International Energy Agency

Building a net zero future: the outlook of energy and emissions in India

For the Indian Institute of Chemical Engineers
(Northern Regional Centre)

15 January 2022

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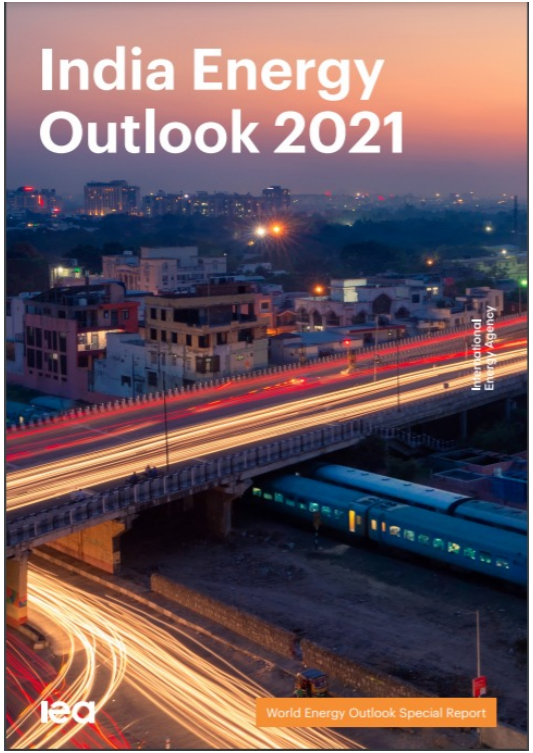
An introduction to the International Energy Agency

- Origin in 1974
- Evolving priorities
- Today, over 40 countries in the family
- A strategic partnership with India
- Scenarios not forecasts



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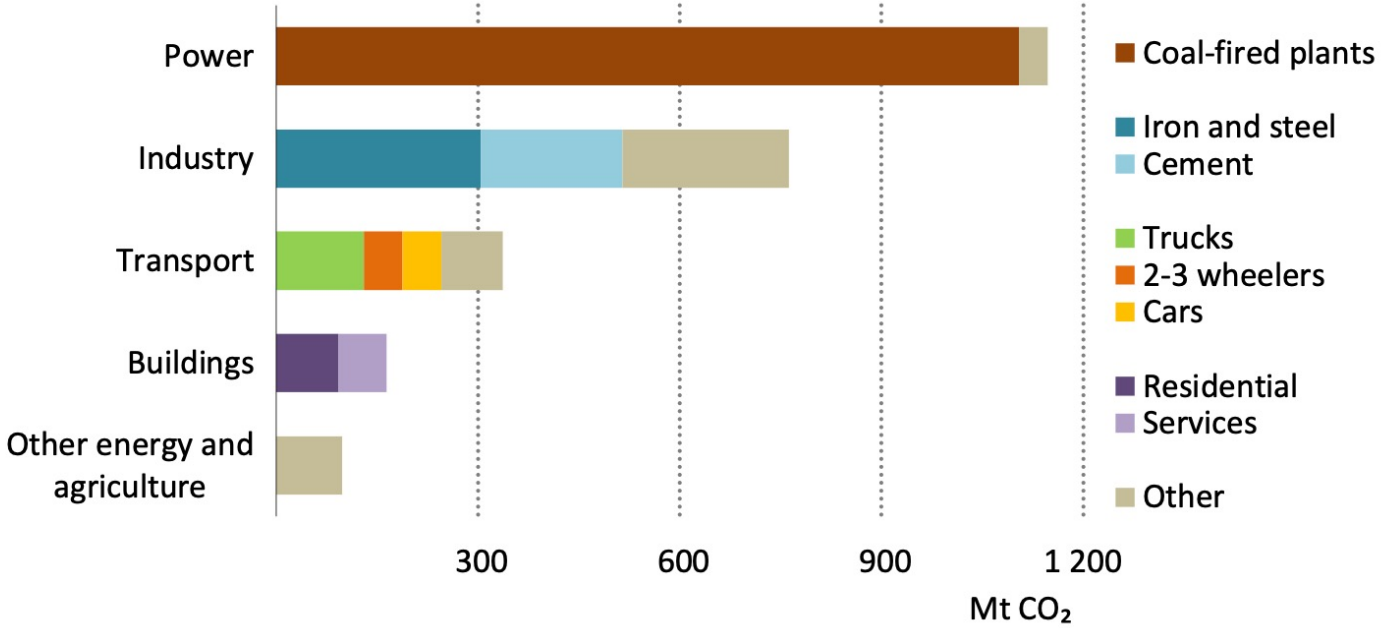
A net zero ambition changes everything – if implemented

CO2 emissions from the Indian energy sector, 2019



India's power sector is the largest contributor to its CO2 emissions, and coal-fired power plants are responsible for the great majority of power sector emissions.

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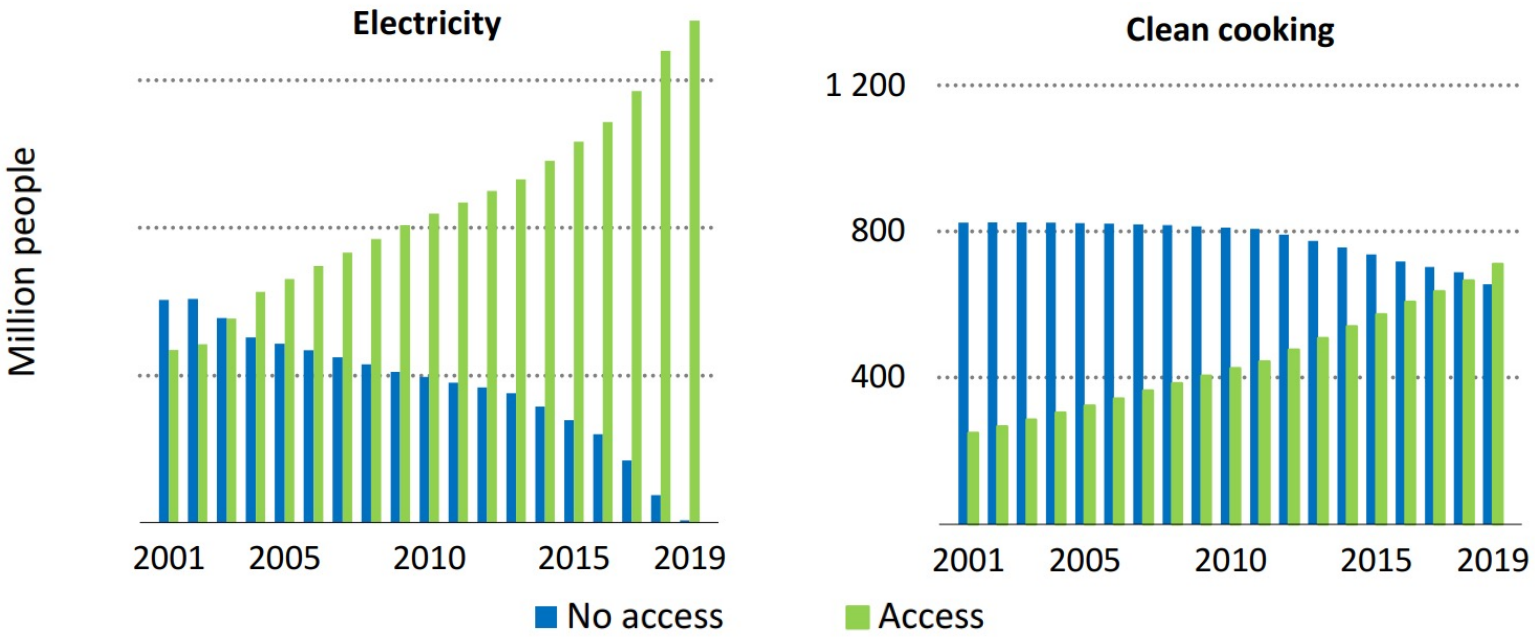
A success and a challenge

Access to electricity and clean cooking in India



India connected almost half a billion people to the electricity grid during the last decade; attaining universal access to clean cooking is the next big challenge

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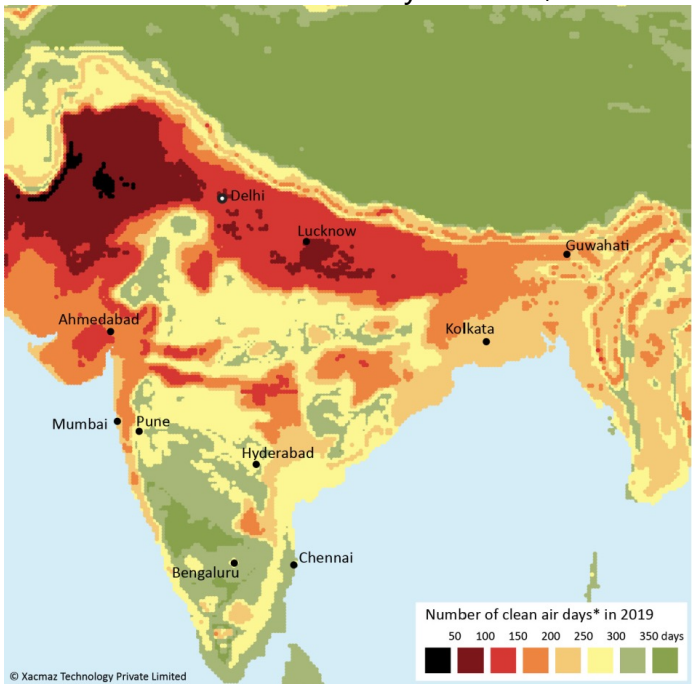
The air pollution crisis – led by energy use

Number of clean air days in India, 2019



Nearly half of India's population lives in regions with fewer than 200 clean air days a year

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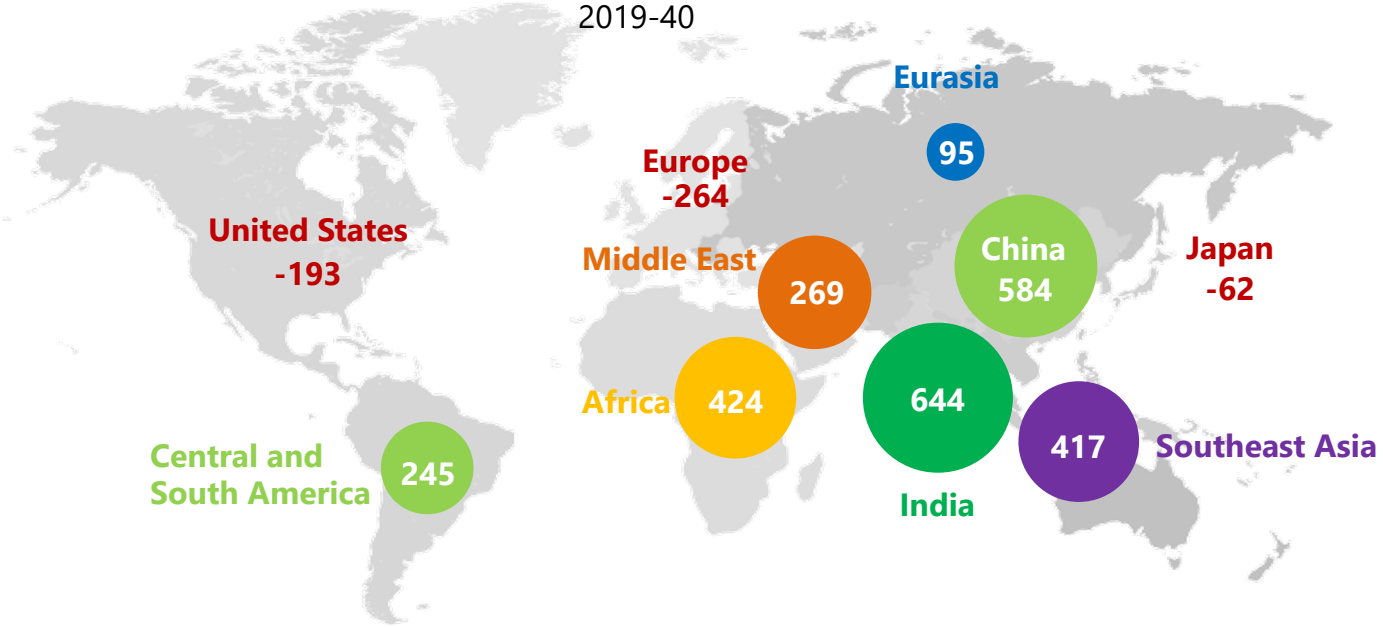
India at the centre of the global energy system

Change in energy demand in the Stated Policies Scenario (Mtoe)
2019-40



A global industrial pivot towards India, its fast-developing economy and increasingly urban population, underpin the largest increase in energy demand of any country, across all of our scenarios

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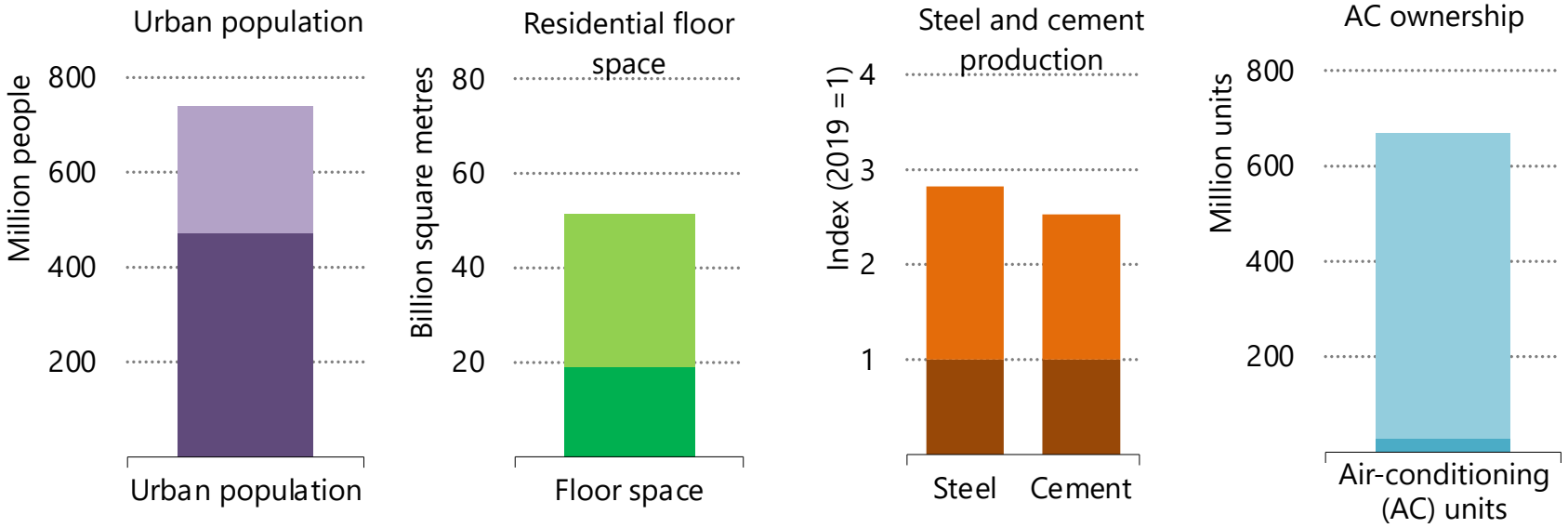
Modernisation and its effects, at scale

Indicators of India's urbanisation and industrialisation

Growth to 2040 in the Stated Policies Scenario



The addition of 270 million people to India's urban population leads to rapid growth in the building stock, and rising household incomes pushes up ownership of appliances & equipment, notably air-conditioners

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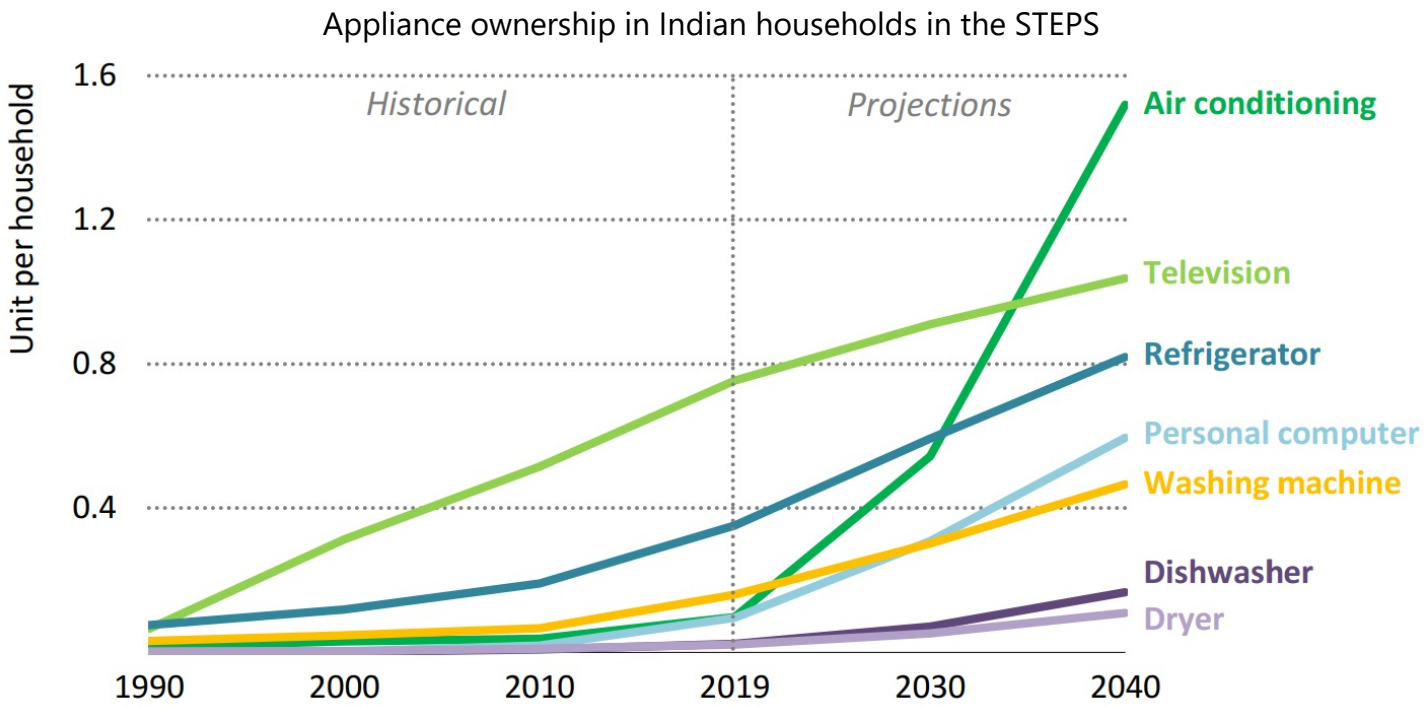
The rise of cooling



AC units see faster growth than any other household appliance over the period to 2040 in the STEPS

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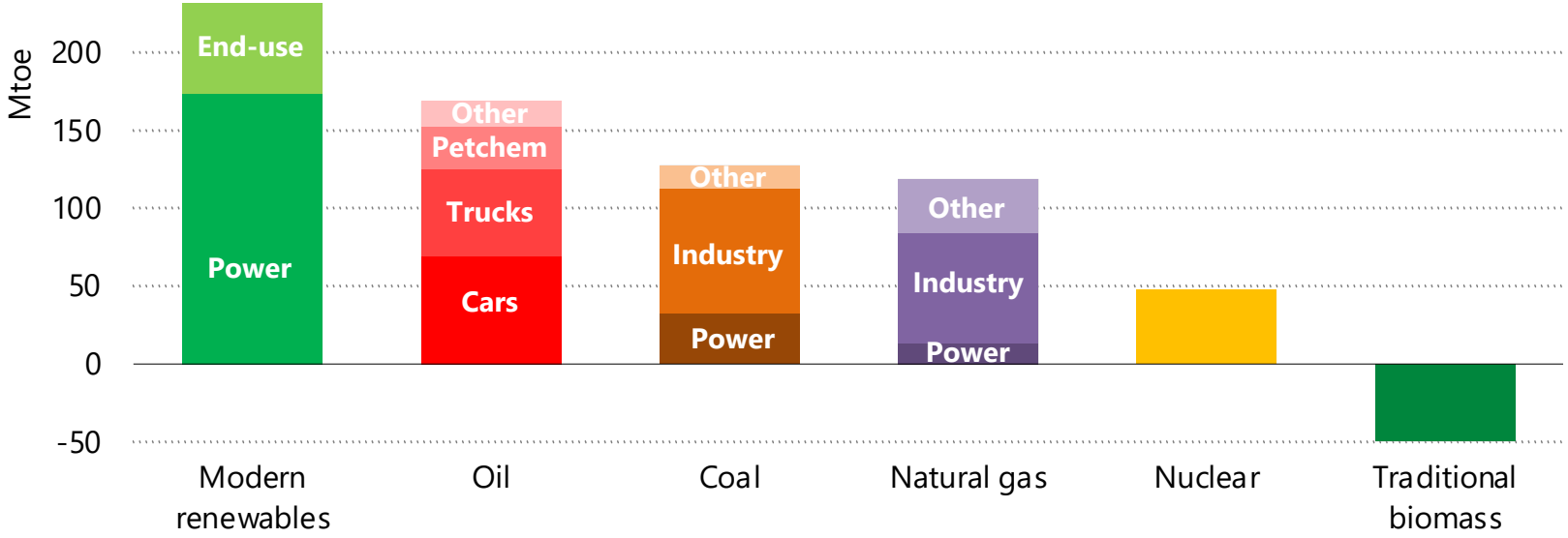
Renewables in the lead but, as things stand, all fuels still in the race

Change in demand by fuel and technology in the Stated Policies Scenario (STEPS), 2019-2040



India is re-ordering its energy priorities as renewables take the largest share of growth in the STEPS to 2040: it is nonetheless the largest global growth market for oil and coal, and among the fastest-growing for gas

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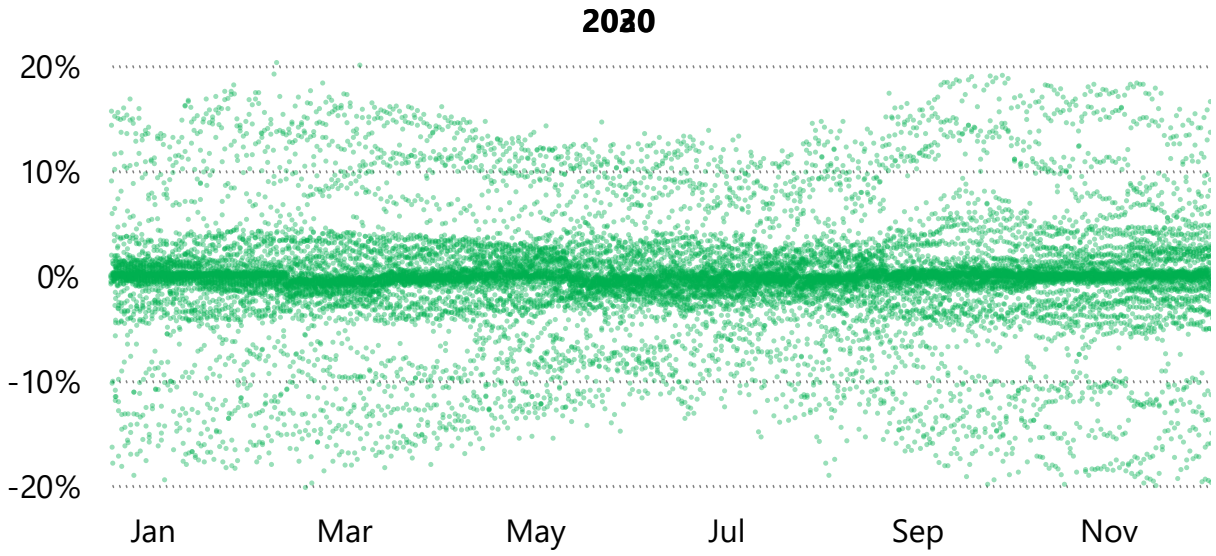
Flexibility is becoming key to electricity security

Hour-to-hour adjustments required in power systems due to variability in wind and solar in India in the STEPS



An AC-induced early evening peak in power demand, alongside much greater variability in supply, puts a huge premium on robust grids & all forms of flexibility: India becomes a global leader in battery deployment

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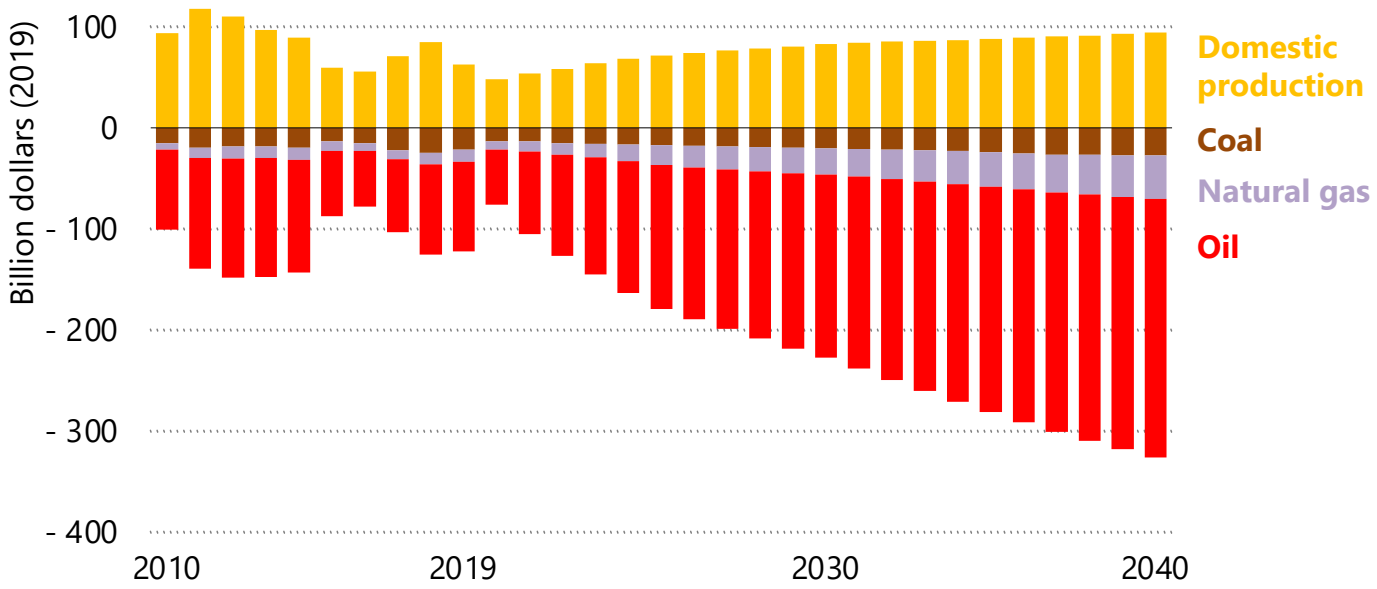
Warning signs on the cost of import dependence…

Market value of domestic production & import bills by fuel in India in the STEPS



India's fuel import bill triples over the next two decades in the STEPS, pointing to continued risks to energy security, while lower fuel use in Sustainable Development Scenario brings this bill down by $1.4 trillion

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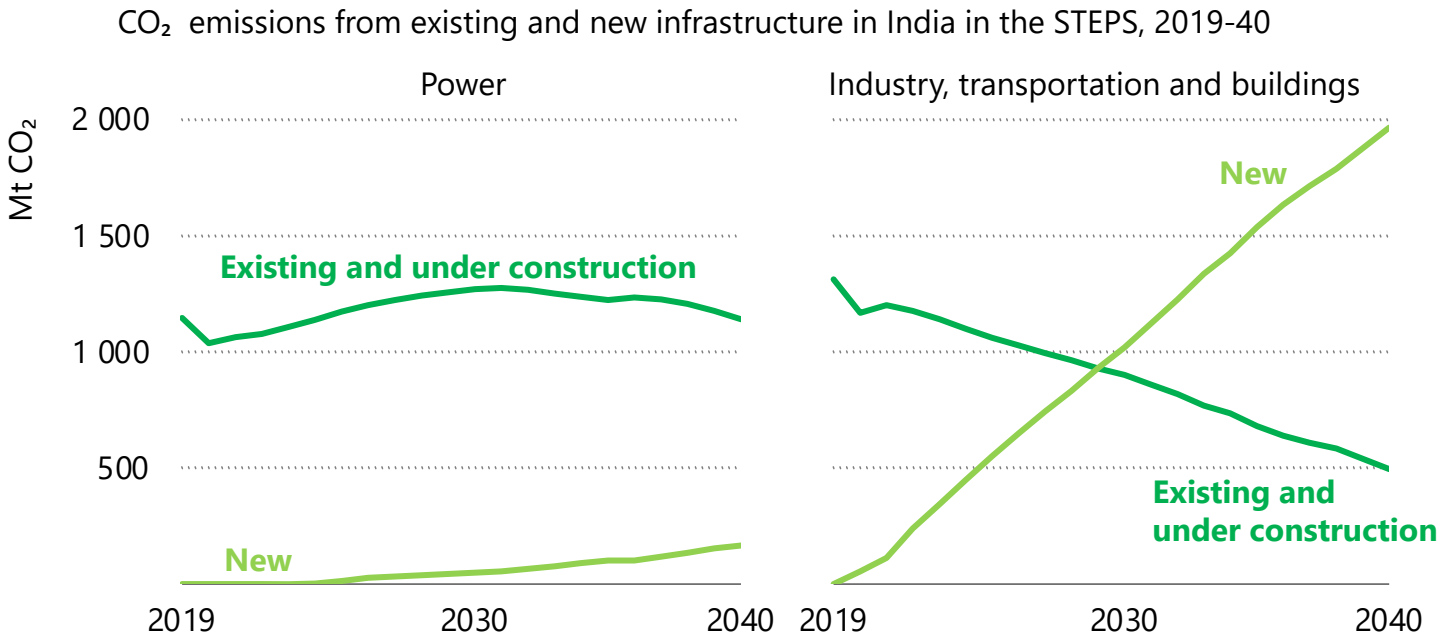
…and on emissions, old and new



Emissions from power flatten out, while industry & transport drive a 50% increase to 2040 in the STEPS: within two decades, most of India's emissions come from factories, vehicles & other sources that do not exist today

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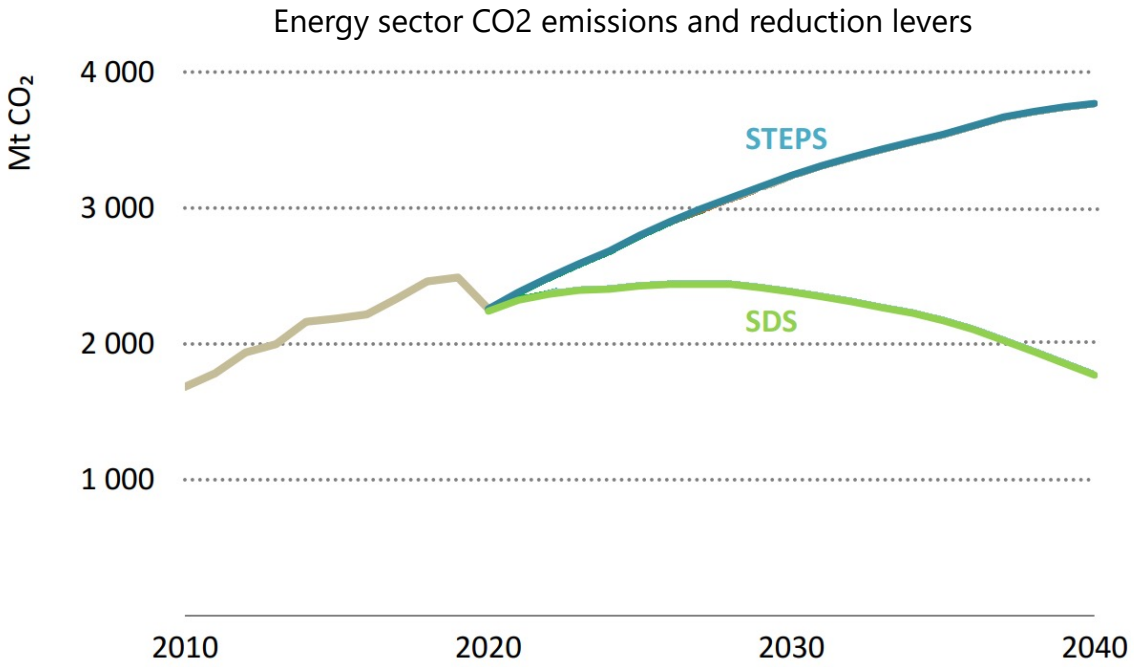
Towards falling carbon dioxide emissions



The enhanced deployment of renewables and efficiency causes CO2 emissions to peak in India in the SDS by 2030 and to decline steadily thereafter

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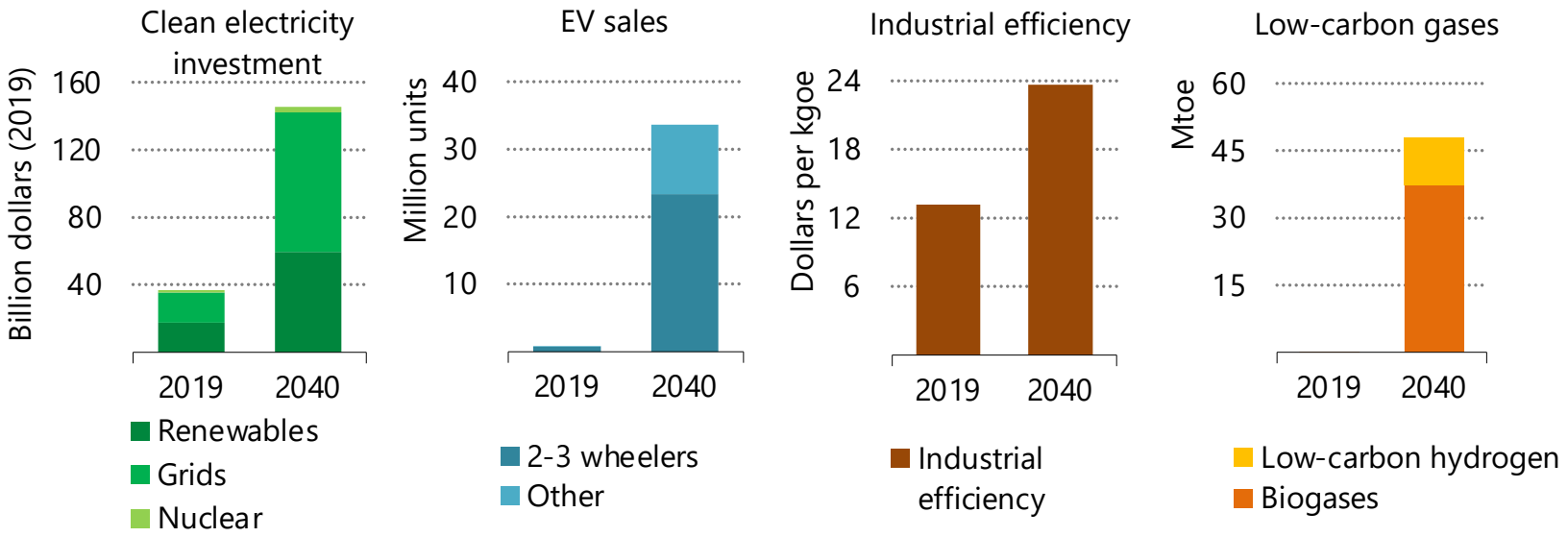
The quest for low-emissions, inclusive growth

Selected indicators for India from the Sustainable Development Scenario



Many aspects of a new model for growth are already evident in India's policy vision, and more are in the Sustainable Development Scenario that would put India on a path towards net-zero emissions

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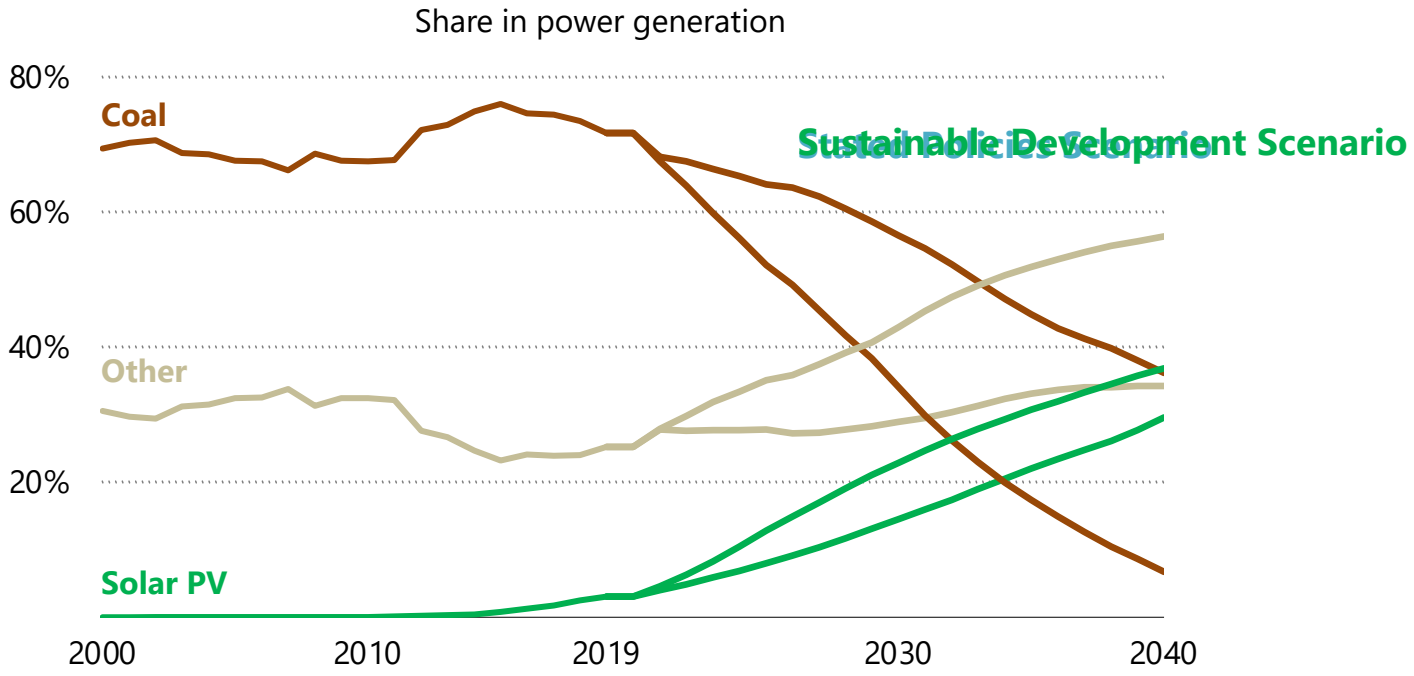
A solar-powered revolution



Electricity demand grows nearly twice as fast as overall energy demand, while the cost-competitiveness of solar makes for a dramatic turnaround in supply with strong support from wind & ambitious policy targets

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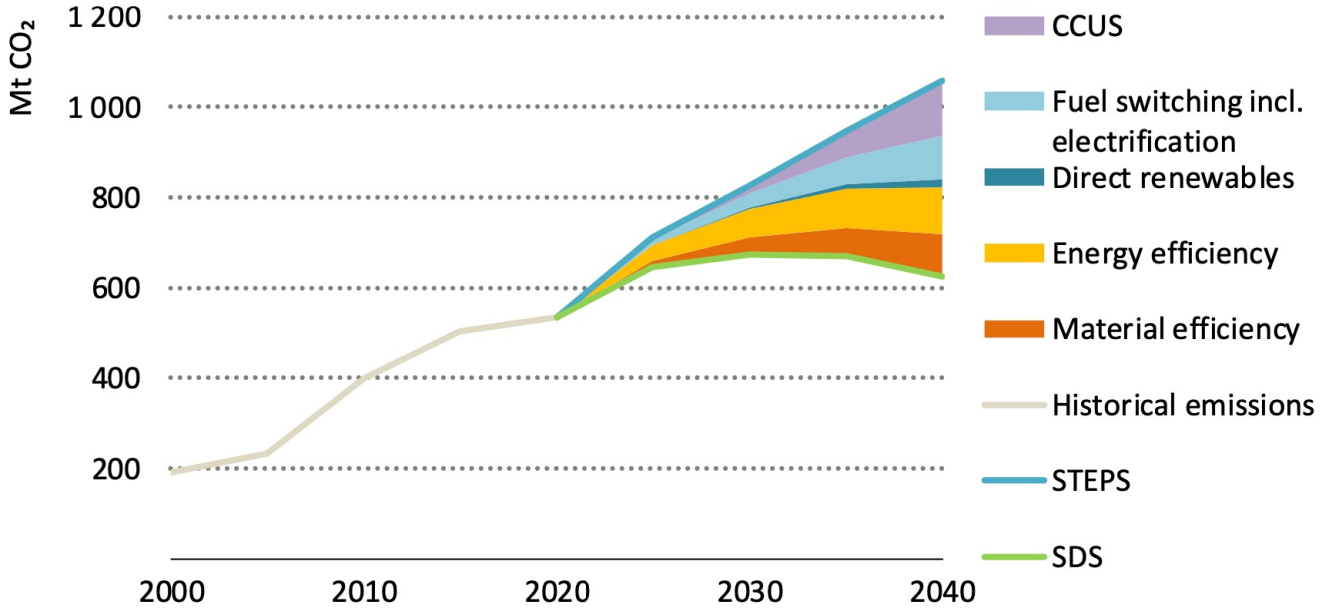
Industrial emission trajectories

Emissions reductions in the industry sector by abatement option between the STEPS and the SDS



Multiple technologies and policy approaches are needed to bring India's industrial emissions to a net zero trajectory

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Conclusions

- As India recovers from the shock of Covid-19, it is re-entering a very dynamic phase in its energy development that will have a huge impact on the country's future and on global trends
- Renewables, led by solar, are transforming India's electricity sector, but close attention to investment risks and rising flexibility needs will be crucial to ensure "round-the-clock" power for all.
- Transport, especially for trucks, and industry are behind continued growth in oil and coal demand in the STEPS, curbed only in part by efficiency, electrification & the rise of natural gas
- Mitigating future environmental and energy security hazards will requires a wide range of efficient & clean technologies, sustainable fuels and infrastructure, and battery storage
- India can meet the aspirations of its citizens without following the high-carbon road that others have pursued. In this endeavour, it can count on the enduring support and partnership of the IEA

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