Alternative industrial sector outcomes in India:

India’s energy use could be much higher

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By
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India is large and growing fast in the IEO2019 Reference case, but much uncertainty can affect energy use.

**All dollars reported use purchasing power parity exchange rates**
Two key uncertainties are industrial sector energy intensity and economic composition, which determine industrial sector growth.

**Reference case Indian gross output shares**

- Share of trillion 2010 dollars

**Reference case regional industrial energy intensity**

- British thermal units per 2010 dollars

**all dollars reported use purchasing power parity exchange rates**
We developed some tests to address uncertainties that could raise energy use to assess the potential outcome.

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<thead>
<tr>
<th>energy intensity assumptions</th>
<th>economic composition assumptions</th>
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<td>standard</td>
<td>Reference case</td>
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<td>alternative</td>
<td>Composition case</td>
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<td>alternative</td>
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<td>Combination case</td>
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We developed some tests to address uncertainties that could raise energy use to assess the potential outcome.
We tested an alternative economic composition that focused the Indian economy on manufacturing rather than construction and services.

Indian gross output by sector
trillion 2010 dollars**

<table>
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<th>Year</th>
<th>Reference and Technology cases 2050</th>
<th>Composition and Combination cases 2050</th>
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<tr>
<td>2018</td>
<td>40%</td>
<td>17%</td>
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<td>2050</td>
<td>43%</td>
<td>12%</td>
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• Indian manufacturing has growth potential greater than in the Reference case based on past policy emphasis of the Indian government.

• Alternative maintains a GDP-neutral growth by reducing construction industry and services sector output.

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We developed some tests to address uncertainties that could raise energy use to assess the potential outcome.
We tested an alternative technology path that increases energy intensity, implicitly covering changes in technology and technique.

India’s industrial technology does not advance as quickly as in the IEO2019 Reference case—eliminating so-called technology leap-frogging.

This assumption *indirectly* tests different paths of technology adoption, capital substitution for labor, and the addition of recorded energy use that was previously not explicit in national accounting.

**Indian manufacturing energy intensity**
British thermal units per 2010 dollars**

- **2010**
- **2050**

**all dollars reported use purchasing power parity exchange rates**
For total Indian energy, the Combination case is more than the sum of its parts—the other tests

Indian primary energy consumption
quadrillion British thermal units

Combination
Composition
Technology
Reference
With analytic inputs to other regions held constant, India’s share of global industrial output increases, and composition has the larger effect.
Per capita energy is helpful for comparing across regions, showing the Combination case brings India close to the current OECD average.
Thank you for your attention, further details are available in the full report

- Additional detailed results include:
  - Assumptions, including what was *not* changed
  - Gross output breakdown by industry
  - Industrial energy use breakdown by fuel

  [https://www.eia.gov/outlooks/ieo/section_issue_aiso.php](https://www.eia.gov/outlooks/ieo/section_issue_aiso.php)

- Discussant: Jitendra Roychoudhury, Research Fellow at King Abdullah Petroleum Studies and Research Center

- Q&A to follow