KEEGAN WERLIN LLP

ATTORNEYS AT LAW

99 HIGH STREET, SUITE 2900

BOSTON, MASSACHUSETTS 02110

(617) 951-1400

TELECOPIER:

(617) 951-1354

February 28, 2020

Mark D. Marini, Secretary
Department of Public Utilities
One South Station, 5th Floor
Boston, MA 02110

Re: DG Interconnection – D.P.U. 19-55

Dear Secretary Marini:

On behalf of NSTAR Electric Company d/b/a Eversource Energy ("Eversource"), enclosed are Eversource's comments regarding distributed generation interconnection cost allocation methodologies.

Thank you for your attention to this matter. Please contact me if you have any questions regarding this filing.

Sincerely,

John K. Habib

John K. Habib

Enclosures

cc: Kate Tohme, Hearing Officer
D.P.U. 19-55 Service List

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC UTILITIES

Inquiry by the Department of Public Utilities On its own Motion into Distributed Generation Interconnection	)))))	D.P.U. 19-55

INITIAL COMMENTS OF
NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY

I. INTRODUCTION

On May 22, 2019, the Department of Public Utilities ("Department") commenced an inquiry to investigate the Massachusetts standards and procedures by which distributed generation ("DG") projects are interconnected to the electric power system in Massachusetts, with an express goal of fostering the continued growth of DG in the Commonwealth, while maintaining the safety and reliability of the electric power system. On December 26, 2019, the Department issued a follow-up memorandum in this proceeding requesting submission of detailed cost-allocation proposals (the "Memorandum"). These comments are submitted by NSTAR Electric Company d/b/a Eversource Energy ("Eversource" or the "Company") in response to the Department's request for comments.

In the Department's Memorandum, the Department noted that, under current Massachusetts interconnection procedures, costs related to infrastructure modifications arising due to the requirements of an interconnecting DG facility are allocated to the DG facility based on the ratemaking principle that the DG facility causing the need for a modification must pay for that modification ("the DG Cost Causation Principle"). Unlike the interconnection policy for retail distribution service customers, the DG facility causing the need for the required upgrade is paying

100 percent of the associated upgrade costs. In the Memorandum, the Department sought proposals indicating either support for the current Distributed Generation Cost Causation Principle or presenting an alternative cost-allocation principle for all or certain circumstances in which an infrastructure modification is necessary to interconnect one or more DG facilities. The Department requested detailed proposals that could be implemented in the near term with little to no further process and expressly stated this proceeding was not the appropriate forum to recommend pre-emptive infrastructure modifications to meet state climate change requirements. Engagement with experts and consultants and joint submissions were also highly encouraged.

Consistent with the Department's guidance, Eversource has worked collaboratively with National Grid and Unitil (collectively, the "Electric Distribution Companies" or "EDCs") to evaluate potential alternatives to the current standards and procedures by which infrastructure modifications necessary for the interconnection of DG are funded. Eversource also selected ScottMadden, Inc. ("ScottMadden") jointly with the other EDCs to support the research and evaluation of a range of approaches to funding infrastructure modifications. Although Eversource and the other EDCs have not elected to submit a joint proposal, the Company expects that the perspective detailed in these comments has considerable alignment with those of the other EDCs. Eversource will continue to work with the other EDCs and other stakeholders on this important issue and expects further alignment will be achievable through additional collaboration.

As described in these comments, the Company's perspective is informed by consideration of standards and practices for funding infrastructure upgrades necessary for the interconnection of DG and renewable resources in jurisdictions across the United States. The Company's perspective is also based on specific consideration and evaluation of the relative fit with existing policies and programs in Massachusetts, including the Solar Massachusetts Renewable Target ("SMART")

program. Through collaboration with the EDCs and ScottMadden, Eversource has sought to develop a perspective that advances and balances the Commonwealth's important clean energy policies with respect to DG in a manner that is effective, fair and – most importantly -- maintains the reliable operation of electric power system.

Based on thoughtful review and consideration, Eversource recommends that the Department and stakeholders consider Massachusetts DG-related infrastructure modifications and the allocation of costs associated with those upgrades within a broader context of the Commonwealth's clean energy and climate policies that directly impact the electric power system. The long-term design of the electric power system in Massachusetts is going to be directly influenced by a range of critical clean energy and policy goals. The integration of renewable DG resources is an important, but not exclusive, goal that will continue to impact the electric power system. As always, Eversource works to plan distribution and transmission investment in an optimal manner, consistent with all applicable state policy goals. Eversource expects that, by doing so, its system will be more efficient, lower cost and of greater value to assisting in state policy goals over the long term.

Optimal system planning will necessarily incorporate the near-term infrastructure requirements for the interconnection of DG and it will remain appropriate for DG facilities creating the most immediate needs for infrastructure modifications to contribute to the costs of those modifications and receive price signals to inform development decisions appropriately. However, optimal infrastructure modifications will inevitably address system needs that extend beyond the interconnection of the immediate queue of DG facilities. Therefore, it is not necessarily reasonable to allocate the full cost of infrastructure modifications to current DG facilities in such cases.

Eversource recognizes that the continued evolution of the electric power system may increasingly involve major infrastructure modifications that will both enable the near-term interconnection of DG resources and also have the potential to serve the longer-term needs of the electric power system. At this juncture, the Company does not know of a generally accepted approach for differentiating such benefits with precision and accuracy so that the benefits could be incorporated into a comprehensive proposal that meets the Department's objectives of being implemented in the near term with little to no process. However, working with the EDCs and stakeholders, the recommendations set forth herein will position the Department to explore potential approaches for reasonably differentiating cost responsibility subject to later refinement. Any standard adopted in this proceeding by the Department should be designed to incorporate learning and have the flexibility to iterate in alignment with market knowledge and public policy.

In the near term, the Department should address current barriers to the continued growth of DG in Massachusetts through changes that are consistent with long-term objectives for cost allocation and design of the electric power system. Specifically, Eversource recommends that the Department authorize the EDCs to: (1) identify optimal infrastructure solutions that address future system needs in addition to requirements for the near-term interconnection of DG facilities through concurrent interconnection and system planning studies; and (2) appropriately allocate the costs of DG-related infrastructure modification to an expanded group of DG facilities, which includes future projects that may be enabled by the current infrastructure modifications made to accommodate DG interconnections today. The allocation of infrastructure modification costs to future, as-yet unknown DG facilities will reduce the cost responsibility of current DG facilities on an equitable basis in many cases and will mitigate the potential for free-ridership in the future by providing for contributions by future growth.

The Company expects these changes to the Massachusetts standards and procedures for the interconnection of DG would equitably mitigate potential barriers to the near-term growth of DG in Massachusetts and serve as a starting point for more comprehensive standards that are aligned with the Commonwealth's clean energy and climate goals.

II. Research & Evaluation of Alternative Approaches

The research and findings presented to the EDCs by ScottMadden is provided as Appendix 1 to these comments and was an instructive resource for the development of the Company's perspective and recommendation. In the course of the firm's research, ScottMadden extensively reviewed industry reports and articles, regulatory proceedings and other relevant analyses. In total, ScottMadden reviewed standards and procedures in place in 10 states, plus four regional transmission organizations ("RTOs"), including jurisdictions with aggressive goals for the growth of DG and renewable resources similar to Massachusetts.

A key finding of ScottMadden's research was that the current DG cost-causation approach remains the generally accepted method for establishing cost responsibility for system upgrades in many jurisdictions. Advantages of the current cost-causation approach include providing price signals for the cost of integrating resources on certain portions of the electric power system; thereby creating an incentive for better utilization of the existing infrastructure. The cost-causation approach is also viewed to be consistent with fundamental regulatory principles pertaining to customer equity and fairness in that it places cost responsibility on the direct beneficiary of incremental system upgrades.

Disadvantages were identified with the cost-causation approach with respect to "free riders" and economic efficiency. When costs are assigned to a single incremental project triggering the initial need for infrastructure modifications, the potential is created that subsequent

projects may seek to interconnect to the system without the need for further modifications. These future projects would be the beneficiaries of the initial infrastructure modifications but would likely have no responsibility for funding those upgrades, as the upgrades would be already completed. Similarly, cost-causation approaches that assign responsibility to a single or small group of projects may create inefficiencies in terms of recurring applications for interconnection that may result in project terminations.

Several mechanisms for mitigating potential instances of free-ridership and improving efficiency have been implemented and explored in many jurisdictions, including Massachusetts. Assignment of cost responsibility to a group of projects through a group/cluster study process would properly spread the cost of infrastructure modifications among multiple beneficiaries. Mechanisms for post-upgrade reimbursement would also serve to have the beneficiaries of system modifications contribute to the costs caused by their interconnection, while recognizing that modifications will be completed in advance of other DG facilities seeking to interconnect to the electric power system. Significantly, nearly all examples that enable greater sharing of infrastructure modification costs continue to adhere to the cost-causation principle and seek to recover costs from the DG customers that receive the most direct near-term benefit from system modifications.

Financial analysis of DG project economics has demonstrated that the price signals provided by the cost-causation approach may significantly impact project development decisions, including decisions to proceed with or abandon DG projects that require more substantial and costly infrastructure modifications. ScottMadden's analysis confirmed that solar projects would be less likely to be economic or feasible under the current SMART program as the costs of the infrastructure modification that the projects are causing escalate. The costs of system upgrades

for most projects have historically been within levels at which project economics can support, but it remains possible that system modifications necessary to interconnect large solar facilities located on portions of the electric power system with high penetration of existing DG facilities and/or lower amounts of local load could be more substantial and cost prohibitive in some cases going forward.

A key driver of system upgrades is the need to address reverse power flows to maintain a reliable and safe distribution system. The Company expects that the current queue of DG projects seeking to interconnect may create reverse power flows from Distribution to the Transmission system and necessitate upgrades of entire Distribution stations, as well as Transmission facilities. These transmission and distribution upgrades may require substantial investments that may potentially be cost prohibitive to individual or even a collection of DG customers. Eversource is concerned that this phenomenon will result in the abandonment of projects, which may or may not be based on proper economic signals. Therefore, Eversource views it as critical that appropriate price signals be preserved and balanced with important public-policy goals, as discussed later in these comments.

A handful of examples were identified in which the cost of infrastructure modifications to regional transmission system were recovered from all customers in recognition of the benefits that such investment provided to advance state policy objectives. For example, a cost-allocation method was developed by the Midcontinent Independent System Operator ("MISO") for a special class of Multi-Value Projects ("MVP") that reliably and economically enabled regional public policy needs. The costs of transmission system investments that directly enabled renewable generation resources in Competitive Renewable Energy Zones ("CREZ") under the administration of the Electric Reliability Council of Texas ("ERCOT") were similarly directed to be recovered

from all customers. These examples of pre-emptive infrastructure modifications are outside the scope of proposals that the Department has sought in this forum, but the basis for customer funding reflected in the various approaches is relevant to consideration of cost allocation approaches in this proceeding.

III. Massachusetts Clean Energy Policy

Eversource recognizes the Massachusetts standards and procedures for cost allocation of infrastructure modifications must be evaluated in the context of the Commonwealth's goals for DG, clean energy and the electric power system more broadly. The overarching goal encompassing all of these areas is the Commonwealth's objective to aggressively address Climate Change as reflected in the Global Warming Solutions Act ("GWSA"). Massachusetts has committed to the reduction of greenhouse gas emissions levels 80 percent by 2050 and contributions from renewable DG are a critical element of the Commonwealth's plans for achieving those reduction targets. Contributions from distributed solar generation are specifically targeted to support Massachusetts Renewable Portfolio Standard ("RPS") requirements through the RPS solar carve-out I and II ("SREC I and II") and the SMART Program and the Department has directed the EDCs to support the integration of distributed resources through their Grid Modernization plans. The standards and procedures for cost allocation of infrastructure modifications should be consistent with the Commonwealth's climate goals and complement programs and policies intended to support development of distributed generation.

The Company also views it as relevant that the Commonwealth's policies with respect to the solar generation sector have evolved and matured with the growth of the market since launch of the first RPS solar carve-out in 2010. Chapter 75 of the Acts of 2016 directed the Department of Energy Resources ("DOER") to develop a statewide solar incentive program to encourage the

continued development of solar renewable energy generating sources and enumerated several key criteria for what ultimately became the current SMART program. Among those criteria were goals to promote a stable and self-sustaining solar market at a reasonable cost to customers; to create accurate price signals and market-based mechanisms; and to consider underlying system costs and support diverse installation types.

The Commonwealth's solar policies are further reflected in the design of the Commonwealth's solar incentive programs. In particular, in an effort to promote market diversity, both the SREC II and SMART programs feature provisions intended to control the development of large ground-mounted solar arrays on greenfield sites. The SREC II program restricted eligibility of most such systems to a "managed growth" market segment with capped participation and the SMART Program design includes a "greenfield subtractor" intended to lower incentive for the development of such facilities relative to other installation types. DOER has proposed to substantially increase this subtractor as result of the 400 MW review of the SMART Program and clarified that the program was "designed to steer development away from large scale ground mounted projects in undeveloped spaces."[1]

Large facilities that Massachusetts solar policies have sought to discourage or limit also frequently require more significant and costly infrastructure modifications to interconnect to the electric power system. Standards and procedures for allocation of infrastructure modification costs

[1] Massachusetts Department of Energy Resources, SMART Program 400 MW Review, pg. 8, September 5, 2019 https://www.mass.gov/files/documents/2019/09/04/400%20MW%20Review%20DRAFT%20090419.pdf

that serve to discourage the development of such large facilities may be viewed to be consistent with state policies, but only to a point. Although the Commonwealth has sought to promote market diversity, large facilities have still provided the most substantial and lowest cost solar energy generation to advance climate goals. The majority of capacity enrolled or qualified for the SMART program currently comes from facilities with generating capacity of 1 MW or more and these facilities receive the lowest base compensation rates provided through the program. As a result, the escalation of infrastructure modification costs could significantly curtail the growth trajectory and average cost of clean energy generation within Massachusetts under the current cost causation approach[2].

Eversource also recognizes that advancement of the Commonwealth's clean energy goals and achieving progress towards emission reduction targets is going to have impacts on the electric power system that extend beyond integration of DG resources. The Massachusetts Comprehensive Energy Plan ("CEP") recognized that clean energy policies focused primarily on the electric sector are likely to have diminishing returns going forward and that achieving additional emissions reductions will require increases in the electrification of the thermal and transportation sectors. The CEP also notes that electrification may serve to leverage the investments made in a cleaner electric power system by using that clean electricity in vehicle and heating applications. However, the creation of an electric power system that serves substantial new sources of electric load with

[2] Some DG facilities participating in SMART that also intend to participate in the ISO New England Inc. wholesale markets will be required to interconnect under the ISO-NE interconnection process. The proposals at issue in this proceeding will only apply to DG facilities interconnecting under Massachusetts interconnection procedures.

renewable resources is ultimately going to require further infrastructure modifications, including modifications that may overlap with those required to connect DG to the electric power system in the near term.

Eversource recommends that the Department seek to establish standards and procedures for allocation of system modification that remain consistent with the range of policies summarized above. Although the cost-causation principle may be consistent with some aspects of the Commonwealth's clean energy policies, it may also be insufficient as the sole basis of standards and procedures for allocation of infrastructure modification costs.

IV. Cost Allocation Principles

Thoughtful evaluation of the research and analysis of ScottMadden and consideration of the full range of the Commonwealth's relevant clean energy policies has led Eversource to recommend a DG cost allocation approach that advances the three key objectives enumerated below. In parallel, and as a consequence of the guiding objectives for this initiative, the Company also expects to advance goals with respect to customer equity, safety and reliability, transparency, innovation and cost-efficiency.

A. Appropriate Alignment of DG Interconnection and System Planning

Investment activity in the electric power system will continue to be a function of a range of factors that extend beyond the interconnection of DG. Eversource will continue its planning and investments associated with asset condition and load growth. Policies that seek to advance emission reductions through electrification may further influence system planning and investment activity. The study and design of DG-related infrastructure modifications is necessary for long-term system planning and should be undertaken in a way that best positions the Company to identify optimal long-term infrastructure solutions. Eversource proposes to align planning

activities with interconnection studies performed under Massachusetts interconnection procedures in order to identify the most cost-effective long-term solutions for the electric power system as a whole. Allocation of costs to DG facilities will reflect their relative contributions to optimal infrastructure solutions identified through parallel planning activities.

B. Preserving Price Signals to Encourage Responsible and Competitive DG Development

Eversource views it as essential that any cost-allocation approach continue to provide information to DG developers regarding the full infrastructure cost implications of their proposed projects and create financial transparency of those costs to influence development decisions. The costs of infrastructure modifications have the potential to be significant in some cases. Any policy that substantially insulates DG projects from the ultimate cost of their development would lead to uneconomic decision making and harm other customers who would bear ultimate responsibility for infrastructure modification costs. The elimination of price signals would also potentially run contrary to policies that encourage market diversity by disproportionally benefiting large-scale ground-mounted projects located in undeveloped areas. As a result, the Company recommends against the adoption of any proposal that eliminates or caps the cost responsibility of DG projects for infrastructure modifications.

C. Sharing of Infrastructure Modification Costs Among Beneficiary Projects

Research by ScottMadden confirmed that a notable disadvantage of the cost causation principle is that it risks burdening a single project with a substantial cost for infrastructure modifications. Allocation of substantial infrastructure modification costs to a single project may make it uneconomic to proceed with development or, if not, enable other projects to unfairly be "free riders" if they can connect to the electric power system without the need for further infrastructure modifications. The Company also recognizes if infrastructure modification costs

can be appropriately divided among a larger number of DG projects then they will be less likely to serve as a barrier to the continued development of solar generation in the Commonwealth.

V. Infrastructure Planning and Allocation Proposal

Eversource expects that efficient and appropriate cost allocation will be dependent on efficient system planning for an increasingly dynamic electric power system that serves a range of customers and markets. Accordingly, the Company's proposal necessarily links a proposal to encourage the identification of optimal infrastructure modifications with a proposal for allocating the cost of those modifications.

Concurrent studies for optimal solutions

In addition to identifying infrastructure modifications necessary for the safe and reliable operation of proposed DG facilities in parallel with the electric power system, Eversource recommends planning distribution and transmission investment in an optimal manner that is consistent with all state policy goals. The Company recommends that, concurrent with Massachusetts DG Interconnection studies, Distribution studies and Area System Operator ("ASO") Transmission Cluster studies, Eversource would conduct a rolling 10-year distribution and transmission assessment on an annual basis. Approved ISO-NE Transmission Plans would serve as an input (base-case modeling) into the annual assessment and long-term studies that will analyze multiple scenarios would be utilized. Low, Medium and High scenarios would be constructed with consideration given to a range of input assumptions on DG, Energy Efficiency and Electric Demand growth including Electric Vehicle and Heating Electrification demand. DG in the Low scenario would be based directly on the prevailing DG interconnection queue (factoring in average attrition rates).

At the conclusion of these studies, Eversource would identify Distribution and Transmission Network Upgrades required to most cost effectively mitigate all identified reliability constraints in each scenario. Upgrades identified across Low and Medium scenarios would be deemed to be high priority and would be included within Long-term Distribution and Transmission Plan as "Planned Local Projects." Thereafter, Eversource would immediately move from the planning phase to the design and engineering phase. Special consideration in prioritization would be given to upgrades that have long-lead times for implementation. Given that these projects are shown to be needed across reasonable scenarios, the implication is raised that the upgrades will be needed to serve demand growth; to address baseline DG assumptions; and to meet requirements of future public policy initiatives.

Upgrades that are identified in the High but not otherwise needed across Low and Medium scenarios would be included within the Long-term Distribution and Transmission Plan as "Proposed Local Projects." Further analysis in subsequent annual planning study cycles would be conducted and, as certainty around longer-term assumptions increase, these Proposed Projects may transition to Planned Projects. These Planned and Proposed projects as developed by the Company would inherently take a longer-term view in planning. Assuring that the scenarios do not materially diverge would help to be certain that the most cost-effective and efficient long-term solution is built.

The concurrent 10-year distribution and transmission assessment conducted by the Company will identify parallel upgrades that may be installed or expanded as part of an optimal

solution that addresses potential system needs beyond the near-term interconnection of proposed DG facilities:[3]

1. Technologies for Voltage Control on the Distribution System

Voltage deviations on the Distribution system may necessitate Distribution station voltage control devices such as Load Tap Changers (LTCs), Reactors, DVARs or Capacitor Banks.

2. Distribution Bulk Transformer Addition or Replacement

With the high side of the transformer voltage at 100 kV or higher, the upgrade may involve expansion of a Distribution station to add an additional Bulk transformer or replace the existing bulk transformers with larger rated transformers (or other technologies as deemed applicable to mitigation of identified thermal constraints).

3. New Bulk Station

In regions where multiple stations are determined to be capacity limited, new bulk stations may be required where high side of the Station voltage is at 100 kV or higher.

4. Technologies for Voltage control on the Transmission System

Voltage deviations outside of station equipment criteria may necessitate voltage control devices such as Reactors, Capacitor Banks, Synchronous Condensers or STATCOMs.

5. Radial Transmission Line

There may be instances where a load pocket is currently served radially through distribution line/s and system-planning criteria to reliably serve load in combination with localized DG penetration may necessitate upgrading the distribution line/s to radial transmission lines.

6. Network Transmission Line (New, Reconductoring or Rebuild)

Thermal overload of existing transmission lines may require reconductoring. Where reconductoring (typically the most cost-effective solution) may not be feasible, rebuild or new transmission lines may be needed.

[3] The ASO is focused on only the low case (DG in the queue today). This analysis would be above and beyond the ASO analysis.

The Company expects that the optimal solutions identified through the planning process will include additional or expanded infrastructure modifications that will address system needs beyond the near-term interconnection of certain, proposed DG facilities. Costs of modifications that are not solely attributable to the near-term interconnection DG will be excluded from amounts allocated to DG facilities. The cost of infrastructure modifications that are identified to accommodate current DG facilities and further DG growth will continue to be allocated to DG customers, but through a mechanism that shares costs among both current *and future* DG facilities.

After Planned Projects are approved by the Department, the ASO and Hosting Capacity maps would be updated to reflect additional capacity built into the system thereby signaling more DG to locate in those regions and take advantage of the new infrastructure – thus enabling more DG growth on the system. At the conclusion of each annual System Planning study, the Company would publish detailed reports quantifying DGs enabled at each station above and beyond the prevailing Massachusetts DG Interconnection queue, considering both distribution and transmission impacts.

Equitable allocation of costs

Consistent with a goal to preserve price signals, Eversource recommends maintaining application of the cost-causation principal to many infrastructure modifications. The Company expects that a single DG facility or a group of facilities will continue to create the need for infrastructure modifications and may largely be the exclusive beneficiary of such upgrades. Continuing to apply the cost-causation principal to these costs is equitable, promotes market efficiency and is consistent with cost-allocation procedures in place across the United States.

Eversource recommends that infrastructure modification costs should be shared among any current or future group of DG projects that collectively create a need for, and benefit from, the

current system upgrade because this approach will reduce free ridership and barriers that may result from costs being allocated to a single or narrow group of projects. Distribution costs would be station specific, i.e., costs incurred at a Bulk Distribution station would be allocated only to DG customers connected to the distribution system downstream of that specific station.

Transmission cost allocation would be based on Distribution Factor Analysis (DFAX). Distribution Factor Analysis (DFAX) is a generally accepted process within the electric power sector for identifying the relative electrical contributions of individual resources to necessary infrastructure modifications. DFAX is utilized by RTOs and distribution companies across the United States. Eversource proposes that DFAX, as compared to more basic averaging of costs across of group of projects, is a preferred approach that remains consistent with cost-causation principles. DFAX serves to allocate costs of Transmission upgrades to customers proportionate to their relative electrical contributions to constrained Transmission facilities.

More specifically, if only three bulk stations contribution to an overload on a transmission facility that requires an upgrade, DFAX analysis determines the relative electrical contributions of those stations to the transmission constraint and would then enable Eversource to proportionately allocate cost of addressing that transmission constraint only to DG customers connected downstream of those three bulk stations – and more importantly not to any other DG customers.

Eversource recommends further maximizing the sharing of infrastructure modification costs by allocating costs across both current and potential future DG capacity that is enabled by infrastructure modifications on a station basis. Optimal system upgrades that enable the safe interconnection of a single facility or group of facilities to the electric power system will often enable the subsequent interconnection of more facilities without the need for further infrastructure modifications. The current Massachusetts DG Cost-Causation Principal for Massachusetts

distribution interconnection applies the full cost of such infrastructure modifications to only projects that are currently seeking to connect to the electric power system and thus triggering the immediate need for the investment. This burdens existing projects for costs of infrastructure that has the potential to provide benefits to other DG customers in the future. This approach also unfairly enables future DG customers to benefit (perhaps substantially) from investments that were funded by prior customers. Eversource views this aspect as requiring a more efficient and fair method for allocating costs that would reduce barriers to DG development across time.

Eversource recommends modifying the current application of the cost causation principal by allocating only a DG facilities pro-rata share of infrastructure modification costs based on both current and future potential DG capacity, enabled by a set of infrastructure modifications. This would lower the cost responsibility of any single facility that requires infrastructure modifications relative to the current approach when those modifications enable the interconnection of additional DG capacity. The cost responsibility of current facilities will not depend on the total capacity enabled by infrastructure modifications being utilized, even though the continued support of solar development in the Commonwealth may make that outcome likely. Instead, infrastructure investment that is not funded by reimbursements from current DG facilities seeking to interconnect will be funded by the Distribution Company on an interim basis until such time that further reimbursements are provided by future DG projects to offset the initial Distribution Company investment.

In turn, Eversource should be eligible to recover a return on and of the "interim" funding through an appropriate mechanism discussed below. Eversource would also recommend that the period during which DG facilities remain responsible for reimbursing prior upgrade costs be limited. It is not practical for the Company to track a growing volume of infrastructure

modifications indefinitely such that those upgrades would be reimbursed by a DG facility developed many years from now. A two to three-year reimbursement period, after which subsequent projects would not be responsible for prior upgrade costs, would likely be reasonable to implement and sufficient to prevent adverse free-ridership.

Eversource's recommendation is consistent with what ScottMadden described as a Utility Post-Upgrade Reimbursement approach in its research. Eversource's recommendation also substantially aligns with the referenced "Common Upgrade Power Zone" or "CUPZ" model envisioned by National Grid, subject to further consideration on final design and implementation that Eversource views as important to maintain equity, economic price signals and administrative feasibility. The Eversource approach presents relative advantages with respect to equity as it spreads costs among all DG facilities that benefit from a set of infrastructure modifications, both current and future. The Eversource approach also reduces barriers for DG development, particularly for facilities that may trigger a need for a relatively costly upgrade that would serve to enable a much greater amount of DG capacity to connect to the electric power system in the future.

VI. Cost Recovery Recommendation

Eversource's recommendation to allow for funding of a portion of infrastructure modifications that are both necessary for the near-term interconnection of DG and consistent with long-term needs of the electric power system has the potential to result in an acceleration of capital investment in both the distribution and transmission systems. Although Eversource recommends that the principal portion of the investment addressed by this proposal would appropriately continue to be reimbursed by DG customers, the Company will fund infrastructure modifications that enable further DG development on an interim basis until new DG facilities materialize.

The Company's recommendation would also serve to accelerate investment in infrastructure that is not solely attributable to the interconnection of DG facilities, but nonetheless is a component of an optimal solution that addresses overall system objectives. The Company's resulting investment will be aligned with other Department objectives, including the integration of distributed generation through modernization of the electrical grid. The Grid Modernization Factors ("GMFs") of all the EDCs are expressly established for the purpose of recovering reasonable incremental investment prudently incurred by an EDC, including investment that is incremental relative to current practices. Therefore, the Company recommends adjusting the GMF to allow recovery of capital expenditure incurred through implementation of this cost-allocation approach.

Similar to other investments recovered through the GMF, the Company would seek recovery of costs associated with infrastructure modifications only after expenses have been incurred and the associated investments have been placed in service. Infrastructure modification expenditures would be included in each annual GMF filing and separately identified from other eligible expenditures. The Company would have the burden of producing proper documentation sufficient for the Department to approve the GMF.

Recovery of investment through an appropriate existing mechanism is consistent with the Department's desire to minimize necessary process for implementation of any proposal. However, Eversource would consider proposing a separate factor similarly structured for the timely recovery of incremental capital investment if the Department preferred separating the recovery of infrastructure modifications addressed in this proposal from other grid modernization activity.

The recovery of transmission infrastructure modifications will need to be provided for differently from distribution investments and there may need to be variation in the recovery

mechanism across the EDCs. Current practice for recovery of transmission system upgrades necessary for the state level interconnection of generation resources occurs through an I.3.9 study, based upon the cost-causation principal with the interconnecting generation resource responsible for funding the full cost of such infrastructure modifications. Eversource anticipates that it will be feasible for a portion of transmission infrastructure modifications associated with DG to be funded on an interim basis similar to distribution investment via a separate retail rate adjustment such as the GMF with suitable approvals from the Department.

For Eversource, Schedule 21-ES and NSTAR of the OATT does not have a schedule to provide for the direct charging of costs associated the with annual revenue requirement for transmission interconnection costs. The Distribution Company may provide reimbursement for an amount of transmission infrastructure modification cost reflected in the proposal, but such amounts would not be accounted for in plant balances of the Distribution Company. Recovery of such investment cost through retail distribution rates would require the establishment of a regulatory asset recovered over an appropriate amortization period. Eversource looks forward to additional discussion and collaboration on this issue.

VII. Other Items

The recommendation put forth by Eversource in these comments are suggested to apply only to large DG facilities under Massachusetts interconnection agreements. The Company recognizes that the Department provided stakeholders the opportunity to also make a separate cost-allocation proposal for small facilities, Eversource does not have a specific recommendation at this time. Eversource supports the appropriate allocation of infrastructure modification costs to small DG facilities in a way that can be readily administered and be easy for customers to

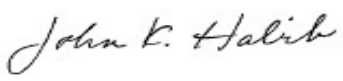
understand. The Company similarly supports the recovery of operation and maintenance (O&M) expense solely attributed to DG facilities.

VIII. Conclusion

Eversource's recommendations presented in these comments encompass incremental steps that may be undertaken in the near term to better align overall system planning with the interconnection of DG to the electric power system and to mitigate potential barriers to the continued DG development through equitable cost sharing. The current proposal is consistent with the Department's request for solutions that can be implemented in the near term with little to no process and exclusion of pre-emptive infrastructure solutions for consideration in this forum. The Company expects that further investigation and evaluation could identify complementary solutions that could ultimately contribute to development of a more comprehensive set of policies for system planning and cost allocation that would be more efficient, equitable and more efficiently advance the Commonwealth's clean energy goals at lower cost to customers. The Company expects to advance additional solutions through its Grid Modernization activities and would be pleased to work with the Department and other stakeholders to identify other approaches to support the continued growth of DG and other clean energy resources in the Commonwealth.

Respectfully Submitted,

NSTAR ELECTRIC COMPANY
d/b/a EVERSOURCE ENERGY



John K. Habib, Esq.
Keegan Werlin LLP
99 High Street, 29th Fl.
Boston, MA 02110
(617) 951-1400
Dated: February 28, 2020

Appendix 1

scottmadden
MANAGEMENT CONSULTANTS

Smart. Focused. Done Right.®

Interconnection Cost Allocation

February 28, 2020

ScottMadden was retained by Eversource, National Grid and Unitil Corporation (together, the "Massachusetts Electric Distribution Companies" or "EDCs") to prepare research and analysis on interconnection cost allocation methods used by electric utilities across the United States.

- The research and analysis was used to support EDC position papers filed before the Massachusetts Department of Public Utilities ("DPU") in D.P.U 19-55. The DPU requested proposals for alternative interconnection cost allocation methods for Distributed Generation ("DG") facilities.

ScottMadden's approach to the assignment included three phases: research and analysis, evaluation, and financial analysis.

- The research and analysis phase reviewed various methods to allocate and recover capital investments and operations and maintenance (O&M) expenses needed to connect DG facilities to the electric grid. The research focused primarily on those states with high solar penetration.
- The evaluation phase assessed cost allocation methods relative to four design objectives: cost recovery, cost responsibility, DG development and administrative ease.
- The financial analysis phase examined the impact of various cost allocation methods on DG project economics.

Interconnection costs are defined as investments and O&M expenses required to connect DG facilities to the electric grid. There are two types of interconnection costs: Network Expansion Costs and Grid Impact Mitigation Costs.

- **Network Expansion Costs** are related to the electric lines that interconnect the DG project with the grid as well as any additional equipment such as transformers to enable the export of electricity into the grid. Most DG projects generally incur these costs which could be driven by the distance from interconnection point or project-specific requirements, such as project size.
- **Grid Impact Mitigation Costs** are incurred by the utility to mitigate any impacts on the electric grid that a DG project would trigger. These costs are generally related to infrastructure modifications and upgrades.

Interconnection cost allocation methods vary depending on the magnitude of the upgrade costs and system requirements.

- For residential-sized projects, distribution system upgrades (e.g., transformer upgrade) are in some cases absorbed by the utility and included in rate base.
- For commercial-sized and larger projects, however, distribution system upgrades required to interconnect DG projects safely are commonly paid for by the "cost causer" – or the marginal project in the queue that triggers the distribution upgrades.
  - With more interconnection requests, more distribution upgrades are needed to accommodate greater grid-hosting capacity.

Interconnection costs in Massachusetts are presently allocated based on the principle that the DG facility causing the need for a modification must pay for that modification ("Cost Causation Principle"). The Cost Causation Principle is a method traditionally applied across the United States.

- The primary benefit of the Cost Causation Principle is it creates an incentive for developers to utilize the existing infrastructure.
- The primary drawbacks of the Cost Causation Principles are fairness and efficiency.
  - Fairness refers to situations where future projects may benefit from distribution system upgrades but do not incur the costs, putting cost responsibility of the upgrades on the developer that triggers the need for the upgrades (the "cost-causer").
  - Efficiency refers to procedural delays due to prohibitive upgrade costs that may grind the interconnection queue to a halt for that circuit until a solution is found or the applicant drops out.
  - In addition, the approach creates cost uncertainty for developers.
- Massachusetts has 'Separation of Costs' clause that ensures an interconnecting customer pays only that portion of the interconnection costs resulting from the system modifications required to allow for safe and reliable parallel operation of the DG facility.
  - The clause states: "Should the Company combine the installation of System Modifications with additions to the Company's [Electric Power System] EPS to serve other Customers or Interconnecting Customers, the Company shall not include the costs of such separate or incremental facilities in the amounts billed to the Interconnecting Customer for the System Modifications required pursuant to this Interconnection Tariff."

ScottMadden's approach to the assignment included three phases: 1) research and analysis, 2) evaluation, and 3) financial analysis.

1. **The research and analysis phase included a review of cost allocation methods to allocate and recover capital investments and O&M expenses needed to connect DG facilities to the electric grid.**
   - The research focused primarily on those states with high solar penetration. The research relied on several industry studies and articles, as provided on the next page.

2. **The evaluation phase included an assessment of cost allocation methods based on four design objectives**
   - Cost recovery – interconnection costs are recovered in a timely fashion.
   - Cost responsibility – interconnection costs are recovered in a fair and equitable manner, consistent with how costs are incurred.
   - Distributed Generation development – interconnection costs address public policy principles, including the importance of DG development.
   - Administrative efficiency and simplicity – interconnections costs can be recovered with administrative ease.

3. **The financial analysis phase examined the impact of various cost allocation methods on DG project economics.**
   - The financial analysis utilized DG Project assumptions from various industry sources. In addition, the financial analysis prepared scenarios evaluating the impact of different allocation methods and interconnection costs on DG project economics.

ScottMadden prepared findings related to each phase of the assignment.

Industry Reports

- National Renewable Energy Laboratory (NREL), several reports on interconnection emerging issues and trends
- National Association of Regulatory Utility Commissioners (NARUC) Distributed Energy Resources (DER) Rate Design and Compensation
- Lawrence Berkeley National Laboratory (LBNL), Transmission Benefit Quantification, Cost Allocation And Cost Recovery
- Anderson Economic Group, LLC, Michigan Unplugged? The Case for Shared Investment in Regional Transmission Projects
- Sandia National Laboratories (SNL), Analysis of 100 Small Generation Interconnection Procedure (SGIP) Studies

Industry Articles

- Greentech Media (GTM)
- Public Utilities Fortnightly (PUF)
- NREL

Financial Analysis Assumptions

- Rhode Island Renewable Energy Growth Program: 2020 Celling Price Recommendations (September 2019)
- Department of Energy Resources (DOER) Solar Massachusetts Renewable Target (SMART) Program - 225 CMR 20.00

Federal Energy Regulatory Commission (FERC) Orders and ISO Approaches

- FERC Order 1000 and Order 890
- Independent System Operators (ISO) Cost Allocation Policies
  - MISO Multi-Value Projects
  - ERCOT Competitive Renewable Energy Zones (CREZ)
  - ISO New-England Policies
  - CAISO Wholesale Distribution Access Tariff

Selected Proceedings on Interconnection Procedures and Cost Issues

- Reviewed States include:
  - California
  - New York
  - Hawaii
  - Arizona
  - Minnesota
  - New Jersey
  - Colorado
  - North Carolina
  - Vermont
  - Nevada

The research phase identified seven general approaches to cost allocation and cost recovery.

1. **Cost-Causer Pays**. This approach (or the 'Cost Causation Principle') assigns full cost responsibility to the first DG project that causes the need for system upgrade. This is the method most commonly implemented in the United States.
   - This method creates an incentive for developers to utilize the existing infrastructure.
   - However, the approach raises fairness or free rider concerns where future projects benefit from distribution system upgrades but do not incur the costs. In addition, the approach may create procedural delays and clog the interconnection queue due to prohibitive upgrade costs.

2. **Cost-Causer Group Pays**. This approach assigns cost responsibility to a group of DG projects that cause the need for the upgrades. This approach is designed to address fairness or free rider concerns. There are three variations of this approach:
   - **2a. Developer Group Pre-Upgrade Payment**. The DG projects pay upfront 100 percent of the costs. The DG projects share system upgrade costs among a group of DG applications evaluated at the same time. Applications submitted within a time window are evaluated as a group and system upgrade costs are shared across all projects based on their relative contribution toward the upgrade.
     - The approach is more efficient, and reduces the likelihood that applications stall when system upgrades are required.
     - However, applicants must remain through the entire group-study process. This can cause delays as projects change or applicants drop out. Studies may need to be repeated and costs re-allocated, which could create cost inefficiencies and delays. In addition, the process can be lengthy with no timeline requirements, and may be inefficient for small DG projects.
   - **2b. Developer Group Post-Upgrade Reimbursement**. The first DG project pays 100 percent of costs and is later reimbursed when other DG projects are added. Future projects pay a prorated share of the costs based on their capacity. Payments are made to the utility who then distributes it to developer(s). Cost sharing ends when the new capacity is maxed out.
     - The approach is equitable, spreads costs among those who benefit, includes a relatively streamlined process, and improves cost certainty for utility. The approach can be efficient for quickly getting large numbers of small projects online.
     - However, the DG Project which triggers the system upgrade may not have access to upfront capital. The approach may result in DG projects forced to absorb full cost of upgrade if no subsequent projects arise. And finally, small DG projects may need to wait for a large project to pay the upfront capital.

2. **Cost-Causer Group Pays (cont.)**
   - **2c. Utility Post-Upgrade Reimbursement**. An approach where the utility pays 100 percent of costs when the system upgrade is triggered from interconnection applications and is later reimbursed as projects join. Costs are prorated to interconnecting projects on a $/kW basis depending on future available capacity. Subsequent projects (that benefit from the upgrades) also pay a prorated portion of the upgrade costs (based on the relative capacity-to-total new capacity).
     - The approach is equitable, spreads costs among those who benefit, and includes a relatively quick and streamlined process The approach can be efficient for quickly getting large numbers of small projects online. Finally, the approach enables small projects to interconnect even in the absence of large projects.
     - However, the approach raises cost recovery concerns for the utility if not enough future projects are in the queue. Costs may be recovered in the rate base, which creates bill impact and cross-subsidization concerns.

3. **Pre-emptive Upgrades**. An approach where the utility pre-emptively upgrades select portions of distribution system and later recovers costs from developers or ratepayers. The utility pays for initial investment at pre-selected targeted area(s) with the expectation of recovering the costs through future applications. DG projects connecting to the upgraded network reimburse the utility through a pro-rated fee based on the cost of the upgrade, network capacity, and project capacity. The prorated fee is evenly divided among projects by KW size.
   - The approach is equitable, spreads costs among those who benefit, and improves cost certainty for developers (decreasing financial risk and potentially increasing the developer's ability to obtain financing). Pre-emptive upgrades approach may also reduce project timelines, allow small projects to still be viable due to reduced allocation amount, and places initial cost burden on utility as opposed to small developers.
   - However, the cost recovery risk is transferred to the utility and ratepayers. Costs may go into a regulatory asset and if the reimbursements do not cover the costs, then the net balance is recovered from ratepayers. The approach does not account for distribution circuit upgrades that certain projects will still have to absorb with no reimbursement policy in place.

4. **Flexible Interconnect Capacity Solution**. An approach where instead of implementing upgrades, the utility and developer agree to power curtailment in case of any system issues instead of a system upgrade. The method includes minimal capital costs for developers, but substantial software costs for utility to manage the power curtailment capability. Developer project feasibility may be impacted with power curtailments reducing revenues. The concept has previously been implemented in UK.
   - The approach results in avoided upgrade costs for developers, utilities, and ratepayers. Loss in revenue, administrative challenges, and potential hardware requirements may impact DG project's financial feasibility.
   - The approach avoids implementation of any system upgrades. This becomes challenging on circuits where significant additional amounts of DG projects are anticipated to interconnect in the future.
   - The method also requires capabilities at the utility to actively manage or signal DG to curtail power through an Advanced Distribution Management System (ADMS) or other means. At present, this would not be feasible until such systems are deployed by Massachusetts EDCs in the future through the Commonwealth's Grid Mod proceeding.
5. **Fixed Interconnection Fees.** An approach where the upgrade costs are recovered from all interconnecting customers through a one-time fee. Approach is most commonly applied for residential and small commercial customers. The approach includes interconnection costs of upgrades as part of rate base and recovers from all interconnecting customers through a one-time fee.
   - Per NREL, although this approach can facilitate interconnection, its fairness and effectiveness is still under evaluation, and there is little experience with such solutions to date.
   - One key concern is the over- or under- recovery of costs which can result in cross-subsidization between interconnecting customer and other ratepayers.
6. **Utility Financing of Interconnection Costs**: An approach where interconnection costs can be financed by the utility and recovered from the DG developer through monthly charges developed based on 'traditional revenue requirement' method. The revenue requirements are calculated for the costs of facilities or system upgrades. With this method, the interconnection costs are financed for the developer at utility's cost of capital.
   - While the method eases the burden of any upfront payments from the developer, the utility's recovery of costs is over a longer timeframe. This is mitigated by the return that the utility is able to earn on the investment through the recovery timeframe.
7. **Recovery of O&M Expenses:** An approach where the utility's O&M costs related to the interconnection facilities are recovered from the DG developer through a monthly charge.

Lessons learned from transmission: there are many examples of the pre-emptive upgrades approach for transmission investments to achieve public policy goals, particularly in MISO and ERCOT.

1. **FERC Order 1000**
   - As an initial matter, FERC provided general guidance on development of transmission cost allocation methods, particularly in Order 890 and Order 1000.
   - FERC Order 1000 addressed questions on cost allocation for transmission upgrades and grid expansion, and gave regions flexibility to develop unique cost allocation methods that would balance the interests of transmission providers, customers, and the broader network.
2. **MISO Cost Allocation for MVPs**
   - MISO developed a cost allocation method for a special class of projects labeled “Multi-Value Projects” (MVPs).
   - MVPs are regionally beneficial transmission projects designed to support energy policy imperatives while also providing reliability and economic benefits over multiple MISO zones.
   - Costs are allocated on a system-wide basis using a “postage-stamp-to-load” cost allocation.
3. **ERCOT Cost Allocation for CREZs**
   - ERCOT developed a unique cost allocation method for transmission projects in designated Competitive Renewable Energy Zones (CREZ).
   - Transmission companies bear the initial up-front costs for the investments but funding comes from consumers who pay through a cost socialization method applied across the entire ERCOT footprint.
   - Costs socialization reflects that the transmission benefits are shared by everyone in the region.

Methodology	Description	Design Objectives: Cost Responsibility	Design Objectives: Cost Recovery Risk	Design Objectives: DG Development	Design Objectives: Administrative Ease
1. Developer – Cost Causer Pays (Traditional Approach)	First DG Developer pays 100% of costs	Potential 'Free-Riders'	Recover costs from developer, except overruns	Higher costs, potential delays and terminations	In place today
2a. Developer Group – Pre-Upgrade Payment (Traditional Approach)	Group of DG Developers pay before upgrade (costs allocated)	Better aligns costs and benefits	Recover costs from developer(s), except overruns	Lower costs for first project	In place today
2b. Developer Group – Post-Upgrade Reimbursement	First Developer pays 100%, and is reimbursed by other developers (costs allocated)	Better aligns costs and benefits if other developers participate	Recover costs from developer(s), except overruns	Uncertainty of reimbursements	Additional processes for allocation and re-imbursement
2c. Utility – Post-Upgrade Reimbursement	Utility pays 100%, and is reimbursed by other developers (costs allocated)	Better aligns costs and benefits if other developers participate	Recover costs primarily from developer(s)	Shared costs, may improve certainty	Additional processes for allocation and re-imbursement
3. Developer(s)/ Ratepayers – Pre-emptive Upgrades	Utility invests preemptively, later recovers from developers. Upgrade costs not recovered are rate-based	Better aligns costs and benefits if other developers participate	Potential uncertainty in cost recovery	Lowers cost for first project, improves cost certainty	Additional processes for allocation and re-imbursement

More Favorable Impacts — Less Favorable Impacts

scottmadden MANAGEMENT CONSULTANTS

Methodology	Description	Design Objectives: Cost Responsibility	Design Objectives: Cost Recovery Risk	Design Objectives: DG Development	Design Objectives: Administrative Ease
4. Developer(s) – Flexible Interconnect Capacity Solution	Developer(s) pay indirectly through power curtailment (that avoids the need for upgrade)	No upgrade costs	No upgrade costs	May erode project economics	Additional processes and investments to manage curtailments
5. Fixed Interconnection Fees (Applicable mostly to Residential Customers)	Utility maintains and upgrades the distribution system and recovers the costs through a one-time fee from interconnecting customers	Better aligns costs and benefits if other developers participate	Potential uncertainty in cost recovery	Lowers cost for first project, improves cost certainty	In place today
6. Utility Financing of Interconnection Costs	Utility recovers interconnection costs through monthly charges based on traditional revenue requirement method	Better aligns costs and benefits if other developers participate	Cost recovery over a longer timeframe with potential credit risk exposure	Impact on project economics neutral to negative	Additional processes for long-term administration
7. Recovery of O&M Expenses	Utility maintains and upgrades the distribution system and recovers the O&M costs through monthly charges	Better aligns costs and benefits	Better aligns costs and revenues	Adds cost responsibility for developer	Additional processes for administration

scottmadden MANAGEMENT CONSULTANTS

ScottMadden developed a cash flow model for the financial analysis.

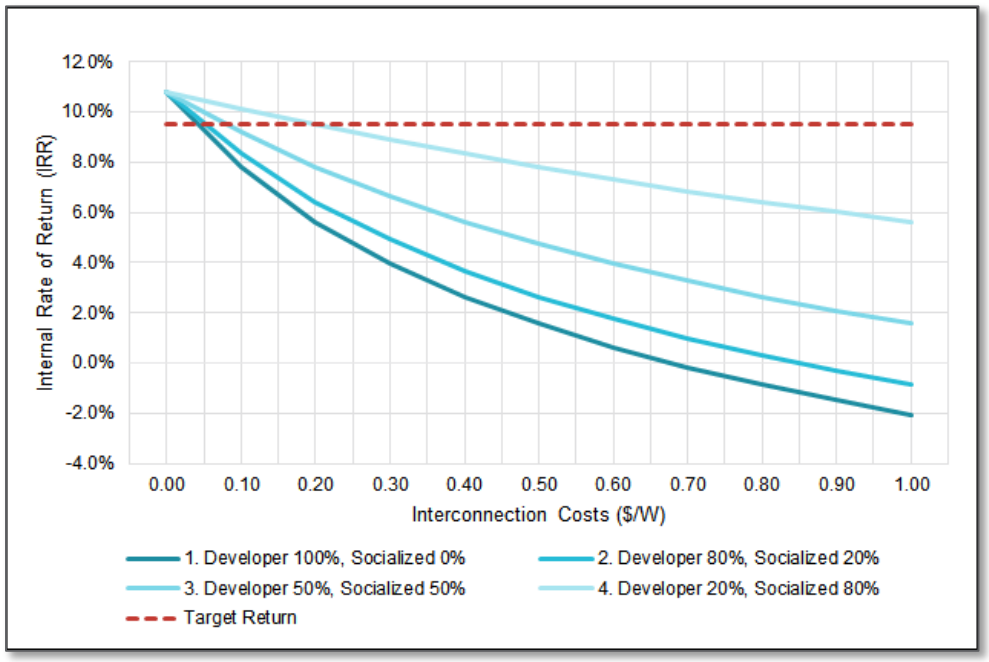
- The purpose of the financial analysis was to examine the impact of various interconnection cost allocation methods on the cost of DG.
- The model "solves for" IRR based on compensation structure and varying interconnection costs.
- The Base Case was developed using Rhode Island Renewable Energy Growth Program: 2020 Celling Price Recommendations (Sept. 2019) (pg. 21-22) and DOER Massachusetts SMART Compensation Program.
  - Facility Assumptions
    - Facility Size: 2.0 MW
    - Capital Costs: $1.447 per $Watt_{DC}$ ($3.4M)
      - Excludes average Interconnection Costs: $0.155 per $Watt_{DC}$
    - Capacity Factor: 15.30%
    - Annual Degradation Factor: 0.50%
    - Facility Life: 30 Years (Lazard / NREL)
  - SMART Compensation Assumptions
    - Electric Distribution Company: Varies
    - Capacity Block: Last Available Block
      - Block 8 for Eversource West, Eversource East, and Massachusetts Electric
      - Block 4 for Fitchburg Gas & Electric
    - Facility Size: 2.0 MW
    - Base Compensation: Varies by EDC and Block
    - Rate Adder Type: None
  - O&M Costs
    - Fixed O&M Costs: $14.50 per kW
    - Site Lease: $50,000 per year
    - Project Management: $12,000 per year
    - Insurance: 0.45% of total cost
  - Capital Structure and ITC
    - Equity 40% (at 9.50% Cost of Equity)
    - Investment Tax Credit: 26.0%
      - Reduced accelerated tax benefit by one-half of ITC i.e., 87%
    - Debt 60% at 6.00% cost of debt with 15-year term, 2.0% lender's fee
    - Inflation: 2.00%

The illustrative analysis shows that DG project economics fall rapidly as interconnection costs increase.

- The illustrative analysis shows that the IRR on a DG project improves with various forms of cost socialization.

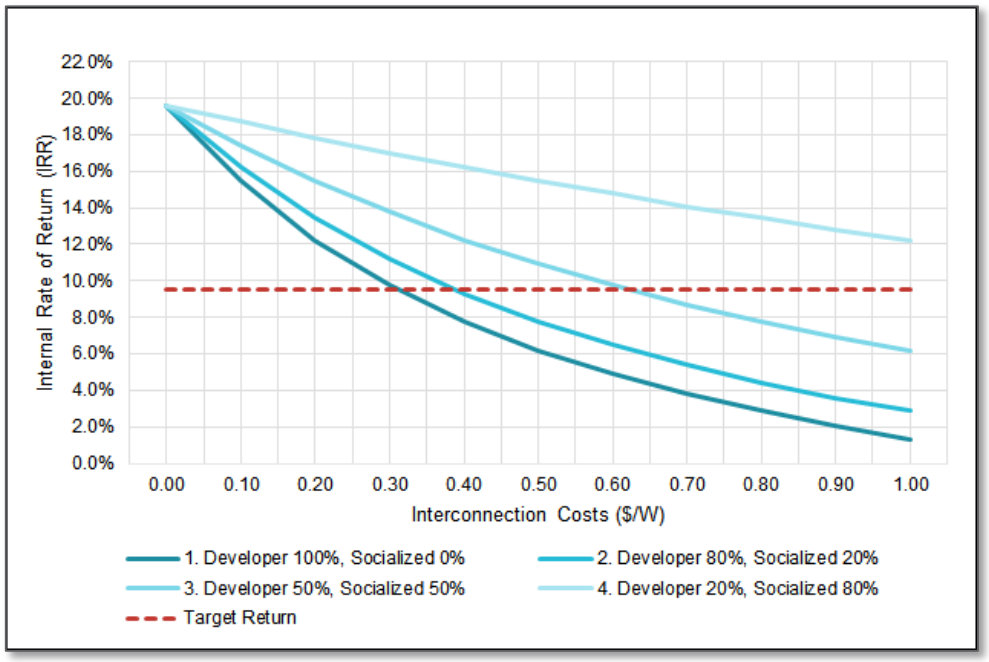
Eversource West Service Area

DG Developer IRR Comparison (Illustrative)



Eversource East Service Area

DG Developer IRR Comparison (Illustrative)

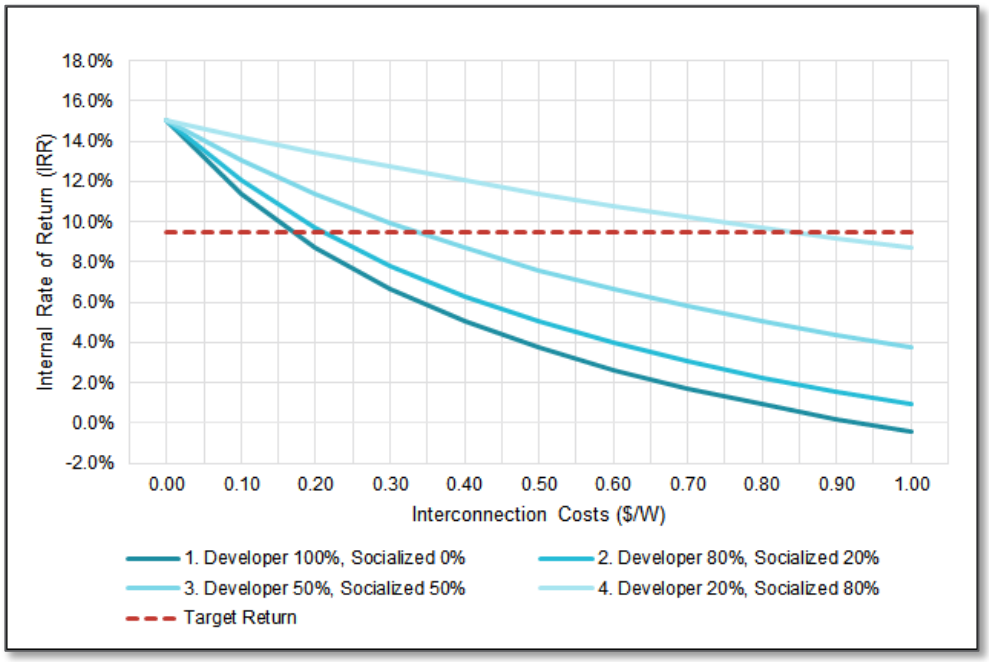


The illustrative analysis shows that DG project economics fall rapidly as interconnection costs increase.

- The illustrative analysis shows that the IRR on a DG project improves with various forms of cost socialization.

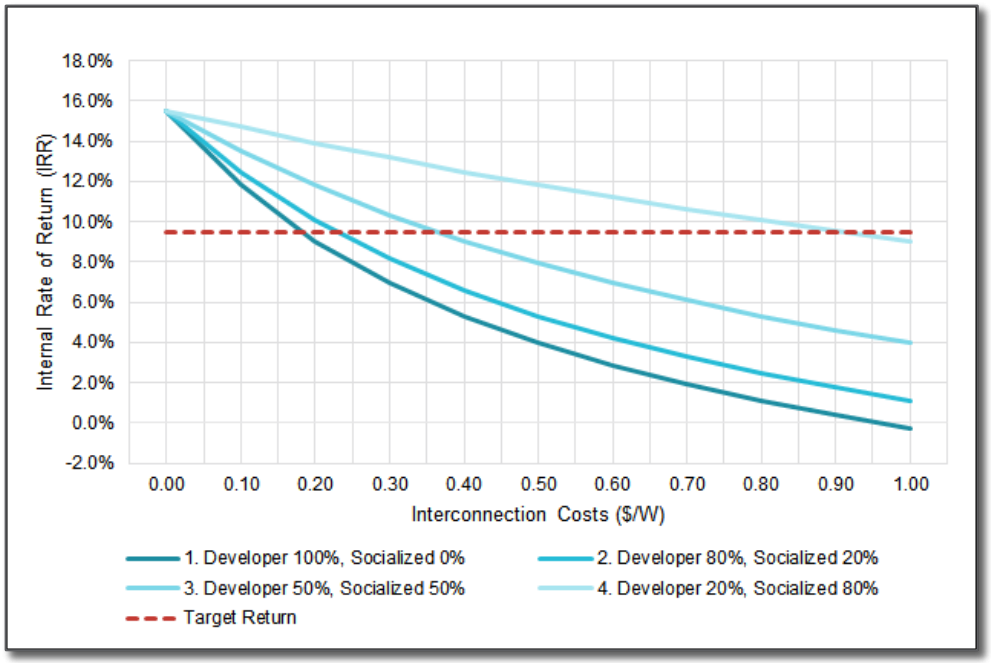
Massachusetts Electric Service Area

DG Developer IRR Comparison (Illustrative)



Fitchburg Gas & Electric Service Area

DG Developer IRR Comparison (Illustrative)



There is consideration of a new cost allocation approach to facilitate DG projects called "Common Upgrade Power Zones". The approach would be aligned with the "cost-causer pays" principle but combines the additional concept of the utility post-upgrade reimbursement discussed as approach 2c.

- The approach establishes Common Upgrade Power Zones (CUPZ) for projects over 25 kW (non-simplified). Distribution upgrade costs net of system improvement costs would be allocated at substation level to all "Enabled Capacity." Potential benefits to developers include:
  - Lower costs to integrate new DG.
  - Cost sharing among developers.
  - Improved cash-flows.
  - Clear costs for additional DG to connect in the same area.

- The approach would be enabled by the EDCs investing in the unused distribution capacity. A cost recovery factor would then recover the revenue requirement associated with that investment.
  - Upfront capital cost for developers would be reduced when upgrades create capacity they do not utilize.
  - Developers would also be responsible for O&M payments related to ongoing expenses associated with the upgraded assets
  - Future projects' Contributions in Aid of Construction (CIAC) would reduce the invested capital being recovered in the factor

- The approach provides for a reduction to the recovery factor as more developers enroll in each CUPZ.

CUPZ Cost Allocation: Key Components	Similarities to Other Utilities' Practices
■ **DG Development Zones:** Creation of Zones for system upgrades and DG development. Price signals incentivize development in less congested areas, and share costs equitably in those areas with costs	Similar to ERCOT's CREZ approach where renewable development zones were created for transmission investments
■ **Group Study Process:** Projects evaluated in groups, costs allocated on per MW basis at the substation level for distribution upgrades	Consistent with current group study process in Massachusetts and other states
■ **Cost Treatment:** Separate treatment of transmission-level costs and distribution-level costs	Similar to FERC approved cost allocation of PSCo's transmission investments in Colorado which includes separate treatment of varying upgrade costs
■ **Cost Certainty**: Future payments by additional projects are made at same level as initial projects	Achieves benefits similar to cost certainty provisions currently implemented in Massachusetts and California
■ **Post-Upgrade Cost Recovery:** Costs recovered from projects interconnecting in the future	Similar to New York's Post-Upgrade Reimbursement and Massachusetts Group Study but with enhancement for cost certainty for all projects in a zone
■ **O&M Cost Responsibility:** Customers responsible to pay O&M costs on an ongoing basis	Similar to Cost of Ownership charge approved for San Diego Electric & Gas (California)
■ **Cost Recovery Mechanism:** Cost recovery of incremental utility investment would be tracked through a reconciling factor, which would decline over time as new projects enroll in each zone	Consistent with provisions for recovery of other expenditures that are incremental relative to current practices

1. Cost-causer pays is the most common approach.

- The approach ensures costs are recovered consistent with how costs are incurred.
- However, the method raises 'Free Rider' concerns where one project pays for upgrades that provide benefits to other projects. The method may also result in delays due to prohibitive upgrade costs for DG developers.

2. There are several approaches to address "free rider" concerns.

- A common approach to address 'Free Rider' concerns is having group study processes where multiple projects share costs. This method is currently implemented in Massachusetts, as well as in other states such as California, Colorado, and New York.
- There are several variations of this approach: payment upfront or reimbursement as new projects become online.
  - New York has approved an innovative approach termed as the 'Post-Upgrade Reimbursement' method in which first project pays all costs and is later reimbursed as other projects interconnect. While the approach may streamline the interconnection process, the first developer is still responsible for upfront capital.
- While the group study processes address the 'Free Rider' concern, they may not sufficiently improve project economics in cases where system upgrade costs are unusually high.

3. Cost allocation methods also consider separate treatment of costs related to electric grid improvements.

- Approach is currently applied in Massachusetts, California, and Hawaii for distribution interconnections, where upgrades that benefit all customers are recovered through rate base.
- Hawaii Rules also allow credits to developers in case the interconnection upgrades result in deferral or replacement of planned distribution system upgrades. This is similar to the allowance for "System Improvement" cost allocation for Massachusetts EDCs.

4. **State mandates (e.g., Renewable Portfolio Standards) have played an important role in driving transmission interconnection cost allocation methods that reduce the burden on renewable projects.**
   - For example, the MISO "postage-stamp-to-load" cost allocation began developing in 2009, in recognition of the need to identify a set of value-based transmission projects that would enable utilities to meet their Renewable Portfolio Standard (RPS) mandates.
   - Similarly, the ERCOT CREZ cost socialization was also established, in part, to support achievement of Texas RPS.

5. **There are potential approaches that may improve DG project economics.**
   - Costs may be shared across customers and developers based on who benefits.
     - For example, costs related to system upgrades that benefit ratepayers are recovered through rate base in California, Hawaii, and Massachusetts.
     - Cost socialization is applied in some transmission investments, particularly in MISO and ERCOT, which reflects that the transmission benefits are shared by everyone in the region.
   - Pre-emptive upgrades may result in a reduction in developer costs as upgrades may create more capacity than the project needs.
   - One key concern with these approaches is on how to align the benefits with cost responsibility and potential impacts.