Market Renewal Benefits Case

IESO
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Introduction

- This presentation provides an overview of the Market Renewal Benefits Case; we will discuss:
  1. Benefits Case context and background
  2. Methodology and key findings
  3. At a high level, approach and analysis for each workstream
  4. Project costs

Market Renewal

- The Market Renewal Program is an ambitious set of initiatives which will amount to a fundamental redesign of Ontario's electricity markets and prepare us for future change
- Although our current design has served Ontario well, the demands of a modern grid are evolving
- Reforms are required today in order for the IESO to continue to manage the grid reliably and cost effectively

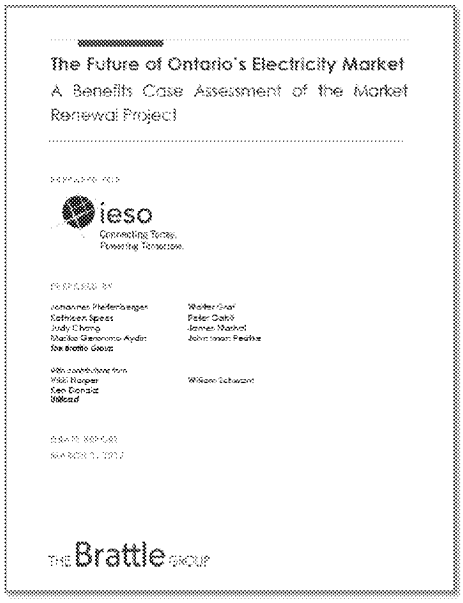
Core Elements of Market Renewal

Market Renewal consists of three distinct work streams:

Work Stream	Primary Objective	Initiatives
Energy	**Reduce cost and gain efficiency** scheduling energy to meet provincial demand	• Single Schedule System • Day-Ahead Market • Enhanced Real-Time Unit Commitment
Capacity	**Reduce cost** of procuring resources to meet long-term demand	• Capacity Trade • Incremental Capacity Auction
Operability	**Increase flexibility** to reliably and cost-effectively integrate renewable resources	• More Frequent Intertie Scheduling • Investigate other opportunities

Making the Case for Market Renewal

- IESO commissioned a third party assessment to establish the potential benefits and costs
- Draft report is posted on the IESO website and being reviewed by stakeholders
- Stakeholders have been engaged from the beginning and have provided important feedback


The Future of Ontario's Electricity Market
A Benefits Case Assessment of the Market Renewal Project

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Benefits Case Methodology

+ Benefits Energy Operability Capacity	**1. Review prior studies of Ontario's system** • Determine the scope of benefits considered in the Ontario studies and the consistency with expected benefits of the market renewal project **2. Supplement with studies of other electricity markets' design enhancements** • Consider the similarity and differences of the market characteristics and scope of design changes to translate benefits from other markets into the Ontario context **3. Compile evidence across studies to develop an expected benefits range** • Develop baseline estimates; understand drivers/risks and uncertainty range to assess whether even lowest plausible benefits exceed implementation costs • For capacity, update IESO analysis with new supply outlook information **4. Account for the implications of contracts** • Determine the share of potential benefits likely captured prior to (vs. after) contracts expire • Categorize contracts based on asset owner incentives to respond to improved price signals
– Costs	**1. Review costs and lessons learned from other system operators** • Examine cost reporting and implementation circumstances • Interviews with others RTOs' staff and energy system vendors **2. Bottom-up indicative estimates based on IESO systems and personnel** • Utilicast review of IESO personnel, IT systems, and upgrade costs and avoided costs
= Net Efficiency Benefits	**1. Calculate present value of net benefits** • Benefits over 10 years 2021-30 (some capacity benefits earlier)

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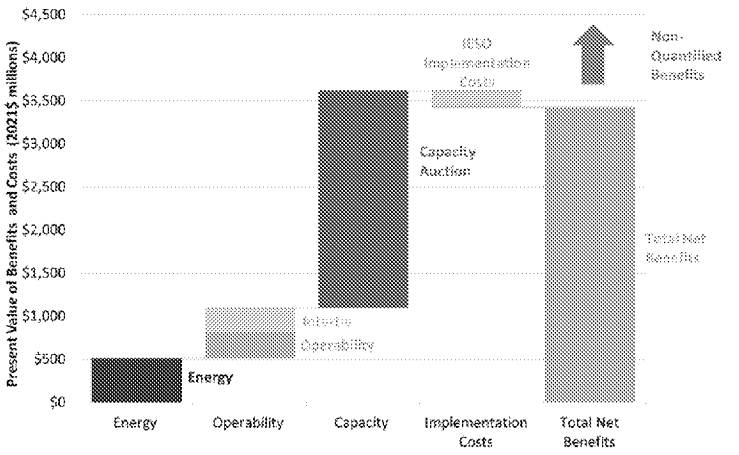
Benefits Case - Key Findings

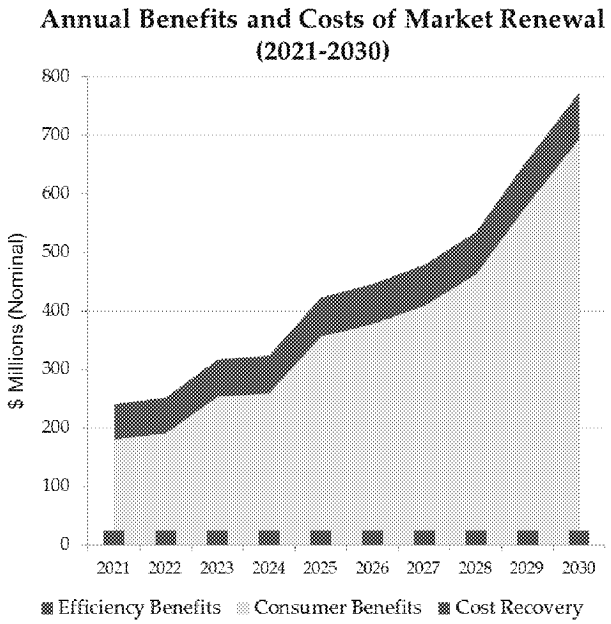
- Benefits range from $2,200 million to $5,200 million (10 year NPV)
- The benefits are likely to grow significantly over time



- Opportunity to leverage best practice from other jurisdictions both for design and implementation

Timing and Distribution of Benefits

- Market Renewal will increase efficiency; suppliers and consumers will benefit
- Consumers receive the greatest benefit
  - Lower capacity payments
  - Avoided fuel costs
  - Share of capacity exports
  - Better use of interties
- Suppliers also benefit
  - Share of capacity exports
  - Better manage fuel costs
  - New revenue opportunities

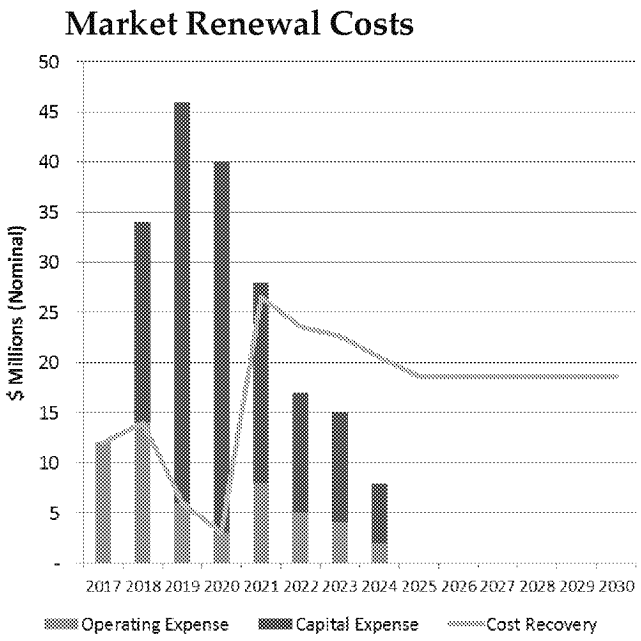


Expected Non-quantified Benefits

- Non-quantified benefits are likely to deliver additional value, for example:
  - Inefficiencies in the current design are costly to manage taking up extensive time and resources including expensive external legal expertise and consultants
  - Inefficiencies require very complex operational and settlement processes which are labour intensive and subject to possible human error
- Actual efficiencies realised have often been greater than those expected often because of the non-quantifiable benefits
  - E.g., SPP realised $1Bn in savings over a two year period compared to an expected saving of $400M

Project Costs and Cost Recovery

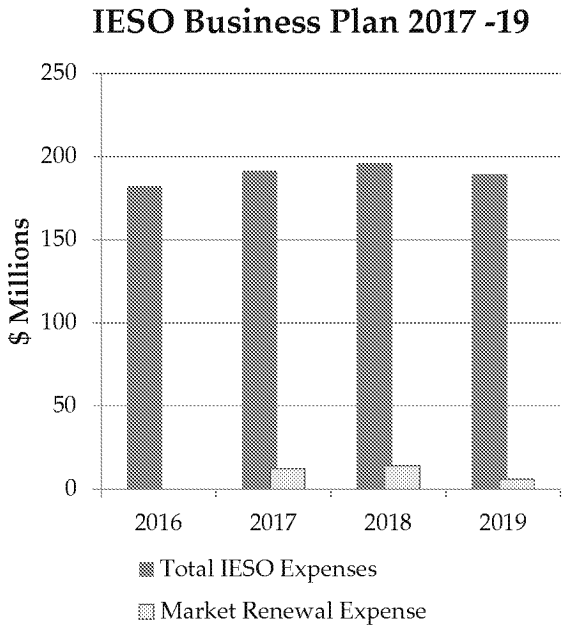
- Total project costs are $150 – $200 million
- Costs will be recovered through uplift on a volumetric basis from Ontario consumers and exporters
- 75% of costs will be capitalized and will not be paid for by consumers until 2021 when the project is in service and benefits are being realized
- The remainder of project costs are operational and will be recovered as they are incurred



Note: Costs include 20% contingency

Near-Term Cost Recovery

- Over the business planning period of 2017-19, the cost of Market Renewal to consumers will have a small impact on the IESO fee
- These costs ($6 - $14M) represent annual operational costs for the project, including:
  - Staffing (50%)
  - Technical support (25%)
  - Facilities (5%)
  - Contingency (20%)



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Risks and Mitigation

- The IESO will monitor risk on an ongoing basis; risk assessments / mitigation plans and the Audit Committee of the Board of Directors will provide oversight for the project

Risk	Mitigation
Effective **resourcing** is critical to project quality and maintaining core business	• Plan is in place for a dedicated project team to minimise impact on rest of business; hiring underway and on track
Lack of **stakeholder buy-in / and or fatigue** can cause delays and cost increases	• Together with stakeholders, IESO has established an enhanced stakeholder engagement framework that reflects their needs as well as the IESO's. IESO committed to designing with stakeholders, not for stakeholders
Scope creep has increased costs in other jurisdictions	• IESO implementing robust project management framework and governance framework; detailed workplan targeted for Q3, 2017 prior to key investment decisions. Contingency has been increased to 20% to reflect potential risk
Cross-system and cross-vendor **integration** can be challenging	• Engage a single vendor early in the project (2016) to support integration
Challenges with **contract amendments** could increase time and cost	• Not seeking wealth transfers; committed to working collaboratively with counterparties early and often

Capacity Stream

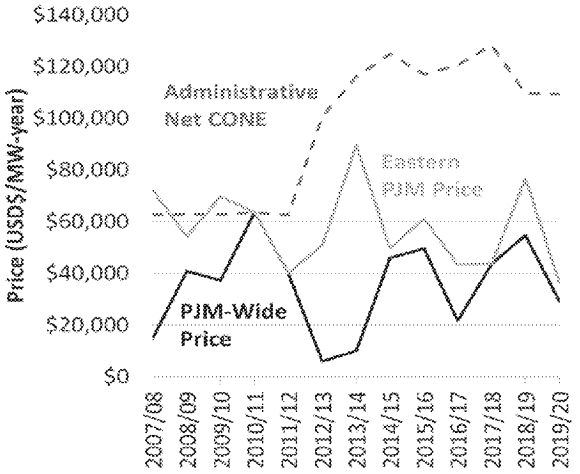
- Introduce an incremental capacity auction to competitively procure resources when they are needed based on a platform that is resource agnostic
- Auctions have proven highly effective in achieving low cost outcomes in many markets across North America and Globally
- DR auction shows how the concept could work in Ontario

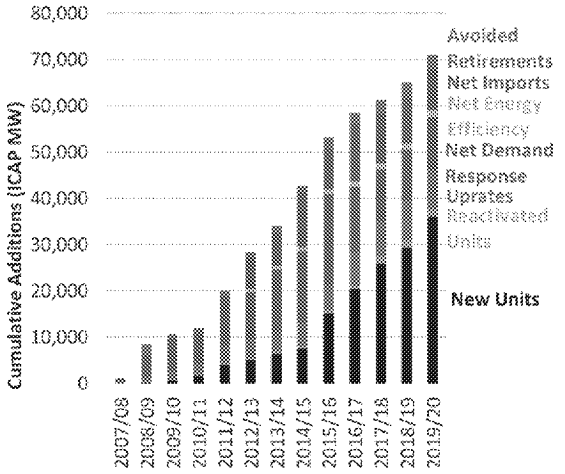
Ontario has used many different procurement mechanisms: competitive RFPs, standard offer and bilateral negotiations. Broad and open **competitive RFPs have yielded the best value** for consumers.

The DR Auction has been a first step in testing out an auction platform. It provides an annual mechanism for resources to compete transparently. It has attracted a number of **new entrants and innovative approaches**

A Capacity Auction will provide **a stable and enduring platform** where existing assets and new entrants can compete on a regular basis for incremental capacity needs. Transparent price signals will lead to **improved investment** decisions.

Capacity: Illustration of Experience in PJM





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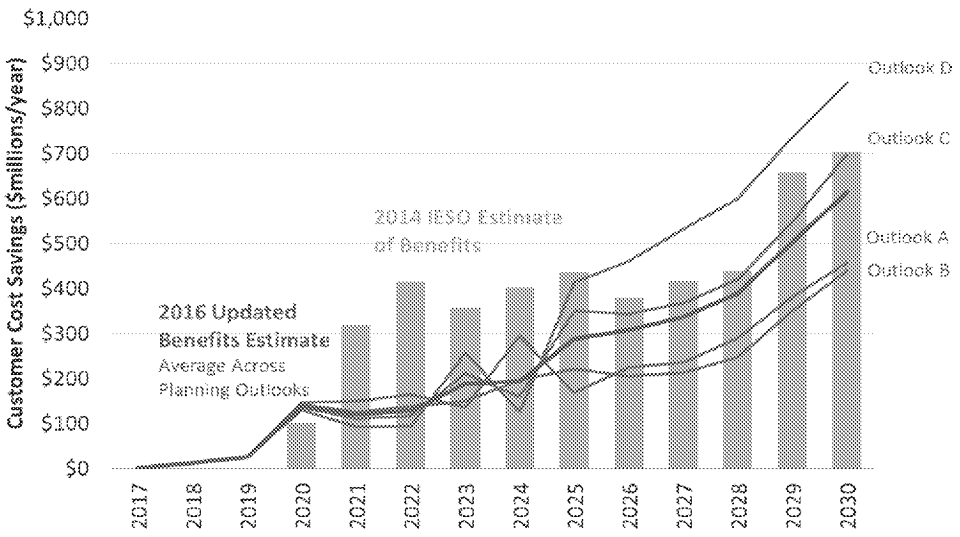
Capacity: Range of Benefits



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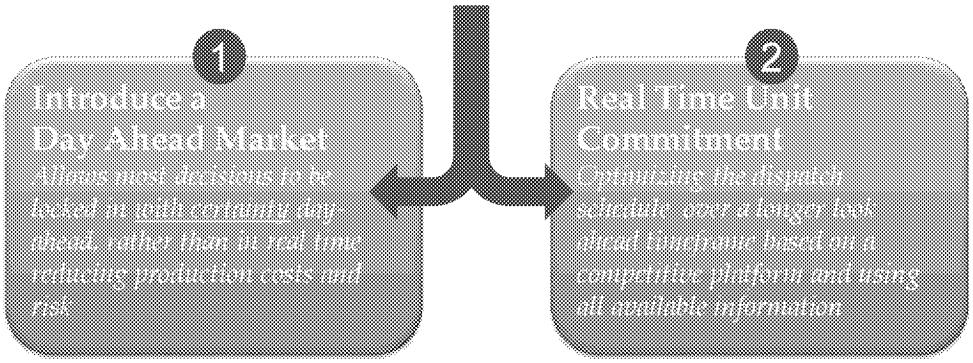
Energy Stream: Improve Asset Utilization

Current design relies on a real time market and dispatches resources based on a short 1 hour look ahead basis. In practice the design has proven difficult to manage cost effectively. The solution is to manage scheduling and dispatch over a longer time horizon



To make these changes the IESO will need to replace the current two-schedule settlement design with a simplified version

Energy: Comparison of Features to Other Jurisdictions

Comparison Factor	Market Renewal	MISO 2005	CAISO 2009	ERCOT 2010	SPP 2014
1. Scope of Enhancements Studied	Nodal Pricing, Day-Ahead, Intra-Day Unit Commitment	Nodal Pricing, Day Ahead, Real Time	Nodal Pricing, Day Ahead, Co Optimization	Nodal Pricing, Day Ahead, Co Optimization	Nodal Pricing, Consolidated Balancing Areas, Day Ahead, Ancillary Services, Co-Optimization
2. Range of Marginal Costs	$39/MWh	$100/MWh	$47/MWh	$40/MWh	$39/MWh
3. Intermittent Resource Deployment	8% 12% by 2020s	<2%	2%	8%	12%
4.Relation to Market Renewal	n/a	Similar	Similar	Similar	Higher
5. Adjustments Needed to Apply Benefits to Ontario	n/a	Slight Upward Adjustment Needed	Slight Upward Adjustment Needed	None Needed	Downward Adjustment Needed

Notes:
- Lower than Market Renewal
- Similar to Market Renewal
- Higher than Market Renewal

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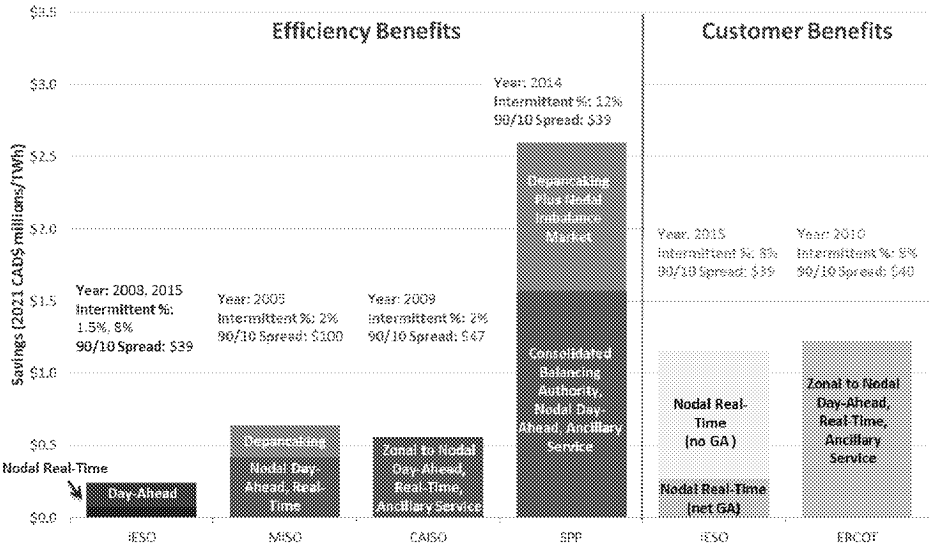
Comparison of Benefits from Energy Enhancements



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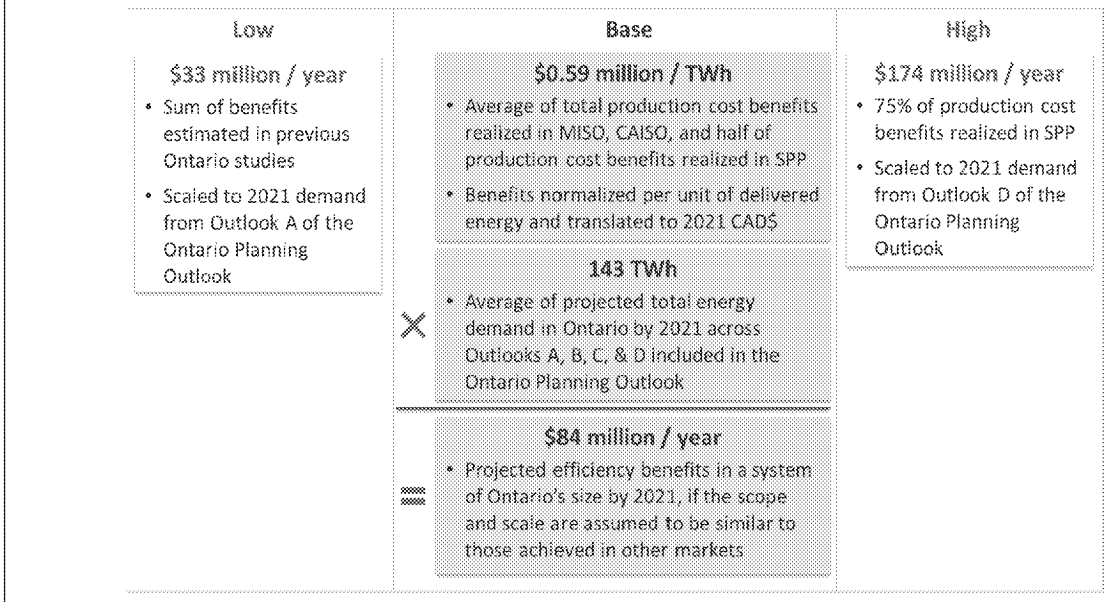
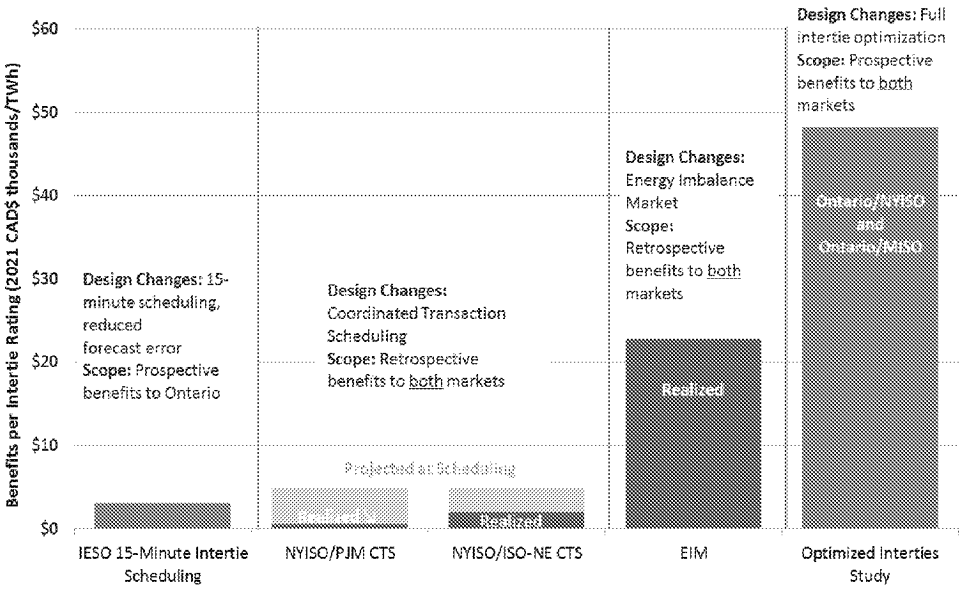
Energy: Range of Projected Benefits



Operability Stream

- With a growing role for intermittent and decentralized resources, Ontario's electricity sector will require increased flexibility
- The IESO is working with stakeholders to identify solutions for near term needs through the Enabling System Flexibility SE
- To meet longer term needs Market Renewal will:
  - Introduce more frequent (15 minute) intertie scheduling
  - Explore additional opportunities to increase coordination and flexibility on the interties

Operability: Comparison of Benefits from Intertie Enhancements



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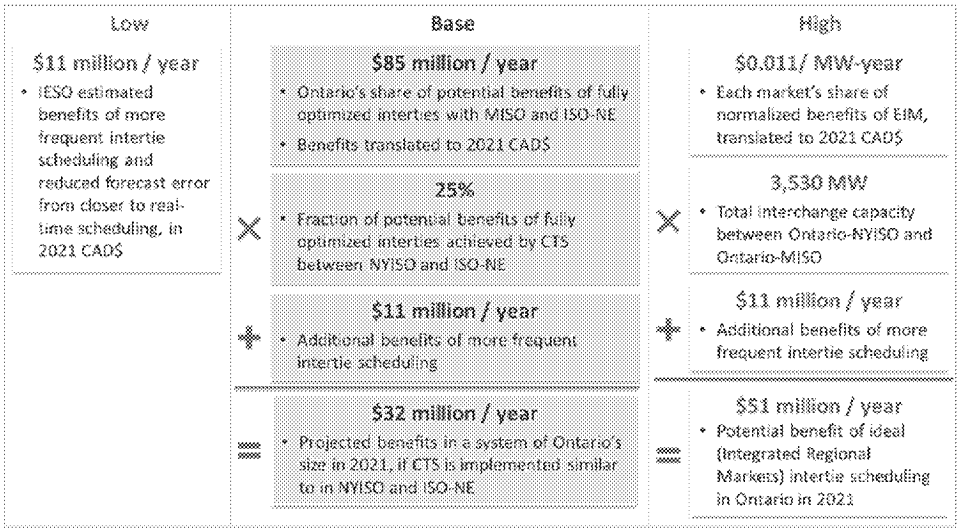
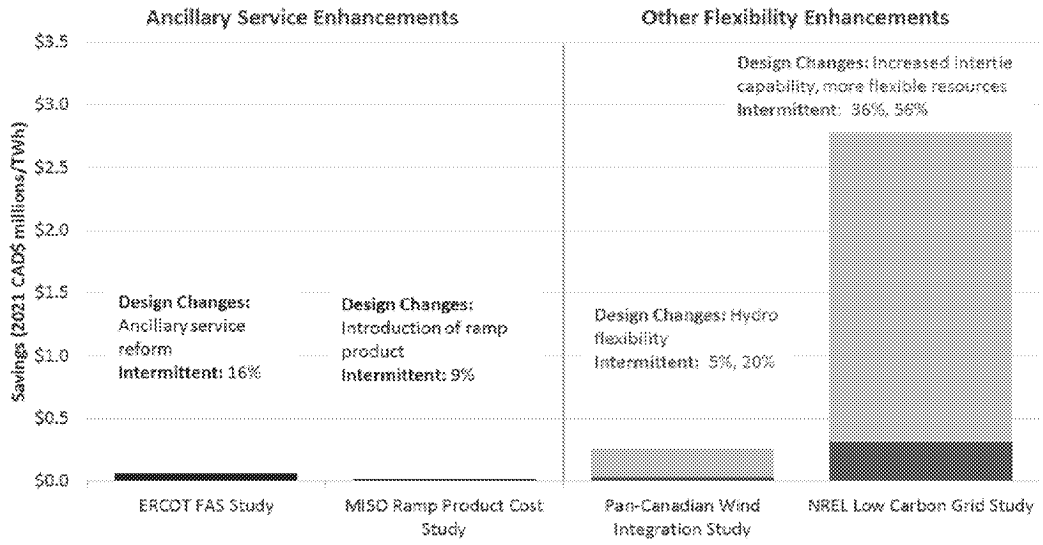
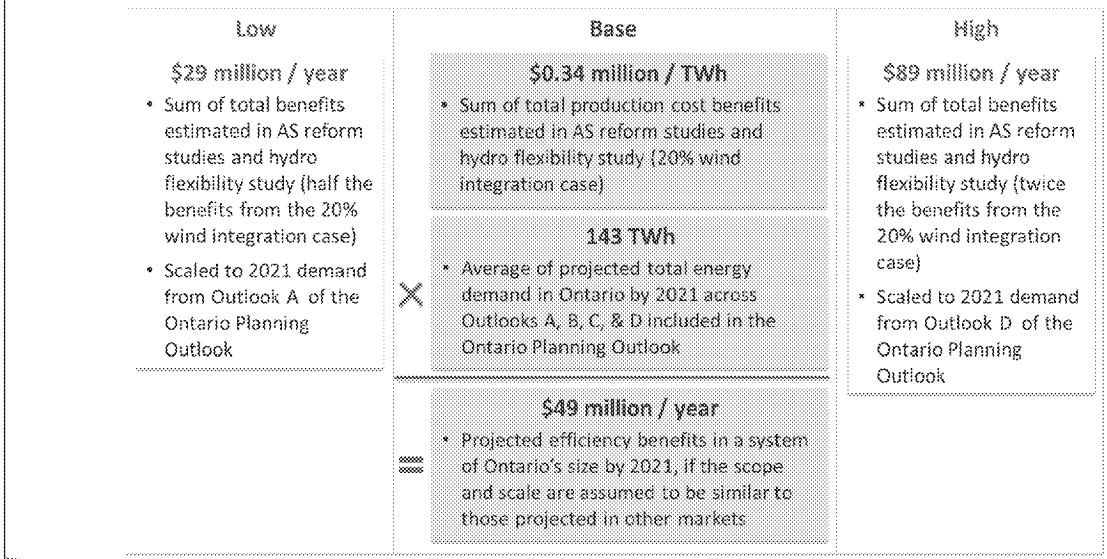
Operability: Range of Benefits from Intertie Enhancements



Operability: Comparison of Benefits from Other Enhancements

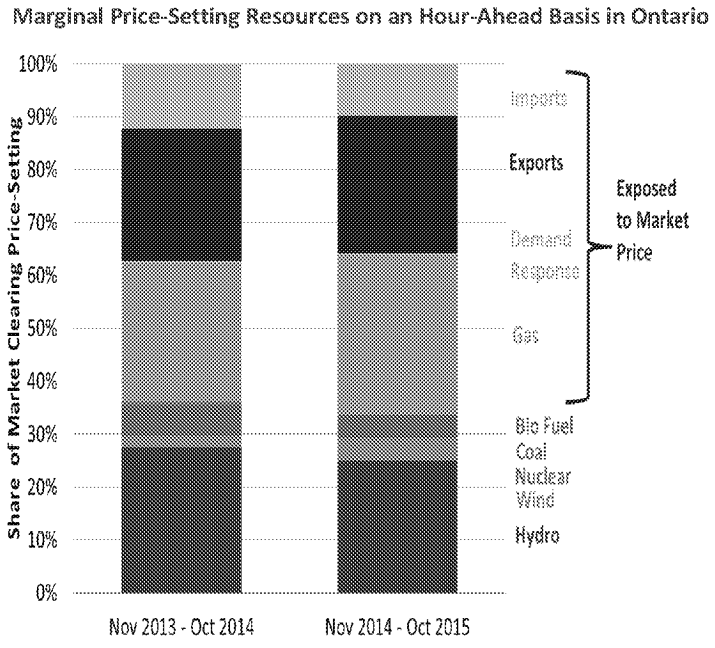


Operability: Range of Benefits from Other Enhancements



Accounting for Contracts

- Many contracted and regulated resources respond to contract incentives rather than market incentives
- However, prices are set by marginal resources
- In the majority of hours, the marginal resource is responsive to market incentives (i.e., imports/exports, DR, and gas)



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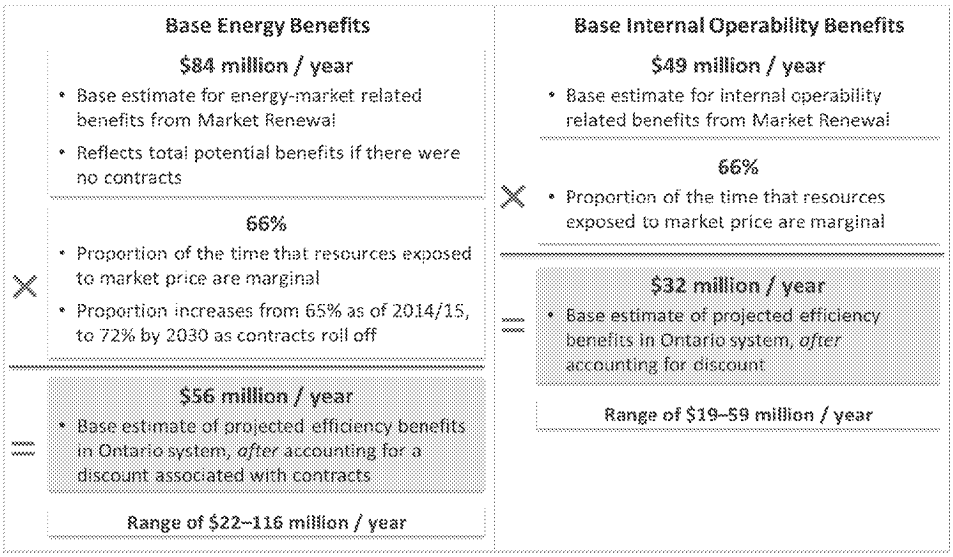
Impact of Contracts on Benefits Case



Stakeholder Feedback To Date

- General agreement that a fundamental change is needed and that the current design is not sustainable
- Broad agreement that Market Renewal will provide benefits to Ontario's electricity sector
- Stakeholders appreciative of opportunity to help shape engagement framework and opportunities for enhanced roles
- Some concern about the details of design and how they will impact individual parties
  - IESO sensitive to these concerns and will work closely with stakeholders to address their issues during design work
- Concern has been raised that future policy interventions could undermine the benefits of the project

Stakeholder Perspectives

Contracted Generators

- Want to ensure they will not be made worse-off under the new design
- Benefits are not contingent on material wealth transfers from suppliers; will work closely with counterparties through engagement framework to develop mutually agreeable solutions

Renewable Generators

- Want to understand how new renewable resources would be incentivized
- Not directly impacted. Securing clean energy post current contracts will be an ongoing policy discussion but markets can help future procurement to deliver best value for money

Industrial Loads

- Want to ensure costs won't increase
- Will still have the same opportunity to manage capacity costs (as with GA); design will be consistent with policy decisions on locational pricing and options will be explored through the design phase

Emerging Technologies

- Seeking technology neutral markets with transparent revenue streams in which they can compete

Suppliers and Consumers

- Concerned that regulatory and policy interventions could undermine efficiency and benefits of new design

Next Steps

- Finalize Benefits Case report (end Q1)
- Seek approval for IESO Business Plan and submit to OEB (Q2)
- Work with stakeholders to develop stakeholder schedule for the design phase (Q2)
- Begin design work (Q2)
  - Duration of design work TBD with stakeholders but expect 12-18 months
- Create and publish detailed work plan for complete Market Renewal project (Q3)

APPENDIX

How Benefits Accrue to Customers

Benefit Category	Impacts on Customers
Fuel, Emissions, and O&M Cost Savings	• Reduced system variable costs will translate to lower energy plus uplift costs to customers
Reduced Curtailment/Spilling of Clean Energy	• Fully utilizing clean energy will enable displacing costlier gas-fired generation (reducing system and customer costs) or increased exports (reducing Global Adjustment costs to customers) • Environmental benefits materialized through either avoided CO2e emissions, or lower clean energy investment costs to maintain the same level of CO2e emissions
Increased Export Revenues and Reduced Import Costs	• Reduced costs as some expensive Ontario resources are replaced with lower cost imports • Realize additional contributions to capacity costs through export revenues
Investment Cost Savings	• Customers will pay lower capacity prices under competitive auction than current contract prices, materialized as lower Global Adjustment costs • Customers share a portion of the revenues from capacity exports to offset Global Adjustment costs • Benefits will grow over time as contracts expire
Reduced Gaming Opportunities and Administrative Complexity	• Avoided excess payments from market gaming will typically translate to avoided customer costs • Few direct impacts on customers from reduced complexity
Eliminating Inappropriate Wealth Transfers	• Customers will typically be the primary beneficiary of avoided transfer payments from gaming opportunities, lack of competition, and inappropriate wealth transfers • Customers will materialize benefits through lower capacity payments (through Global Adjustment) and reduced uplift charges. Transfer payments embedded within from intertie offer guarantees, CMSC payments, and day-ahead/real-time cost guarantees will be significantly reduced or eliminated
Supporting Competition and Innovation	• Competition and innovation will reduce system costs, translating to lower prices and customer costs • Customers wishing to participate as demand response, distributed resources, or prosumers will have enhanced opportunities
Alignment with Provincial Policy Goals	• A more dynamic and cost-effective market platform will enable lower-cost solutions for achieving or adapting to policy goals, avoiding costlier solutions that customers may otherwise have to pay for

How Benefits Do (or Do Not) Accrue to Other Market Participants

Benefit Category	Impacts on Other Market Participants
Fuel, Emissions and O&M Cost Savings	• Contracted Suppliers: Kept whole to contract terms for the most part (until contracts expire). Updating contract terms with Market Renewal will introduce costs from contract amendments, and the details of any contractual change will introduce some favorable or unfavorable adjustments. Some may share benefits from incremental opportunities to provide operability services. • Merchant Suppliers: Suppliers will share in Market Renewal efficiency benefits on an aggregate basis (with avoided production costs exceeding the reductions in energy price/uplift payments), but individual suppliers may be better or worse off. Sellers that have assets with lower costs, greater flexibility, and in more favorable locations will benefit most; less economically competitive sellers are likely to be worse off. • Fuel Sellers: Potentially worse off due to lower gas sales; reduced intra-day balancing costs.
Reduced Curtailment (Spilling) of Clean Energy	• Clean Energy Producers: Either equally well off (if not subject to curtailment risks) or better off (if currently losing revenue from curtailments). • New Clean Energy Developers: Either equally well off (if the same quantity of clean energy is developed), or worse off (if avoided curtailments enable lower quantities of clean energy investment).
Increased Export Revenues and Reduced Import Costs	• Suppliers: Realize additional contributions to capacity costs through share of export revenues; high-cost suppliers may be worse off as their power is more easily replaced by cheaper power from neighboring markets. • Traders: Better off from more cost effective intertie trading opportunities.
Investment Cost Savings	• Contracted Suppliers: Kept whole to contract terms until contract expiration. Share benefits from capacity exports. • Merchant Suppliers: Low-cost suppliers will benefit from selling capacity at a market price that exceeds net going-forward costs, including new entrants and non-traditional supply types. Higher-cost suppliers will become less profitable. Sellers that previously enjoyed contract payments exceeding cost/market value will be worse off.
Reduced Gaming Opportunities and Complexity	• Market participants currently exploiting existing design flaws through gaming will be made worse off. Other non-customer market participants unlikely to be affected. • Most market participants will benefit from reduced administrative complexity.
Eliminating Inappropriate Wealth Transfers	• Market participants currently profiting from inappropriate wealth transfers, for example that may be embedded within uplift payments, will be made worse off. Other non-customer market participants largely unaffected.
Supporting Competition and Innovation	• New Entrants & Emerging Technologies: Benefit from enhanced opportunities to compete and enter the market. • Less Competitive Existing Technologies: Worse off if unable to compete with new entrants.
Alignment with Provincial Policy Goals	• Alignment between policy goals and market design will reduce the regulatory risks associated with market intervention (which can be invited by lack of such alignment). All market participants will benefit from mitigating risks.