Non-Wires Alternatives (NWAs)

Energizing Distributed Energy Resources to Bring Value to Canadian Grids, Utilities and Ratepayers

Discussion Paper
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CANADIAN SOLAR INDUSTRIES ASSOCIATION
L'ASSOCIATION DES INDUSTRIES SOLAIRES DU CANADA

Non-Wires Alternatives

Energizing Distributed Energy Resources to Bring Value to Grids, Utilities and Ratepayers

This discussion paper explores the use of Distributed Energy Resources (DERs) as Non-Wires Alternative (NWA) solutions to avoid, reduce or defer traditional infrastructure investments along the transmission and distribution systems. It provides an overview of the NWA landscape in Canada, with a focus on pilot demonstrations, relevant regulatory initiatives and key barriers in place. Building on best practices and learnings from leading jurisdictions, the paper establishes guiding principles and provides recommendations to enable the wide-scale deployment of NWAs across Canada.

The Canadian Solar Industries Association (CanSIA) developed this paper in consultation with members of NEXUS - a strategic project founded by CanSIA and operating in collaboration with the Canadian Wind Energy Association (CanWEA) that focuses on customer adoption of energy management technologies and enabling broader uptake of renewable energy.

The Canadian Solar Industries Association (CanSIA)

240 Bank Street, Suite 400,
Ottawa, ON - K2P1X4
www.cansia.ca

Prepared by

Power Advisory LLC

dunsky

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Executive Summary

Non-Wires Alternatives (NWAs) – also referred to as Non-Wire Solutions (NWS) – offer significant opportunities for the grid, utilities and customers. With growing transmission and distribution infrastructure needs on the horizon, Distributed Energy Resources (DERs) can provide **cost-effective, scalable solutions that can be rapidly deployed to help avoid, reduce or delay large capital investments.**

A number of pilot projects and regulatory and policy initiatives underway in Canada are exploring how to implement NWAs. **Ontario and Alberta have made the most progress, while the rest of Canada is at earlier stages.** Despite ongoing demonstration projects and regulatory initiatives, NWAs remain relatively new to the Canadian electricity sector and face several barriers to widescale deployment, including:

- Lack of standardized approaches to identifying and evaluating potential NWA solutions.
- Challenging market and regulatory frameworks with often unclear eligibility for NWAs, lack of alignment with other market policies and regulations, and challenging and costly interconnection and permitting processes.
- NWAs require new utility remuneration, planning and operational practices that diverge from the status-quo framework of utility-owned assets and capital-intensive solutions.

Key Lessons from Other Jurisdictions: In the US, several states provide valuable examples of benefits of NWAs

NWAs work

- diverse technologies
- deployed in varying configurations
- address multiple kinds of system constraints
- millions of dollars of ratepayer savings

Multiple co-benefits of deferred investment

- avoided, reduced or deferred cost
- more time to understand load growth, technology advancement, and emerging trends prior to making significant infrastructure investments
- reduce risk of technology lock-ins and stranded assets

Executive Summary

Building on the experience of other jurisdictions and applying the Canadian context, we outline key principles for enabling wide-scale deployment of NWAs in Canada and corresponding recommendations for Canadian regulators and policymakers

Principles for enabling wide-scale deployment of NWAs in Canada

1. Leveled playing field for NWAs
2. Technology agnostic approach
3. Streamlined and scalable procurement
4. Breaking down informational and incentive silos
5. Full value recognition

Recommendations and Implementation Considerations

Incorporate NWAs in system planning by requiring that NWA solutions are identified and evaluated against traditional 'poles and wires' assets.

Standardize procurement and market design to facilitate adoption of NWAs and provide certainty for utilities and investors.

Standardize DER Valuation and Enable Value-stacking to capture the diversity of benefits and services DERs can offer to the grid.

Review utility remuneration to remove utility preference towards asset ownership and capital-intensive investments.

Content

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1. Introduction

In this section, we introduce the concept behind Non-Wires Alternatives (NWAs) and the role that Distributed Energy Resources can play in deferring or avoiding traditional infrastructure investments.

- Overview of NWAs
- Opportunities and Benefits
- Procurement Mechanisms

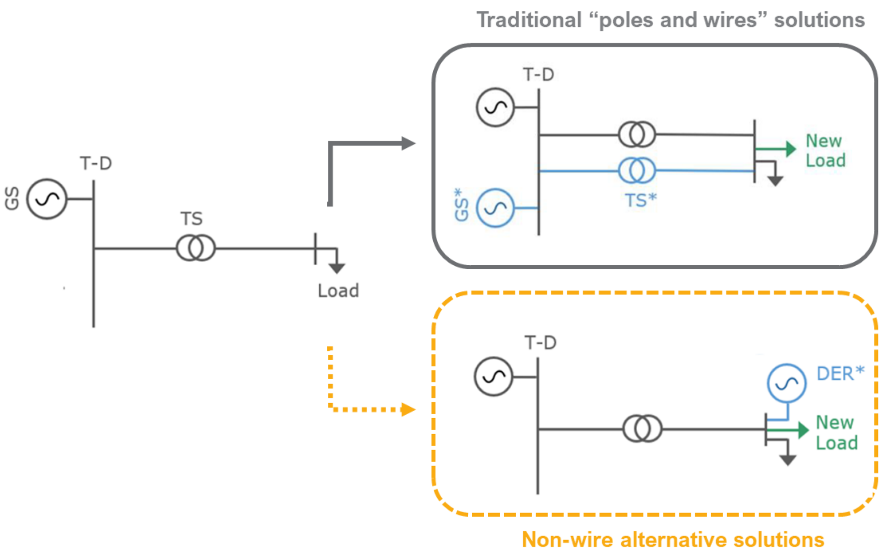
1. Introduction

Overview of NWAs

Non-Wires Alternatives (also referred to as Non-Wire Solutions) are non-traditional upgrades to electricity transmission and distribution (T&D) systems that leverage Distributed Energy Resources (DERs) to avoid, reduce or defer investments in traditional "poles and wires" assets. The core function of NWAs is to reduce load at a given transformer, substation or circuit to avoid exceeding capacity ratings and limits, which would otherwise require infrastructure upgrades or new investments[1].

DERs are broadly defined as electricity-producing resources or controllable loads connected to the distribution grid. DERs can include distributed generation (DG) options such as solar photovoltaics (PV), energy storage, energy efficiency (EE), and demand response (DR) among other technologies. In many cases, these technologies offer more cost-effective and faster deployment alternatives to often expensive and time-intensive T&D infrastructure build-outs.

Wires vs. Non-Wires Alternatives [2,3]



Distributed Energy Resources (DERs) [4]
Distributed Generation (e.g. behind-the-meter Solar PV)
Energy Storage (e.g. battery storage)
Energy Efficiency (e.g. building retrofits)
Demand Response (e.g. controllable loads)
Plug-in Electric Vehicles (using Vehicle-to-Grid technologies)

[1] While NWAs can apply to the entire electricity supply (e.g. transmission NWAs), the paper focuses on the use of NWAs within the context of the distribution system.
[2] Adapted from Independent Energy System Operator. Innovation and Sector Evolution Whitepaper Series – Non-Wires Alternatives Using Energy and Capacity Markets (DRAFT), 2019
[3] Legend: GS – Generating Station, TS – Transmission Station, T-D – Transmission Distribution
[4] Certain definitions of DER exclude energy efficiency.

Overview of NWAs

While the term “NWA” is a relatively recent addition to the electric power industry terminology, the underlying concept behind NWAs has long been discussed within the context of targeted Demand Side Management (DSM). These initiatives aimed to develop geo-targeted EE programs to achieve energy savings in high-value parts of the distribution system.

The recent renewed interest in NWAs by utilities and regulators can largely be attributed to three key reasons:

- Aging infrastructure, increasing loads from transportation, building and industry electrification, and growing capacity constraints on local grids;
- Increased interest in and deployment of DERs, largely driven by significant technology cost reductions and increased consumer demand for choice; and
- Significant increases in network, computational and analytical capabilities in the electric power industry that have allowed utilities and market operators to have increased visibility into customer loads, deployed DER and grids.

Opportunities and Benefits

NWAs offer several unique benefits and opportunities to grids, utilities and customers.

Benefits to the Grid

- Cost savings through avoiding or deferring expensive system upgrades
- Projects can be used to avoid and defer investments on both the transmission and distribution levels
- Increased system reliability and resiliency
- Can provide energy, capacity and other system services
- Emission reductions through increasing the uptake of low- and non-emitting DER technologies

Benefits to Utilities

- Leverage growth in customer-sited DER deployment to resolve grid constraints
- Quick and timely response to changing loads and consumption patterns through incremental and staged investments
- Reduce risk of stranded (or underutilized) assets and costs that may result in the context of uncertain load growth
- Social and environmental benefits associated with avoiding the construction of new transmission and distribution lines

Benefits to Customers

- Potential cost-savings for ratepayers (depending on rate structure and utility remuneration framework)
- Provides customer-sited DERs with appropriate compensation for value they bring to the system
- Enables increased adoption of DER technologies through a concrete value stream

Market Design and Procurement Mechanisms

Among the key decision parameters in the use of NWAs is the choice of mechanism used to acquire DERs. Multiple approaches have been explored to date with no clear model standing out as a standard or best practice. The choice of policy or procurement mechanism is largely dependent on the market context (i.e. vertically integrated utility versus restructured market) and the regulatory framework. Options vary in complexity, subject to design around performance criteria, commercial arrangements and market participation. In the table below, we highlight key models relevant to the Canadian context.

	Direct Utility Investment[1]	Competitive Solicitations (i.e. RFPs)	Capacity Auctions	Demand Side Management (DSM) Integration[1]	Pricing-Based Mechanism
Description	Direct utility ownership and operation of DERs to be leveraged as NWAs	Solicit proposals from third-parties to deploy NWAs and evaluate based on pre-defined technical and cost criteria.	Market-based procurement mechanism to secure capacity needs	Integrate NWAs into existing traditional EE and DSM program portfolios through targeted incentives	Price signals that encourage uptake of DERs and compensate for value to system
Key Advantage	Streamlined operation and control	Allows considerations of non-cost attributes	Fair and transparent process	Leverages existing programs and implementation channels	Can be adapted to reflect system needs and align with broader policy goals
Key Disadvantage	Requires strong regulatory oversight	Prescriptive solicitation requirements may unintentionally restrict innovative solutions	Complex mechanism to navigate for small DER projects/customers that can potentially lead to higher costs	Equity and fairness concerns about access to DSM programs, and conflicting priorities with traditional DSM programs.	Complex regulatory approval process that requires consensus on valuation methodology and frequent recalculation of compensation rates

[1]While both direct utility investment and DSM integration models represent utility-initiated projects, the compensation mechanism to DERs, ownership structure and delivery mechanism make them distinct options

2. Deployment in Canada

In this section, we provide an overview of the current landscape for NWAs in Canada, including:

- Pilot projects exploring the role of NWAs and different procurement mechanisms;
- Initiatives that aim to integrate NWAs into the regulatory and market frameworks;
- Ongoing regulatory and policy engagements related to NWAs and DERs more broadly;
- Market and regulatory barriers that may be limiting uptake of NWAs in Canada; and
- Utility considerations for NWA adoption.

The earliest NWA project in Canada can be traced back to 1997. In the absence of a gas supply, the Grassy Narrows First Nation in Ontario faced a $6M electricity transmission line upgrade to meet the community's growing heating load.

Instead, a $3.7M biomass-fired district heating system was used to avoid the transmission line upgrade.

Overview

In Canada, NWAs have largely been in the form of proof-of-concept demonstration projects. Several early-stage pilots and demonstrations have inspired further activity and interest in NWAs from utilities, regulators and DER developers.

To date, most of the activity has been in the Ontario market. There are several demonstration projects and regulatory initiatives exploring the applicability of NWAs in Ontario, assessing technical and market barriers to NWA and identifying pathways for wide-scale deployment. In addition, Integrated Regional Resource Plans (IRRPs) from more than 5 regions in Ontario (Toronto, York, Ottawa, Barrie and others) identified that future local capacity needs can be addressed through NWA solutions, and recommended further assessments to evaluate the cost-effective of DERs in avoiding or deferring future infrastructure investments.

The past year has also seen an focus on in NWAs in the Alberta market, with the Distribution System Inquiry and several demonstration projects planned by utilities across the province.

Canada's other electricity markets – which are serviced by vertically integrated utilities – lag behind in the exploration of NWA solutions. While DSM portfolios from British Columbia and Quebec have identified transmission and distribution deferral benefits, it is unclear whether any viable NWA projects have been explored[1].

[1] Haley et. al. The 2019 Provincial Energy Efficiency Scorecard. Efficiency Canada, 2019. https://www.scorecard.efficiencycanada.org/

2. Deployment in Canada

Pilot Projects

	Brant Local Demand Response Pilot (ON)	Power.House (ON)	York Region Pilot (ON)	Whitecourt Transmission Deferral (AB)	Waterton Energy Storage (AB)
Description	In response to identified near-term capacity requirements in the Brant area, the IESO worked with local distribution companies to procure 3 – 15 MW of local capacity through load reduction, behind-the-meter generation and storage. The procured capacity was intended to serve as an interim solution to defer a 115 kV Brant-Powerline sub-system.	The project investigated the potential of residential storage-paired solar PV as a Virtual Power Powerplant (VPP). Among other variables, the pilot of 20 systems within Alectra's service territory assessed the feasibility of using those assets to avoid or defer T&D upgrades.	As one of the fastest growing regions in Ontario, York region is expected to face system constraints in mid to late 2020s. The IESO is initiating a demonstration project in the region to explore market-based approaches to procuring DERs as NWAs. The project will test concepts from the IESO's Sector Evolution whitepapers, with a focus on using local energy and capacity markets and auctions to compensate DERs for system benefits.	Altalink, the transmission system operator in Alberta, has received funding to develop a 20 MW/20 MWh battery storage system that will be used to defer required transmission system upgrades at the Whitecourt substation. The project will test the extent to which the battery system can serve as an NWA solution to avoid or defer the need to build a new transmission line in the area to serve growing loads.	To address increasing frequency of outages occurring in the Town of Waterton and Waterton National Park, Fortis Alberta will be deploying battery storage to increase system resiliency. Specifically, the project will assess the technical, economic and social benefits of using NWAs to address reliability issues faced by customers connected at locations near the end of long electricity distribution feeders.
Key Insights and Takeaways	The IESO did not receive any proposals in response to the solicitation. This was attributed to insufficient marketing of the project, tight RFP timelines, large minimum system size requirements and the short-lived lifetime of the project.	The feasibility study identified that in some regions within the utility's service territory, the forecasted solar and storage adoption under the proposed program could defer required infrastructure investments by 2 years – resulting in a value of $12M.	The project is still in the design phase and procurement is expected to start in Q4 2020 for implementation in Summer 2021.	The project is still in the development phase. Altalink estimates that the project can result in $37M in savings to ratepayers, in addition to benefits of reduced land-use by eliminating the need for new line construction.	The project is still in the development phase.

[1] The table above does not represent an exhaustive list of all NWA deployments in Canada and only highlights a sample of pilot projects
[2] The projects highlighted above received financial support through government/program funding

2. Deployment in Canada

Regulatory and Policy Initiatives

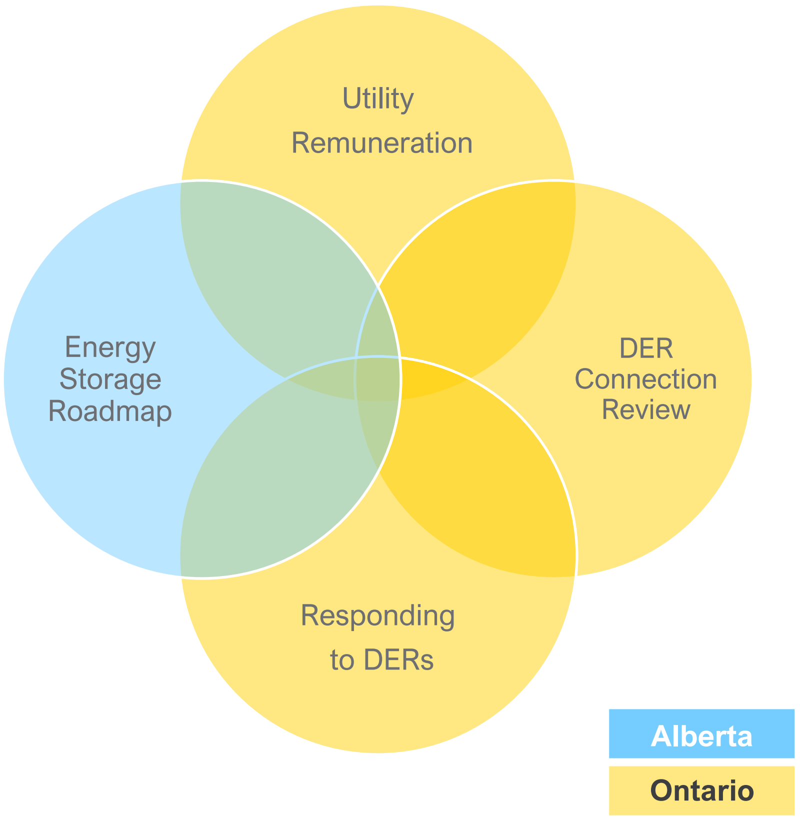
	IESO Innovation and Sector Evolution (ON)	Regional Planning Review Process (ON)	Targeted Conservation (ON)	Distribution System Inquiry (AB)
Description	To identify and assess key challenges and opportunities facing the electricity sector in Ontario, the IESO is developing a series of Innovation and Sector Evolution Whitepapers that can inform future system planning, market structures, policy decisions and regulatory framework. DERs fall in the center of the IESO's focus, with topics such as assessing frameworks for integrating DERs in IESO markets, outlining market design options for NWAs, and exploring required transmission-distribution interface to ensure reliable operations.	The IESO is undertaking a review of the Regional Planning process in Ontario to adapt system planning efforts to the changing environment of the electricity sector and improve consideration and development of innovative solutions featuring emerging DER technologies	The IESO worked with several local distribution companies across Ontario to support the assessment and development of targeted conservation programs that can address local distribution and transmission infrastructure needs.	The Alberta Utilities Commission (AUC) is investigating the future of the electricity distribution system in the province in the context of emerging technologies and disruptions in the sector. As part of the inquiry, the AUC is exploring how DERs can be used to avoid, defer or reduce future infrastructure investments through NWAs. The inquiry will assess implications for traditional planning approaches, rate structures, cost-recovery mechanisms, utility incentives and other key elements of the regulatory system in Alberta
Key Insights and Takeaways	To date, the IESO has released a paper[1] discussing potential options for NWA market design that enables compensation for the infrastructure avoidance or deferral value DERs bring to the grid. The paper outlines the potential use of capacity and energy markets for NWA procurement.	The engagement is currently ongoing and final report is expected Q3 2020. Initial recommendations and principles emphasize the need for integrating NWAs in regional planning process, developing tools and data that enable the consideration of NWAs and introducing screening criteria for magnitude of need, economic value and timing to inform the viability of NWA solutions.	In addition to provincial conservation and demand management (CDM) achievable potential studies, the IESO will be coordinating local achievable potential studies to better determine the potential for additional CDM to address regional needs.	Module one of the inquiry concluded in November 2019. The AUC and interveners from different stakeholder groups generally agreed on the role of NWAs in the future electricity system and the need to integrate them in planning and regulatory frameworks in a way that aligns the incentives of utilities with customers and other stakeholders. The second phase of the engagement was initiated in March 2020.

[1] The IESO whitepapers are intended to be exploratory in nature and do not necessarily highlight the IESO's position nor commitment to a certain market design

Related Engagements

In addition to the NWA regulatory initiatives highlighted earlier, there are several ongoing engagements in Ontario and Alberta that relate to enabling DERs more broadly and addressing key barriers they face.

- **Utility Remuneration:** Consultations with industry stakeholders to identify how utilities can be incentivized to consider viable technology options in the changing electricity sector to increase overall efficiency and cost-effectiveness of the sector.
- **Responding to DERs**: Engagement to develop a regulatory framework that supports the adoption and integration of DERS and maximizes value to customers and the grid.
- **DER Interconnections Review:** A review of the OEB's requirements for the connection of DERs standardize and improve the connection process to alleviate current barriers.
- **AESO Energy Storage Roadmap:** Initiative to provide greater clarity for market qualification and participation of storage in Alberta's energy market, identifying steps necessary for enabling storage interconnection, and implementing changes that unlock the full value storage assets bring the grid



Regulatory and Market Barriers

Despite ongoing demonstration projects and regulatory initiatives, NWAs remain relatively new to the Canadian electricity sector and are not well-supported under current market and regulatory structures. Several barriers will have to be addressed before widescale deployment is achieved:

- **Limited knowledge and technical capacity**
  - NWAs may not be considered in utility planning due to lack of knowledge and information about services, viability, cost and timing.
  - Industry, customers and other non-utility stakeholders may not be aware of or have enough information on system needs and the opportunity for NWA solutions.
  - Certain technologies may not have a long performance track-record.
- **Lack of standard approach to identifying NWA services and quantifying their value**
  - Lack of metrics to compare NWAs with traditional investments.
  - Distribution planning processes may not provide adequate information to assess value.
  - Regulatory frameworks may not recognize the value that NWAs (and DERs more broadly) can bring to the grid.
- **Challenging regulatory framework**
  - Unclear eligibility for NWAs under some regulatory and policy framework (e.g. Alberta Electric Utilities Act and Transmission Act).[1]
  - Lack of alignment with other market policies and regulations (market reform, existing conservation program, etc.).
  - Interconnection and permitting processes can be challenging and costly.

[1] Alberta's Electric Utilities Act definition of "electric distribution systems" excludes any generating units, making some forms of DERs ineligible as NWAs. Similarly, the Transmission Regulation Act sets constraints on when the AESO can consider NWAs, with lack of clarity on exact conditions under which an NWA can be pursued.

Utility Considerations

As the actors ultimately responsible for managing the grid and supplying their customers with electricity in a safe, reliable and cost-effective manner, utilities have a significant role to play in enabling NWAs in their service territories. Several hurdles in the utility sector must be overcome to support wide-scale NWA deployment:

- **Divergence from traditional infrastructure investments**
  - Typical regulatory models tie utility remuneration to asset investment and operations, creating a potential barrier to exploring NWAs.
  - Deploying and managing NWAs adds complexity to the system, which may be outside the normal scope of utility operations.
  - More experience with utility-owned assets and capital-intensive solutions (e.g. demand response).
- **Lack of standard program or procurement process**
  - No standard business model that utilities can use to acquire these assets.
  - Lack of standard contract terms and compensation structure.
- **Uncertain utility cost recovery**
  - Lack of clarity on how NWAs fit into cost recovery process for utilities
  - Cost allocation issues for assets that serve multiple utilities or regions

In addition to the barriers identified in this section, there are several other considerations around utility involvement in NWAs:

- Ownership models: Who owns the asset, what qualifications are required?
- Performance requirements: What performance guarantees are required to ensure the service is delivered to the utility as required?
- System operation: What technology solutions and data requirements are needed to ensure reliable and safe operations?

3. Lessons From Other Jurisdictions

Despite the broad interest in NWAs globally, deployment of NWAs is largely in its infancy. Over the last decade, several high-profile demonstration and pilot projects have been launched across the United States and elsewhere, often initiated by government rather than by utilities. Many of these leading jurisdictions are currently evaluating the lessons learned from these projects and taking steps towards more formally integrating NWAs into regulatory and planning processes.

In this section, we present key examples from leading jurisdictions that highlight:

- Pilot projects that showcase the potential, benefit, and effectiveness of NWA solutions to avoid, reduce and defer T&D investments; and
- Regulatory and policy frameworks that offer insight into how jurisdictions are leveraging the knowledge gained from pilot projects to accelerate NWA adoption.

Pilot Projects

New York

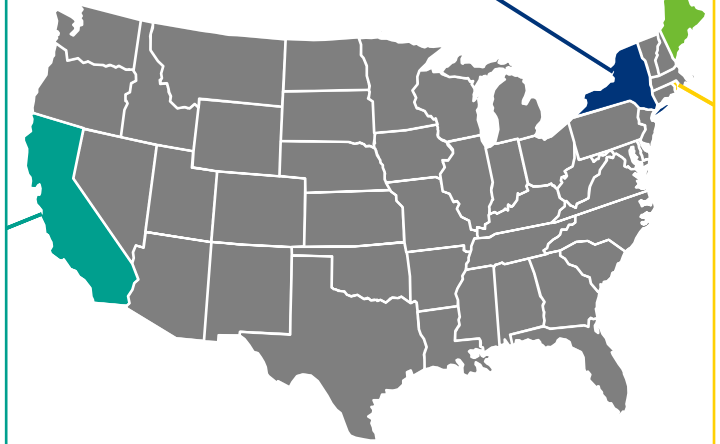
Consolidated Edison's Brooklyn Queens Demand Management (BQDM) project incorporated a diverse set of DERs to defer investment in a $1 billion substation upgrade. The project procured energy efficiency, demand response, distributed generation, and electric storage through a variety of channels including ramping up existing programs and soliciting new load-reducing projects through an RFP. The variety of procurement approaches allowed the initial procurement of rapid-deployment resources, which bought additional time for resources with longer lead times.

Maine

Spurred by stakeholders arguing against the need for a $1.5 billion transmission infrastructure upgrade, the Main Public Utilities Commission authorized a pilot project to develop 2 MW of DER in the Boothbay peninsula. GridSolar employed a mix of DER solutions including battery and thermal storage, solar PV, and energy efficiency to address increasing load on Maine's capacity constrained Boothbay peninsula. The project successfully avoided more than $12 million in additional costs to rate-payers by indefinitely delaying the planned transmission upgrades.

California

Southern California Edison addressed local capacity constraints resulting from the closure of a nearby nuclear power plant by contracting with Stem to deploy a virtual power plant (VPP) consisting of over 100 customer-sited systems that include energy storage and demand response capabilities. The VPP provides 85 MW of flexible capacity resources and has demonstrated how systems from different technology providers located at multiple customer sites can be aggregated successfully.



Rhode Island

Since 2012, National Grid's Tiverton/Little Compton NWA project has avoided a $2.9 million feed upgrade by deploying targeted energy efficiency and demand response resources. Originally meant to defer investment until 2017, the project has enabled National Grid to push investment even further into the future. Time has shown that the original load forecasts were too aggressive, and with advancements and cost reductions in other DER technologies in the interim, National Grid is now planning additional NWA investments in the area with targeted electric battery resources.

Pilot Project Best Practices

The pilot projects undertaken in various jurisdictions provide several transferrable learnings for the Canadian context. Most importantly:

- **NWA solutions work.** The success of these projects represents a significant learning and validation of the underlying concept behind NWAs in an applied setting. The different pilot projects have demonstrated the effectiveness of a variety of diverse technologies, deployed in varying configurations and utilized for addressing multiple kinds of system constraints. Results highlight that NWAs have effectively saved ratepayers millions of dollars by deploying DERs over traditional assets.
- **There are multiple co-benefits of investment deferral.** Many NWA pilot projects have demonstrated that there are many benefits to delaying traditional infrastructure upgrades. Deferring investment offers present financial value by way of discounting future costs. It also provides more time to understand load growth, technology advancement, and emerging trends prior to making significant infrastructure investments and reduce risk of technology lock-ins and stranded assets. For example, in the case of Maine's Boothbay pilot project, the full anticipated load growth in the area never materialized. Without the NWA project, the utility would have developed the traditional solution – an investment ratepayers would have paid for even though it was not needed. Similarly, Rhode Island's Tiverton/Little Compton project delayed investment long enough for new DERs such as electric storage to become viable.

Regulatory and Policy Initiatives

New York

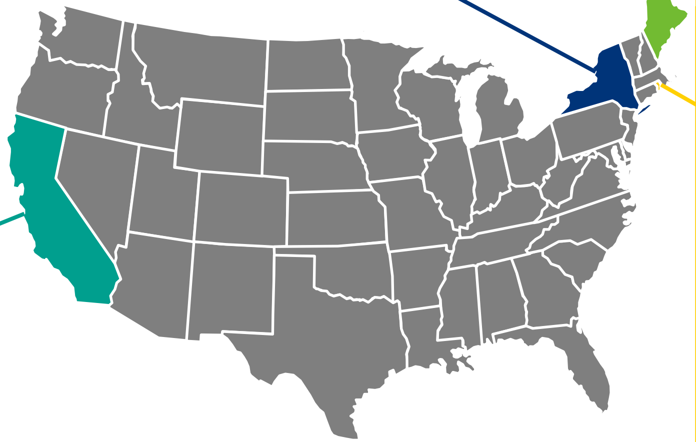
As part of New York's Reforming Energy Vision (REV) initiative, utilities in New York must file Distribution System Implementation Plans (DSIP) every two years. These plans outline how utilities will facilitate, manage and encourage the deployment of DERs in their territories, including the processes for identifying and using DERs for NWAs. The utilities have established an NWA suitability criteria framework based on project type, cost and timeline for identifying opportunities. New York has also established a tariff-based approach for incentivizing NWAs via the Value of Distributed Energy Resources (VDER). The VDER contains multiple value components including the Locational System Relief Value, which provides additional compensation in designated capacity constrained areas.

Maine

Within Maine's Office of the Public Advocate, the NWA Coordinator is charged with determining if cost-effective NWA solutions can feasibly replace transmission and distribution upgrades proposed by utilities in their annual grid investment plans. The NWA Coordinator works closely with the Efficiency Maine Trust – an independent energy efficiency program administrator – to compare the economic costs and benefits of traditional utility investments versus customer-sited NWAs. When NWAs are found to be the most cost-effective option, Maine law requires the Efficiency Main Trust to develop and implement a plan to procure those resources.

California

California's Distribution Investment Deferral Framework (DIDF) requires utilities to file annual reports that identify opportunities where future distribution system upgrades can be deferred or avoided through DER deployment. Once identified, the utilities issue competitive solicitations for selected NWA opportunities. Currently, California is piloting the use of tariffs (as opposed to RFPs) to spur DER investment that leads to deferring grid investments.



Rhode Island

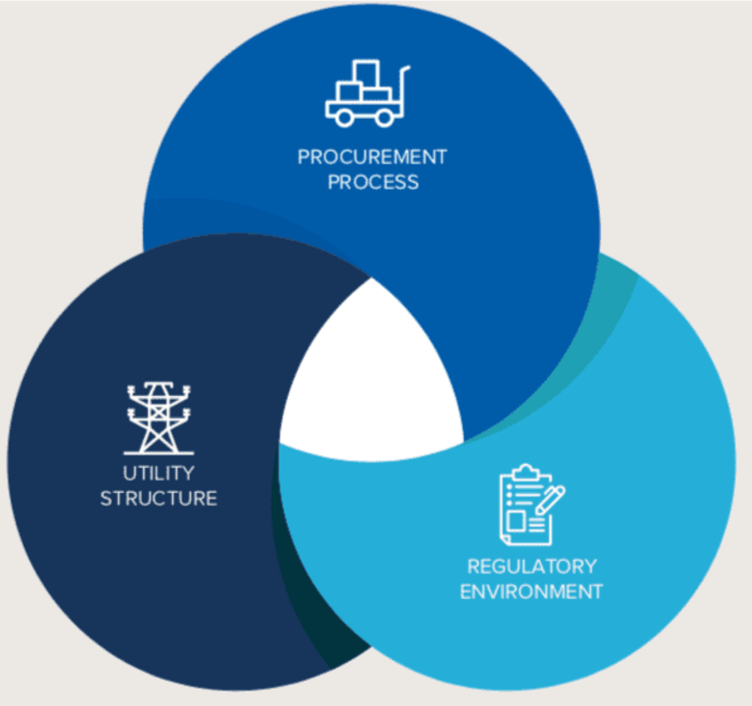
In Rhode Island, the state's main utility – National Grid – must file an annual System Reliability Procurement (SRP) report, which identifies "*customer-side opportunities beyond energy efficiency that are cost effective and provide the path to lower supply and deliver costs to ratepayers in Rhode Island*." For projects identified in the SRP, National Grid has the opportunity to earn financial incentives based on a combination of action-based and savings-based metrics.

Regulatory and Policy Best Practices

With a sizeable sample of successful regulatory initiatives underway across North America, best practices can be leveraged in Canada to maximize the benefits of NWAs for ratepayers and utilities. The Rocky Mountain Institute succinctly summarizes key lessons from these initiatives through a three-pronged best practice framework:[1]

- **Establishing a supportive regulatory environment:** Regulators need to be empowered to pursue the necessary actions and reforms required to effectively leverage NWAs. In many cases, this is internally motivated or comes from legislative directive (when the regulator has limited statutory authority) that mandates the pursuit of NWAs. A supportive regulatory environment is the first step towards achieving greater transparency and visibility into how utilities plan and operate their distribution networks.
- **Integrating NWAs into utilities' standard operating procedures:** NWAs are not business-as-usual for utilities, and their internal structure and processes are often not designed in a way that facilitates these investments. Responsibility for NWAs needs to reside with the entity responsible for traditional utility investments and should leverage any NWA pilot projects to test different technologies and procurement models as well as integrate NWAs into the utility's operating procedures.
- **Creating a holistic process for NWA procurement:** A deficient procurement process can have significant negative consequences such as driving up total acquisition costs or even completely eliminating otherwise cost-effective solutions due to commercial terms that drive up risks or exclude certain technologies. Many successful pilot projects to date have used a multipronged approach with combination of procurement processes, including expanding existing customer programs, competitive auctions, and RFPs.

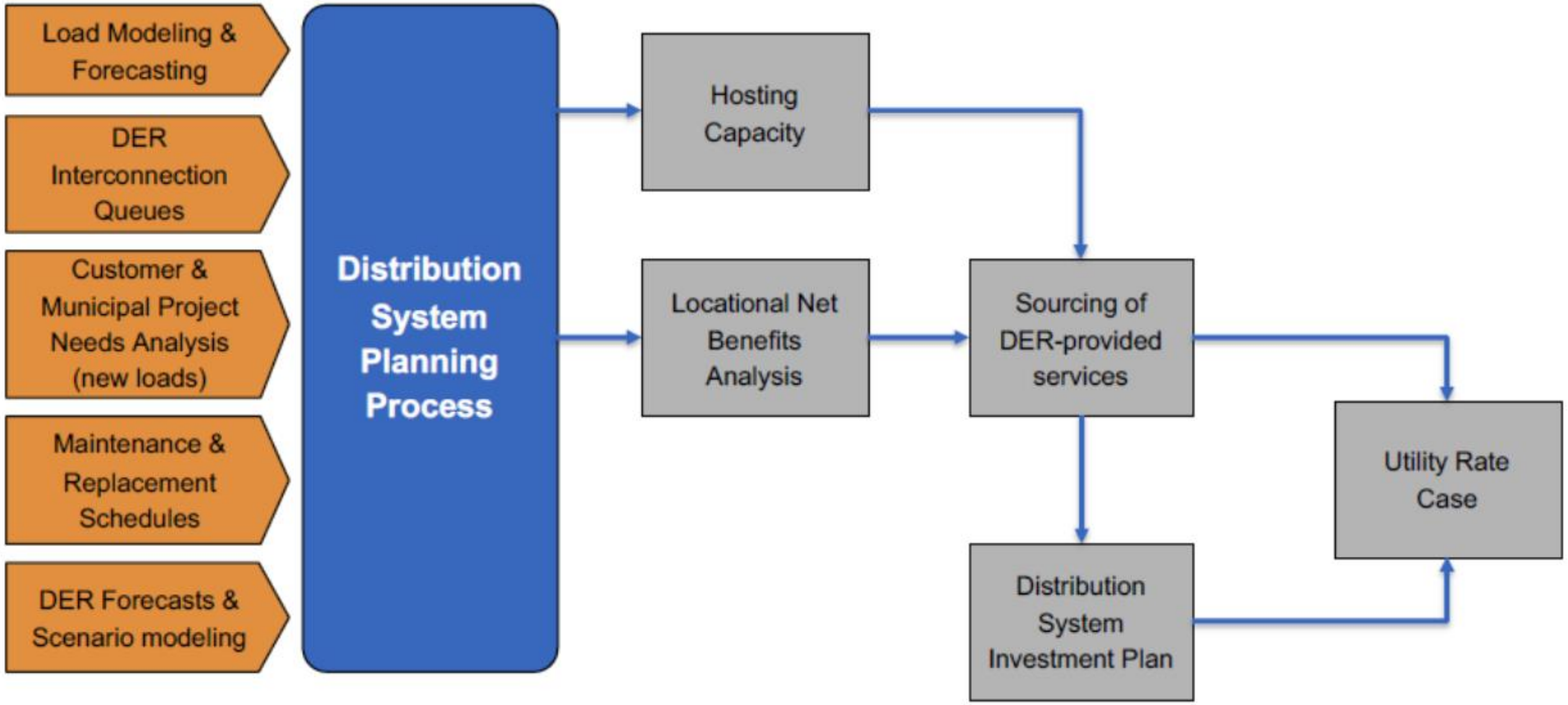
NWA Best Practices Framework[1]



[1] Prince, Jason, Jeff Waller, Lauren Shwisberg, and Mark Dyson. The Non-Wires Solutions Implementation Playbook: A Practical Guide for Regulators, Utilities, and Developers. Rocky Mountain Institute, 2018. http://www.rmi.org/insight/non-wires-solutionsplaybook/

Principles for Enabling NWAs in Canada

Enabling NWAs requires undertaking a broader distribution system planning modernization effort to provide more visibility into and control of the distribution system, maximize the benefits DERs bring to the system, and maintain system reliability and reasonable cost of service to ratepayers.



[1] Advanced Energy Economy (AEE). Distribution System Planning: Proactively Planning for More Distributed Assets at the Grid Edge, 2018. https://info.aee.net/21ces-issue-briefs

Principles for Enabling NWAs in Canada

Building on the experience of other jurisdictions and applying the Canadian lens and context, we outline the following key principles for enabling wide-scale deployment of NWAs in Canada:

1. **Leveled playing field** for NWAs through standardized and transparent processes for screening for technical feasibility, and cost-effectiveness of NWAs relative to traditional infrastructure investments in an “apples-to-apples” comparison
2. **Technology agnostic approach** that does not eliminate the use of innovative solutions and technologies, as long as they meet technical requirements and offer cost-effective alternatives to wires-based solutions.
3. **Streamlined and scalable procurement** that considers NWAs on a continued basis as a solution that can be used to respond to changing market conditions and emerging trends, particularly in the face of uncertain load growth.
4. **Breaking down informational and incentive silos** between utilities, consumers, DER developers and other stakeholders to alleviate barriers to DERs and NWAs.
5. **Full value recognition** of the spectrum of services DERs can bring the grid to maximize benefit to all stakeholders

Recommendations and Implementation Considerations

Based on these guiding principles, we recommend the following action items and implementation considerations to regulators and policymakers in Canada.

System Planning	• Require consideration of NWAs in utility planning process through an assessment of viability and cost-effectiveness of DERs relative to traditional infrastructure investments in meeting system needs. • Increase transparency and data sharing about system needs between utilities, customers and service providers to determine where and when DERs and NWAs can provide value to the grid (e.g. hosting capacity maps). • Ensure effective communication, education, collaboration and knowledge-transfer about NWAs as well as consideration of NWAs in broader market development, system planning, and other initiatives related to DERs (e.g. interconnection).
Procurement and Market Design	• Investigate alternative mechanisms to acquiring NWAs in addition to capacity auctions. • Establish clarity on needs and required capability of NWAs (i.e. frequency of dispatch, triggers, notifications). • Align procurement timelines with project development timelines.
DER Valuation	• Establish standards to define, assess and compensate DERs for the value they bring to the grid. • Allow value-stacking of benefits for DERs to capture benefits from multiple value-streams for different services they bring to the grid. (e.g. wholesale market, local capacity as NWA, and customer value).
Utility Considerations	• Adjust utility remuneration and incentives to capture the mutual benefits of DERs to customers and the grid by allowing capitalization of NWA expenses and removing ownership preference. • Establish guidelines and standardized processes for consideration of NWAs across utilities to ensure consistency.

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