

Sharing Quantitative Insights on North American Energy Trade and Integration Through the EMF Process

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North American Energy Trade and Integration



Stanford EMF is now coordinating an effort to support trilateral discussion and sharing of energy information initiated by the Energy Secretaries and Minister from Canada, Mexico, and the United States for the North American region. This team effort will focus upon understanding:

- the availability of existing data,
- the opportunities for developing new metrics meeting investors' and policymakers' needs, and
- the sharing of market insights that flow from numerous analytical models and frameworks.

Background information about the agreement can be found at <http://www.nacei.org/en/>.

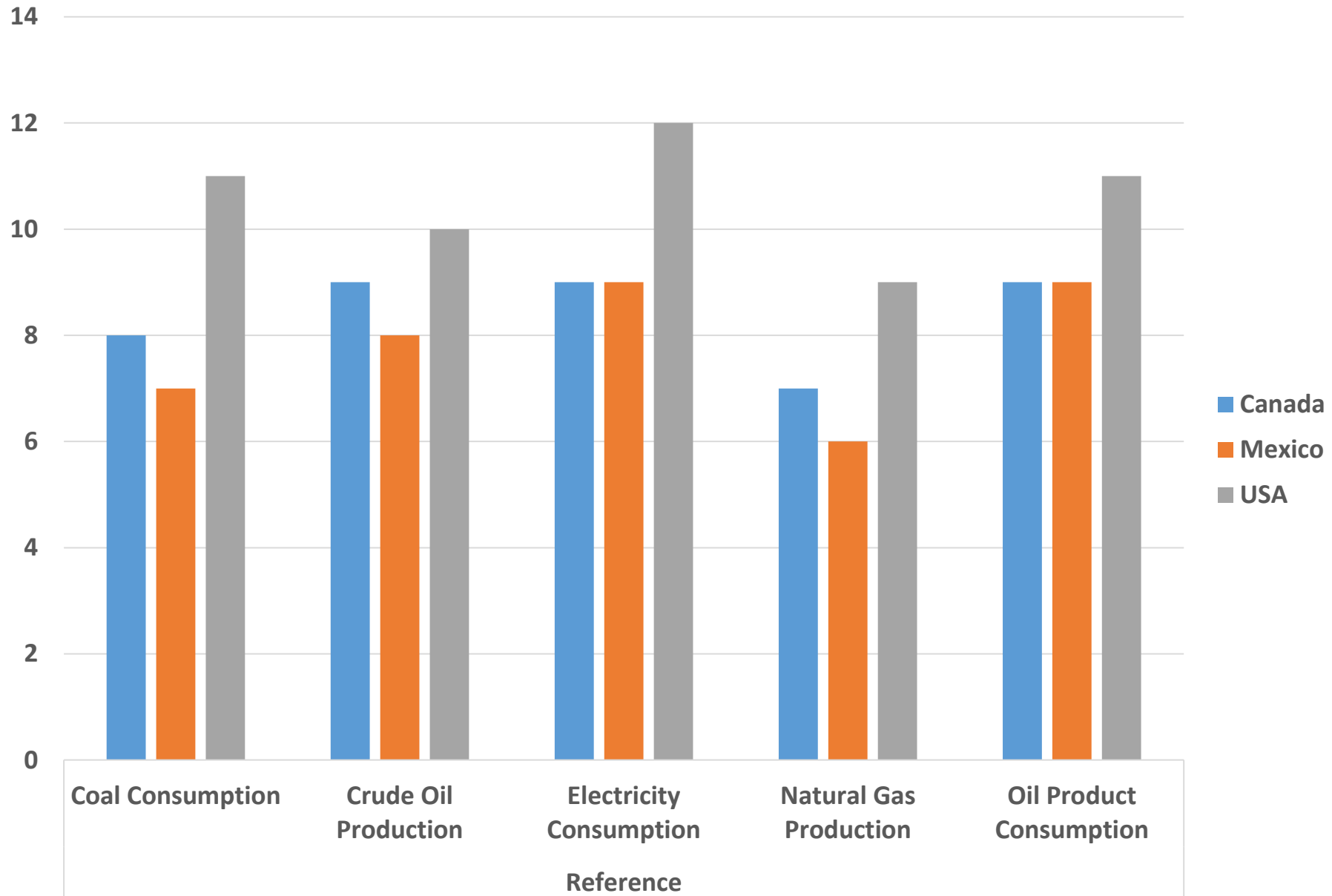
EMF34 Study Timeline

- **June 28, 2017:** Brainstorm group session in Washington, DC.
- **March 20-21, 2018:** First full working group meeting to review initial results and revise scenarios.
- **July 2018:** Second round study design distributed.
- **October 16-17, 2018:** Second working group meeting.
- **Every 6 Months:** Additional working group meetings to discuss most recent results and new or revised scenarios for future evaluation.

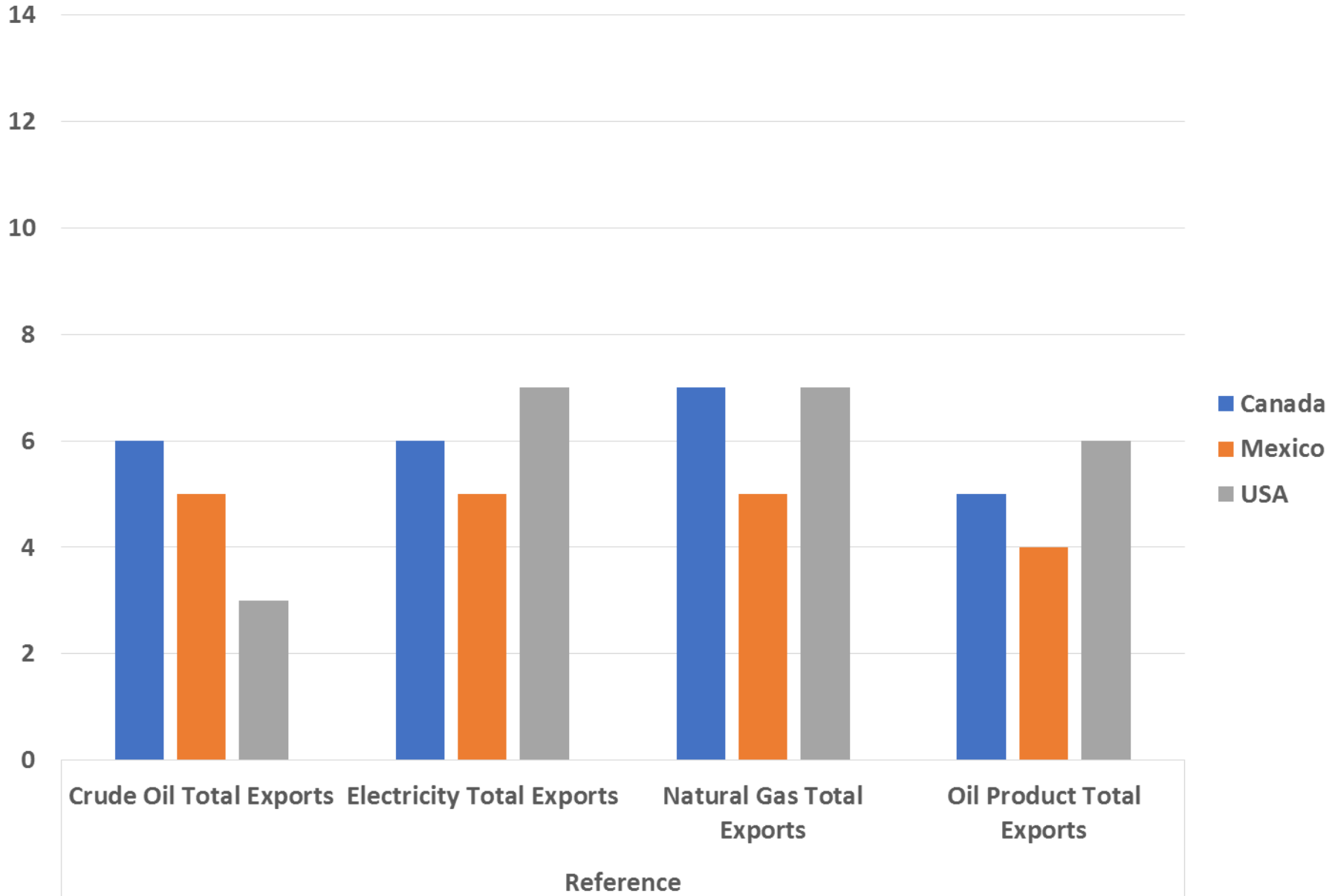
Why Current Values Can Differ Across Models

- Different concepts depending upon focus
 - Inclusion of self generation within electric consumption
 - Inclusion of liquid products within natural gas
- Different conversion factors
 - Fossil fuels: gross versus net caloric values
 - Non-combustible sources (renewables, nuclear)
- Different benchlines (year, updates, etc.)

of Models Reporting Variables and Regions



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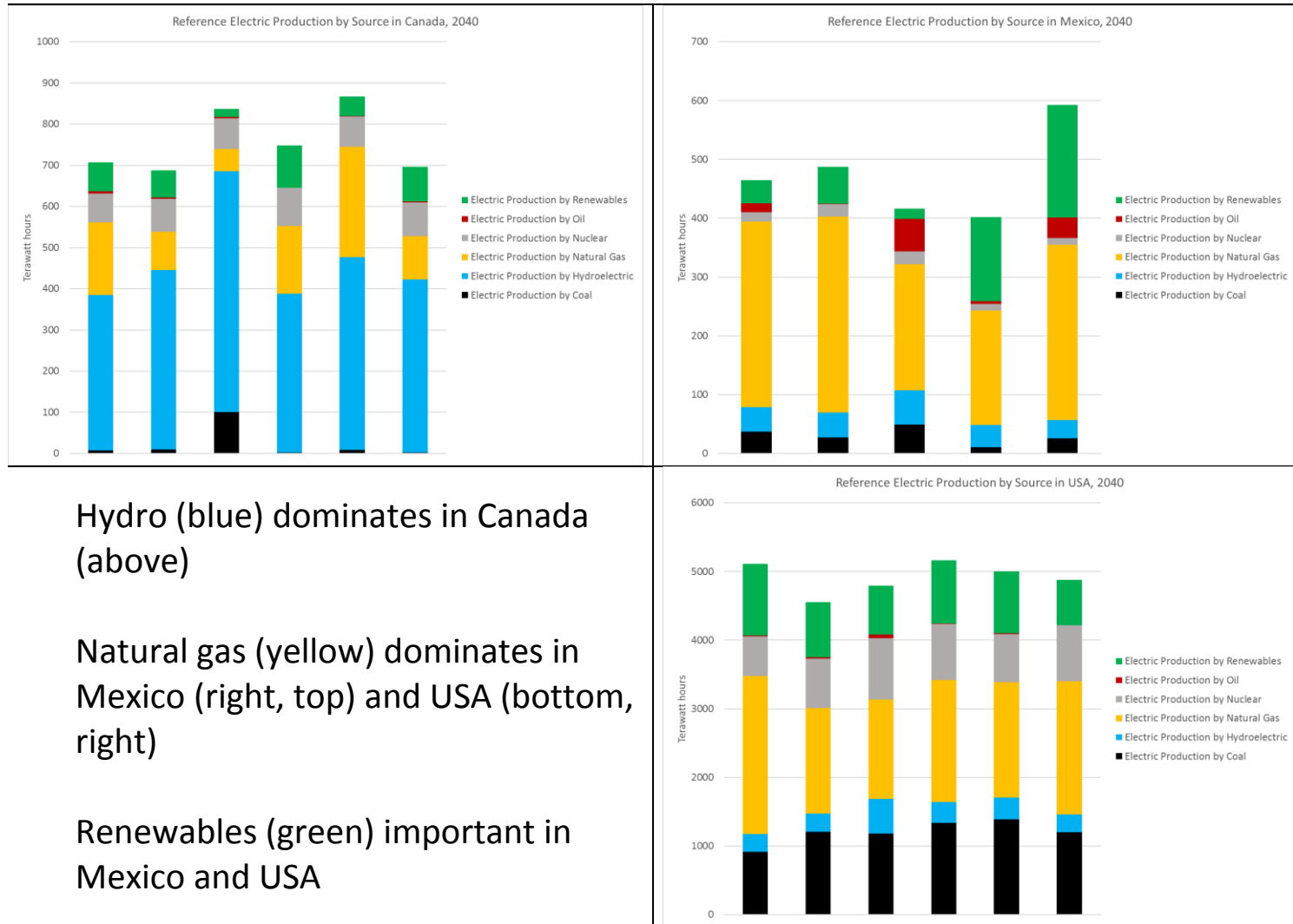
Prospects for Expanding Energy Trade

- First Round: Responding to Macroeconomic Growth
 - Initial focus on measurement, not on policy
 - Canada, Mexico, USA, combined North America
 - Gross (net) energy imports expand with internal growth
- Second Round: Responding to Energy Trends
 - Lower world oil prices
 - More abundant North American natural gas supply
 - Increased North American electrification across all end-use sectors
 - Higher Intermittent Renewables Penetration
 - Shifts in cross – border energy Infrastructure (oil/gas/power)
 - Harmonized/country-specific carbon policy (taxes)

Newly Formed EMF34 Subgroups

- Enhanced Oil Recovery/Carbon Capture Sequestration (EOR-CCS)
 - Initial interest in 45Q tax credit for sequestration of carbon oxides.
 - Expanded coverage to various options for expanding domestic fossil production with minimal climate impacts
- Cross-Border Infrastructure
 - Renewable energy sources
 - Increased electrification
- “Generic” Policy: carbon tax
 - Integrated across North America
 - Imposed by Canada and Mexico but not by USA

Electric Power by Source, 2040

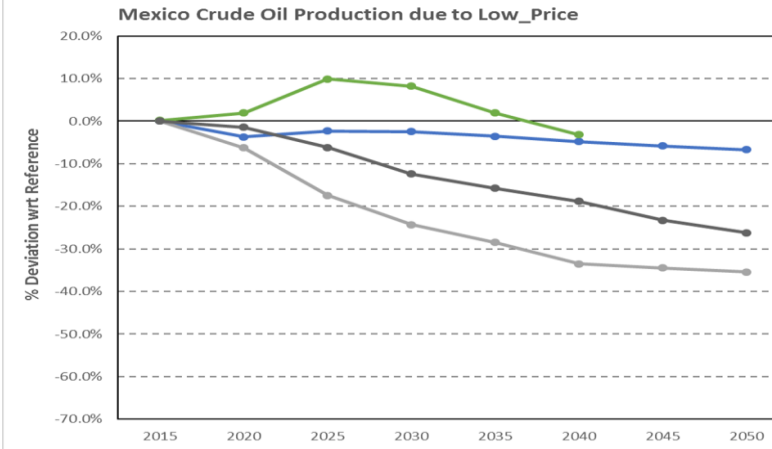
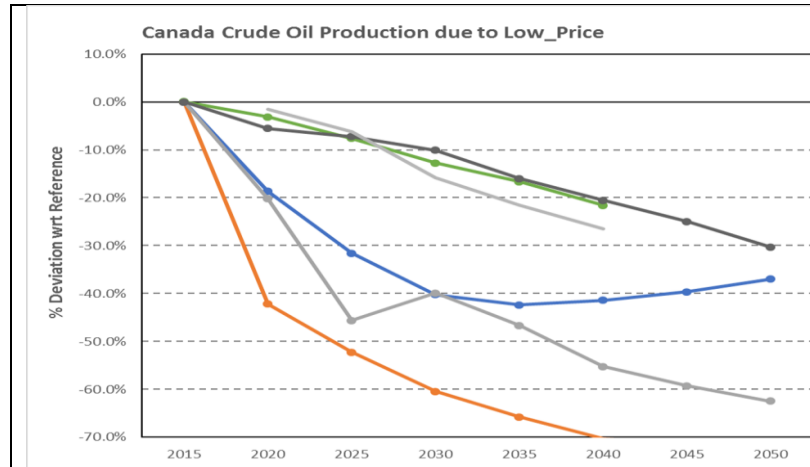


Hydro (blue) dominates in Canada (above)

Natural gas (yellow) dominates in Mexico (right, top) and USA (bottom, right)

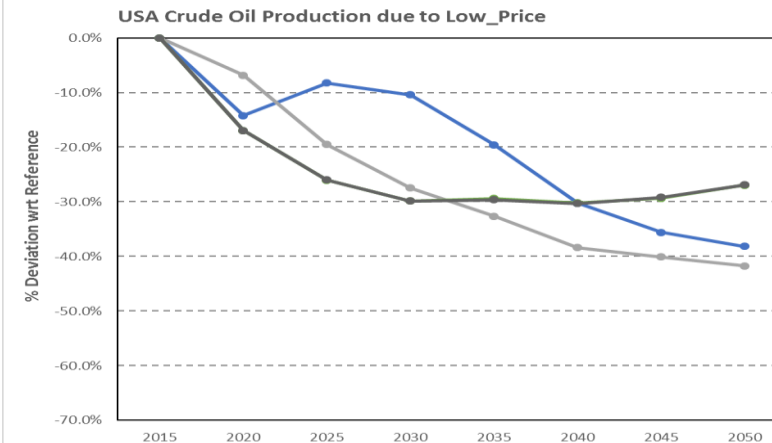
Renewables (green) important in Mexico and USA

Crude Output with Lower Oil Prices, 2015-2050



When Brent Decreases by 60%

- Canadian crude output (above) down by 30-70%
- Mexican crude output (top right) down by 10-35%
- USA crude output (bottom right) down by 30-40%



Next Steps

- Continue improving metrics across models
- Improve information about key factors including cross-border trade and infrastructure
- Explore differences in energy trade outlooks by country/model
- Understand important responses, e.g.,
 - Oil/gas/power exports and imports
 - Prospects for renewables & electrification in each country
 - North American supply responses
- Questions, Participation, Ideas?: please contact hillh@stanford.edu