Positive tipping points for electric vehicles

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Passing a tipping point
Interacting climate tipping points

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Lenton et al. (2019) Nature
Global CO$_2$ 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

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Past tipping point

Easter Parade, 5th Avenue, New York City

1900: Spot the automobile
1913: Spot the horse

Source: US National Archives.
Reinforcing feedbacks in technology diffusion

- 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

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Social contagion

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Norway road transport: tipping petrol cars out of the market

Tax & subsidy

Electric vehicle policies
- Access to bus lanes
- No road tax
- Free parking
- Investment in charging infrastructure

Global research, development & deployment of electric vehicle technology
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/
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...

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)

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.

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:

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.

Norges eldste eibil ga rekkeviddeengang allerede i 1902. Fremdeles skire... – Å kjøre dem er uvant, ubehagelig og ukomfortabelt.
Global road transport: price parity tipping point

Up-front cost of vehicle

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Bloomberg NEF
Triggering a tipping cascade
COP26 clean transport campaign

Electric vehicles cheaper than petrol cars in major economies

Petrol cars cheaper than electric vehicles

EV & battery deployment up; costs down

EV cars cheaper than petrol cars in many markets

Petrol cars still cheaper

EV light trucks cheaper than diesel

Diesel trucks still cheaper

Renewables + battery storage cheaper than coal power

Coal still cheaper

Oil firms commit fully to diversifying investments

Oil firms still hedging their bets

Sharpe & Lenton (2021)
Interacting economic tipping points

- Low cost batteries
- Smart energy systems
- Clean hydrogen
- Advanced biofuels

POWER
- Clean electricity
- Other 1.6

CARS

TRUCKS

SHIPS

TRAIN

AIR

INDUSTRY
- Iron & steel 2.3
- Cement 2.2
- Chemical 1.1
- Other industry 2.2
- Aluminium 0.3
- Paper 0.2

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