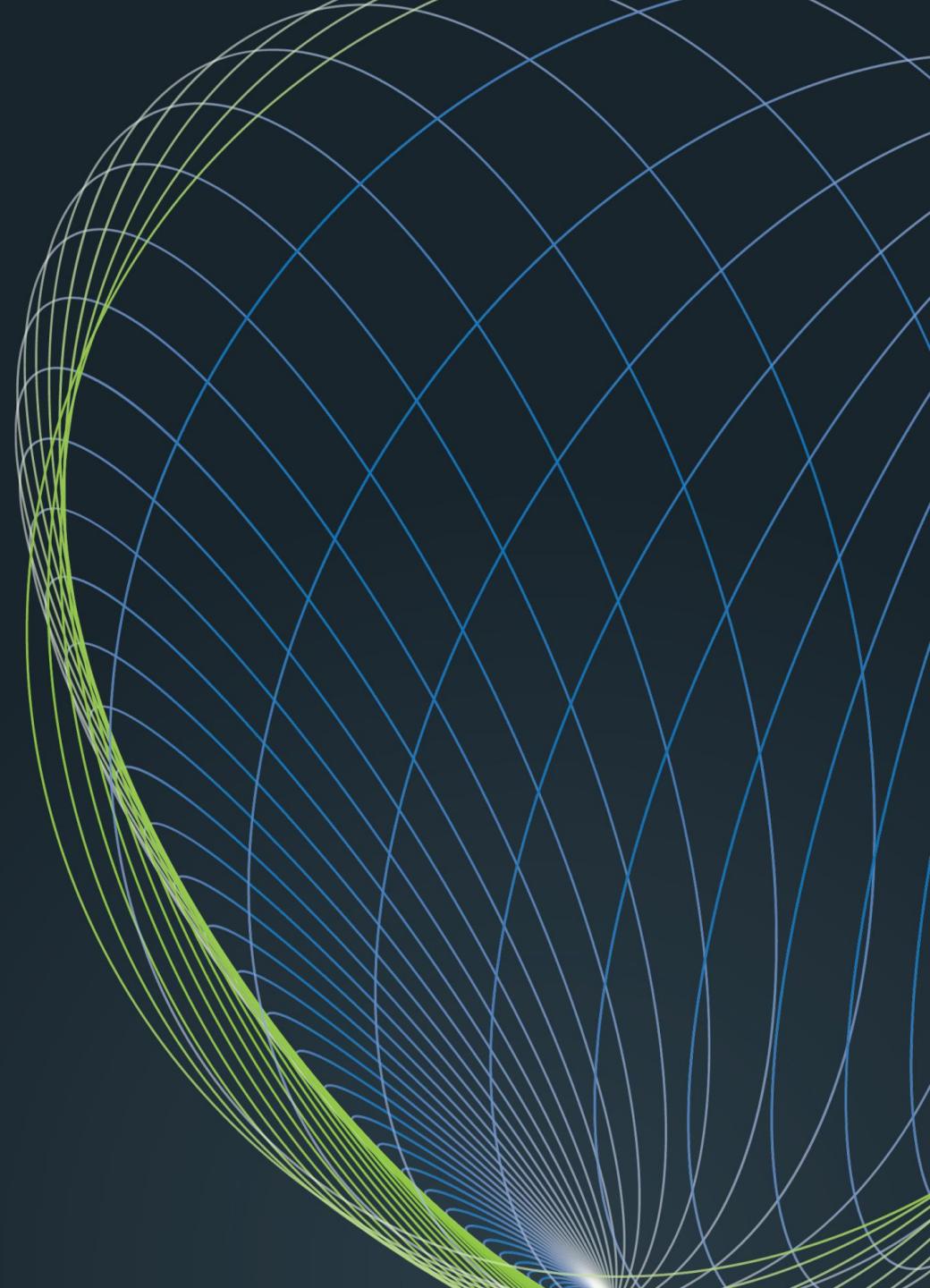


Positive tipping points for electric vehicles

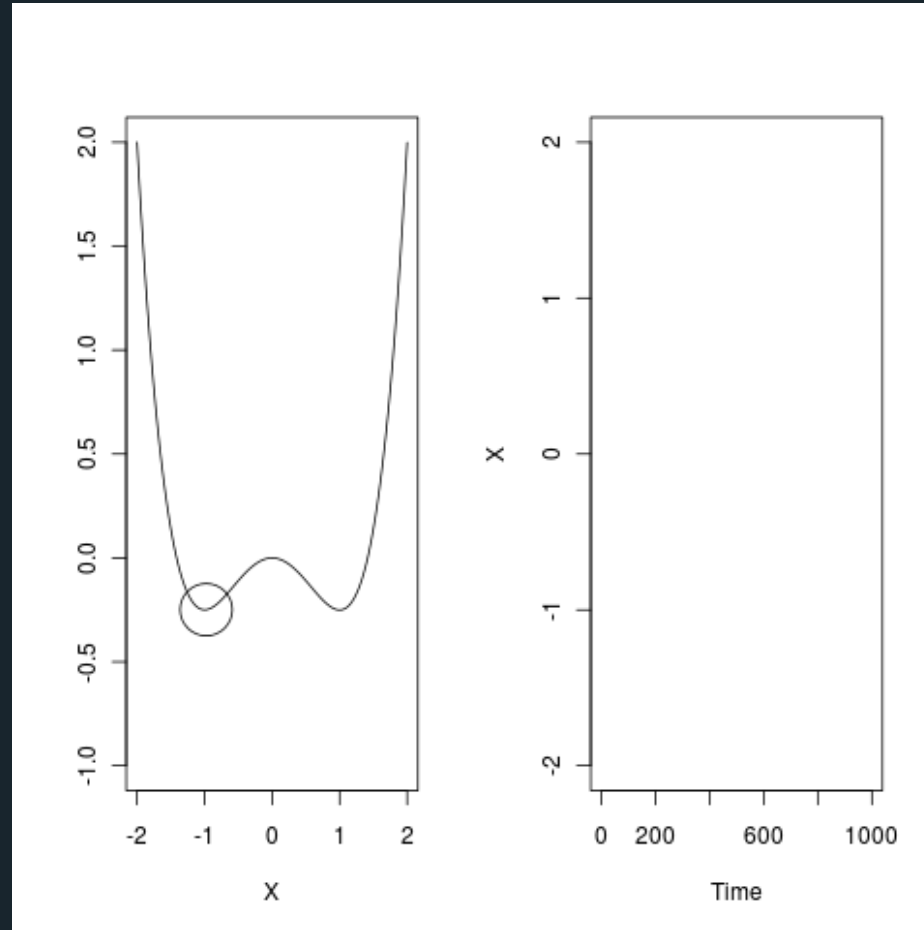
Tim Lenton

Director, Global Systems Institute, University of Exeter
t.m.lenton@exeter.ac.uk

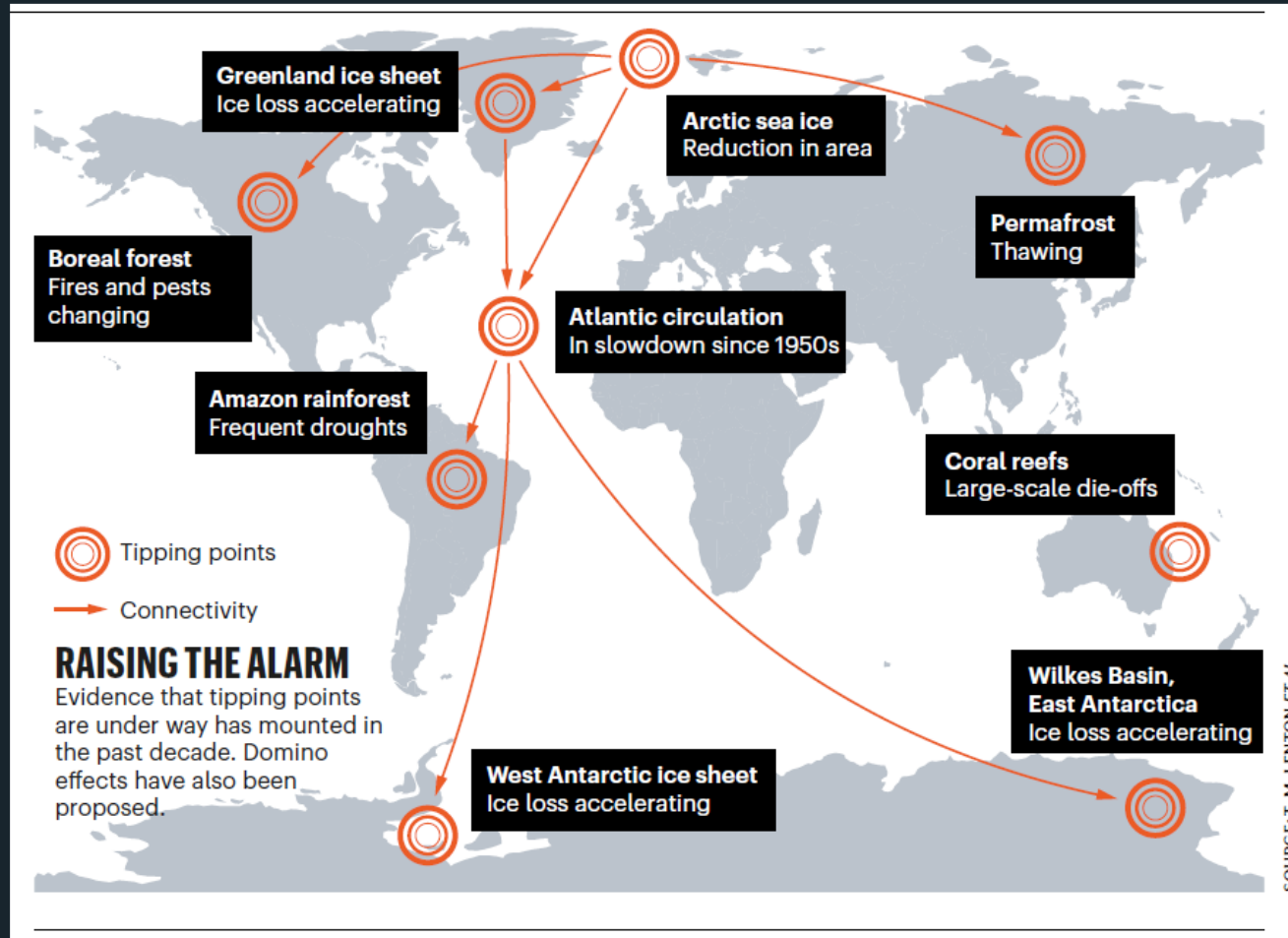
exeter.ac.uk/gsi



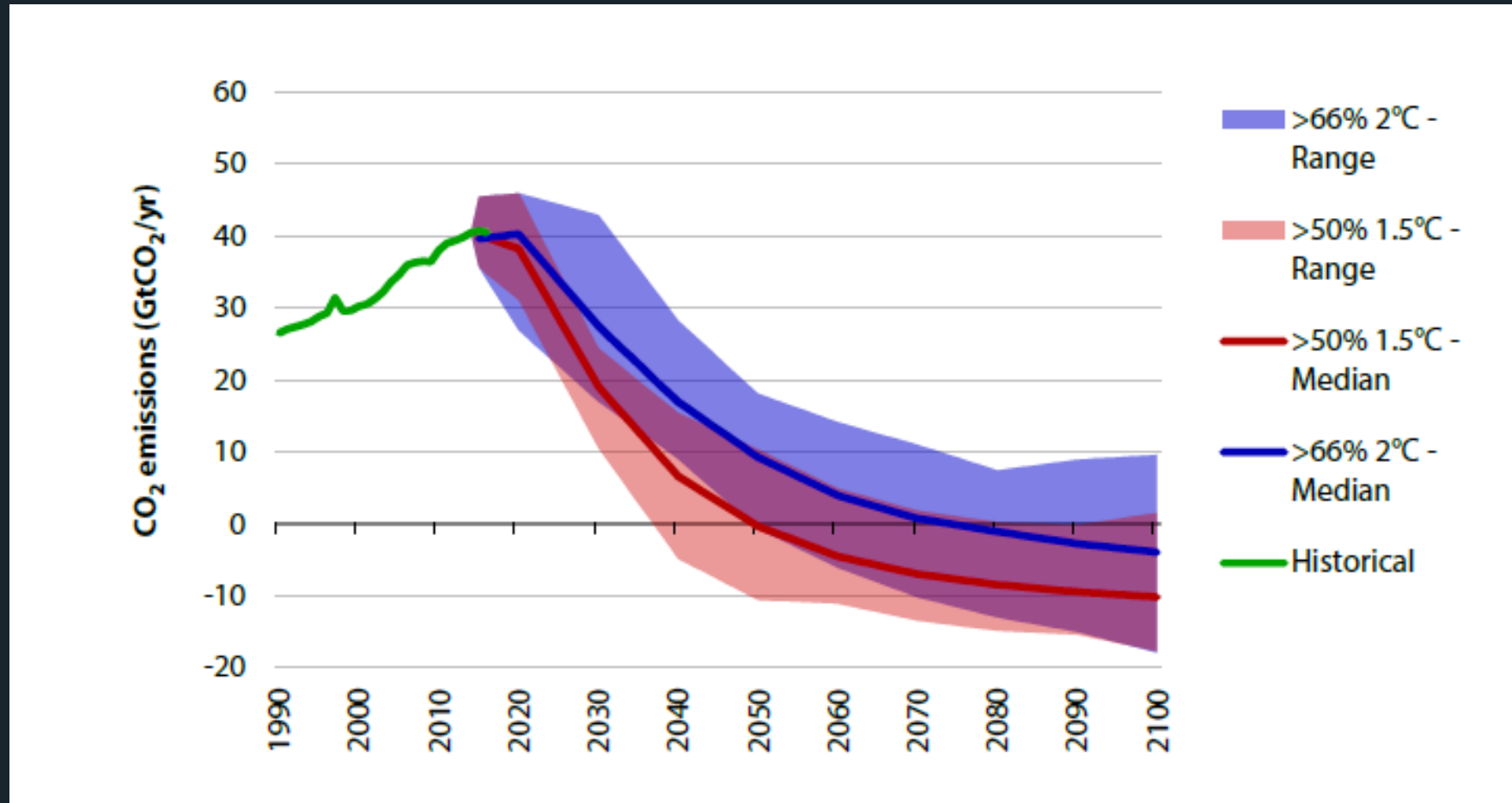
Passing a tipping point



Interacting climate tipping points



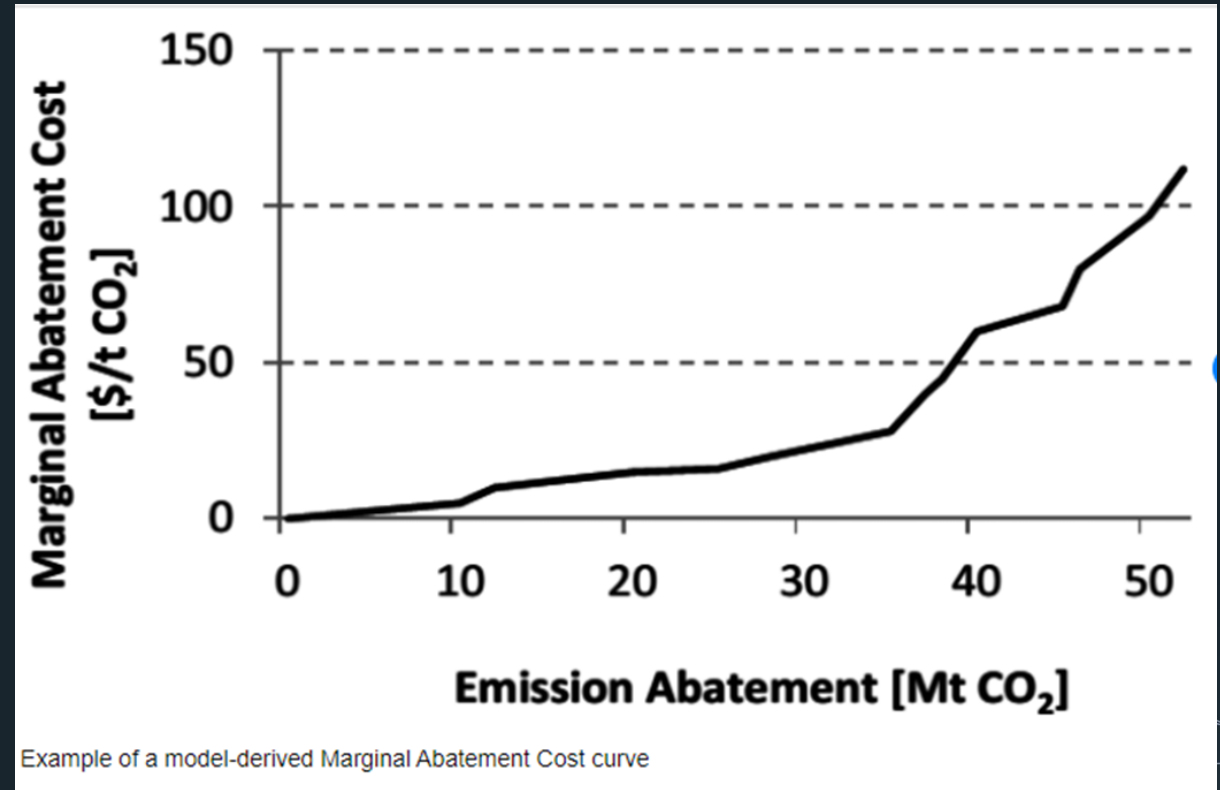
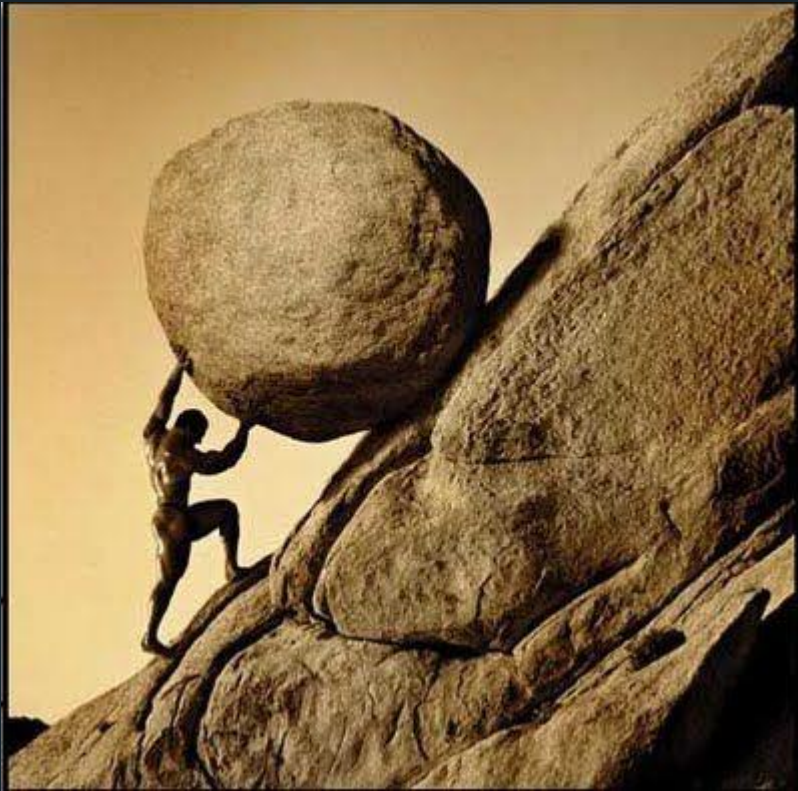
Global CO₂ emissions to meet Paris goals



Committee on Climate Change (2019) *Net Zero: The UK's Contribution to Stopping Global Warming*

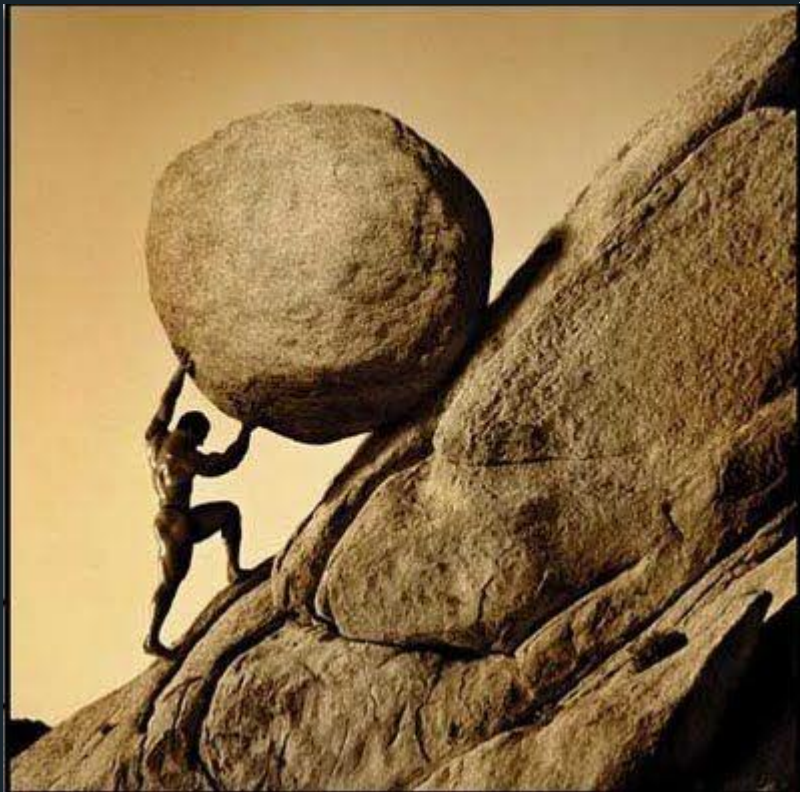


Traditional models of economics of emissions reduction



System transition

Tipping point



Global Systems Institute



Past tipping point

Easter Parade, 5th Avenue, New York City

1900: Spot the automobile



Source: US National Archives.

1913: Spot the horse

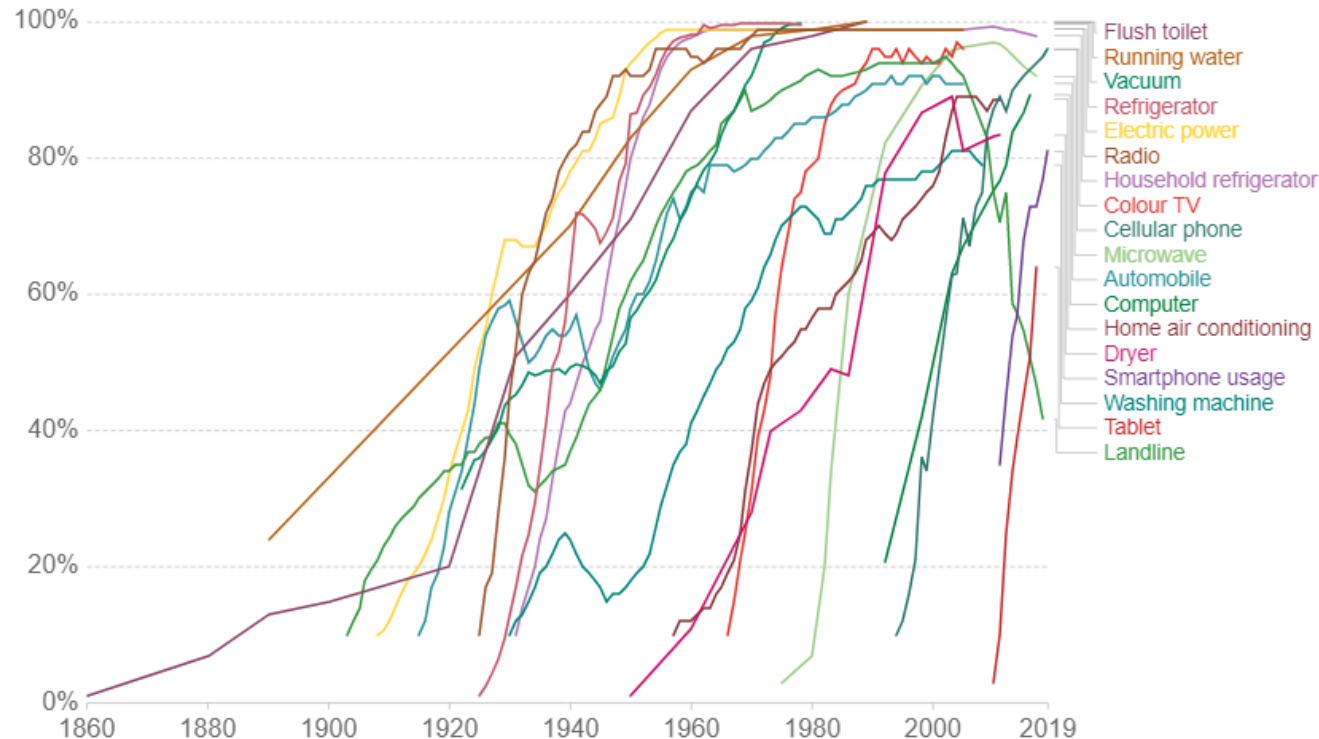


Reinforcing feedbacks in technology diffusion

Technology adoption in US households, 1860 to 2019

Technology adoption rates, measured as the percentage of households in the United States using a particular technology.

Our World
in Data



Source: Comin and Hobijn (2004) and others

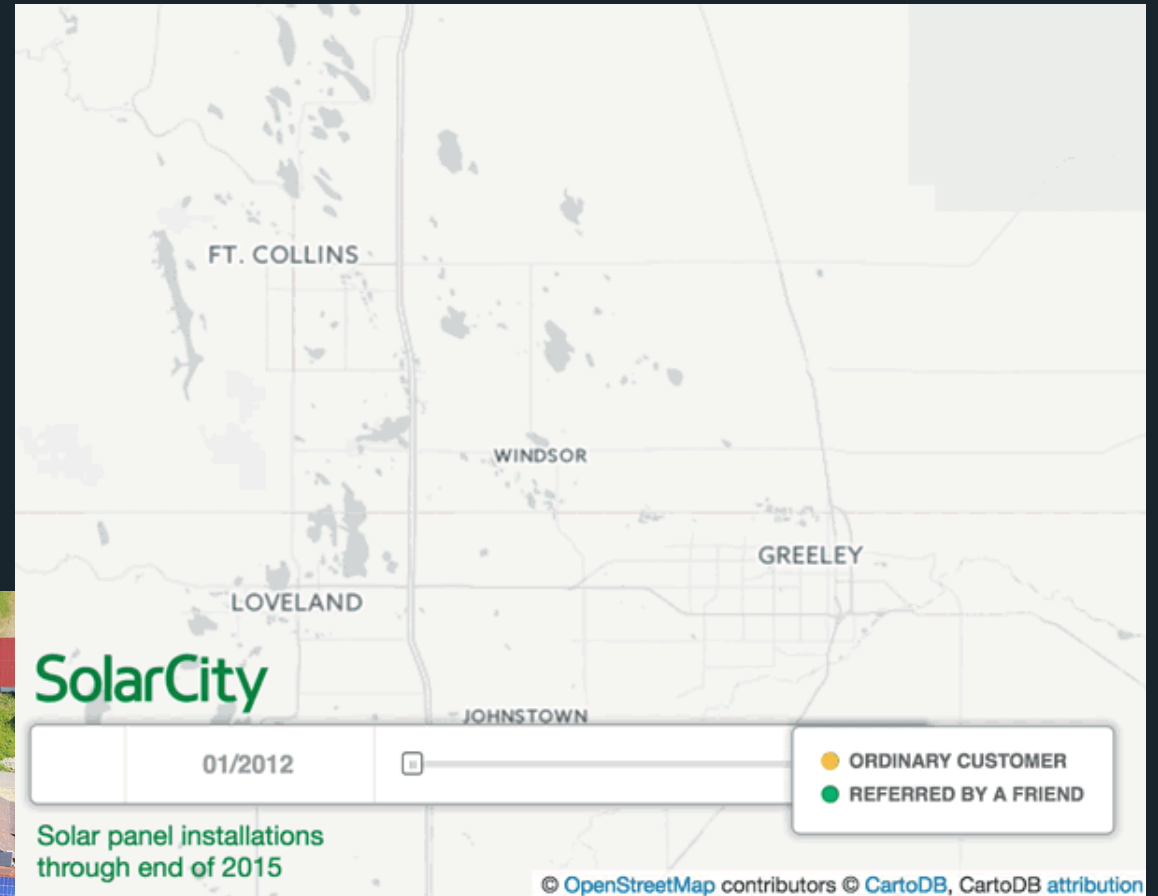
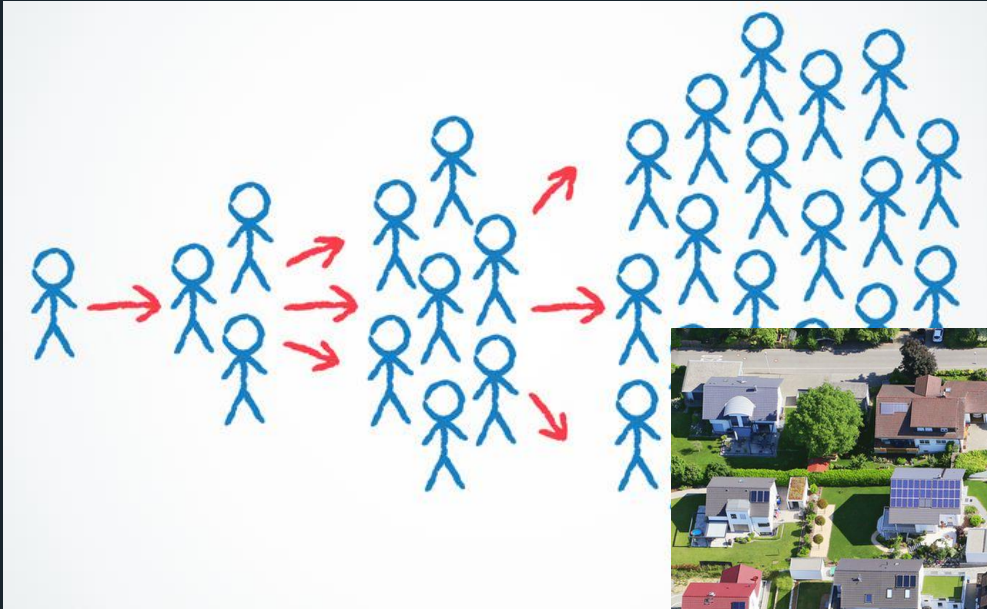
Note: See the sources tab for definitions of household adoption, or adoption rates, by technology type.

OurWorldInData.org/technology-adoption/ • CC BY

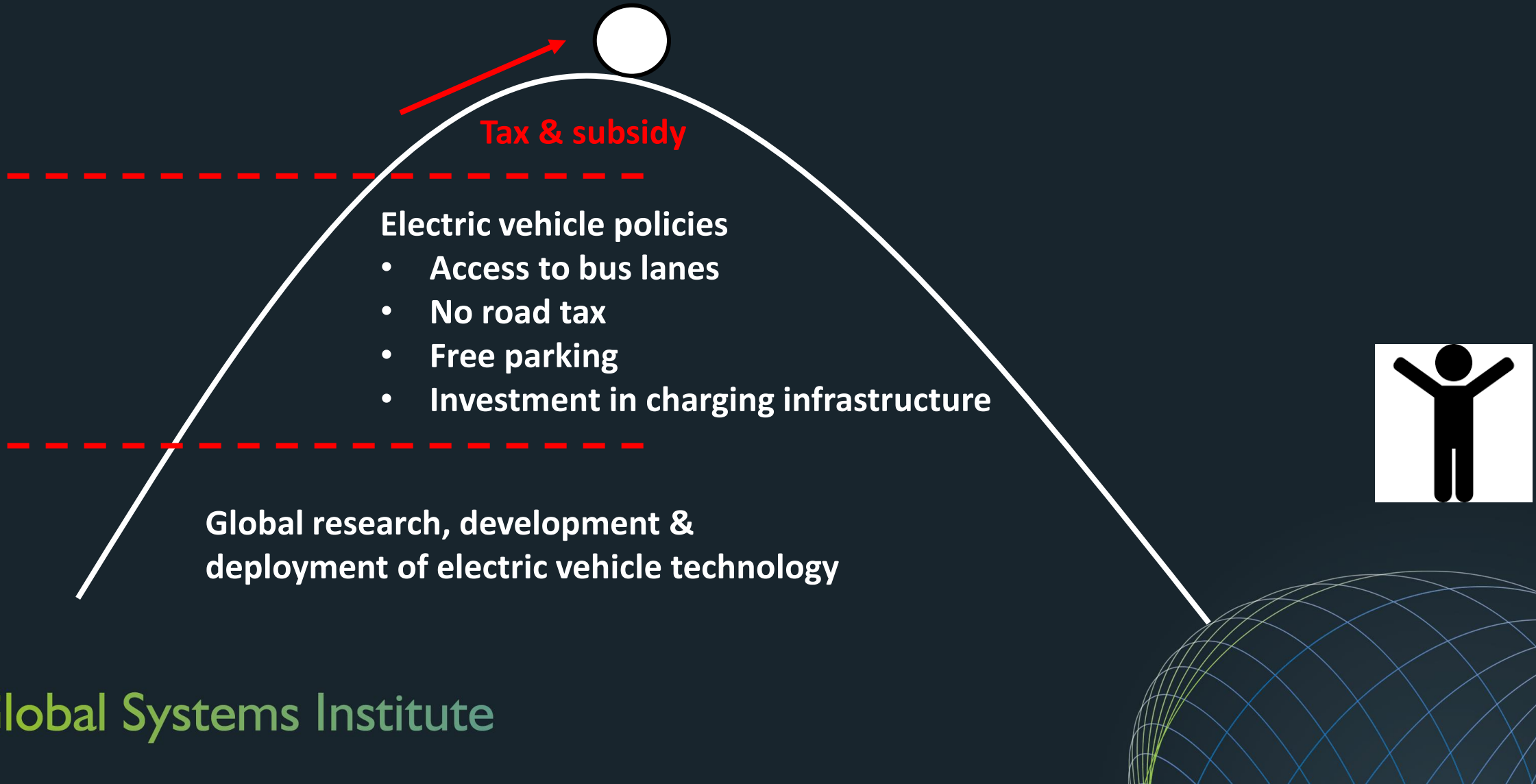
- The more something is made the better it can be made (learning-by-doing)
- The more something is made the more cheaply it can be made (economies of scale)
- The more something is used the more technologies emerge that make it more useful



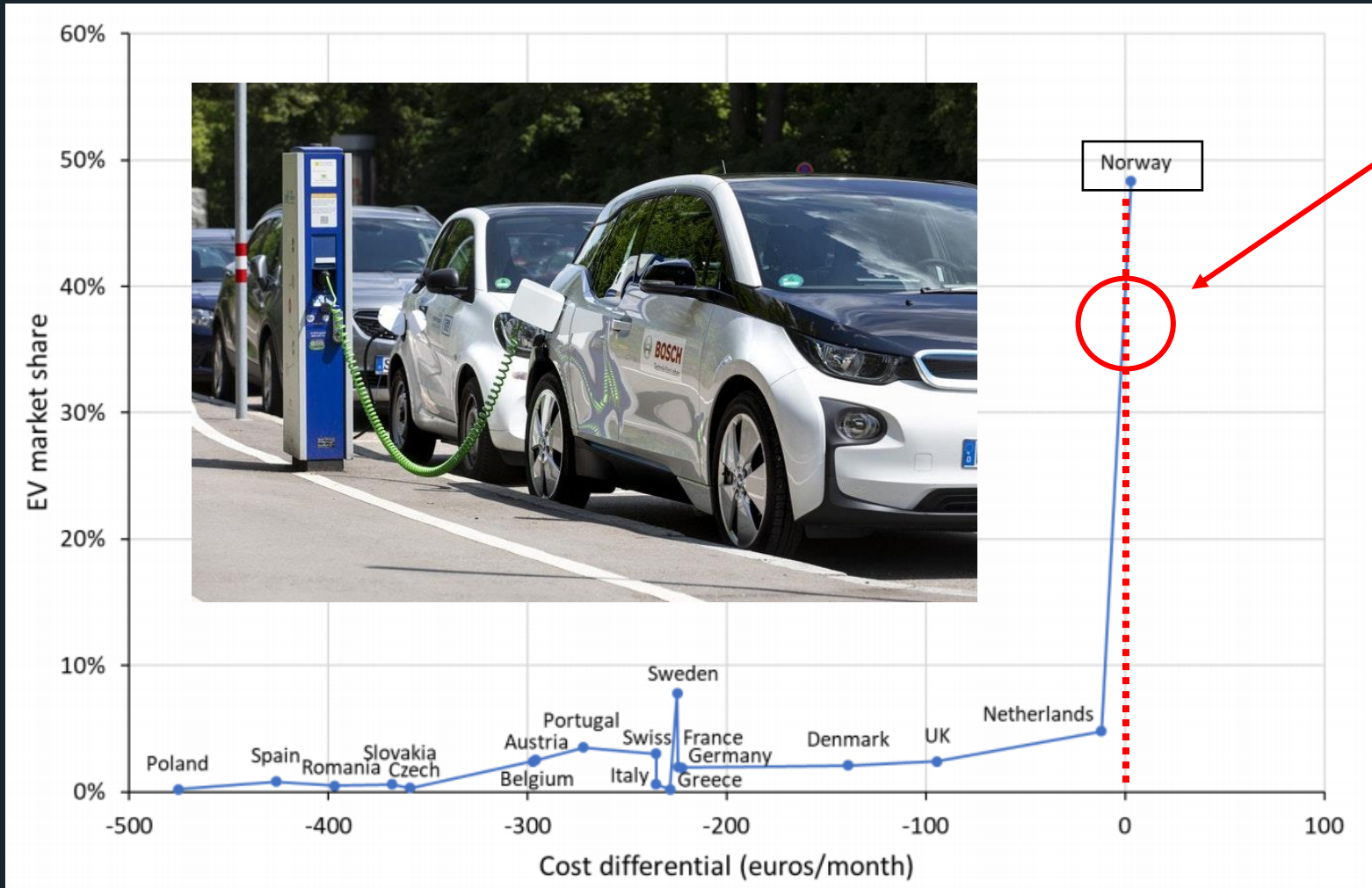
Social contagion



Norway road transport: tipping petrol cars out of the market



Norway road transport: fastest transition in the world



“The progressive tax system makes most EV models cheaper to buy compared to a similar petrol model, even if the import price for EVs are much higher.”

“This is the main reason why the Norwegian EV market is so successful compared to any other country.”

Norway EV agency

<https://elbil.no/english/norwegian-ev-policy/>

Robbie Andrew
@robbie_andrew

I doubt there are many outside of Norway that know that the Norwegian pop group A-ha was critical in the introduction of electric car incentives in Norway. I certainly didn't. Read on...



11:24 am · 9 Jan 2021 · Twitter Web App

3,604 Retweets 1,331 Quote Tweets 9,821 Likes

Robbie Andrew @robbie_andrew · 9 Jan

Replying to @robbie_andrew

In 1989, two members of the group, Morten Harket and Magne Furuholmen were in Switzerland with environmentalist Frederic Hauge, when they came across a hobby-converted Fiat Panda. Stated range: 45 km. They snapped it up and imported it to Norway.

Photo: In Switzerland (Bellona)



8 82 801

Robbie Andrew @robbie_andrew · 9 Jan

They were unhappy with "disincentives" to owning an electric car, including road tolls. So they drove repeatedly through toll stations without paying. Every time, they received a fine, which they didn't pay. According to the rules, the car was then confiscated.

Photo: Bellona.



7 44 599

Robbie Andrew @robbie_andrew · 9 Jan

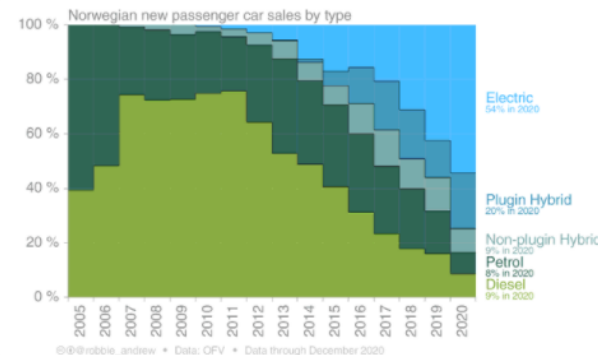
Finally, in 1996, the team had their way and electric cars were exempted from paying road tolls, the star power of A-ha helping along the way. Presumably the government just gave up, since exempting one car wasn't going to break the bank.

Source:



Robbie Andrew @robbie_andrew · 9 Jan

These early efforts were important in the long process (starting with the oil crises in the 1970s) of developing interest in electric cars in Norway, from a few individuals through to 2020's extraordinary record 54% of all new cars sold being battery-electric.



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Robbie Andrew @robbie_andrew · 9 Jan

Note that while some sources say that the converted Fiat Panda was in 1989 the first electric car in Norway, the history goes a bit further back.

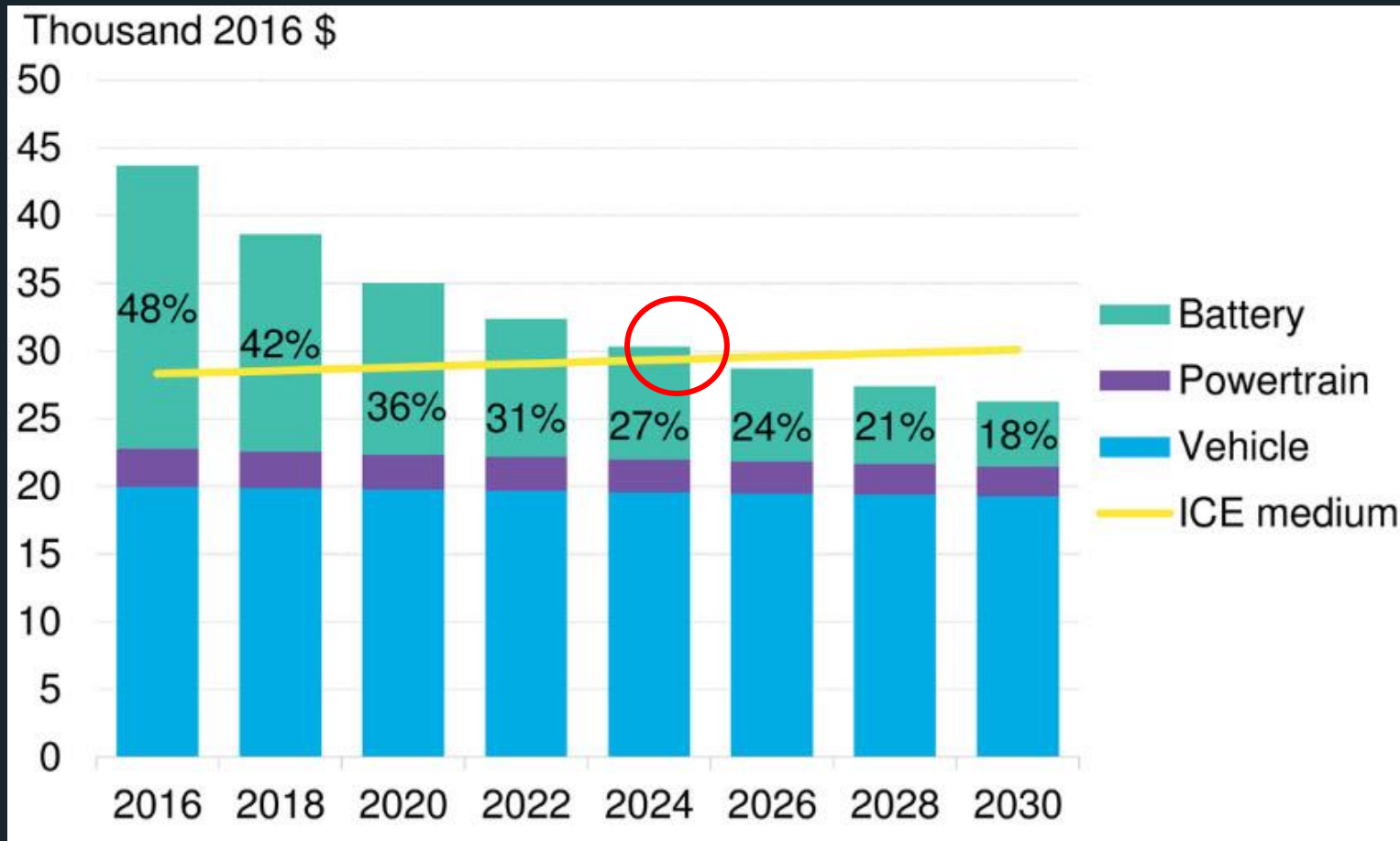


Norges eldste elbil ga rekkeviddeangst allerede i 1902. Fremdeles skre...
- Å kjøre den er uvant, ubehagelig og ukomfortabelt.
@tu.no

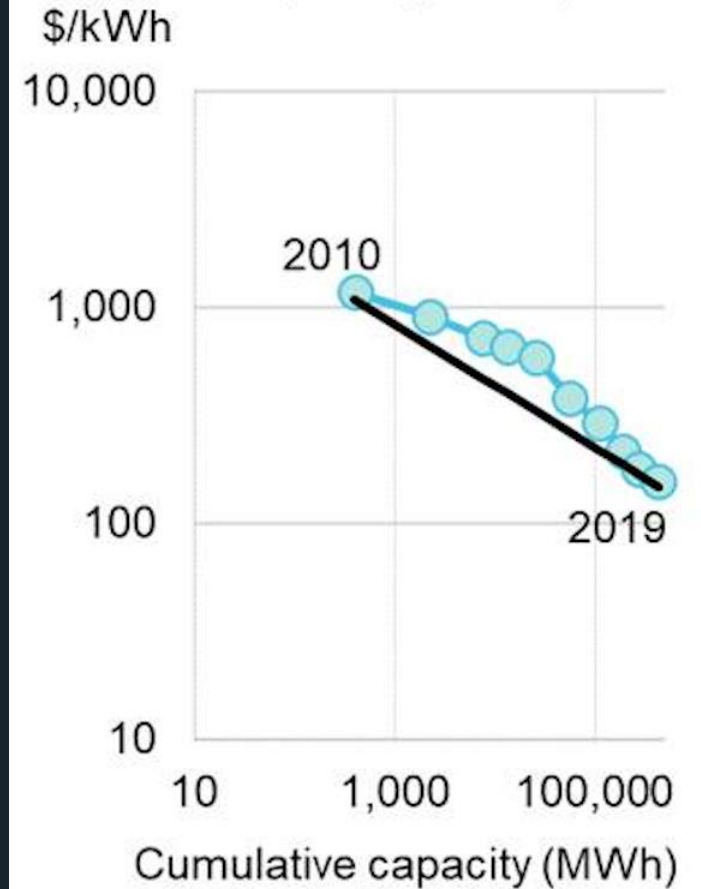
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Global road transport: price parity tipping point

Up-front cost of vehicle



Batteries pack price (\$/kWh)

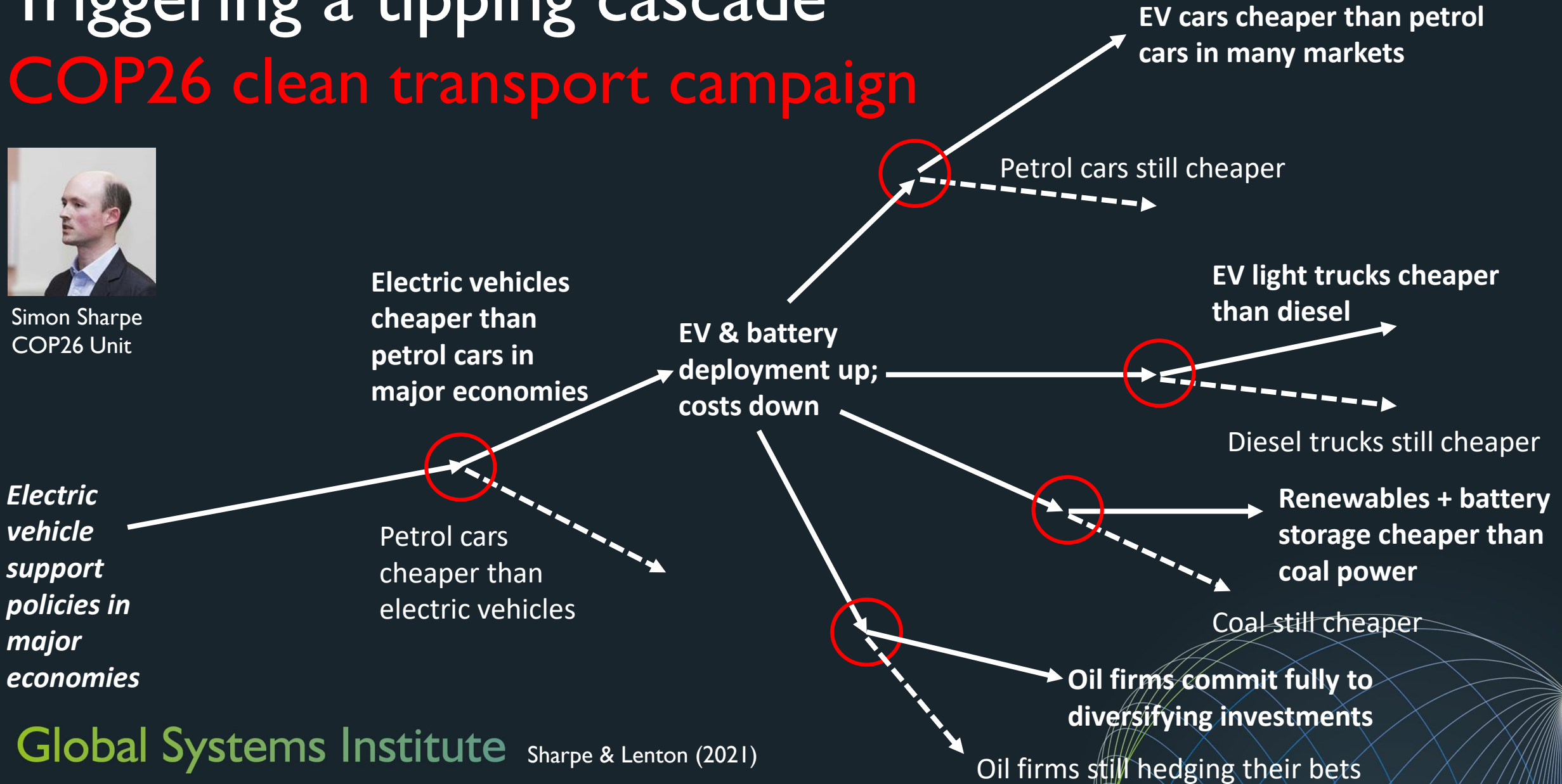


Triggering a tipping cascade

COP26 clean transport campaign



Simon Sharpe
COP26 Unit



Interacting economic tipping points

