Identifying high-value opportunities for non-wire alternatives: A retrospective of state-led approaches

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Abstract: State legislatures and Public Utilities Commissions are interested in ensuring prudency in utility investments and their alignment with the public interest. They are also increasingly recognizing the potential climate, financial and technical benefits of incorporating Distributed Energy Resources (DER) in utility planning. Non-wire alternatives (NWAs) have gained popularity in the last decade as a strategy to identify cost-effective opportunities for DER that can defer or replace investments in traditional infrastructure. Therefore, states have established procedures to standardize their consideration. This paper describes and compares the approach of eight states to identify high-value opportunities for NWAs. State's considerations and frameworks are discussed and compared in the context of five characteristics: i) integration of NWAs to utility planning and the prioritizing of: ii) transparency, iii) accessibility, iv) flexibility, and v) creativity in NWA identification. The discussion is done by identifying NWA-enabling legislation or regulation in each state and related policy proceedings, legislation, plans, and media. After the analysis, the paper proposes key considerations to strengthen the role of NWA identification approaches in promoting utility prudency and collaborative culture in utility planning.

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Acronyms

CA	California
CN.	Connecticut
DER	Distributed Energy Resources
IGP	Integrated Grid Plan
LCPS	Least Cost Procurement Standards
ME	Maine
MN	Minnesota
NH	New Hampshire
NWA	Non-wire Alternative
NY	New York
PUC	Public Utilities Commission
REV	Reforming the Energy Vision
RI	Rhode Island
T&D	Transmission and Distribution
US.	United States of America

1 Introduction

Public Utility Commissions (PUCs) and state legislatures are increasingly recognizing the potential climate, financial and technical benefits of including Distributed Energy Resources (DER) in Transmission and Distribution (T&D) planning. Therefore, they have aimed to enable standardized consideration of DER-based infrastructure in future grid investments (Hawaiian Electric, 2020a). In this paper, I subscribe to Dyson et al., (2018) 's definition of DER as a range of hardware and software resources that can generate, control, or reduce electricity demand. They include both supply and demand-side infrastructure. DER can generally be deployed across low-voltage distribution networks. Energy storage, distributed generation, energy efficiency, and demand response are examples of DER.

Non-wire alternatives (NWAs) have gained popularity in the last decade as a strategy to identify cost-effective opportunities for DER. NWAs are investments that defer or replace traditional infrastructure (e.g., lines or transformers) by deploying non-traditional solutions, such as DER. At least eight states have established mechanisms where utilities must compare traditional infrastructure investments to NWAs to prioritize the most cost-effective solutions. In its initial stage, NWA consideration calls for aligning grid needs with DER performance and costs (Pacific Energy Institute, 2020). Therefore, states and utilities have developed strategies for NWA opportunity identification, where the grid needs are classified as suitable or not for NWAs. Here, suitability encompasses the technical capabilities of NWAs and their potential to be the most cost-effective option. This is a critical stage as it defines the rest of the NWA consideration process. This stage, NWA opportunity identification, is also the focus of this paper.

In this paper, I compare how eight states have approached NWA opportunity identification in the context of *i)* integrating NWAs to utility planning, and prioritizing *ii)* transparency, *iii)*

accessibility, *iv)* flexibility, and *v)* creativity in NWA identification. I do that by identifying NWA-enabling legislation and regulation in each state, as well as other related policy proceedings, legislation, plans, and media. Finally, I list considerations for regulators, developers, and advocates to promote the success of NWA opportunity identification as a catalyst for energy affordability and stakeholder collaboration in utility planning.

1.1 Distributed Energy Resources and Non-wire alternatives

DER deployment has substantially grown in the US. The country went from producing 3% of its electricity from renewable sources in 2011 to 11% in 2020. In 2019, efficiency programs across the nation saved 17% more energy than in 2011, and the US's battery installed capacity had an annual growth of 67% in 2020 (Root, 2022). One of the main drivers of this rapid rise has been the need to address the climate crisis. DER are also alternatives for increasing reliability and resiliency for critical infrastructure and areas where outages and power quality issues are frequent (Dyson et al., 2018). In addition, due to technological improvements and cost decreases, DER are beginning to demonstrate their role in deferring generation and T&D costs, which contributed to the creation of the concept of NWA.

NWAs are gaining public attention by deploying several projects across the country. In 2018, Arizona Public Service installed a 2 MW battery system in the Punkin Center to defer the construction of 17 miles of distribution miles. Between 2013 and 2015, a Gridsolar project sought to substitute part of a 300-mile transmission line in Boothbay, Maine, by implementing a combination of energy efficiency measures, battery storage, and solar. The project reported savings of $12 million for ratepayers. The Brooklyn Queens Demand Management Program, implemented by ConEdison in New York, was approved as a $200 million portfolio that included efficiency, demand response, and distributed resources strategies to defer a $1.2 billion

substation upgrade (Chew et al., 2018). Currently, across the country, multiple utilities keep a public record of the NWA opportunities they have identified, discarded, and implemented (Con Edison, n.d.; Orange & Rockland, n.d.). These projects have shed light on the opportunities to consider DER-based alternatives in utility planning. At the same time, the current status of NWAs highlights the challenges that DER needs to overcome to achieve large-scale deployment.

In a survey across seven states in 2020, the Pacific Energy Institute (2020) determined that NWAs for procurement totaled only 1-2% of all T&D capital projects. States like Minnesota have not found a single NWA that is more cost-effective than its traditional counterpart under the current NWA consideration process (Xcel Energy, 2021). Even when NWA projects have continued to be implemented, the deployment of NWA raises big regulatory, business, and technical questions. Some are related to utility risks with third-party providers, limited demonstration of DER's suitability to address grid needs, and the constraints of current valuation methodologies (Reid et al., 2022). Therefore, it is imperative to understand how successful current approaches are at finding the NWA opportunities with the highest probability of success in procurement and evaluation processes.

1.2 Non-wire alternatives and the utility business

The relevance of standardized consideration of NWAs also lies in how it challenges the traditional model of electric utility regulation. Investor-owned electric utilities function under cost-of-service regulation (US Environmental Protection Agency, 2022). The latter means that they are entitled to a regulator-approved rate of return on their investments, including but not limited to power plants, transmission lines, and transformers (Dyson et al., 2018). The latter creates a bias toward prioritizing capital-intensive projects, while the most cost-effective alternatives that do not involve utility-owned capital are potentially overlooked (Averch, 2018).

This regulatory framework encourages companies to invest as much as possible while possibly, deprioritizing issues of community well-being, fairness, and electricity affordability. This situation is especially relevant considering that many DER technologies can potentially address grid needs while being more cost-effective and, in some cases, reducing the total electricity demand.

In many ways, one of the main objectives of Public Utilities Commissions is to ensure prudency in utility investments. They aim to restrict the consequences of the utility's bias toward high capital investments in utility management and costs (Public Utility Regulatory Authority, 2022b). Therefore, the potential financial benefits for ratepayers have been a critical motivator for advancing NWA consideration. However, NWAs can benefit utilities as well. For instance, they can provide opportunities to distribute a project's risk between the utility and a DER provider. The utility could internalize the risk of overloading lines and the provider of malfunctioning DER (Reid et al., 2022). However, even when NWA projects continue to total just a small fraction of utility investments, state-led mandates that require utilities to consider NWAs have proven to be the primary catalysts of the market (Chew et al., 2018; Dyson et al., 2018).

1.3 Identifying NWA opportunities across states

Utility planning involves identifying grid needs and determining a solution to address them. Figure 1 illustrates, in general terms, the role that states and utilities have identified for NWA consideration within utility capital planning. Once needs are identified, responsible stakeholders, usually utilities, must determine whether each grid need is suitable for NWAs. Generally, the projects identified as suitable for an NWA can undergo a solicitation process. The proposals are then evaluated to understand if the NWA is, in fact, suitable and more cost-

effective than the initially proposed traditional project. If so, the NWA is implemented. Considering that identification processes are the initial filter for NWA consideration, pursuing efficient frameworks that put forward successful NWA solicitation processes and economize time and resources is key

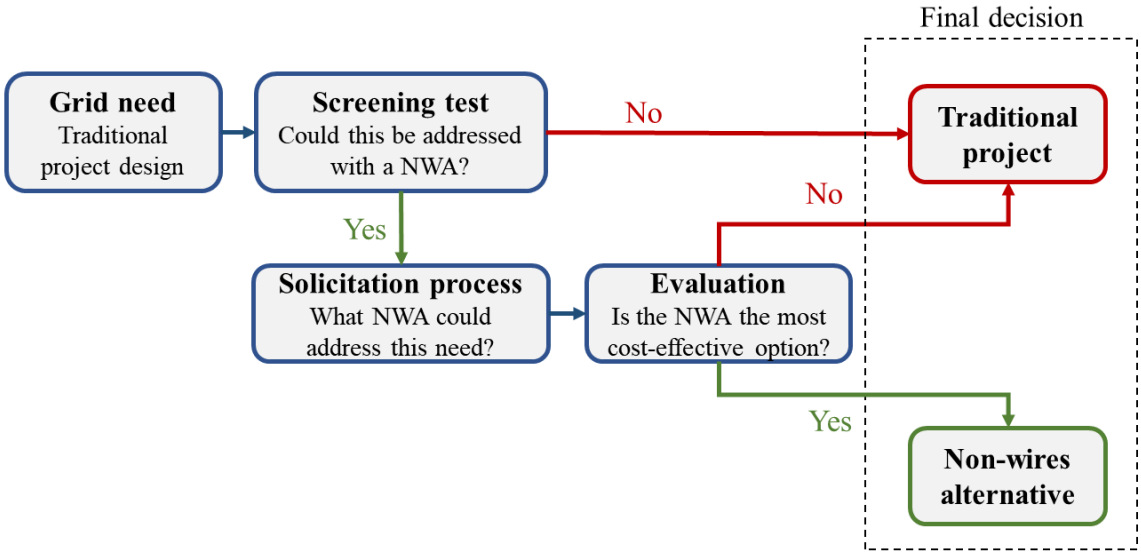

Figure 1. General consideration framework for non-wire alternatives.

Naturally, approaches across states to identify NWA opportunities are varied. The differences in perspectives, assumptions, and involved stakeholders can potentially lead to different outcomes. Given that NWAs are a nascent strategy, understanding and comparing ongoing progress is critical to identify current approaches' advantages and disadvantages. Particularly, understanding how states think about NWA opportunity identification can shed light on how much these mandates influence the way utilities plan their capital investments and promote the fair treatment of DER-based infrastructure. This would then create a door to assessing how NWA consideration relates to overarching goals of preserving the public interest in utility planning and how it advances grid modernization opportunities such as providing new services and creating new business models.

A handful of researchers have taken initial steps to compile progress related to NWA consideration. Dyson et al. (2018) conducted 65 interviews with experts across multiple states to provide a Playbook with recommendations to implement and scale NWAs. Their work offers some examples from different jurisdictions to illustrate best practices. However, their objective is not to compare state approaches or provide a close look at NWA opportunity identification strategies. The Northeast Energy Efficiency Partnerships (2017) produced a report compiling relevant policy proceedings involving NWAs in five states. Similarly, the Pacific Energy Institute (2020) summarizes the practices of seven jurisdictions to identify NWAs. Some other researchers have focused on describing the technical and policy implications of specific NWA projects across the US (Chew et al., 2018). However, a comparison and discussion of states' particular approaches to identifying NWA opportunities, and their alignment with best practices, are yet to be made.

1.4 This paper's approach

This professional paper elaborates on what is the status of state-led NWA opportunity identification and how states compare with each other. The paper focuses on NWA identification since the effectiveness of this initial step is critical to ensure the consideration of the highest-value opportunities. In order to do that, through a literature review, I identified five key characteristics of appropriate NWA identification approaches that are aligned with common state goals and the mission of PUCs: *i)* integration to utility planning, *ii)* transparency, *iii)* accessibility, *iv)* flexibility, and *v)* encouragement of creative NWAs.

Then, I identified the legislation and/or regulation that enabled NWA consideration in eight states across the US: California, Connecticut, Hawaii, Maine, Minnesota, New Hampshire, New York, and Rhode Island. I used that alongside related policy proceedings, legislation, plans,

and media to describe and compare how states are aligned or distant from best practices in NWA consideration. I attempt to illustrate how NWAs can be considered differently to achieve state goals. With this paper, I hope to expand the knowledge of how states are using NWA opportunity identification to transform utility planning to increase stakeholder collaboration and ensure utility prudency.

1.5 Case studies

All states included in this paper (California, Connecticut, Hawaii, Maine, Minnesota, New Hampshire, New York, and Rhode Island) have pursued regulatory dockets aiming at altering the traditional utility business model through NWAs. While this was my primary criterion for selecting these case studies, states have pursued NWAs under different utility landscapes and with diverse antecedents of grid modernization efforts. Unavoidably, these differences permeate their approach to NWA consideration.

In a 2018 report, about the time when NWAs started popularizing, The GridWise Alliance (2018) released its Grid Modernization Index. Instead of ranking states, Grid Wise aimed at evaluating to what extent states are living up to their fullest grid modernization potential, considering their specific landscape, technology deployment, and stakeholder coordination. To do that, they accounted for the requirements and policies each state has established regarding grid planning and DER, the data available to consumers and service providers, and the inclusion of new services in utility investments. The report clusters states' progress regarding grid modernization into five groups: leaders (2 states), movers (8 states), believers (12 states), beginners (7 states), and states with few to no action (21 states). This paper compares NWA opportunity identification progress in states that are part of the first four groups. The latter allows a comparison and analysis of how states with different grid modernization progress and

landscape are incorporating NWA consideration in their planning. Figure 2 also shows how NWA consideration is occurring in states with diverse electric system sizes.

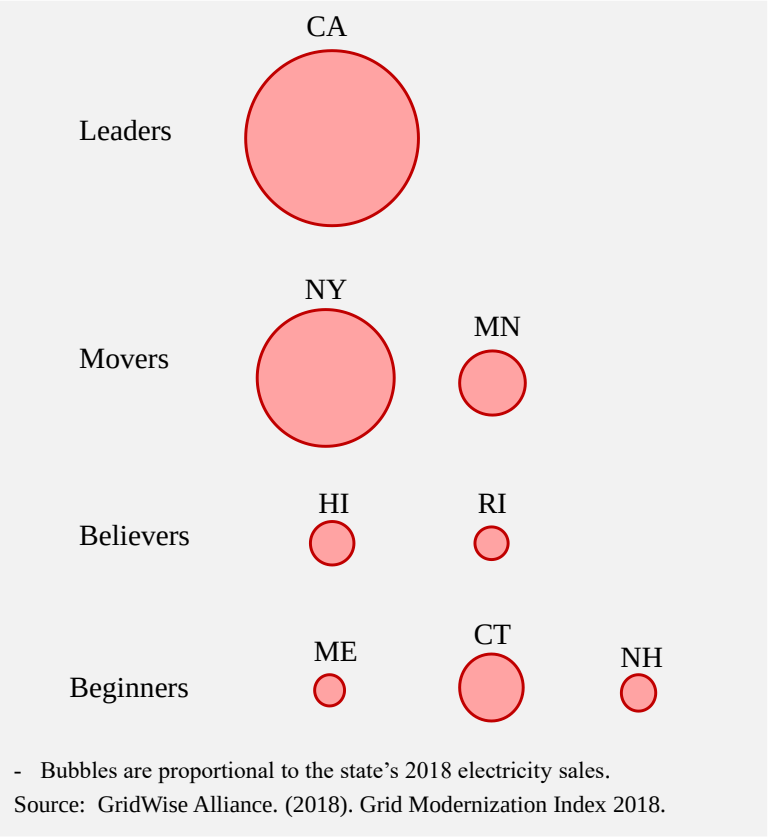

Figure 2. GridWise Alliance's 2018 grid modernization Index and electricity sales by state.

NWA consideration is advancing in multiple Wholesale Electric Power Markets and under different Retail Electric Power Markets (see Table). Except for Minnesota and Hawaii, all states included in this paper operate in deregulated markets (US Environmental Protection Agency, 2022). Traditionally regulated markets feature vertically integrated utilities that own the entire flow of electricity. Reforming the grid in these states is a more complex challenge (Shallenberger, 2017). On the other hand, in deregulated markets, utilities are not allowed to own transmission and generation assets (US Environmental Protection Agency, 2022).

Table 1. State's Electric Power Market Structure.

State	Wholesale Electric Power Market	Retail Electric Power Market
CA	California ISO	Competitive
CN.	New England ISO	Competitive
ME	New England ISO	Competitive
HI	-	Traditionally Regulated
MN	Midcontinent ISO	Traditionally Regulated
NH	New England ISO	Competitive
NY	New York ISO	Competitive
RI	New England ISO	Competitive

Note: Independent system operator (ISO).
Source: US Environmental Protection Agency. (2022, January 24). Power Market Structure [Overviews and Factsheets]. https://www.epa.gov/green-power-markets/power-market-structure

This paper includes early deployers of NWA consideration, such as New York and Hawaii, who started NWA conversations before 2016 as well as states like Connecticut, whose mandate is as new as 2022. Since this paper focuses on state-led consideration, it includes states whose NWA consideration has been led by the State Legislature (Maine and New Hampshire), and states where direction has explicitly come from PUCs. However, I later find out and discuss how NWA consideration has been established through articulating multiple stakeholders to reach varied state-wide goals.

The remainder of the paper is structured as follows: Section 2 elaborates on the characteristics of NWA opportunity identification that this paper addresses. Section 3 describes and examines the status of NWA opportunity identification across eight states. After that, Section 5 presents a discussion and the paper's main conclusions.

2 Desirable characteristics in NWA opportunity identification

NWA opportunity identification assists jurisdictions in targeting NWA consideration towards projects with the highest likelihood of bid developer success and that are more likely to maximize benefits. Since NWAs are still nascent and experience and tools for their analysis are limited, pursuing entire NWA consideration processes for every need is not a compelling use of resources. Identifying the highest-value opportunities helps to deprioritize projects with likely marginal benefits or that, presumably, will not yield cost-effective proposals (Dyson et al., 2018).

NWA opportunity identification also seeks to preserve an engaged market by avoiding proposal fatigue. Developers might question the value of submitting bids in jurisdictions with numerous solicitations for NWA projects but where few or none are allocated (Kelly, 2020). NWA screening must contribute to efficient, transparent processes where states, developers, and utilities can support each other while experience and technological improvements allow a more flexible and proliferous NWA market.

Figure 3 presents five key characteristics that can align NWA opportunity identification approaches with overarching goals of utility regulation and grid modernization, setting them up for successful outcomes. I have selected these characteristics based on a literature review and considering NWAs in the context of utility regulation goals. PUCs are interested in regulating utilities to ensure safe, efficient, adequate, and affordable energy systems. They are tasked with balancing public and private concerns (Minnesota Public Utilities Commission, n.d.). The desirable characteristics included in this paper are *i)* integration of NWA identification to utility planning, *ii)* transparency, *iii)* accessibility, *iv)* flexibility of the approach, and *v)* encouragement

of creativity in NWA design, consistent with grid modernization goals. This section elaborates on each characteristic individually.

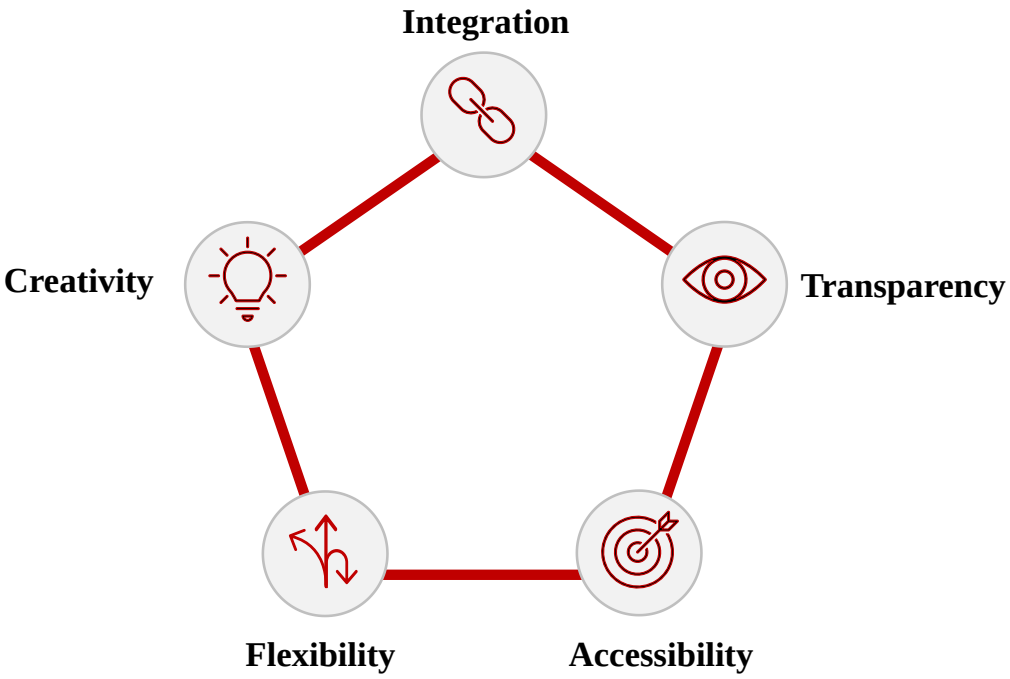

Figure 3. Characteristics of best-practices-oriented NWA identification approaches.

2.1 Integration

Because of the novelty of the NWAs, utilities and regulators are just starting to figure out the most effective ways to coordinate their consideration across all the stakeholders and stages of utility planning. NWAs have the potential to contribute to decision-making consistent with PUCs' mission and with the public interest of reliable, clean, and affordable electricity. However, if NWAs are to become a key tool for prudence testing in utility investment, NWA consideration cannot be housed in a siloed utility department or used as a filter for only some capital investments (Dyson et al., 2018). In order to encourage fruitful NWA consideration, states should aim at ensuring opportunity identification frameworks have a determined and integral place in capital investment discussions (Kelly, 2020). While not every project is suitable

for NWAs, thorough consideration of capital investments through the lens of NWAs will maximize their potential to advance goals of energy affordability and strengthen the oversight role of PUCs.

However, the integration of NWA opportunity identification should be mindful of the characteristics of NWAs and DER. Therefore, it should be standardized to give enough time for soliciting and procuring DER-based projects (Smart Electric Power Alliance, 2016). In addition, the integration of NWA creates the risk of ending up in situations where it is unclear if there is meaningful NWA consideration. Therefore, states and utilities should aim to have a balance between ensuring that NWA consideration is an integral part of utility planning and having clear, separate documentation and reporting on how NWAs were analyzed and included in the process (Dyson et al., 2018).

2.2 Transparency

Developers, vendors, and customers expect transparency in procurement processes and utility decisions (Kelly, 2020), which should include NWA opportunity identification. As frameworks for identifying potential NWAs surge, utilities should aim at documenting and reporting the specifics of grid needs and the analytics supporting the establishment of their screening criteria. Delivering transparent regulatory oversight is part of PUCs' vision (Hawaii Public Utilities Commission, n.d.) and a tool for fulfilling their mission of acting in line with the public interest (Minnesota Public Utilities Commission, 2022). Transparent processes would strengthen the presumption that NWAs are advancing prudency and collaborative planning culture. Transparency should be prioritized to provide clarity to: *i)* the market regarding the characteristics of the solution that is needed, *ii)* regulators concerning the role of NWA

consideration and compliance with NWA requirements, and *iii)* customers as to how energy affordability and community needs are prioritized in capital investments.

2.3 Accessibility

Historically, the complicated nature of some regulatory proceedings has burdened the participation of key stakeholders (e.g., local governments, advocates, and developers) in grid planning (National Council on Electricity Policy, 2019). Also, NWA opportunity identification approaches are expected to guide fair, repeatable, and clear processes for all stakeholders (Hawaiian Electric, 2020b). PUCs have proposed NWAs as a strategy to broaden stakeholder engagement in utility planning and move away from linear planning approaches with limited space for stakeholder reaction (Schauffler, 2022). States and utilities can live up to this vision by establishing accessible NWA opportunity identification frameworks. They can do so by defining criteria or project characteristics that determine which traditional projects are suitable for NWAs. These are commonly known as screening criteria. Figure 4 presents the most common characteristics used to describe the suitability of NWA and the question each criterion tries to answer. These guidelines should be established to consider that the applicability of NWA has not been fully explored and that the market is evolving continuously.

I. **Project type:** Generally, utilities categorize their investments into different groups in their capital plans. Depending on the type of project, NWAs could be more or less suitable to defer or replace traditional investments. This is partly because NWA's services have been explored more deeply in some specific circumstances. Therefore, this category helps prioritize projects with the highest likelihood of success based on the type of need the project addresses (Dyson et al., 2018). Setting a project-type requirement allows

PUCs to consider energy affordability benefits while accounting for grid resiliency and reliability goals.

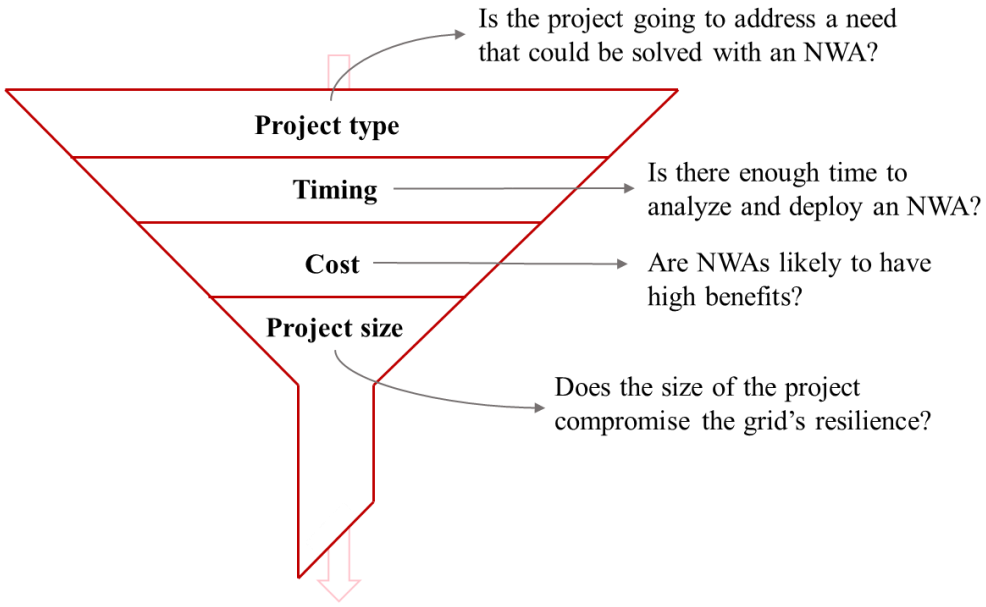

Figure 4. Overarching elements in screening criteria.

II. **Timing:** By recognizing the time needed to deploy an NWA, states and utilities can set a minimum time required to procure NWAs. Ideally, this criterion is selected based on historical procurement experiences. Screening criteria should recognize that different technologies need different timelines for their deployment. A single timing threshold for all technologies will likely fail to respond to these nuances (Dyson et al., 2018).

III. **Cost:** States and utilities can set a cost threshold to prioritize projects that maximize the potential financial benefits of deploying NWAs (i.e., the most expensive projects) and exclude inexpensive projects with marginal benefits or that could be affected by high transaction costs. This criterion should be established based on utility-specific historical capital data (Dyson et al., 2018).

IV. **Project size:** Jurisdictions can set a threshold for the percentage of the peak load an NWA can supply to mitigate the negative consequences of NWA failure. As the experience with NWA deployment increases, this criterion would be unnecessary. However, considering the nascent nature of the market, a project size threshold can help utilities get comfortable with NWAs (Dyson et al., 2018).

2.4 Flexibility

Regulators are tasked with providing oversight to, generally, multiple investor-owned utilities and to diverse types of investments. At the same time, NWAs are a nascent concept, and their efficient implementation is subject to experimentation and influenced by the specific context of their deployment. In the interest of ensuring efficient and successful frameworks that are more likely to capture benefits that advance the common good, NWA opportunity identification approaches should be designed as guiding paths, not strict conditions for approving or discarding NWAs (Dyson et al., 2018). Flexibility prevents limiting the market and the creativity of developers and other stakeholders and avoids unnecessarily restricting NWA consideration. Establishing frameworks that can accommodate different utility sizes and landscapes, and project types would increase the efficiency of NWA opportunity identification by avoiding one-size-fits-all approaches. As more applications of NWA are tested, frameworks should be able to evolve and welcome the identification and deployment of new opportunities. For instance, approaches should allow utilities to consider projects outside the screening criteria. This flexibility would resonate with the evolving nature of the NWA market (Dyson et al., 2018).

2.5 Creativity

States across the country have enacted legislation and regulation pursuing grid modernization (Maine Legislature, 2016; New York State, n.d.). Grid modernization responds to state-wide

goals of having cleaner energy, and more efficient and resilient energy systems. It also requires the transformation of energy systems and, therefore, the implementation of innovative solutions. NWAs have the potential to advance PUCs' goals of modernizing the grid by identifying high-value opportunities for diverse technologies. In that sense, NWA opportunity identification approaches should be designed to foster creativity and innovation in solutions.

Stakeholder engagement can be a strategy to increase the adoption of innovative NWAs. Developers, solution vendors, and utility program providers have valuable knowledge of the required conditions for NWA success. This process would incentivize deeper collaboration among stakeholders, allow utilities to focus on solicitations where there is agreement on their suitability for NWAs, and expand their view of what NWA suitability looks like (Kelly, 2020).

In addition, DER have proven to be an alternative to many grid needs traditionally addressed with wire and pole approaches. However, there are limitations to their uses. For instance, there could be challenges related to grid stability, the interconnection between DER and the rest of the grid, or extremely high costs if DER-based projects are expected to fulfill all the needs initially addressed by traditional infrastructure. Creative NWA screening that looks for optimal applications for DERs should account for the potential of hybrid solutions (i.e., solutions that mix traditional infrastructure with DER).

Hybrid solutions can combine the capabilities of both NWA and wires-and-poles to propose more cost-effective projects that meet technical standards and advance the public interest. Deploying hybrid solutions would require more collaboration between developers and utilities, especially for those solutions that a single party cannot provide alone (Kelly, 2020). Therefore, NWA consideration calls for new, creative ways to pursue collaboration in procurement, which would then influence what is conceived as suitable or not for NWAs.

3 Status of NWA opportunity identification

State legislatures and PUCs have been the primary enactors of NWA consideration. Explicit requirements for NWA consideration are more common from PUCs; such is the case of California, Connecticut, Hawaii, Minnesota, and New York, where PUCs have directed the inclusion of NWAs in utility planning. On the other hand, in Maine, after the passage of the *Declaration of policy on smart grid* infrastructure in 2009, the Maine Legislature introduced further legislation to enable the consideration of NWAs in the state (Maine Legislature, 2016). In the case of New Hampshire, utilities started pursuing NWAs after the State Legislature directed the submission of Least Cost Integrated Plans every five years, which must include an assessment of supply options and T&D requirements (New Hampshire Legislature, 2015).

However, the establishment of NWA frameworks has often resulted from the coordination between these two bodies. For instance, Rhode Island's state legislature passed the Comprehensive Energy Conservation, Efficiency, and Affordability Act to prioritize cost-effectiveness in utility investments (Rhode Island Legislature, 2006). The bill required utilities to submit System Reliability Procurement Plans every three years and the Rhode Island PUC to establish the Least Cost Procurement Standards (LCPS). To prioritize cost-effectiveness, the PUC later set guidelines for including NWA in utility planning through the LCPS (Rhode Island Legislature, 2006). Annex A summarizes the legislation and/or regulation that enabled NWA consideration in the eight states included in this paper.

3.1 Motivations for NWA consideration

In multiple cases, NWA consideration has been recognized as a tool to achieve the goals of broader state programs. For instance, New York started the process of standardizing NWA consideration by introducing their Reforming the Energy Vision (REV) strategy; an initiative

aiming at transforming the energy system into one that is more decentralized, resilient, and affordable (New York State, n.d.). In 2017, the New York Public Service Commission required utilities to file NWA opportunities as a tool to achieve REV's goals (Pacific Energy Institute, 2020). One of the main objectives of NWA consideration in Connecticut is to advance the state's Equitable Modern Grid Framework, aiming to decarbonize the grid while increasing the energy system's affordability, security, resilience, and reliability (Connecticut Public Utilities Regulatory Authority, 2019). Similarly, since Maine's NWA policies branched from their Smart Grid Policy, the state has framed NWA as part of its toolkit to achieve state goals such as improving grid reliability and efficiency and reducing greenhouse gas emissions (Maine Legislature, 2016).

As far as the states included in this paper go, every jurisdiction has cited cost-effectiveness as a critical motivator for evaluating NWAs. In 2016, Hawaii Public Utilities Commission stated that the continued technological advancements and the decreasing cost trends in DER were reasons for pursuing NWA consideration (Hawaii Public Utilities Commission, 2018b). According to Connecticut's Public Utilities Regulatory Authority (2022), NWA consideration creates a new platform for regulators and general stakeholders to assess the prudency of utility investments by having the necessary information and providing oversight. Similarly, New York's Public Service Commission points out that NWA consideration is a strategy to stop relying on rate cases as the first stage where NWA, alternatives to traditional proposed projects, are discussed, stating that this is inefficient and does not leave enough time to deploy other options (Public Service Commission, 2016).

3.2 Integration of NWA consideration in Utility Planning

States and utilities have seen value in integrating NWA consideration with other stages of utility planning. States' approaches are varied and specific to their utility landscape. Some states have decided to establish unique processes for NWA consideration, while others have opted for integrating NWAs within broader policy proceedings, some already existing (see Table). Early NWA pursuers have identified and set examples of NWA consideration integration. For instance, Hawaii's Integrated Grid Plan (IGP) seeks to combine multiple stages of utility planning, including NWAs, into one process. After assessing a lack of coordination between IGP and other dockets, the utility directed Hawaiian Electric to identify interrelationships between the IGP and other dockets to truly integrate the utility's efforts. According to the PUC, prioritizing the integration of the IGP was beneficial to maximize synergies and avoid contradictions or unnecessary duplication (Hawaii Public Utilities Commission, 2018a).

Table 2 summarizes the regulatory context under which PUCs evaluate NWA opportunity identification. Given the nature of NWAs and the necessary coordination between stakeholders, a popular approach has been to include NWA consideration as part of utility-integrated planning. There is a synergic relationship where NWAs can benefit from being considered in the collaborative, comprehensive context of utility-integrated plans and where integrated plans can benefit from including alternative evaluation to capital investments in the form of NWAs. Every process, including states with annual fillings, starts with identifying grid needs.

3.3 Transparency and NWA opportunity identification oversight

Including NWA consideration in policy proceedings has given PUCs the opportunity of providing oversight of the process. A popular approach to pursue a transparent process has been to prioritize data availability. NWA opportunity identification tends to be included in filings that

Table 2. Frameworks for grid needs identification by state.

State	Filling	Period [years]	Description
CA	Distribution Deferral Opportunity Reports	1	The filling is under the context of the Distribution Investment Deferral Framework, which specifically aims at sourcing DER to defer or avoid traditional distribution capital investments.
CN	NWA filling	1	The state established an NWA process that starts each January with a Data and Grid Needs fillings.
ME	NWA filling: planning study for small transmission projects and distribution projects	1	The state established an NWA process that starts with filling system needs for the next 5 years, proposed projects, and a description of the system's capacity and load by substation and circuit.
HI	Distribution Planning Process	1	The process starts with the load forecasts and an analysis of the grid's needs.
MN	Integrated Distribution Plan	2	The plan's requirements include distribution system and finance data, hosting capacity, DER scenario analysis, investment plans and NWA analysis.
NH	Least Cost Integrated Plan	5	Provides an understanding of the distribution planning, including long-term demand forecasts, energy supply and distribution plan and integration of energy efficiency and demand-side management programs.
NY	Distributed System Implementation Plan	2	Contains multi-year capital and operating expenditures and system information needed to ensure effective market participation by third parties.
RI	System Reliability Procurement (SRP) Plan	3	Describes general planning principles and future areas of focus for SRP, including trends in DER, and changes in the scope of NWAs.

Sources: (Hawaiian Electric, 2020a; Liberty, 2021; *Least Cost Procurement Standards*, 2006; Maine Legislature, 2019, 2019; Minnesota Public Utilities Commission, 2018; Northeast Energy Efficiency Partnerships, n.d.; Public Utility Regulatory Authority, 2022)

are accompanied by technical and financial data requirements. For instance, in Connecticut and California, where regulators have established a separate process for NWA consideration, they

have also set data filing requirements. Across all states, capital spending plans, hosting capacity maps, and load forecasts are common requirements. Specifically, in their Least Cost Procurement Standards, the Rhode Island PUC explicitly mentions they require filing DER trends partly to understand how DER market changes might affect NWA planning (Rhode Island Public Utilities Commission, 2017).

Transparency is essential to understand how NWA opportunities are being identified. However, in my search, publicly available information on the analytics supporting screening thresholds and frameworks for NWA opportunity identification (see Section 3.4.1) is limited or non-existent. As states gain experience with NWAs, transparency will be vital to understanding how opportunity identification should evolve in the direction of integrating DER consideration across all utility planning. However, it is also true that NWA has the potential to increase utility planning transparency. As utility filings go, NWA consideration has created a platform for public comments and scrutiny of alternative consideration and evaluation in major T&D investments.

PUCs have been the primary agent providing oversight to NWA consideration. However, states have also explored the establishment of third-party NWA consideration oversight, such as the case of Maine and Connecticut:

- **Maine's NWA coordinator:** This figure is contracted by the Public Advocate to fulfill functions that include: *i)* reviewing utilities' proposed projects, *ii)* making recommendations concerning what NWA to implement and their procurement, and *iii)* tracking and reporting the progress of NWA projects across the state. The NWA coordinator and the utilities are expected to reach an agreement concerning implementing NWAs. Otherwise, the PUC is responsible for resolving the contention (Maine Legislature, 2019).

- **Connecticut's Process Monitor:** This is an external consultant to the Public Utilities Regulatory Authority without association with the Authority or the utilities. Since Connecticut has an annual NWA process, among the tasks of the monitor are: *i)* facilitating NWA-related meetings, *ii)* reviewing annual data and grid needs filing, *iii)* overseeing solicitations, and iv) submitting comments on the utilities NWA opportunity identification or the progress of NWAs in the state (Public Utility Regulatory Authority, 2022b).

Maine's NWA coordinator has a weightier role when it comes to identifying and designing NWAs, compared to Connecticut's Process Monitor. Initially, Connecticut's Regulatory Authority intended to establish a similar role. However, the state's utilities expressed concerns regarding how this party would disrupt and duplicate engineering expertise in the planning process. The utilities argued that establishing the role would have negative implications for the utility's role as the primary system planners and operators (Public Utility Regulatory Authority, 2022b). Therefore, the Authority decided to establish a third-party whose responsibilities were closer to an extension of the Authority's oversight tasks and not an extension of the utility's engineering planning role. In Maine, the role of the NWA coordinator has proven useful for ratepayers who can advocate with data from a third-party expert. However, the complexities of duplicating engineering expertise are clear. For instance, in the first decision after the NWA law was passed, the alternatives proposed by the NWA coordinator were not implemented after the utility added new planning standards to the project that the alternative did not satisfy (Schauffler, 2022). The PUC approved the traditional project arguing that the identified NWA failed to analyze impacts on lower-voltage distribution systems and solar availability during winter (Andrewsstaff, 2022).

3.4 Accessibility and screening criteria considerations

States have taken different approaches in distributing responsibilities among stakeholders regarding the development of screening criteria. In Rhode Island and Connecticut, after public comments and stakeholder engagement periods, regulators established the screening criteria utilities use to guide their opportunity identification process. On the other hand, in states like New York, Hawaii, and New Hampshire, the PUC ordered utilities to develop their criteria. In New York, utilities were directed to coordinate their NWA consideration frameworks. Minnesota took a hybrid approach where the PUC established a cost floor for NWA consideration, but utilities had to develop other criteria elements.

Utility discretion in screening criteria design has allowed utilities to inform the process with their reality. For example, in states like California and New York, criteria vary from utility to utility. In one of its Orders, the New York Public Service Commission mentioned how larger utilities might require higher-cost floors than smaller utilities, which is reflected in the different criteria among utilities (New York Public Service Commission, 2017). Currently, all utilities in the state have ongoing NWA evaluation processes (Joint Utilities, n.d.). On the other hand, Minnesota's approach, where all utilities are subject to the same regulator-directed cost floor, has led to situations where its smaller utilities do not plan to build any infrastructure above that threshold (Minnesota Power, 2021; Otter Tail Power Company, 2021). Hence, they have not identified any projects as suitable for NWAs. Minnesota's largest utility, Xcel Energy, has stated that they believe more work must be done to better determine the cost threshold for this filter (Xcel Energy, 2021).

While most states studied in this paper have adopted the same screening criteria for every type of project, New York's utilities have adopted different parameters according to the project size. The state has defined large projects as those occurring on a major circuit or substation and

above and small projects as those at the feeder level and below. These differences reflect that smaller projects are expected to be less costly and require shorter lead times (New York Public Service Commission, 2017).

3.4.1 Elements in screening criteria

While overarching characteristics generally form screening criteria, each state's reasoning of what determines NWA suitability varies. The latter influence what characteristics states deem necessary or not to identify NWA opportunities. Table 3 summarizes the elements of each state's screening criteria. Some states have explicitly defined criteria establishing that projects based on asset conditions are unsuitable for NWAs. While this can be interpreted as a requirement based on the type of project, the table presents them separately. Project type, cost, and timeline are the most common elements. Annex B shows a more specific summary of each state's screening criteria.

Table 3. Project characteristics included in each state's screening criteria.

State	Cost	Project type	Timeline	Project size	Asset condition
CA		✓	✓		
CN	✓	✓	✓		
ME			✓		
HI	✓	✓	✓		
MN	✓	✓	✓		
NH	✓		✓		✓
NY	✓	✓	✓		
RI	✓	✓	✓	✓	✓

Note: Sources and more details can be found in Annex B.

Load relief and reliability are the most common types of projects for which NWA suitability is considered. New York State Electric & Gas and Rochester Gas and Electric Corporation have differentiated between load relief projects that do not require customers' contributions (i.e., behind the meter) and those that do, saying that projects that require collaboration are unsuitable for NWAs. Connecticut's Public Utilities Authority, whose NWA consideration framework is the most recent, also includes power quality and resilience projects as likely suitable for NWAs.

Regarding the cost threshold, Minnesota is the state with the highest cost threshold: $2 million. Rhode Island, Hawaii, and Connecticut have all established a $1 million threshold as their cost floor. Both Maine and New Hampshire have a minimum cost threshold of $0.5 million. In the case of New York, all utilities have a cost floor of $1 million for large projects, except ConEdison, and Orange and Rockland, which do not have a cost minimum. New York utilities have considerably lower floors for small projects, except New York State Electric and Gas, & Rochester Gas and Electric Corporation, whose criterion is the same for large and small projects.

Figure 5 presents the timeline requirements by state. Connecticut has the least restrictive time criterion. On the other hand, infrastructure must be required furthest in the future in Minnesota and New York. Again, New York's approach to designating different criteria for small and large projects allows them to consider small projects required in a shorter timeframe than large ones. New York is the only state to establish a period instead of a minimum time requirement. Even though I could not track New York's reasoning, Dyson et al. (2018) argue that utilities might want to include a timing threshold to exclude from consideration needs identified too far in the future because of forecast uncertainty. Connecticut's Public Utility Regulatory Authority (2022) has had opposing views on this idea. In a 2022 Decision, they mentioned that if a load forecast does not materialize, that does not mean that the NWA was a failure. Instead, it

means that the traditional investment would have been an unnecessary investment and a missed opportunity to capture DER's additional benefits. In addition, the Authority mentions that the scalable nature of DER should also be considered an advantage in these situations.

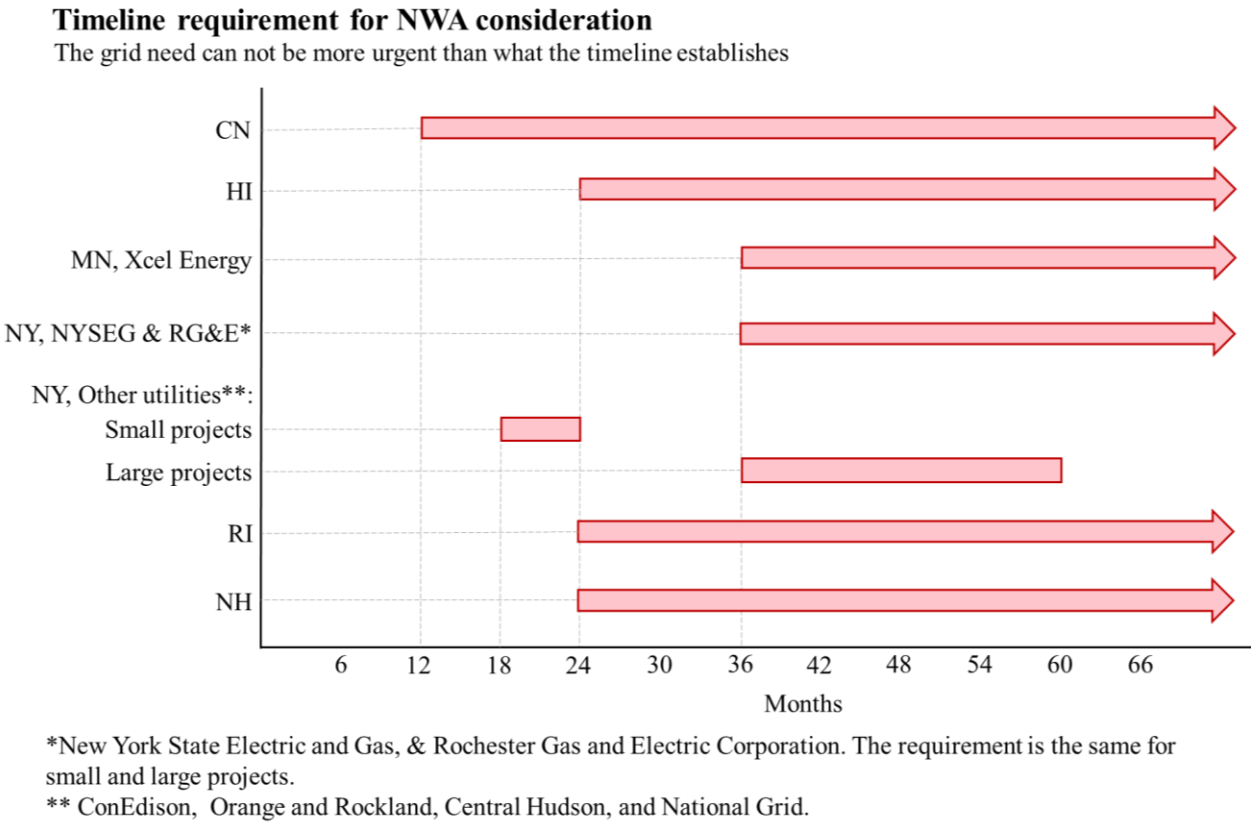

Figure 5. Time requirements for NWA consideration by state.

Unlike other states, California has opted for a more complex framework where DER service requirements and timelines are set by each utility but are just part of an initial screening stage (Pacific Gas and Electric Company, 2021). Then, each utility adopted three elaborated prioritization metrics to rank opportunities in a deferral shortlist: Cost-Effectiveness, Forecast Certainty, and Market Assessment (Pacific Energy Institute, 2020). Even though this is a more complex approach than the one adopted in other states, in practice, California's screening focuses on similar ideas of the project's cost, type, time requirements for DER deployment, and DER's

capabilities to address the system's needs. According to Pacific Energy Institute (2020), California's complex approach has not been able to identify more NWA opportunities than more straightforward methods that are based on stakeholder input.

3.5 Flexibility in opportunity identification and the role of screening criteria

So far, I have discussed how screening criteria can be adapted to respond to the particular reality of each utility or the diversity of project sizes and types. Additionally, I have already mentioned how screening criteria can be set as strict thresholds to estimate NWA suitability or guiding paths where NWA suitability is likely. Minnesota has taken more of a strict approach by establishing a regulator-led cost floor for all NWA opportunities. As mentioned before, this risks leaving NWA opportunities without consideration. On the other hand, other states have set considerations to include NWA opportunities outside of screening thresholds. For instance, Maine's NWA law established that the NWA coordinator might investigate NWAs below the $0.5 million threshold if there is a reasonable probability of an NWA being the most cost-effective option (Maine Legislature, 2019). Similarly, the Rhode Island PUC says it is up to the utility's discretion to propose NWA projects that do not pass the screening criteria. This guideline alone would not be a strong enough driver to stimulate NWA deployment. However, this type of consideration will be increasingly relevant as incentives for NWAs evolve.

Hawaiian Electric states that its methodology seeks to be over-inclusive instead of overly restrictive. The utility sets pathways for further consideration of projects that do not entirely fit the screening criteria. Projects that pass it are considered for procurement options. However, those projects that are not suitable for procurement (e.g., new real estate developments) or that will cost below $1 million but still might be suitable for NWAs are placed on a different track, where they are considered for programs and pricing options (Hawaiian Electric, 2020b).

Connecticut has had a different approach as well. Instead of having a binary classification of projects (i.e., suitable vs. not suitable), the state's screening criteria classifies projects into three groups: *i)* likely, *ii)* potential, and *iii)* unlikely NWA solicitation opportunities. Utilities must justify why every project in the list is suitable or not for NWAs (Public Utility Regulatory Authority, 2022a).

3.6 Creative solutions: consideration of hybrid alternatives

Since the NWA market is nascent, exploring what NWAs look like is still evolving. However, some states are examining other possibilities beyond the traditional infrastructure vs. DER binary. For instance, as established by Connecticut's Public Utilities Regulatory Authority, part of the recommendations that utilities can make in their filings is that an NWA could substitute only partially for the relevant investment (Public Utility Regulatory Authority, 2022a). Maine's NWA law establishes that the Commission can approve or disapprove a portion of an investment (Maine Legislature, 2019). Rhode Island's Least Cost Procurement Standards encourage utilities to consider partial or hybrid solutions when an NWA cannot defer an entire project (Rhode Island Public Utilities Commission, 2017). However, the consideration of partial solutions is even in an earlier stage than the consideration of NWAs, where frameworks of opportunity identification are unclear or non-existent. I believe it is fair to assess that the current screening frameworks do not provide fair treatment to potential partial solutions since entire projects are discarded as suitable for NWA on the basis of the type of needs the entire project addresses and their implementation timelines.

4 Discussion and conclusions

The standardization of NWA consideration in utility planning is in its early stages, as most states included in this paper have frameworks from 2018 or more recent years. However, the growing adoption of NWA consideration also speaks to how it has become a compelling concept for legislators and regulators. To pursue state-wide goals of energy affordability, climate change mitigation, and grid modernization, these eight states have explicitly integrated NWA consideration into utility planning by including it in periodic utility filings. However, passing new legislation and adopting new regulatory frameworks is less complicated than transforming regulatory and planning culture (Schauffler, 2022). Emerging commonalities in NWA opportunity identification are an instrument to understand NWA's current role in utility capital planning. At the same time, the differences among states are helpful in clarifying what approaches are more successful at guaranteeing the meaningful consideration of NWAs.

4.1 Considerations for regulators

In the following sections, I lay out essential considerations for regulators for establishing and updating NWA opportunity identification frameworks in relation to what I found out in this paper.

4.1.1 Integration: Coordinating NWAs with utility planning

Across states, NWA opportunity identification is performed in the context of capital investment plans. Regulators have attempted to include NWA consideration alongside fillings of grid needs to ensure opportunities are assessed throughout all future utility investments (see Table 2). Therefore, it will be increasingly crucial for regulators to pursue the clarification and establishment of planning reporting standards to systematize the consideration of NWAs under robust assumptions on how capital investments are proposed. For instance, considering that

current methods identify NWA opportunities based on cost caps, project types, and timelines (see Section **Error! Reference source not found.**), they are vulnerable to utilities presenting the infrastructure needed for a single area as disaggregated investments. A challenge that Maine's NWA coordinator faced during their first proposed NWA was that Central Maine Power would frequently add new requirements that the NWA would need to address (Schauffler, 2022). Therefore, it is fundamental to adapt guidelines on what is expected from capital investment plans in the context of utility planning that considers NWAs.

4.1.2 Transparency: Repairing for the asymmetry of grid information access

Across states, NWA consideration has worked as a platform to reduce data availability gaps for stakeholders regarding utility planning. States have put in place mechanisms to limit public disclosure of sensitive data, especially data at the costumer level or data related to cybersecurity risks. However, they have also listed new requirements for data-sharing related to NWAs (Public Utility Regulatory Authority, 2022a). Because of data requirements, ratepayers, developers, and regulators are increasingly better equipped to make decisions and understand the context under which utilities plan for infrastructure. Moving forward, the following considerations would help NWAs solidify as a driver for transparent and efficient planning and procurement processes:

1. Regulators should create an environment where stakeholders can periodically inform the update of data requirements. As described by Connecticut's Public Utility Regulatory Authority (2022a), data requirements are meant to allow regulators and stakeholders to understand and critically evaluate grid needs and NWA solicitation opportunities. As stakeholders gain more experience with NWAs, new data needs might surge. This includes technical facts about the grid need, the status of the system, and the timelines for when data needs to be accessible. For instance, after Maine's PUC rejected the first NWA

considered in the state, one of the advocates' main concerns was that if they and the NWA coordinator had access to utility planning data at an earlier stage, the outcome could have been different. Periodic stakeholder participatory processes would allow similar concerns to be considered in what data becomes available during NWA processes.

2. Equally important, states should also hold high transparency standards regarding how NWA opportunity frameworks are developed. NWA opportunity identification should be based on relevant data, including historical planning data. However, in most cases, how states established their screening criteria's thresholds is unclear. In the future, regulators should require or provide clarity in the reasoning behind NWAs' cost caps, timeline, and project type requirements before applying and approving screening criteria. This reasoning should be made public so stakeholders can better contribute to how effective screening criteria are and how they can evolve in the future.

4.1.3 Accessibility: Moving away from linear planning approaches by pursuing public input

NWA consideration has contributed to making the consideration of alternative investments a public issue. Historically, utility planning has operated under a linear structure, where utilities are responsible for identifying needs, coming up with solutions, and presenting an investment plan (Schauffler, 2022). NWAs have created the possibility of new points for stakeholder discussion other than after investment decisions have been made. States like Connecticut and Maine have installed third parties whose part of their task is to provide feedback on NWA opportunity identification. NWA consideration has become part of utility fillings, subject to regulatory scrutiny and public comments (see Table). NWA opportunity identification can strengthen a culture of collaborative and accessible planning by focusing on the following considerations:

1. States with periodic stakeholder engagement are better positioned to actively update their NWA opportunity identification strategies. In those states where utilities were in charge of establishing NWA opportunity frameworks, screening criteria, as mandated by regulators, were established through stakeholder participatory processes. Nevertheless, NWA consideration should not be meant to be a one-time regulatory change. Instead, it should be a continuous process that seeks to embed DER options in utility planning as DER technologies evolve and the market changes. Active stakeholder engagement will help regulators assess the effectiveness of these frameworks and lay the ground to update screening criteria when initial assumptions change. States should consider setting stakeholder engagement standards and requirements, which could be integrated into existing NWA filings. Merely including NWA consideration as a requirement will not fulfill the potential of NWAs in transforming utility planning.
2. States should actively promote NWAs and NWA filings among stakeholders, including NWA opportunity identification and solicitation processes. For instance, Connecticut's Public Utility Regulatory Authority (2022a) tasked utilities and the NWA Monitor with promoting the NWA process in order to ensure robust proposals and competition. High engagement in the NWA process would further preserve the assumption of prudency in utility investments.

4.1.4 Flexibility: Changing outcomes instead of reporting and planning strategies

Instead of viewing NWA opportunity identification approaches as an end goal, they should be interpreted as a bridge to internalize the consideration of DER-based infrastructure in utility planning, modernize the grid, and reach state climate and energy affordability goals. In fact, NWA consideration has been established under these assumptions (see Section 3.1). This paper

shows how inflexible approaches to opportunity identification can have undesirable outcomes, such is the case of Minnesota, where smaller utilities have not identified a single project that fits the NWA screening criteria. On the other hand, more flexible approaches that utilities can adjust to their reality have proven to be more successful.

In setting up their screening criteria, regulators should consider that, as the industry and the public gain experience with NWAs, flexible screening criteria will continue to be a strategy to foster creativity and reduce gaming in NWA consideration. States should create avenues for stakeholders to question and propose alternatives outside the screening criteria. States have started to do so (see Section 3.5). This will disincentivize utilities from planning their capital investments strategically around thresholds so that they can avoid NWA consideration. Additionally, it will become an indicator to understand how frameworks can evolve to be better adapted to the state of NWA and DER technologies.

4.1.5 Creativity: Beyond deploying NWAs

If NWA consideration is meant to transform linear approaches of utility planning and integrate DER-consideration in capital investments, I believe it is unfair to measure its success only in terms of the number of NWAs deployed. NWA consideration could also be playing hiding roles, such as regulating utilities' prudency in their traditional investments. Utilities might seek cost-effectiveness in their traditional projects, so their projects are picked frequently. In addition, I believe that this consideration is critical in strengthening the role of NWA consideration:

1. A framework that focuses on maximizing and measuring DER's capabilities only in terms of their ability to provide the same services as traditional projects will continue to leave high-value opportunities out. Regulators should pursue collaborative frameworks where

hybrid solutions are possible. New channels of communication, data transparency, and partnerships will be needed for stakeholders to unite expertise and identify the portion of each project for which each technology is the optimal option.

4.1 Considerations for developers

NWAs call for increased coordination between stakeholders. Third parties will play a key role in proposing and developing NWAs. Moving forward, the following considerations would promote a positive role of developers in NWA consideration:

1. Developers should be actively involved in updating NWA opportunity identification frameworks. As developers gain experience with DERs, they should seek to participate in stakeholder processes where they can provide feedback on how screening criteria should evolve according to their new capacities.
2. Additionally, developers should advocate for transparency and specificity in NWA opportunity identification. The proposal of successful bids will depend on developers having a clear understanding of the state of the grid, the need being addressed, and the expectations their proposals need to fulfill to be awarded. Public commenting in NWA fillings will be an excellent venue for this type of advocacy (see Table 2).

4.2 Considerations for advocates

NWAs have the potential for communities to perceive the additional benefits of DER technologies. States are increasingly discussing including societal and environmental benefits in NWA cost-benefit analyses. Moving forward, advocates should continue to demand data availability and transparency in NWA opportunity identification as a strategy to scrutinize the

prioritization of electricity affordability in NWA decisions. Advocates should take advantage of the increasing amount of data to use it as a tool for advocacy, as well as identifying gaps and advocating for their closure.

In the future, it will become critical to understand how successful are NWA identification frameworks in selecting projects with high societal and environmental benefits.

4.3 Future research

NWA is a relatively nascent market. Therefore, the understanding of their benefits, applications, and optimal consideration is evolving. Moving forward, I believe that answering these questions could get us closer to having more clarity:

- As NWA consideration enters diverse contexts of utility planning (see Table 2), how does the context of NWA consideration affect the lens through which states evaluate NWA opportunities?
- How do NWAs interplay with other utility fillings and processes that aim to increase DER's consideration and deployment?
- What are the appropriate metrics to evaluate when screening criteria needs to evolve as DER technology advances and utilities, developers, and regulators gain experience in their deployment?
- How can the utility business model move towards hybrid NWA consideration?
- How can NWA opportunity identification frameworks prioritize selecting projects with high societal and environmental benefits?

In addition, it is essential to recognize that NWA opportunity identification is just a portion of NWA consideration. Further research needs to be done to understand the proper ways to evaluate

the cost and benefits of NWAs, pursue successful solicitation processes, and what incentives would be the most successful at encouraging the large-scale adoption of NWAs.

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Xcel Energy. (2021). *Integrated Distribution Plan 2022-2031* (pp. 1–407).

A. NWA consideration enabling legislation and regulation by state

Table A-1. Relevant NWA enabling policies in studied states.

State	Year	Responsible	Legislation/Regulation	Description
CA	2019	Public Utilities Commission	Administrative Law Judge's Ruling Modifying the Distribution Investment Deferral Framework Process	It establishes an annual process focused on identifying opportunities for third-party owned DER infrastructure that can defer traditional investments.
	-	Utilities	Distribution Deferral Opportunity Report	It is submitted by the utilities to compile with the order above.
CN.	2019	Public Utilities Regulatory Authority	Equitable Modern Grid Decision	It established several objectives for the Authority, including i) supporting the growth of Connecticut's green economy, ii) enabling cost-effective decarbonization, iii) increasing access to reliable, resilient, secure energy, and iv) moving forward the conversation about energy affordability. One of the mechanisms to achieve this was to open an investigation on NWAs.
	2022	Public Utilities Regulatory Authority	PURA Investigation into Distribution System Planning of the Electric Distribution Companies – Non-Wires Alternatives	It aims at establishing a process for competitive, transparent evaluation of NWAs against traditional infrastructure. Multiple stakeholders gave input for the creation of this framework.
HI	2015	Hawaii Public Utilities Commission	Docket No. 2015-0070, Decision and Order No. 33584	The Commission directed Hawaii Electric Company to consider fully non-transmission and non-distribution alternatives.
	2019	Hawaii Public Utilities Commission	Docket No. 2018-0055, Decision and Order No. 36288	The Commission reiterated the need to consider and evaluate NWA as an integral part of utility planning.
	2020	Hawaiian	Non-Wires Opportunity	The Company proposed a

		Electric	Evaluation Methodology	methodology to identify NWA opportunities.
ME	2009	State Legislature	Declaration of policy on smart grid infrastructure	The law seeks at digitalizing the electric system, deploying more DER, smart technologies and storage, provide costumers with energy consumption data and eliminate barriers for smart grid adoption.
	2019	State Legislature	An Act To Reduce Electricity Costs through Non-wires Alternatives	It sets the guidelines for NWA consideration in the state, including screening criteria and the establishment of the NWA coordinator.
MN.	-	Minnesota Legislature	Minn. Stat. 216B.2425: State Transmission and Distribution Plan	It mandates that utilities submit, every odd-numbered year, a list of transmission and distribution projects needed to upgrade and maintain the grid, also known as Biennial Distribution System Plan. The Law states that utilities must identify investments to support continued DER development.
	2018	Public Utility Commission.	Order Approving Integrated Distribution Plan Filling Requirements	The PUC established requirements for the submission of Integrated Distribution Plans (IDPs). The PUC sets a cost floor for NWA consideration, and utilities must create a screening process that provides information on *i)* the type of projects that lend themselves to NWA, *ii)* a timeline needed to consider NWA, and *iii)* a cost threshold.
	-	Utilities	Integrated Distribution Plans	Utilities set screening criteria for NWA opportunity identification and present their identified options.
NH	2015	New Hampshire	NH Rev Stat § 378:38: Least Cost Energy	It requires utilities to submit their Least Cost Integrated Plans

		Legislature	Planning	every five years. Each plan must include an assessment of supply options and T&D requirements. The latter needs to include an assessment of the costs and benefits of smart grid technologies.
	-	Utilities	Least Cost Integrated Plans	Utilities show how they have pursued NWA consideration in their Plans to fulfill the requirements.
NY	2014	Public Service Commission	Reforming the Energy Vision	This initiative aims to transform the energy system into one that is more decentralized, resilient, and affordable. The strategy looks to maximize the instances where DER options are more cost effective than traditional infrastructure.
	2016	Joint Utilities of New York	Supplemental Distributed System Implementation Plan	It set guidelines and agreements to propose NWA suitability criteria.
	2017	Public Service Commission	Order on Distributed System Implementation Plan Filings	Mandated the refinement of the suitability criteria proposed by Joint Utilities of New York.
RI	2006	Rhode Island Legislature	Comprehensive Energy Conservation, Efficiency, and Affordability Act	It requires utilities to make cost-effective decisions and submit a System Reliability Procurement Plan every three years.
	2017	Rhode Island Public Utilities Commission	Least Cost Procurement Standards	Mandates to include NWAs in the System Reliability Procurement Plan.
	-	National Grid	System Reliability Procurement Plan	The utility establishes its NWA consideration criteria and other NWA considerations.

B. Screening criteria by state

1. California

Table B-1. California's initial screening criteria.

Aspect	Criteria
	Pacific Gas & Electric
Project type	Distribution capacity, Voltage Support, Reliability, and resiliency.
Timeline	Before 2024*

*For the projects included in the 2021 report.

Note: California has established a different approach to NWA opportunity identification compared to any other state. The state performs an initial timing and technical screen. Later, each utility establishes three metrics that are used to prioritize projects: i) cost-effectiveness, iii) forecast certainty, and iii) market assessment.

Source: Pacific Gas and Electric Company. (2021). PG&E's 2021 Distribution Deferral Opportunity Report. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M400/K593/400593924.PDF

2. Connecticut

Table B-2. Connecticut's screening criteria.

Group	Aspect	Criteria
Likely NWA opportunities	Project type	Distribution system capacity, power quality, reliability, renewable or distributed resources integration, or resilience.
	Cost	< $1 million.
Potential NWA opportunities	Cost	< $0.5 million, > $1 million.
Unlikely NWA opportunities	Cost	< $250,000, > $0.5 million.
	Timeline	Needed within 1 year to ensure continuous service

Notes: Utilities are required to submit a description of whether each project is suitable or not for NWAs.

Sources: Public Utility Regulatory Authority. (2022). Non-wire Solutions Process Design Document. https://www.dpuc.state.ct.us/2nddockcurr.nsf/8e6fc37a54110e3e852576190052b64d/59e888f10a5de7d2852588f5005b106c?OpenDocument

3. Maine

Table B-3. Maine's screening criteria.

Aspect	Criteria
Cost	≥ $500 k

Notes: The NWA coordinator may examine NWAs if the project does not fit the criteria, but they believe there is a reasonable likelihood that a NWA would be more cost-effective than the proposed investment.

Source: Maine Legislature. (2019). An Act To Reduce Electricity Costs through Nonwires Alternatives. https://www.mainelegislature.org/legis/bills/bills_129th/billtexts/HP085501.asp

4. Hawaii

Table B-4. Hawaii's screening criteria.

Aspect	Criteria
Timing	≥ 24 months
Project type	Capacity, reliability and resilience.
Cost	≥ $1 million for NWA procurements.

Notes: Projects under $1 million may be considered for targeted DER programs to address specific NWA needs.

Source: Hawaiian Electric. (2020). Non-Wires Opportunity: Evaluation Methodology. https://www.hawaiianelectric.com/documents/clean_energy_hawaii/integrated_grid_planning/stakeholder_engagement/working_groups/distribution_planning/20200602_dpwg_non_wires_opportunity_evaluation_methodology.pdf

5. Minnesota

Table B-5. Minnesota's screening criteria.

Aspect	Criteria			
	Xcel Energy	Otter Tail	Dakota Energy	Minnesota Power
Project type	Capacity projects		Demand side management or load management	Load-serving and reliability issues*
Cost	≥ 2$ million	≥ 2$ million	≥ 2$ million	≥ 2$ million
Timeline	36 months	-	-	-

*when there is not an asset renewal being addressed. Minnesota Power also says that NWA is suitable only when the operational characteristics of NWAs are adequate for the need.

Sources: Dakota Electric Association. (2021). Dakota Electric Association Integrated Distribution Plan (IDP). (Docket E-111/M-21-728; pp. 1–162).

Minnesota Power. (2021). 2021 Integrated Distribution Plan (Docket No. E015/M-21-390; pp. 1–181).

Minnesota Public Utilities Commission. (2018). Order Approving Integrated Distribution Planning Filing Requirements for Xcel Energy. https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BF05A8C65-0000-CA19-880C-C130791904B2%7D&documentTitle=20188-146119-01

Otter Tail Power Company. (2021). Integrated Distribution Plan (Docket No. E017/CI-21-612; pp. 1–112).

Xcel Energy. (2021). Integrated Distribution Plan 2022-2031 (Docket No. E002/M-21-694; pp. 1–407).

6. New Hampshire

Table B-6. New Hampshire's screening criteria

Aspect	Criteria
	Liberty
Project type	Not based on asset condition
Cost	≥ $500 k
Timeline	≥ 24 months

Source: Liberty. (2021). Least Cost Integrated Resource Plan. https://www.puc.nh.gov/Regulatory/Docketbk/2021/21-004/INITIAL%20FILING%20-%20PETITION/21-004_2021_01_15_GSEC_LCIRP.PDF

7. New York

Table B-7. New York's screening criteria.

Aspect		Criteria			
		Central Hudson	**Con Edison and O&D**	**National grid**	**NYSEG & RG&E**
Project type		Load relief and reliability*.	Load relief and load relief in combination with reliability	Load relief and reliability*	Load relief** and reliability
Cost	Large projects	≥ $1 million	No floor	≥ $1 million	≥ $1 million
	Small projects	≥ $300 k	≥ $450 k	≥ $500 k	≥ $1 million
Timeline	Large projects	36-60 months	36-60 months	36-60 months	≥ 36 months***
	Small projects	18-24 months	18-24 months	18-24 months	≥ 36 months***

*Reliability includes remote single source regions or enhancement projects requested by customers (i.e., redundant supplies).

**If they do not require customer contributions.

***Including customer in-service dates.

Sources: Joint Utilities. (n.d.). Utility-Specific Non-Wires Alternatives (NWA) Opportunities. Retrieved April 16, 2023, from https://jointutilitiesofny.org/utility-specific-pages/nwa-opportunities

Joint Utilities. (2017). Joint Utilities' Supplemental Information On The Non-Wires Alternatives Identification And Sourcing Process And Notification Practices.

8. Rhode Island

Table B-8. Rhode Island's screening criteria.

Aspect	Criteria
Project type	Load relief and reliability. Not based on an asset condition.
Cost	< $1 million.
Timeline	< 24 months
Size of the project*	< 20% of the relevant peak load

*If load reductions are required.

Source: Rhode Island Public Utilities Commission. (2017). Least Cost Procurement Standards.