

ENABLING SYSTEM FLEXIBILITY

Stakeholder Engagement

Meeting #2

August 16, 2016

Agenda

- Stakeholder engagement and timeline
- Response to stakeholder feedback
- Enabling flexibility
 - Other ISO solutions
- Next steps

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Stakeholder Engagement

Stakeholder Engagement and Timelines

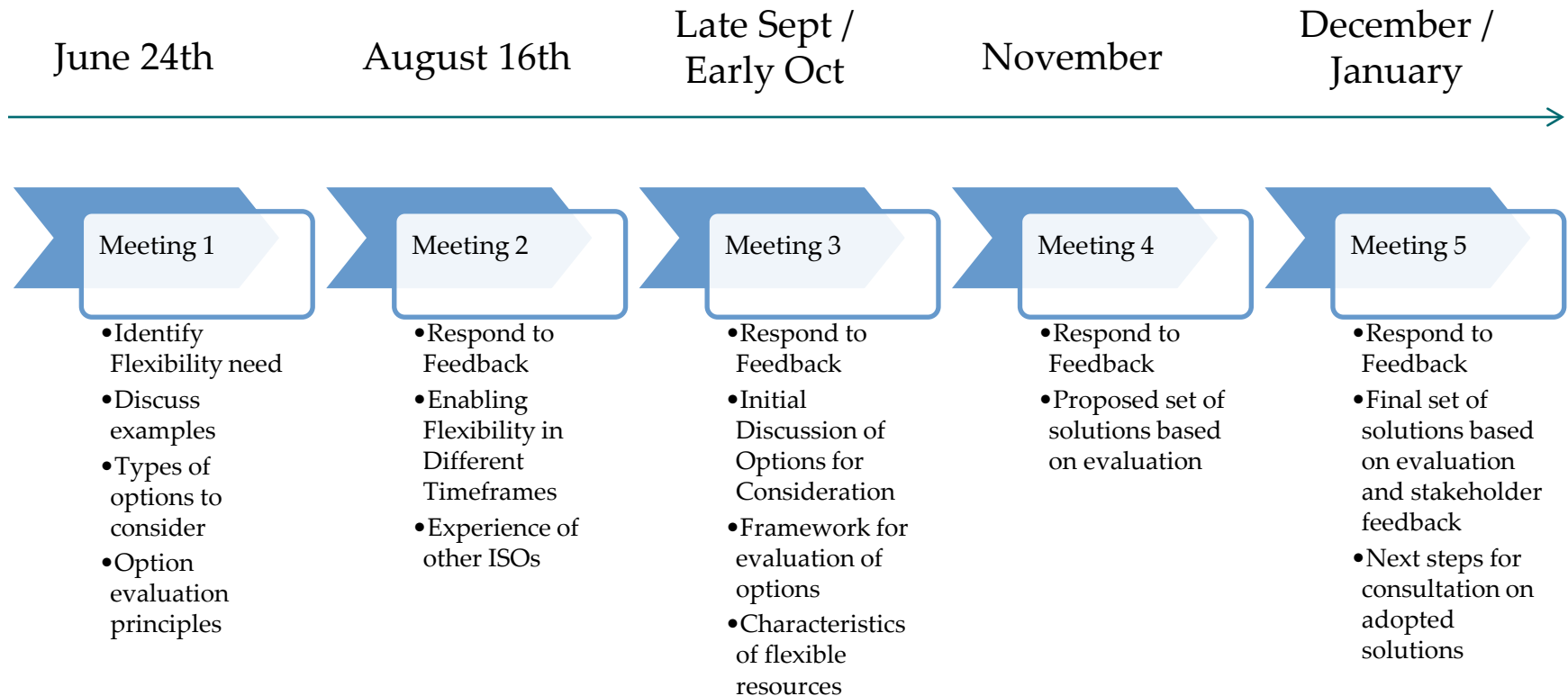
Gordon Drake

August 16, 2016

Engagement Overview

- The objective of this engagement is to determine potential solutions that can enable and achieve flexibility to meet the evolving needs of the system
- The IESO will discuss with stakeholders and seek feedback on:
 - The nature of the flexibility need
 - A range of potential options to address flexibility need in the near- and long-term
 - A comparison of potential options best suited for the system
 - Recommended solution(s) for system flexibility

Engagement Timeline



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Stakeholder Engagement

Responses to Stakeholder Feedback

Mark Hartland

August 16, 2016

Stakeholder feedback – Engagement with stakeholders

- Interest for further details related to IESO operability assessments
- *IESO may provide additional information in future sessions as options are developed or feedback indicates a need for specific information. The IESO will do so as long as it does not compromise confidentiality obligations.*

Stakeholder feedback – System flexibility need

- Inquiries regarding the amount of MWs required to manage VG forecast uncertainty and if OR could be used to manage this uncertainty
- *IESO: We are targeting about 1000 MW of additional flexible resources, with 300 MW expected to be obtained by the end of 2017 and the remaining 700 MW by the end of 2018.*

Regarding whether or not OR could deal with this, as the stakeholder engagement process progresses, we will be in a position to better assess and comment on the merits of various proposals and how they measure against the criteria identified on slide 50 of the June 24th presentation.

Stakeholder feedback – System flexibility need

- Question regarding how quickly a resource providing flexibility must be able to provide power when called upon
- *IESO: The IESO evaluated our forecast accuracy in the time frames when the IESO commits resources. Our last commitment is made about an hour ahead of real-time, when intertie transactions are confirmed. We found that between an hour ahead and real time, the forecast becomes significantly more accurate. Therefore, the IESO requires flexible resources to be available in real-time that could provide power in 20-30 minutes, if called upon.*

Stakeholder feedback – Potential solutions to consider

- Feedback received regarding potential solutions
- *IESO: The IESO thanks all stakeholders for providing input on potential solutions which may be considered. As the stakeholder engagement process progresses, we will be in a position to better assess and comment on the merits of various proposals and how they measure against the criteria identified on slide 50 of the June 24th presentation.*

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Stakeholder Engagement

Enabling Flexibility

Hok Ng

August 16, 2016

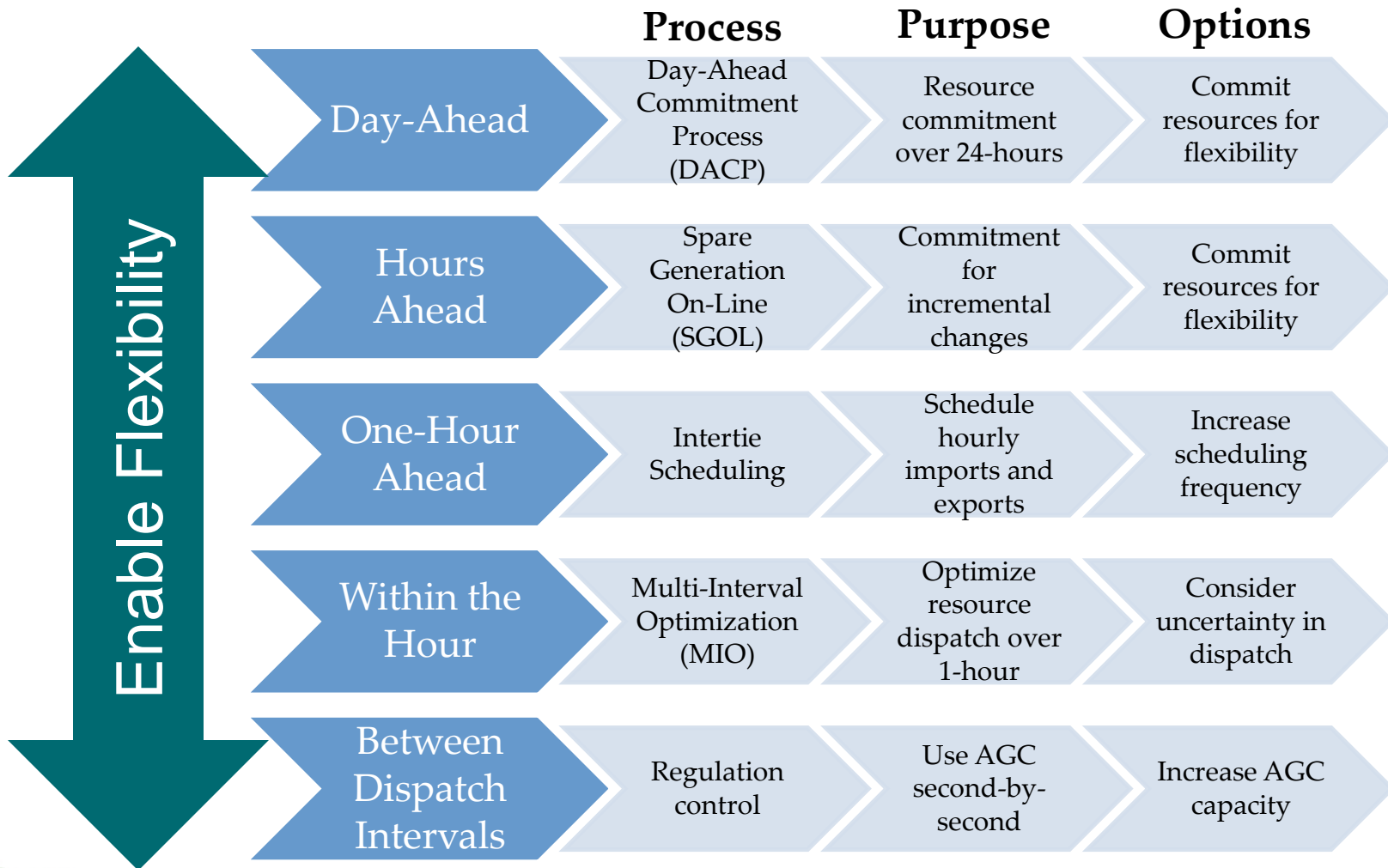
Flexibility Need

- Additional flexibility needed to address increasing variability and forecast uncertainty
- In the day ahead to the hour ahead pre-dispatch time frame, the VG forecast uncertainty is higher, thus the need for flexibility in real-time
 - Manifests in the real-time market
 - Sometimes requires manual actions
 - Manual actions not sustainable with VG growth
- However, forecast accuracy significantly improves between the hour-ahead and real-time

Enabling Flexibility

- To ensure sufficient flexibility is available in real-time, the IESO may need to change the way it schedules/commits resources in the following time frames:
 - Day ahead when DACP commitments are made
 - Several hours ahead when SGOL commitments are made
 - 1-hour ahead pre-dispatch when intertie transactions are scheduled
 - Sub-hourly when Ontario resources are dispatched on a 5-minute basis
- Understanding the time frames when flexibility can be enabled will help identify potential solutions

Enabling Flexibility in Different Timeframes



Potential Solutions

Solutions considered must be consistent with the following principles

- Maintain system reliability
- Cost-effective, competitive, transparent and stable
- Send efficient price signals
- Scalable to system need changes over time
- Technology neutral, allowing for the development of new technology and/or maximizing capability from existing assets

Considerations

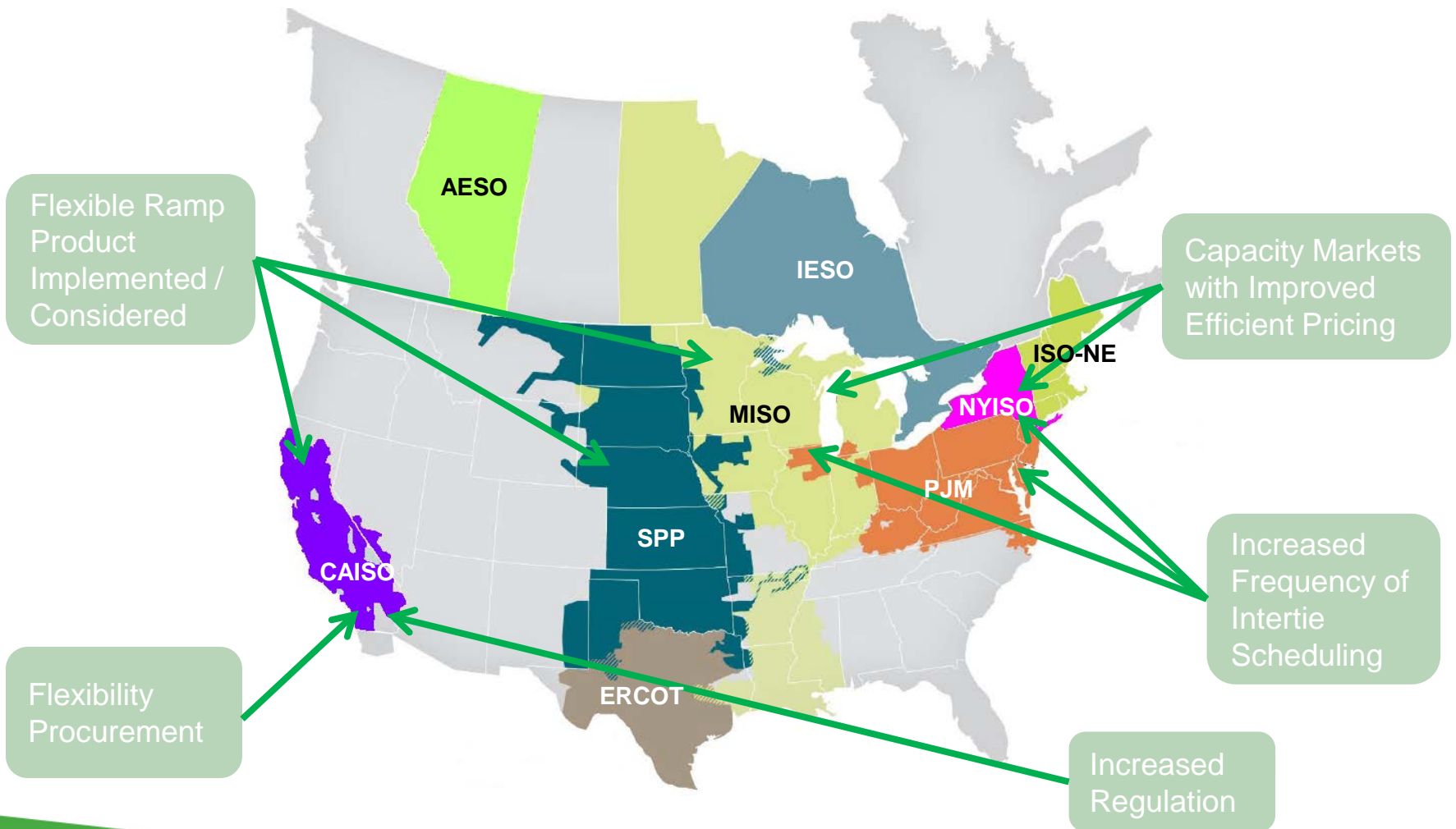
Flexibility can be enabled during any market timeframe

- How do we assess how much uncertainty to account for in different time frames and scheduling processes?
- How should flexibility be represented in the market?
 - Additional reserve (i.e. scheduling more 30R)
 - Additional regulation
 - New market-based product
- What does it mean to “provide flexibility”?
- How can resources be incentivised to provide flexibility?
- What is the “cost” of providing flexibility?

Solutions In Other ISOs

- Looked at solutions in US ISOs that are relevant to Ontario based on:
 - Supply mix
 - Current market design
 - Alignment to other market development initiatives

Other ISO Solutions



Observations From Other ISOs

- No one solution for all ISOs
 - Different supply mix
 - Different market features in place
- Other ISOs considered the following when identifying solutions for flexibility
 1. Role of regulation and OR as solutions
 2. Separate product for flexibility
 3. Importance of transparent and efficient price signals
 4. Solutions for entire market timeframe: day-ahead to real-time dispatch

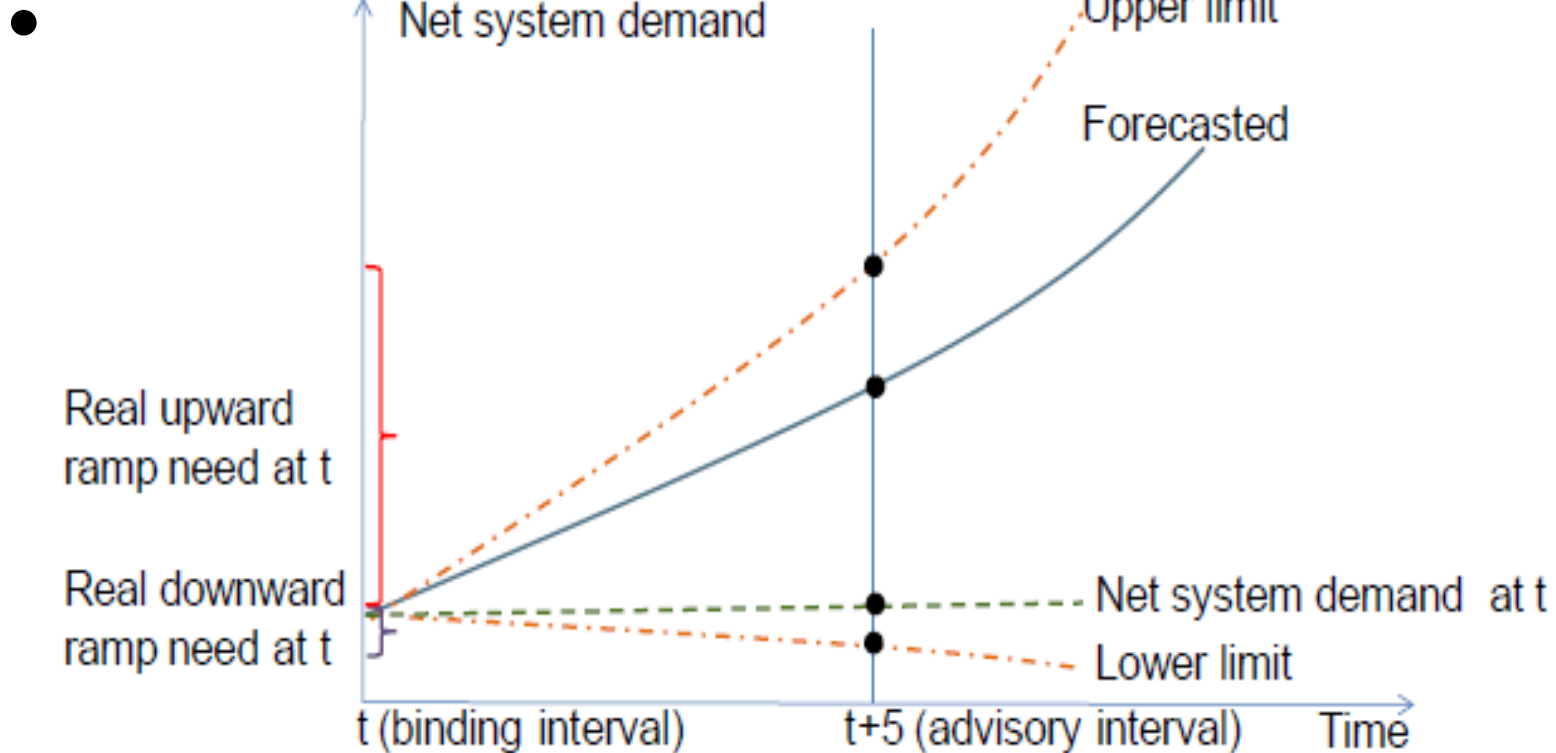
1. Role of Regulation and OR

- Regulation is used to match total system generation and load on a second-by-second basis
 - Generally not co-optimized with energy and OR; no transparent pricing
 - Expensive to expand AGC capacity
- OR is required for contingency events
 - Activated forced outages and large unexpected net demand changes
 - Non-frequent activation as directed by operator
- Regulation and OR with a flexibility product can be a part of the overall solution
 - Must be consistent with principles stated earlier

2. Flexibility Product

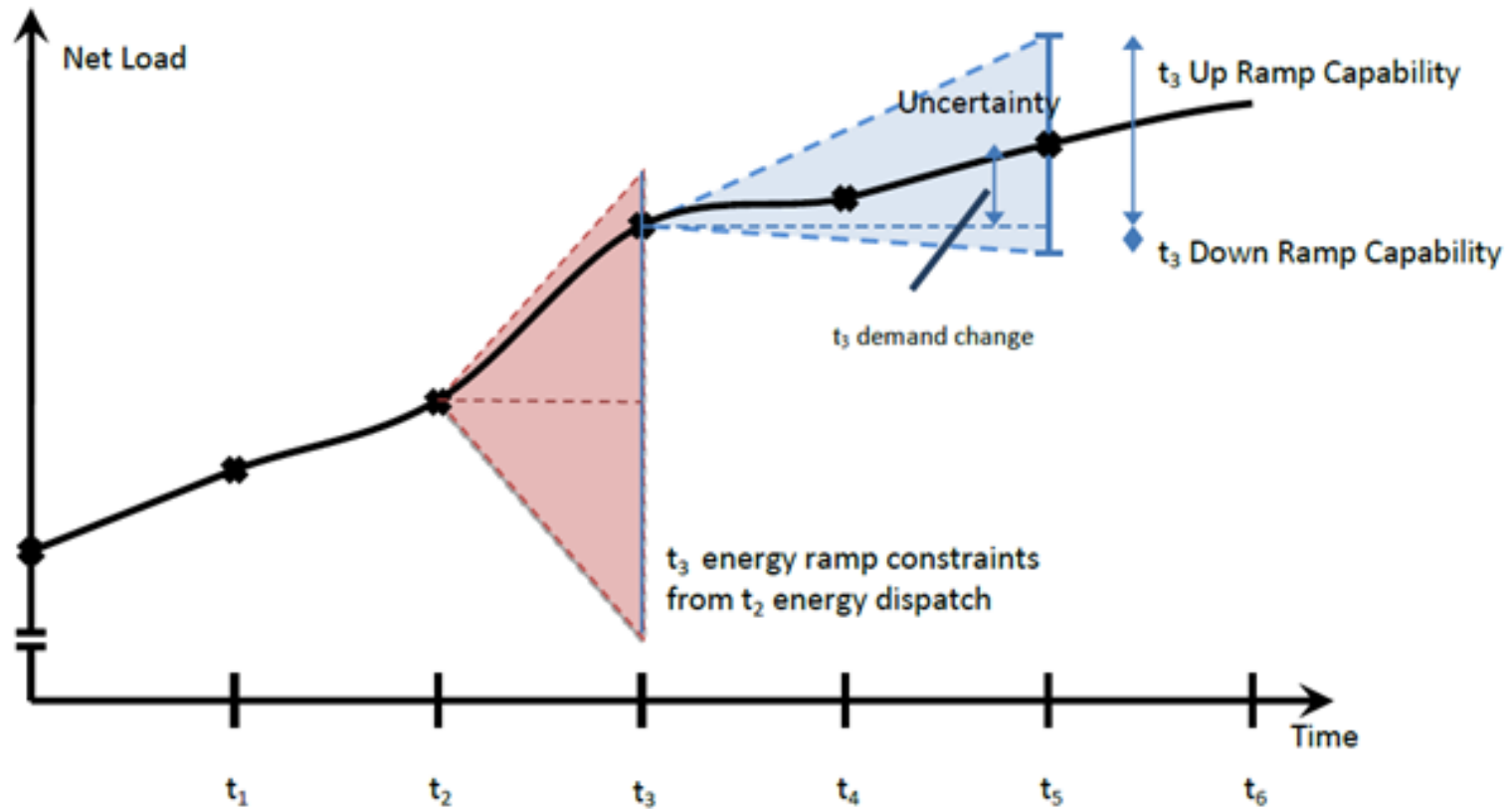
- Meets reliability needs
 - Uses upper and lower demand profiles to capture uncertainty
 - Can be scheduled for energy and/or OR, co-optimized with both of these market products
 - Reduces need for operator actions
- Determines a value for flexibility
 - Transparent price signal
 - Incentivises existing resources to offer flexibility and potential future development of capacity
 - Procurement alone doesn't solve need
- Implemented in MISO (May 2016), CAISO (Fall 2016)
- Under consideration for SPP

2. Flexibility Product – Net Demand Profiles



Source: CAISO

2. Flexibility Product – Ramp Constraints



Source: MISO

3. Transparent and Efficient Price Signals

- Puts a value on flexibility
- Real-time prices based on marginal costs
 - Extended LMP in MISO, Hybrid GT Pricing in NYISO
 - Encourages development of flexible resources in capacity markets
- Make-whole payments for resources committed for flexibility

4. Enabling Flexibility Throughout Market Timeframes



Allows for participation by many types of resources to capture benefits providing flexibility

Reduces costs

Provides certainty

Reduces manual actions

Interim Solutions for Flexibility

- Recognising implementation times of solutions other ISOs have taken interim measures for flexibility
 - Operator driven processes to commit flexible resources
 - Constraints introduced to market dispatch and commitment processes
- Consider options potentially suitable to meet IESO near term flexibility requirements

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Next Steps

Gordon Drake

August 16, 2016

For Next Meeting

Provide list of options for evaluation including:

- A. Improvements to, or increased use of, existing market mechanisms
- B. Introduction of a new market product(s), which could be co-optimized with energy and reserve
- C. Development of other incentives to increase the flexibility in the system

It is important to note that a combination of solutions may be proposed which, in sum, will meet the flexibility need.

Stakeholder Feedback

- The IESO has received input from a number of stakeholders and continues to welcome feedback regarding potential solutions that:
 - i. can meet the reliability need identified and
 - ii. are consistent with the principles identified
- These proposals will be considered alongside those developed by the IESO and evaluated in this SE against a common set of principles
- In order to prepare adequately for meeting #3, feedback and suggested approaches should be sent to engagement@ieso.ca by August 31, 2016.