The Energy Transition Narrative

The Elevator Pitch

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Two Competing Views on the Energy Transition

Slow, hard, & forced vs. fast, beneficial, & inevitable

New Energy Technologies: Superior or Inferior

Growth of New: S-curves or Linear

Cost: Learning Curves or No Change

Challenges: Temporary or Insoluble

Financial Markets: Responsive or Static

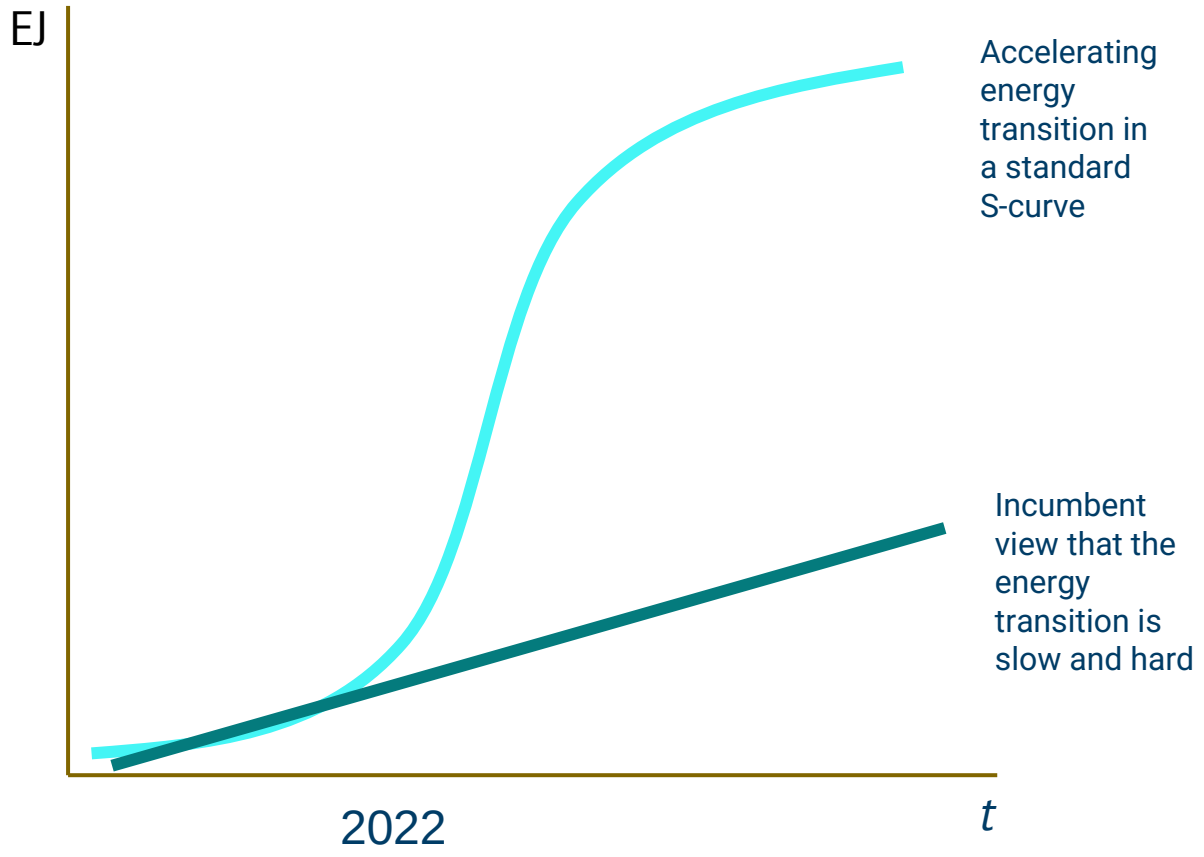
Policy & Societal Pressure: Rising or Static

Who Sets the Tempo: Insurgents or Incumbents; Fossil Importers or Exporters

Disruption Comes: Early or Late

Narrative: Gain or Pain

Indicative Energy Transition Pathways

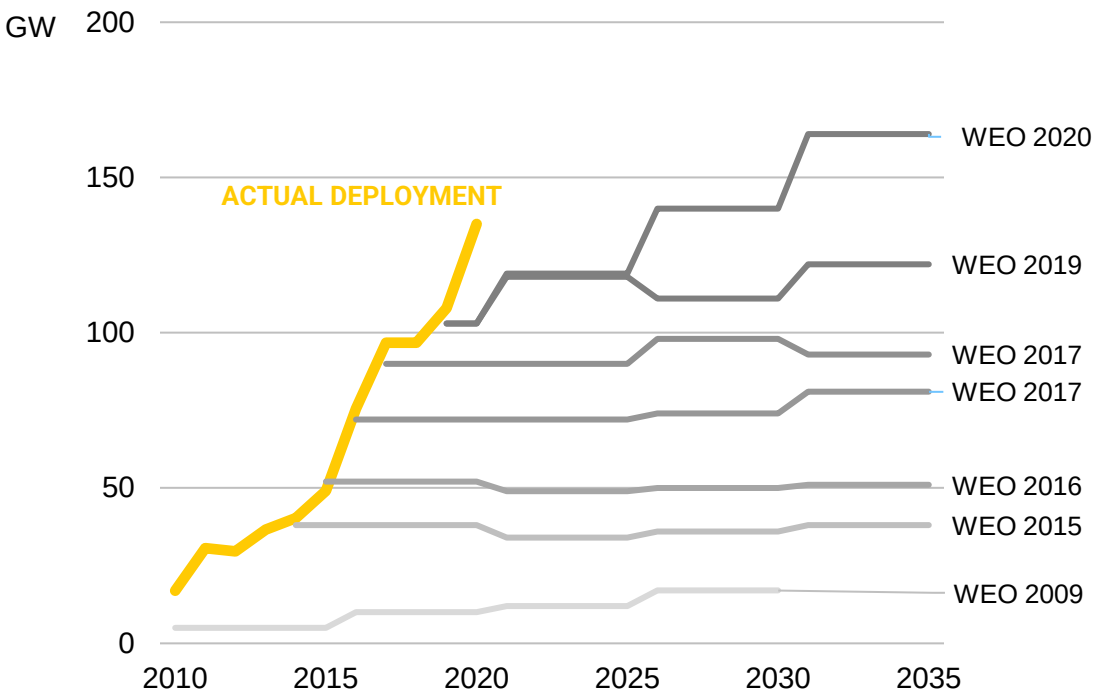


Source: RMI

Incumbent Energy Experts Are Behind the Curve

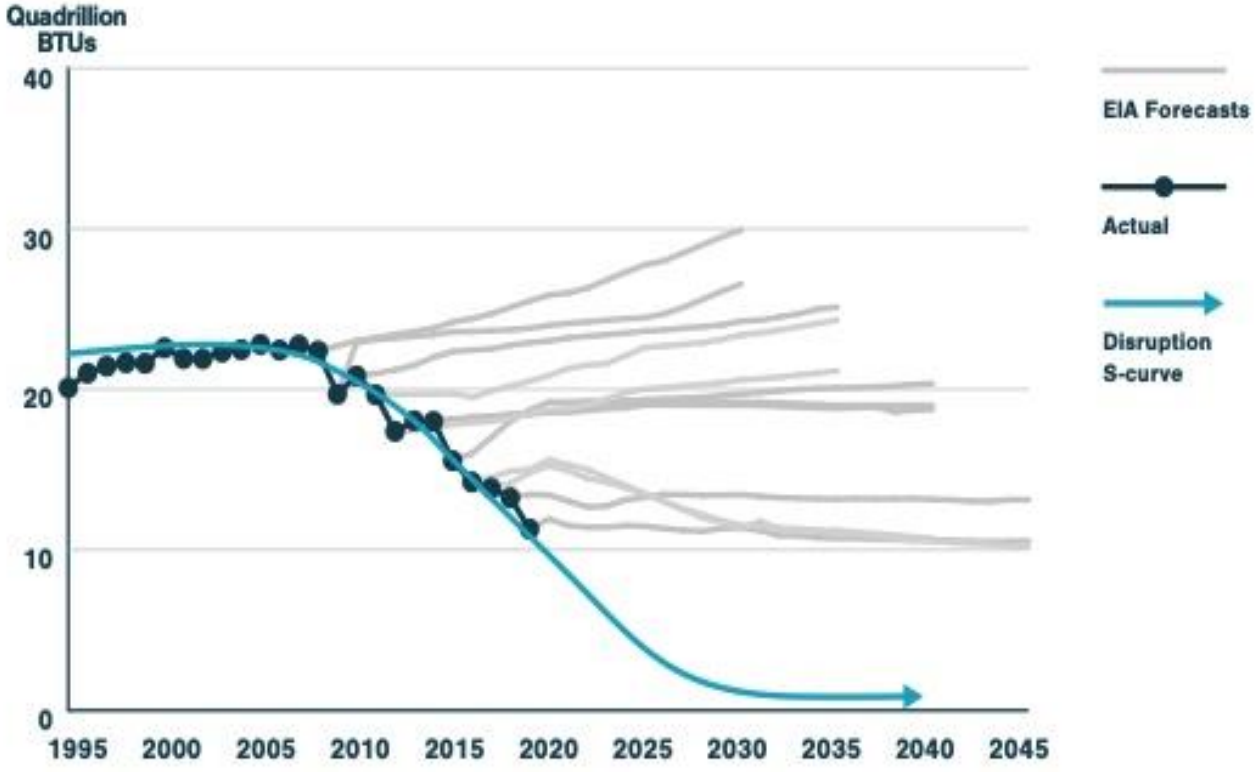
Those wedded to old thinking will struggle to navigate the new reality

IEA's Projected Solar Deployment



For 20 years the IEA has forecast linear growth of solar deployment. For 20 years solar has been growing exponentially.

EIA's Projected US Coal Sales



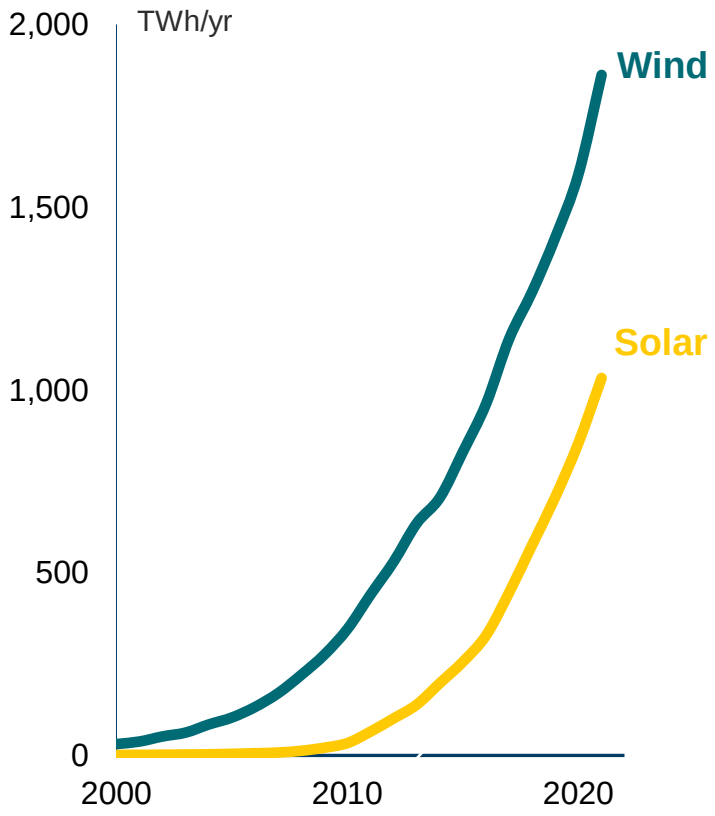
The EIA has been forecasting rising US coal demand since 2010. But demand has been falling rapidly.

Source: IEA (L); RethinkX (R)

The Energy Revolution is Under Way

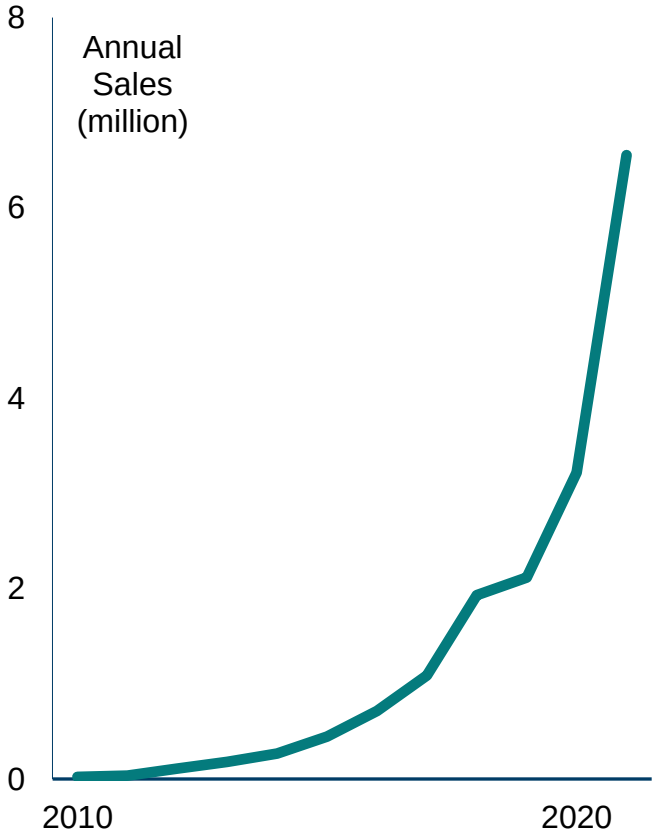
With exponential change all around

Solar & Wind Generation: Annual



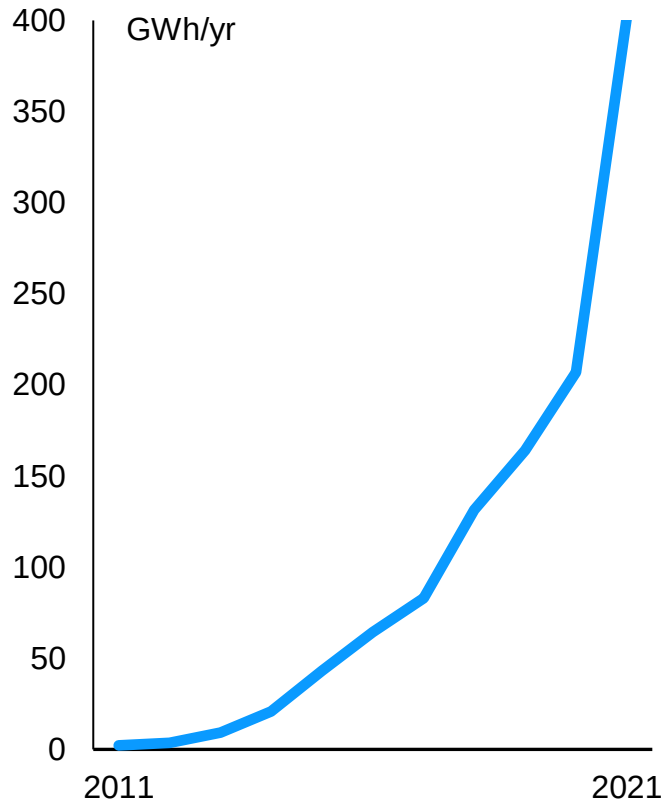
CAGR* 21% 39%

EV Sales: Annual



68%

Battery Sales: Annual

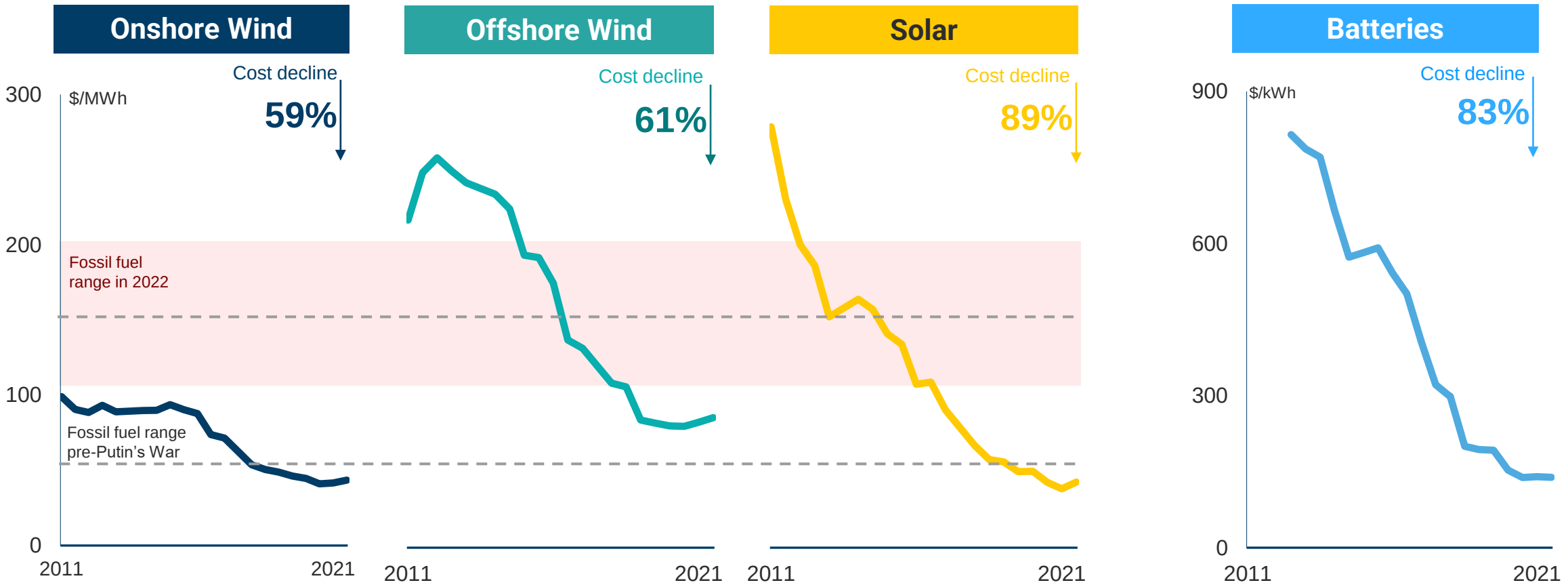


68%

Source: BNEF, BP; Note: * sample time period

Driving Down the Cost of Renewable Technologies

The cost of new energy technologies has fallen by 60%–90% in 10 years



Learning Rate*	37%	36%	19%

Source: BNEF; Note: * in sample time period; Definition: the learning rate is the observed cost reduction for each doubling of deployment

Putin’s War Speeds Up Change

High fossil fuel prices and energy security bring forward change

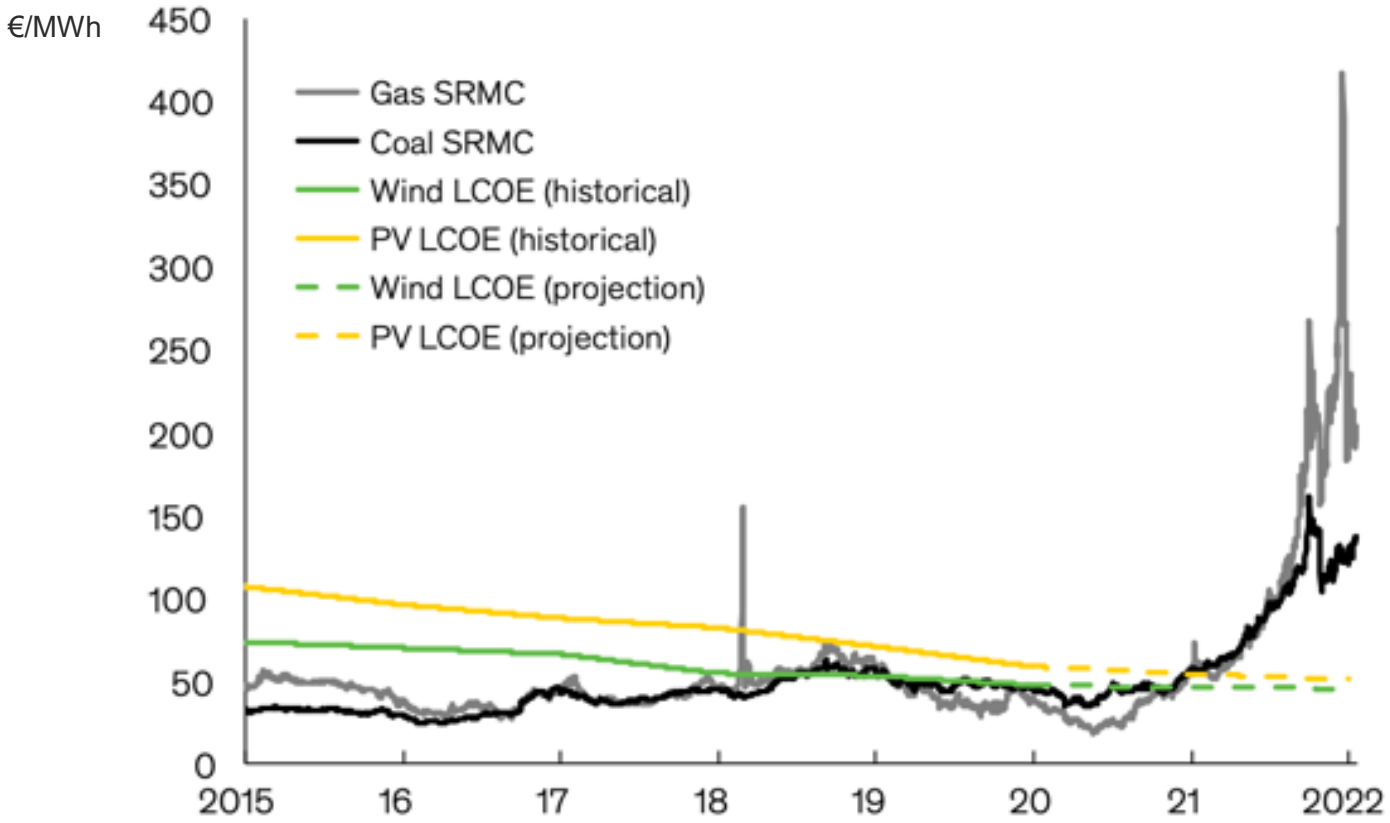
High prices of fossil fuels reduce fossil fuel demand and massively increase the **competitiveness of renewable technologies.**

Governments have an additional **energy security and economic incentive** to deploy renewables and increase efficiency. Witness the IRA in the United States, REPowerEU in Europe, and the IEA Sonderborg Action Plan on efficiency.

Renewable energy deployment **continues to grow exponentially**. We expect solar growth in 2022 of ~30% and EV sales growth of ~60%.

The removal of 5% of global fossil fuel supply from Russia inevitably means some new coal and LNG supply. But net fossil fuel demand will still fall.

Marginal Costs of Fossil Fuels vs. Total Cost of Renewables (Germany)



Source: McKinsey

So the Energy Future Will Be Different from the Past

As the growth of new technologies drives energy system change

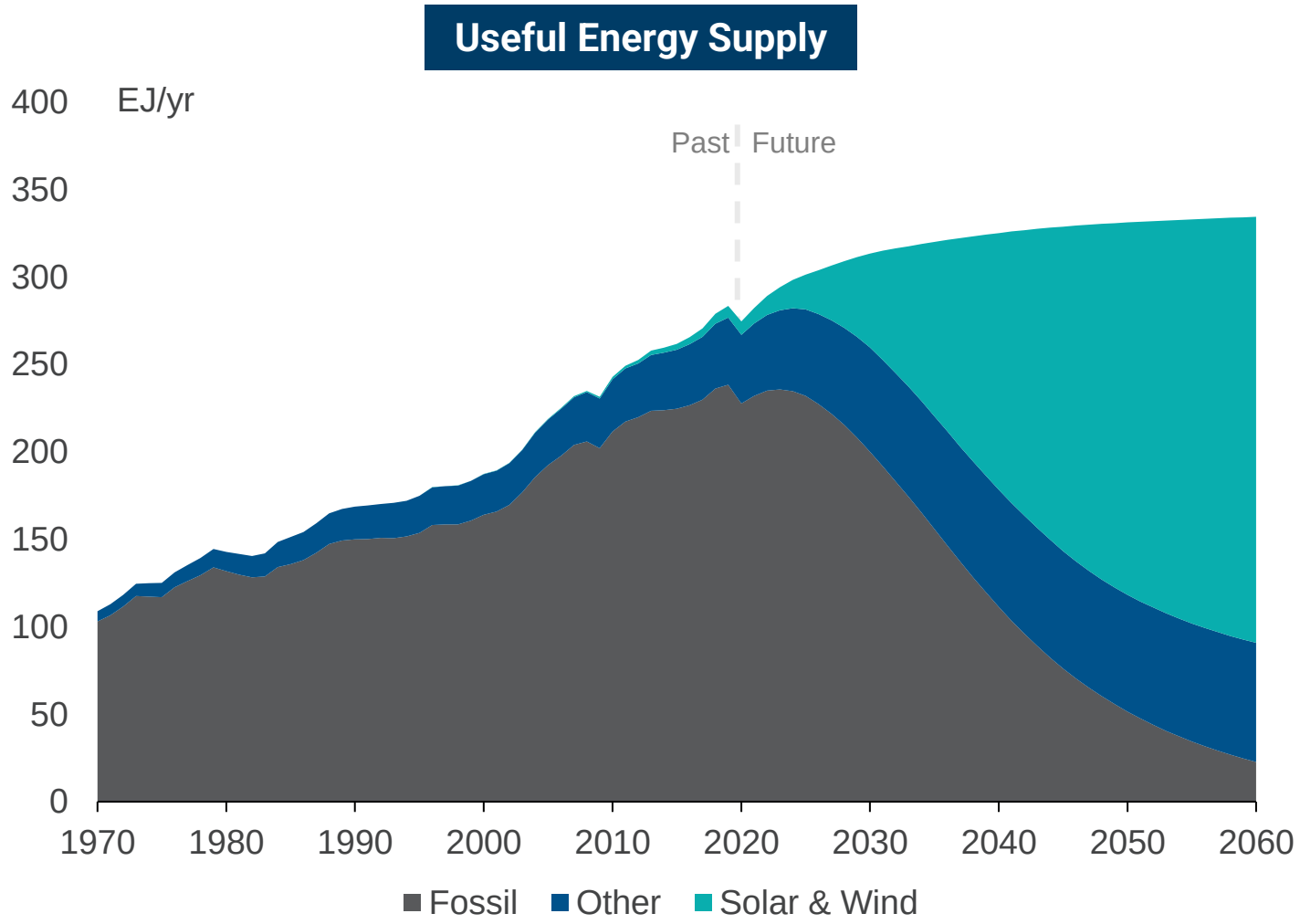
In 2019, fossil fuels supplied 83% of primary energy demand according to BP.

But in 2019 non-fossils already supplied 85% of the **growth** in primary energy demand because of their **exponential growth.**

From 2019–21 **all the growth** in primary energy supply (8 EJ) has been met by **renewables.**

All the growth in future supply of primary and useful energy will come from **renewables** in the Rystad central scenario.

So **fossil fuel demand** has **peaked**. And now its only future is **plateau and then decline**.



Source: Rystad central scenario (1.6)