

# Design Element Options

Phase 2 – Session 6  
Single Schedule Market Project

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January 30, 2018

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# Today's Agenda

## Preliminary Decisions with Rationale:

- Pricing for Loads
  - Zonal pricing and the number/location of those zones
  - Price granularity for certain types of load participants
- Financial Transmission Rights
  - A methodology for mitigating the impacts of moving away from the current uniform price regime
  - Discuss options for in-zone disbursement of residuals

## Stakeholder Feedback from December 2017:

- Intertie congestion pricing
  - Discuss stakeholder comments

# Preliminary Decisions

- Stakeholders have asked the IESO to bring forward preliminary decisions where possible
- These materials identify preliminary decisions and offer supporting rationale
- The IESO has made preliminary decisions where there is a single option or lack of viable alternative option, where there is substantial consensus by the IESO and stakeholders as to a preferred option, or where internal analysis has led the IESO to propose a specific solution
- Stakeholders are requested to use meeting time to discuss any comments, questions or concerns related to these preliminary decisions, and are also invited to provide written feedback
- Preliminary decisions are non-binding, are intended to facilitate progress on design elements which will be finalized in the High Level Design document

Design Element #16

# PRICING FOR LOADS

# Pricing for Loads

The IESO previously presented 7 load pricing options to Stakeholders

The options involved three main choices:

**Choice #1:** How will loads be charged for the cost of losses and congestion?

**Choice #2:** Will dispatchable and non-dispatchable load be charged prices with the same level of granularity?

**Choice #3:** What will be the level of price granularity?

# Recap – November SE Session

- The IESO examined Options 1, 2, 3 and 7 at the last meeting
- Data were calculated using load weighted nodal prices
  - IESO identified negative pricing as a concern
- There was a methodology brought forward for the purpose of discussing how congestion and loss residuals could be disbursed
  - Methodology would offset some of the potential price differences between zones

*Data reviewed by the IESO were comprised of historical nodal prices (non-settlement prices) and are not reflective of past, present, or future settlement prices*

# Today's Session – Load Pricing

Today the IESO is presenting the following suite of decisions regarding Load Pricing:

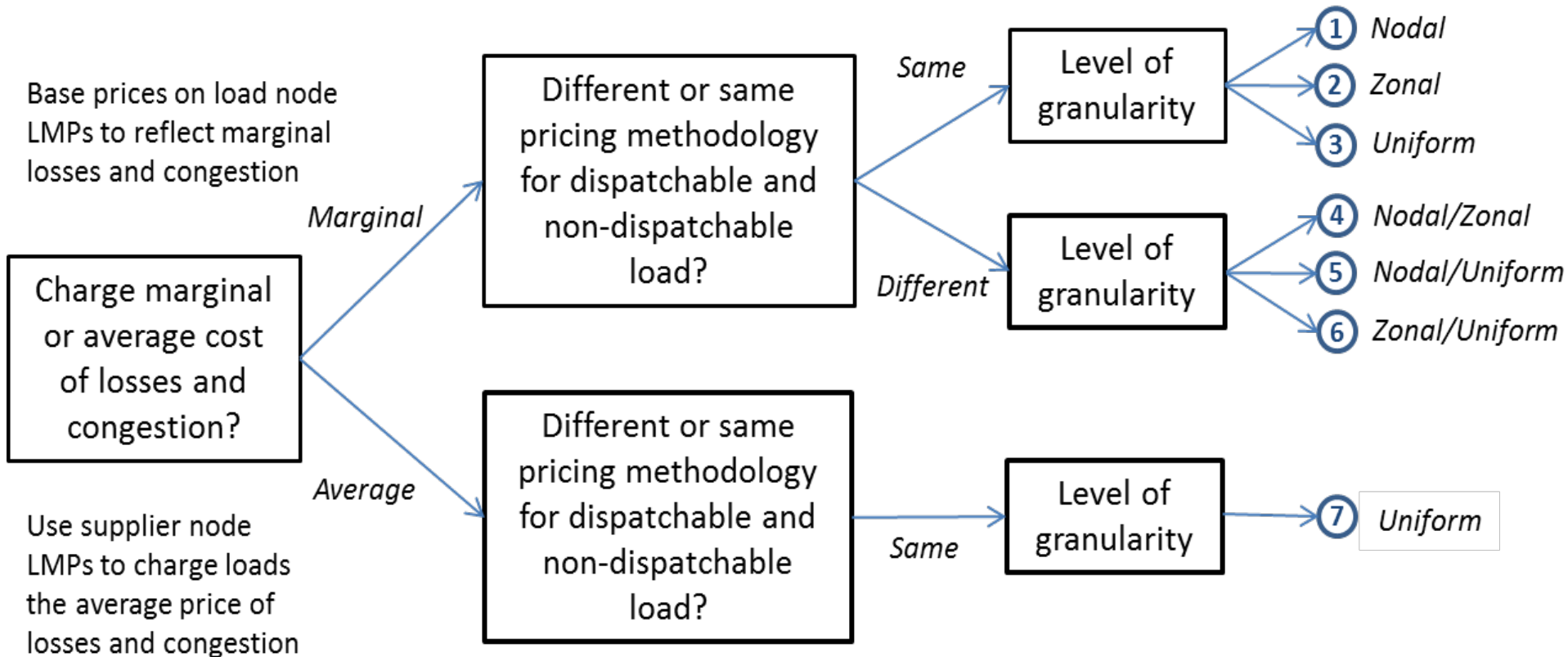
1. Pricing for non-dispatchable load (NDL)
2. Proposed load pricing zones
3. Price granularity for dispatchable resources
  - a) Dispatchable Load (DL)
  - b) Storage
  - c) Price Responsive Load (PRL)
4. Optionality for non-dispatchable loads
5. Disbursement methodology for residuals
  - a) Zonal disbursement
  - b) In-zone disbursement (options)



Design Elements #16

# LOAD PRICING

# Load Pricing (7 options)



# Preliminary Decision – Non-Dispatchable Load

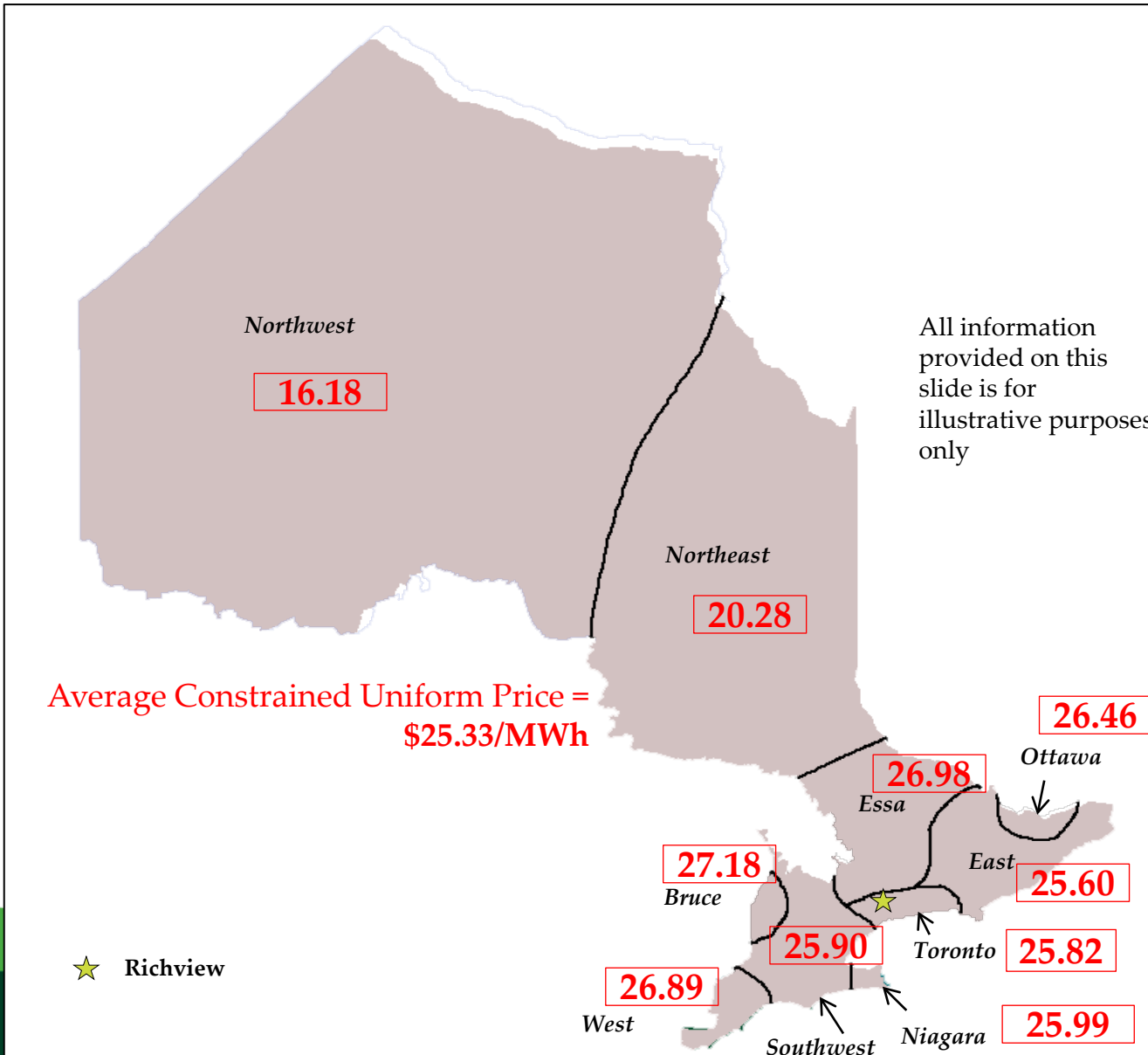
## Zonal Pricing – with a nodal option

- Zonal pricing is a more efficient option than uniform pricing
- The definition of load zones match major and expected Ontario system constraints/congestion
  - An approximation of nodal pricing for NDL

# Preliminary Decision – Non-Dispatchable Load

- Zonal pricing will support increased energy market participation from loads relative to the current uniform pricing system by providing:
  1. Efficient short-run signals for NDL
  2. Efficient long-run pricing signals for the location of energy intensive economic activities
- The residual disbursement methodology may be able to offset some cost impacts of moving away from a uniform price while keeping the marginal incentives needed to respond to regional prices

# Zonal Pricing – General Observations (2014-2016)



- Average annual Northern Ontario prices are less than those in Southern Ontario and the Constrained Uniform Price
- Average zonal prices across Southern Ontario are similar
- The average Constrained Uniform Price is very similar to, but on average lower than, the zonal prices in Southern Ontario

# Recap - Negative Prices

- In an ideal energy market
  - Offers from suppliers reflect the marginal costs of supplying power
  - Bids from consumers reflect the marginal benefit from consumption
- In practice, across Ontario there are times when market prices may differ from underlying marginal costs
  - This is most frequently observed in the Northwest
  - Prices less than  $-\$50/\text{MWh}$  were observed in ~6%, 12% and 21% of intervals in 2016, 2015, and 2014

# Managing Negative Prices

- In recent years the IESO has been able to mitigate the effects of negative prices under the two-schedule system:
  - Offer floor prices for wind/solar and flexible nuclear
  - Settlement rules allowing replacement offer/bid prices (for CMSC)

# Managing Negative Prices – Next Steps

- The IESO has begun the process of better understanding the causes and consequences of negative pricing
  - Looking to engage market participants to better understand the drivers of negative offers
  - Identify and evaluate potential options that could address the consequences of negative prices



# PROPOSED LOAD PRICING ZONES FOR NON-DISPATCHABLE LOAD

# Preliminary Decision – Proposed NDL Load Pricing Zones (Number and Boundaries)

The IESO proposes 10 load pricing zones

- The zones would be delineated by the current boundaries between the 10 existing electrical zones

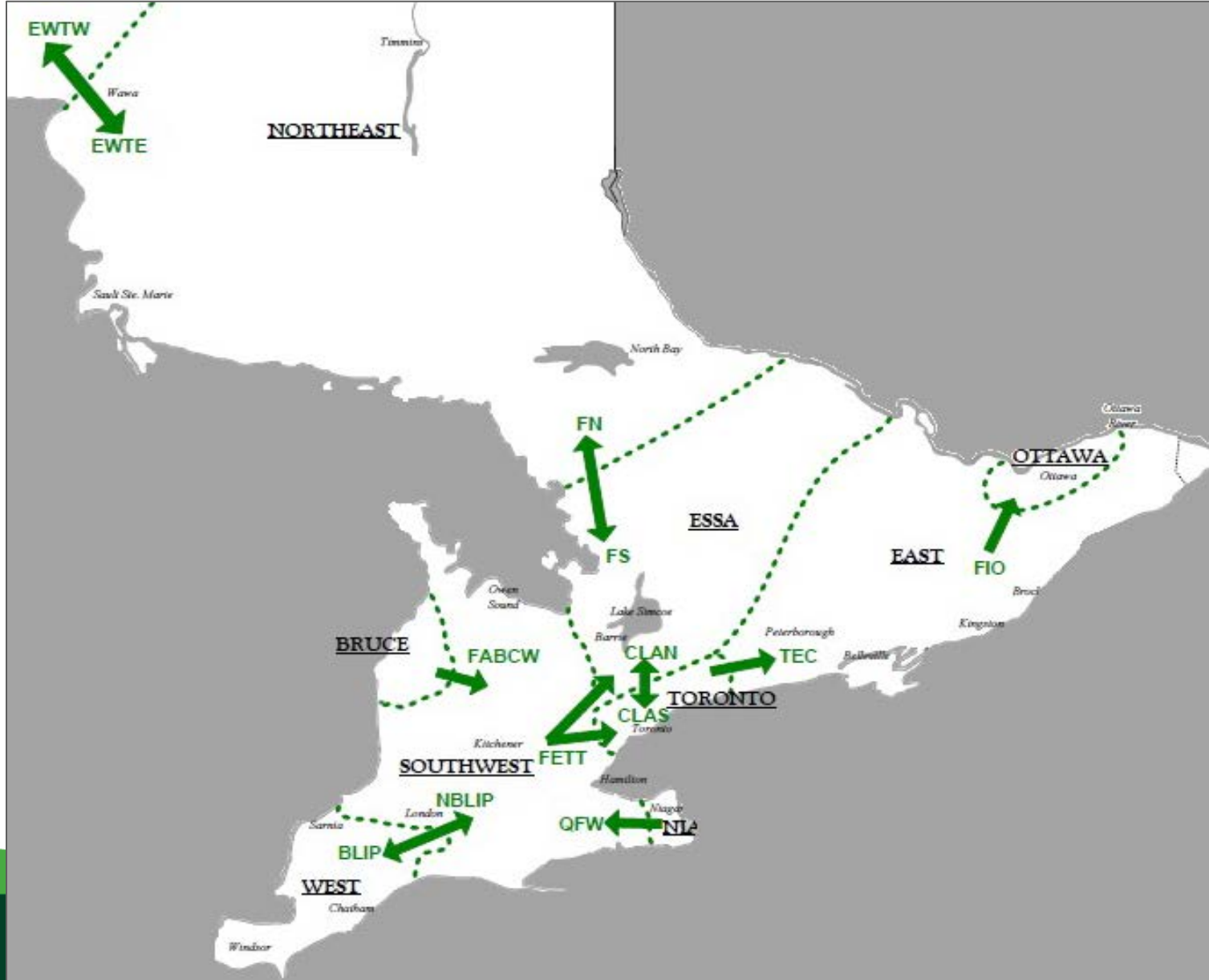
# Rationale for NDL Zonal Boundaries

- Zonal boundaries should encompass sets of nodes with similar impacts on:
  - Congestion on transmission constraints that could result in material cost discrepancies, even if these constraints are expected to bind infrequently
- Such boundaries support efficiency by:
  - Causing loads in different regions to pay prices that reflect differences in the cost of meeting load
  - Efficient short-run signals for NDL
  - Efficient long-run pricing signals for the location of energy intensive economic activities

# Rationale for NDL Zonal Boundaries – cont.

- The IESO's current 10 electrical zones are defined by 9 interfaces which represent system boundaries due to:
  - Sources of frequent, material and/or potentially material levels of congestion
  - Congestion at these major interfaces can result in substantial price separation between zones
  - Such congestion is important to signal through prices so that market participants are able to respond appropriately

# Ontario Zones and Interfaces



# Ontario Zonal Map

- Load zones correspond with Ontario's 10 electrical zones
- A searchable map to view the zonal boundaries
  - Site gives the ability to search by postal code or street address

<http://www.ieso.ca/localContent/zonal.map/index.htm>

- Note: Actual boundaries are based on physical connectivity to the transmission grid. This map is for visualization of the approximate geographic locations for those boundaries. Please contact the IESO or your LDC to determine your exact connection point and zone.

## Rationale for NLD Zonal Boundaries – cont.

The IESO has performed a quantitative analysis of the price differences among the 10 existing electrical zones. The results of that analysis show:

- Frequent material congestion between the Northwest and Northeast zones
  - Interface between NW and NE is frequently congested
- Infrequent, but at times material, congestion between Southern Ontario zones

# Rationale for Zonal Boundaries – cont.

- A statistical analysis conducted by the IESO found that the mean zonal prices are statistically different between most zones in Southern Ontario (2014-2016 data).
  - T test to test if the mean is the same between two zones;
  - The differences between the mean zonal prices are statistically different from zero at the 95% confidence level;
- While not necessarily frequent, price separation between the 8 zones in Southern Ontario can be material
- Important to signal those price separation events
  - Zonal price signals allow loads to make better informed and more efficient decisions regarding consumption and investment



# Southern Ontario Zonal Price Comparison 2014-2016

	Zonal Comparison (avg. # of intervals of price separation per year)				
Range (\$/MWh)	Toronto vs. SW	Niagara vs. SW	SW vs. West	East vs, Ottawa	Toronto vs. Essa
>\$100	24	44	99	58	99
\$5 to \$100	43	1,119	432	876	705
\$0 to \$5	86,564	85,744	86,348	86,066	86,041
=0	18,569	18,292	18,320	18,199	18,354

# PRICE GRANULARITY FOR DISPATCHABLE RESOURCES

# Preliminary Decision – Price Granularity for Dispatchable Resources

## Dispatchable resources settled on a nodal price

- Dispatchable resources include:
  - Dispatchable Loads (DL)
  - Storage
  - Price Responsive Load
    - These are loads that are non-dispatchable in real-time but wish to participate in the day-ahead market
- Such resources bid their own price and quantity, pay day-ahead prices for their own schedules and pay the real-time price for balancing amounts
- Nodal pricing for such resources is the best way to align their prices with the IESO's nodal dispatch

# Rationale for Dispatchable Resource Pricing

- Nodal pricing for dispatchable resources is the best way to encourage efficient bids and thus ensure efficient dispatch outcomes
  - If zonally priced, there could be a misalignment between zonal prices and the nodal dispatch outcomes
  - When such misalignment occurs, a system of out-of-market uplift payments would then be needed to ensure dispatchable resources follow dispatch when zonal and nodal prices diverge
- To avoid creating inefficient bidding incentives dispatchable resources should be settled at the same price granularity in both day-ahead and real-time

# PRICING OPTIONALITY

# Preliminary Decision – Optionality for Non-Dispatchable Load

## Offer an Option to Elect Nodal Pricing for a Period of One Year

- The IESO's preliminary decision is to offer non-dispatchable resources (NDLs) the option to elect a nodal price for a period of one year
  - The default will be for NDLs to pay a zonal price
- Nodal/zonal optionality allows non-dispatchable resources to be settled at the most granular price, giving them an incentive to respond to locational price signals

# NDL Optionality – Becoming a Price Responsive Load

- The Day-Ahead Market project has a preliminary decision to give non-dispatchable load the option to become a price-responsive load
  - Price responsive loads would provide bids and quantities into the day-ahead market and receive financially binding day-ahead schedules, but continue to be non-dispatchable in real-time
- This will provide non-dispatchable loads the ability to manage their energy costs through the day-ahead market

# Nodal Pricing for Price Responsive Load

- As a dispatchable resource in the day-ahead market, price responsive loads would be settled at a nodal price
- Nodal pricing ensures that, for resources participating in the day-ahead market, day-ahead settlement prices align with day-ahead schedules, which are determined nodally
- Such alignment eliminates the need for an extra set of make whole payments which would otherwise be needed whenever zonal pricing and nodal day-ahead schedules differed



# Preliminary Decision – Election Period

An election period for both non-dispatchable and price responsive load of one year is reasonable as it:

1. Eliminates the ability for a load to elect to pay a nodal price during months when its nodal price is expected to be lower than the zonal price, and then elect a zonal price when its nodal price is expected to exceed the zonal price
  - a) The above scenario would allow loads to shift seasonal costs onto other loads
  - b) Election of nodal pricing for one year allows a participant to potentially pay a lower cost for energy for an entire year, which would be the appropriate yearly energy cost for load in its location
2. Lessens the administrative burden on the IESO
  - a) Limits the number of changes to composition of non-dispatchable load within zones for a number of settlement processes including; energy settlements and residual disbursement calculations

# Election Period – Second Level Design Issues

There are several other considerations that need to be worked out, such as (list is non-exhaustive):

- Is there a re-election window once a year?
- Is the re-election period also for one year?
- Anytime mid-month?
- How long must a resource stay on zonal pricing before re-electing a nodal price?
- Are there any exceptions to the one year election period or decision windows?
  - What if changes occur to the transmission system ?
  - Change in load patterns for a specific business?

# DISBURSEMENT METHODOLOGY FOR RESIDUALS

# Residual Disbursement Methodology – Recap

Disbursing residuals across load zones in Ontario would:

1. Determine monthly load weighted average prices for each Ontario load zone
2. Compare those monthly load weighted averages to the uniform supplier weighted price
3. Any zones with a load weighted price that is higher than the uniform supplier price would receive a share of the congestion and loss residuals
  - Share would be proportional to the zone's total cost of energy in excess of the cost at the uniform supplier weighted price for that month

# Residual Disbursement Process

The process can be broken up into 3 key steps:



# Restatement of Considerations

- Act as a mechanism to mitigate the impact of moving to a nodal/zonal price for loads in a zone experiencing a price higher than the uniform supplier weighted price
- The mitigation mechanism applied to higher price zones should not result in those zones having a lower price (net of residuals) than the lower price zones
- Process needs to preserve the marginal incentives of the price signal
  - Traditional FTRs disburse payments based on a static allocation and do not affect actual scheduling/consumption
  - Preserving marginal incentives will retain the efficiency benefit of zonal vs. uniform pricing

# Purpose of Residual Disbursement – cont.

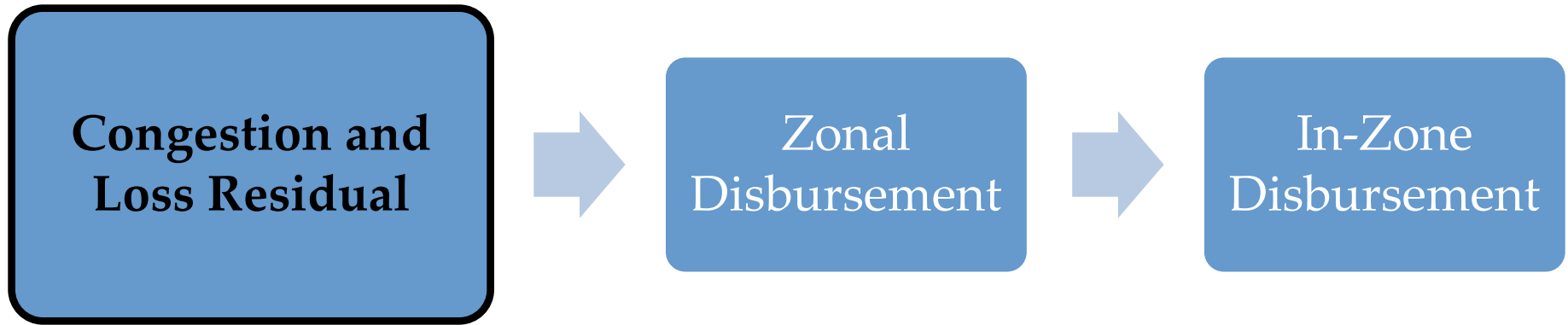
- The residual disbursement would act as a substitution for FTRs and used to address the impacts of moving away from uniform pricing for wholesale loads
- All physical load in Ontario that is settled in the wholesale market would be eligible
- The residual disbursement would be performed monthly
  - Minimize interfering with the marginal incentives of a locational price
  - Addresses the long term average of any transitional shifts in cost as a result of a locational price
  - Lessens the distortion on loads' marginal incentive as a result of some uncertainty that the monthly process creates

# Purpose of Residual Disbursement - cont.

- The disbursement could be introduced as a temporary measure to be phased out over several years
  - The disbursement would allow wholesale loads to get accustomed to their applicable locational price
  - The IESO, in collaboration with stakeholders, could look to create a more traditional FTR market for protecting against congestion risk
    - The loss residual could be disbursed through uplift



# Step 1: Congestion and Loss Residual

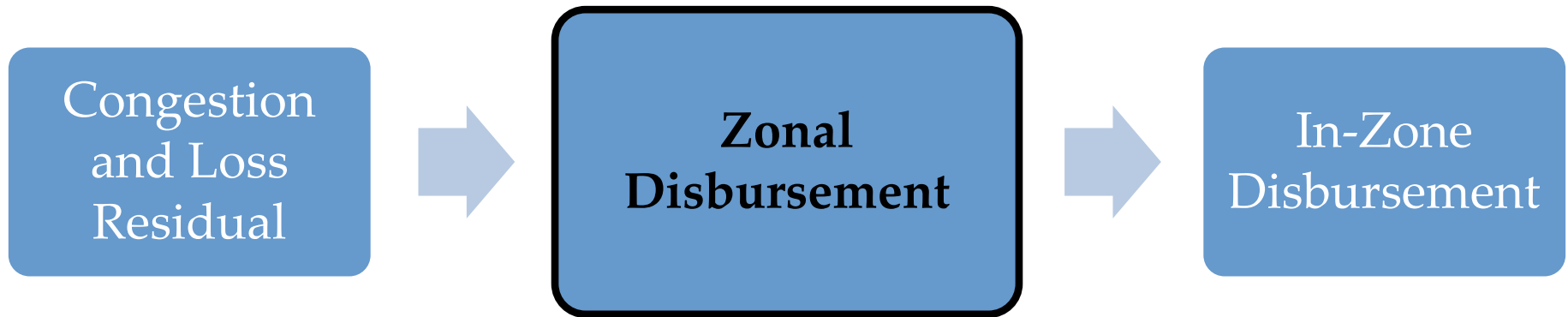


- The residual exists as a result of including the marginal cost of congestion and losses in load pricing
- Typically the amount of money collected from loads exceeds that which is paid to energy suppliers – resulting in a positive residual

# Step 1: Congestion and Loss Residual

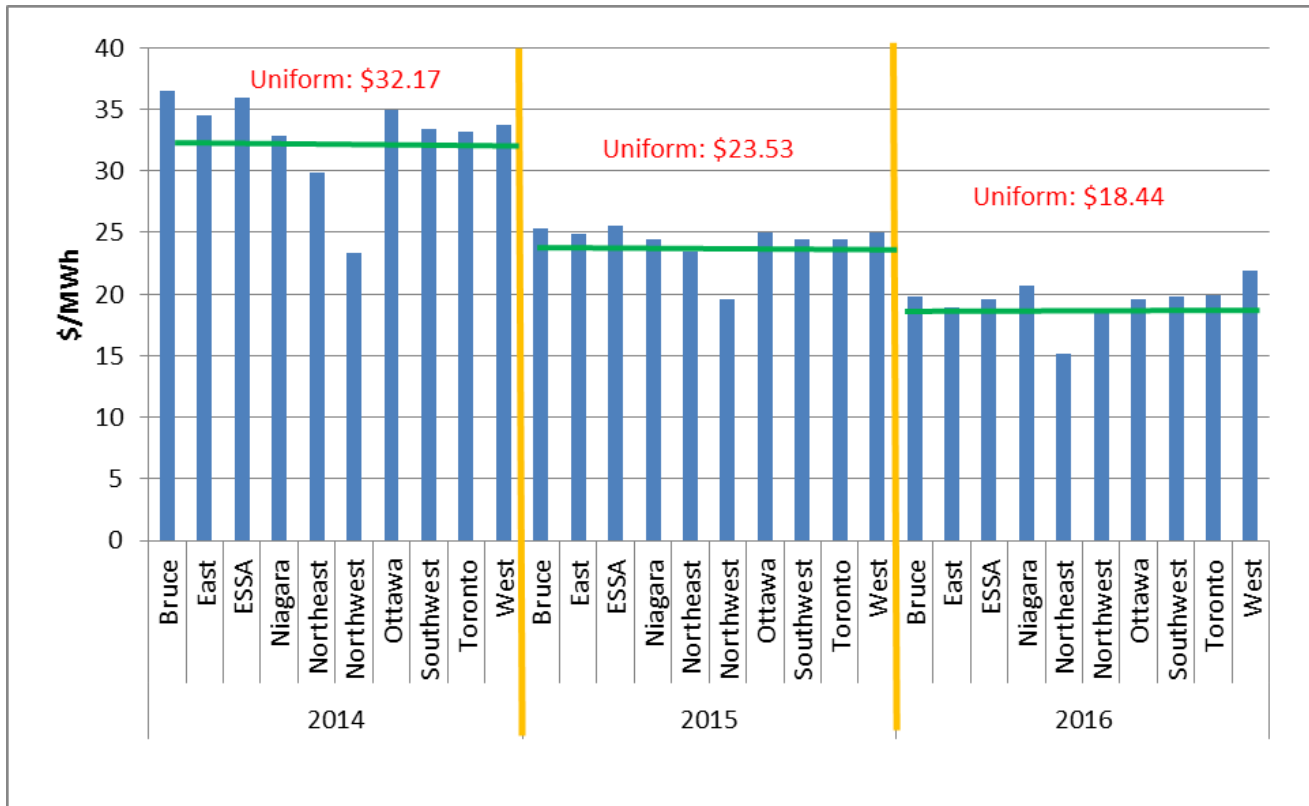
- The residuals collected from the DAM would be used to fund the disbursements
- With the IESO submitting a day-ahead forecast of Ontario non-dispatchable load into the DAM, it is projected that almost all load will be participating in the DAM during which they (either alone or through the IESO) will lock in the cost of their consumption
  - Hence, the majority of the residual will be collected in DAM
  - DAM prices will be most strongly linked to the total charges load is expected to pay for energy

## Step 2: Zonal Disbursement



- The following presents quantitative analysis using historical data
  - The disbursement process was simulated across each calendar month (2014-2016)
  - Annual dollar values are an average of the monthly zonal price before and after a residual was disbursed
  - Uniform supply-weighted price is the amount that the zonal disbursements are proportioned against

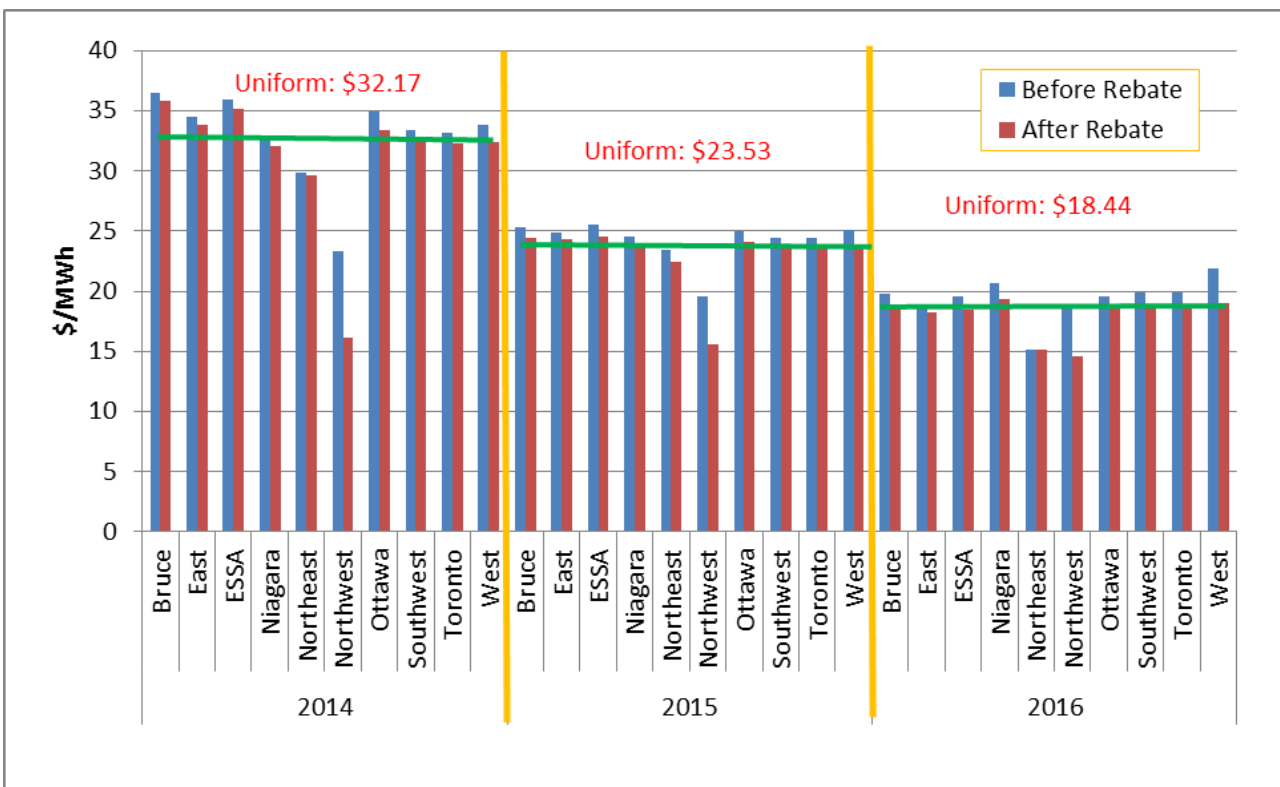
# Analysis: Zonal Difference (All Loads)



- The prices are different between zones;
- Northeast and Northwest prices are generally lower than the Ontario average

Note: All information provided on this slide is for illustrative purposes only

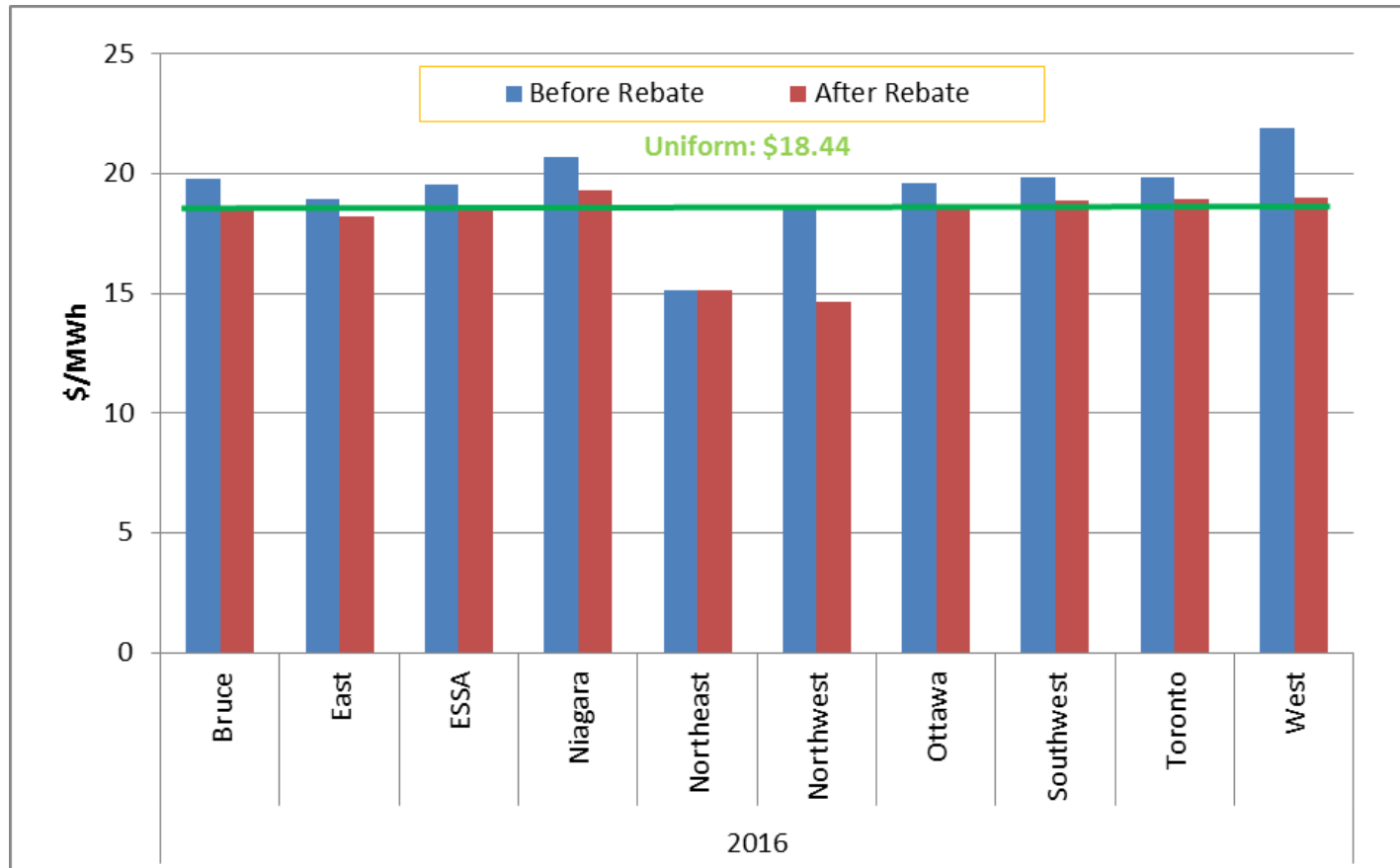
# Analysis: Zonal Difference after Rebate



- Rebate of congestion and loss residuals will bring the higher than average zonal prices down towards the uniform supplier weighted average price
- The monthly disbursement should not materially impact marginal consumption incentives
- NW and NE zones do, in certain months, qualify for receiving disbursement

Note: All information provided on this slide is for illustrative purposes only.

# Analysis: Zonal Difference after Rebate (2016)



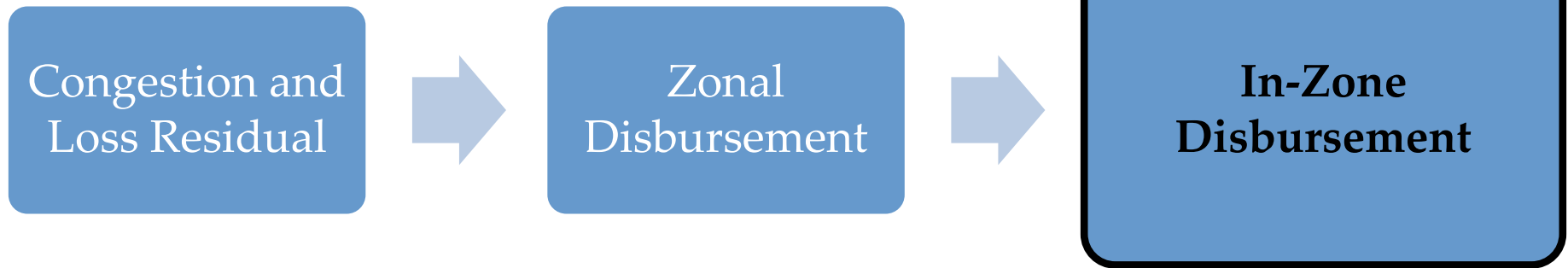
Note: All information provided on this slide is for illustrative purposes only.

# Next Steps for Zonal Disbursement Methodology

## Disbursements to loads paying a nodal price

- Nodally priced loads will also be eligible to receive residual disbursements (this applies to dispatchable loads, price responsive loads and non-dispatchable loads that elected a nodal price)
- The IESO is thinking through how best to disburse residuals to loads paying a nodal price, need to consider:
  - Marginal incentives
  - Complexity
  - Fairness

# Step 3: In-Zone Disbursement



- The following will discuss the possible methodologies for disbursement of the residual to individual loads within a zone
- Zonal and In-Zone Disbursement would follow similar timelines
  - Disbursement follows a monthly time step (based on inputs from the 1<sup>st</sup> to the end of the month)



# Methodology Consideration

- Ontario loads within a zone would be eligible to receive a disbursement for the residual provided that:
  - a) A positive residual from the marginal cost of loss and congestion was collected in a given month
  - b) The zone met the criteria for residual disbursements
  - c) The load itself met the criteria for residual disbursements within the zone
- The following will explore the assignment of the in-zone proportion of the zonal residual

# Options for In-Zone Disbursement

## Option A - Static allocation

- Proportional to its share of a static allocation of consumption in the zone with respect to other loads in the zone

## Option B - Share of consumption for the month

- Proportional to its share of actual monthly consumption in the zone with respect to other loads in the zone

## Option C - Share of energy expenditure for the month

- Proportional to its share of total cost of energy that is in excess of the cost at the uniform supplier weighted price for that month with respect to other loads in the zone
  - Similar concept as Zonal Disbursement

# Option A

# Static Allocation

## Pros

- Preserves marginal incentives given static allocation
  - Disbursement would not depend on actual consumption
- A static allocation would not add significant computation complexity to the disbursement

## Cons

- Need supporting process for allocation of future "rights" within the zone
- A static allocation may be outdated with monthly changes in consumption or energy costs based on prevailing energy prices
- Does not ensure fairness if some loads in the zone are priced nodally and some loads are priced zonally (if coexist in zone)

# Option B

# Share of Consumption

## Pros

- Preserves partial marginal incentives as it is not directly tied to the expenditure of consuming load
- Disbursement would be up to date with monthly changes in consumption
- Does not need new supporting process for allocating future “rights” within the zone
  - allocations would be determined based on meter readings
- Allocation based on consumption is least complex

## Cons

- Does not ensure fairness if some loads in the zone are priced nodally and some loads are priced zonally (if coexist in zone)

# Option C                      Share of Energy Expenditure

## Pros

- Ensures fairness if some loads in the zone are priced nodally and some loads are priced zonally (if coexist in zone)
- Disbursement would be up to date with monthly changes in consumption
- Does not need new supporting process for allocating future “rights” within the zone
  - allocations are determined based on loads’ consumption and corresponding prices

## Cons

- Mutes marginal incentive given closer alignment of disbursement with the expenditure of consuming load
- Adds computation complexity to the disbursement

# Stakeholder Feedback Requested

The IESO would appreciate stakeholder feedback on the preliminary decisions presented and options discussed, specifically:

- Zonal pricing for NDL
  - The number of zones and rationale for zonal boundaries
- Nodal pricing for dispatchable resources
  - Rationale for nodal granularity
- Optionality for NDL
  - Length of the election period
  - Other second level design issues that should be considered
- The disbursement methodology for residuals among zones
- The disbursement methodology for residuals within zones (3 options)

# Next Steps

- The IESO will review and respond to stakeholder feedback ahead of the March 29<sup>th</sup> SSM session
- Any issues that require further analysis and conversation will be brought to the next session for additional discussion
  - Preliminary decisions will be revisited, where appropriate
- The IESO will look to provide additional preliminary decisions (e.g. in-zone residual disbursement) based on IESO analysis and stakeholder feedback

Design Element #5

# INTERTIE CONGESTION PRICING



# Today's Discussion

- The IESO appreciates the thoughtful feedback that has been submitted regarding the intertie congestion pricing design element
- We have set aside time at today's session to allow stakeholders to voice their comments in more detail
  - Hope to gain a better understanding of the issues and concerns
- Will use today's discussion and the written feedback to re-examine the preliminary decision discussed in December 2017
  - Aiming to provide responses to feedback ahead of the March 29<sup>th</sup> SSM meeting and assess revisions to the preliminary decision, as appropriate

# Summary of Feedback on Intertie Congestion Pricing

Feedback received from	Main themes
Association of Power Producers of Ontario	<ul style="list-style-type: none"><li data-bbox="755 549 1881 711">• Concerns over potential effects of the IESO's preliminary decision</li><li data-bbox="755 711 1881 872">• A desire for the IESO to take a step back from the preliminary decision and consider other factors</li><li data-bbox="755 872 1881 1330">• The treatment of importers/exporters vs internal generation and loads</li></ul>
Brookfield Renewable	
Hydro Quebec Energy Marketing	
MAG Energy Solutions	
Nalcor Energy Marketing	
OPG	
TransAlta	

# Summary of Feedback on Intertie Congestion Pricing

## Concerns over effects of the preliminary decision

- It will undermine FTR's current utility as a hedging product
- It will not provide adequate incentives for efficient outcomes
- FTI and the IESO have not convincingly justified the assertion that method 2 will lead to better outcomes than method 1

## Need to step back

- ICP options should remain unchanged until more fundamental design questions such as those DAM, FTRs and MFIS are finalized
- ICP should not be considered a "preliminary decision". More information needs to be provided on the pros and cons of each of the possible approaches and a deeper discussion needs to take place with stakeholders before a design decision is made

## Treatment of importers/exporters vs internal generation and loads

- The IESO should be mindful of the fact that different incentives drive the offers of imports and internal generation
- Market rules should not apply the same logic to importers/exporters and internal resources as they face different constraints