



THE IMPACT OF COVID-19 ON THE INDIAN ENERGY OUTLOOK: IMPLICATIONS FOR COAL

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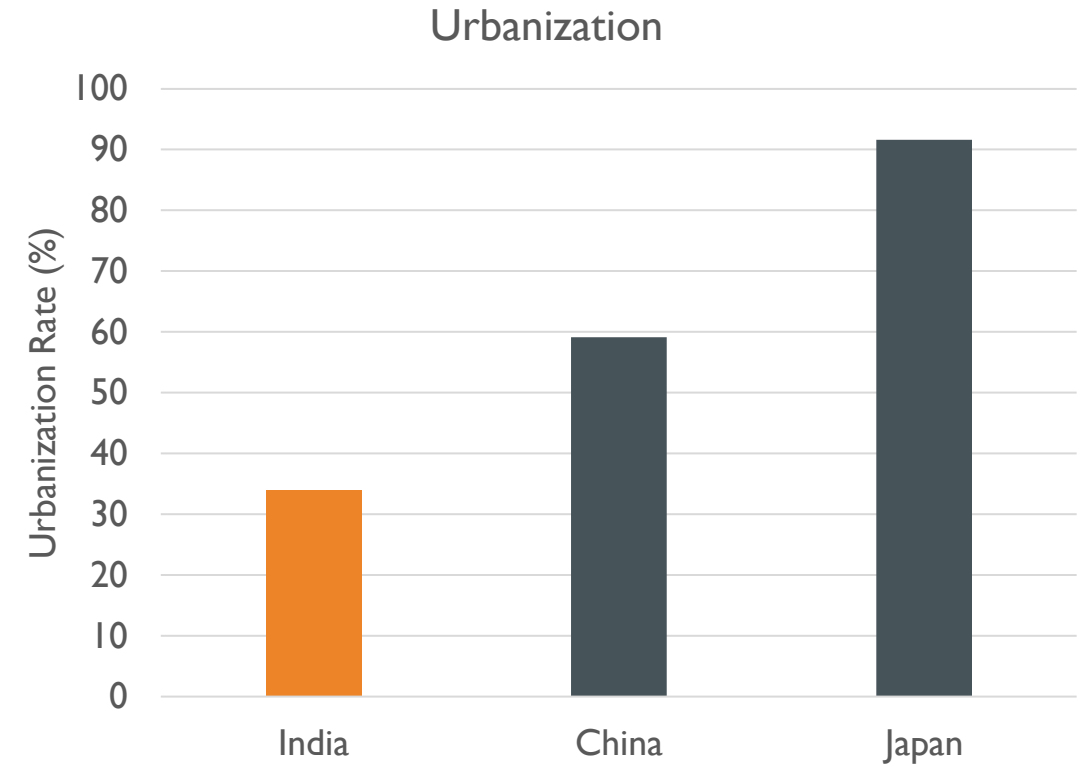
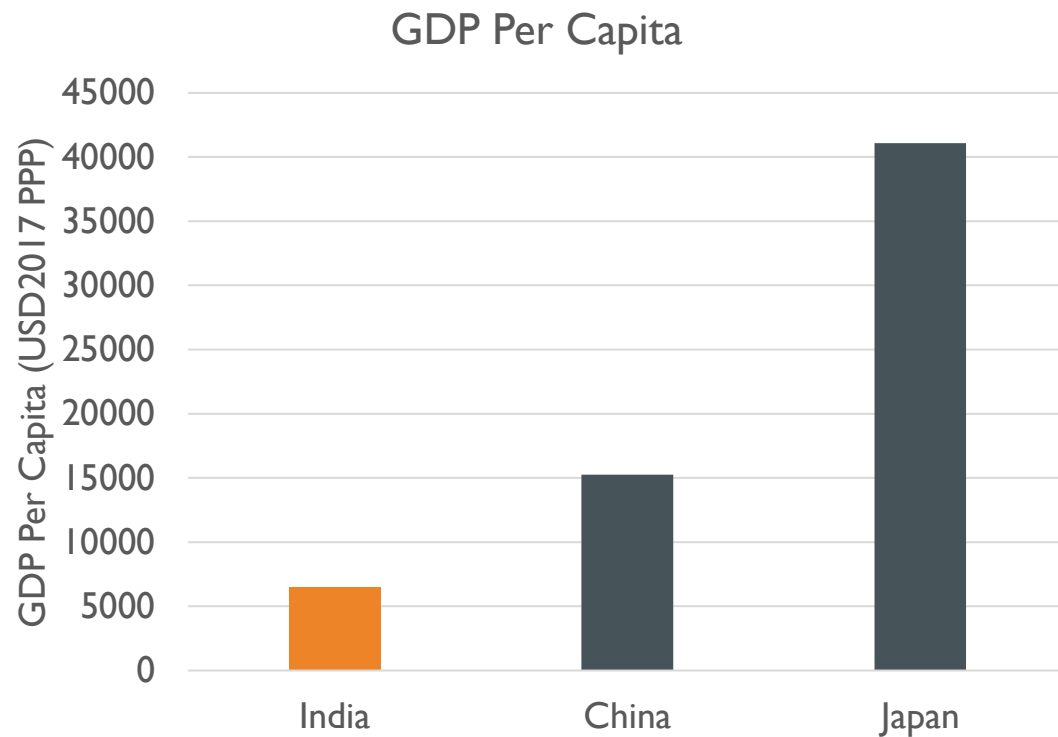
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- Indian economic context before COVID-19
- Short-term impacts of COVID-19
- Scenarios for mid-term impacts of COVID-19
- Short and mid-term outlook for key coal consuming sectors:
 - Power
 - Industry, in particular iron and steel

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INDIA IS STILL A VERY POOR COUNTRY

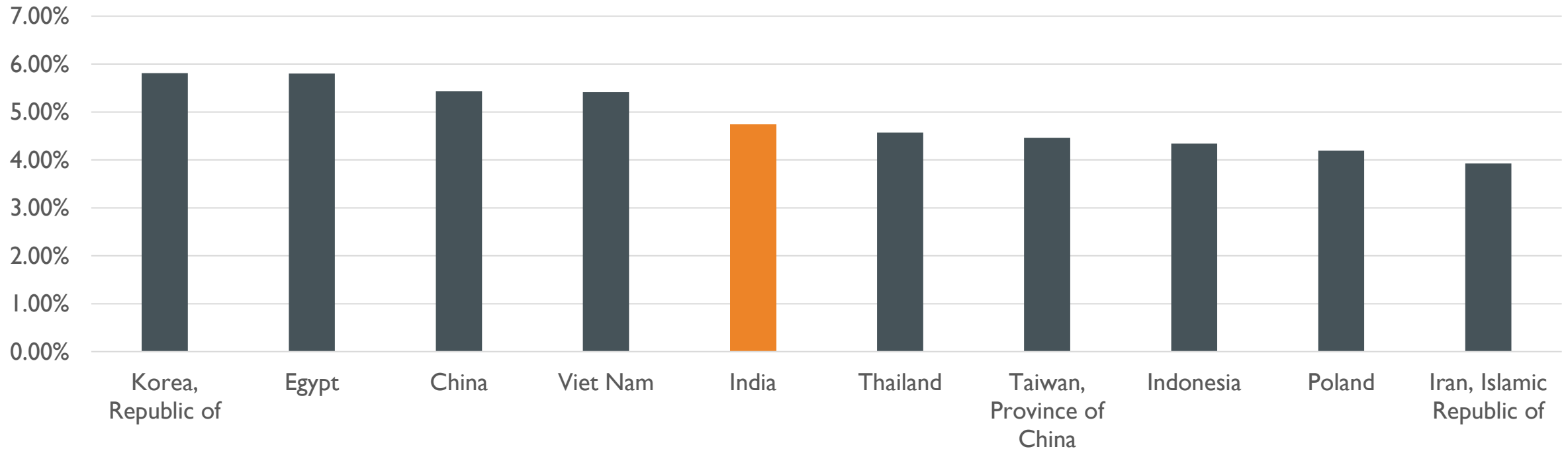


Key Message: The huge transitions of industrialization, urbanization and demographic transition are still underway in India. Energy and material demand must grow strongly to meet development needs.

Data source: World Bank, World Development Indicators

INDIA'S GDP GROWTH PERFORMANCE HAS BEEN AMONG THE BEST IN THE WORLD SINCE 1980

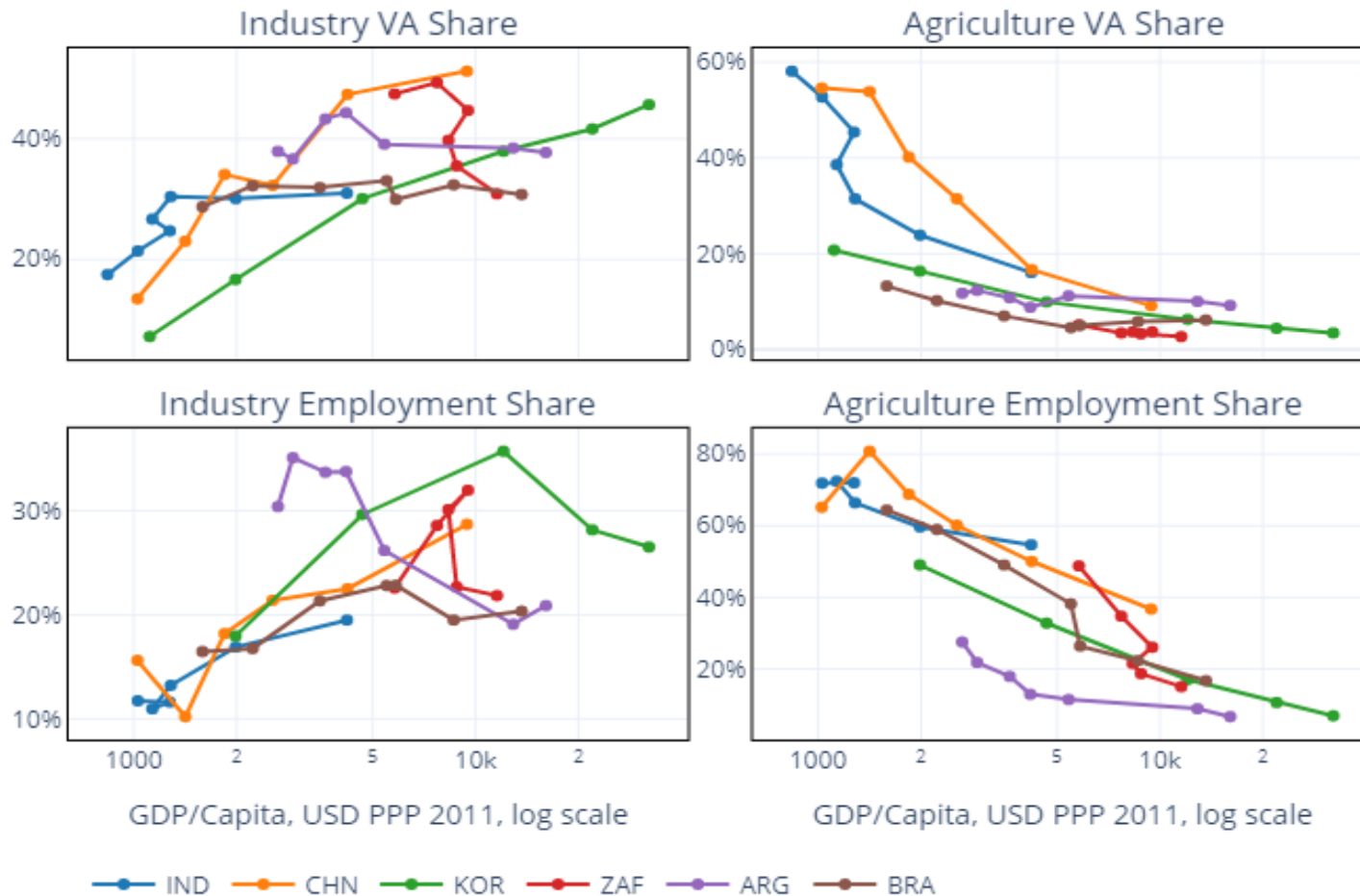
Annualized GDP Per Capita Growth, 1980-2017, Of Top 10 Performing Large Economies in the World



Key Message: India has a strong history of good growth performance, but still a large development gap that needs to be bridged.

Data source: Penn World Tables

INDIA'S GROWTH MODEL IS VERY DIFFERENT TO THE EAST ASIAN LATE INDUSTRIALIZERS / EMERGING COUNTRIES



Compared to China, South Korea (even post-war Japan), India's growth model is characterised by:

- Lower levels of industrialization (share of industry in GDP)
- Early development of services, particularly high-productivity export services (business outsourcing).
- Relatively lower level of employment in high labour intensity manufacturing, and slow transition of employment out of agriculture

EVEN BEFORE COVID-19, INDIA'S GROWTH MODEL WAS SHOWING SOME WEAKNESSES

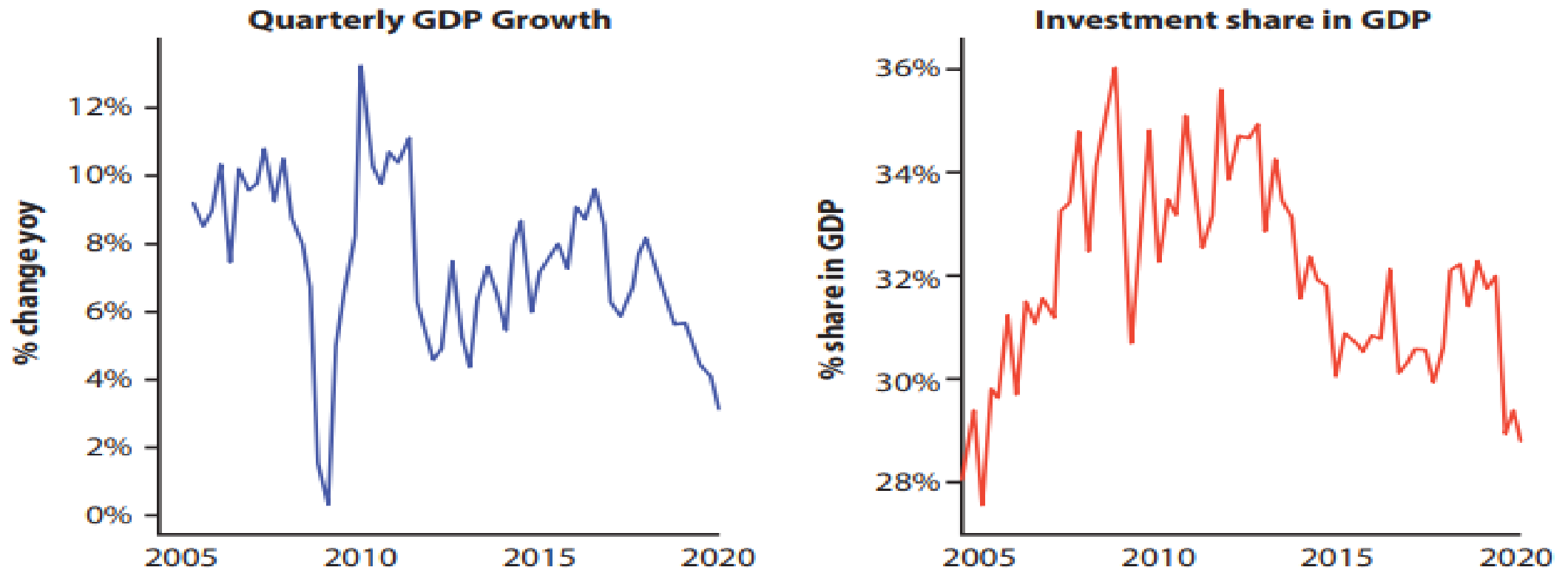


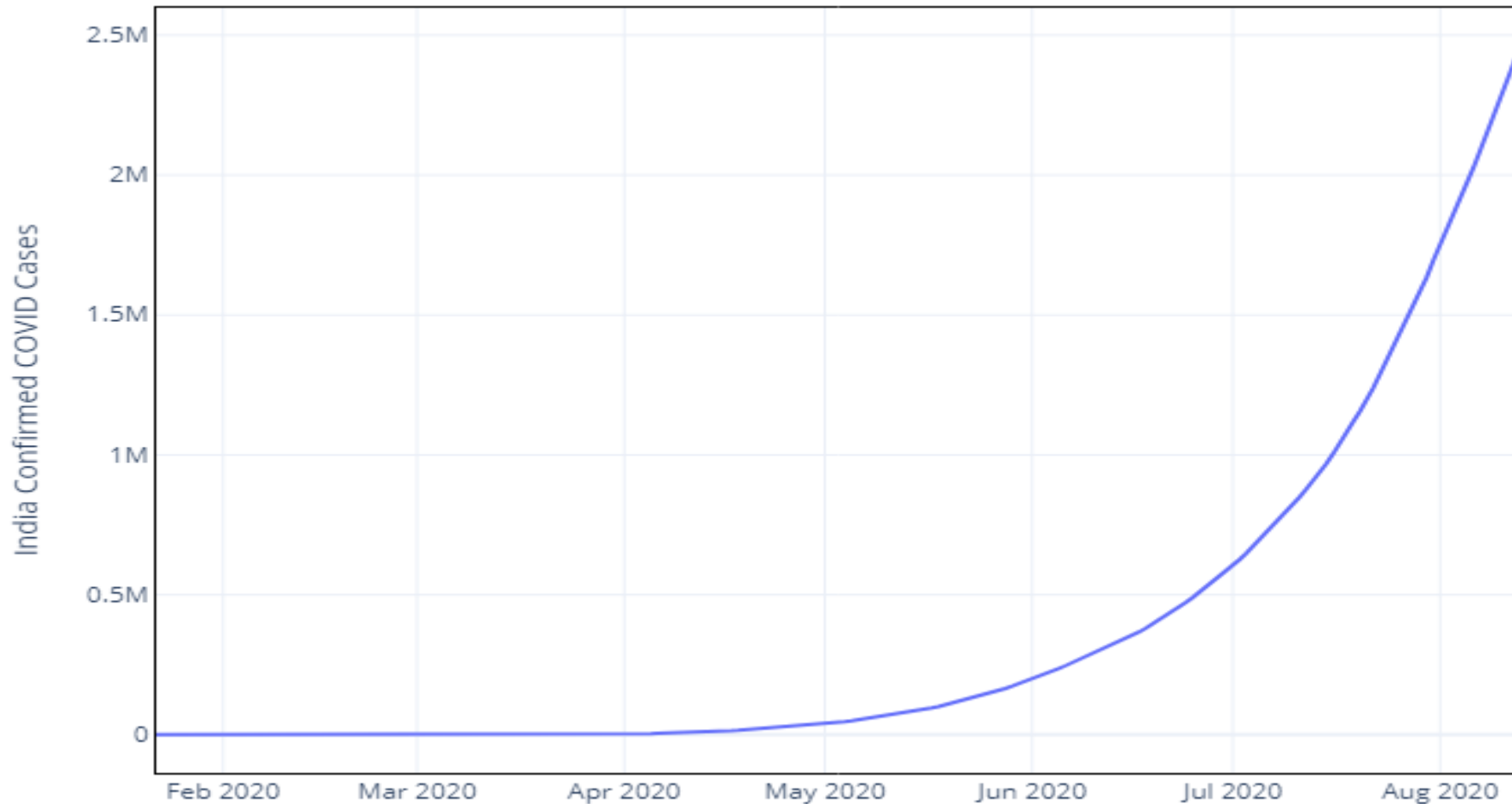
Figure 2: Annualized quarterly GDP growth and quarterly investment share in GDP, 2004–2005 to 2019–2020

Source: Dataset available from (RBI 2020). 2004–2005 prices have been inflated to 2011–2012 prices for the years 2004–2005 to 2010–2011.

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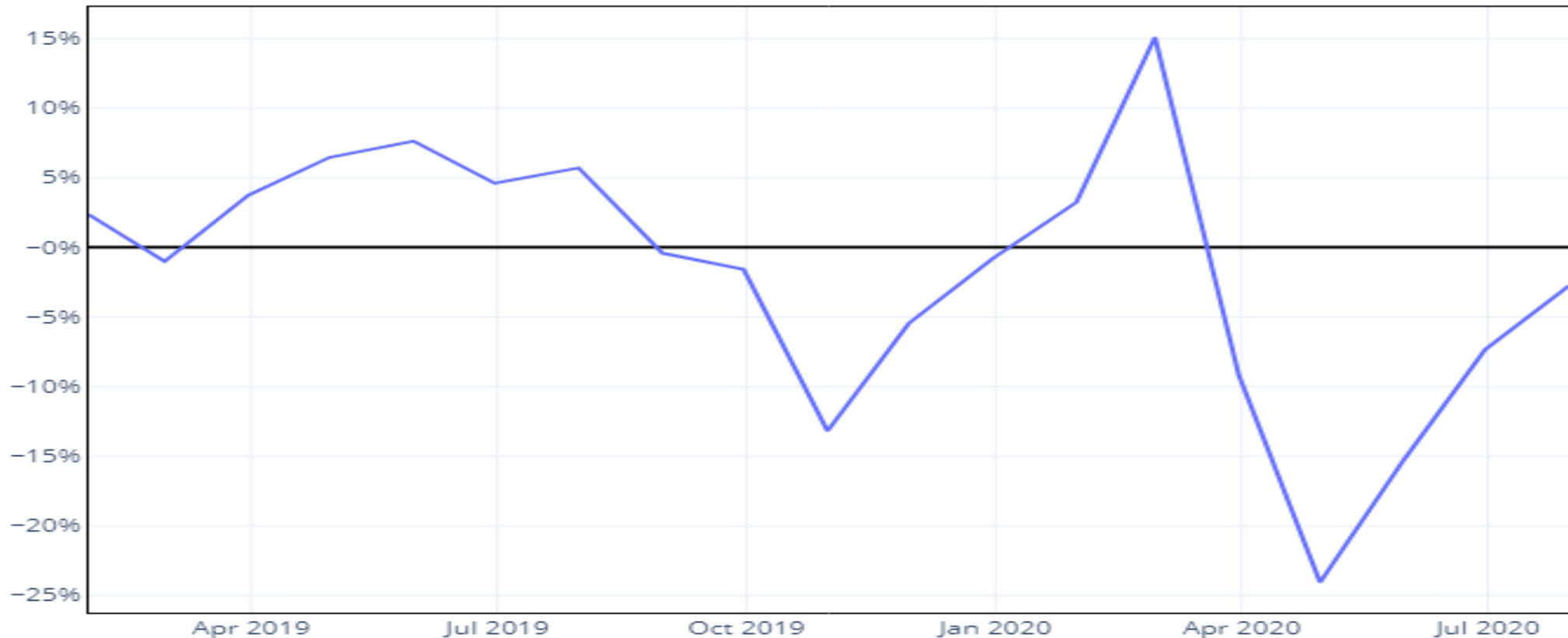
INDIA IS ONE OF THE WORST HIT COUNTRIES IN TERMS OF TOTAL NUMBER OF CASES, ALTHOUGH THE DEATH RATE AND INFECTION RATE PER POPULATION ARE STILL RELATIVELY LOW



Data source: CSSEGISandData/COVID-19

THE SHORT-TERM IMPACT CAN CLEARLY BE SEEN IN THE DEMAND FOR ELECTRICITY WHICH DROPPED BY -30% DURING THE HEIGHT OF THE LOCKDOWN

Annualized Change in Monthly Electricity Demand



Date source: POSOCO

MULTILATERAL AGENCIES PROJECT THAT INDIA'S GDP WILL CONTRACT 3-9% IN 2020, WITH PROBABILITY WEIGHTED TOWARD THE LOWER END

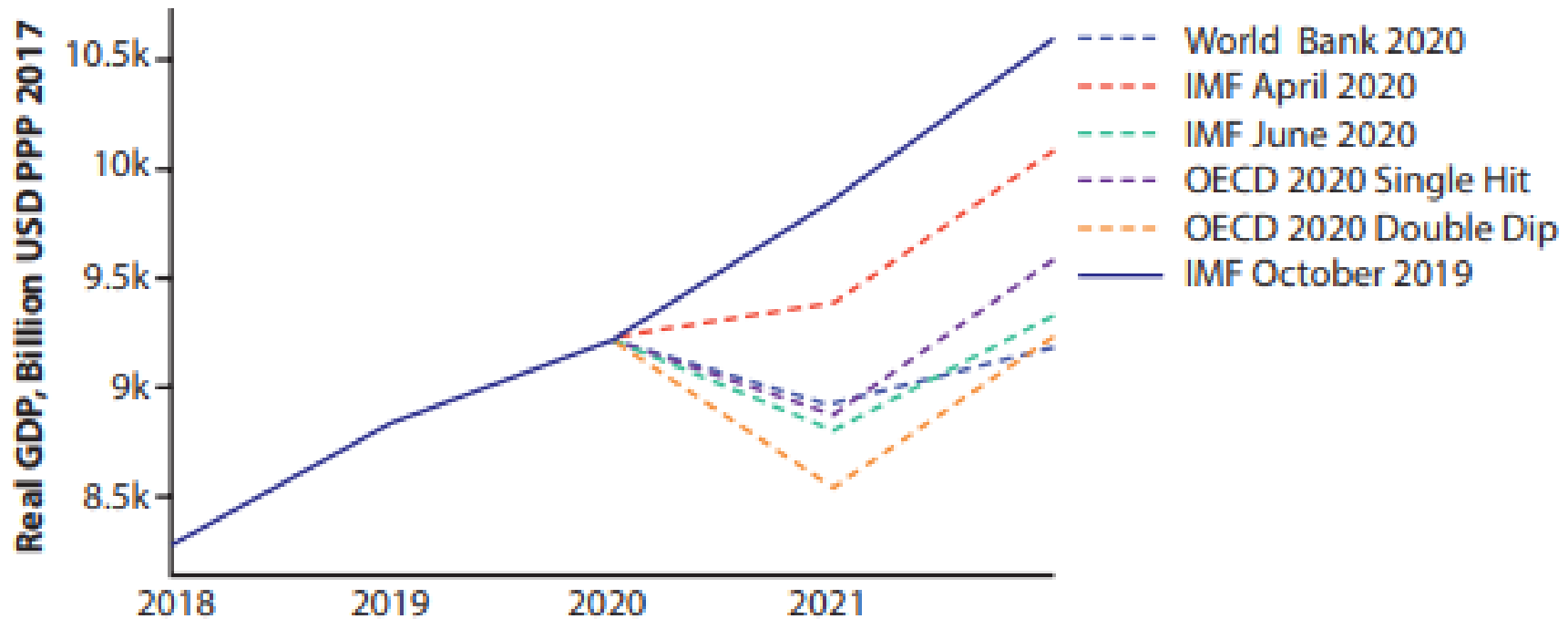


Figure 5: Short-term GDP forecasts for India from various multilateral agencies.

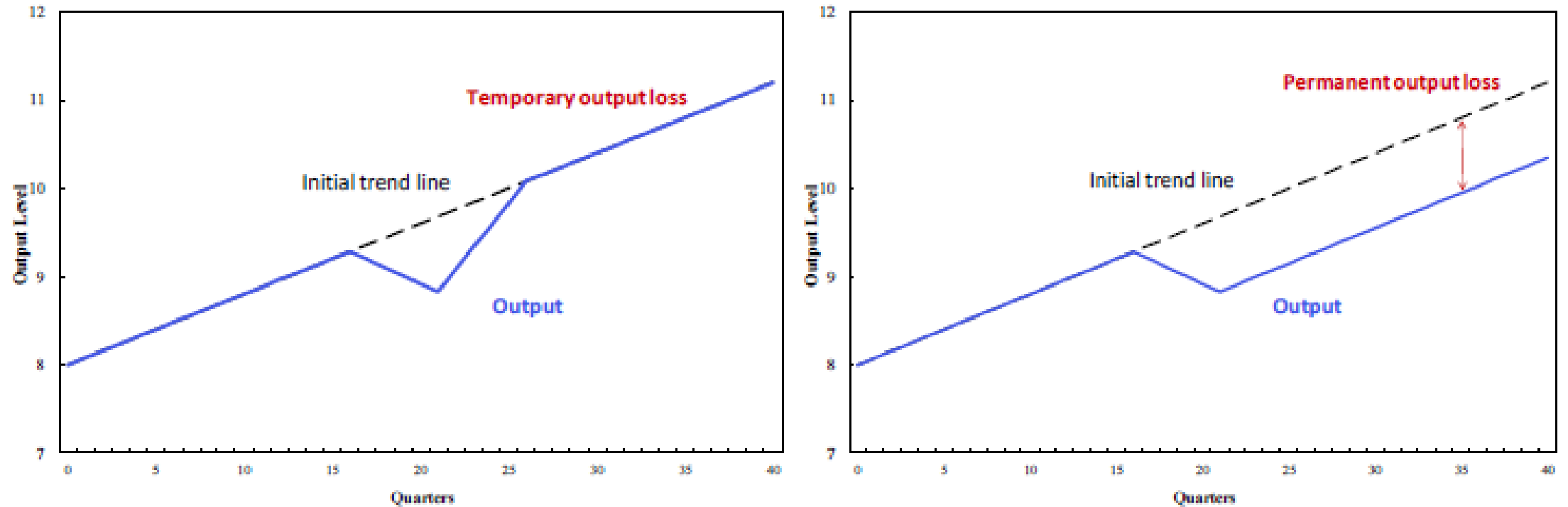
Source: Based on data from World Bank (2020), IMF (various years), and OECD (2020)

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WHAT PERSPECTIVE DO WE TAKE? TRANSITORY SHOCK, OR LASTING CHANGE IN TREND?

Figure 3. Concepts of the Business Cycle



Source: Cerra and Saxena (2017), "Booms, Crises, and Recoveries: A New Paradigm of the Business Cycle and Its Policy Implications", IMF Working Paper

INDIA'S POST-COVID GDP IS EXPECTED TO BE 6-17% BELOW THE LEVEL OF THE PRE-COVID TREND BY 2025

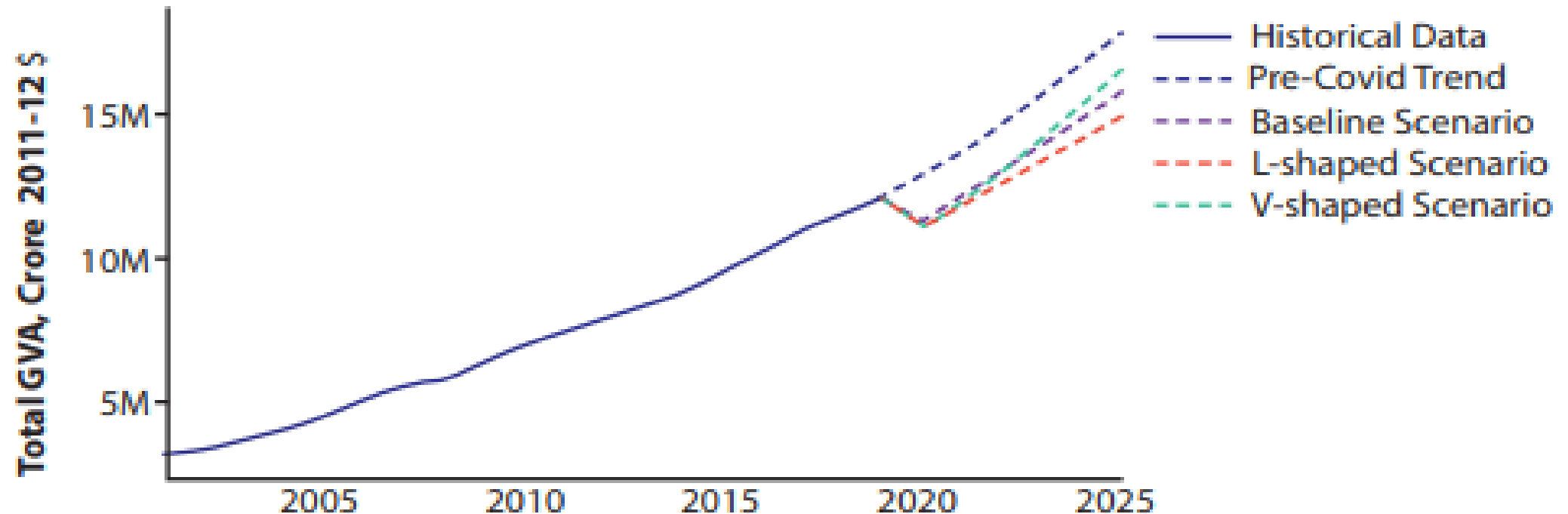


Figure 6: Aggregate GVA forecasts in three scenarios, all-India level

Source: Spencer (2020), "Bending the Curve: 2025 Forecasts for Electricity Demand by Sector and State in the Light of the COVID-19 Epidemic", TERI

THIS WILL RESULT IN ELECTRICITY DEMAND THAT IS 6-16% BELOW THE PRE-COVID TREND LEVEL BY 2025, WITH SERVICES AND INDUSTRY HARDEST HIT

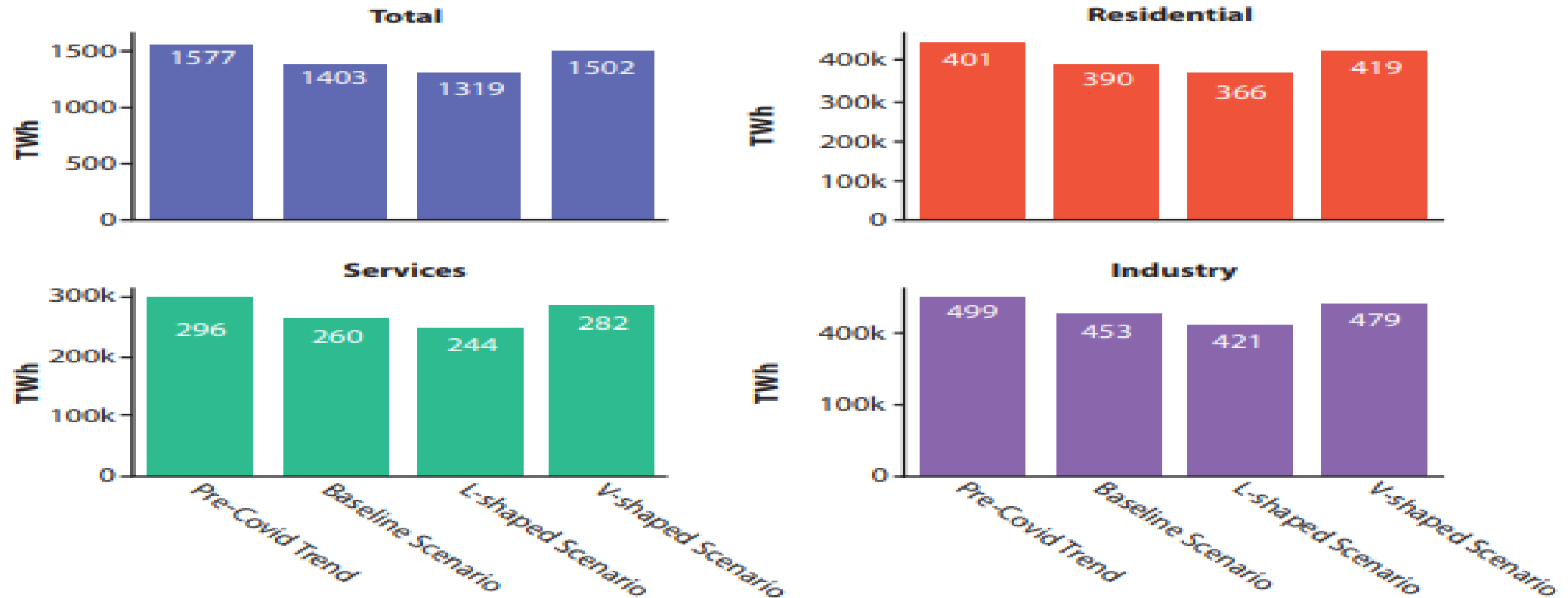


Figure 7: All-India electricity demand in aggregate and by sector (2025)

Source: Spencer (2020), "Bending the Curve: 2025 Forecasts for Electricity Demand by Sector and State in the Light of the COVID-19 Epidemic", TERI

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INDIA'S STEEL CONSUMPTION IS PROJECTED TO GROW TO ~480 MT BY 2050. THE LARGE RANGE IS DUE TO ALTERNATIVE SCENARIO FOR THE STRUCTURE OF INDIA'S GROWTH

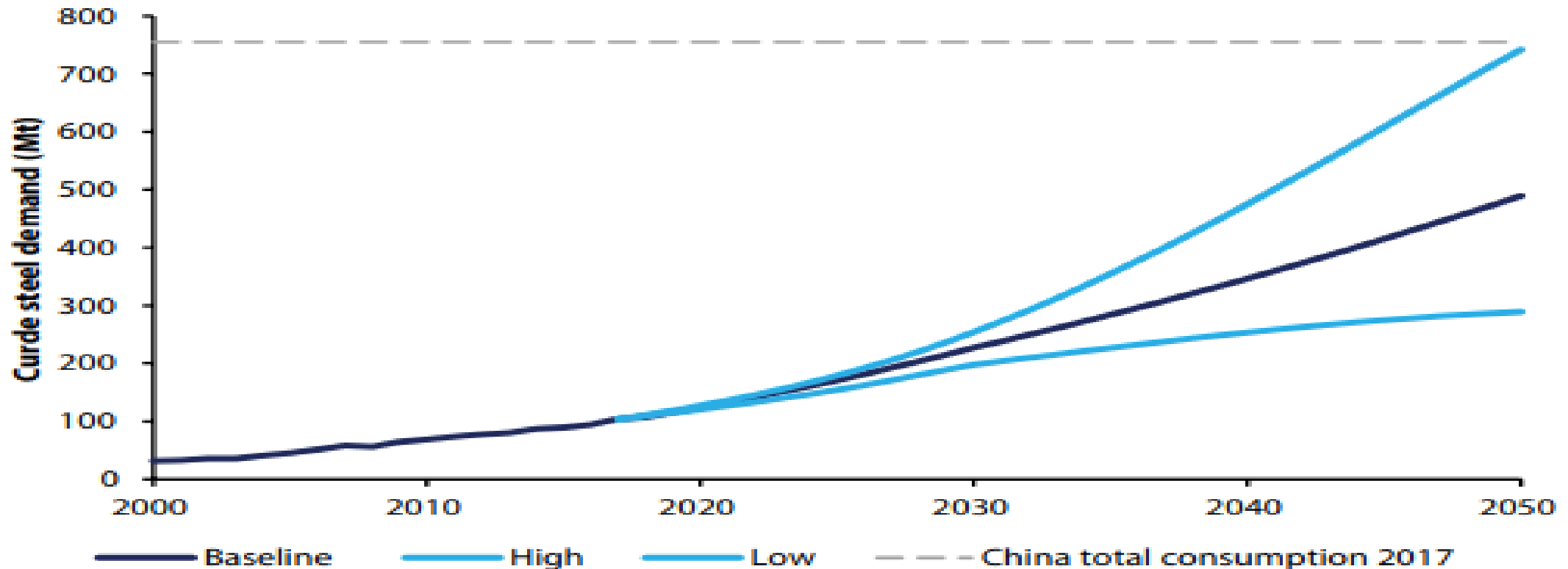
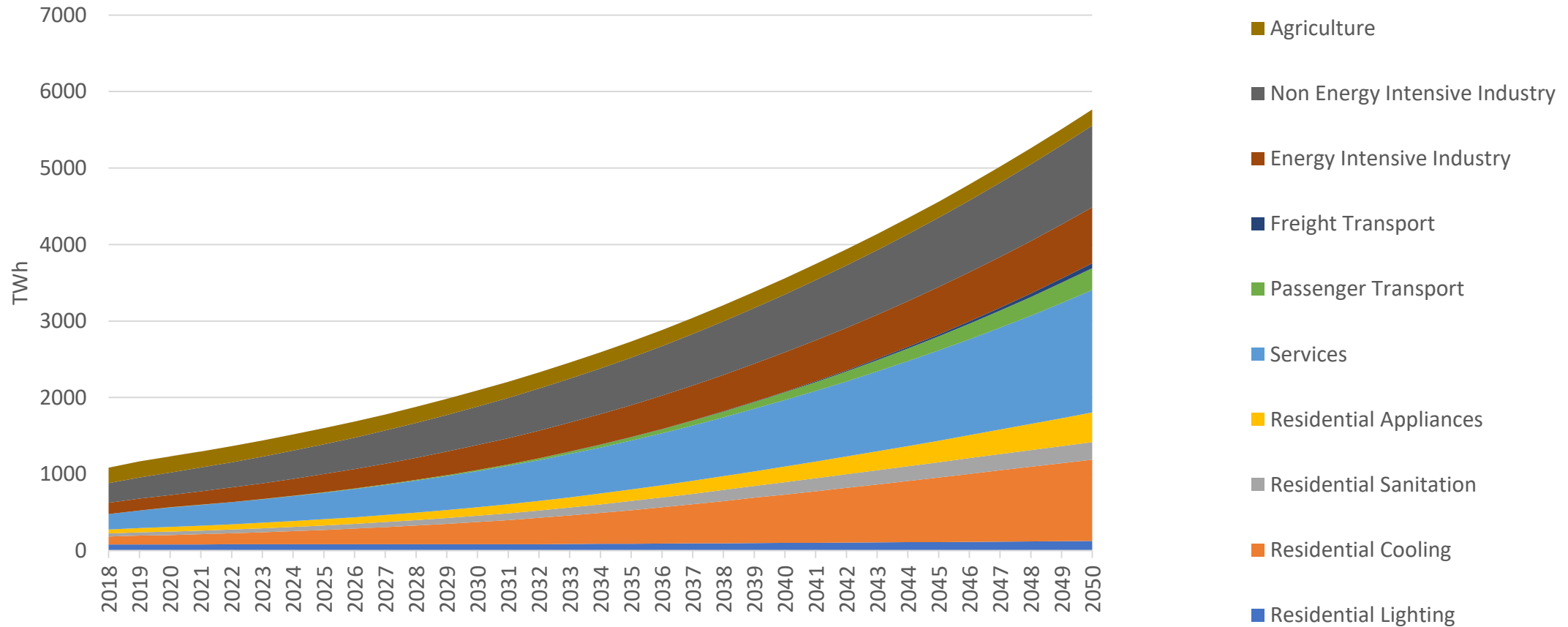


Figure 9: Scenarios for total crude steel demand (Mt), 2000–50
Source: TERI analysis based on data from WSA (2018b); World Bank (2017)

BY 2050, INDIA'S ELECTRICITY DEMAND IS PROJECTED TO GROW TO AROUND 5500 TWH, ROUGHLY A FACTOR 4.5 ON TODAY'S LEVEL

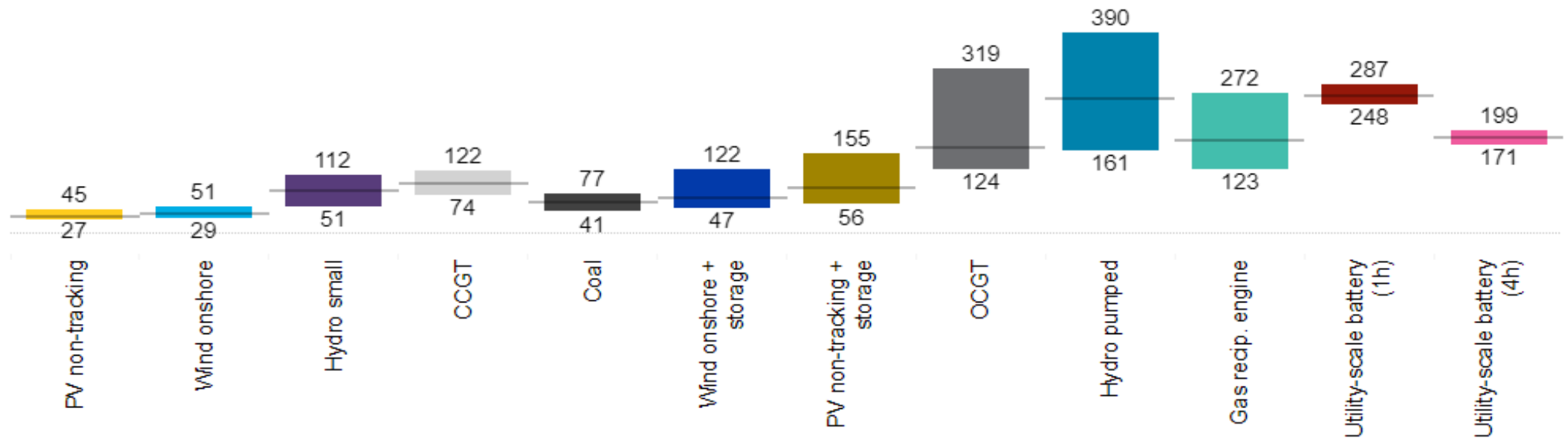


Source: TERI modelling

THE ECONOMICS OF RENEWABLES MEAN THAT RENEWABLES WILL TAKE THE MAJORITY OF INCREMENTAL POWER DEMAND GROWTH

Levelised Cost of Electricity (nominal \$/MWh)

LCOE current range (\$/MWh, nominal) - 2020 H1



Select technology (for historic and forecast data below)

LCOE historic range (\$/MWh, nominal)

Wind onshore

LCOE forecast range (\$/MWh, real 2018)

ON A PURE COST BASIS WITHOUT ADDITIONAL POLICY, MODELLING STUDIES SUGGEST THAT COAL ELECTRICITY IS PROJECTED TO PEAK BY ~2030 AND STAGNATE THEREAFTER

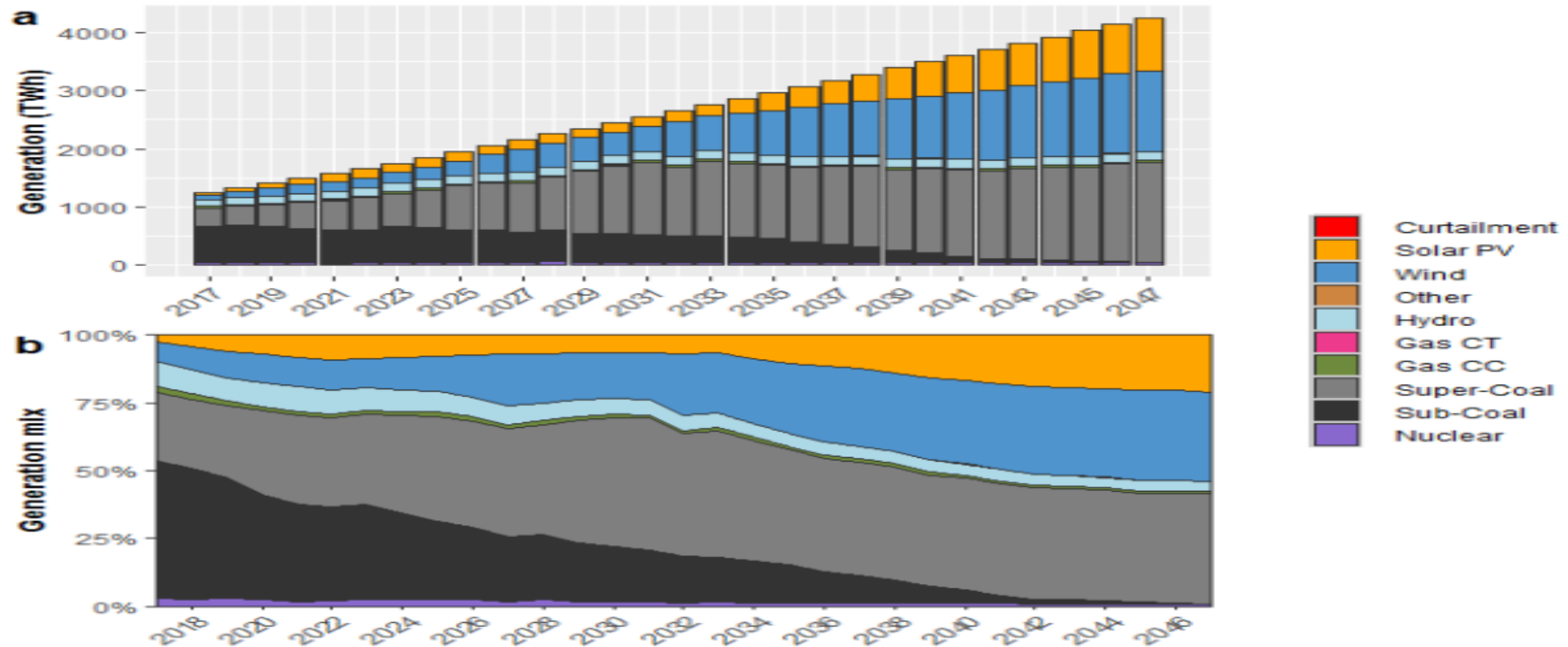


Figure 20. Absolute (a) and relative (b) annual generation mix for 2017–2047, Base scenario

Source: Rose, Chernyakhovskiy, Palchak, Koebrich, Joshi (2019), “Least-Cost Pathways for India’s Electric Power Sector”, NREL.

CONCLUSIONS

1. COVID-19 has had a significant impact on India, and is likely to lead to lower and slower economic growth, and energy demand growth over the next few years:
 1. No need for substantial new investments in energy supply over the next few years, in the context of current oversupply.
2. In the long-term, India's energy and material demand is projected to increase substantially, although there is considerable uncertainty as to the rate and structure of growth. It seems more likely that India will follow a more 'frugal' pathway, based on services and lower rates of urbanization and infrastructure investment.
3. Technological change means that, even without policy, thermal coal demand is likely to plateau within the next 10 years.
4. Industrial and coking coal demand will depend on i) the rate and structure of economic growth; ii) technological innovation to develop more efficient and lower carbon alternatives.