



**Holistic Energy
Resource Optimization**

A new paradigm in utility system planning

Presented by:
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Industry in flux

- **Reliability, clean energy and affordability:** Utilities face immense pressure to maintain reliability, modernize the grid, decarbonize, and accommodate new loads, all while keeping rates low.
- **Speed and uncertainty:** With sudden increases in load growth, utilities need to meet capacity needs quickly, locking in capital spending for long-lived assets under highly uncertain future conditions.
- **Complex analysis and stakeholder sophistication:** As planning questions are becoming more complex, stakeholders are seeking more information.
- **System interactions:** T&D modernization enables more interaction of supply and demand side resources but planning tools struggle to address this.

HERO benefits

Clarity on tradeoff: Providing understanding of the tradeoffs to consumers and local economy of alternate decision pathways.

Efficiency: Reduced form problem can address hundreds of scenarios in the time utility planners would typically do a handful.

Transparency and collaboration: Increasing comprehension through visualization of results.

Full utility value chain: HERO addresses load-serving related investments for generation, transmission, distribution and demand side programs simultaneously.

Traditional utility planning processes



- 10 to 20 year planning horizon
- 2 to 5 year frequency
- 1-2 years to prepare
- Limited collaboration
- Independent assumptions

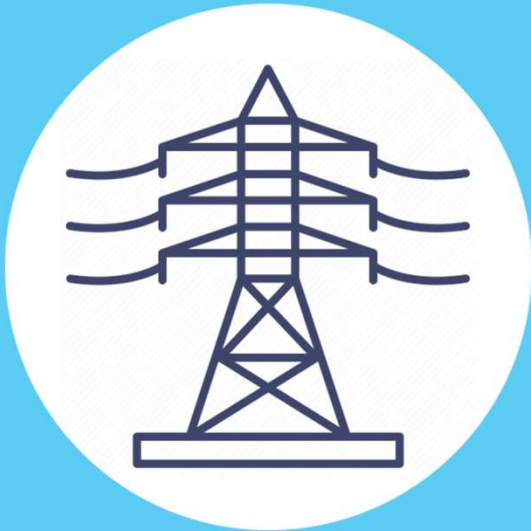
Outcomes:

- Short-term investment plan
- Long-term indicative plan



Traditional utility planning processes

Transmission Planning



- 10 year planning horizon
- 3–5 year frequency
- 1–2 years to prepare
- Limited collaboration
- Independent assumptions
- Single hour

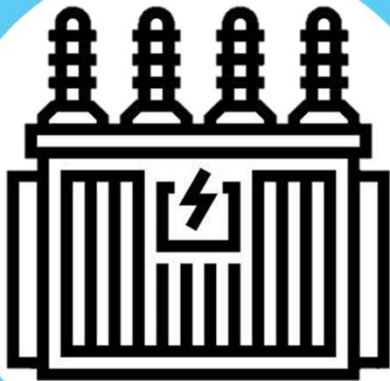
Outcomes:

- 3 to 5 year capital plan



Traditional utility planning processes

Distribution Planning



- 5 to 10 year planning horizon
- 3–5 year frequency
- 1–2 years to prepare
- Limited collaboration
- Independent assumptions
- Single hour

Outcomes:

- 3 to 5 year capital plan
- Single scenario



Traditional utility planning processes

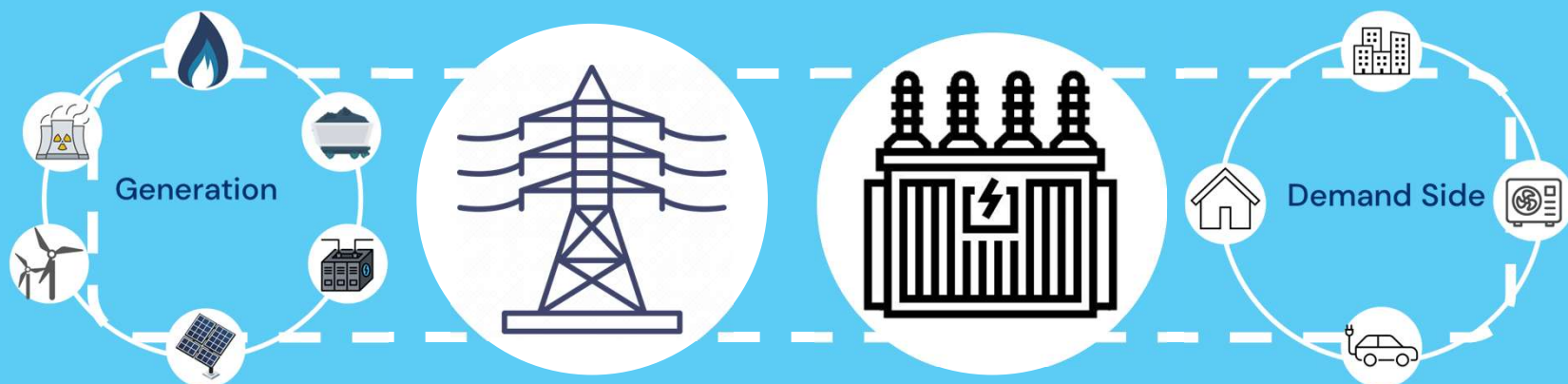


- 3 to 5 year planning horizon
- 3–5 year frequency
- 8–12 months to prepare
- Limited collaboration
- Independent assumptions
- Coincident peak
- Hourly energy

Outcomes:

- 3 year program plan
- Single scenario

Holistic Planning Processes



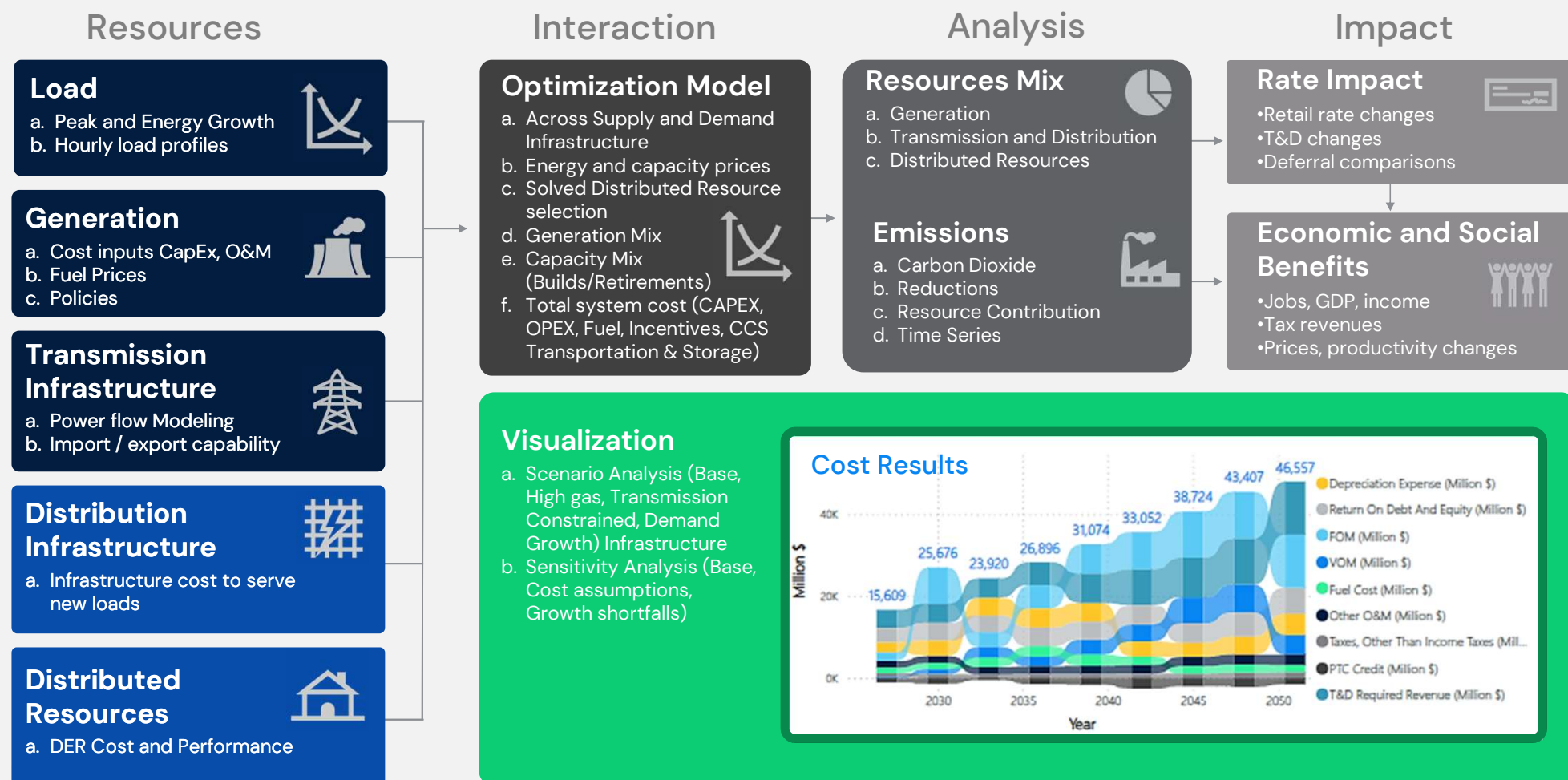
- Same time frame
- Consistent assumptions
- Multi-scenario

- 3–6 months
- Collaborative
- Complementary

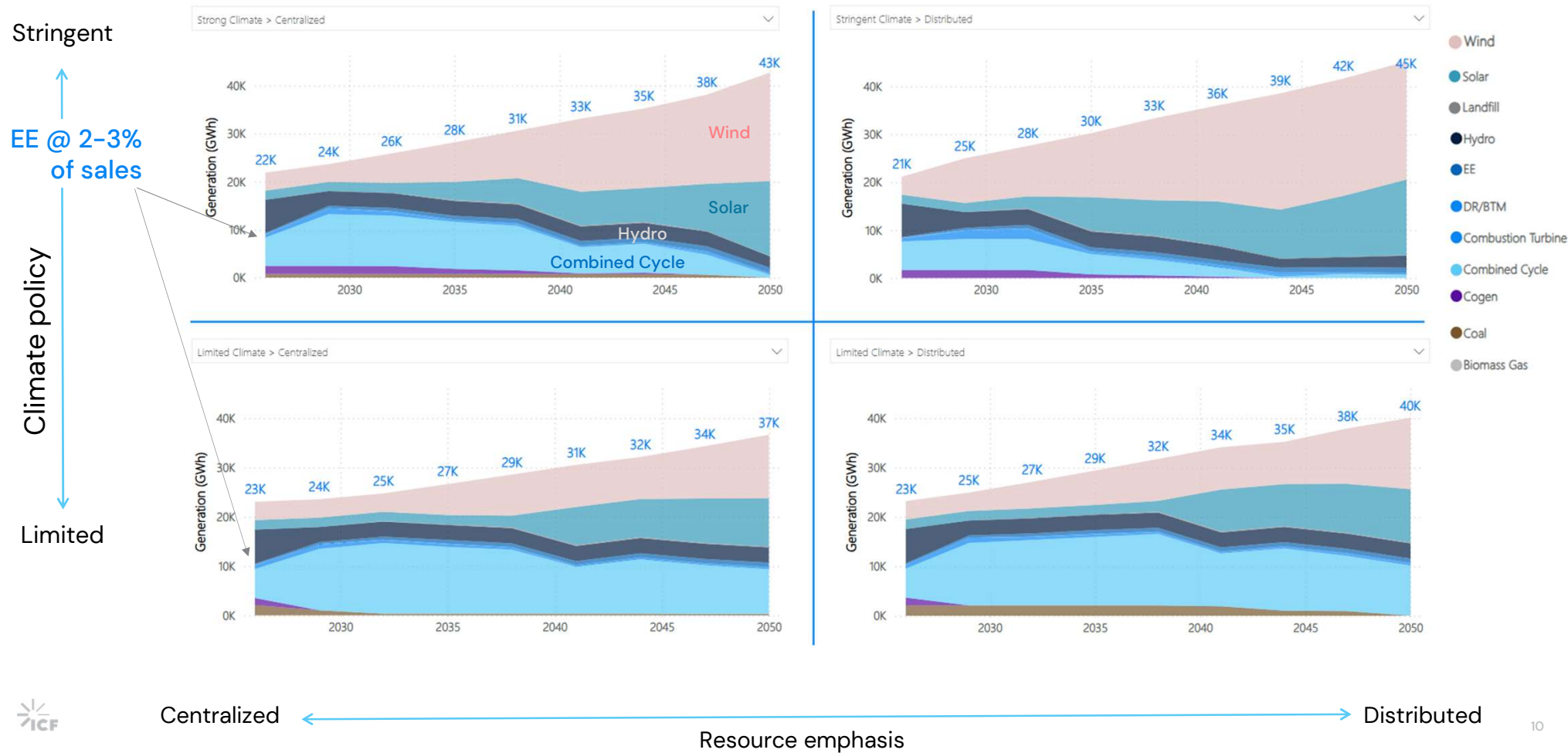
HERO Key Findings

- New **energy efficiency economic** at 2–3% of sales
- **Gas generation critical** to support resource adequacy
- **10%** peak reduction from Demand Response and DER
- **30%** of distribution system investment \$ avoided by demand side resources
- **15%** cost premium for Net Zero by 2045
- **+/- 14%** rate variance due to capital decisions

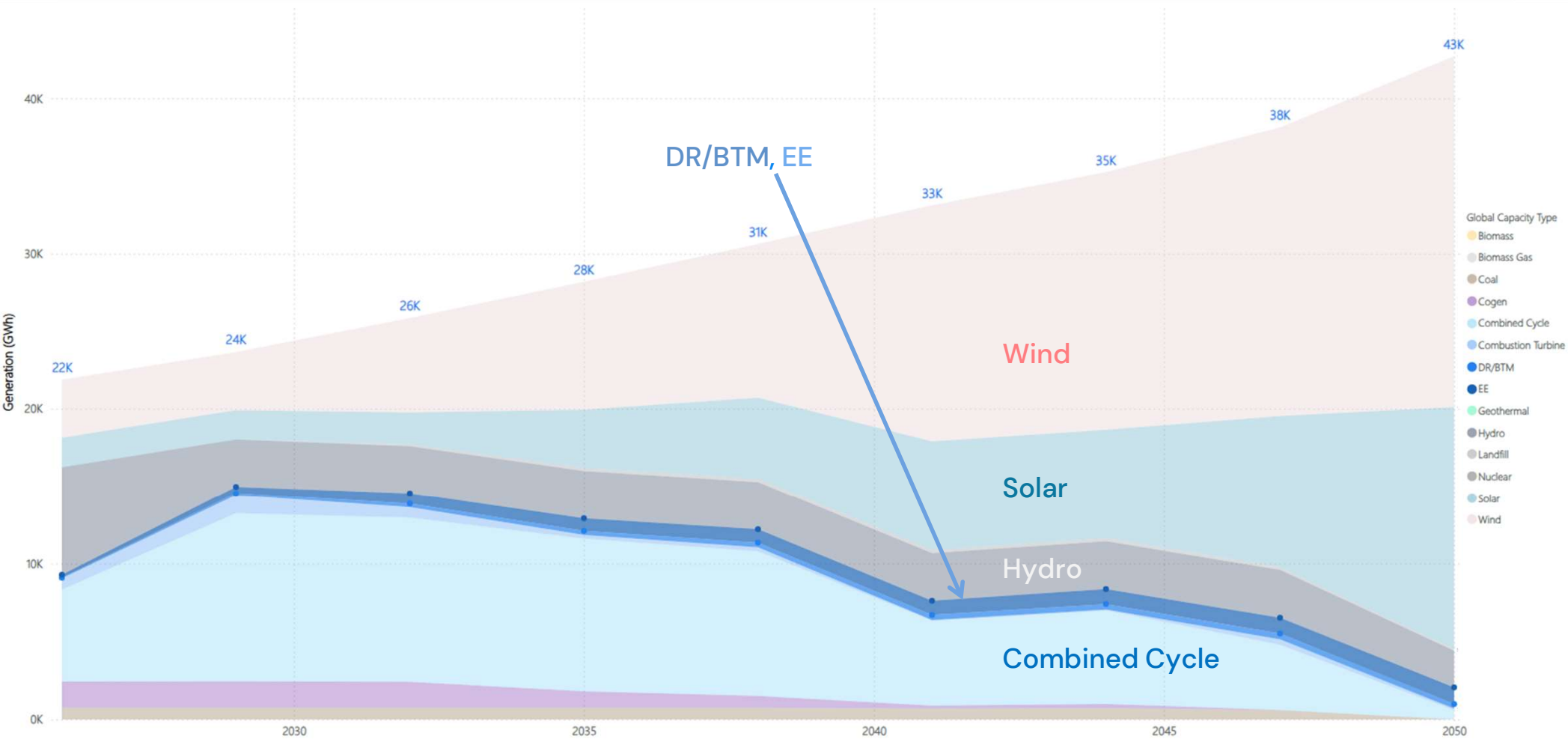
HERO Modeling Framework



Each scenario results in a unique mix of resources



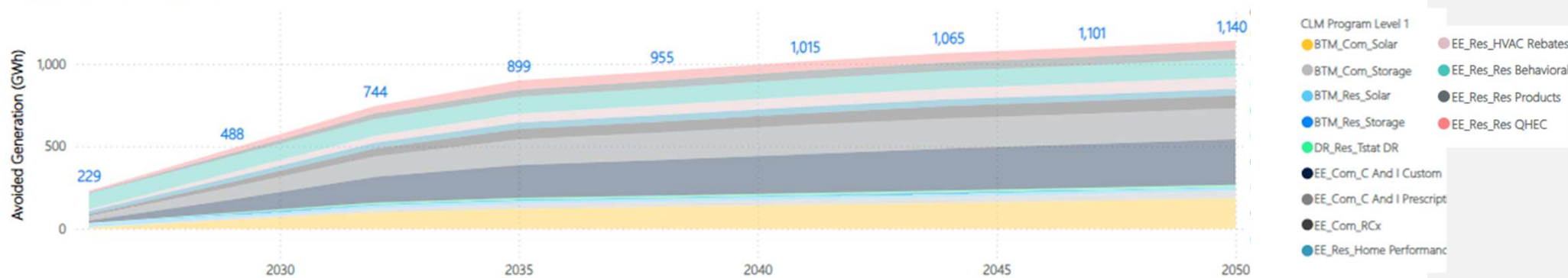
Role of EE/DER in meeting load



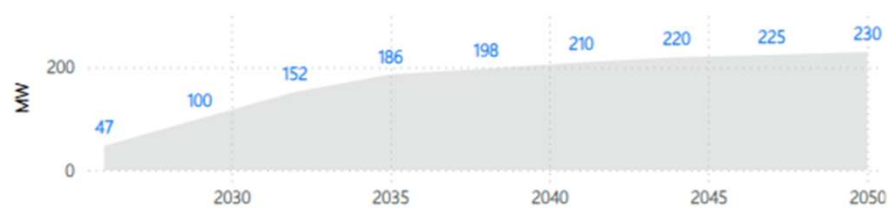
DSM Measures play a significant role in meeting load

Scenario:
Limited Climate > Centralized

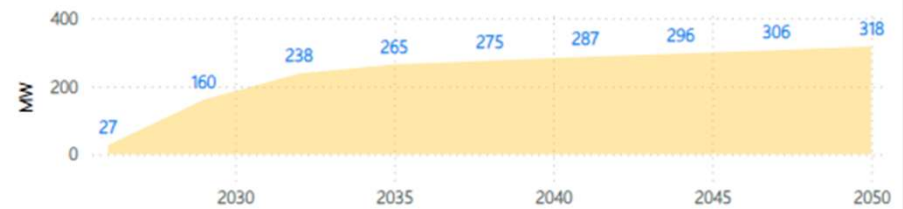
Avoided Generation (GWh)



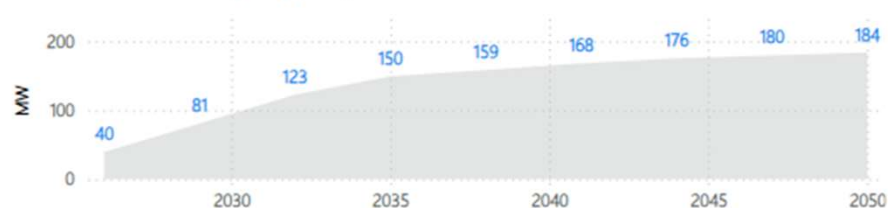
EE Avoided Summer Capacity (MW)



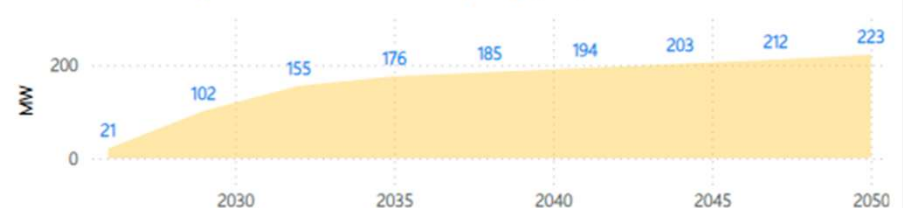
Active Load Management Avoided Summer Capacity (MW)



EE Avoided Winter Capacity (MW)



Active Load Management Avoided Winter Capacity (MW)



Confidential and Proprietary

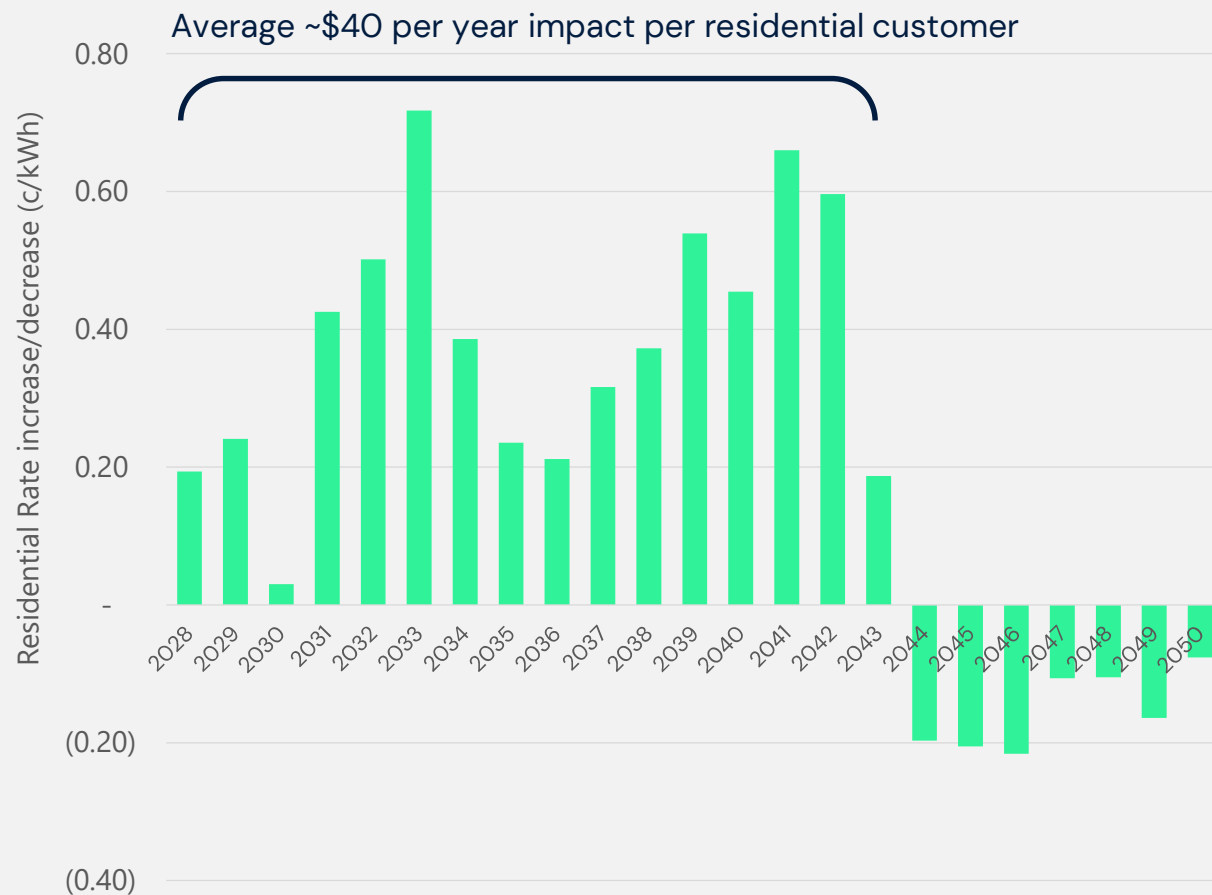
DER has potential to avoid \$2 – \$3 billion (~30%) in distribution grid investment



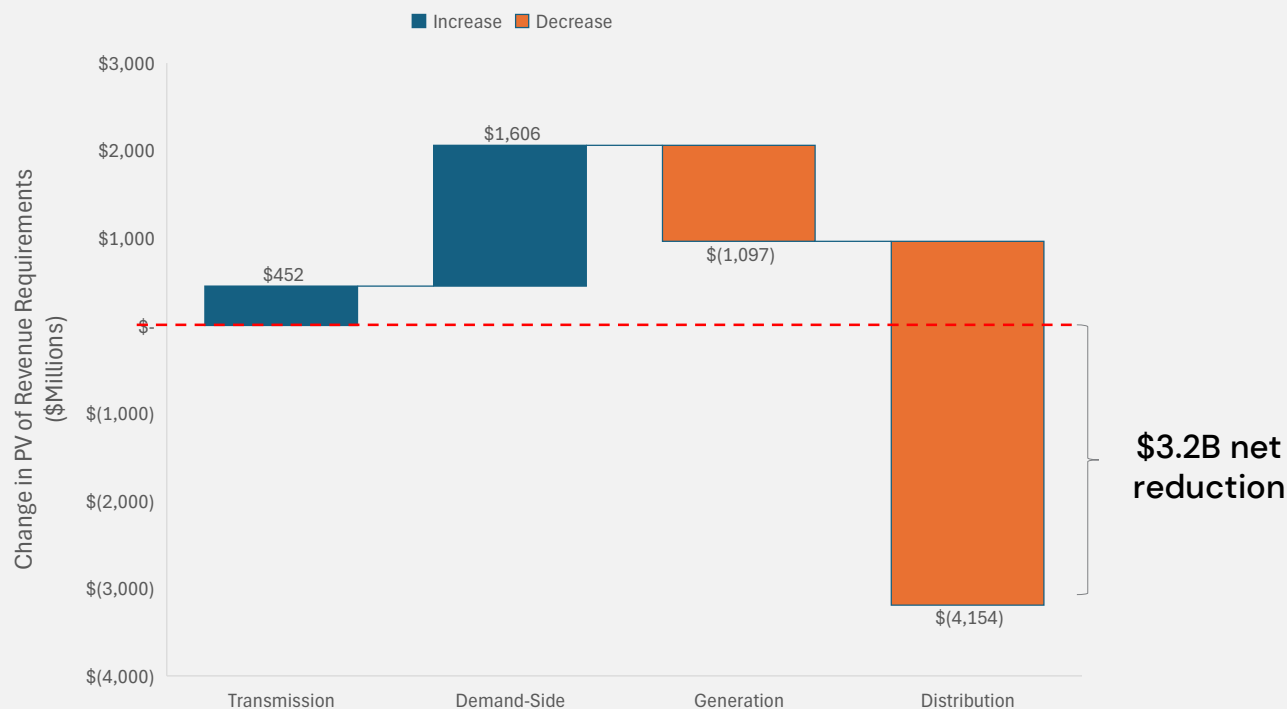
What if...innovations result in a lower demand growth trajectory

	Expected	Actual
Average Annual Energy Growth 2026-2031	3.3%	2.4%
2032-2050		1.3%

Capacity Type	Capacity Delta	Cumulative Investment Delta
Unit	MW	Million \$2022
Period	Year 2032	2028-2032
Total	753	\$926.1



What if...distributed resource enablement occurs



\$3.2 Billion

PVRR saved by shifting from a central station focus to a DER focus reduces (8%)

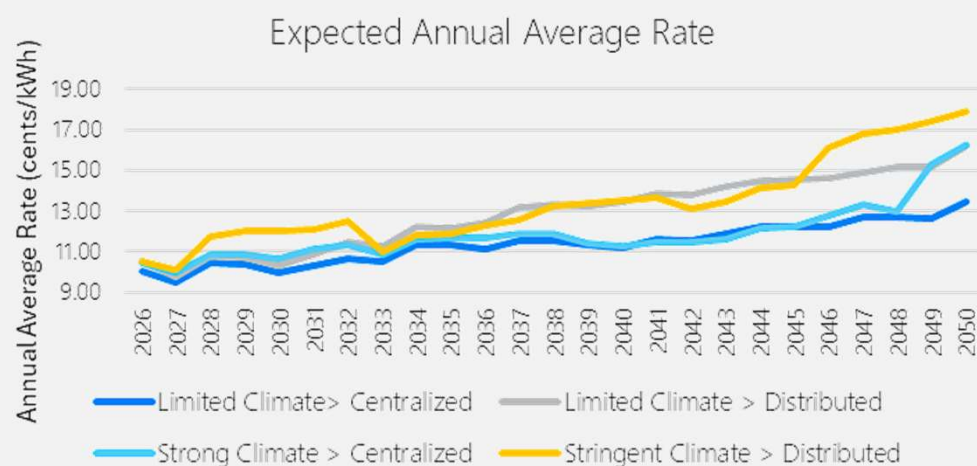
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~ 750 MW premise level installations (EE and DR) avoids roughly 1400 MW of installed generation capacity

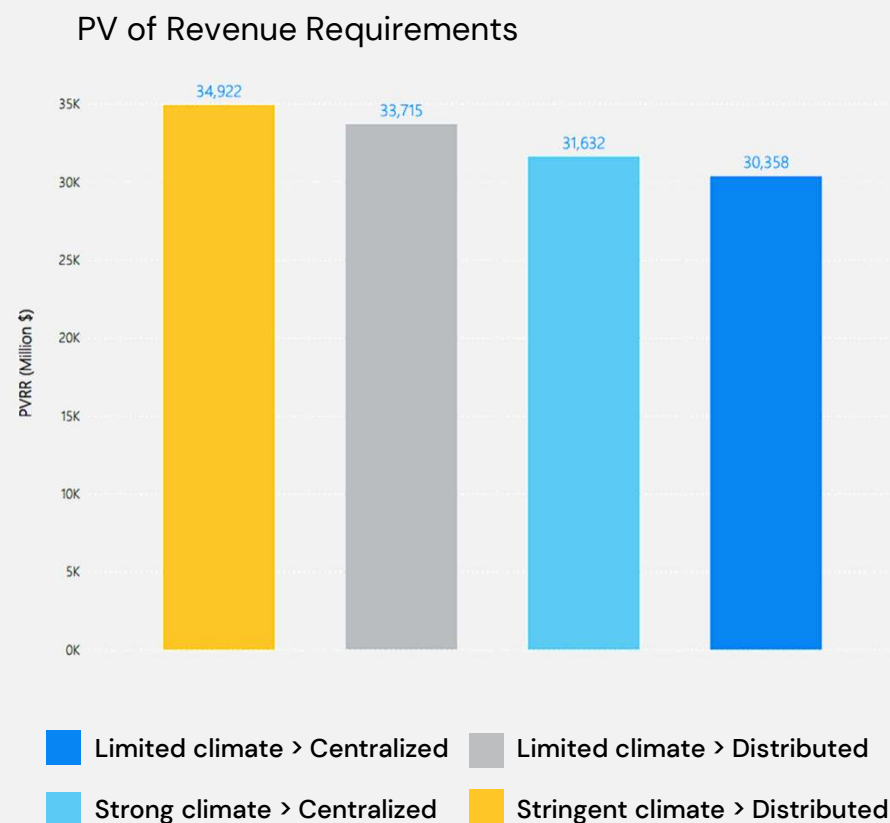
\$110/year

Annualized reduction in typical residential customer electric bill

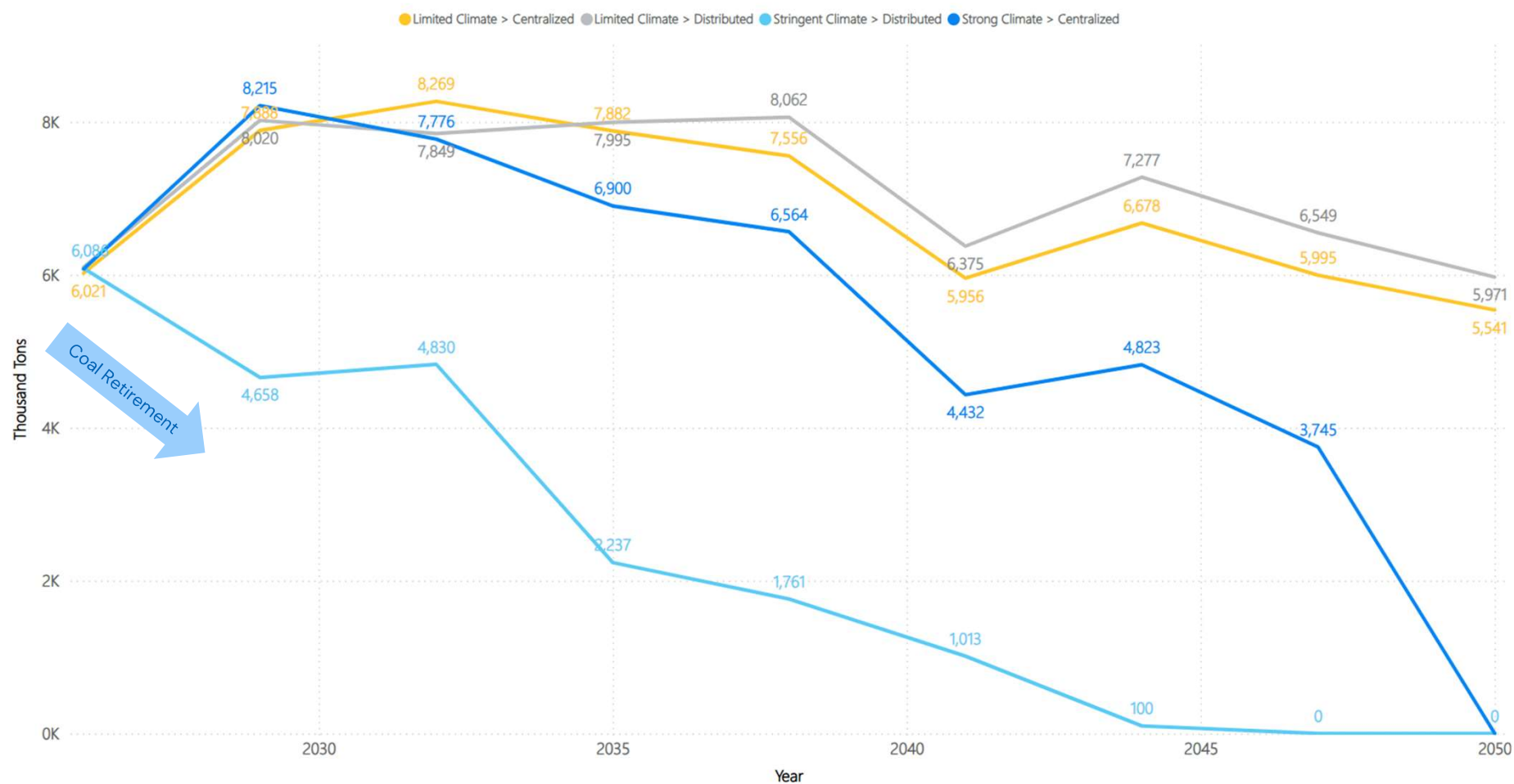
Premium for strong climate & DER policies is only 1.6 cents/kWh or \$157/yr



Portfolio	Annualized Rate 2026-2050 (Cents / kWh)	Δ Residential Customer Annual Expense From Stringent Climate Case
Stringent Climate > Distributed	12.61	-
Limited Climate > Distributed	12.16	(\$45)
Strong Climate > Centralized	11.51	(\$111)
Limited Climate > Distributed	11.04	(\$157)

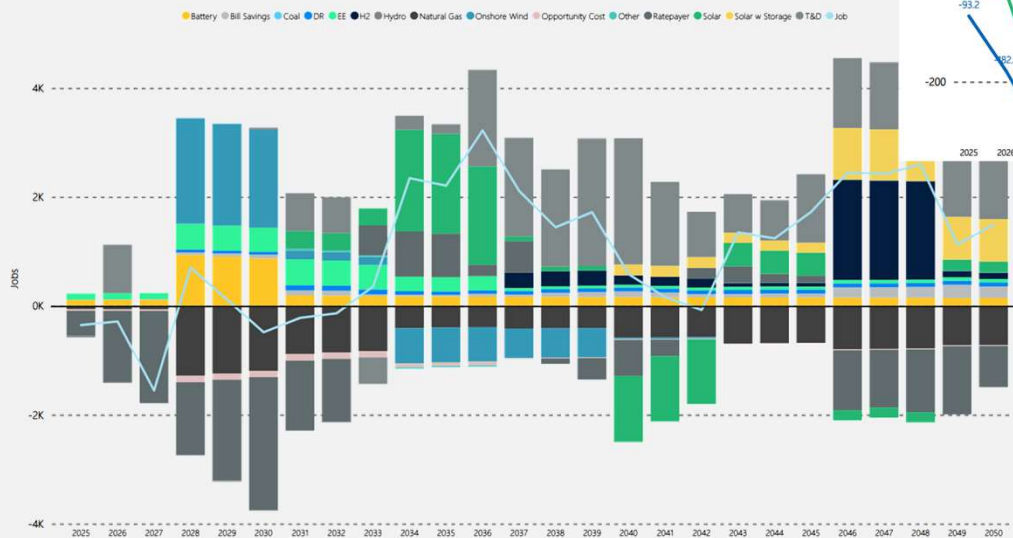


GHG emissions vary significantly across scenarios



Economic impacts can be assessed relative to a Reference Case

Positive Net job creation with more local solar installations



Overall positive local GDP, but net Income swings



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