Lessons from Other Markets' Reform Efforts for Enabling Energy Storage

PREPARED BY

Kathleen Spees

Sarah Sofia

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Two conditions required for ramping up battery deployment:

1 Underlying Economic Value Proposition

Batteries can create the greatest economic value in markets with a combination of:

- High renewable penetration & renewable curtailments
- Costly transmission congestion
- Deep decarbonization targets or consumer interest in carbon-free supply
- Emerging reliability and balancing needs
- Resource adequacy needs and tight supply-demand balance
- Substantial system uncertainties and volatility (e.g. outages, fuel prices, forecast error)

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2 Efficient Incentives for Delivering that Value

Private companies will expand battery deployments to the extend they are remunerated for the value they create. Requires:

- Modern market structures that define and pay for marginal value, recognize emerging reliability needs, and offer granular pricing signals
- Technology-neutral access to markets where batteries can deliver value (energy, ancillaries, renewable certificates, non-wires alternatives)
- Addressing barriers to entry (e.g. legacy approaches to interconnection, T&D rates, retail billing, rates & participation rules that did not consider batteries)

Why are batteries taking off in other markets?

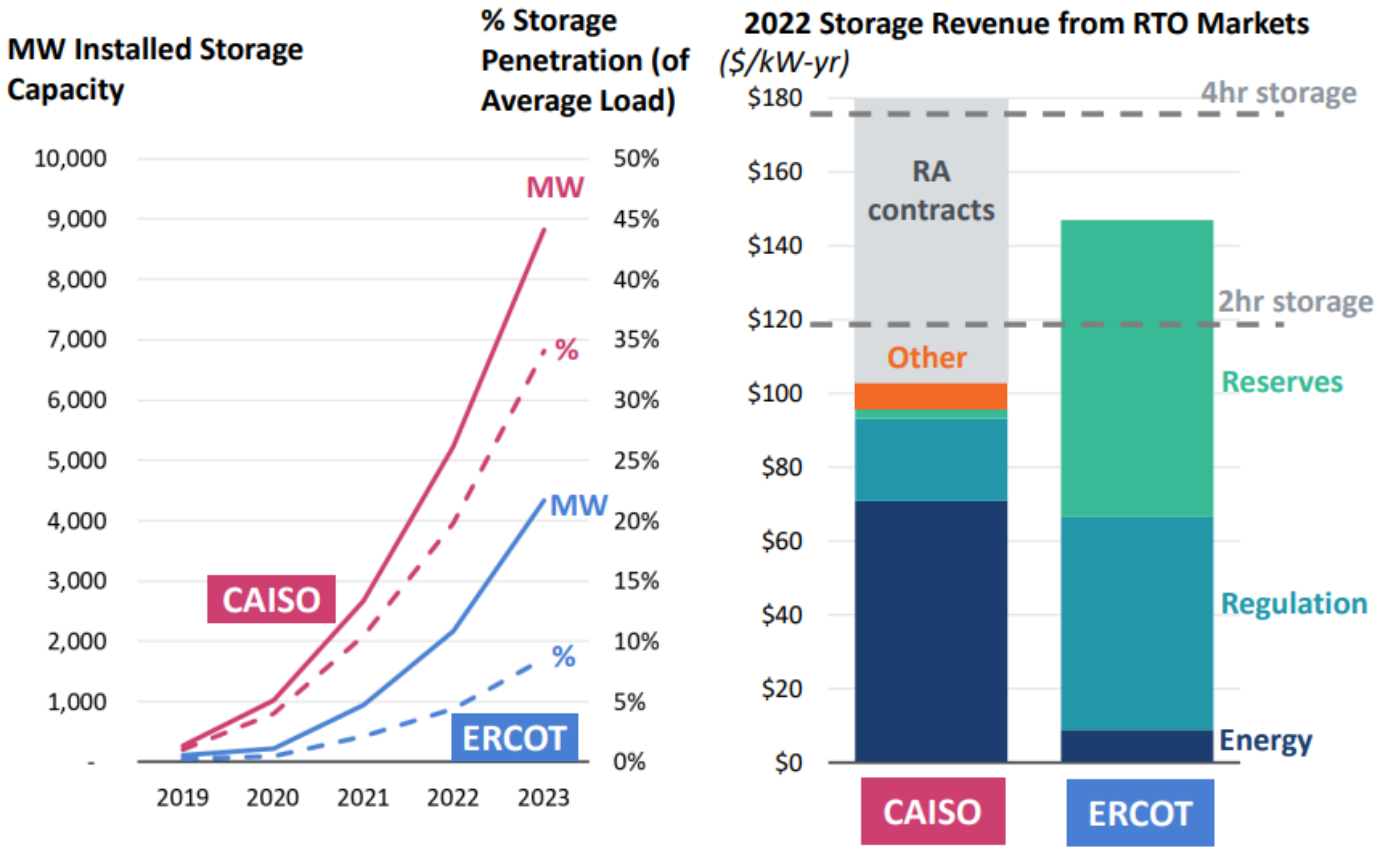
Diverse "value stacks"

- Wide array of applications, business models, configurations, and revenue stacks underneath rapid increases battery investments
- Speaks to the diversity and versatility of storage for different use cases (focused on reliability value, energy arbitrage, green value, avoided distribution outages, T&D applications….)

Common themes enabling battery growth include concerted efforts to:

- Modernize wholesale markets, retail arrangements, and incentive structures to align with emerging system & reliability needs
- Address participation barriers for batteries & other emerging resources
- Examples: Australia Market Reform Program; MISO Reliability Imperative; Ontario Battery Obstacles Review; California Scaling Up and Crossing Bounds

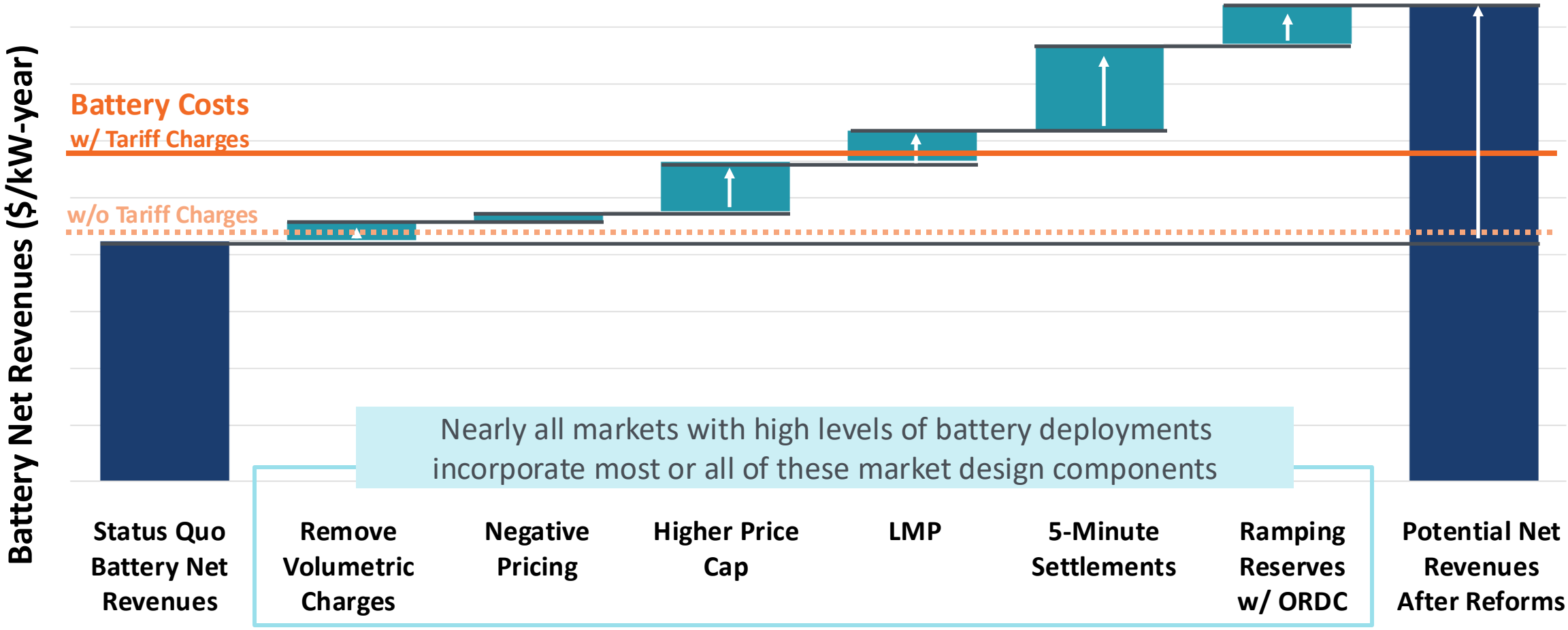
EXAMPLES: RAPID BATTERY DEPLOYMENT IN US MARKETS



Source: Brattle. Energy Storage Market Design Roadmap.

Can similar reforms unlock battery potential in Alberta?

INDICATIVE INCREASES IN BATTERY NET REVENUES FROM SELECT MARKET REFORMS (PARTIAL LIST)



Sources and Notes: Indicative net revenue impacts estimated relative to historical 2024 market prices and conditions, after applying each potential reform and considering outcomes in other markets with similar structures.

Contact Information

Dr. Kathleen Spees

PRINCIPAL | WASHINGTON DC

Kathleen.Spees@brattle.com

412.445.2694

Dr. Kathleen Spees is a Principal at The Brattle Group with expertise in wholesale electricity markets design and carbon policies.

Her expertise focuses on environmental policy and wholesale electricity market design, economic analysis, and modeling. For RTO market operators she supports implementation and development of wholesale markets including energy, ancillary services, capacity, FTRs, clean energy attribute markets, and integration of emerging technologies. She supports regulators, NGOs, and utilities to develop GHG reduction policy alternatives, conduct power sector and economy-wide modeling of GHG abatement pathways, and assess benefits/costs in the context of policy reforms for clean energy transition. For energy-intensive companies pursuing net zero commitments, Dr. Spees offers economic advice for designing internal GHG pricing and abatement incentive programs, estimating fleet-wide GHG abatement cost curves, identifying least-cost pathways to net zero, designing internal GHG pricing and incentive programs, and conducting due diligence analysis of GHG-abatement investments.

Dr. Spees earned her PhD in Engineering and Public Policy within the Carnegie Mellon Electricity Industry Center and her MS in Electrical and Computer Engineering from Carnegie Mellon University. She earned her BS in Physics and Mechanical Engineering from Iowa State University.