

Can science alone save us from climate change?

2 February 2022

Kevin Loane
Charts editor



Hydrogen: an energy trend flying under the radar

Decomposing CO2 emissions: taxes work!

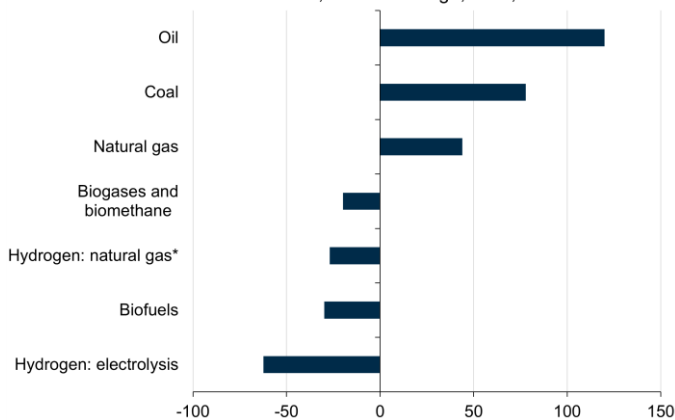
Exponential decay in solar prices?

Hydrogen: an energy trend flying under the radar (12 January 2022)

- Transitioning from fossil fuels and meeting various climate goals will require a significant amount of energy substitution, creating risks and opportunities
- According to the International Energy Agency, in 2021 hydrogen was the fuel source with the largest relative shortfall in investments required to meet net zero emissions goals — even though hydrogen capacity expanded more than fourfold in 2021

Over/under investment by fuel supply

2021 vs net zero emissions scenario, annual average, USD, billions



*with carbon capture, utilisation and storage (CCUS)

Source: IEA / Fathom Consulting

- The average production cost of hydrogen stands between 1.6 and 2.3 USD/kg, depending on the source of energy used to extract it. At these costs, hydrogen is already a viable replacement for diesel fuel in buses, trains, trucks and SUVs. Are investors missing a trick in their narrow focus on EVs?
- Hydrogen is particularly attractive to complement the energy infrastructure in countries well-endowed with potential renewable energy sources — for example, offering a potential lifeline to Middle Eastern economies in a post-hydrocarbon world, as solar power plants and gas pipeline infrastructure can be retrofitted to handle hydrogen

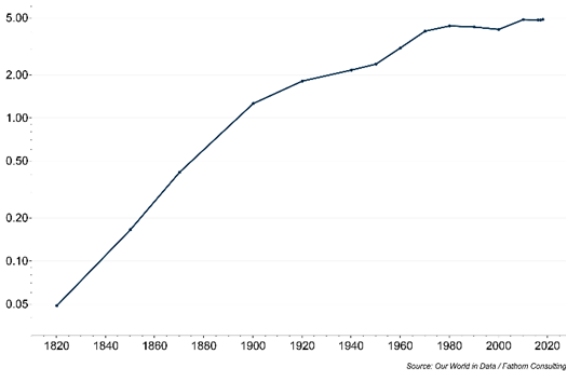


Decomposing CO2 emissions: taxes work! (19 January 2022)

- Global emissions of CO2 have risen in almost every year since at least 1820, long-run data show
- Global emissions per capita have also tended to rise, as our first chart shows, though not without interruption
- If we look at emissions per unit of GDP the picture is more complex – they peaked in the early 20th century and have fallen since then, with the shift to more energy efficient forms of production accelerating after the oil price shocks of the 1970s, which were followed by structurally higher real oil prices
- Emissions per unit of energy consumed continued to rise until the early part of the 21st century, however, though there are signs that they have fallen recently, at the same time as new forms of taxation have encouraged a switch to cleaner forms of energy
- The more rapid improvement in energy efficiency that followed the oil shocks of the 1970s, combined with the recent switch to cleaner forms of energy, remind us that the market mechanism works – higher prices encourage behaviour change, eventually
- To hasten the transition to net zero, a good part of the proceeds from higher carbon taxes should be ploughed into publicly funded R&D – something that has yet to take place at scale
- Governments might also use some of the revenues from carbon taxes to compensate poorer households as energy prices rise – if they do go down this route, then economics textbooks tell us this is better achieved by direct payments to consumers, rather than by subsidies to producers, to avoid insulating the end user from the market mechanism

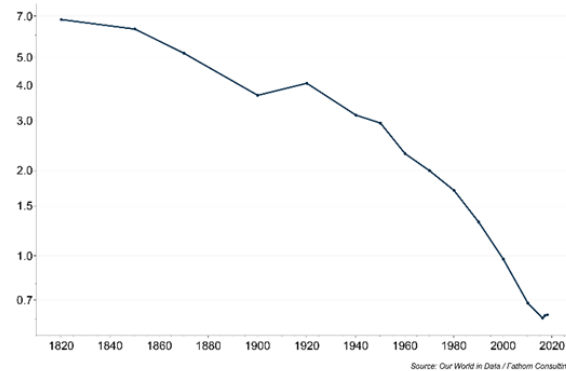
Global emissions per capita

Tonnes of CO2, log scale



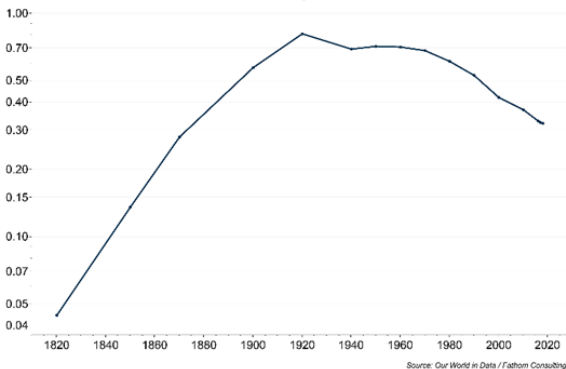
Global energy consumption per unit of GDP

kWh per \$1 of GDP, 2011 prices, log scale



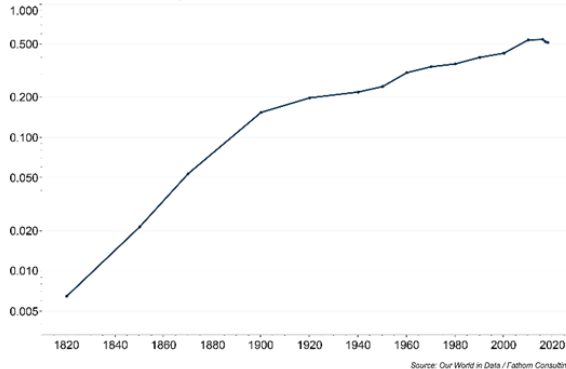
Global emissions per unit of GDP

Kilos of CO2 per \$1 of GDP, 2011 prices, log scale



Global emissions per unit of energy consumed

Kilos of CO2 per kWh, log scale

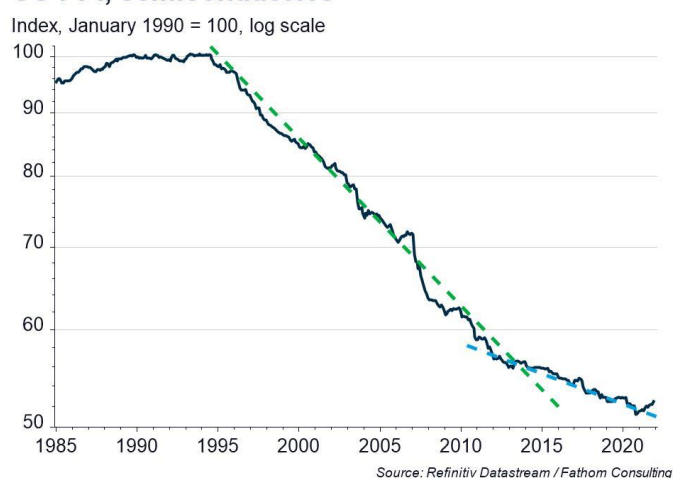




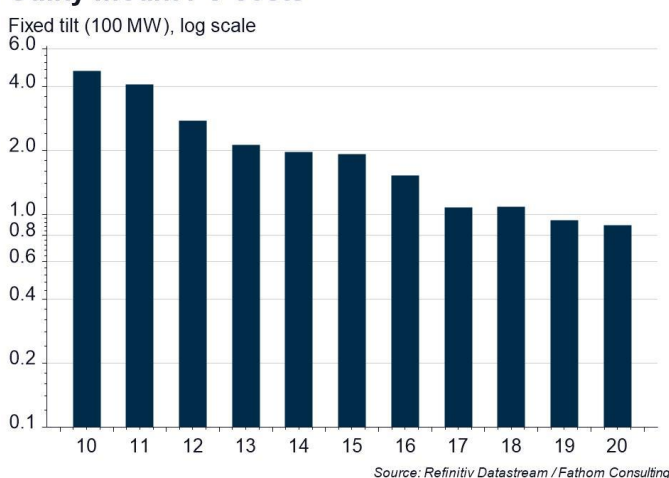
Exponential decay in solar prices? (26 January 2022)

- Wary of provoking public dissatisfaction by imposing carbon taxes and other measures that could affect the cost or quality of life, many governments seem to be betting on rapid technological progress to meet ambitious climate targets
- There is reason for optimism: the cost of solar electricity has fallen dramatically, and if positioned in the right (i.e., sunny) place it is cheaper than electricity generated from fossil fuels
- If the rate of price decay was sustained across renewables and other green technologies, the energy transition 'could save trillions'¹
- However, there are also reasons to be cautious: the history of semiconductor prices shows that the rate of decline in costs of new technologies is likely to ease eventually, and there has already been a flattening out in the rate of decline in solar prices
- Moreover, solar has its limitations (e.g., the sun doesn't always shine when electricity is needed), and large uncertainty remains around the outlook for prices across other green technologies, including batteries and hydrogen, and how these will compare to fossil fuels
- Solar prices may be the posterchild for renewables, but if the easing of price declines observed in solar and semiconductors occurs earlier than expected for other green technologies, then carbon taxes and other more costly interventions will be needed to ensure that climate goals are achieved

US PPI, semiconductors



Utility mount PV costs



Further reading:

[The bumpy road to climate transition](#)

Chart authors: Jonathan Ashworth, Andrea Zazzarelli, Brian Davidson, CFA

¹ https://www.inet.ox.ac.uk/files/energy_transition_paper-INET-working-paper.pdf



In case you missed it, here's last month's round-up:

[Round-up: From UK corporate debt to Chinese housing glut](#)



Fathom Consulting
47 Bevendens Street
London
N1 6BH
Tel: +44 (0)20 7796 9561



Contact information
kevin.loane@fathom-consulting.com
www.fathom-consulting.com

This newsletter is a confidential, copyright protected communication intended only for the person to whom it was originally sent. If received in error, please notify the sender and delete immediately. Its intended recipients may not make copies of this newsletter, or distribute it to third parties, without the written consent of Fathom Consulting.

Fathom Consulting is a trading name of Fathom Financial Consulting Limited, a company registered in England & Wales under the Companies Act, company number 04942817, © 2022

Regulatory Disclaimer

FFC LIMITED and all of its affiliates (henceforth FFC) do not conduct "investment research" as defined in the FCA Conduct of Business Sourcebook (COBS) section 12 nor do they provide "advice about securities" as defined in the Regulation of Investment Advisors by the U.S. SEC. FFC is not regulated by the SEC or by the FCA or by any other regulatory body.

This research report has not been prepared in accordance with legal requirements designed to promote the independence of investment research and is not subject to any prohibition on dealing ahead of the dissemination of investment research. Nonetheless, FFC has an internal policy that prohibits "front-running" and that is designed to minimize the risk of receiving or misusing confidential or potentially material non-public information.

The views and conclusions expressed here may be changed without notice. FFC, its partners and employees make no representation about the completeness or accuracy of the data, calculations, information or opinions contained in this report. This report may not be copied, redistributed or reproduced in part or whole without FFC's express permission.

Information contained in this report or relied upon in its construction may previously have been disclosed under a consulting agreement with one or more clients. The prices of securities referred to in the report may rise or fall and past performance and forecasts should not be treated as a reliable indicator of future performance or results. This report is not directed to you if FFC is barred from doing business in your jurisdiction. Nor is it an offer or solicitation to buy or sell securities.

Analyst Certification

I Kevin Loane, the lead analyst, certify that the views expressed herein are mine and are clear, fair and not misleading at the time of publication. They have not been influenced by any relationship, either a personal relationship of mine or a relationship of the firm, to any entity described or referred to herein nor to any client of FFC nor has any inducement been received in relation to those views.

I further certify that in the preparation and publication of this report I have at all times followed all relevant FFC compliance protocols including those reasonably seeking to prevent the receipt or misuse of material non-public information.