



Carbon, Energy and Materials Visions for the Future

Identifying aspects and relevance of the
climate-resource-nexus

Webinar, 29 Sept. 2020

Edgar Hertwich¹ and Stefan Pauliuk²

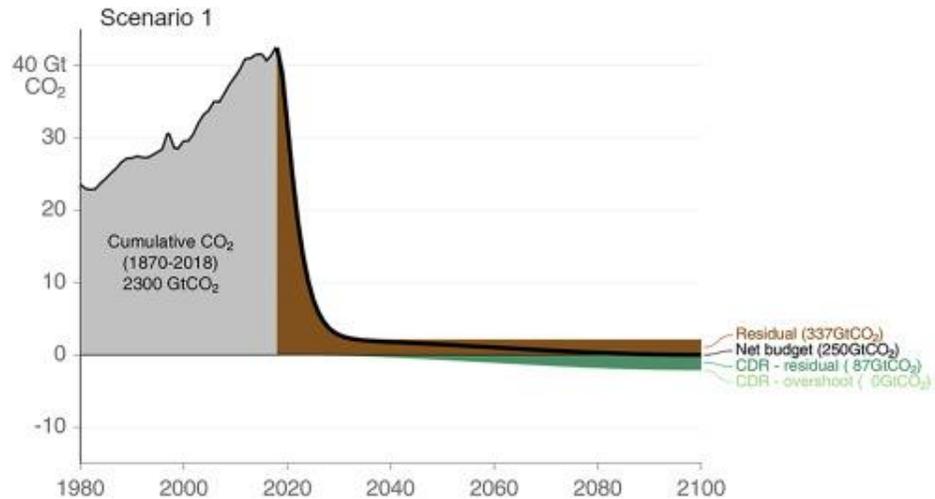
¹Norwegian University of Science and Technology and ²University of Freiburg



International
Resource
Panel

Carbon budget

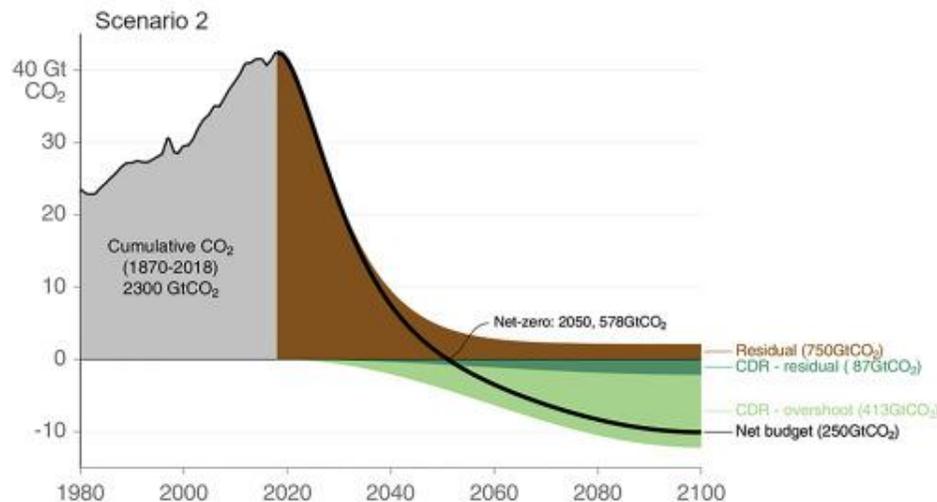
CO₂ emissions until we reach 1.5°C



Aggregate cumulative emissions lead to ultimate temperature rise.

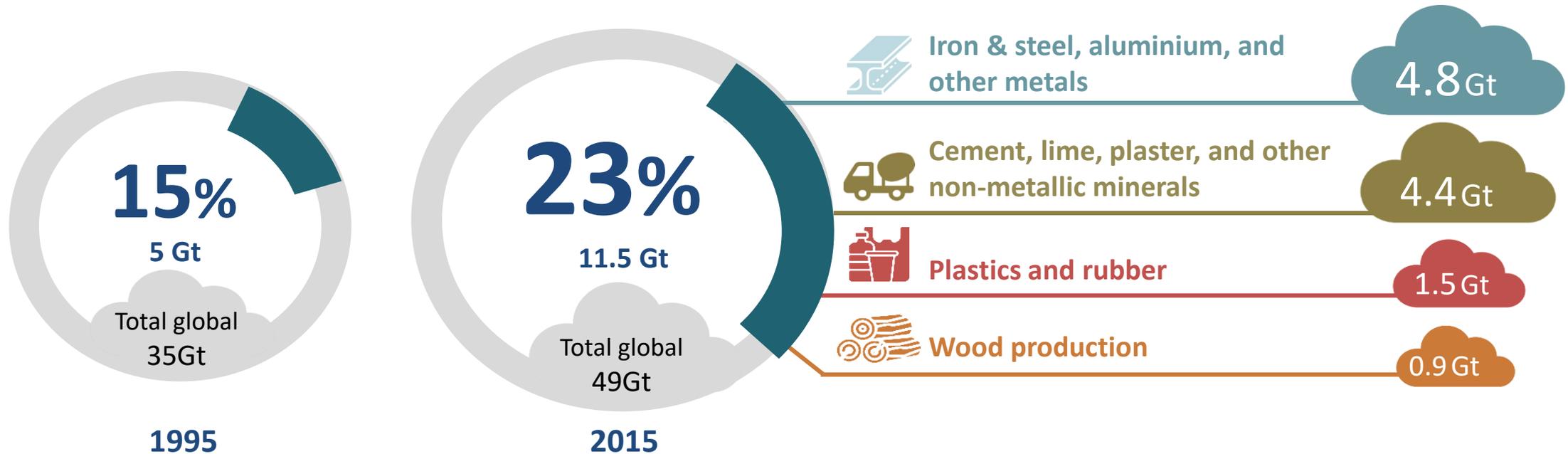
Therefore, they are limited if we want to limit temperature rise.

Rapid drop, faster than what we achieved with COVID 19, needed to keep below 1.5 and avoid expensive carbon removal operation.



The production of materials causes 23% of global GHG emissions

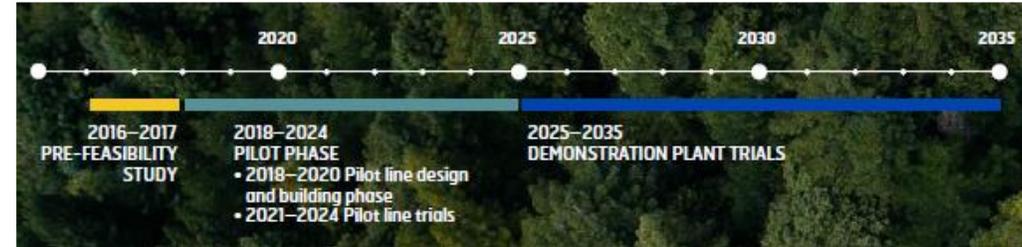
Global GHG emissions from a value-chain perspective



Decarbonization of materials production is in the works ... but its commercialization is some way off



Stefan Löfven: "Ett epokskifte i svensk stålindustri" Foto: SVT



Här invigs nya pilotanläggningen: "Ett epokskifte i svensk stålindustri"

31 aug. 2020

UPPDATERAD IGÅR 17:50 PUBLICERAD IGÅR 17:36

Nu är ett stort steg taget när det gäller produktion av fossilfritt stål. Under måndagen invigde statsminister Stefan Löfven (S) Hybrit:s pilotanläggning i Luleå.

Målet med Hybrit, ett samarbete mellan SSAB, LKAB och Vattenfall, är att byta ut kokskolet vid stålframställning mot fossilfri el och vätgas, för att på så sätt minska koldioxidutsläppen.

Nu testas delar av tekniken i en pilotanläggning på SSAB-området i Luleå som invigdes under måndagen.

I klippet hör du bland annat statsminister Stefan Löfven om vad anläggningen kommer betyda för Sverige.

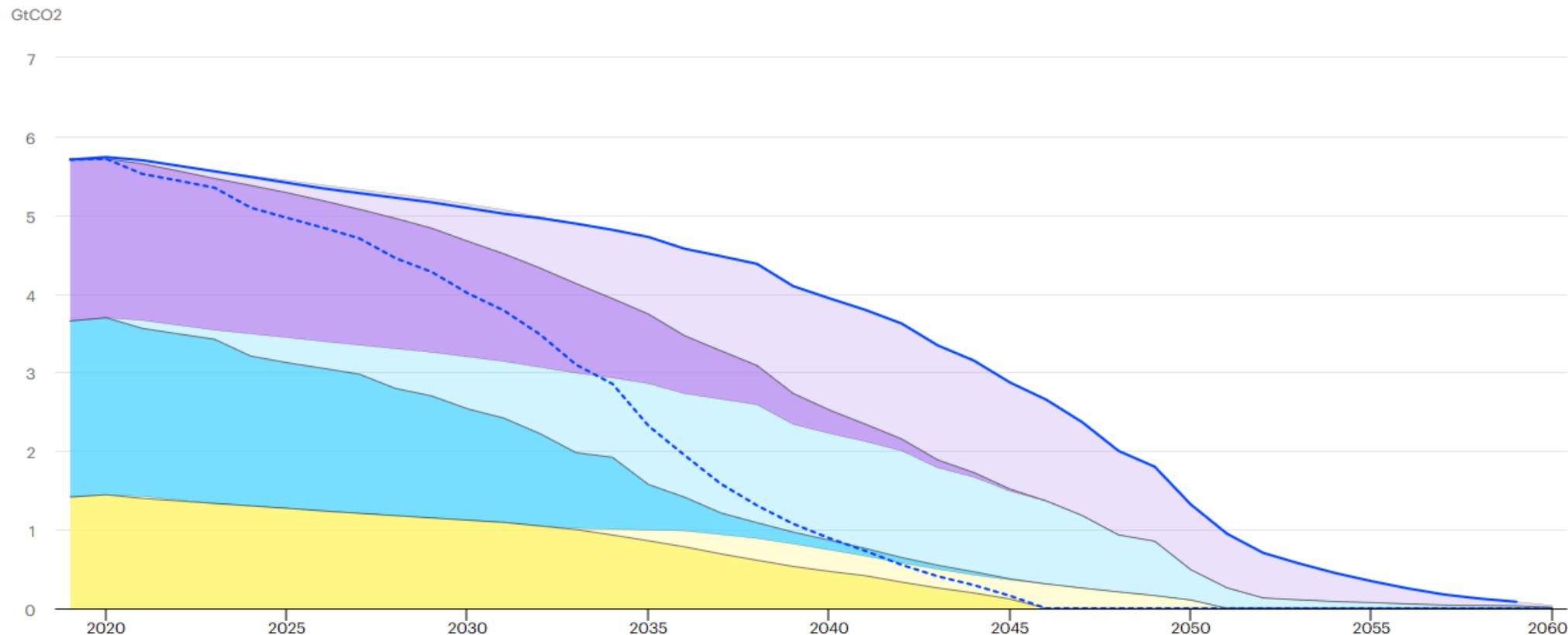
<https://www.svt.se/nyheter/lokalt/norrboten/stefan-lofven-ett-epokskifte-i-svensk-stalindustri>
<http://www.hybritdevelopment.com/>



Long-term lock-in to existing, polluting technology

Unlocking CO2 at the next investment point in heavy industrial sectors by sector, 2019-2060

Open



● Chemicals ● Cement ● Steel ● 25-year investment cycle ● Typical lifetime

UN 
environment
programme



RESOURCE EFFICIENCY AND CLIMATE CHANGE

Material Efficiency Strategies for a Low-Carbon Future

Summary for Policymakers

#ResourceEfficiency4Climate

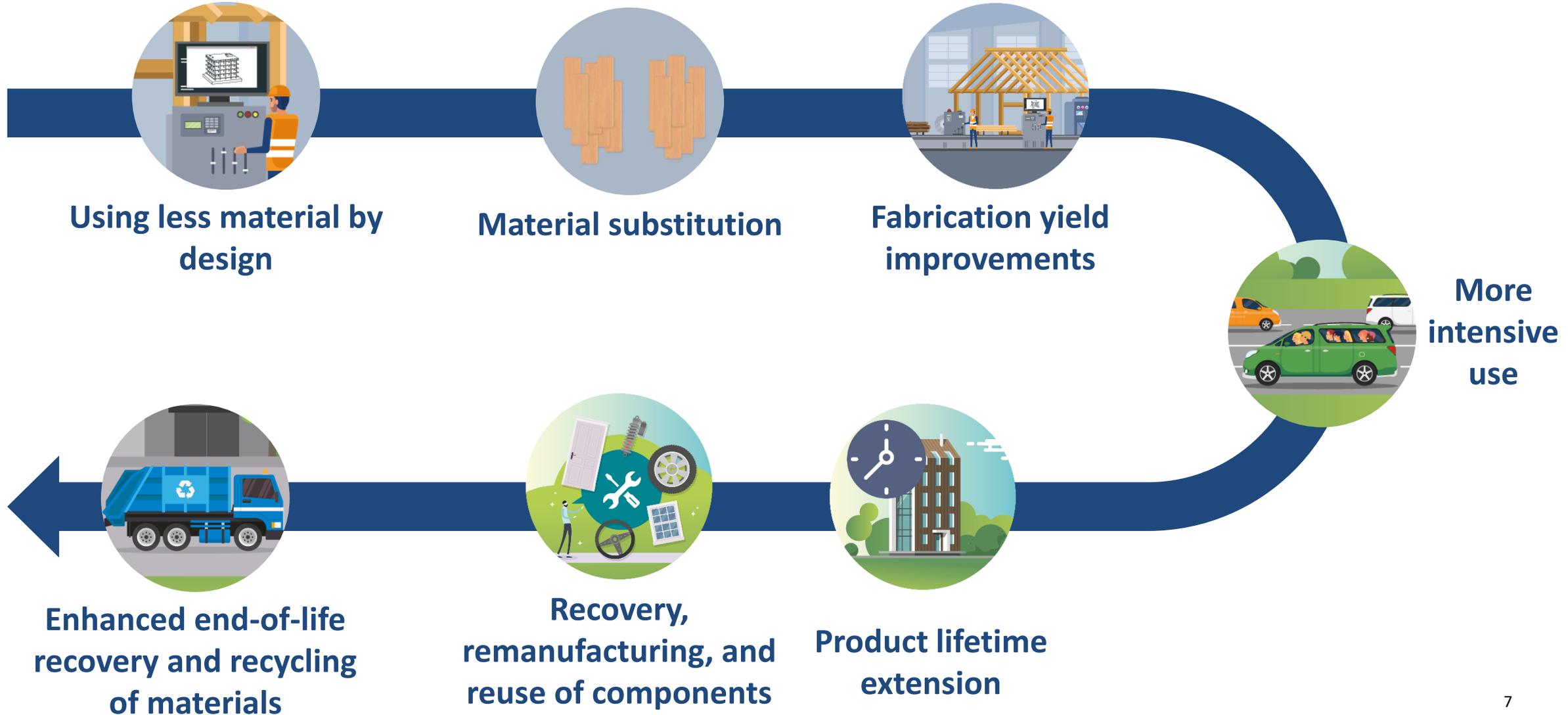
@UNEPIRP

@EmissionsGap



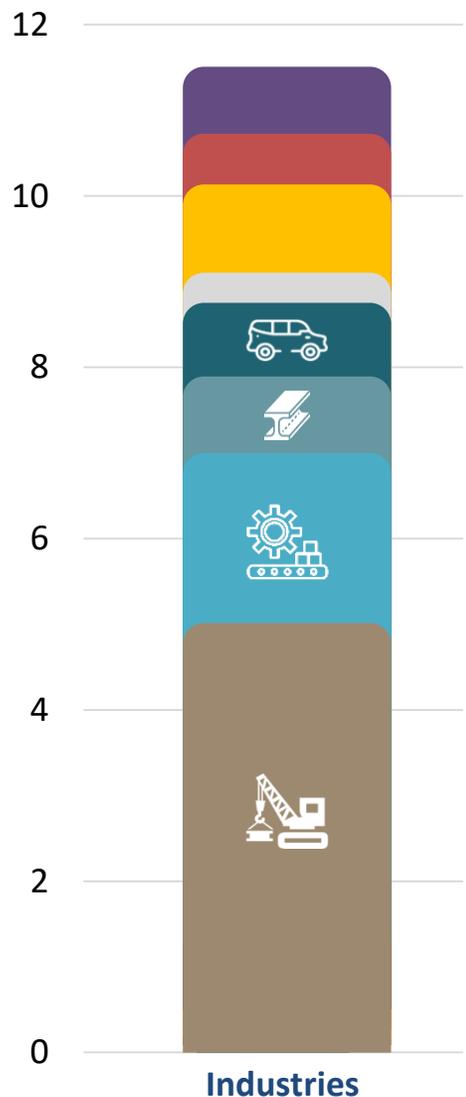
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Report assesses seven crucial Material Efficiency Strategies to reduce emissions

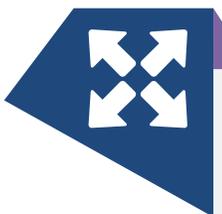




IRP report focuses on high-relevance housing and cars as examples



- Final Use
- Services
- Other products
- Electronics
- Vehicles
- Metal products
- Machinery
- Construction



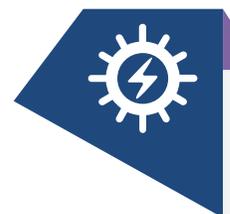
...using large amounts of material



...providing essential services to society



...creating high economic value

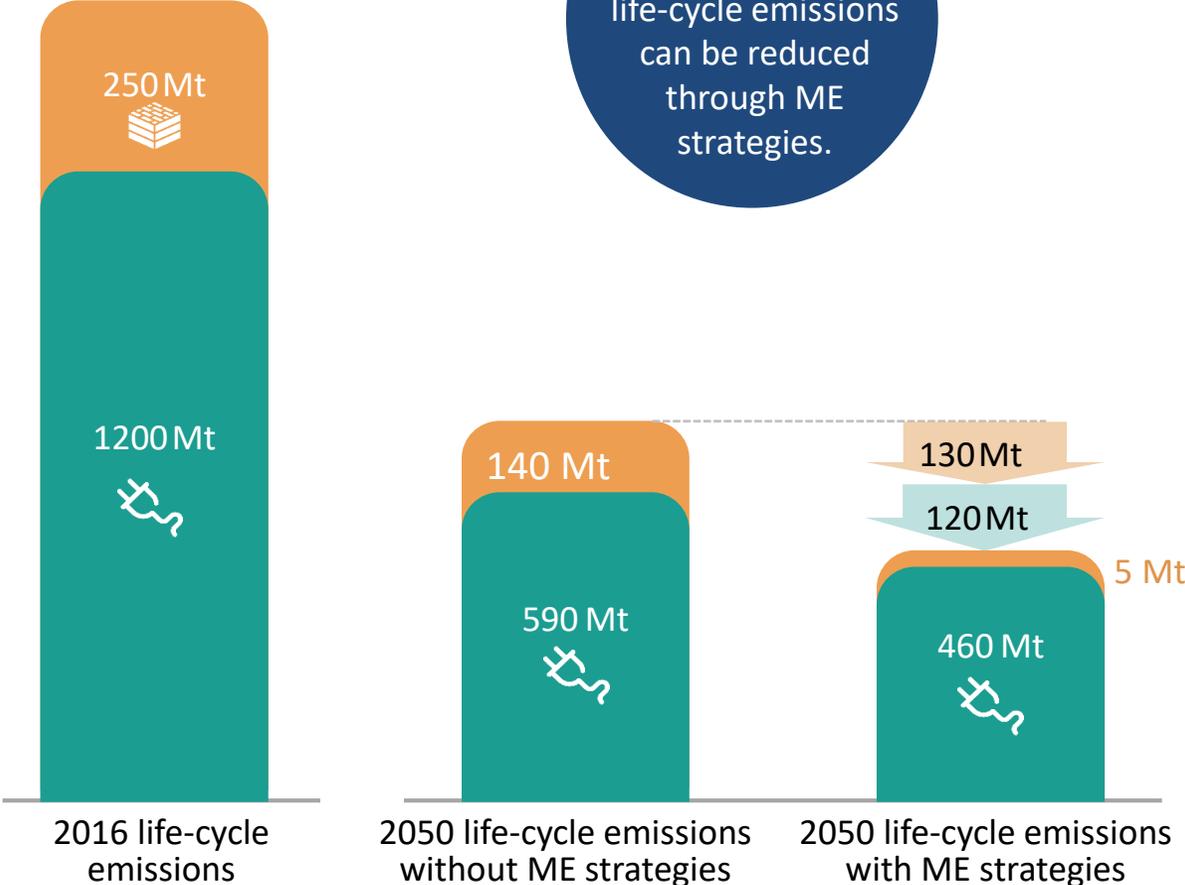
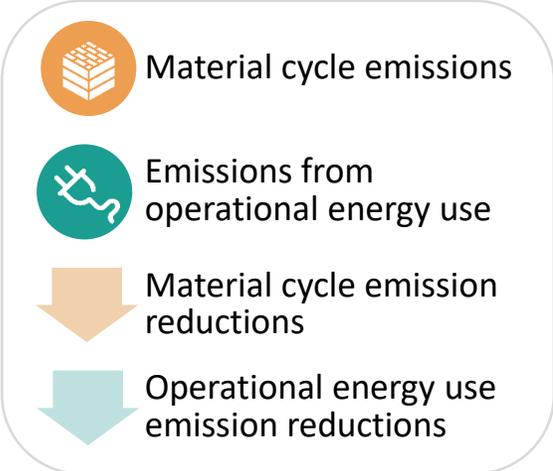


...showing significant potential to increase efficiency

Material Efficiency Strategies can reduce 35% of lifecycle emissions from homes in G7 countries in 2050

G7 Countries

35%
life-cycle emissions
can be reduced
through ME
strategies.

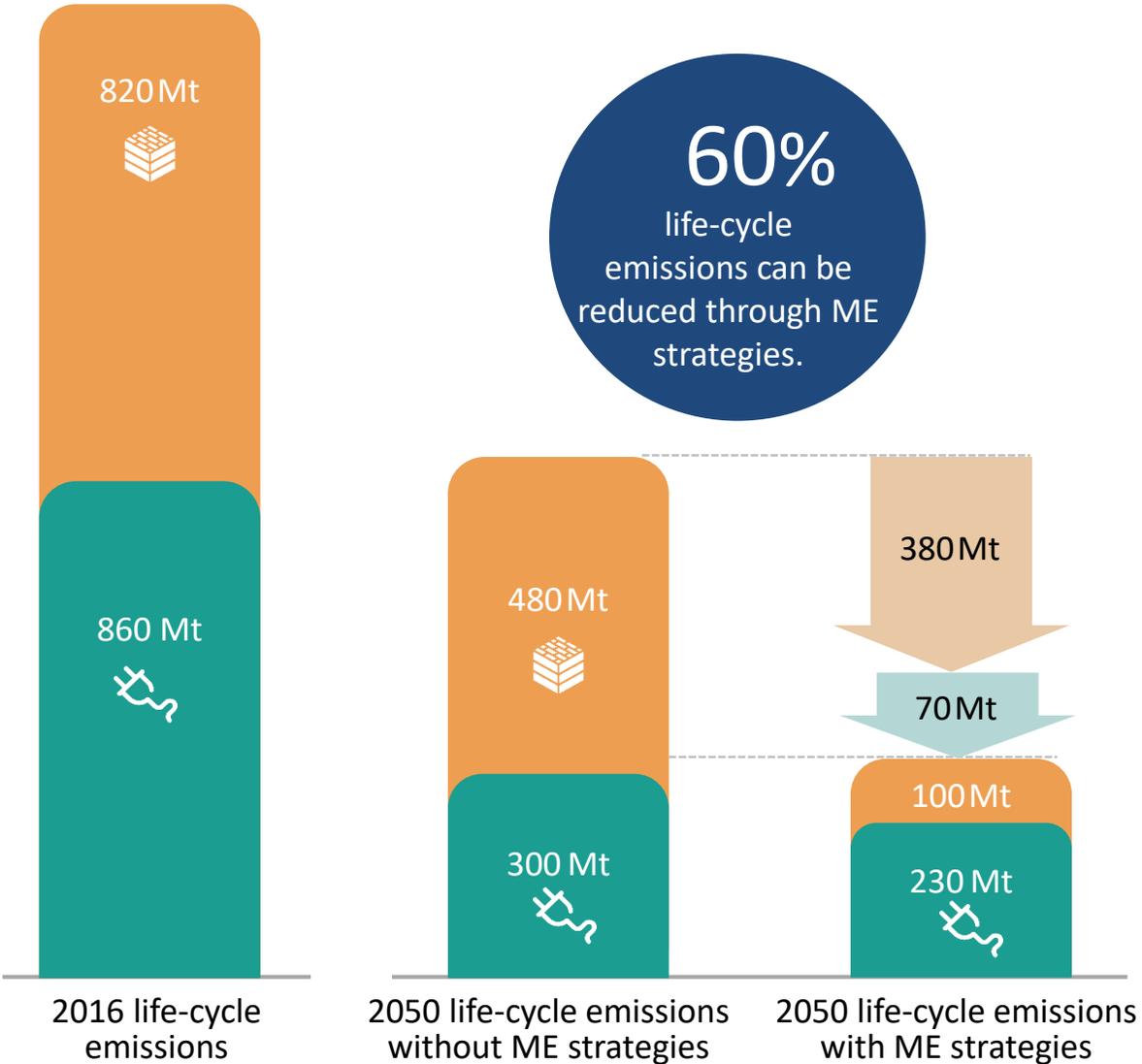


(a) MES=Material Efficiency Strategies

MES can reduce 60% of lifecycle emissions from homes in China and India in 2050

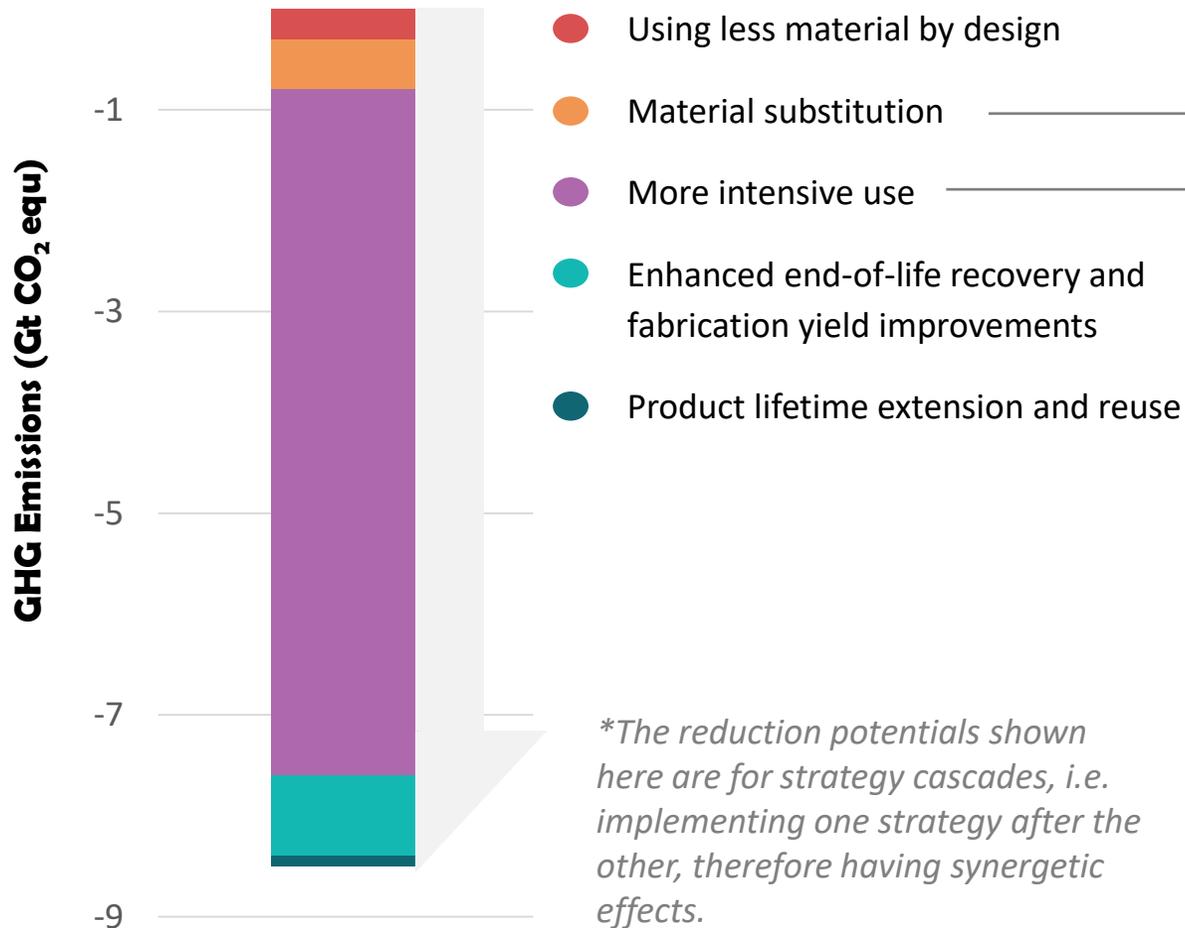
China and India

- Material cycle emissions
- Emissions from operational energy use
- Material cycle emission reductions
- Operational energy use emission reductions



More intensive use and recycling are the most important strategies

🏠 Potential GHG savings from material efficiency strategies for homes in G7 (2016-2060)



Most of the strategies reduce predominantly material related emissions

Some affect materials and operational energy use

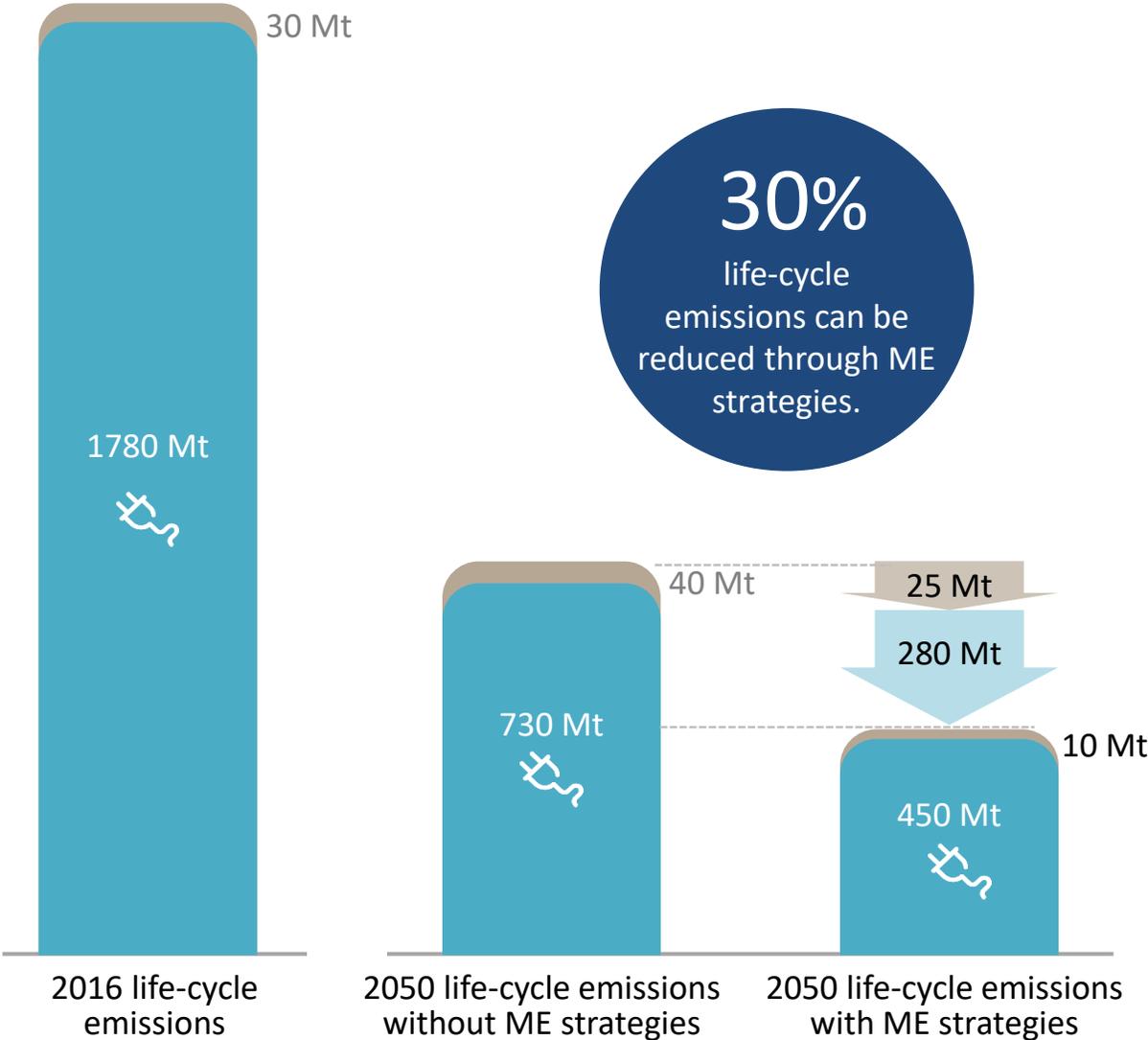
'More intensive use' reduces materials and heating/cooling needs

'Material substitution' (wood instead of cement) can increase energy use

Ca. 20% cumulative savings

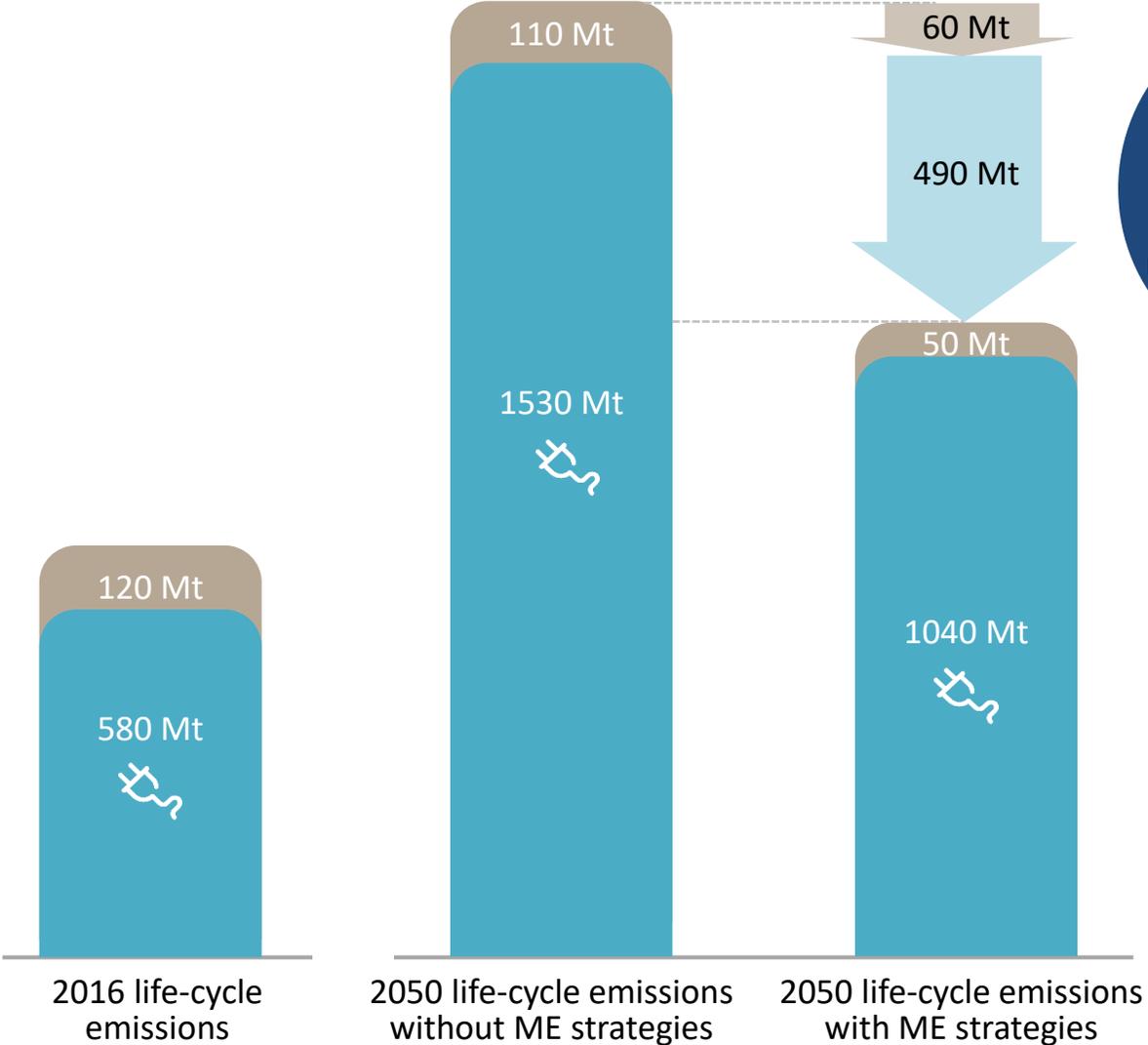
Material Efficiency Strategies can reduce 30% of lifecycle emissions from cars in G7 countries in 2050

G7 Countries



Material Efficiency Strategies can reduce 35% of lifecycle emissions from cars in China and India in 2050

 **China and India**

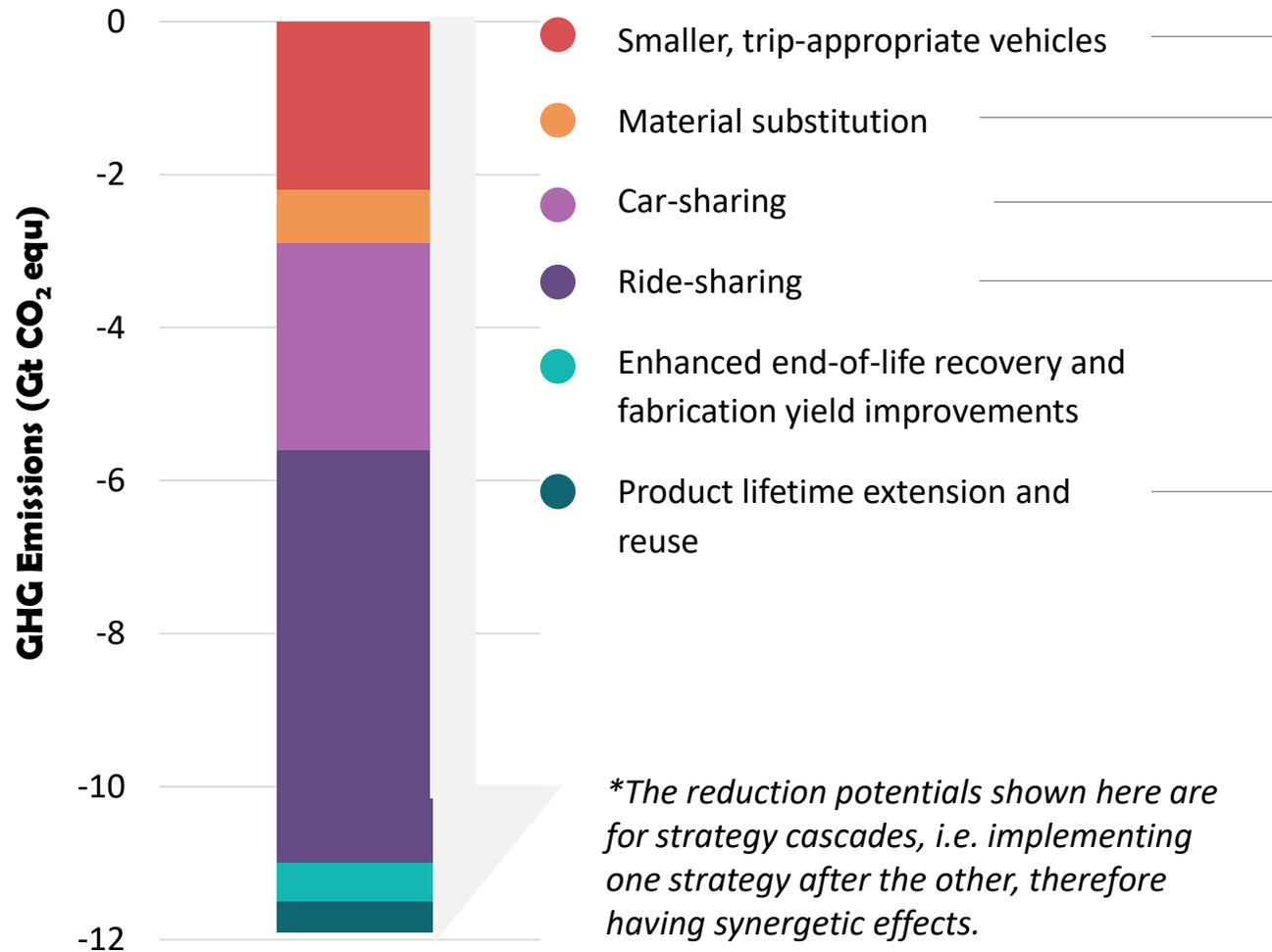


35%
life-cycle emissions can be reduced through ME strategies.

-  Material cycle emissions
-  Emissions from operational energy use
-  Material cycle emission reductions
-  Operational energy use emission reductions

More intensive use, leaner vehicles and recycling are crucial

 Potential GHG savings from material efficiency strategies for cars in G7 (2016-2060)



Most promising strategies reduce materials AND operational emissions through

- Reducing the number of vehicles
- Making vehicles lighter



Ca. 25% cumulative savings

Vision

Multifamily, wooden buildings as new construction, NZEB

Shared facilities

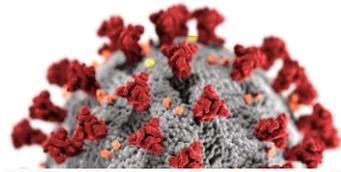
Shared fleets of vehicles of various sizes

Zero emissions material production from 203x



Our response to COVID-19: A Threat to Resource Efficiency

275

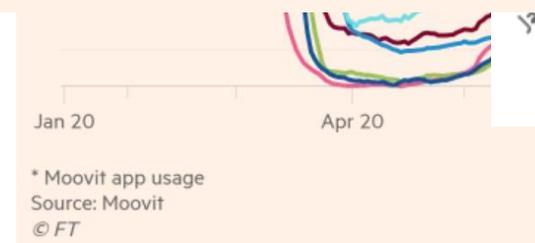


- In response, manufacturers from General Motors to Germany's Daimler poured billions of dollars into new services offering car sharing, taxi services or the option to access vehicles without the hassle of a purchase.

- Covid-19 may have turned the tide.

Indications from China, which came out of lockdown as Europe and the Americas were just entering theirs, are of a sharp rise in individual car use as commuters shun public transport.

- Hesitance to shared mobility



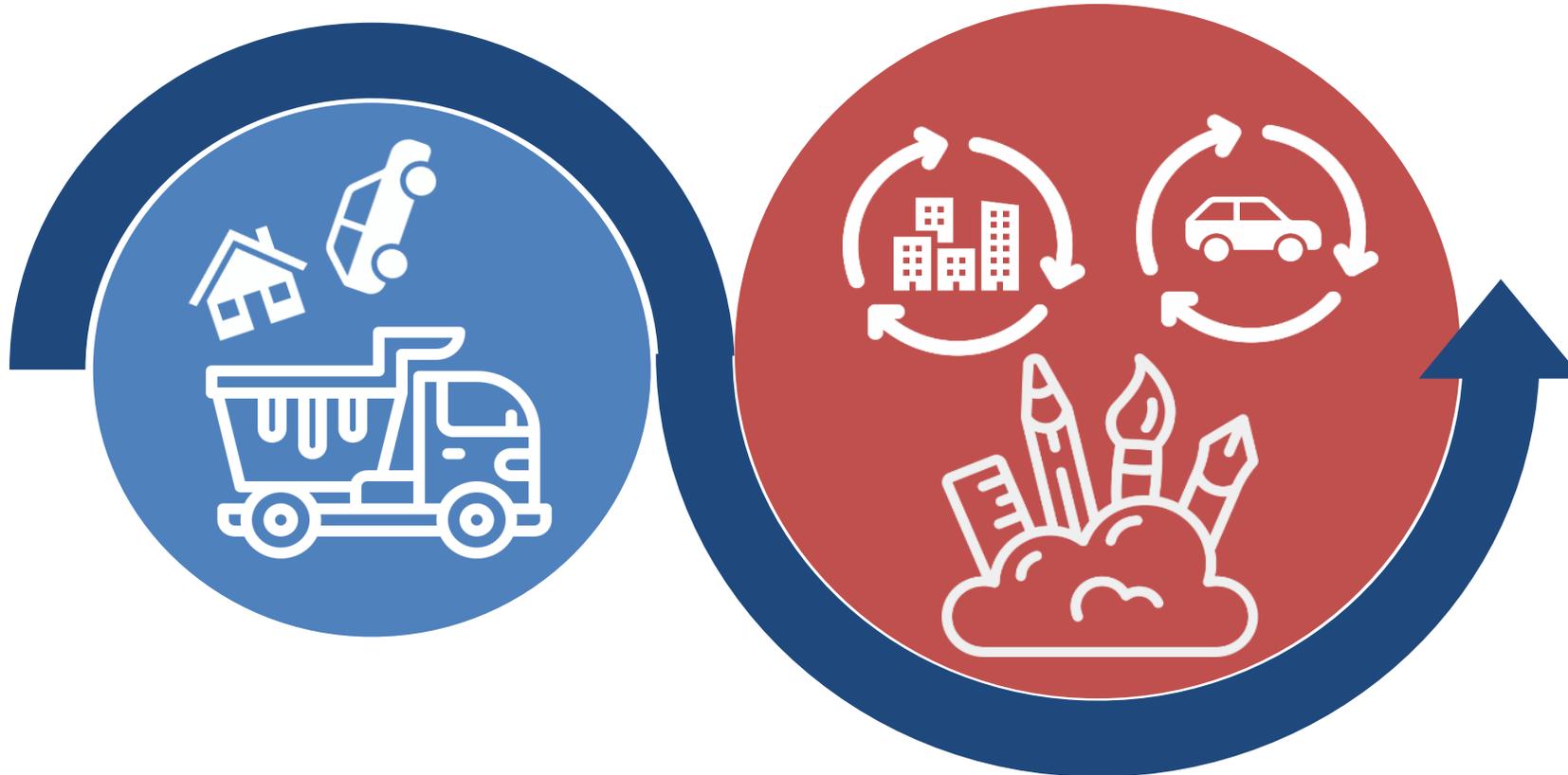
The pandemic has convinced some finally give up on city living.



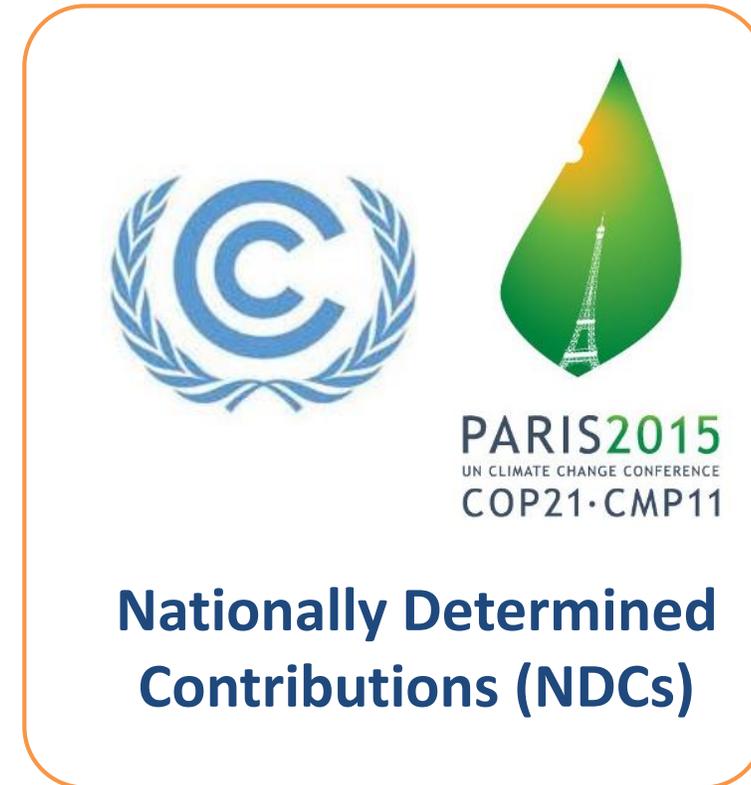
Current material efficiency policies often lack a climate impact perspective and climate policies often miss the material-efficiency perspective

Current material-related policies focus mostly on **end-of life** landfill diversion

However, the **design** of houses and vehicles is a key point of leverage for GHG impact



Policies that apply across sectors may be of equal importance





THANK YOU

Download the summary and other material at:

www.resourcepanel.org

<https://environmentalfootprints.org/>



For questions and engagement please contact edgar.hertwich@ntnu.no