Shaping of Well Below 2^{o}C Pathways: Modelling and Assessment for India

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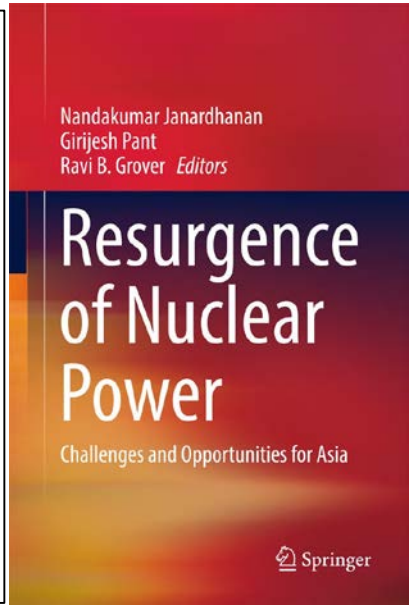
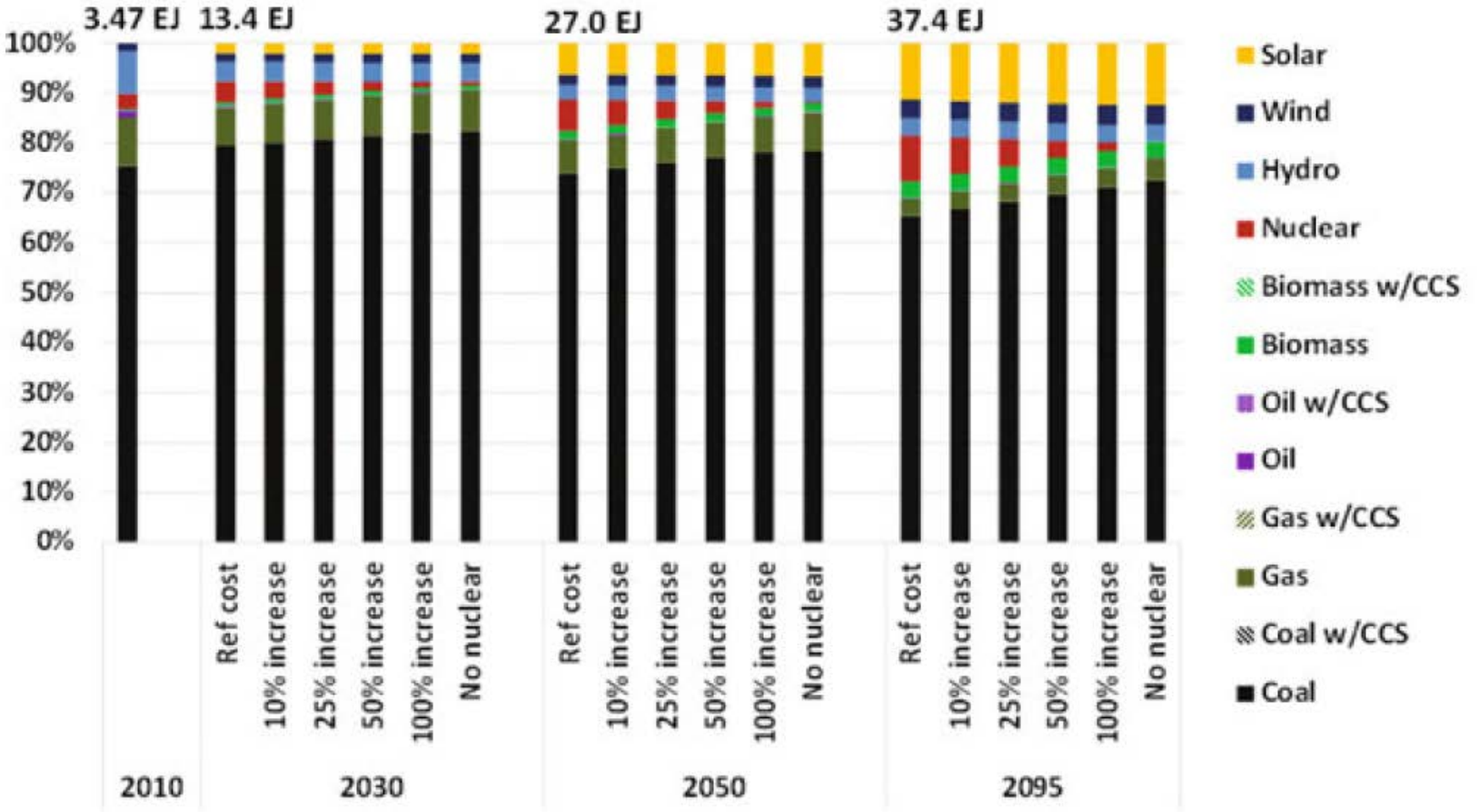
Chapter 10
A Perspective on the Cost of Nuclear Energy

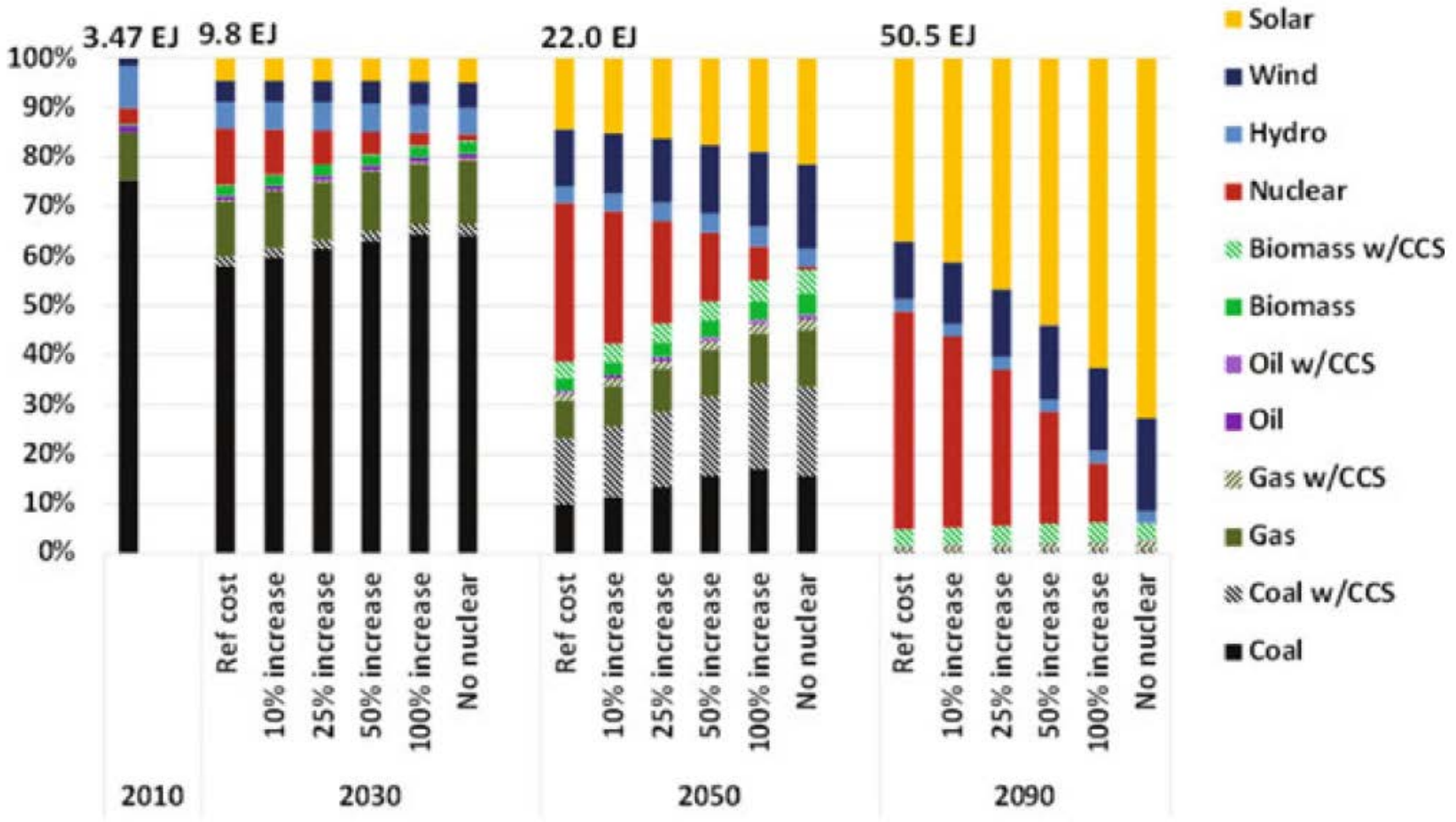
Vaibhav Chaturvedi, Priyadarshi R. Shukla and Karthik Ganesan



Electricity Generation Mix in India: Reference Scenario



Electricity Generation Mix in India: 2°C Scenario



Climate Liability Versus Nuclear Liability

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Transformation of India's transport sector under global warming of 2 °C and 1.5 °C scenario

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A Comparison of Transport Mix Across Scenarios

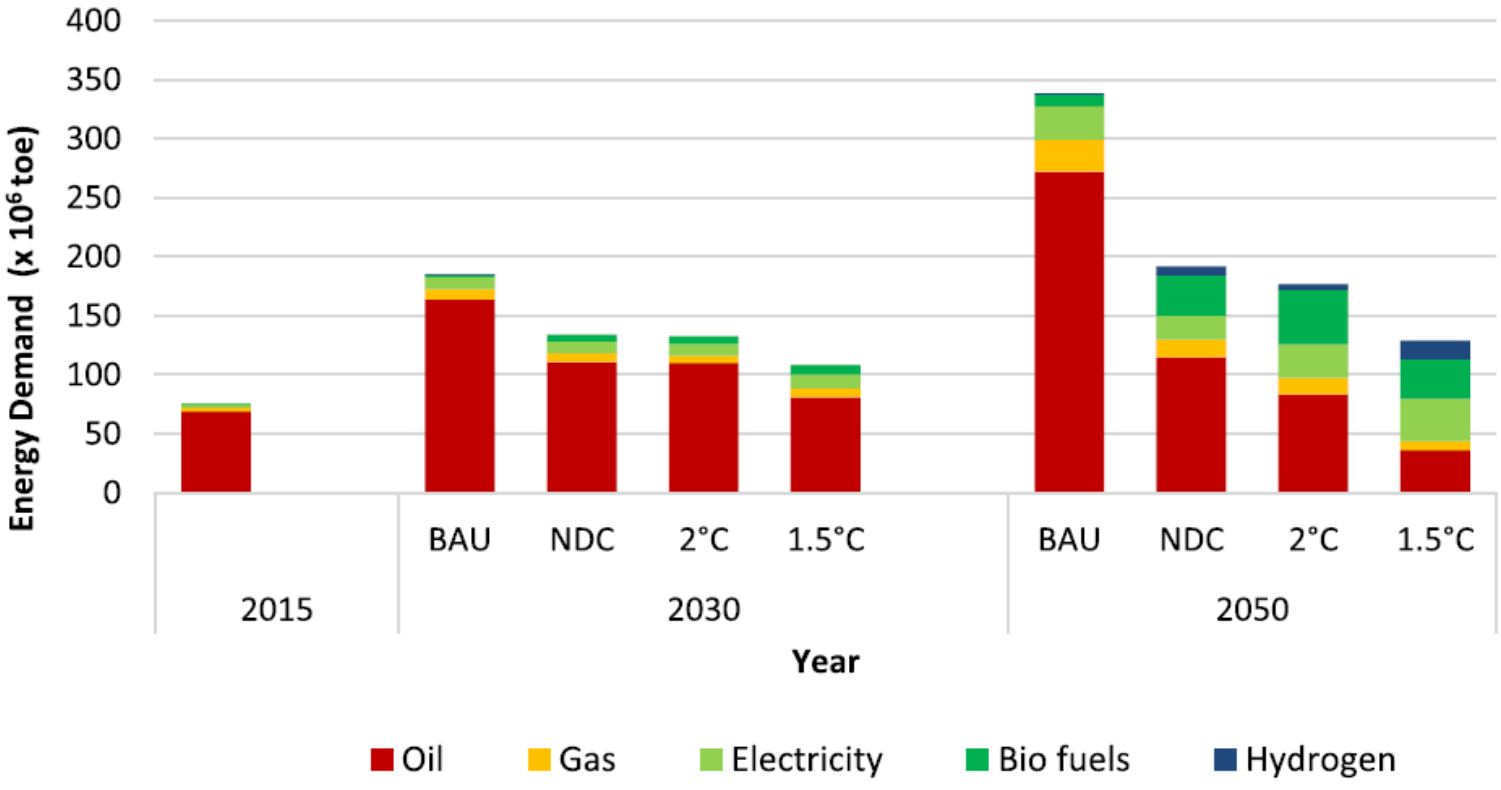
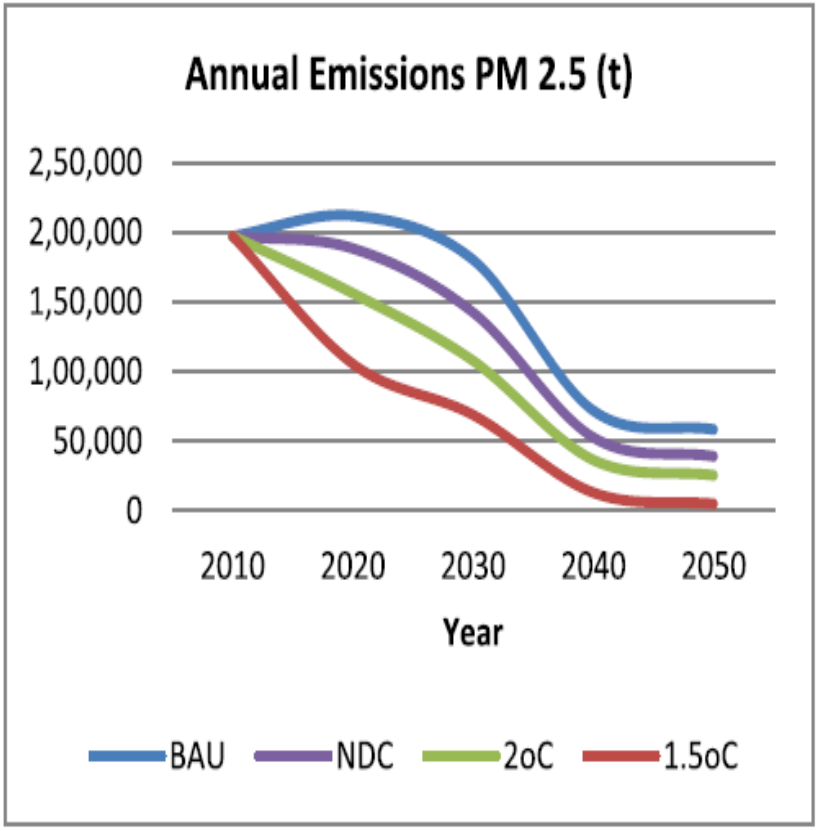
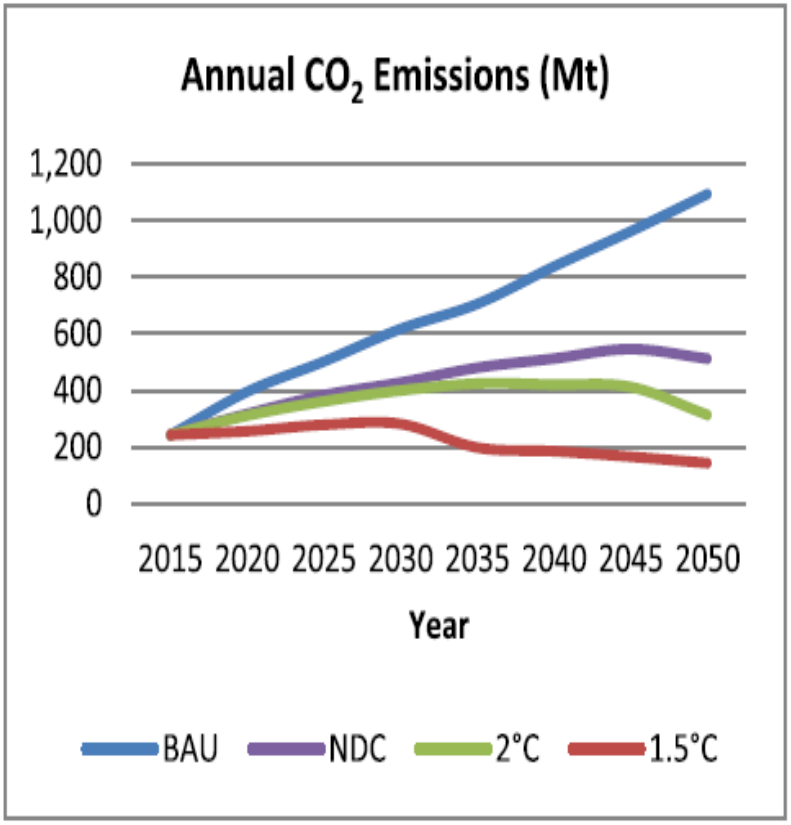


Fig. 5. A comparison of transport energy mix across scenarios.

https://doi.org/10.1016/j.jclepro.2017.10.076

Environment Impacts Across Scenarios from India's Transport Sector





https://doi.org/10.1016/j.jclepro.2017.10.076

Transport Mix Across Scenarios: Conclusions

1. India's NDCs include sustainability measures which enhance decoupling of CO2 emissions compared to BAU. But NDCs do to meet emissions target compatible with 2^{o}C pathway.

2. 1.5^{o}C scenario is transformative and needs urgent and intensive implementation of demand-side measures and modal shifts towards public transport.

3. Aligning low carbon scenarios with sustainable development goals (SDGs) such as energy security, clean energy access delivers sizable co-benefits

https://doi.org/10.1016/j.jclepro.2017.10.076

Title: Long-term economic implications of 1.5°C scenario: A case study of India

Authors: Shivika Mittal, Shinichiro Fujimori, Jingyu Liu, Priyadarshi R Shukla

The paper assesses Five (5) Scenarios:

1. **INDC Scenario (INDC)**
2. **Emission Quantity Control: 2^{O}C Scenario (EQ_2D_Eq)**
3. **Emission Quantity Control: 1.5^{O}C Scenario (EQ_2D_Eq)**
4. **Emissions Price: 2^{O}C Scenario (EQ_2D_Eq)**
5. **Emissions Price: 1.5^{O}C Scenario (EQ_2D_Eq)**

GHG Emissions across Scenarios

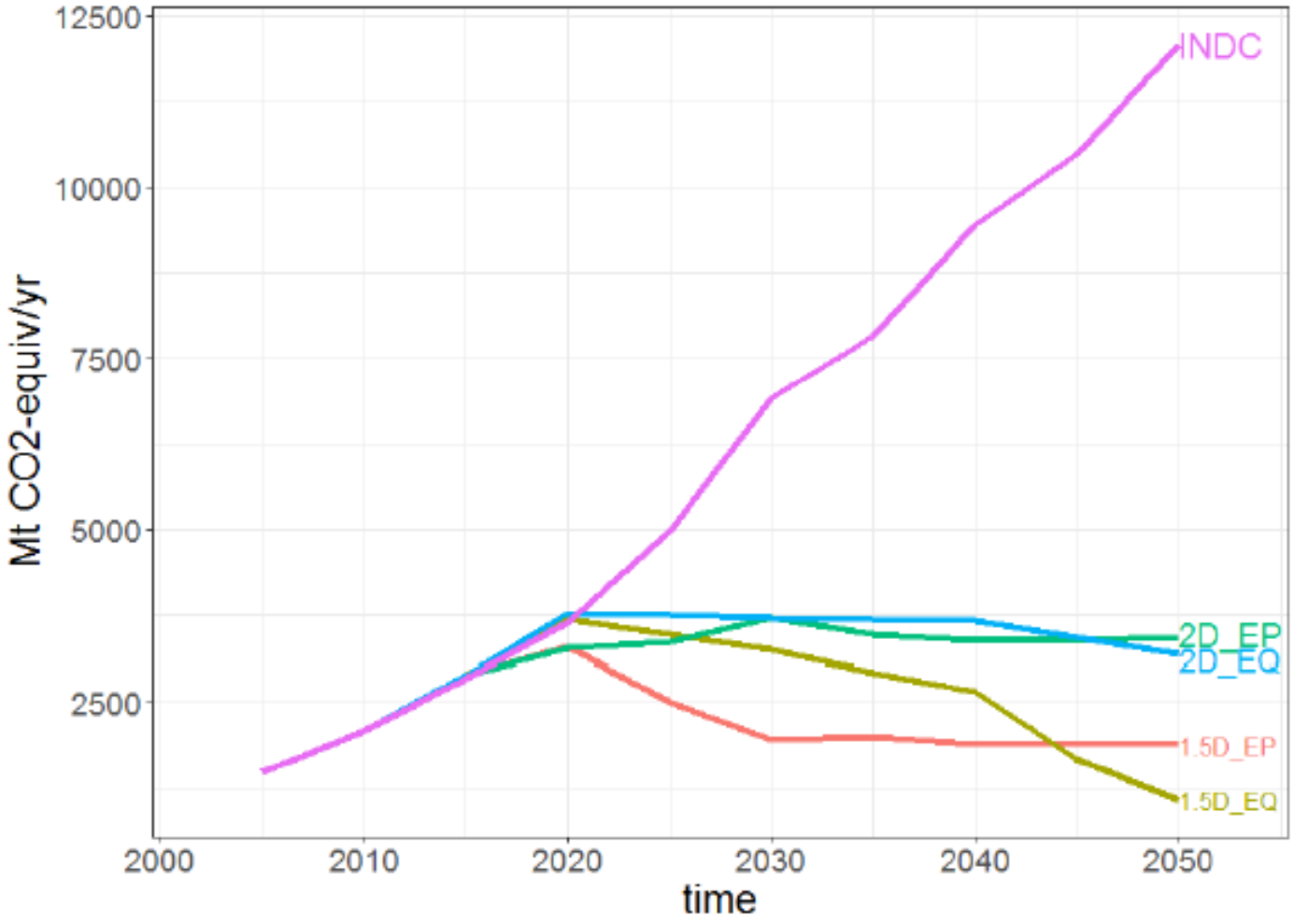


Figure 1. GHG emissions across different scenarios

Electricity Generation Capacity across Scenarios

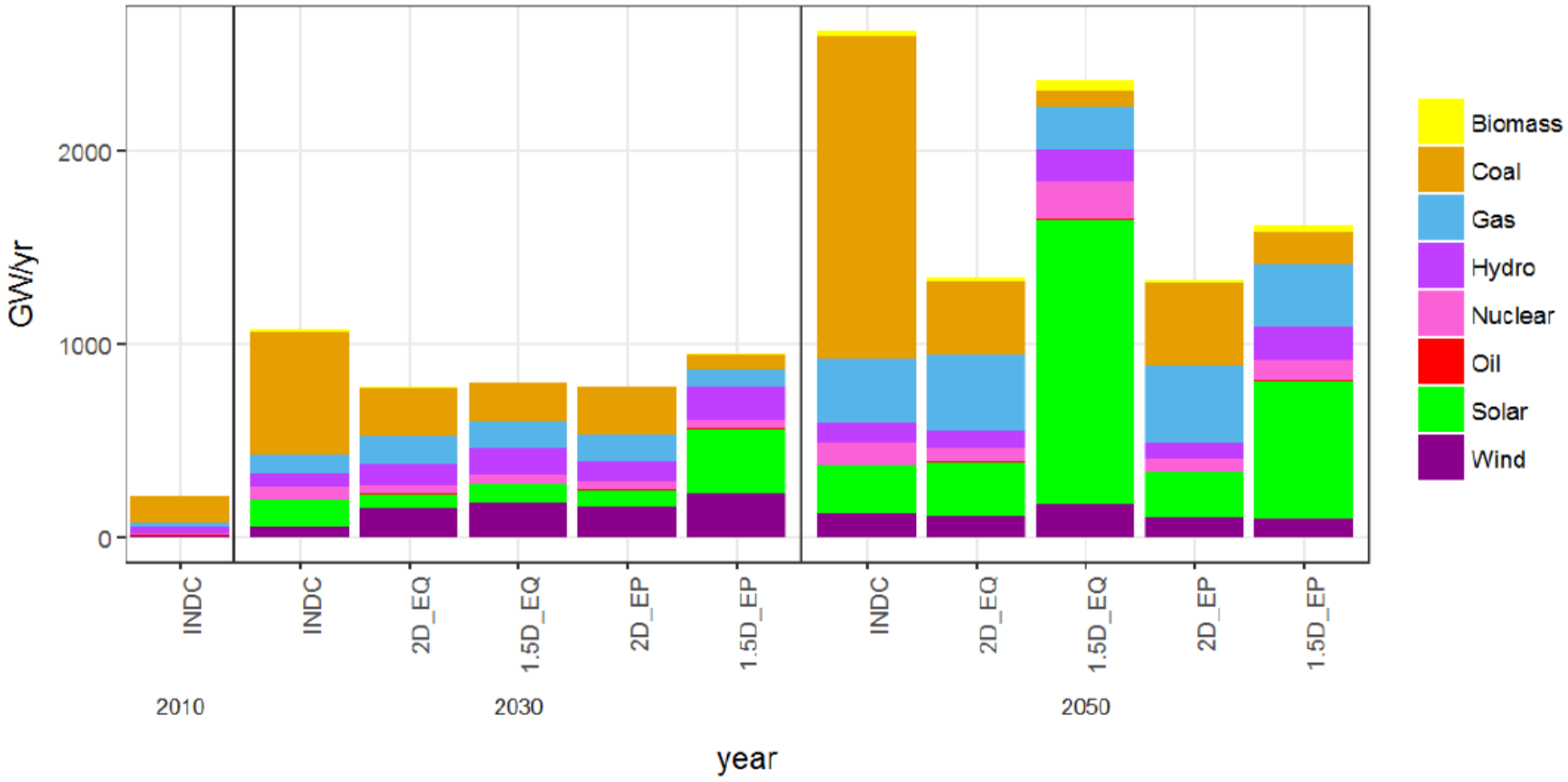
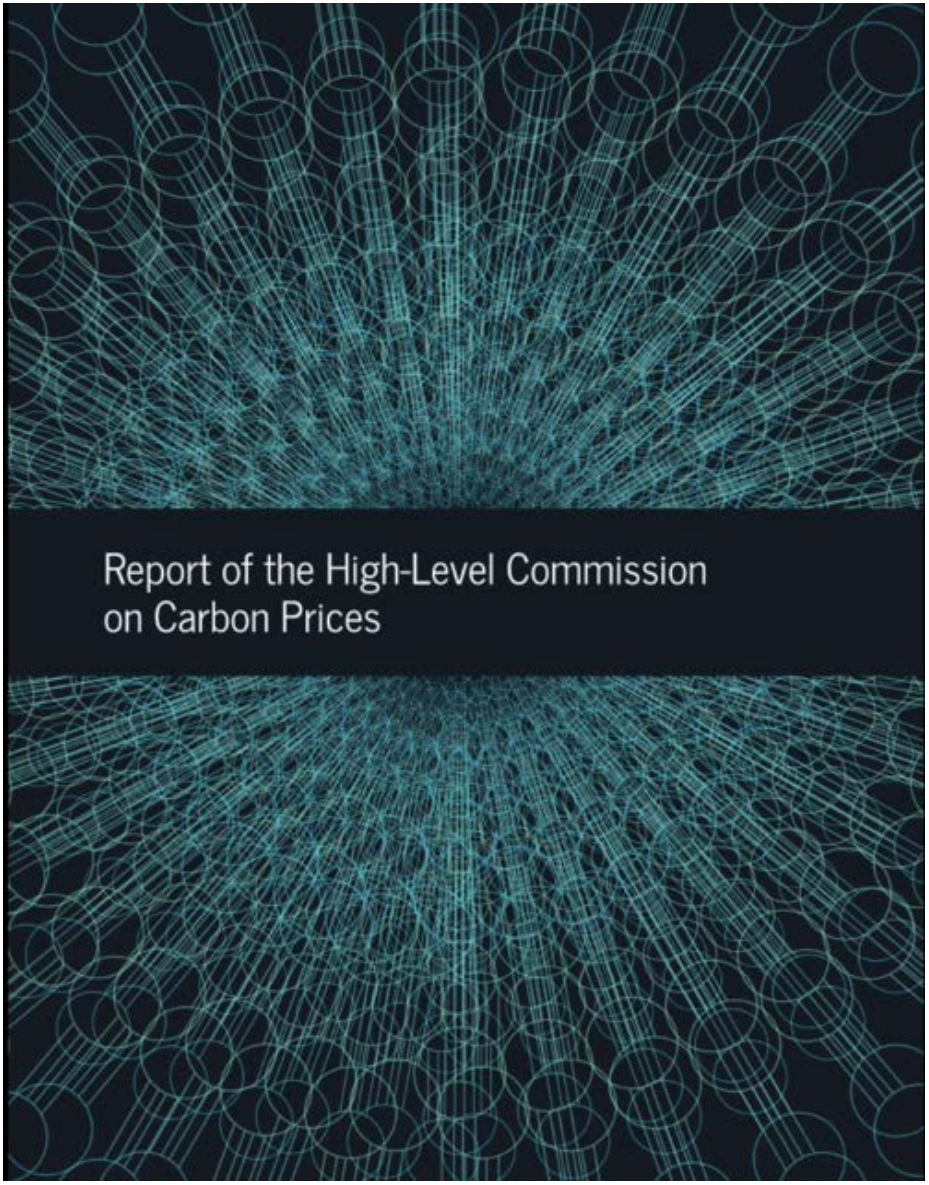


Figure 7. Electricity generation capacity in different scenarios

Climate Change and SDGs: Way forward



Report of the High Level Commission on Carbon Pricing

Switching Prices of Onshore Wind

Table 1: Switching Prices for Onshore Wind in Three Countries

	New Onshore Wind vs. Existing Unabated Coal	New Onshore Wind vs. New Unabated Coal
United States	10	0
Germany	80	60
China	30	20

Source: Energy, Climate Change and Environment: 2016 Insights (IEA 2016).

Note: Unabated coal plants are plants that are not fitted with CCS technology, which captures the harmful emissions that cause global warming for permanent burial. All figures are expressed in US$/$tCO_2$ (United States dollars per ton of carbon dioxide emissions). Germany has less favorable wind conditions than China and the United States.

[14] This analysis uses 2015 information on fossil fuel prices and the cost of renewable energy. It is intended to illustrate the policy implications of varying circumstances rather than provide up-to-date information on the cost of switching to a different energy generation technology.

Social Value of Mitigation Action (SVM)

Mitigation actions entail direct costs, co-benefits, and adverse side effects (IPCC, 2014b) - <u>Potential co-benefits include:</u>

- The **immediate benefits of avoided GHG emissions**:
  - Less adverse effects from local air pollution on health & agriculture productivity (Clarke et al. 2014)
  - Greater energy security and lower vulnerability of trade balance to oil price volatility

- **An acceleration of technological change** when early investments in low-carbon technologies deliver learning-by-doing effects with positive spillovers on technological change in the form of a "Schumpeterian" innovation wave (Stern 2015b; Bramoullé and Olson 2005).

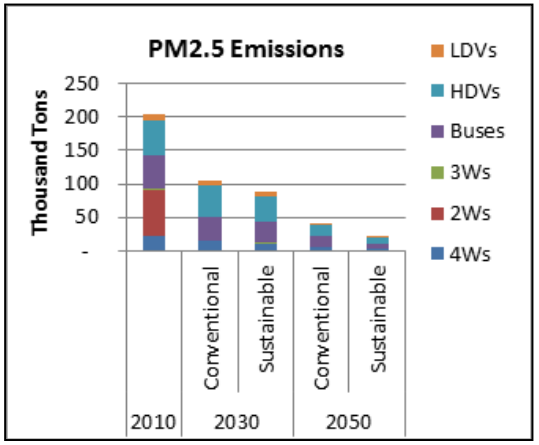
- The **short-term knock-on effects and long-term development benefits** of a well-conducted low-carbon transition:
  - Redirecting savings toward productive investments
  - Strengthening industrial fabric through investing in low-carbon technologies and local resources
  - Reduced poverty through higher growth, higher employment, and better access to modern energy, transport, and housing infrastructures (Arezki et al. 2016).

Carbon Price Corridor
(Consistent with the Paris Agreement)

Based on evidence from industry, policy experience, and relevant literature, and taking into account the strengths and limitations of the respective information sources, this Commission concludes that, in a supportive policy environment, the explicit carbon-price level consistent with the Paris temperature target is at least US$40–80/tCO$_2$ by 2020 and US$50–100/tCO$_2$ by 2030. The implementation of carbon pricing would also need to duly consider the non-climate benefits of carbon pricing (for instance, the generation of additional government revenue), the local context, and the political economy (including the policy environment, the adjustment costs, the distributional impacts, and the political and social acceptability of the carbon price).

Carbon Price + other well-designed policies

Mitigation Co-Benefits



Thank you

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