The case against carbon pricing

Johan Lilliestam

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Two theoretical models for how to best mitigate climate change.

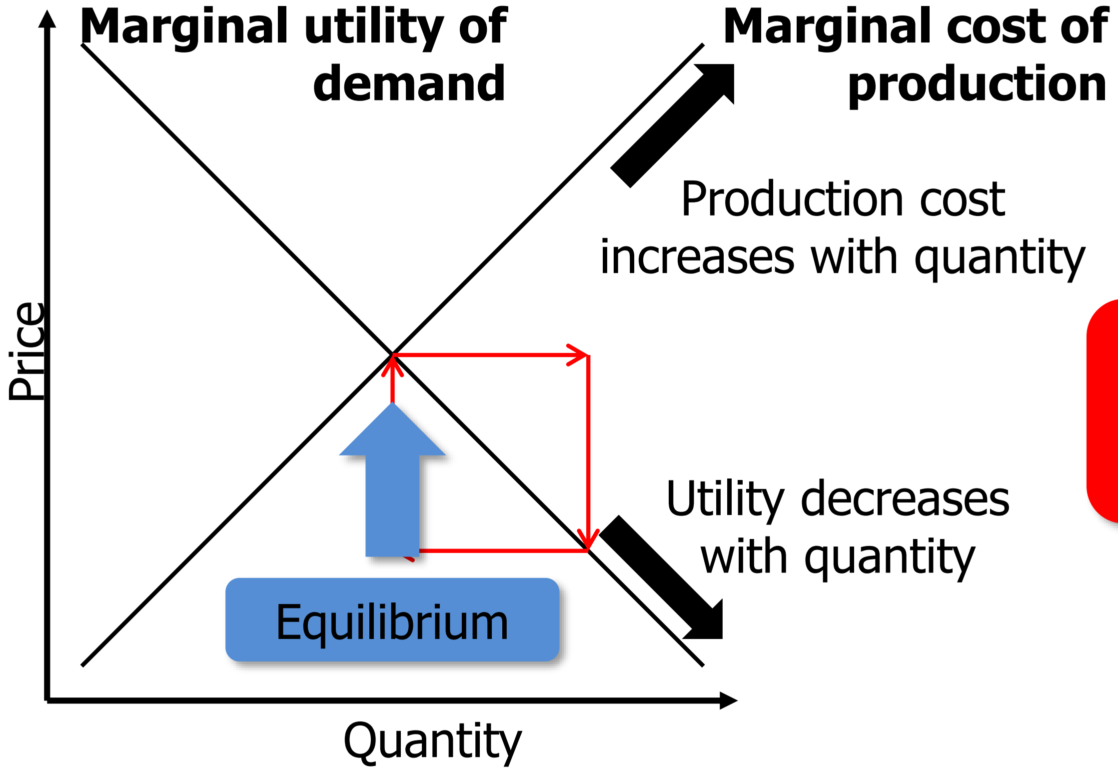
They play out over different time scales

They are good at achieving different aims

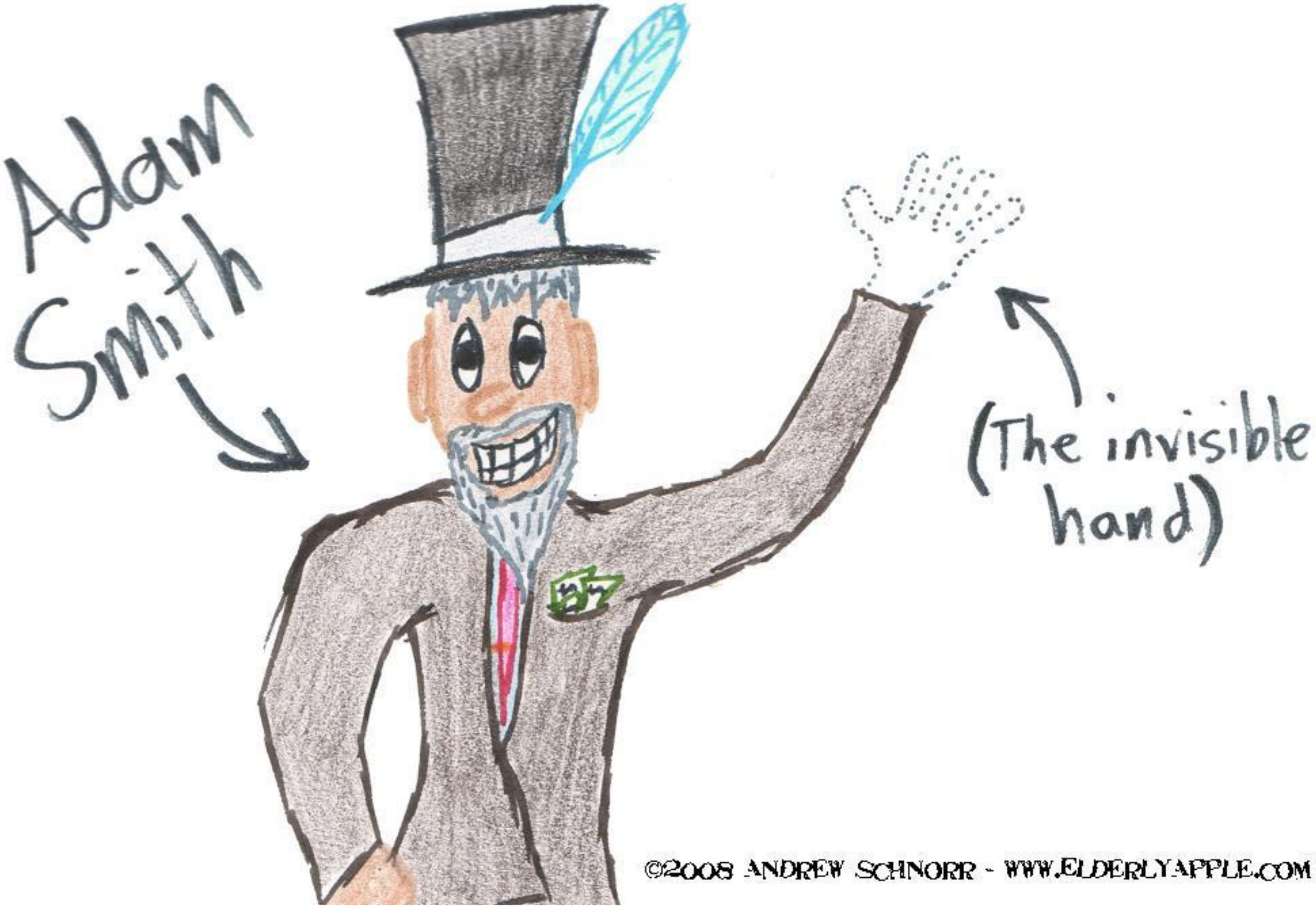
This presentation is based on these publications:

Patt & Lilliestam (2018), **Joule**
Lilliestam et al. (2012), **Climate & Development**
Ellenbeck & Lilliestam (2019), **Energy Research & Social Science**

The neo-classical model



If away from intersection: self-correct to intersection



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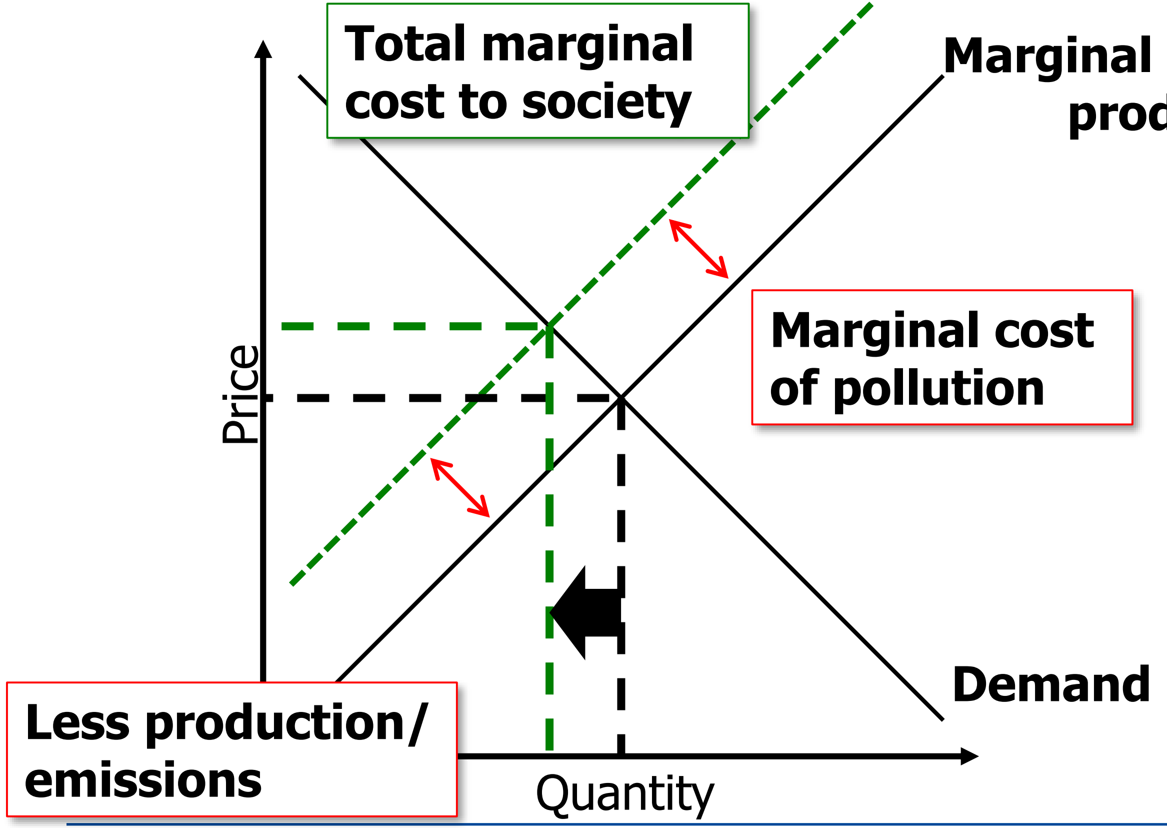
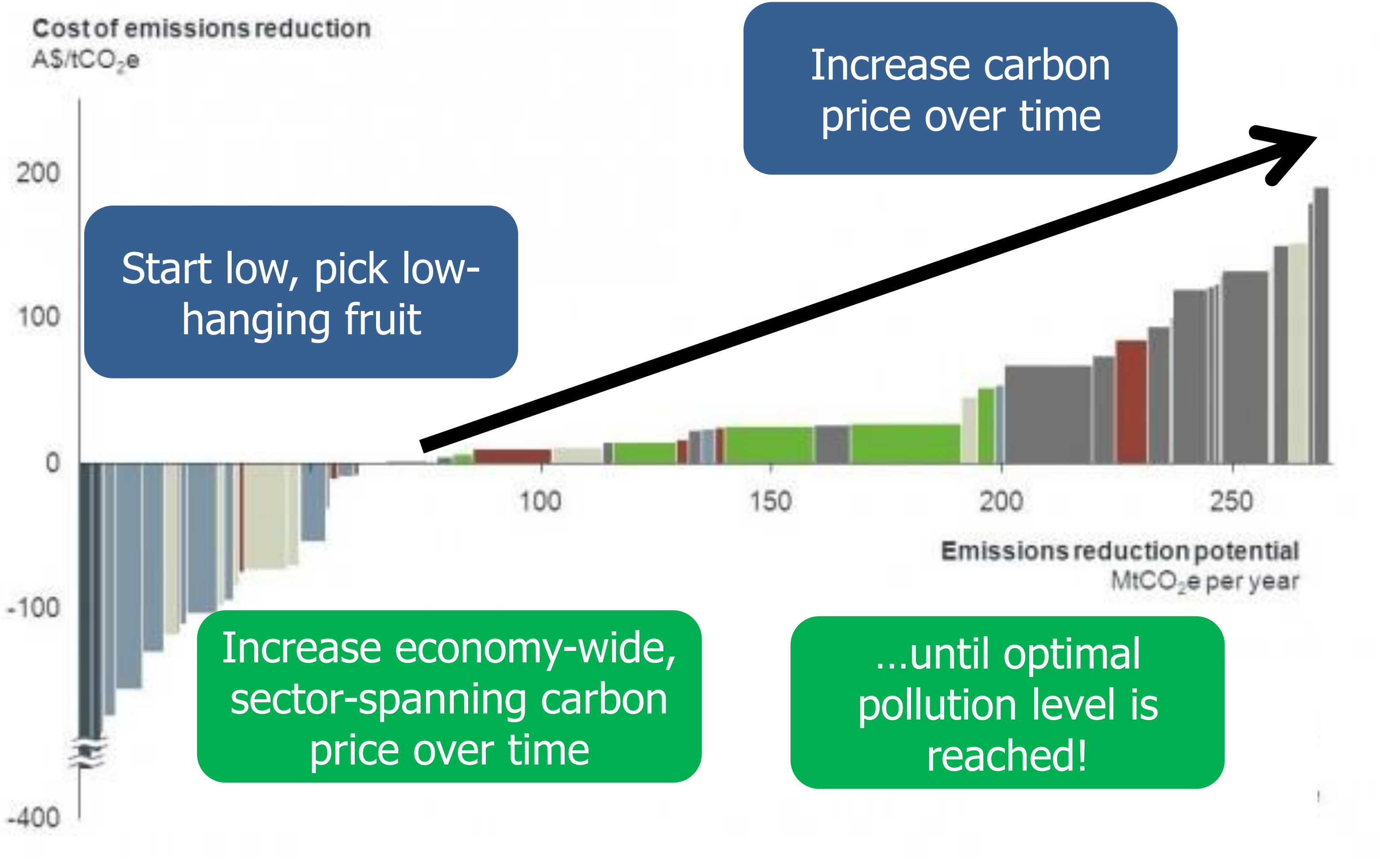
External costs: pricing in the cost of pollution



Through carbon tax or emissions trading



Picture source: Climateworks Australia

UNFCCC-COP3/KYOTO

地球温暖化防止京都会議

This model fits the knowledge, expectations of the Kyoto world:

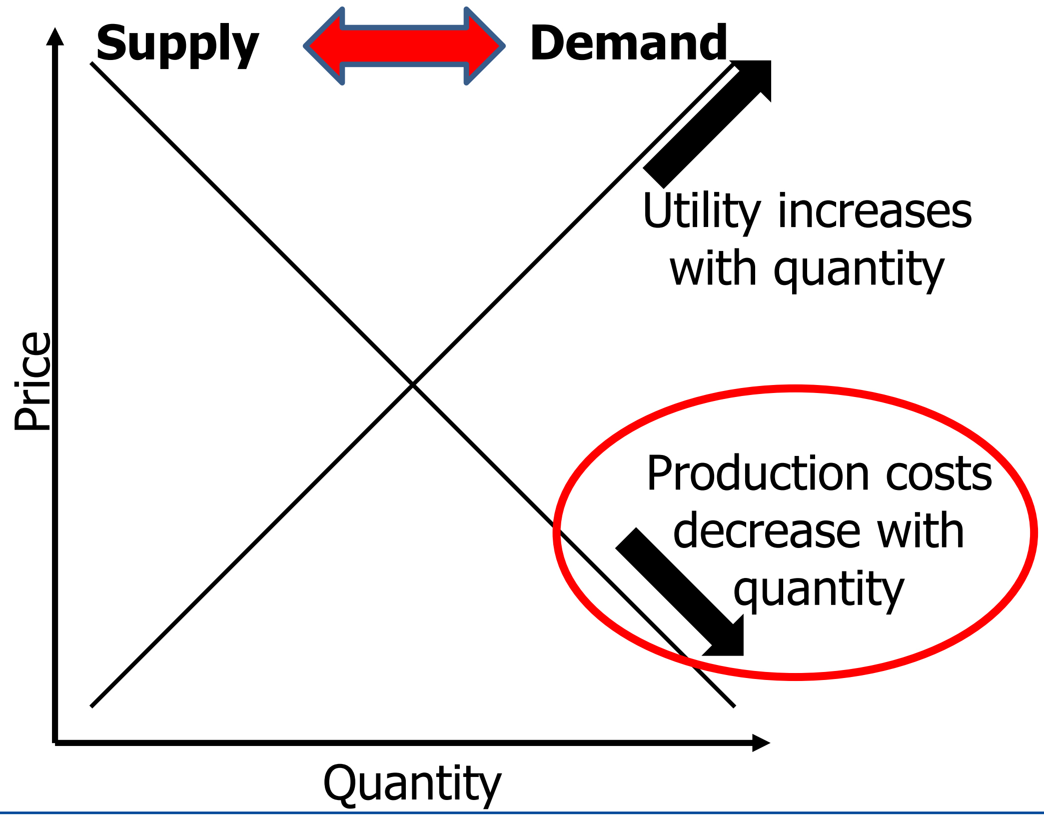
if we need to stop growth in emissions and then reduce a bit, carbon pricing is just the right instrument

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

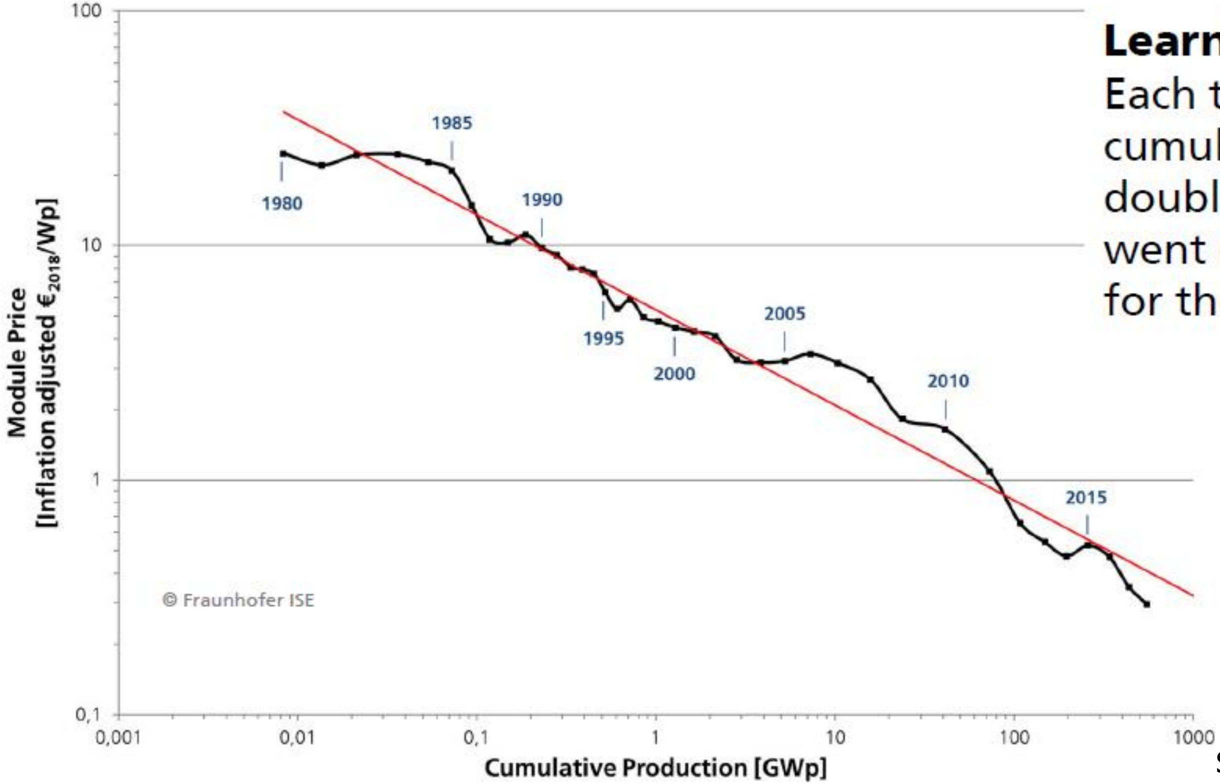
In a Paris world, the need is different:
we do *not* need to reduce emissions, but **completely eliminate** them

This requires us to create an entirely new, renewables-based energy system

The transition model: based on evolutionary economics



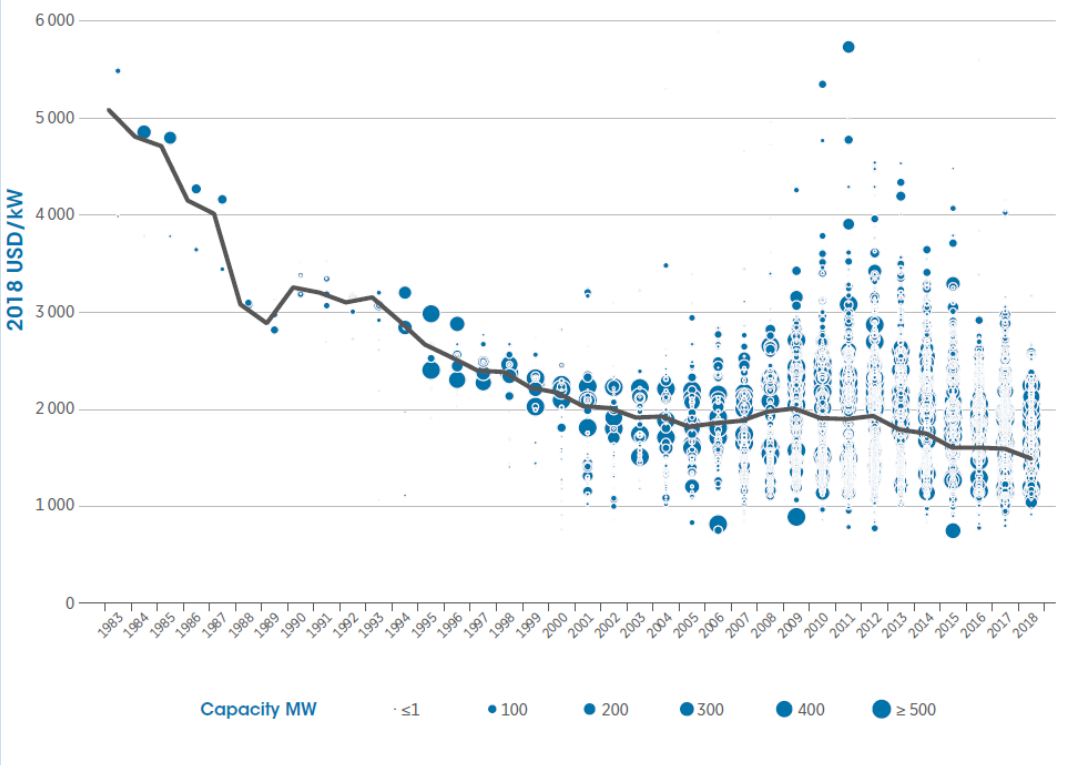
Decreasing PV costs



Learning Rate:
Each time the cumulative production doubled, the price went down by 24 % for the last 38 years.

Source: Fraunhofer ISE (2019)

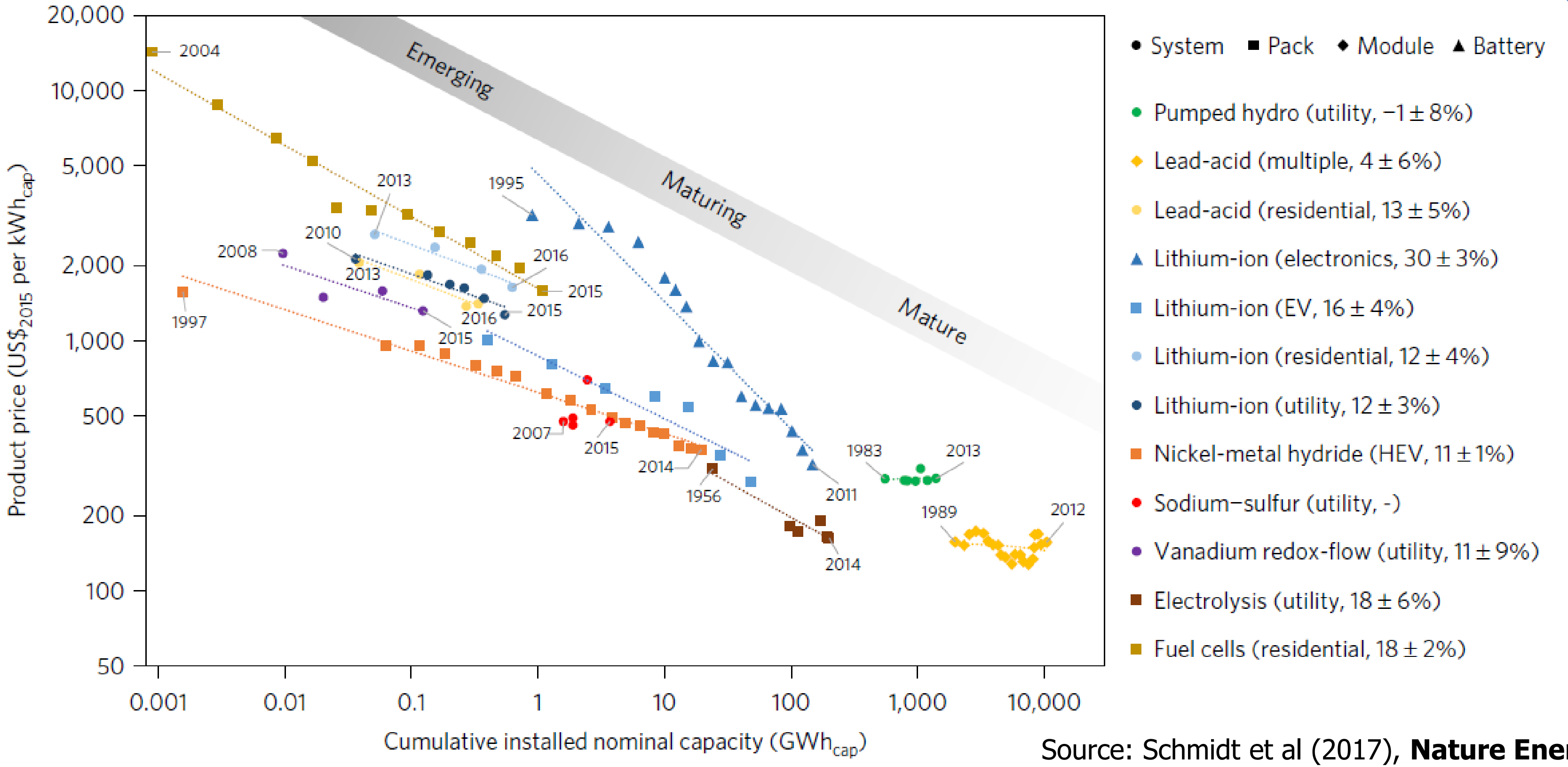
Decreasing wind power costs



Source: IRENA (2019)

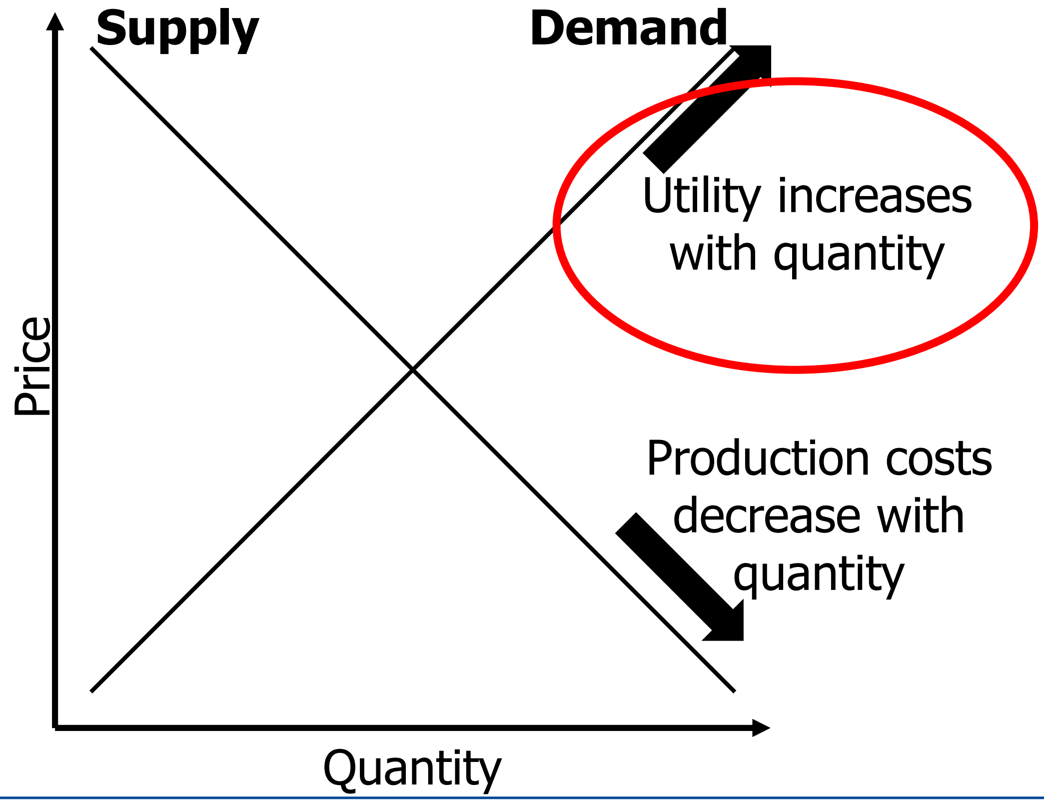
The global weighted-average installed costs of onshore wind have declined by 71% in 35 years, from around USD 5000/kW in 1983 to USD 1500/kW in 2018. This was driven by declines in wind turbine prices and balance of project costs.

Decreasing battery costs



Source: Schmidt et al (2017), **Nature Energy**

The transition model: evolutionary economics



Gadu-gadu

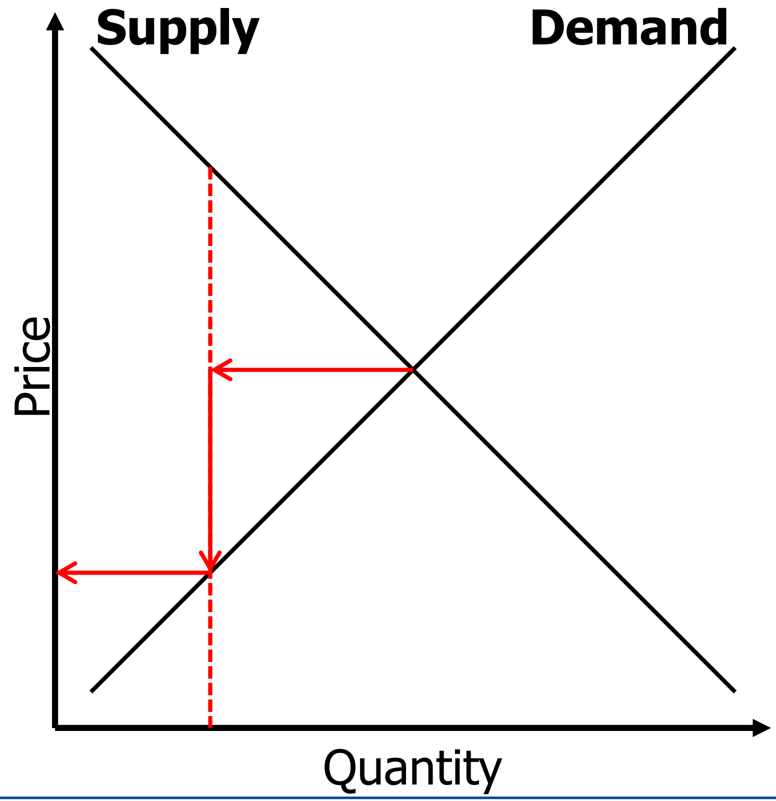
Polski komunikator internetowy

Technology:
Cost and performance

New infrastructure:
adapted to the needs of the new technology

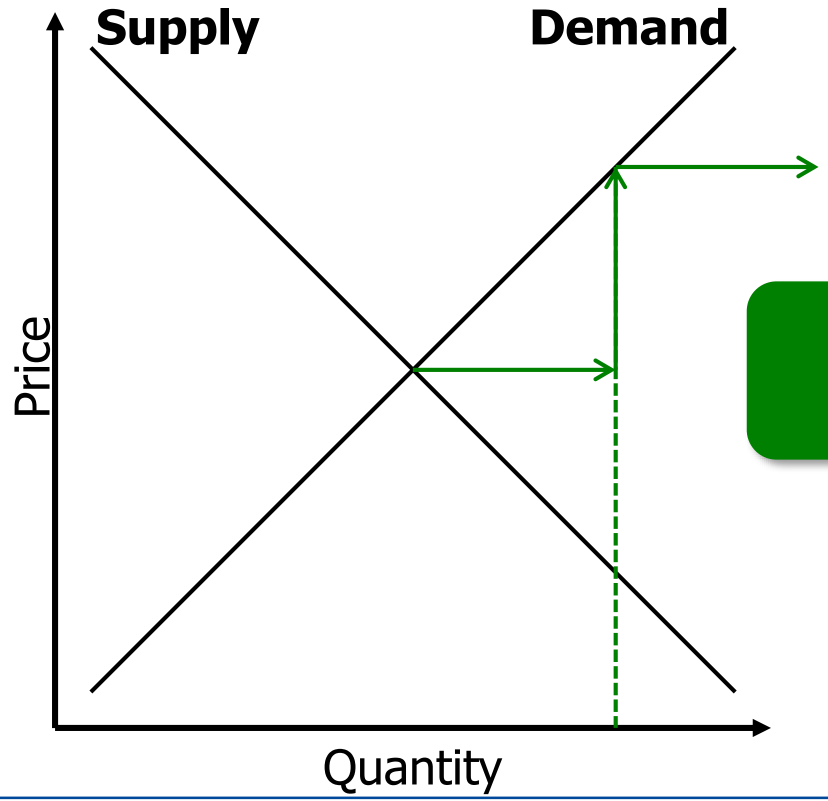
New institutions:
Rules and norms based on the needs of the new tech

The transition model: consequences



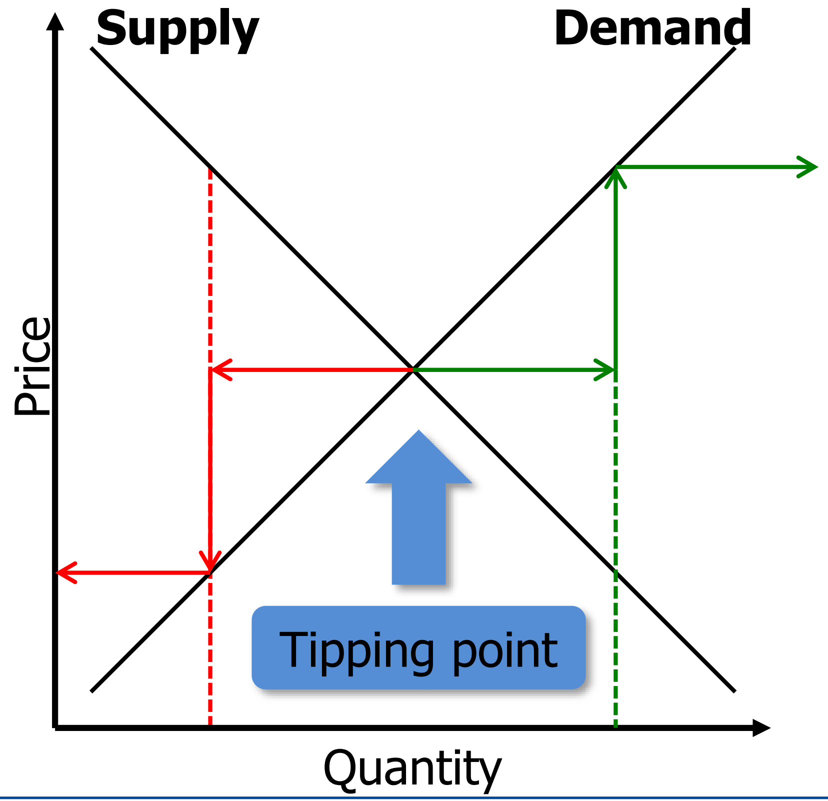
If Q left of intersection: self-correct to zero

The transition model: consequences

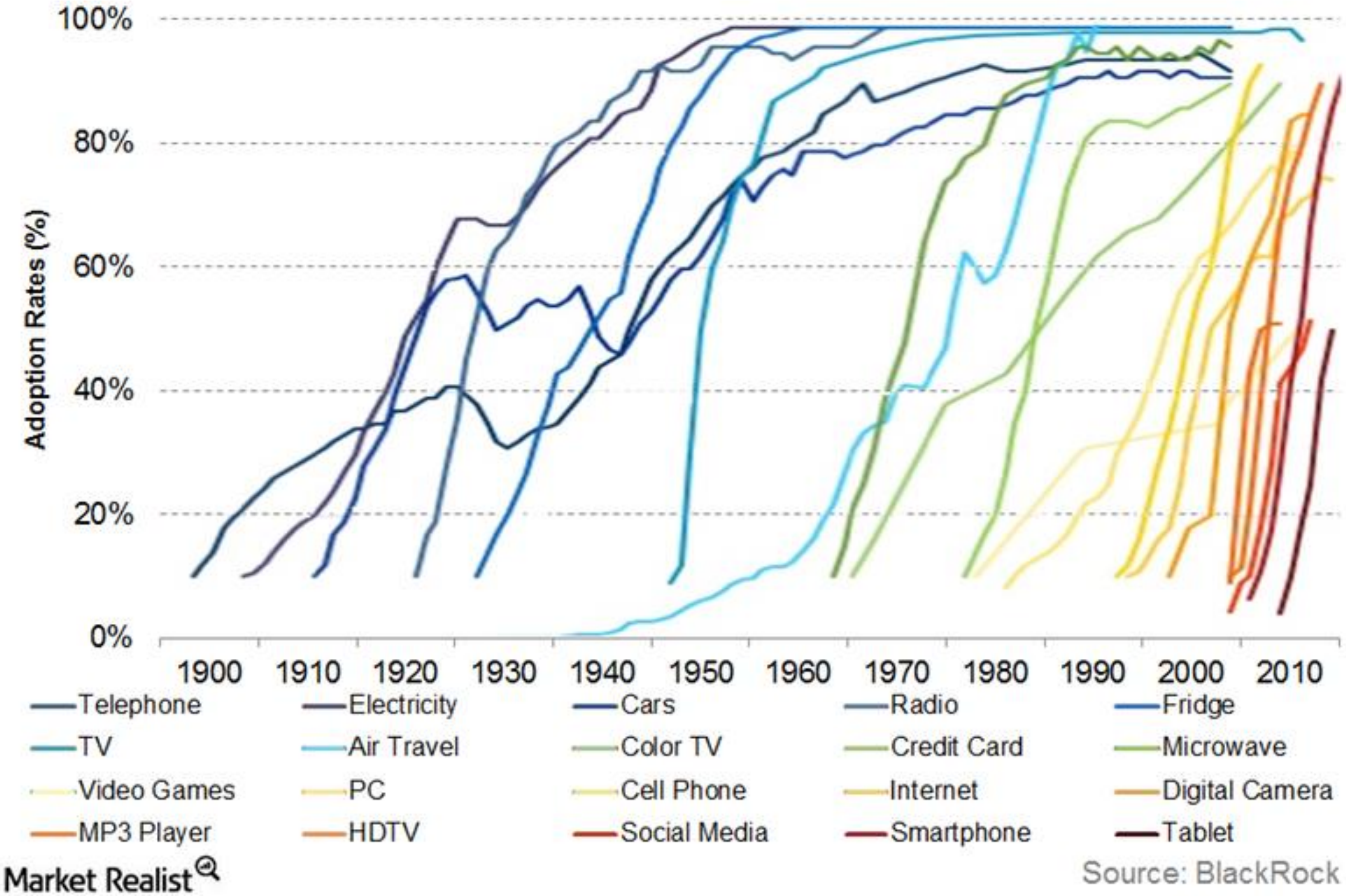


If Q right of intersection: self-reinforced expansion to saturation

The transition model: consequences

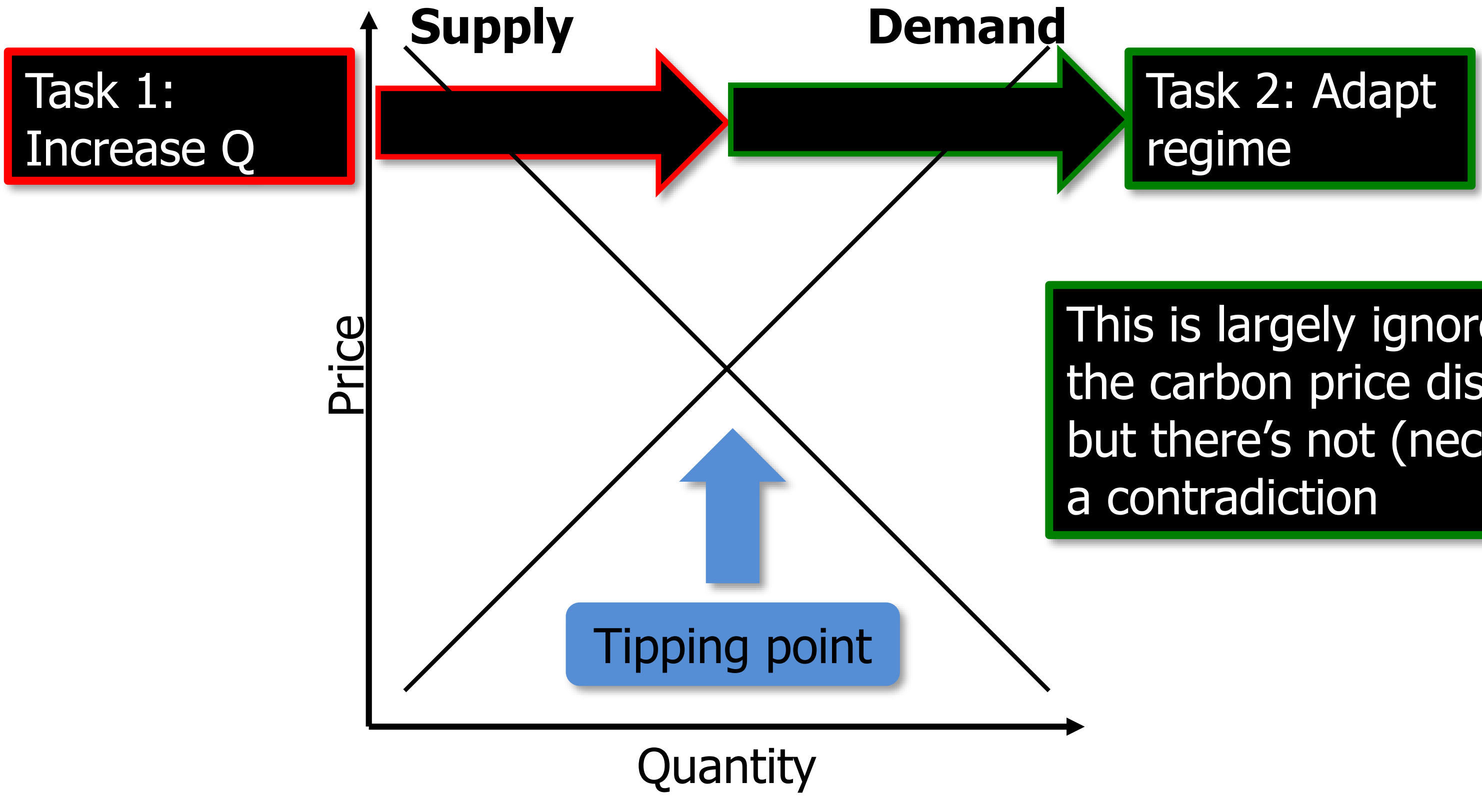


Technology adption: all or nothing



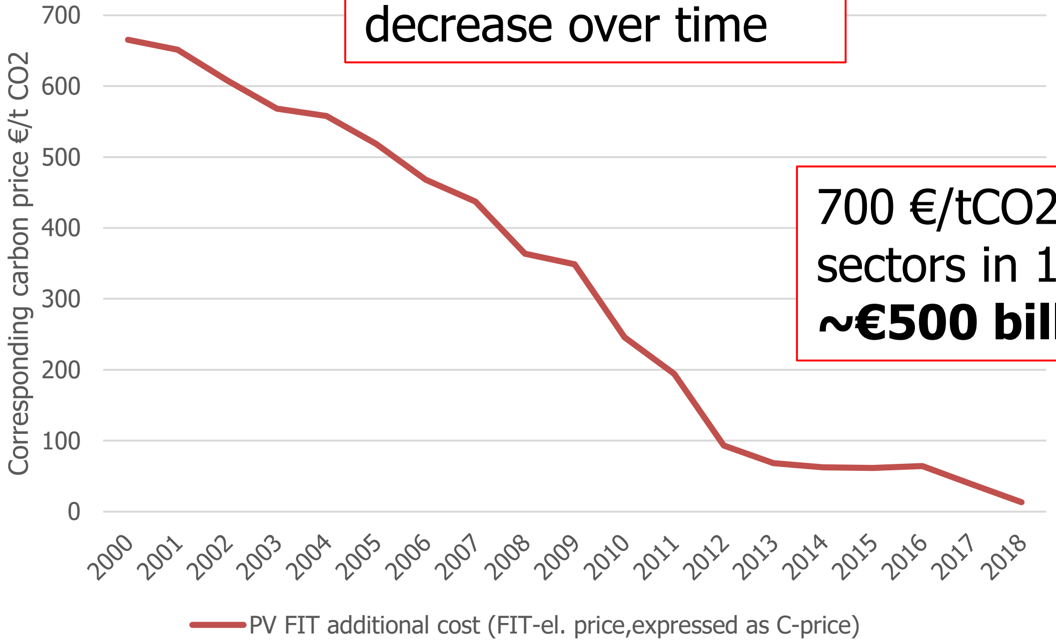
The transition model is consistent with the Paris world

Two different tasks to solve



This is largely ignored by the carbon price discourse, but there’s not (necessarily) a contradiction

Example: Supporting PV through an economy-wide carbon price

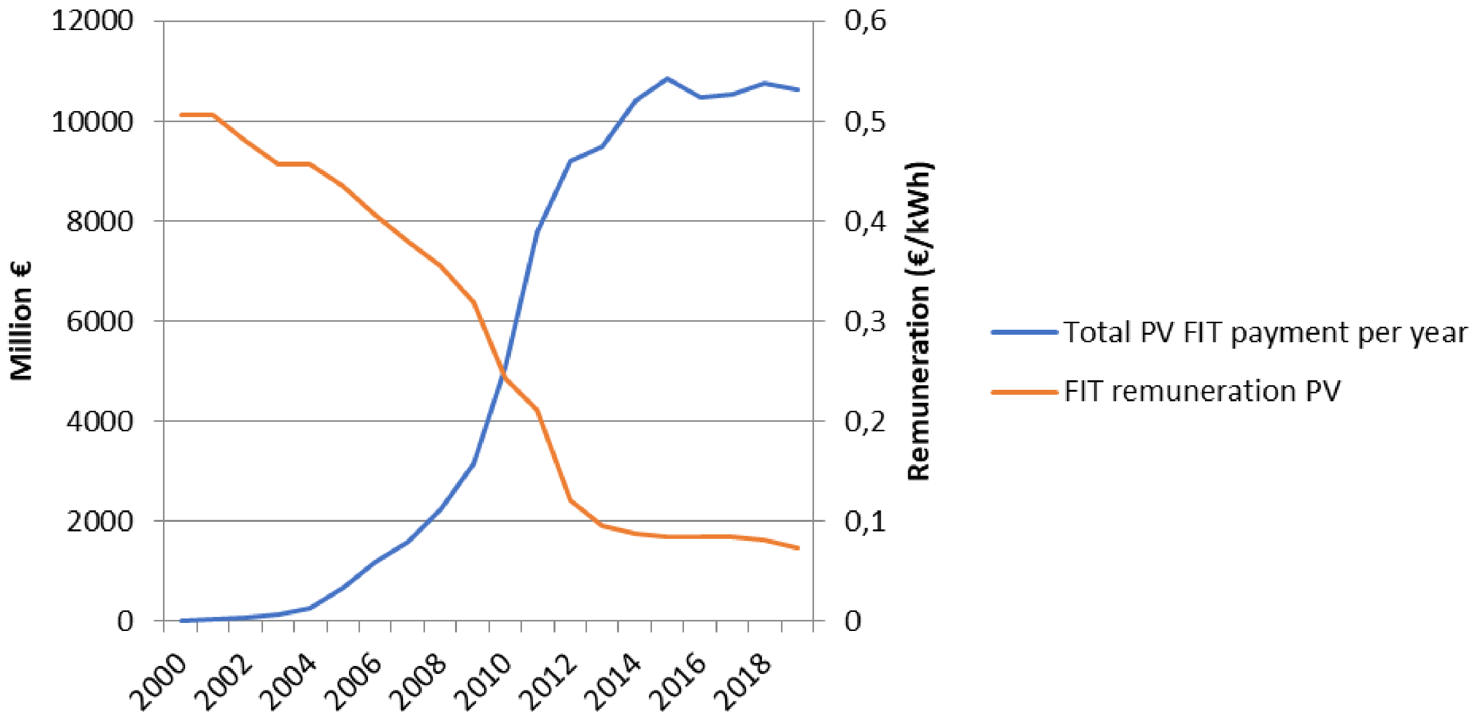


Start (very) high and decrease over time

700 €/tCO2 to all ETS sectors in 1990: **~€500 billion per year**

Source: Patt & Lilliestam (2018), **Joule**

Technology-specific support reduces total cost

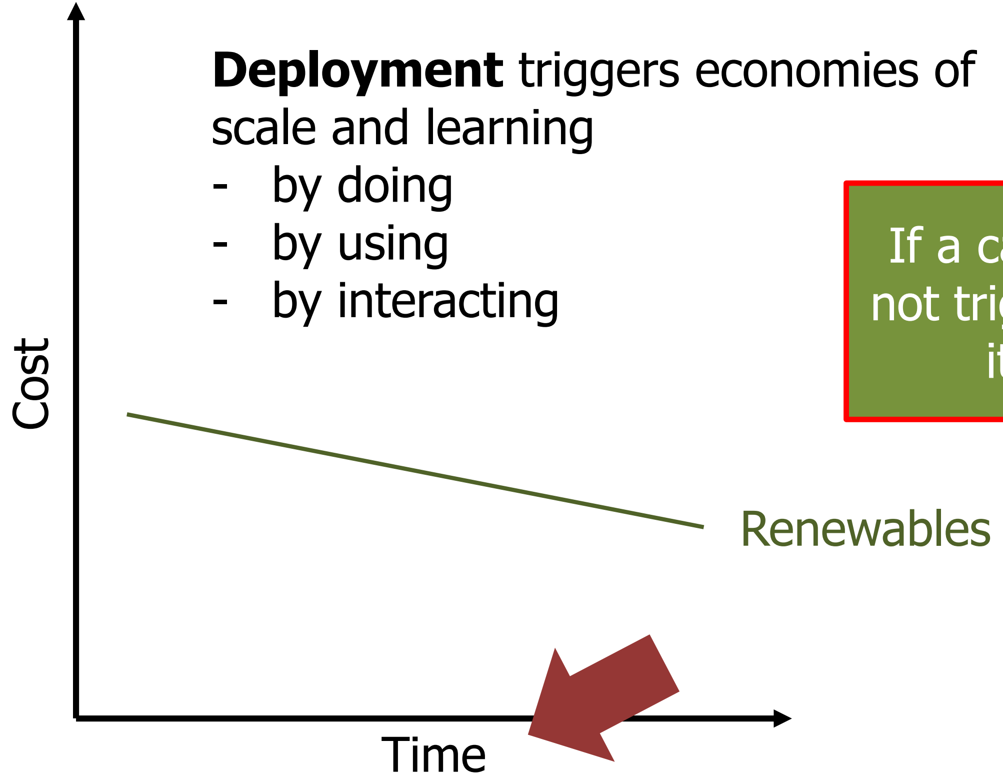


Source: BMU (2019), Erneuerbare Energien in Zahlen (economy-wide) **carbon pricing** will be extremely expensive, if it works at all, to increase the amount of still immature, carbon-neutral technology

tech-specific **market introduction instruments** (can) work, and keep costs under control as deployment and cost are negatively correlated

Carbon price: leading to deployment and lower costs?

Deployment triggers economies of scale and learning
- by doing
- by using
- by interacting



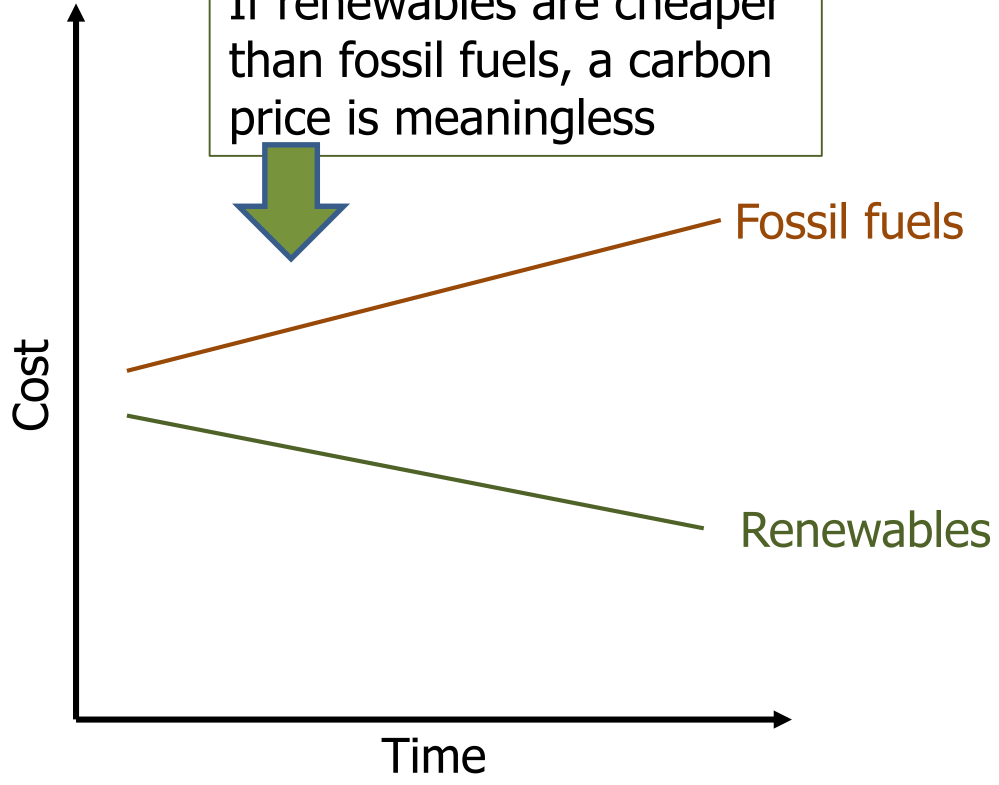
If a carbon price does not trigger deployment, it's of no use

If we get deployment, renewables will tend to become cheaper with deployment, or at least not more expensive

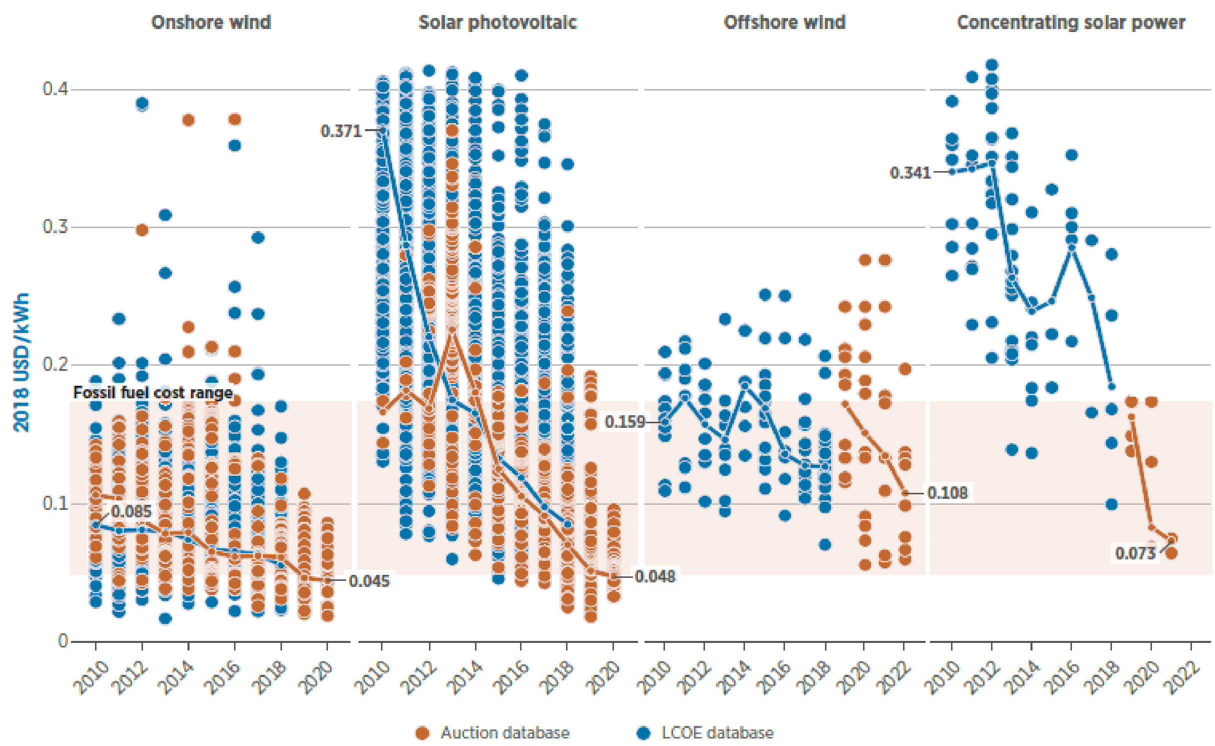
Fossil fuels tend to become more expensive, or at least not much cheaper

Carbon price → deployment, cost reduction of zero-carbon tech?

If renewables are cheaper than fossil fuels, a carbon price is meaningless

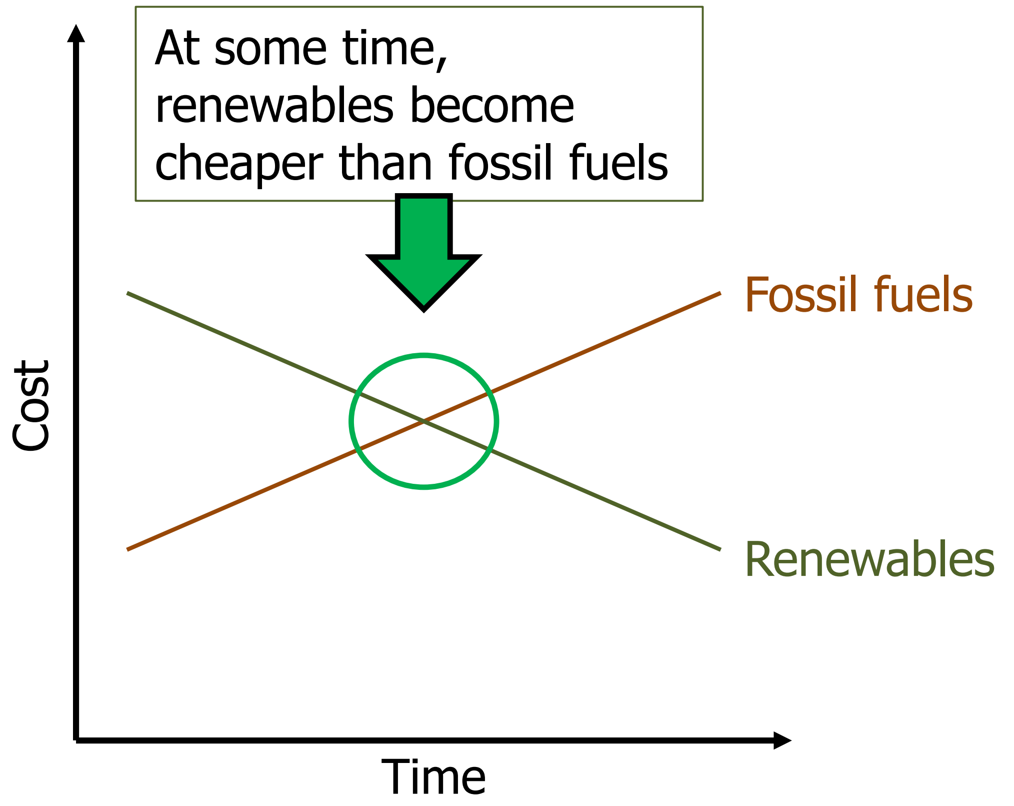


Renewable kWhs often cheaper than fossil kWhs

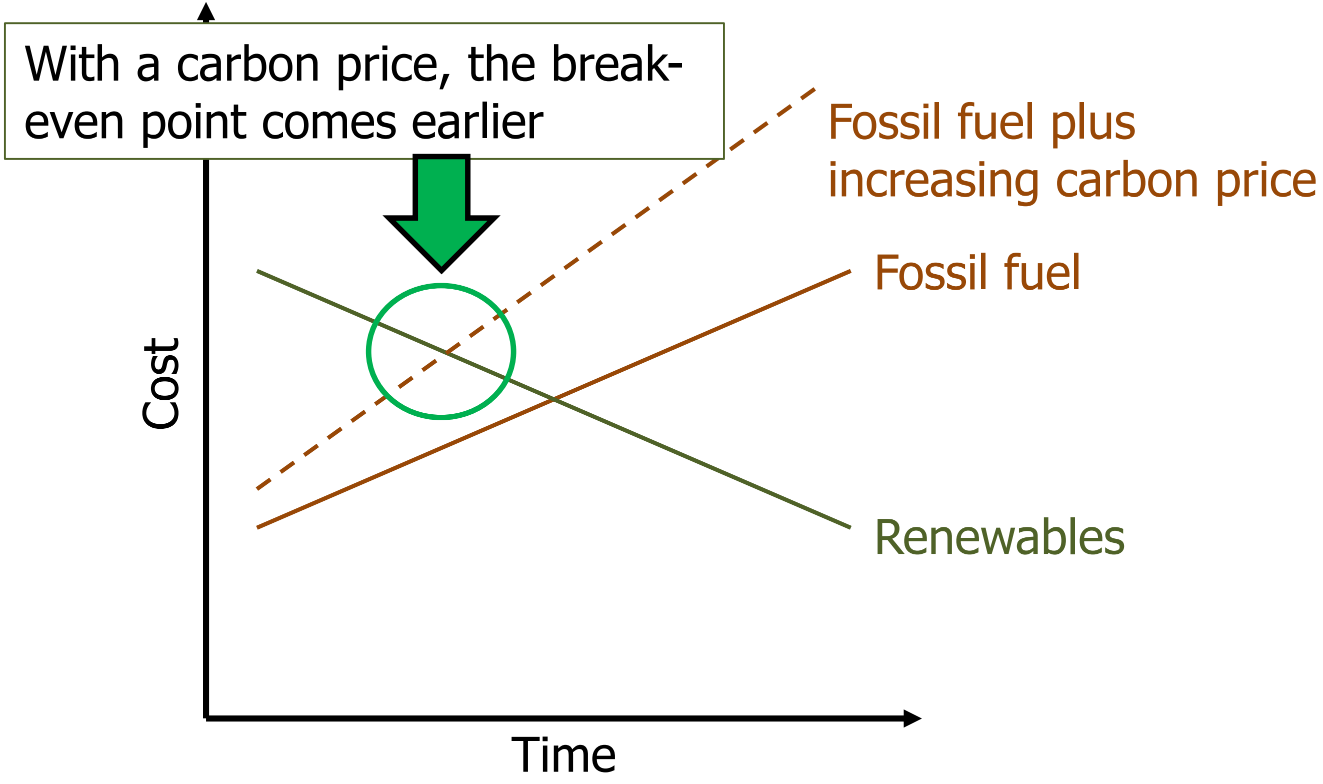


Source: IRENA (2019)

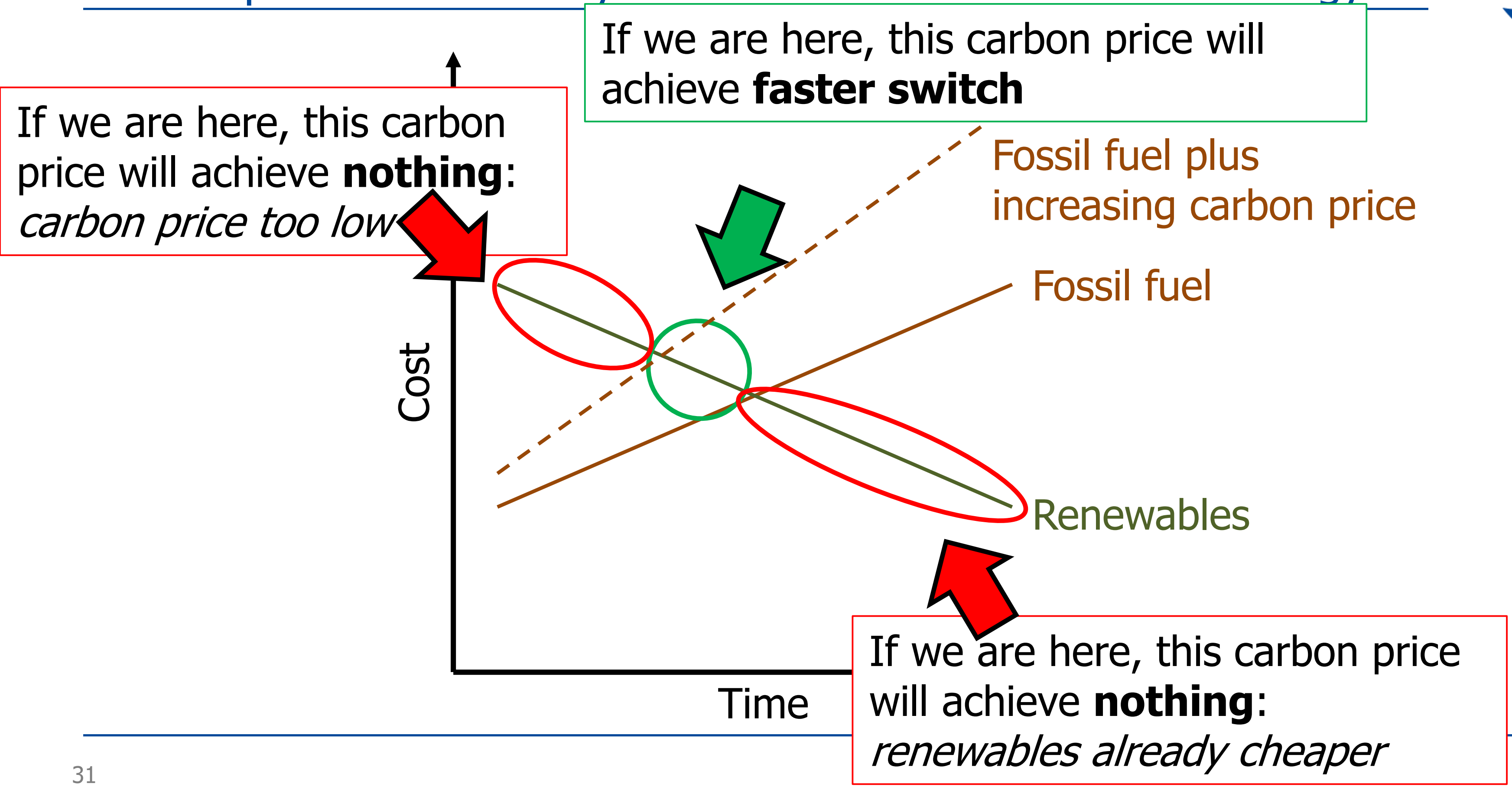
Carbon price → deployment, cost reduction of zero-carbon tech?



Carbon price → deployment, cost reduction of zero-carbon tech?



Carbon price – useful only for a short time for each technology

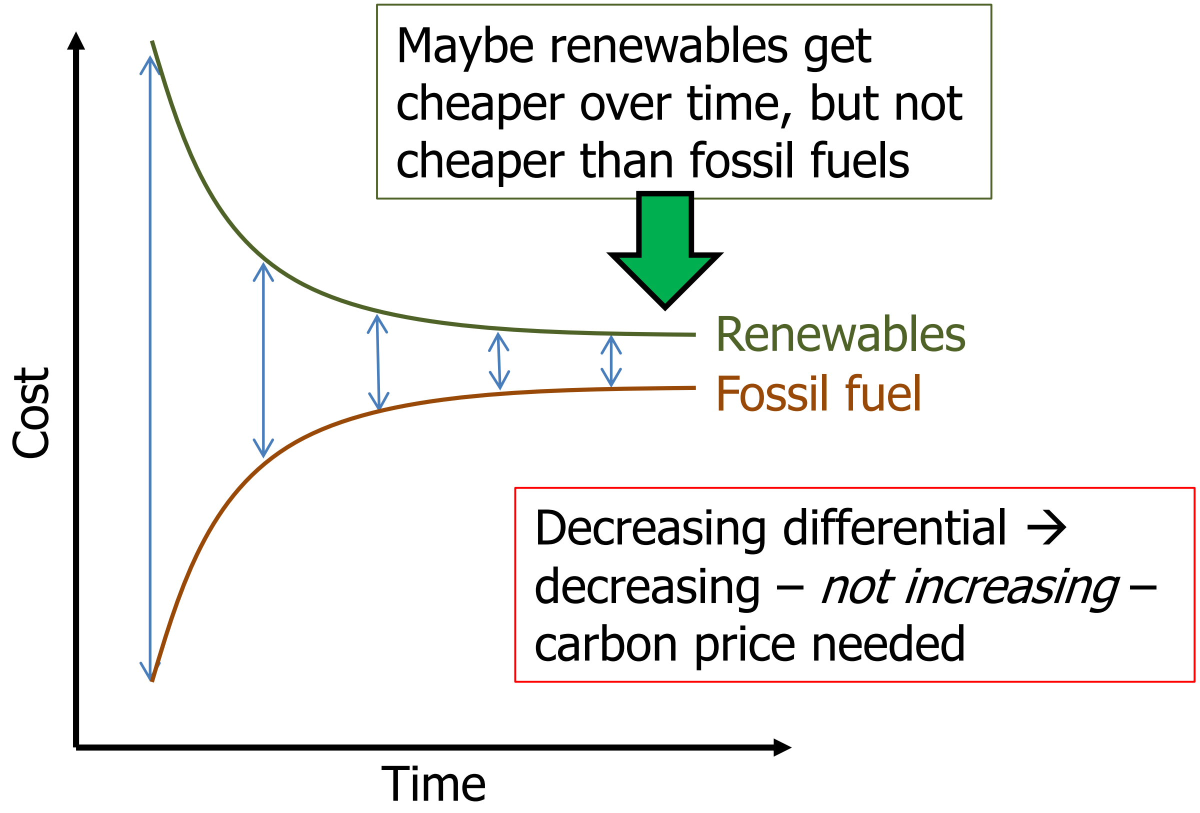


For each specific technology, a carbon price will be useful for a short time:

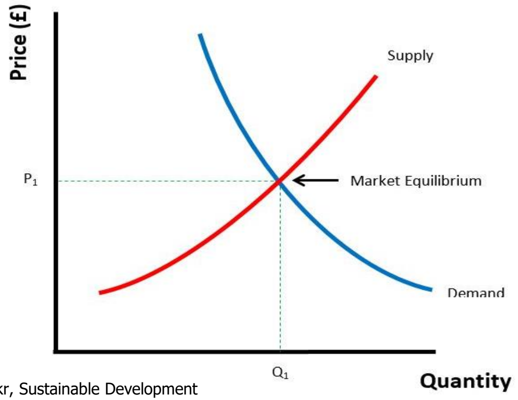
Before that time, the price is **too low**

After that time, the price is **too high**

Carbon price – useful over time in one case



The main barrier is not cost, but the regime



Flickr, Sustainable Development

Flickr, O. Viriyincy

Flickr, Bryan Alexander

A carbon price addresses the wrong barrier – cost – and when cost is still a barrier, it is addressed in the wrong way; it ignores the main barrier – the regime

Technology-specific market schemes and (or) regime adaptation, **sector by sector**, addresses the actual barriers

Prof. Dr. Johan Lilliestam
Professor of Energy Policy

Energy Transition Dynamics group
Institute for Advanced Sustainability Studies

Write: johan.lilliestam@iass-potsdam.de

Visit: www.iass-potsdam.de

Tweet: @JLilliestam

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European Research Council
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Sources

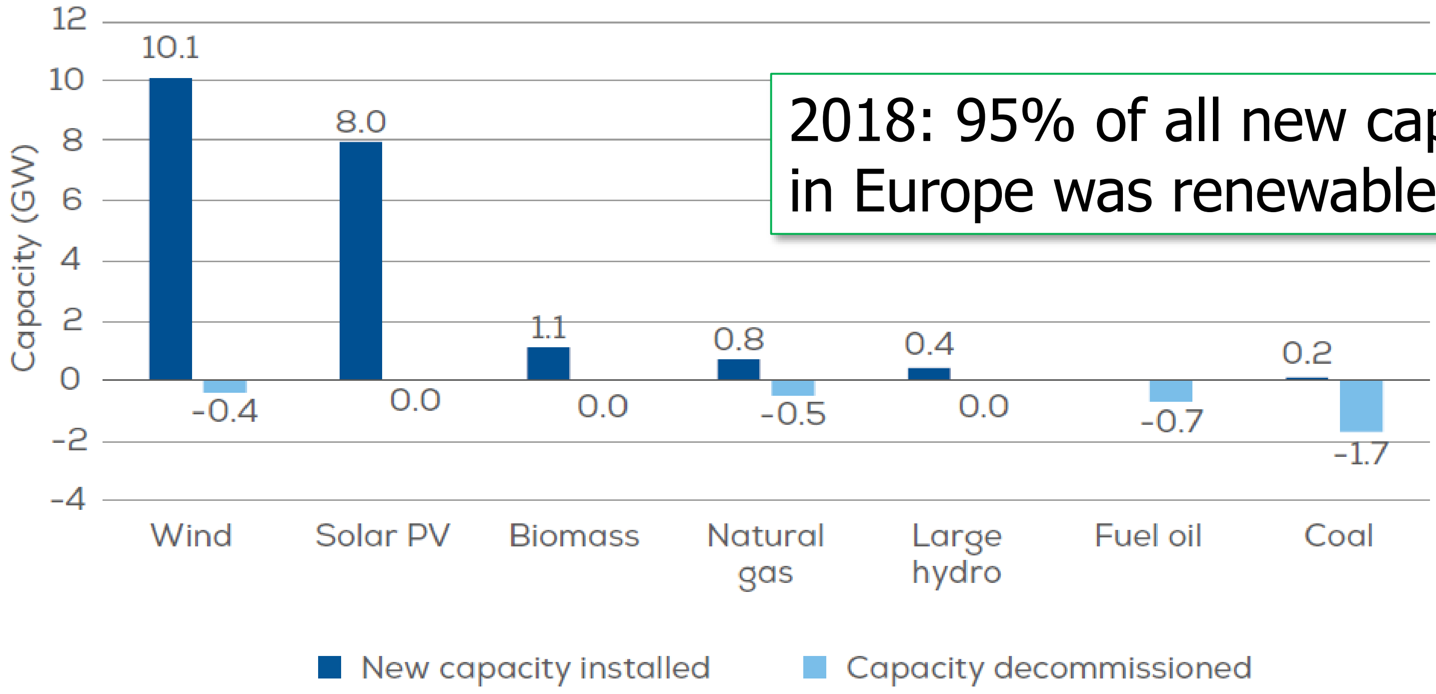
Peer-reviewed

- Patt & Lilliestam (2018), *The case against carbon pricing*, **Joule** 2 (12), pp. 2494-2498. (open access)
- Lilliestam et al. (2012), *An alternative to a global climate deal may unfolding before our eyes*, **Climate & Development** 4 (1), pp-1-4. (open access)
- Ellenbeck & Lilliestam (2019), *How modelers construct energy costs: discursive elemets in energy system and integrated assessment models*, **Energy Research & Social Science** 47, pp. 69-77 (open access).

Some further fun things to read

- Lilliestam (2019), *Die CO2-Steuer ist das falsche Instrument*, **Tagesspiegel**
- Patt & Lilliestam (2019), *Eine Alternative zu CO2-Steuern*, **Neue Zürcher Zeitung**

Installed and decommissioned power capacity, EU28, 2018



2018: 95% of all new capacity in Europe was renewable

Source: WindEurope 2019