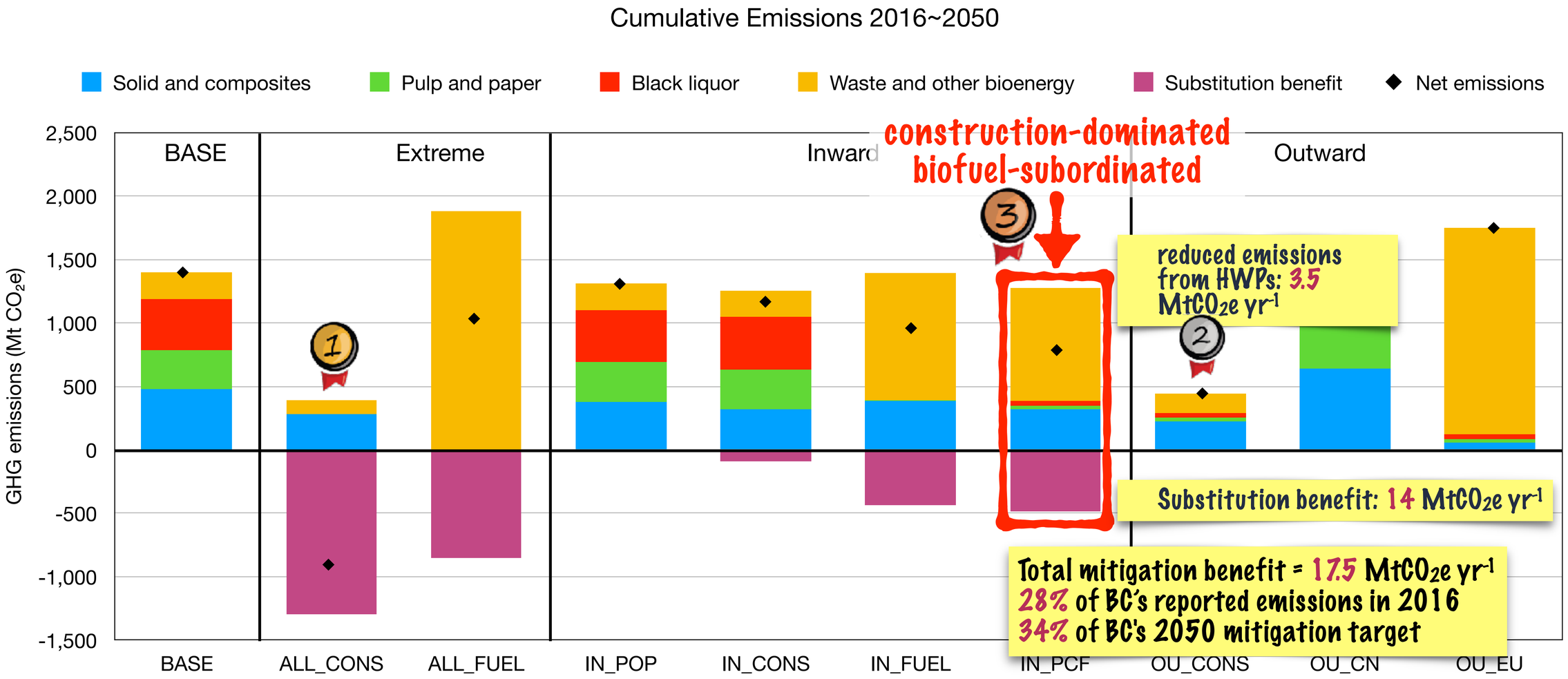
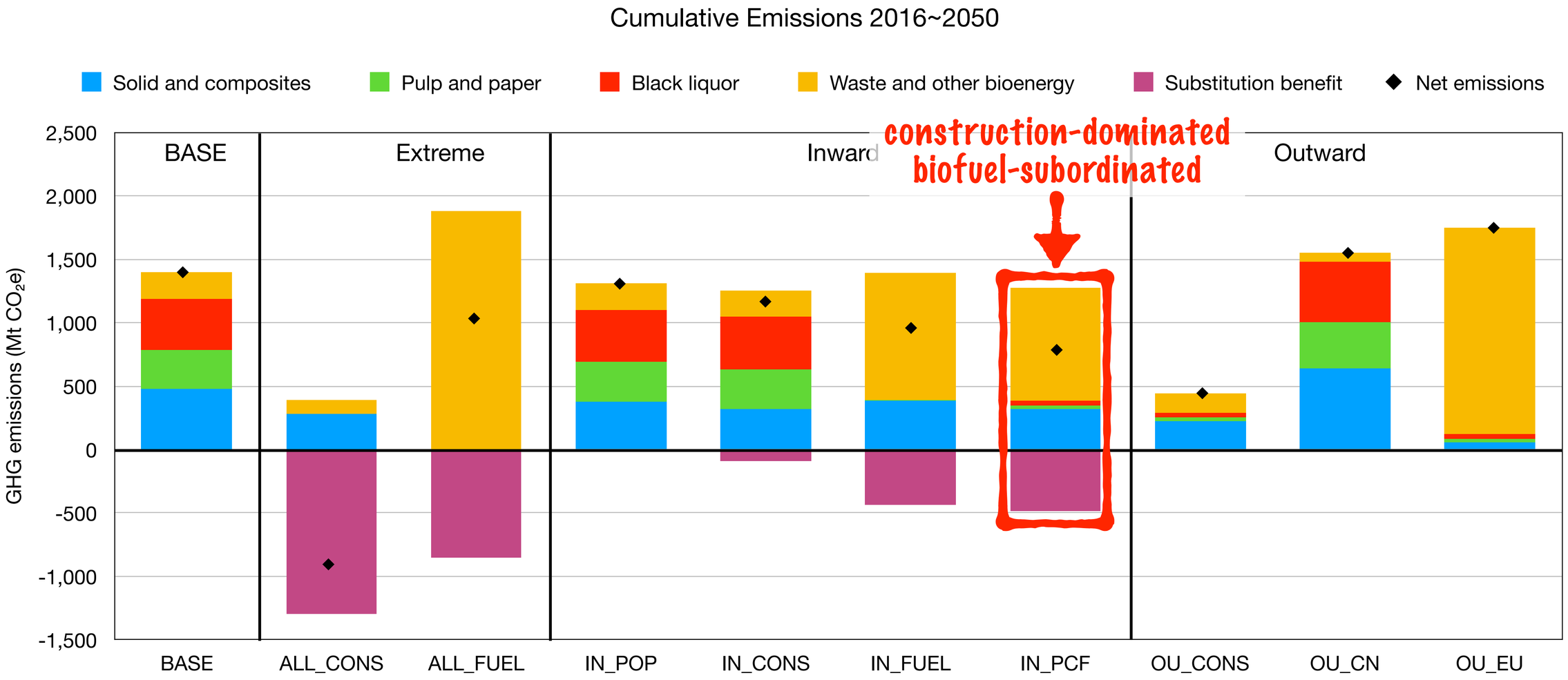


Results highlights: construction + biofuel combined



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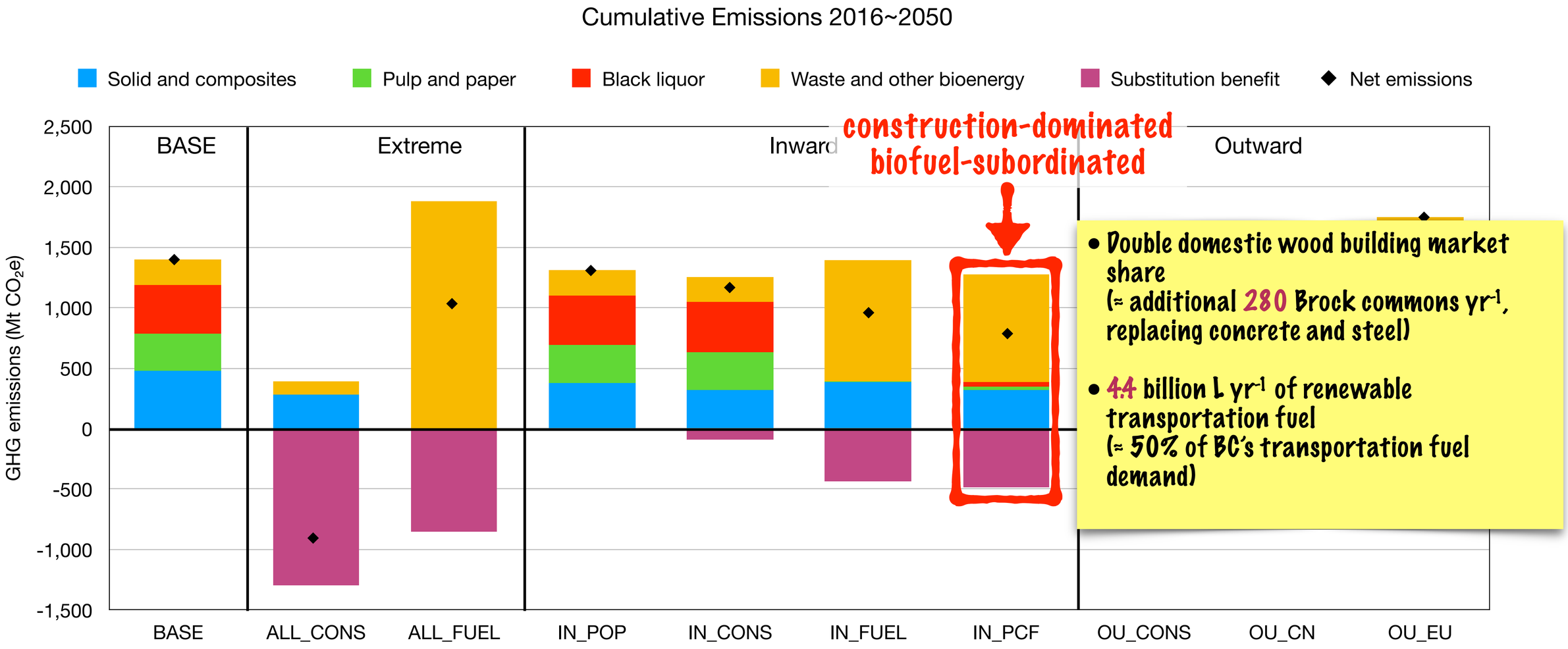

- Double domestic wood building market share
  (≈ additional 280 Brock commons yr^{-1}, replacing concrete and steel)
- 4.4 billion L yr^{-1} of renewable transportation fuel
  (≈ 50% of BC's transportation fuel demand)

Conclusions

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  - < 32 yrs, inward-biofuel, beneficial from BC’s mitigation perspective
- A bioeconomy combining mass timber construction and biofuel production
  - Rejuvenate rural communities

Acknowledgement

- Faculty of Forestry, UBC
- Pacific Institute for Climate Solutions
- Canadian Forest Service

Xie SH. Impact of harvested wood products consumption strategies on British Columbia's greenhouse gas emissions [PhD Dissertation]. [Vancouver, BC, Canada]: University of British Columbia; 2020. Available from: https://doi.org/10.14288/1.0390321

Xie SH, Kurz WA, McFarlane PN. Inward- versus Outward-Focused Bioeconomy Strategies for British Columbia's Forest Products Industry: A Harvested Wood Products Carbon Storage and Emission Perspective. 2021. Under Review.