Vision and Challenges

Defeating Climate Change, Growing our Economy, Protecting Customers, Leading the World

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Policies for a Clean Electric Grid

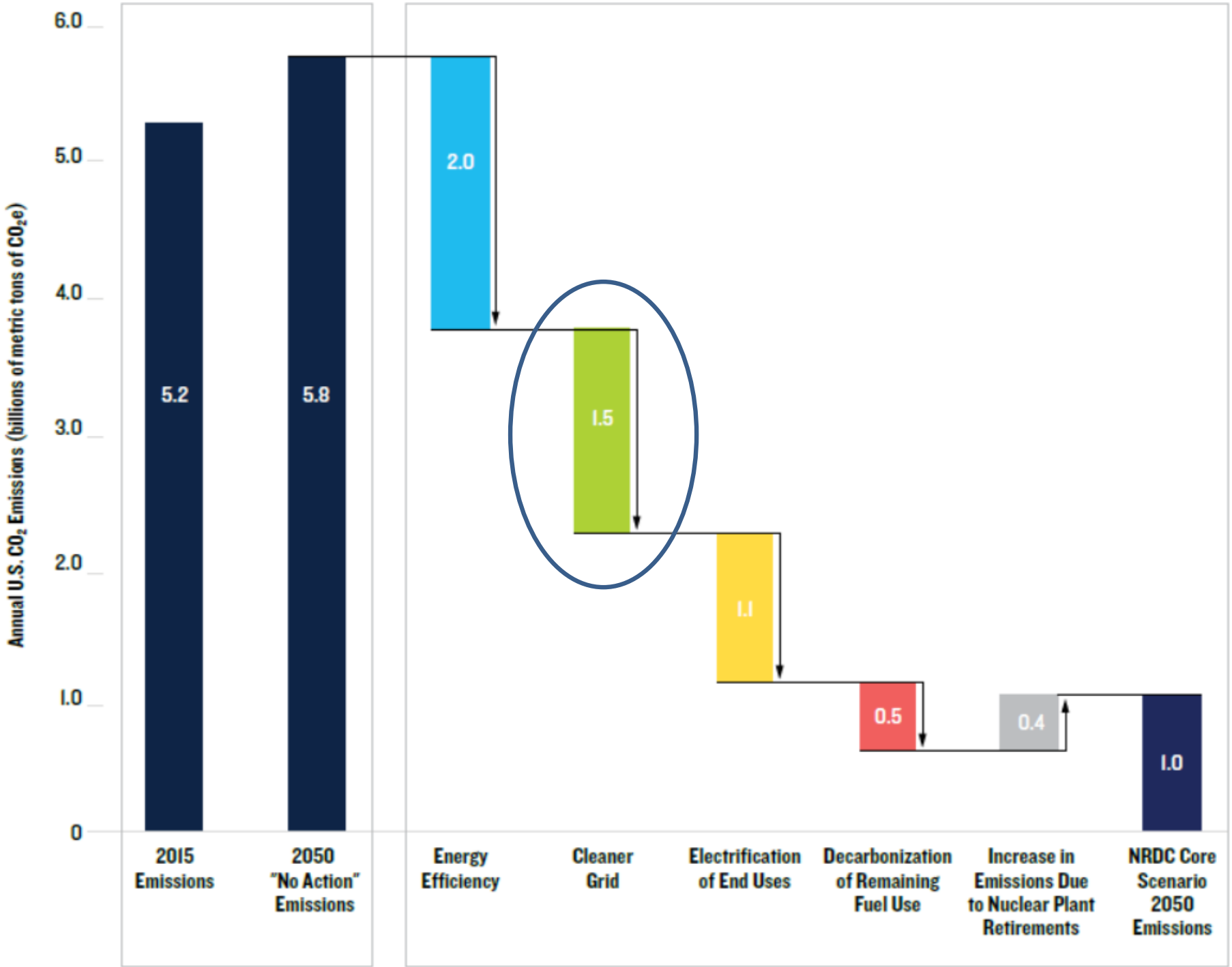
Summary

Vision

- An interconnected, efficient power system
  - High levels of clean, zero-carbon energy
  - Electrifies and strengthens the economy
  - Integrates the distribution and transmission systems.

Challenges

- Many sandboxes threaten to frustrate next generation market designs
- Financing/stranded assets
- Inadequate transmission planning and cost allocation
- New challenges


Annual U.S. CO_2 Emissions (billions of metric tons of CO_2e)
6.0
5.0
4.0
3.0
2.0
1.0
0
5.2
5.8
2.0
1.5
1.1
0.5
0.4
1.0
2015 Emissions
2050 "No Action" Emissions
Energy Efficiency
Cleaner Grid
Electrification of End Uses
Decarbonization of Remaining Fuel Use
Increase in Emissions Due to Nuclear Plant Retirements
NRDC Core Scenario 2050 Emissions

Low-Carbon Grid Vision

- A **highly efficient and flexible energy system**
  - High capacity transmission grid
  - High flexibility grid market rules
    - New market products
    - Maximize value of EVs, other DERs
- **State-friendly market policies**
- Enabler of **beneficial electrification** of EVs and buildings.

Sandboxes - Barrier to the Integrated Grid?

IOUs, IPPs, Co-ops, Munis

50 States

FERC

Cities

Distribution Utilities

NERC

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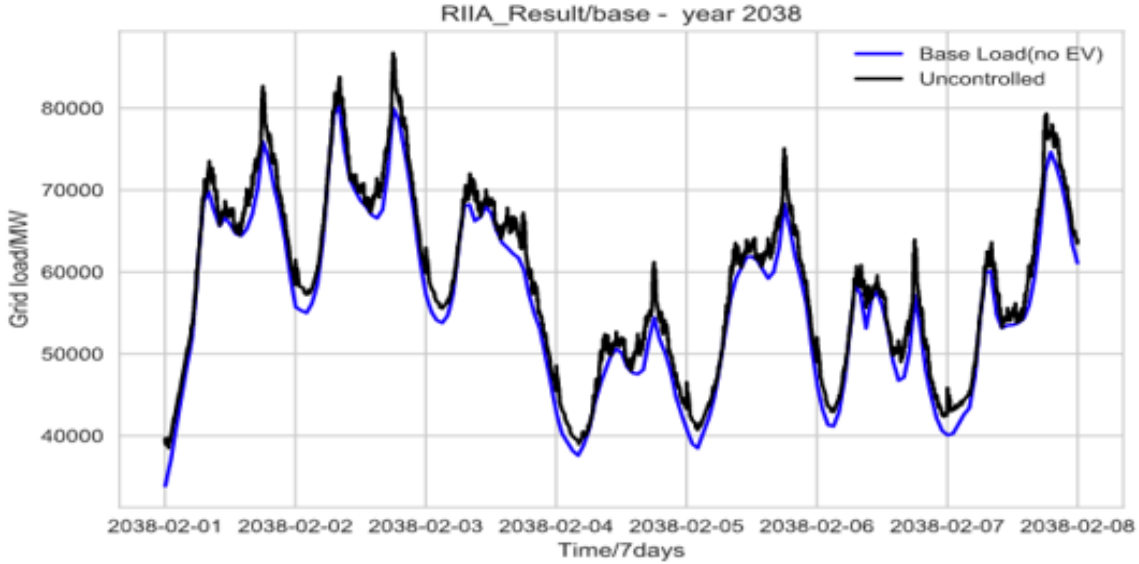
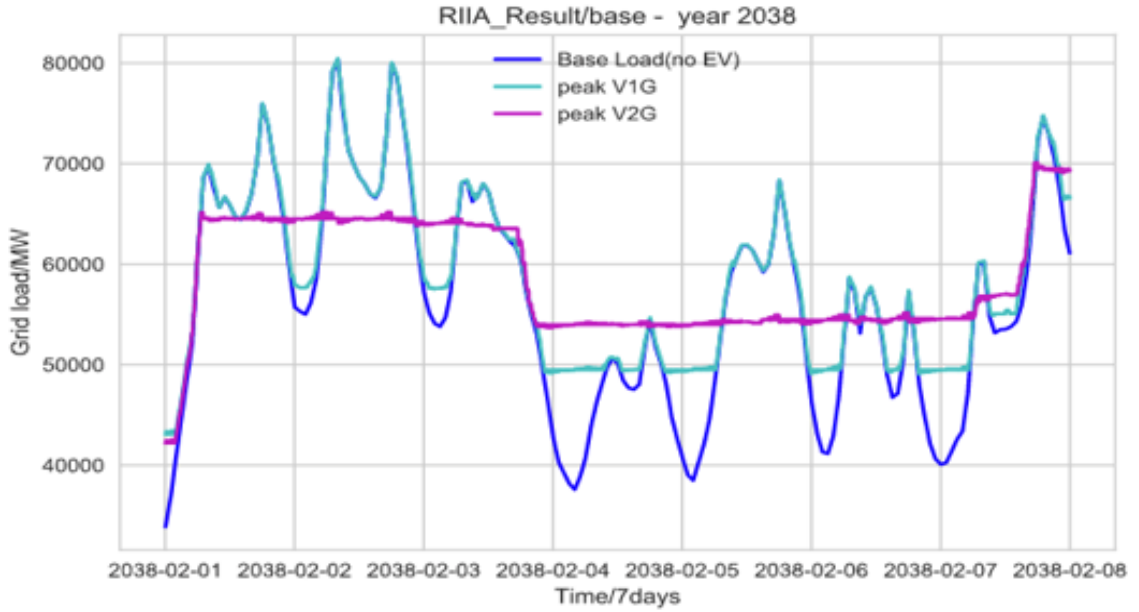
Models Assume a Unified Grid

Example: Recent MISO study (with LBNL and Emerging Futures) evaluated impacts of V1G and V2G from light duty vehicles during 2019 and 2039 for Peak Reduction and Ramp Mitigation.

Peak Reduction Results (2038)





EVs:

- 4.74 Million

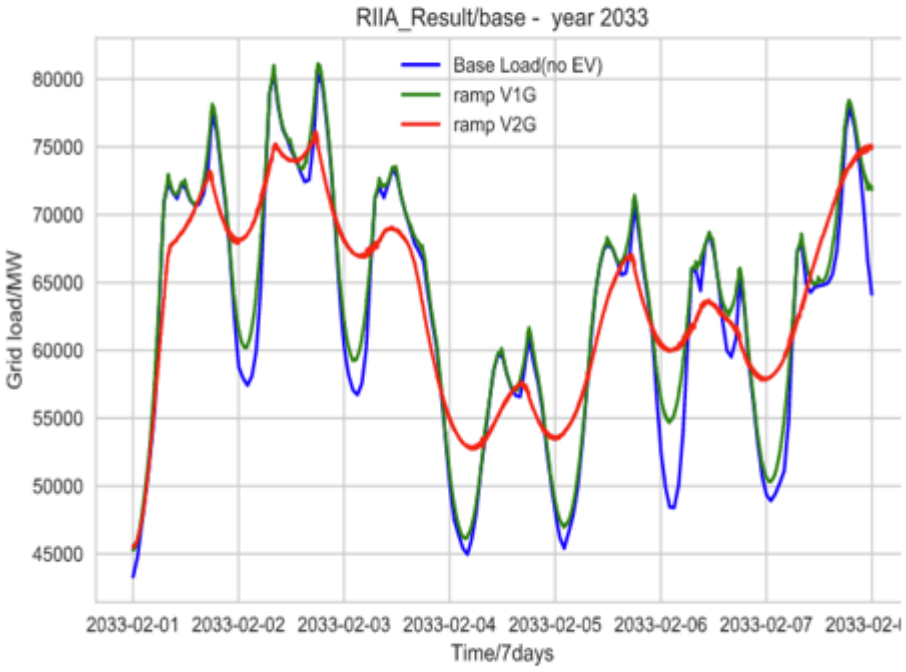
Charging Infrastructure:

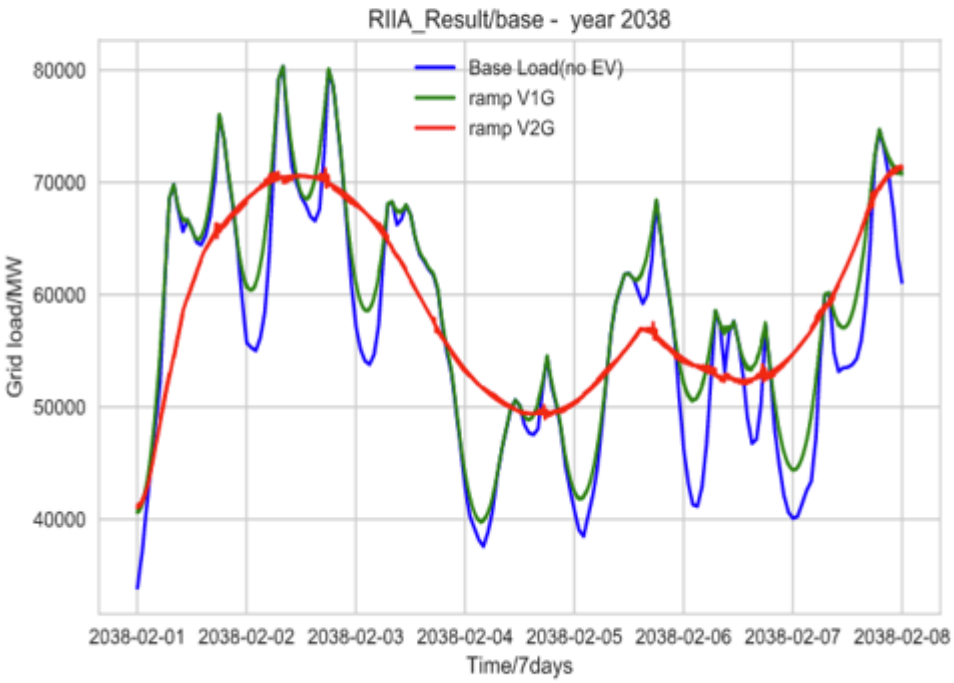
- Home 95%
- Workplace 66.5%

Renewables:

- Wind 30.75%
- Solar 7.85%

Ramp Mitigation Results (2033,2038)





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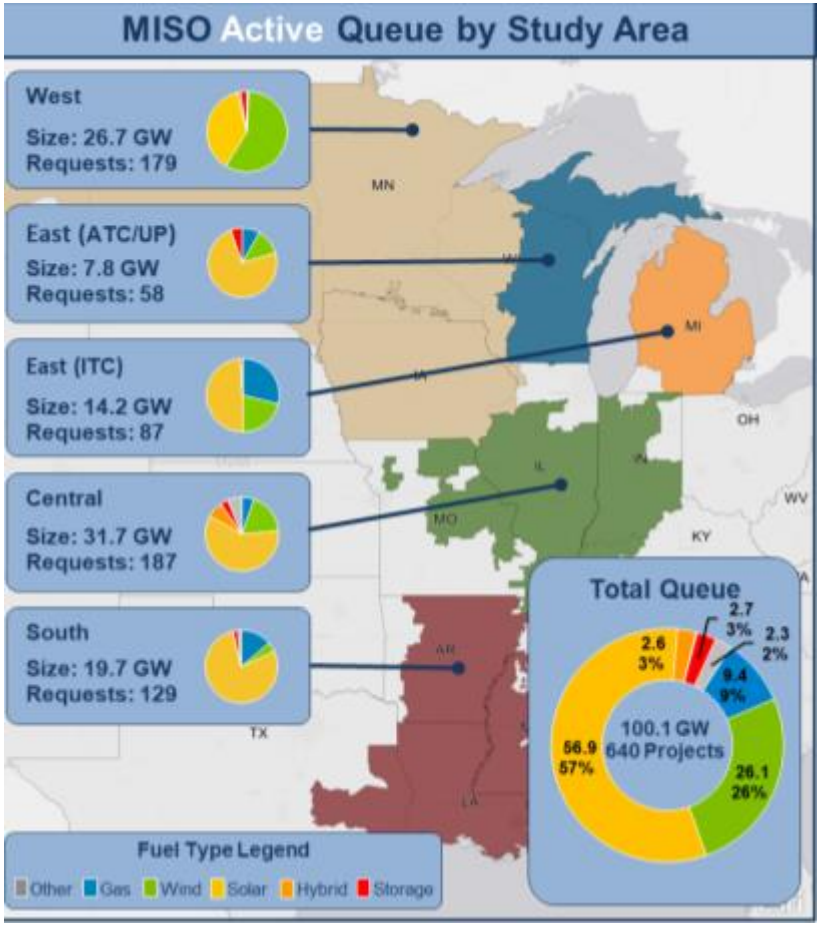
Transmission Plans Falling Behind

MISO's network increasingly incapable of handling significant wind and solar interconnection requests

- Major 345 kV upgrades needed
- Billions of dollars in costs
- Thousands of MWs dropping out of interconnection queue
- Avoided carbon impacts

Lack of offshore wind grid and a weak interregional grid also major concerns.



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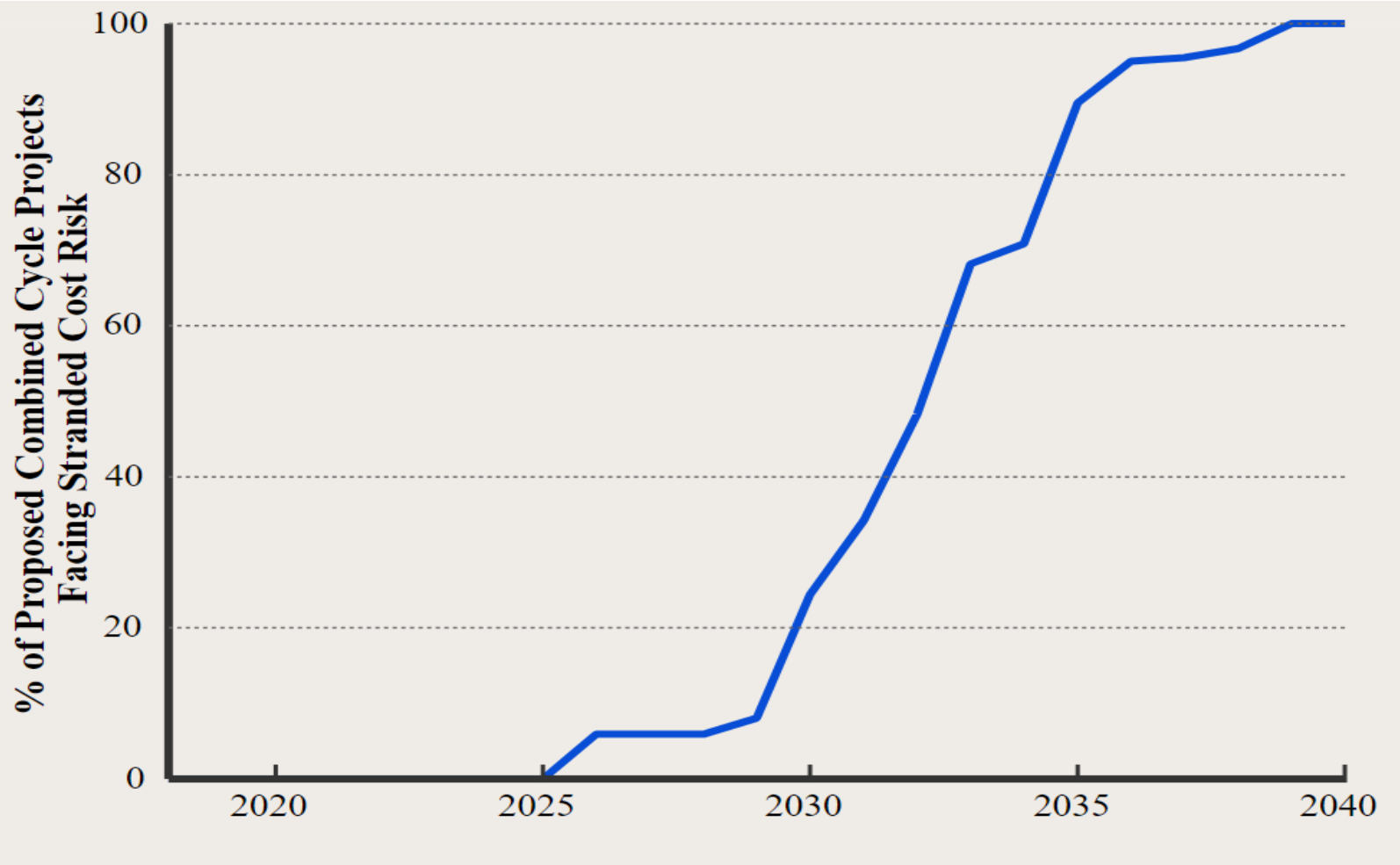
Financing/Stranded Costs



RMI, *The Growing Market for Clean Energy Portfolios and Prospects for Gas Pipelines in the Era of Clean Energy* (2019)

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New Challenges

Contact Information

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