OEB LDGWG
Benefits of Load Displacement Generation and Distributed Generation

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Development of Standby Rates Policy for LDG

- Ontario Energy Board (the "Board") initiated a consultation process to develop standby rates for Load Displacement Generation (LDG) on January 24, 2013

- The Board has stated that a number of technical issues, such as cost allocation, avoided costs, benefit valuation, and rate design, need to be addressed before the Board can finalize standby rates for LDG

- This presentation provides a high-level overview of the benefits of LDG that should comprise part of the methodology to be used to calculate standby rates
  - ✓ The concepts in this presentation regarding benefits are applicable to all Distributed Generation (DG) resources, including LDG, therefore LDG and DG are one in the same for the purposes of this presentation

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Background

Power System Planning and Costs versus Benefits Challenge

- Traditional power system planning, commonly referred to as Integrated Resource Planning (IRP), typically has not effectively assessed distributed resources vis-à-vis transmission and/or central generation (i.e., transmission-connected) resources

- As a consequence, distributed resources (i.e., LDG, etc.) have historically not been valued compared to transmission/central generation regarding ability to meet power system resource requirements

- Therefore, lack of integration in IRP processes can result in many of the Direct and Indirect Benefits of LDG not being captured within traditional utility rate making
  - i.e., utilities have typically not 'factored in' LDG/DG as cost effective resource options in part due to the lack of IRP processes to value their costs and benefits

- However, this is changing as the penetration of LDG/DG has rapidly increased (e.g., California), therefore benefits need to be, and are starting to be, taken into account regarding standby rates/charges

Benefits of LDG

Direct Benefits of LDG

- LDG/DG Benefits can be summarized by Direct Benefits to the power system and Indirect Benefits related to the power system

- Direct LDG/DG Benefits
  - ✓ Asset Deferrals
    - Transmission/distribution capacity
    - Generation capacity
      - e.g., requiring less capacity to meet resource adequacy and/or reserve requirements
  - ✓ Reliability
    - Reduced line losses
    - Ancillary Services (e.g., reactive power, voltage support, etc.)
    - Increase load factor and power quality
    - Peak shaving
    - Congestion management
    - System restoration and 'islanding'

Indirect Benefits of LDG

- LDG/DG Benefits can be summarized by Direct Benefits to the power system and Indirect Benefits related to the power system

- Indirect LDG/DG Benefits
  - ✓ Policy objectives
  - ✓ Environmental
  - ✓ Land use
  - ✓ Technology
  - ✓ Siting

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Benefits of LDG

- Some of the Direct Benefits should comprise a component of the methodology to calculate standby rates in Ontario
  - ✓ While the Indirect Benefits can be very important, it is likely premature for these Benefits to comprise part of the methodology to calculate standby rates

- While it is challenging to properly value LDG/DG regarding costs and benefits, many studies and some utilities/regulators have utilized methodologies to value these costs and benefits

- Therefore, in part based on accepted methodologies to calculate benefits, Direct Benefits of transmission/distribution asset deferrals should comprise a component of the methodology to calculate standby rates with further consideration to incorporating reduced line losses and ancillary services
  - ✓ Where practical, these Direct Benefits could methodologically be addressed universally or on a case-by-case basis

Transmission/Distribution Asset Deferrals

- LDG/DG benefits can be estimated by determining avoided costs from deferring transmission and/or distribution investments, net the costs associated with installing, operating, maintaining, administering, and coordinating LDG/DG units
  - ✓ Reduction in peak loads on a substation provides benefits by decreasing substation maintenance, increasing equipment life, and/or deferring additional capacity, etc.

- For examples of ways to estimate these benefits see
  - ✓ The Potential Benefits of Distributed Generation and Rate-Related Issues that May Impede its Expansion, U.S. Department of Energy (2007)
  - ✓ Valuation of Renewable and Distributed Resources: Implications for the Integrated Resource Planning Process, Electric Power Research Institute (2007)
  - ✓ Assessing the Benefits of On-Site Combined Heat and Power During the August 14, 2003 Blackout, Energy and Environmental Analysis, Inc. (2004)
  - ✓ Quantitative Assessment of Distributed Energy Resource Benefits, Oak Ridge National Laboratory (2003)

Reduced Line Losses

- LDG/DG can reduce line losses in the following ways
  - ✓ Less electrical resistance per unit (i.e., less resistivity) resulting from closer delivery from generating resources to loads
  - ✓ Less carried current resulting from reductions in net inflow from the grid
  - ✓ Less conductor of transformer heating through management of transmission and/or distribution assets in conjunction with LDG/DG

- Actual reduced line losses from LDG/DG are very complex and depend on the load displaced, time, weather, physical placement of LDG/DG on the grid, etc.

- For examples of ways to estimate these benefits see
  - ✓ The Potential Benefits of Distributed Generation and Rate-Related Issues that May Impede its Expansion, U.S. Department of Energy (2007)
  - ✓ Valuation of Renewable and Distributed Resources: Implications for the Integrated Resource Planning Process, Electric Power Research Institute (2007)

Ancillary Services

- Reactive Power is the main Ancillary Service that can be provided by LDG/DG
  - ✓ Transmission and distribution efficiency can improve when Reactive Power production from transmission-connected generation is replaced with reactive power from LDG/DG
    - i.e., providing Reactive Power locally frees up transmission and distribution system capacity for additional real (i.e., non-reactive) power transfers from generation to loads
  - ✓ Providing Reactive Power locally reduces line losses therefore improving efficiencies on the grid

- For examples of ways to estimate these benefits see
  - ✓ The Potential Benefits of Distributed Generation and Rate-Related Issues that May Impede its Expansion, U.S. Department of Energy (2007)
  - ✓ Voltage Regulation: Tapping Distributed Energy Resources, Public Utilities Fortnightly (2004)
  - ✓ Ancillary Service Details: Voltage Control Oak Ridge National Laboratory (1997)

Summary and Next Steps

- OEB LDGWG should examine and assess ways to incorporate at least some of the Direct Benefits in the methodology to calculate standby rates

- Methodologies to calculate LDG/DG benefits exist

- Application of LDG/DG benefits regarding applicability of standby rates or comprising part of methodologies to calculate standby rates exists (e.g., California)

- In order to more efficiently meet future power system reliability requirements and lower overall costs to customers, a broader view is needed to better integrate LDG/DG into IRP processes
  - ✓ For Ontario this means coordination and integration with Long-Term Energy Plan, Regional Planning, Renewed Regulatory Framework, Distribution Revenue Decoupling, etc.

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