# Alternative Pathways to 1.5°C Can Help Achieve Multiple National Energy Goals

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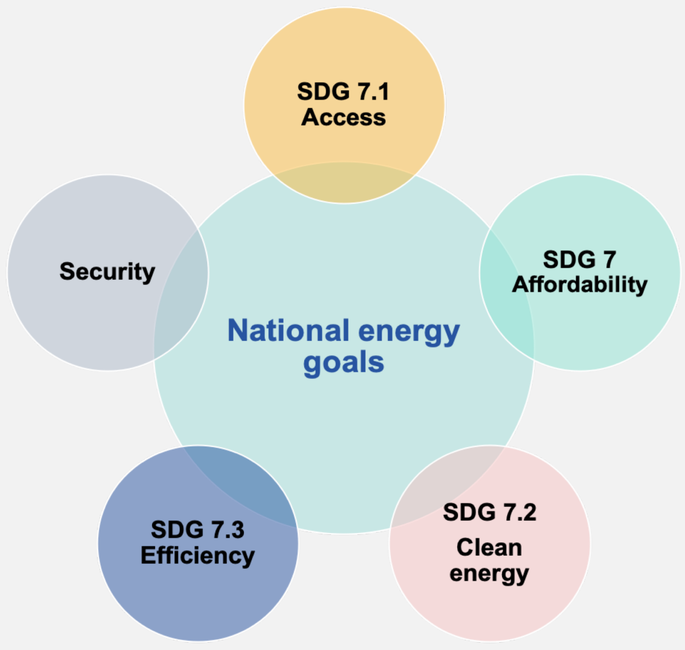
## Key messages

- Co-benefits & tradeoffs on national energy goals in SDG-7 vary by mitigation pathway choices & regional context
- While focusing on certain technologies in pathway choice can help limit some tradeoffs; behavior change & societal transformations offer the best options across all regions to achieve national energy priorities as well as climate goals
- International financial transfers alone are insufficient to meet energy & climate goals together

**Introduction:**

- Countries must choose between competing energy goals outlines in UN SDG-7 and domestic priorities in the light of geopolitical tensions, often contextualized as energy trilemmas
- Representative 1.5C mitigation pathways typically show tradeoffs on SDG metrics
- Instead of representative archetypes, a scenario ensemble with variations in technology, pace of transition, demand side mitigation options and global effort sharing could better illuminate the specific tradeoffs and options to achieve both climate & domestic energy goals




*The 5 national energy priorities considered, based on stated and implicit SDG-7 goals*

**Modeling approach:**

Mitigation pathway elements may interact in different ways with national energy goals. The interlinkages with these goals are measured along 5 metrics.

| | |
|---|---|
| **Access** | Share of residential energy from non-solid fuels (natural gas, LPG, biofuels, electricity etc.) |
| **Affordability** | Share of average annual household income spent on residential energy needs |
| **Clean energy** | Share of renewable energy in the residential electricity mix |
| **Efficiency** | The primary energy intensity of GDP, assuming average fossil efficiency for other primary energy sources |
| **Security** | Share of energy imports in annual regional consumption |

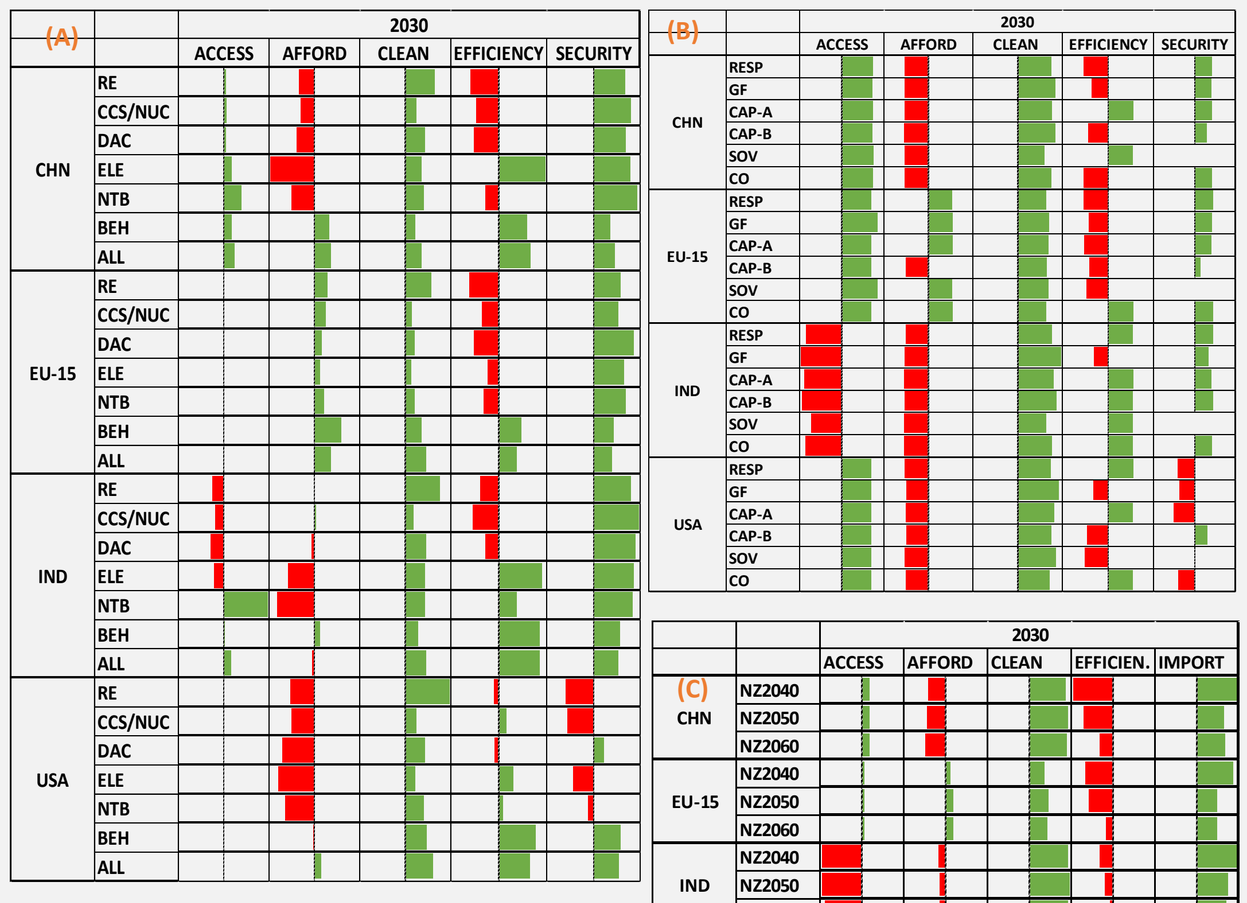
- Integrated Assessment Model, GCAM v. 5.4 to model 18 scenarios
- We assessed implications for all 32 global regions in GCAM, across 5 national energy goals for 2030-2050.

**Pathway variations:**

- Pace of transition – the global net zero $CO_2$ attainment year
- Technology choices – pathways explicitly focused on renewable energy (RE), carbon capture or nuclear energy (CCS/NUC), direct air capture (DAC), electrification (ELE), ban on traditional biomass fuels (NTB)
- Demand side mitigation options – behavior changes (BEH), efficiency improvements and non-CO2 reductions coupled with all technology options (ALL)
- Global effort sharing – by various principles ranging from cost optimal (CO), grandfathering (GF), historical responsibility (RESP) etc.

**Results:**

We showcase a snapshot of results for key regions. The synergies and trade-offs are measured as ratio of the metric in the given scenario to that in the BAU or reference scenario




Magnitude of synergies (green bars) and trade-offs (red bars) across national energy goals in the near term (2030) for pathways varying by (A) mitigation options (B) effort sharing principles and (C) pace of transition, for key regions.

**Conclusions & policy implications**:

- Significant tradeoffs in access & affordability – a double whammy for the Global South, across mitigation pathways. Mainly affordability tradeoffs for the Global North
- Tradeoffs of cost optimal pathways are limited by certain technologies, especially by behavior change and luxury non-$CO_2$ emission reduction
- Technology or financial transfers alone are insufficient to mitigate tradeoffs unless complemented by other policies

For more details, contact georgemv@umd.edu or scan the QR code for a more detailed report.

This work was supported under the IIASA Young Scientist Summer Program (YSSP) and funded by the US National Academy of Science, Engineering & Medicine (NASEM) and National Science Foundation (NSF) Fellowships