

# Impacts of COVID-19 on energy demand

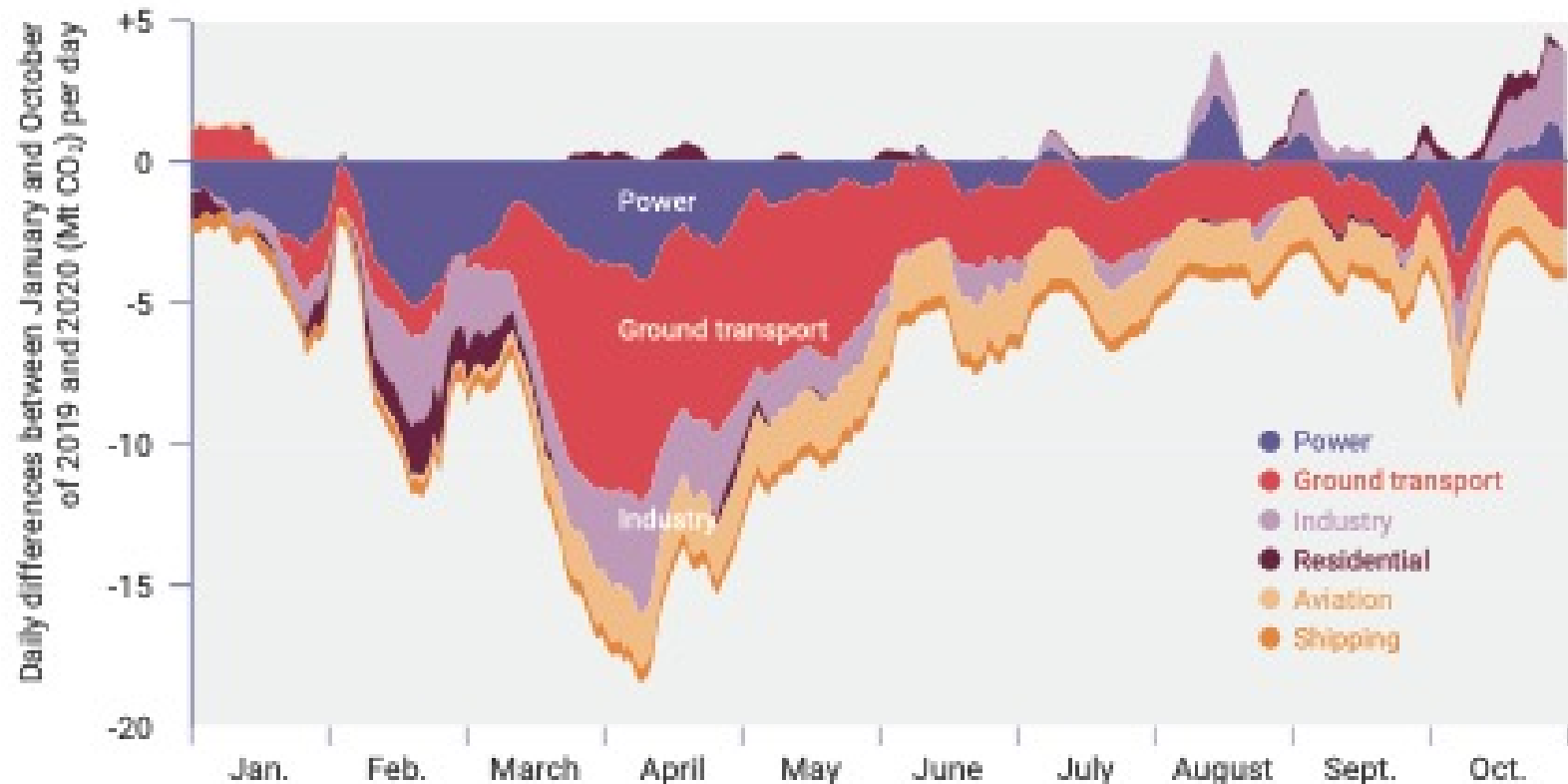
EU-H2020 NAVIGATE project (WP3)

Charlie Wilson (Tyndall Centre for Climate Change Research) & Bas van Ruijven (IIASA)  
Webinar, 17 December 2020



# COVID-19 impacts on energy use and CO<sub>2</sub>

Figure 2.5. Reduction in emissions in 2020 relative to 2019 levels due to COVID-19 lockdowns



Source: Liu et al. (2020)

Figure from:  
 UNEP (2020). The Emissions Gap Report 2020. Nairobi, Kenya, United Nations Environment Programme.

Based on data from:  
 Liu, Z., et al. (2020). COVID-19 causes record decline in global CO<sub>2</sub> emissions. <http://arxiv.org/abs/2004.13614>.



# COVID-19 impacts on building occupancy

Figure 2.1 Changes to average time spent at home (left) and visitors to workplaces (right), average over selected countries

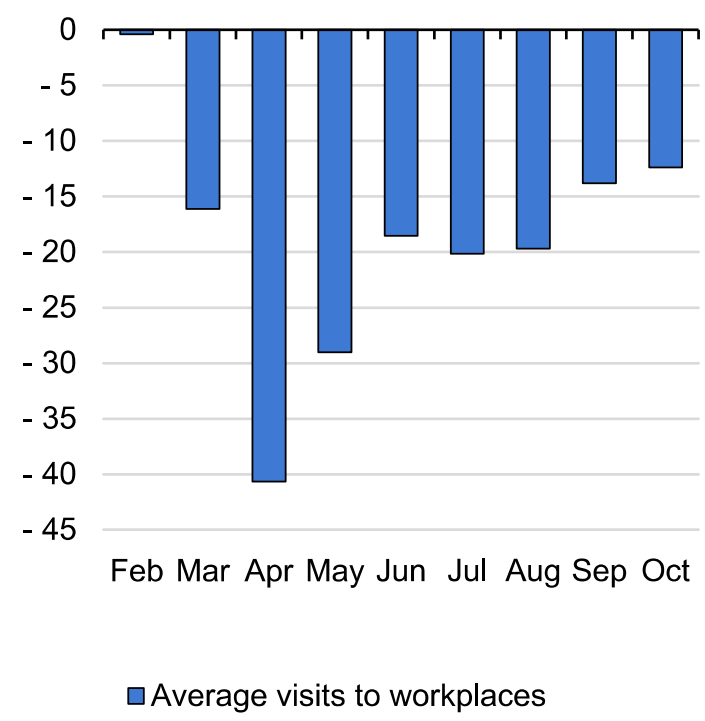
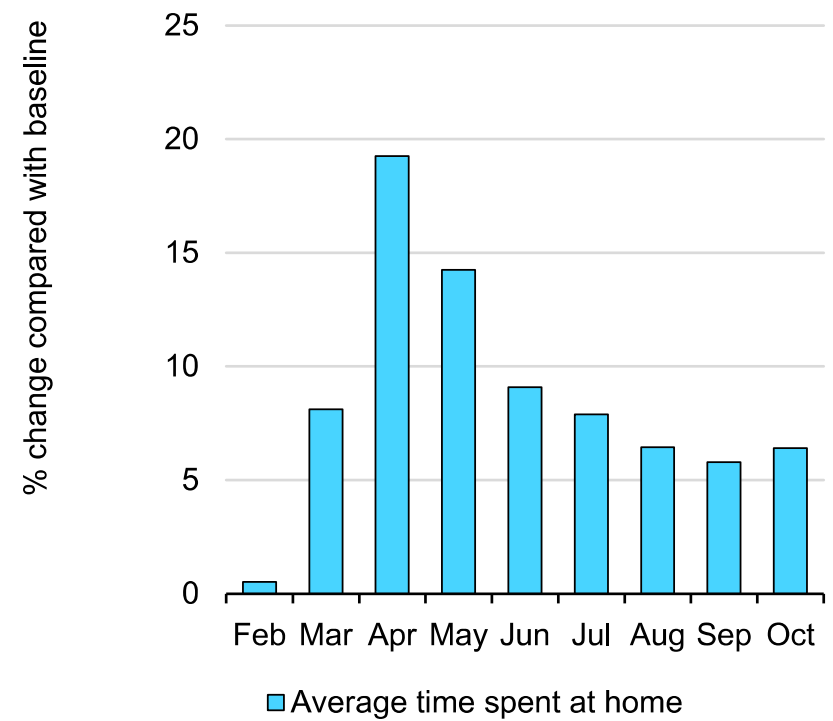


Figure from:  
IEA (2020). Energy Efficiency  
2020. Paris, France,  
International Energy Agency.

Based on data from:  
Google Covid-19 Community  
Mobility Reports for >35  
countries. Baseline = 3 Jan to  
6 Feb 2020.

IEA 2020. All rights reserved.

# COVID-19 impacts on appliance usage

Figure 3.1 Changes in energy usage for one utility in the Netherlands, lockdown period compared with pre-lockdown period

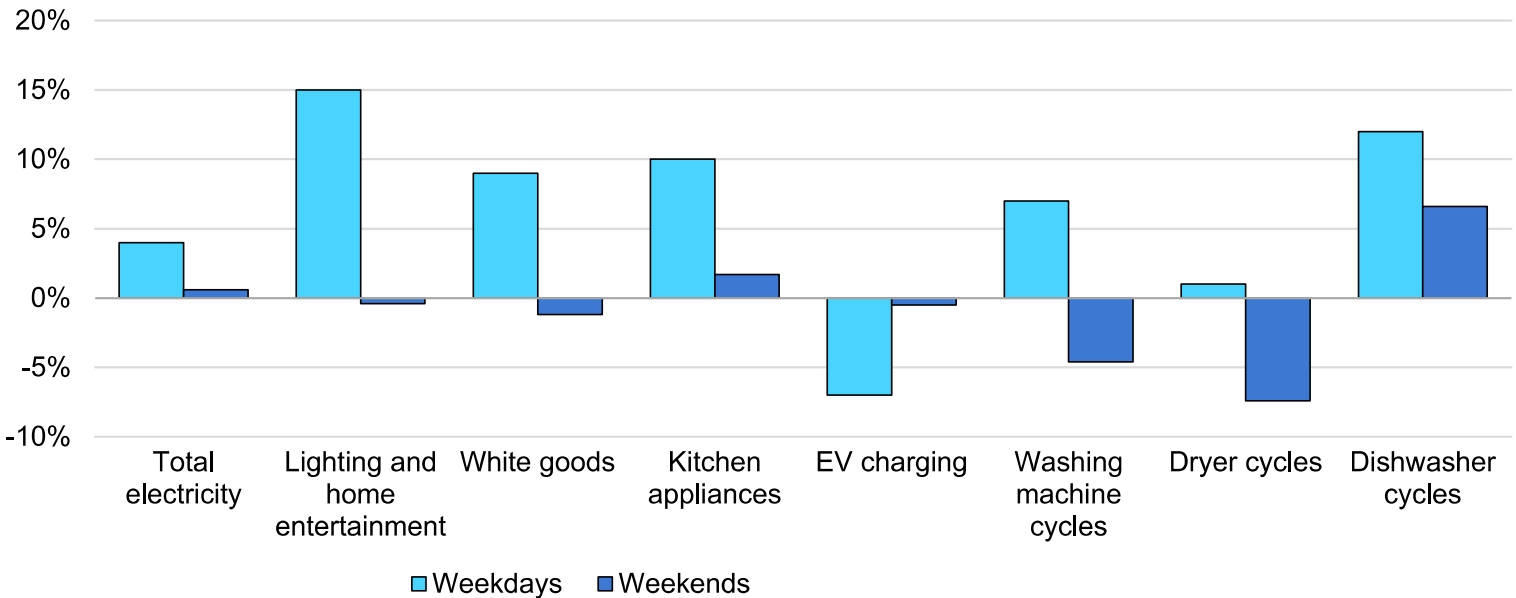


Figure from:  
IEA (2020). Energy Efficiency 2020. Paris, France, International Energy Agency.

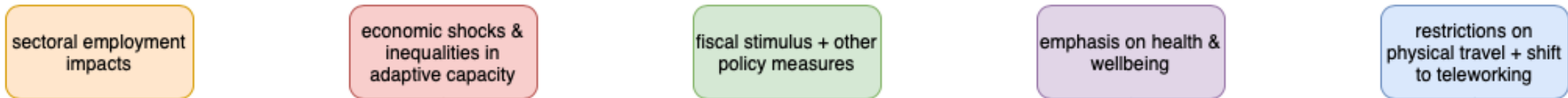
Based on data from:  
Quby, a Dutch utility.

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Source: Quby, [What self-quarantine does to household energy usage: while others guess, Quby measures.](#)

# Covid-19 impact pathways on residential energy demand

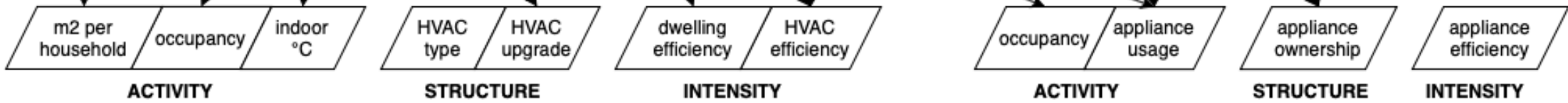
**SYSTEMIC EFFECTS**  
(societal & economic impacts of Covid-19)



**PROXIMATE EFFECTS**  
(direct antecedents of energy demand)

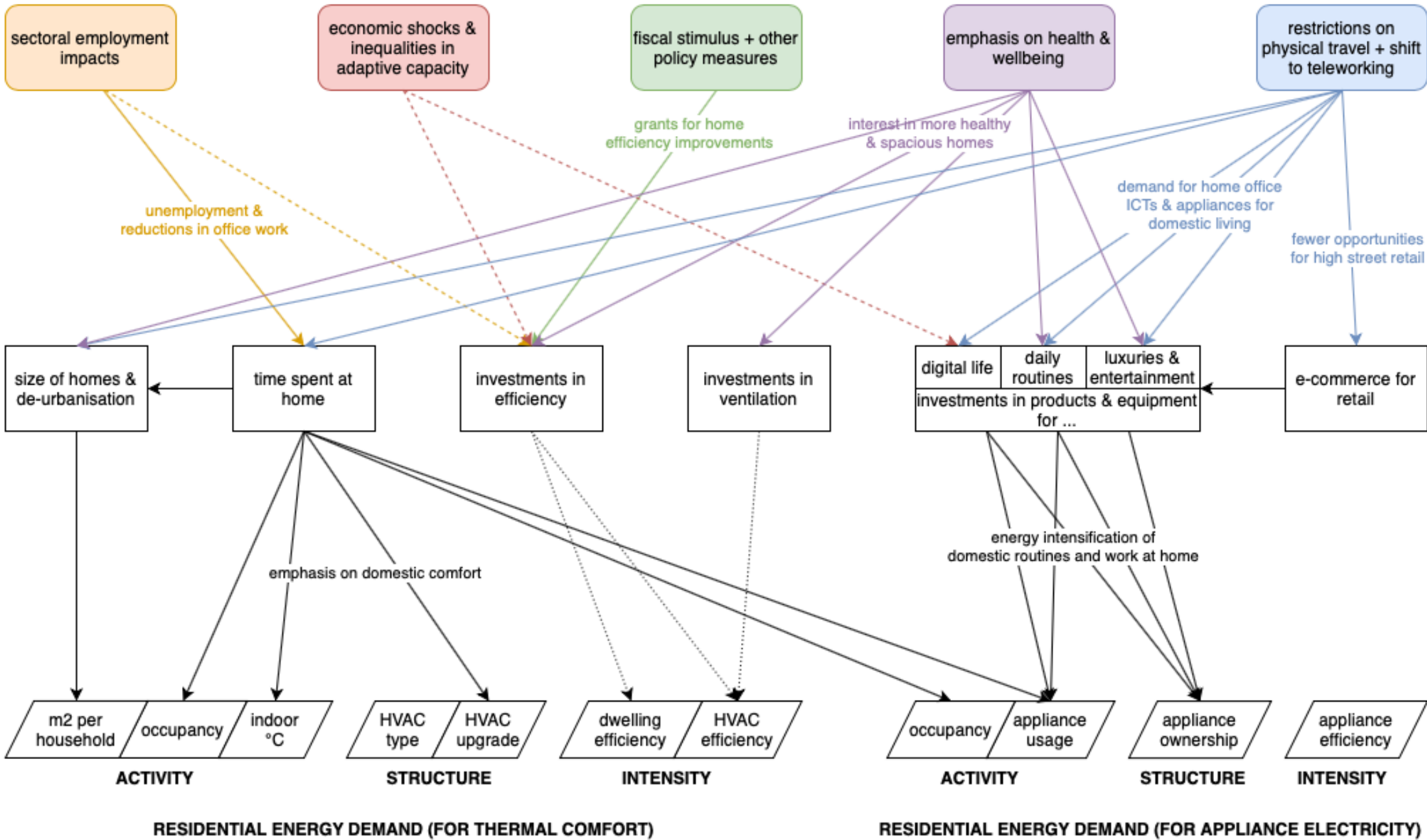


**COMPONENTS OF ENERGY DEMAND**



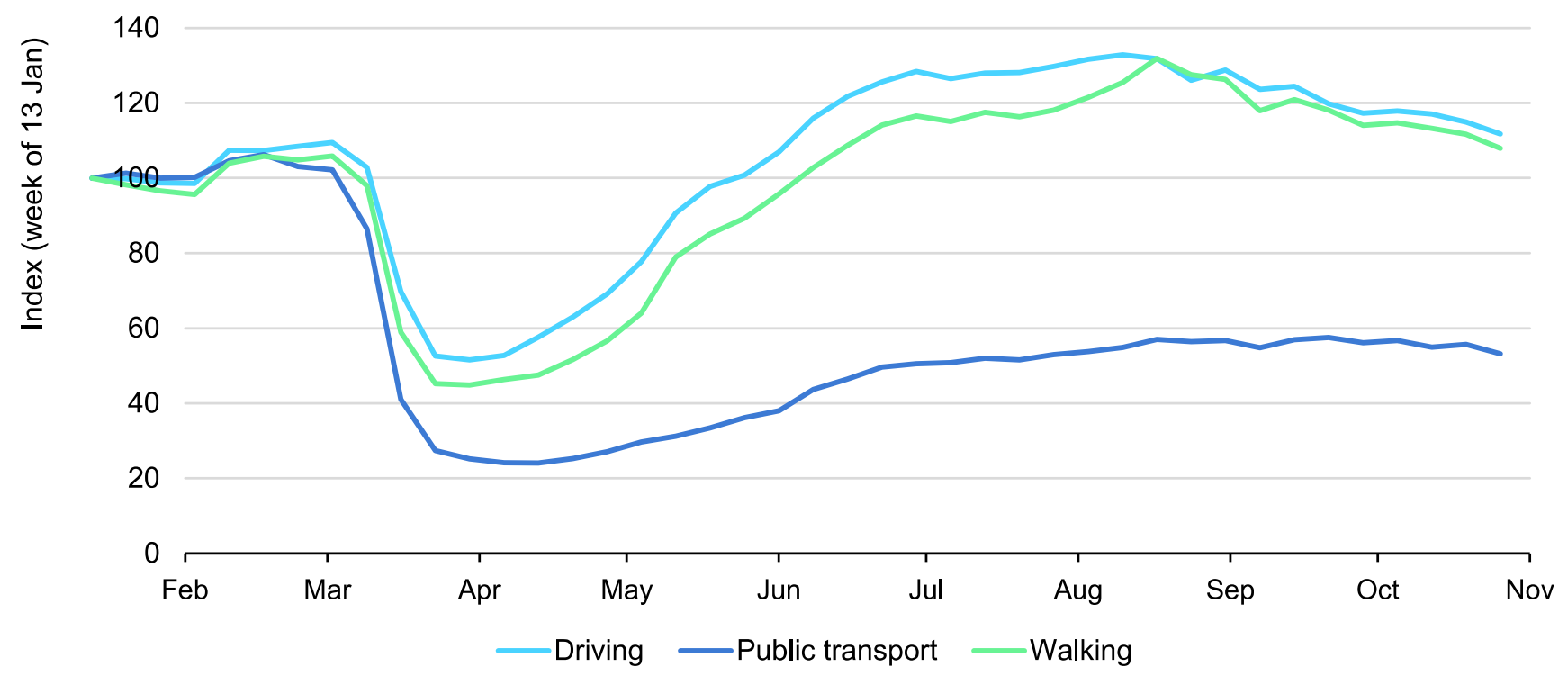
**RESIDENTIAL ENERGY DEMAND (FOR THERMAL COMFORT)**

**RESIDENTIAL ENERGY DEMAND (FOR APPLIANCE ELECTRICITY)**



# COVID-19 impacts on active travel

**Figure 5.3** Index of changes in work week transport trip requests by mode, compared with baseline, February to October 2020, United States



*Figure from:*  
IEA (2020). Energy Efficiency 2020. Paris, France, International Energy Agency.

*Based on data from:*  
Apple Mobility Trends Reports for the US, based on routing requests to Apple Maps app. Baseline = week of 13 Jan 2020.

IEA 2020. All rights reserved.



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# COVID-19 impacts on vehicle fleet turnover

Figure 5.6 Global car sales (left) and electric car sales (right) by key markets, 2015-20

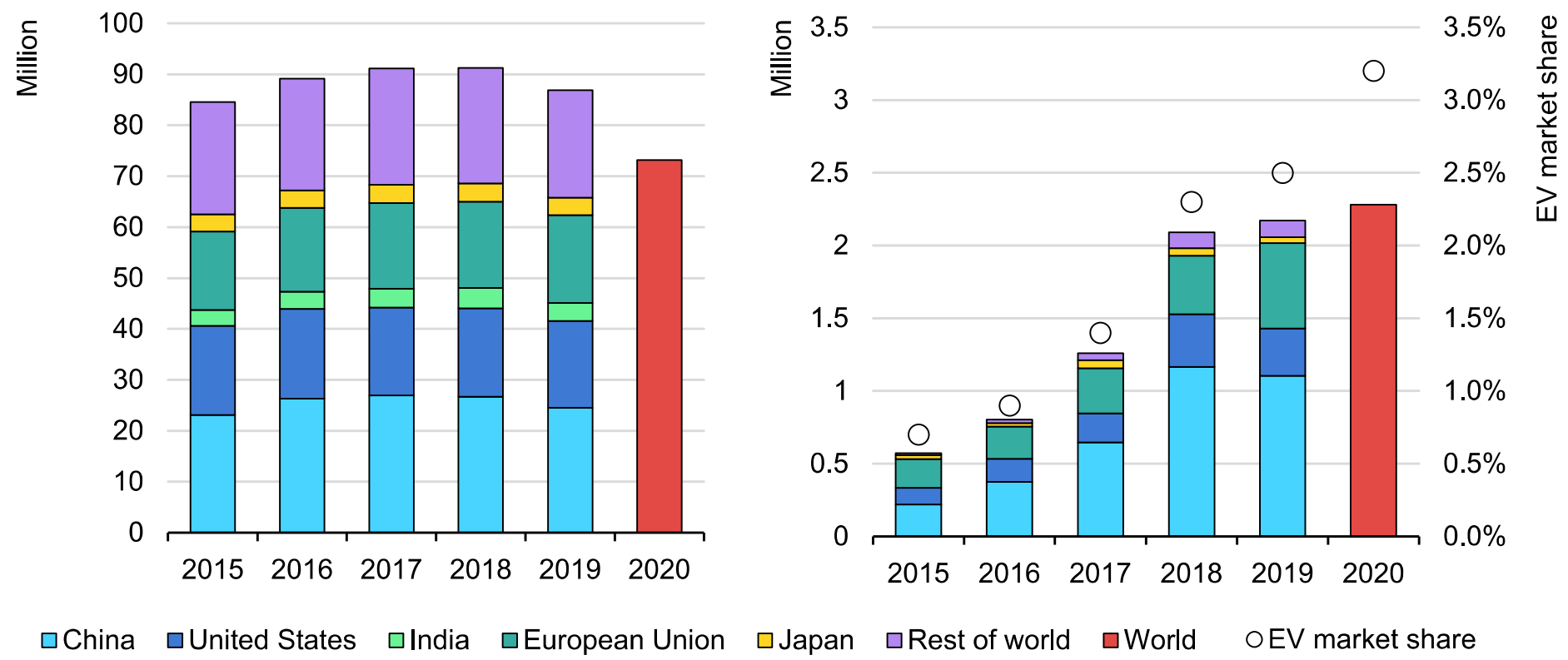


Figure from:  
IEA (2020).  
Energy Efficiency  
2020. Paris,  
France,  
International  
Energy Agency.

Based on data  
from:  
IEA (2020) World  
Energy  
Investment, and  
IEA (2020)  
Tracking Clean  
Energy Progress.

IEA 2020. All rights reserved.

# Covid-19 impact pathways on transport energy demand (land-based passenger mobility)

**SYSTEMIC EFFECTS**  
(societal & economic impacts of Covid-19)

sectoral employment impacts

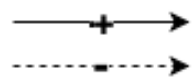
inequalities in household adaptive capacity

fiscal stimulus + other policy measures

emphasis on health & wellbeing

restrictions on physical travel + shift to teleworking

**IMPACT PATHWAYS**



**PROXIMATE EFFECTS**  
(direct antecedents of energy demand)

leisure | commuting | shorter, local journeys  
travel demand for ...

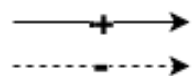
new car sales

viability & provision | ridership  
public transport services ...

investment in active travel infrastructure

multi-occupancy modes | single occupancy modes  
preferences for ...

**IMPACT PATHWAYS**



less overall travel demand partially offset by more local journeys

fewer public transport options & services

shift from public & shared modes to cars & active modes

**COMPONENTS OF ENERGY DEMAND**

total p-km | vehicle occupancy | # of vehicles

EV % of vehicle fleet | public | shared | active | private  
modal share of total p-km

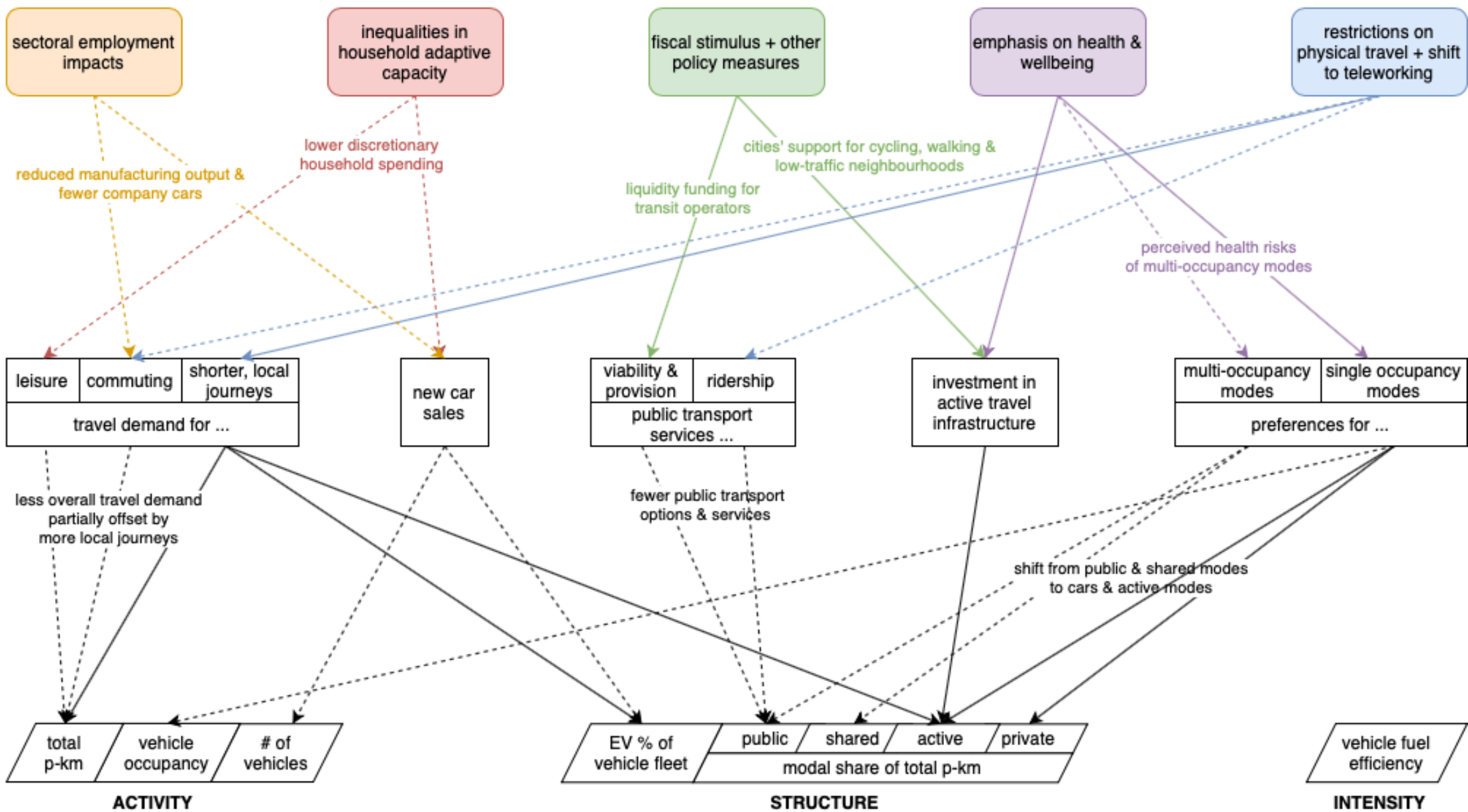
vehicle fuel efficiency

**ACTIVITY**

**STRUCTURE**

**INTENSITY**


**TRANSPORT ENERGY DEMAND (FOR LAND-BASED PASSENGER MOBILITY)**







# Mapping impact pathways helps modelling and policy

## Modelling

- Persistence of observed near-term impacts
  - New emergent medium-term impacts
- 
- Evidence-based scenarios and modelling of long-term impacts on demand and emissions

## Policy Opportunities

- Adverse observed and *potential* impacts on demand  Counteracting policies
- Beneficial observed and *potential* impacts on demand  Strengthening policies



# Now is a policy window to act on energy demand

## Homes

COVID-19 impact	Strengthening policies
Increase in new appliance purchases	Scrappage programme for old ICTs and domestic appliances, purchase incentives for A+++ rated equipment
COVID-19 impact	Counteracting policies
Increase in occupancy and thermal comfort levels	Retrofit programmes and rollout of smarter zonal heating technologies to reduce heated floor area

## Mobility

COVID-19 impact	Strengthening policies
Increase in active travel & micro-mobility within cities	Municipal infrastructure for walking, cycling & low-traffic neighbourhoods, fast-track licensing for micro-mobility providers
COVID-19 impact	Counteracting policies
Slowdown in vehicle fleet turnover and new EV sales	EV purchase and road tax incentives, stimulus support for EV manufacturing, regulatory phase-out of petrol and diesel vehicles

