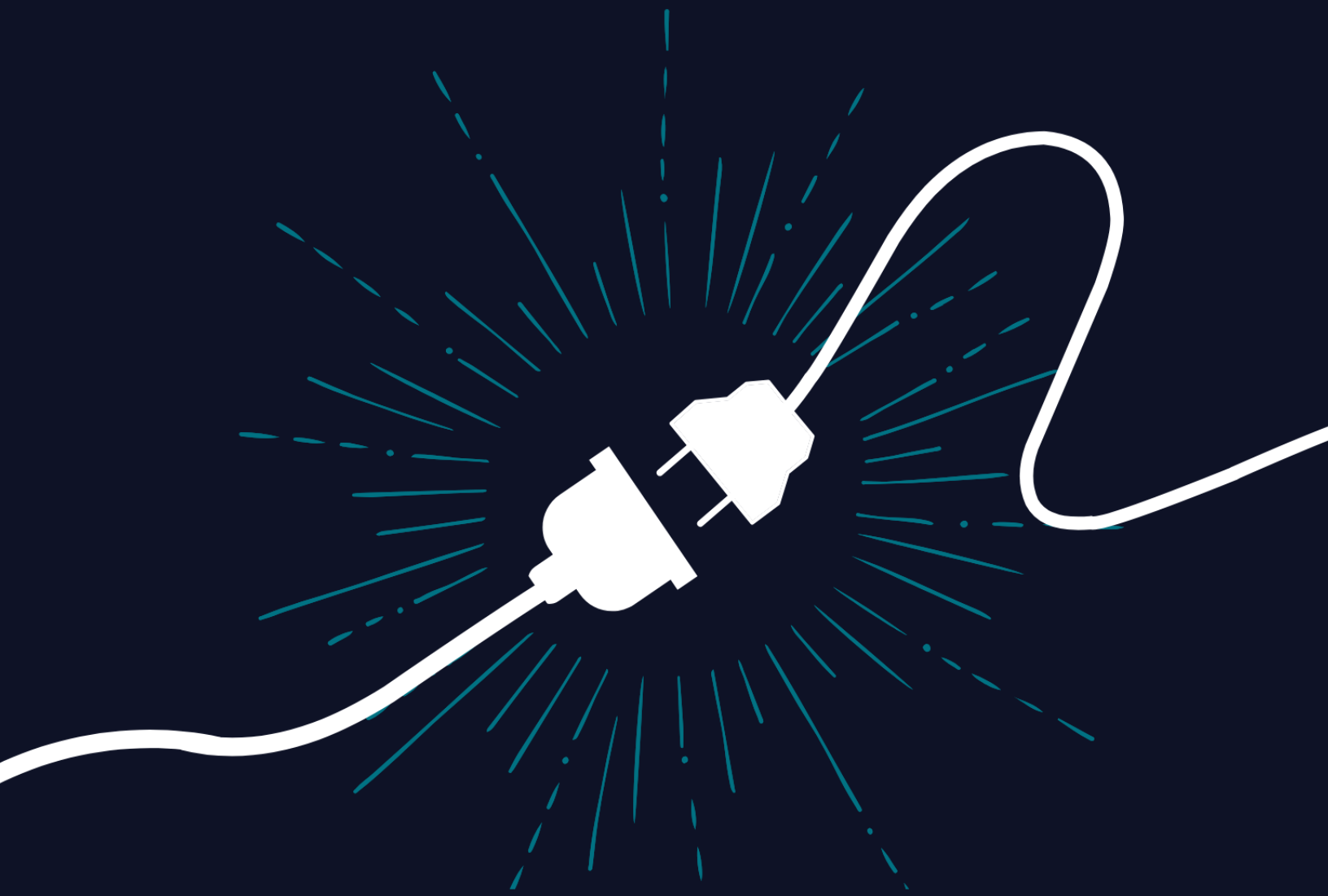
Breaking Fuel Silos in Demand Side Management

Policy Options to Align Energy Efficiency With Net-Zero Emissions Across All Fuels

Brendan Haley, James Gaede, and Alyssa Nippard



Efficiency Canada

Carleton University

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About Efficiency Canada

Efficiency Canada is the national voice for an energy-efficient economy. Our mission is to create a sustainable environment and better life for all Canadians by making our country a global leader in energy efficiency policy, technology, and jobs. Efficiency Canada is housed at Carleton University's Sustainable Energy Research Centre, which is located on the traditional unceded territories of the Algonquin nation.

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Summary

Policymakers and utility planners have recognized the importance of managing the demand-side of energy systems for decades. Instead of building new supply-side resources, it is often less costly and less risky to practice "demand-side management" (DSM). Utilities have traditionally administered DSM programs within established fuel-specific infrastructure and governance systems for electricity or natural gas. This institutional history can create "fuel silos" for the energy efficiency programs supported by DSM within these natural gas or electricity boundaries. Furthermore, efficiency strategies to save fuels such as heating oil and propane are often neglected because they do not have regulated distribution networks.

These fuel silos create barriers to using energy efficiency to meet policy objectives related to net-zero emissions and economy-wide energy efficiency improvements and taking advantage of advancements in technologies like heat pumps and electric vehicles, while simultaneously managing utility system challenges such as peak demands, electricity load growth, and affordability.

There are multiple ways to break fuel silos and develop better coordinated DSM strategies across traditional boundaries. This report surveys early Canadian experience to learn lessons on how DSM can be more closely aligned with net-zero emission and economy-wide energy efficiency policy objectives.

Policy options

A review of American state utility DSM cases reveals several policy avenues to break fuel silos to enable economy-wide energy efficiency. These include:

Define beneficial electrification: Provide a clear definition of beneficial electrification, considering mitigating utility system costs, climate, economic, and social objectives, and give DSM programs the mandate to promote it.

Implement regulatory mandates: Create new targets, mandates, and restrictions/permissions to encourage DSM plans to achieve economy-wide energy efficiency. These can include fuel-neutral energy efficiency resource standards, clean heat standards, restrictions on fossil fuel DSM measures, and expansion of utility service into areas like district heat.

Update cost-effectiveness testing: Customize cost-effectiveness tests used to screen DSM portfolios. Align these tests with policy goals, by removing unbalanced methodologies and/or considering other fuel and societal costs and benefits.

Attribute savings strategically: Attributing savings to DSM administrators can achieve the right goals related to beneficial electrification and demand management. Savings attribution must consider which savings are counted/accepted and who pays for achieving them.

Launch parallel programs: Create funds and programs outside of utility DSM to support objectives such as GHG reductions, equity, non-energy upgrades, and market development.

Canadian experience

The Canadian provinces present a variety of policy examples on options to break fuel silos, as well as the enduring impact that fuel silos have on utility DSM.

Québec's dual fuel program provides an example of an electric utility (Hydro Québec) and a gas utility (Énergir) jointly incentivizing the use of electric heat pumps combined

with a natural gas back-up to avoid electricity peaks during the coldest periods. The program was negotiated between the government and the two utilities and launched despite uncertainty over regulatory approval. The focus on the program permitted it to be put into market quickly, yet did not create a process for the gas back-up peak demand solution to be considered against other peak demand management options, such as demand flexibility.

Ontario provides an interesting case of how a parallel program, outside of the utility DSM plan, can influence changes to DSM policy. The federal Greener Homes grant program helped instigate new electrification protocols within a gas DSM plan, showing that federal spending power can be strategically used to create structural policy changes within DSM institutions. In Ontario, the regulator recognized both full and partial electrification as a legitimate natural gas DSM measure consistent with the primary objective of reducing gas demand.

Nova Scotia presents a case where fuel silos still exist despite an administrative model and domestic fuel mix that should encourage cross-fuel energy efficiency strategies. Electrification is actively encouraged by government-funded programs rather than regulatory mandates. However, government funding primarily focused on the residential sector creates lost opportunities to reduce fossil fuel use in commercial and industrial sectors. An unclear mandate for ratepayer-supported electrification could miss opportunities to closely couple increased electricity use with beneficial demand management strategies in a province where unplanned electrification could increase and/or lock in electricity GHG emissions in a carbon-intensive grid.

Manitoba demonstrates a case where fuel silos can exist under a single independent administrator responsible for saving both electricity and natural gas. The fuel silos exist due to fuel-specific targets and saving attribution methodologies leading to counter-intuitive signals for the program administrator.

British Columbia presents a case of policy-driven electrification via government parallel funding and regulatory mandates, with the strategic use of utility DSM programs to implement. Policy direction to natural gas DSM avoids the installation of new, less efficient gas equipment in homes and businesses while encouraging partial

electrification and higher gas savings to reduce GHGs. Rather than breaking fuel silos per se, B.C. has created a pragmatic and strategically designed policy mix that directs utility DSM towards GHG reduction goals. Electrification is encouraged, separate from energy-saving strategies that can manage the implications of more electricity demand.

Newfoundland and Labrador provide an energy context where hydroelectric cost overruns and surplus electricity, combined with no natural gas distribution network, provide a strong policy rationale for electrification. However, the regulator's rejection of an expanded cost-effectiveness test that considers non-electric customer benefits shows the need for policy direction to break fuel silos.

Lessons

The report concludes with lessons on how to manage fuel silos to better direct energy efficiency towards economy-wide and net-zero emissions-aligned goals. These include:

Reach people with existing energy efficiency program infrastructure: Utility DSM organizations have expertise in program design and delivery, existing marketing channels and relationships with customers and trade allies that can implement energy efficiency programs with objectives and funding sources outside of traditional utility DSM.

External funding can get around and/or change DSM policies: Moving beyond fuel silos quickly has often required government funding, external from ratepayer-funded DSM. Strategically designed, government funding can also trigger changes to DSM program design and governance, as seen in Ontario natural gas programs.

Update DSM governance: DSM governance should be updated to avoid unnecessary costs that can be managed by ensuring electrification is truly beneficial by implementing complementary strategies that consider systemic effects on peak demands, affordability, avoidance of unnecessary electricity buildouts, fossil fuel lock-in, etc. This involves considering policy changes in efficiency targets, regulatory mandates, cost-effectiveness testing, cost allocation and savings attribution. This might be a slower policy process than direct government funding. Yet, creating

structural changes to DSM governance is likely to be a more durable policy change compared to reliance on volatile government funding cycles.

Set rules and baselines: regulatory mandates such as energy efficiency equipment standards, fuel-neutral savings goals, GHG caps, and clean heat standards re-draw energy-saving baselines for DSM programs, directing future portfolios towards more fuel-neutral energy savings opportunities. B.C.'s planned regulatory strategies have significantly impacted the nature of natural gas DSM. No Canadian province has implemented a fuel-neutral energy efficiency resource standard or clean heat standard on gas utilities.

Take a portfolio approach: Successfully breaking DSM fuel silos to meet net-zero emission goals requires consideration of an entire policy mix and a portfolio of strategies. Electrification and multi-fuel efficiency can introduce multiple objectives that can offset and compete, pulling a program administrator in different directions. Electricity growth and saving objectives can be co-managed within a portfolio in a manner similar to how current DSM plans consider both low-cost energy saving and equitable participation objectives. With clear mandates and flexibility, DSM strategies can offset potential challenges with electrification and/or fossil fuel demand decreases and maximize societal benefits, balancing factors such as GHG reductions, costs, and equity.

Design federal funding and standards strategically: While utility DSM is in provincial jurisdiction, federally funded programs and efficiency regulations can influence DSM in either a disruptive or beneficial manner. Federal funding that is co-delivered with existing local programs can not only reduce customer confusion but also trigger policy changes to DSM governance. The federal government's regulatory powers through the Energy Efficiency Act can re-draw the baseline for DSM savings, similar to changes seen in B.C., with both electricity and gas utilities incentivizing electrification options.

Résumé

Depuis des décennies, les décideurs et les planificateurs de services publics reconnaissent l'importance de gérer la demande des systèmes énergétiques. Au lieu de construire de nouvelles ressources du côté de l'offre, il est souvent moins coûteux et moins risqué de pratiquer une « gestion axée sur la demande » (GAD). Les services publics ont traditionnellement administré des programmes de GAD au sein d'infrastructures et de systèmes de gouvernance concernant un seul combustible, pour l'électricité ou le gaz naturel. En raison de l'histoire de ces institutions, des cloisonnements par combustible ont pu apparaître dans les programmes d'efficacité énergétique appuyés par une gestion axée sur la demande, cloisonnée dans les limites d'une seule source d'énergie, soit le gaz naturel ou l'électricité. De plus, les stratégies d'efficacité énergétique visant à économiser des combustibles comme le mazout et le propane sont souvent négligées en raison de l'absence de réseaux de distribution réglementés.

Ces cloisonnements entravent l'utilisation de l'efficacité énergétique pour atteindre les objectifs stratégiques en matière de carboneutralité et d'amélioration de l'efficacité énergétique dans l'ensemble de l'économie. Ils entravent aussi la possibilité de tirer profit des avancées technologiques comme les thermopompes et les véhicules électriques, tout en gérant simultanément les défis des réseaux de services publics, comme la demande de pointe, la croissance de la charge d'électricité et l'abordabilité.

Il existe plusieurs façons de briser les cloisonnements par combustible et d'élaborer des stratégies de GAD mieux coordonnées, qui dépassent les frontières traditionnelles. Le présent rapport examine les premières expériences canadiennes pour tirer des leçons sur la façon dont la GAD pourrait mieux correspondre aux objectifs stratégiques en matière de carboneutralité et d'efficacité énergétique dans l'ensemble de l'économie.

Solutions stratégiques

Une étude de cas de GAD des services publics d'État aux États-Unis révèle plusieurs solutions stratégiques pour briser les cloisonnements par combustible en vue de

l'efficacité énergétique dans l'ensemble de l'économie. Il s'agit notamment des options ci-dessous.

Définir l'électrification bénéfique : fournir une définition claire de l'électrification bénéfique, en tenant compte de l'atténuation des coûts des réseaux de services publics, des objectifs climatiques, économiques et sociaux, et donner aux programmes de GAD le mandat d'en faire la promotion.

Mettre en œuvre des mandats réglementaires : établir de nouveaux objectifs, mandats et restrictions ou autorisations pour encourager les plans de GAD à atteindre l'efficacité énergétique dans l'ensemble de l'économie. Il peut s'agir de normes d'efficacité énergétique neutres en matière de combustible, de normes de chauffage propre, de restrictions sur les mesures de GAD en matière de combustibles fossiles et de l'expansion des services publics dans des secteurs comme le chauffage urbain.

Mettre à jour les essais de coût-efficacité : personnaliser les essais de coût-efficacité utilisés pour analyser les portefeuilles de GAD. Faire correspondre ces essais avec les objectifs stratégiques en éliminant les méthodologies déséquilibrées ou en tenant compte des autres coûts et avantages sociétaux des combustibles.

Attribuer les économies réalisées de façon stratégique : l'attribution des économies réalisées aux administrateurs de GAD permettrait d'atteindre les objectifs souhaités liés à l'électrification bénéfique et à la gestion de la demande. L'attribution des économies réalisées doit tenir compte des économies comptabilisées et acceptées et de l'entité payant pour les réaliser.

Lancer des programmes parallèles : créer des fonds et des programmes hors de la GAD des services publics pour appuyer des objectifs comme la réduction des GES, l'équité, les mises à niveau non énergétiques et le développement du marché.

L’expérience canadienne

Les provinces canadiennes présentent des exemples variés de politiques sur les solutions pour briser les cloisonnements par combustible, ainsi que l’incidence durable que ces cloisonnements ont sur la GAD des services publics.

Le programme à deux combustibles du **Québec** est un exemple de service public d’électricité (Hydro-Québec) et de service public de gaz (Énergir) encourageant conjointement l’utilisation de thermopompes électriques combinées à une pompe de secours au gaz naturel pour éviter les pointes de demande d’électricité pendant les périodes les plus froides. Le programme a été négocié entre le gouvernement et les deux services publics et lancé malgré des incertitudes sur son approbation réglementaire. L’accent mis sur le programme a permis de le mettre rapidement sur le marché, mais il n’a pas créé de processus pour que la solution de secours au gaz en cas de demande de pointe soit comparée à d’autres solutions de gestion de la demande de pointe, comme la flexibilité de la demande.

L’**Ontario** donne un exemple intéressant de la façon dont un programme parallèle, hors du plan de GAD des services publics, peut influer sur les changements stratégiques de la GAD. Le programme fédéral de Subvention canadienne pour des maisons plus vertes a aidé à mettre en place de nouveaux protocoles d’électrification dans le cadre d’un plan de GAD de gaz, ce qui montre que le pouvoir fédéral de dépense peut servir de façon stratégique à produire des changements de politique structurels au sein des institutions de GAD de gaz. En Ontario, l’organisme de réglementation a reconnu que l’électrification complète et partielle était une mesure légitime de GAD du gaz naturel conforme à l’objectif principal de réduction de la demande de gaz.

La **Nouvelle-Écosse** présente un cas où il existe encore des cloisonnements par combustible malgré un modèle administratif et un mélange de combustibles domestique qui devraient encourager des stratégies d’efficacité énergétique à plusieurs combustibles. L’électrification est activement encouragée par des programmes financés par le gouvernement plutôt que par des mandats réglementaires. Toutefois, le financement gouvernemental axé principalement sur le secteur résidentiel crée des occasions perdues de réduire la consommation de combustibles fossiles dans les

secteurs commercial et industriel. Un mandat flou d'électrification financée par les consommatrices et les consommateurs pourrait faire perdre des occasions d'associer étroitement l'augmentation de la consommation d'électricité à des stratégies de gestion de la demande bénéfiques dans une province où l'électrification non planifiée pourrait augmenter ou bloquer les émissions de GES de l'électricité dans un réseau à haute intensité en carbone.

Le **Manitoba** démontre qu'il est possible d'avoir des cloisonnements par combustible sous la responsabilité d'un seul administrateur indépendant chargé d'économiser l'électricité et le gaz naturel. Les cloisonnements par combustible existent en raison de cibles propres à chaque combustible et des méthodes d'attribution des économies réalisées, qui entraînent des signaux contre-intuitifs pour l'administrateur du programme.

La **Colombie-Britannique** présente un cas d'électrification axée sur les politiques passant par des mandats réglementaires et des financements parallèles du gouvernement, conjugués à l'utilisation stratégique des programmes de GAD des services publics pour la mise en œuvre. L'orientation stratégique à l'égard de la GAD de gaz évite l'installation de nouveaux équipements au gaz moins écoénergétiques chez les particuliers et dans les entreprises, tout en encourageant l'électrification partielle et l'augmentation des économies de gaz pour réduire les GES. Plutôt que de briser les cloisonnements par combustible en tant que tels, la Colombie-Britannique a créé une combinaison de politiques pragmatiques et stratégiquement conçues qui oriente la GAD des services publics vers les objectifs de réduction des GES. L'électrification est encouragée, indépendamment des stratégies d'économie d'énergie qui peuvent gérer les répercussions d'une plus grande demande d'électricité.

Terre-Neuve-et-Labrador présente un contexte énergétique où les dépassements de coûts hydroélectriques et les surplus d'électricité, auxquels s'ajoute l'absence de réseau de distribution de gaz naturel, fournissent une justification stratégique solide en faveur de l'électrification. Toutefois, le rejet par l'organisme de réglementation d'un essai de coût-efficacité élargi qui tient compte des avantages non liés à l'électricité pour la

clientèle montre la nécessité d'une orientation stratégique pour briser les cloisonnements par combustible.

Leçons

Le rapport se termine par les leçons tirées sur les modes de gestion des cloisonnements par combustible permettant de mieux orienter l'efficacité énergétique vers des objectifs en matière de carboneutralité et d'efficacité énergétique dans l'ensemble de l'économie. Il s'agit notamment des options ci-dessous.

Il faut communiquer avec les personnes possédant déjà une infrastructure de programme d'efficacité énergétique : les organisations de GAD des services publics possèdent une expertise dans la conception et l'exécution de programmes, les canaux de distribution existants et les relations avec la clientèle et les partenaires commerciaux qui peuvent mettre en œuvre des programmes d'efficacité énergétique avec des objectifs et des sources de financement autres que la GAD traditionnelle des services publics.

Le financement externe peut contourner ou modifier les politiques de GAD : pour briser rapidement les cloisonnements par combustible, il a souvent fallu un financement gouvernemental, extérieur à la GAD financée par les consommatrices et les consommateurs. Un financement gouvernemental stratégiquement conçu peut également déclencher des changements à la conception et à la gouvernance du programme de GAD, comme cela a été le cas dans les programmes ontariens de gaz naturel.

Mettre à jour la gouvernance de la GAD : il faudrait mettre à jour la gouvernance de la GAD afin d'éviter les coûts inutiles – gérables par la garantie d'une électrification vraiment bénéfique – en mettant en œuvre des stratégies complémentaires tenant compte des effets systémiques sur la demande de pointe, l'abordabilité, la prévention de la construction d'infrastructures électriques inutiles, le blocage des combustibles fossiles, etc. Il s'agit d'envisager de modifier stratégiquement les cibles d'efficience, les mandats réglementaires, les essais de coût-efficacité, la répartition des coûts et

l’attribution des économies réalisées. Ce processus stratégique pourrait être plus lent qu'un financement direct du gouvernement. Cependant, la modification structurelle de la gouvernance de la GAD est susceptible d’être un changement de politique plus durable que le recours à des cycles de financement gouvernementaux volatils.

Établir des règles et des niveaux de référence : des mandats réglementaires – comme des normes d’efficacité énergétique des équipements et matériels, des objectifs d’économies d’énergie neutres en matière de combustible, des plafonds de GES et des normes de chauffage propre – redéfinissent les niveaux de référence des économies d’énergie pour les programmes de GAD, en orientant les portefeuilles futurs vers des possibilités d’économies d’énergie plus neutres, au sens où elles sont indépendantes du combustible. Les stratégies de réglementation prévues en Colombie-Britannique ont eu une incidence considérable sur la nature de la GAD du gaz naturel. Aucune province canadienne n’a mis en œuvre de norme d’efficacité énergétique indépendante du combustible ni de norme de chauffage propre pour les services publics de gaz.

Adopter une approche de portefeuille : pour réussir à briser les cloisonnements par combustible de la GAD afin d’atteindre les objectifs de carboneutralité, il faut tenir compte de tout un dosage de politiques et d’un portefeuille de stratégies. L’électrification et l’efficacité multicombustible peuvent introduire plusieurs objectifs, susceptibles de se compenser et de se faire concurrence, conduisant ainsi les administrateurs de programme dans différentes directions. Les objectifs de croissance et d’économie d’électricité peuvent être cogérés au sein d’un portefeuille de la même manière que les plans actuels de GAD tiennent compte à la fois des objectifs d’économie d’énergie à faible coût et des objectifs de participation équitable. Dotées de mandats clairs et de souplesse, les stratégies de GAD peuvent compenser les défis potentiels de l’électrification ou de la diminution de la demande de combustibles fossiles et maximiser les avantages pour la société, en équilibrant des facteurs comme la réduction des GES, les coûts et l’équité.

Concevoir stratégiquement le financement fédéral et les normes : bien que la GAD des services publics relève de la compétence provinciale, les programmes financés par le gouvernement fédéral et les règlements sur l’efficience peuvent entraîner des

répercussions sur la GAD, susceptibles d'être perturbatrices ou bénéfiques. Les financements fédéraux versés conjointement avec des programmes locaux peuvent non seulement réduire la confusion chez la clientèle, mais aussi déclencher des changements de politique dans la gouvernance de la GAD. Les pouvoirs de réglementation du gouvernement fédéral conférés en vertu de la *Loi sur l'efficacité énergétique* permettraient de redéfinir des niveaux de référence pour les économies de la GAD, d'une manière comparable aux changements observés en Colombie-Britannique, et de mettre en place une situation dans laquelle les services publics d'électricité et de gaz encouragent les solutions d'électrification.

Introduction

Policymakers and utility planners have recognized the importance of managing the demand side of energy systems for decades. Instead of building new generations and other supply-side resources, it is often less costly and less risky to practice "demand-side management" (DSM). Energy efficiency can provide the same or better services with lower energy consumption, and it is possible to influence customer use of energy to benefit both individual participants in DSM programs, and the larger utility systems that must manage to match real-time energy demand with supply, future investments, reliability etc.[1]

DSM was integrated into the public regulation of utilities. A "regulatory compact" ensures utilities receive compensation for energy costs and capital investments in exchange for serving all customers under regulatory oversight.[2] Utilities are assumed to have natural monopoly characteristics, and regulatory oversight seeks to ensure energy networks are reliable and operated in an economically efficient manner. The regulatory boundaries in each jurisdiction are typically fuel-specific to match distribution systems with common ownership structures. Energy efficiency programs and strategies implemented through demand-side management adhere to these utility system boundaries. Natural gas and electricity DSM were typically separated, and fuels such as heating oil and propane without distribution networks under regulation, were often neglected. This history leads to "fuel silos" across energy efficiency program strategies.

These fuel silos can create barriers and complications as policy objectives and technology evolve. Governments have set net-zero GHG emission objectives that require switching to zero or low-carbon energy sources and strategic management of existing clean energy resources. In addition, governments have economy-wide energy efficiency objectives, such as Canada's participation in a global target to double the rate

[1] For a history of DSM see Haley et al., "From Utility Demand Side Management to Low-Carbon Transitions"; Nadel and Geller, "Utility DSM"; Gellings, "The Concept of Demand-Side Management for Electric Utilities."

[2] Swartwout, "Current Utility Regulatory Practice from a Historical Perspective."

of annual energy intensity improvement.[3] Policymakers increasingly pursue the "non-energy benefits" beyond the utility system, including customer affordability and comfort improvements, reductions in energy poverty, and environmental improvements.[4]

Technological advancements in end-use technologies like heat pumps and electric vehicles make increased electrification a method to drive economy-wide efficiency improvements and reduce GHGs.[5]

Yet, mass electrification also presents new system challenges, such as the potential for increased peak demands and requirements for transmission and distribution system buildouts. These challenges can be met with demand-side management strategies within the electricity system, such as using energy storage and shaping the timing and location of energy demands (i.e. demand flexibility).

However, some of the potential solutions require breaking down fuel silos. Electrification initiatives coupled with building envelope improvements and demand flexibility will alleviate grid constraints and avoid unnecessary costs,[6] yet these measures could be separated by natural gas or electricity DSM programs. In addition, distributed generation and use of non-electric fuels can alleviate electricity system demand at strategic times and locations, introducing an electric system value for the strategic use of the gas distribution network. In other cases, accelerated electrification in a natural gas-constrained territory can avoid the need for distribution pipeline investments, making electrification a component of natural gas DSM.

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[3] International Energy Agency, "Versailles Statement."

[4] IEA, "Capturing the Multiple Benefits of Energy Efficiency."

[5] About ⅖ of the improvements in the average annual rate of total energy intensity between 2022 and 2030 in the International Energy Agency's Net Zero Roadmap are related to fuel switching (electrification, renewables, and clean cooking). See International Energy Agency, "Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach (2023 Update)." Figure 3.7. Pg. 117.

[6] Haley and Torrie, "Canada's Climate Retrofit Mission: Why the Climate Emergency Demands an Innovation-Oriented Policy for Building Retrofits." modeled comprehensive retrofits and electrification across the Canadian building stock, finding that total TWh electricity demands could decrease, yet the study did not consider peak demands.

Breaking fuel silos is not only needed because of electrification. From a customer perspective, there is no apparent reason to separate energy efficiency services by fuel type. Customers are interested in lower total energy bills and improved benefits, such as comfort, health, and reliability. Expanding economy-wide energy efficiency requires making the customer DSM program experience easier and more affordable, which should involve customer access to energy efficiency services regardless of fuel use and support for fuel switching that benefits customers.

Breaking fuel silos should also not neglect the traditional strengths of demand-side management governance. This includes a clear economic case from a utility system perspective for energy savings, strong accountability for results, more consistent and stable funding, and access to utility customers.[7]

There are multiple ways to break fuel silos and develop better coordinated DSM strategies across traditional boundaries. What path a jurisdiction takes is determined by contextual factors such as existing DSM administrative set-up and utility system challenges. In Canada, there are now a number of early experiments. This report surveys this early Canadian experience to learn lessons on how DSM can be more closely aligned with net-zero emission and economy-wide energy efficiency policy objectives.

First, the report provides a list of possible policy approaches to breaking fuel silos, primarily based on examples found in American states. The following section examines Canadian case studies, considering relevant context conditions and governance decisions. The report concludes with early lessons on how to reduce fuel silos in DSM strategies.

[7] See Haley et al., “From Utility Demand Side Management to Low-Carbon Transitions.”

Policy options for breaking fuel silos

This section explores policy options for encouraging DSM strategies across fuel sources through five dimensions:

- Beneficial electrification definitions
- Regulatory mandates
- Cost-effectiveness testing
- Savings attribution
- Parallel programs

This grouping was developed by reviewing relevant policy developments outside of Canada, focusing primarily on the American states with similar utility DSM governance structures to Canada.

Beneficial electrification definitions

As DSM strategies consider promoting electrification, they require a definition of what new uses of electricity should be encouraged. Policymakers can define beneficial electrification and give DSM administrators the mandate to pursue it.

Farnsworth et al. from the Regulatory Assistance Project suggest that, for electrification to be beneficial, it should:[8]

- Save customers' money in the long run
- Enable better grid management
- Reduce negative environmental impacts

Jurisdictions have defined fuel-neutral efficiency goals. Since electrification of heating, transportation, and industry is often more energy efficient, these goals enable broader electrification alongside traditional energy-saving activities. For example, the Illinois Power Agency Act's definition of energy efficiency "includes measures that reduce the total Btus of electricity, natural gas, and other fuels needed to meet the end use or

[8] Farnsworth et al., "Beneficial Electrification: Ensuring Electrification in the Public Interest."

uses.[9] The Btu (British Thermal Unit) definition enables switching between fuels to achieve economy-wide energy efficiency gains.[10]

In 2018, Massachusetts expanded the scope of energy efficiency and load management programs to include energy storage and other active demand management technologies as well as "strategic electrification, such as measures that are designed to result in cost-effective reductions in greenhouse gas emissions through the use of expanded electricity consumption while minimizing ratepayer costs." Energy efficiency plans could also include "programs that result in customers switching to renewable energy sources," placing a one per cent of total fund cap on these programs.[11] This definition establishes GHG reductions and renewable energy use as objectives, and the combination of active demand management and energy storage with electrification provides the tools for managing the potential for electrification to increase peaks or distribution system constraints. Note that the definition enables overall increases in electricity consumption.

Minnesota presents a case of a state with a cold climate and DSM programs traditionally achieving relatively high levels of savings and spending. The 2021 Energy Conservation and Optimization Act[12] provided legislated criteria that deemed fuel switching to be "efficient" if it results in:

- A net reduction in the amount of source energy consumed for a particular use, measured on a fuel-neutral basis, and
- A net reduction in statewide GHG emission, over the lifetime of the improvement, based on hourly emission profiles of electricity utilities installing the technology.

And that fuel switching must be:

- Cost-effective, from a utility, participants, and society perspective, and

[9] Illinois Power Agency Act. Incorporation of "other fuels" included in Future Energy Jobs Act.

[10] Canadian jurisdictions are more likely to use gigajoules (GJ).

[11] Commonwealth of Massachusetts General Laws. See description of changes under Act to Advance Clean Energy.

[12] Energy Conservation and Optimization Act.

- Installed and operated to improve utility system load factor

Minnesota's definition emphasizes economy-wide energy efficiency, GHG emissions, and cost-effectiveness. The load factor stipulation encourages shifting electricity use away from peak periods.

These examples demonstrate jurisdictions broadening and clarifying DSM definitions to include electrification, with specific criteria and additional tools to manage new electricity demands.

Regulatory mandates

Another policy option involves regulatory mandates encouraging fuel-neutral or cross-fuel energy efficiency solutions. These can include fuel-neutral energy efficiency resource standards, clean heat standards, and restrictions and/or expansions of DSM and utility service activities.

Fuel-neutral energy efficiency resource standards

Energy efficiency resource standards are long-term and mandatory energy-saving targets. They have traditionally been fuel-siloed by the utility. To break fuel silos, some jurisdictions have added GHG emission or fuel-neutral energy efficiency objectives.[13]

For instance, New York established a 185 trillion Btu site energy savings goal over 2015-2025, as well as an electricity sub-target to reach savings equal to three per cent of utility sales by 2025, alongside a heat pump target (see below).[14]

Massachusetts also introduced a fuel-neutral savings goal measured in Btus alongside other goals after legislative changes enabling strategic electrification noted above. A 2019-2020 plan included a new fuel-neutral (MMBtu) saving target (measured by net adjusted lifetime of efficiency measures). This enables savings that might increase

[13] For a wider discussion, see Gold, Gilleo, and Berg, "Next Generation Energy Efficiency Resource Standards."

[14] Recommendation originally made in NYSERDA, "New Efficiency: New York."

electric load but result in economy-wide savings and GHG improvements. Yet, Massachusetts maintained its fuel-specific targets to achieve net annual MWh savings equal to 2.7 per cent of electricity sales and net annual natural gas savings equal to 1.25 per cent of sales. These goals respected the legislative objective to attain all cost-effective electricity and gas savings.[15]

The 2022-2024 Energy Efficiency plan responds to a 2021 "Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy," establishing a net-zero emission by 2050 goal. Under the new Act, the Energy and Environmental Affairs Secretary establishes GHG reduction goals. A 2021 letter established separate electricity and natural gas GHG reduction goals, effective in 2030.[16] The plan itself, negotiated between the program administrators, a stakeholder advisory council, and the government, identified five key savings metrics, based on:[17]

- Net lifetime all fuel savings (MMBtu)
- 2030 cumulative annual emission reductions
- Demand savings (kW) for electric program administrators
- Net lifetime electric savings (MWh)
- Net lifetime natural gas savings (therms)

Fuel-neutral goals, in conjunction with fuel-specific goals, could prevent electric utilities from being incentivized to increase electricity sales to hit efficiency targets while neglecting more comprehensive electricity savings that reduce system costs.

Clean heat standards

Clean Heat Standards are mandatory targets placed on utilities to decarbonize heating systems, with flexibility on the methods to achieve this objective through strategies, such as weatherization, beneficial electrification, thermal energy, and low-carbon fuels.

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[15] See "2019-2021 Three Year Energy Efficiency Plan."

[16] "The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Letter Regarding Greenhouse Gas Emissions Reduction Goal for Mass Save," July 15, 2021.

[17] MA Energy Efficiency Advisory Council, "Massachusetts Joint Statewide Electric and Gas Three-Year Energy Efficiency Plan for 2022-2024."

They can break fuel silos by giving both electric and gas utilities a mandatory objective, with an ability to meet the objective through cross-fuel measures and to offer incentives to customers that impact another utility.[18]

Stebbins and Neme explain that a Clean Heat Standard is distinct from an emissions cap because it is based on a bottom-up accounting of specific measures (e.g. heat pumps installed or weatherization savings) focused on increasing the "good things" installed or used.[19]

Colorado was the first jurisdiction to legislate a Clean Heat Standard in 2021. The statute requires natural gas distribution utilities to file Clean Heat Plans every four years with a target to achieve a 22 per cent reduction below 2015 levels by 2030. The rule aims to give utilities the ability to meet this target with energy efficiency, biomethane, hydrogen, recovered methane, beneficial electrification, and/or distribution leak reductions.[20] The plans have a cost cap over and above what gas utilities spend on system-wide energy efficiency programs equal to 2.5 per cent of annual gas bills for full-service customers. However, the public utility commission may approve costs over the cap if in the public interest.

The Clean Heat Standard on gas utilities is complemented by a Bill (SB 21-246) that enables electricity utilities to implement beneficial electrification, with a requirement to file a beneficial electrification plan every three years and to propose a 10-year electrification target to the public utility board. This allows an electric utility to offer incentives to customers to replace gas appliances with high-efficiency electric appliances. Electric utilities must demonstrate that incremental loads can be

[18] A Clean Heat Standard should not be confused with a "Clean Fuel Standard" which establishes performance metrics on the carbon intensity of fuel, or for example, transportation fuels. A Clean Heat Standard is targeted at heating in particular, which can reduce its emissions through measures such as fuel switching and energy demand reductions.

[19] Neme and Stebbins, "A Comparison of Clean Heat Standards: Current Progress and Key Elements." Pg. 15-16.

[20] Colorado Revised Statutes 2023. 40-3.2-108 (1) (c) (I).

reasonably expected to be served by lower-than-average carbon intensity resources, and that electrification is consistent with maintaining grid reliability.

The Clean Heat Standard provided a political compromise to achieve environmental objectives without bans on new natural gas hookups or natural gas equipment replacements.[21] The first Clean Heat Plan by Colorado's major utility prioritized the use of "certified natural gas"–a form of natural gas that meets certification standards, but is not necessarily biomethane or renewable natural gas–and said hitting the target would exceed the cost cap.[22] An alternative intervener proposal achieved similar annual costs solely through weatherization and heat pumps as an alternative to central air conditioners.[23]

Other jurisdictions designing clean heat standards are learning from this experience. For example, a Massachusetts Commission on Clean Heat recommended a Clean Heat Standard based on a credit system, producing "a strong preference towards pursuing electrification."[24]

Restrictions of DSM and expansion of utility service

Regulatory mandates can also restrict and/or expand areas of activity for demand-side management programs and utility service, which will change the way a DSM administrator achieves its goals and could create new incentives to break fuel silos.

Examples of restrictions to DSM include:

- A 2022 phase-out of incentives for fossil fuel heating systems in Massachusetts via state legislation.[25]

[21] DiChristopher, "Colorado Requires Utilities to Run Building Electrification Incentive Programs."

[22] See "Certified Natural Gas 101."

[23] See Stebbins and Neme "A comparison of clean heat standards" February 2024.

[24] "Massachusetts Commission on Clean Heat Final Report." Pg. 19.

[25] An Act driving clean energy and offshore wind.

- A 2023 elimination of subsidies for gas hookups and electric line extensions for developments using gas or propane in California via utility commission order.[26]

The New York Utility Thermal Energy Networks and Jobs Act exemplifies expanding utility service. This Act enables utilities to operate thermal energy networks as an alternative to fossil heating distribution.[27] Another example is the June 2021 Minnesota Natural Gas Innovation Act, which creates a regulatory pathway for gas utilities to collect funds from ratepayers to reduce GHGs, using resources such as energy efficiency, electrification, renewable natural gas, carbon capture, and district energy.[28]

Cost-effectiveness testing

Specific measures, programs, or entire DSM portfolios are often screened in or out based on cost-effectiveness tests. Several of the mandates and definitions of beneficial electrification require that programs be "cost-effective", which is determined by how benefits and costs are counted and how they are discounted. Tests have common names and principles behind them. Common tests include the program administrator cost test, the total resource cost test, and the societal cost test. However, what is included or excluded within these tests can differ substantially across jurisdictions.

Cost-effectiveness testing can contribute to fuel silos by restricting cost/benefit considerations to the boundaries of a particular utility system without consideration of customer and societal impacts related to other fuels. Cost-effectiveness tests can also be lopsided. For example, most jurisdictions using the Total Resource Cost Test consider utility systems and customer costs and benefits but only adequately account for program participant costs without counting customer benefits related to other fuels, maintenance savings, or "non-energy" benefits.

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[26] "CPUC Eliminates Last Remaining Utility Subsidies for New Construction of Buildings Using Natural Gas."

[27] Utility thermal energy network and jobs act.

[28] Natural Gas Innovation Act.

California and Minnesota have constructed entirely new tests that enable multi-fuel DSM strategies.

In 2019, California modified its "Three Prong Test" to create a "Fuel Substitution Test." The new test removed restrictions on electrification by considering cost-effectiveness at the portfolio level instead of the measure level. This emphasized the cost-effectiveness of an entire portfolio of measures (e.g. heat pump and insulation) rather than the fuel switch itself, which might not be cost-effective on its own. The test also considers the timing of increased demand on GHG emissions. Given that California experiences periods of excess renewable energy generation, increasing load during the correct times can produce no GHG emissions and increase the value of renewable resources.[29]

In 2021, the California Public Utilities Commission moved to goals based on a Total System Benefit metric, which converts lifecycle energy, capacity, and GHG benefits into a single dollar value based on hourly avoided costs. This presents a standard metric for natural gas and electricity savings while incentivizing load reductions during the most expensive and GHG-intensive time periods and encouraging longer-lasting energy savings.

In 2023, Minnesota created a jurisdiction-specific "Minnesota Cost Test." This test was created using the National Standard Practice Manual Framework to replace generic tests with ones that align with jurisdiction-specific policy goals.[30] The test levels the playing field for fuel switching, by providing a single evaluation that includes all avoided costs and the impact of increased supply requirements across all utilities (and related fuels). The test also includes many non-utility impacts, including effects on other fuels and water, public health, the environment, economic development, energy security, and low-income implications on society and participants. The test discounts costs and benefits over time from a societal perspective rather than the typically larger (i.e.

[29] "Decision Modifying the Energy Efficiency Three-Prong Test Related to Fuel Substitution: Decision 19-08-009."

[30] The National Efficiency Screening Project, "National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources."

shorter-term) discount rate based on the weighted average cost of capital for utility investors. The test is recommended to be applied at levels higher than the measure level to prevent the exclusion of energy-saving measures that can be incorporated into cost-effective portfolios. Participant costs, such as electricity panel upgrades, are excluded from the test to avoid a lopsided situation because participant benefits are not counted due to the complexity of estimating them.[31]

Both examples demonstrate the ability to create jurisdiction-specific testing methodologies that consider wider policy objectives and that change alongside changing utility system resources, such as the availability of renewable energy.

Savings attribution

How energy and GHG savings are counted and attributed to DSM activities impacts program cost-effectiveness (as noted above), as well as the incentives created for a DSM administrator to pursue different activities to meet targets and/or receive financial incentives. The attribution of savings across fuels is more complex than fuel-specific savings, and previous policies that aimed to reduce load increases could create perverse incentives when considering economy-wide efficiency and GHG reduction goals.

Jurisdictions found different ways to count savings across fuel sources. This interacts with who funds programs to achieve savings.

An electric or gas utility in Illinois can save gas through fuel switching, get credit and cover incentive costs. The Technical Reference Manual divides savings between electric and gas utilities if both are supporting fuel switching, with gas utility savings counted as the difference between a gas furnace and baseboard electric technology (or

[31] Zoet, "2024-2026 CIP Cost-Effectiveness Methodologies for Electric and Gas Investor-Owned Utilities Docket No. E, G999/CIP-23-46." "National Standard Practice Manual Cost Study: Minnesota."

other new fuel baseline), and the electric utility then claims any savings between this baseline and the efficiency of the actually installed equipment (e.g. heat pump).[32]

California opted to have the new-fuel DSM program claim energy savings from fuel switching, under its Fuel Substitution Test. An electric utility therefore claims all savings from natural gas or electricity and converts the Btu savings into an equivalent kWh number. The natural gas utility that previously supplied the customer would not get credit for savings but see a reduced DSM target by an amount equal to the Btus of gas reduced. Thus, even though there are natural gas avoided costs, the savings are not claimed by the natural gas DSM program. This sees electric utilities driving electrification. It does not give natural gas utilities an electrification objective due to potential conflicts of interest that can occur if a natural gas DSM program promotes removal of gas customers and/or reductions in sales.[33]

In contrast, Minnesota encourages natural gas DSM programs to promote electrification by enabling gas utilities to count efficient fuel switching towards energy-saving goals. These gas savings contribute towards shareholder incentives for DSM performance. In contrast, an electric utility may not receive a financial incentive for fuel switching.[34] In the case of joint gas-utility programs, savings are allocated based on each utility's proportional financial contribution. Btu savings from fuel switching are converted to either therm for natural gas or kWh for electric utilities to report savings, which means reported savings for hitting goals will not be the same as actual impacts on utility systems. Reporting is broken out by savings converted for goals and actual impacts.[35]

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[32] "IL Statewide Technical Reference Manual: Version 7.0."

[33] See "Decision Modifying the Energy Efficiency Three-Prong Test Related to Fuel Substitution: Decision 19-08-009."

[34] Minnesota Statutes 216B.241, Subd. 11 & 12.

[35] Decision before the deputy commissioner of the Minnesota Department of Commerce, Docket No. E,G999/CIP-23-24 in Zoet, "2024-2026 CIP Cost-Effectiveness Methodologies for Electric and Gas Investor-Owned Utilities Docket No. E,G999/CIP-23-46."

Counting savings, while breaking "fuel silos", thus requires decisions and creativity on how to count who is responsible for what and who should be encouraged to prioritize beneficial electrification.

Parallel programs

A straightforward way to break "fuel silos" in energy efficiency is to fund and administer programs outside of the ratepayer-funded utility DSM system. This could include municipal, provincial, or federal energy efficiency programs that can prioritize fuel-neutral programs focused on non-utility benefits such as GHG reductions, economic development, and customer affordability.

Parallel programs that complement utility DSM can fund activities that might otherwise be out of DSM governance scope or neglected due to benefits produced outside of utility system considerations. An example is a May 2023 Minnesota omnibus bill that provided additional funding for low-income weatherization, electric panel upgrades, and heat pump rebates to top up the federal Inflation Reduction Act.[36]

Utility DSM delivery infrastructures can be used to deliver government-funded programs. This can avoid confusion for customers and trade allies and leverage existing administrative expertise and customer relationships. Most interesting for this paper's topic is how these parallel programs can impact DSM governance and operation.

A relevant example comes from New York State, where energy efficiency programs are administered by distribution gas and electric utilities and the New York State Energy Research and Development Authority (NYSERDA). In 2016, a Clean Energy Fund was funded via a surcharge on electricity ratepayers, under the governance of the Public Service Commission, with programs and initiatives administered by NYSERDA. The initial activities focused on areas with "insufficient focus" by other market actors (like

[36] See Wazowicz, "MN Continues to Move the Needle on EE Investments."

utilities), including the removal of non-market barriers to developing markets, innovation and research, and solar electricity.[37]

NYSERDA launched a Renewable Heat NY incentive and marketing campaign in 2017,[38] and developed heat pump potential studies. This started without direct utility involvement yet evolved towards the Clean Heat Program in 2020. This evolution saw utilities presenting "Energy Efficiency and Building Electrification" portfolios to the regulator with specific heat pump targets expressed in Btus. Electrical utilities would offer financial incentives and heat pump installation (as well as some gas utilities targeting non-pipe solutions), while NYSERDA focused on "market development" services focused on workforce, supply chain, and customer demand.[39] At the end of 2023, the program achieved over 240 per cent of its 4-year Btu savings target.[40]

New York presents an example of a non-utility administrator and funding mechanism initiating a fuel-neutral efficiency program that evolved into a new approach to utility DSM.

Policy options summary

The following table presents a list of the policy options above to break fuel silos in utility DSM programming, with a description and relevant examples.

[37] State of New York Public Service Commission, "Order Authorizing the Clean Energy Fund Framework."

[38] NYSERDA, "Annual Investment Plan and Performance Report through June 30, 2017."

[39] State of New York Public Service Commission, "In the Matter of a Comprehensive Energy Efficiency Initiative, ORDER AUTHORIZING UTILITY ENERGY EFFICIENCY AND BUILDING ELECTRIFICATION PORTFOLIOS THROUGH 2025."

[40] "New York State Clean Heat Program 2023 Annual Report." Pg. 3.

Policy	Action	Representative cases
Define beneficial electrification.	Provide a clear definition of beneficial electrification, considering mitigating utility system costs, climate, economic, and social objectives, and give DSM programs the mandate to promote it.	• Minnesota Energy Conservation and Optimization Act.
Implement regulatory mandates.	Create new targets, mandates, and restrictions/permissions to encourage DSM plans to achieve economy-wide energy efficiency.	• Massachusetts fuel-neutral energy efficiency resource standards. • Colorado Clean Heat Standard. • Massachusetts phase out of fossil fuel heating incentives. • Minnesota Natural Gas Innovation Act.
Update cost-effectiveness testing.	Customize cost-effectiveness tests used to screen DSM portfolios so they are balanced and meet policy goals by considering other fuel and societal costs and benefits.	• Minnesota Cost Test. • California Total System Benefit metric.
Attribute savings strategically.	Attribute savings to DSM administrators to incentivize beneficial electrification and demand management.	• Electric utility-driven electrification in California. • Natural gas utility incentive payments in Minnesota.
Launch parallel programs.	Create funds and programs outside of utility DSM to support objectives such as GHG reductions, equity, non-energy upgrades, and market development.	• New York Clean Energy Fund.

Table 1. Policy options to break fuel silos in utility demand side management.

Canadian cases

The rest of this report will apply the policy options above to Canadian DSM examples. A number of innovations related to breaking fuel silos have come out of Canada, rooted in unique energy contexts. We selected jurisdictions to reveal diverse lessons on how to meet the fuel silo challenge. Note that the objective of the case study is to learn about policy system dynamics. Thus, each case needs to provide a more comprehensive description of DSM plans or policies or an up-to-date tracking of events, rulings, or legislative changes. In several cases, jurisdictions might have already updated policies at the time of report publication, and the reader is encouraged to seek out the latest information.

Québec

Québec's electricity system is 99 per cent hydroelectric or wind. The industrial sector is the largest consumer of natural gas, followed by commercial buildings. Over 70 per cent of residential heating systems are electric or heat pump.[41] This creates significant electricity saving potential in switching to more efficient electric heat, and GHG reduction potential from electrifying the industrial, commercial, and residential sectors.

Hydro-Québec's 2022-2026 Strategic Plan estimated that it would need to increase its annual electricity generation by half of current levels to meet net-zero emission goals and continue to operate as a major North American exporter, increasing its energy efficiency targets.[42] These electricity needs, coupled with the priority to maintain low-to-zero carbon electricity generation, create a concern with managing peak demands from electrification.

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[41] In 2021, 64.9% of heating systems were electric and 6.4% were heat pump. Natural Resources Canada, "Comprehensive Energy Use Database. Table 21: Heating System Stock by Building Type and Heating System Type, Quebec, Residential Sector."

[42] Hydro-Québec, "Hydro-Québec Increases Its Energy Efficiency Targets and Makes Progress on the Evaluation of Québec's Hydroelectric Potential."

Hydro-Québec administers electricity DSM programs, and the primary natural gas utility (Énergir) administers natural gas DSM, in addition to Gazifère utility in the Gatineau region. The government of Québec has administered energy efficiency programs since the 1970s under various organizations. These programs are currently funded through carbon tax revenues and a charge on fuel distributors under the Ministry of Energy and Natural Resources.[43]

Chauffez vert (Green Heat) is a government program that promotes switching from fuel oil or propane to electricity. Switching to electric vehicles has been encouraged through a zero-emission vehicle mandate on distributors and incentives through Roulez Vert. EcoPerformance is an industrial program cost shared between Énergir and the government, which can support full or partial electrification.[44] Thus, there is a history of different funding sources and organizations coordinating to provide multi-fuel service, traditionally focused on switching away from non-regulated fuels rather than natural gas.

In July 2021, Hydro-Québec and Énergir jointly announced a bi-énergie (dual energy) program. The program would encourage all energy customers to purchase hybrid heating systems with electric heat-pumps and natural gas auxiliary heating. These hybrid heating systems operate as electric heat pumps for most hours of the heating system, preserving natural gas for the coldest periods to avoid excessive electricity peak demands. Customers receive grants funded by Hydro-Québec, Énergir and the government through the Chauffez vert program for space and water heating for residents and integrated within the Écoperformance program for businesses.[45]

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[43] "Provincial Policy Database." Quebec, Energy Efficiency Program Administration.

[44] See Innovation et transition énergétiques, "Programme ÉcoPerformance."

[45] In April 1, 2024 the grants were starting at $6,000 for heat pump space heater, and $3,700 for hot water heating, and an additional $10,000 for electrical upgrade for single-family residential homes. https://energir.com/en/residential/dual-energy/customers/ and commercial-institutional grants cover up to 80% of equipment purchase and installation premium cost, up to $250,000 per site. See https://energir.com/en/business/dual-energy.
The program was originally proposed before the regulator for residents and launched in June 2022, with a business program launched in November 2023.

Hydro-Québec offers customers a special rate that is lower off-peak and higher during on-peak periods. When the temperature drops below -12 C or -15 C, depending on climate zones, the gas auxiliary fuel must be used for space heating, and the system automatically switches away from electricity.[46]

Énergir said this program represented a change in its business model "by focusing on value creation rather than on the volume of natural gas distributed."[47]

The proposal filed before the provincial regulator (Régie de l'énergie) presented an analysis of the residential program showing that both electricity and gas utilities would reduce revenue requirements by $1.7 billion from 2022 to 2030 through the program compared to an all-electric scenario that would cost $2.7 billion. The program would reduce cumulative emissions by 2.7 Mt, compared to 3.8 Mt in an all-electric scenario.[48] Hydro-Québec would avoid energy, peak, and transmission/distribution costs, but have higher revenue requirements overall to serve new electricity demand. Additional revenue requirements for Énergir were principally related to lost revenues over avoided natural gas cost benefits.

The agreement between utilities would see Hydro-Québec paying a "GHG Contribution" to Énergir to balance out the additional revenue requirements between the utilities. The contribution could be as high as $403 million,[49] but paid based on actual participation (i.e. how many systems converted to dual fuel).[50]

The program could have conceptualized the GHG contribution as an electricity capacity service payment to Énergir's natural gas distribution system to meet a regulatory

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[46] As of April 1, 2024 the Rate DT for residents was 4.8 cents/kwh off-peak and 28.2 cents/kwh during cold periods https://www.hydroquebec.com/residential/customer-space/rates/rate-dt.html. See small and medium business rates here. https://www.hydroquebec.com/business/customer-space/rates/dual-energy-rate-space-heating.html

[47] Énergir, "Annual Information Form." Pg. 38.

[48] Régie de l'énergie, "Décision Sur Le Fond Demande Relative Aux Mesures de Soutien à La Décarbonation Du Chauffage Des Bâtiments, D-2022-061, R-4169-2021, Phase 1." Tableau 6, p. 51.

[49] Hydro-Québec and Énergir, "Réponse Des Distributeurs à l'engagement Numéro 2 (R-4169-2021)." p. 4.

[50] The proposal assumed that 9/15th of potential systems converted from 2022 to 2030.

mandate, akin to paying a natural gas “peaker” electricity generator or importing electricity. This conceptualization would provide a demand-side management solution acting as an alternative to supply-side resources.

However, the proposal before the regulator did not argue this was a payment for the management of the electricity system. Rather it was justified to meet the government’s objective to reduce emissions from building heating by 50 per cent by 2030 within the Plan pour une economie verte 2030 (Plan for a Green Economy 2030). The plan noted that this would be achieved through a partial conversion of natural gas to electricity as a “balanced approach based on the complementarity of the electrical and gas grids”, to “minimize costs for customers”.[51]

The government directly negotiated with the two energy utilities to create the program, who are public or quasi-public institutions. Hydro-Québec is a provincial government owned corporation. Énergir (the gas utility) is investor-owned, yet its primary investor is the Caisse de dépot et placement du Québec, a government-owned manager of public pensions.

The government contributed $125 million over 5 years towards the program and then issued a Ministerial Directive,[52] stating that the regulator should recognize the government’s policy approach and enable sharing of the costs between the two utilities.

The regulator initially approved the program in July 2022 but then accepted an appeal by intervenors, which concluded that the GHG Contribution is not a necessary component of Hydro-Québec’s costs to provide electricity service and that the regulator’s original decision should not have accepted it as part of revenue requirements.

The utilities and government moved forward with the program launch despite this uncertainty over regulatory approval and the utility’s ability to recoup costs through rates.

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[51] Government of Quebec, “2030 Plan for a Green Economy.” Pg. 6.

[52] Gouvernement du Québec, Décret 874-2021.

The dual fuel program presents a novel solution that breaks fuel silos. It is integrated within other energy efficiency programs, particularly Chauffez vert and Écoperformance.

Québec's policy approach centered on the government and public or quasi-public utilities developing a specific dual-fuel program, in contrast to a policy approach that established higher-level fuel-neutral and electricity peak reduction objectives and then invited a consideration of multiple program options. This approach had the benefit of launching a program relatively quickly, despite regulatory complications. However, funding and mandating a specific program created its own silos by failing to put the fuel back-up solution for peak demand reduction in competition with other options. Hydro-Québec is actively promoting and exploring other demand side solutions through a thermal storage program[53] and programs promoting smart home solutions and rewards for demand flexibility.[54] However, the right mix of fuel back-up vs. other demand-side solutions within a portfolio was not considered before the regulator.

Having launched the dual fuel program, Québec policymakers could still seek to better integrate it within DSM governance through policies such as a Clean Heat Standard and/or mandatory electrification plans, which could establish objectives that enable a fuller public examination of solutions and coherent integration within energy efficiency plans overseen by the regulator.

Ontario

Ontario's electricity system is relatively low-carbon due to nuclear and hydroelectric assets. Electricity "Conservation and Demand Management" is administered by the Independent Electricity System Operator (IESO) in conjunction with distribution utilities, and the principal natural gas distributor (Enbridge) administers gas DSM.

The government has frequently called for closer integration of electricity and gas efficiency, yet programs remain relatively siloed. An exception is that low-income

[53] See Hydro-Québec, "Need to Replace Your Central Heating System?"

[54] Hydro-Québec, "Hilo Smart Home."

customers automatically qualify for both gas and electricity programs.[55] At the time of writing, Enbridge reports discussions with the IESO to establish a one-window offering for residential customers.[56]

Cost-effectiveness testing rules include a 15 per cent adder to account for non-energy benefits. As implemented, the "Total Resource Cost Plus test" has included a small consideration of electricity avoided costs alongside other resources saved such as water, propane, fuel oil, etc.[57] The accounting for this has traditionally been marginal; for example, reduced furnace fan use with a more efficient gas furnace. The IESO can indirectly support electrification if counterfactual baselines are judged to be less efficient electric alternatives and through experimental initiatives supported by programs such as its Grid Innovation Fund.

Natural gas DSM can meet its targets through both traditional energy efficiency and incentives for fuel switching equipment, and Enbridge receives a shareholder incentive based on DSM performance. Enbridge conducted pilot projects of hybrid electric heat pump and gas backup systems with smart controls in select cities, starting in 2021, partially supported by the provincial government.[58]

There was a significant change in the residential natural gas DSM program when Enbridge signed an agreement with the federal government to co-deliver the Canada Greener Homes Grant Program. This federal program was introduced in 2021 for Canadian homeowners; there were no incentives for fossil fuel heating technologies, but up to $5,000 was available for full or partial electrification with a heat pump, building envelope improvements, and solar electricity.

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[55] The electricity Energy Affordability Program and the gas Home Winterproofing program.

[56] "Letter from Haris Ginis to Nancy Marconi Re: Enbridge Gas Inc. Ontario Energy Board File No. EB-2021-0002, 2022-2027 Demand Side Management Plan Application Residential DSM Program Update," April 22, 2024.

[57] "Ontario Energy Board Decision and Order EB-2021-0002 Application for Multi-Year Natural Gas Demand Side Management Plan (2022 to 2027)." Schedule E, p. 25.

[58] Enbridge Inc., "Ontario Pilot Program Tests Future of Advanced Hybrid Heating"; Government of Ontario, "Ontario Launches Clean Home Heating Initiative."

At the time, IESO had no residential programs on offer,[59] and thus Enbridge was the natural partner for co-delivery. The co-delivery arrangement was part of the Enbridge 2022-2027 DSM plan, which had to be approved by the Ontario Energy Board (OEB). While the submitted DSM plan gave the flexibility to provide incentives for efficient gas heating equipment, the utility acknowledged that they might be discontinued to co-deliver Greener Homes to produce a "seamlessly combined program."[60] The OEB then ruled the residential whole-home program would offer no incentives for gas equipment, as they were already subject to high-efficiency standards. The Board saw electrification as "consistent with DSM objectives of reducing natural gas consumption" and reducing costs through demand reduction.[61] Furthermore, it stated that less efficient gas-fired heat pumps reduced the opportunity to further reduce gas consumption compared to electric heat pumps.[62]

Enbridge planned to top-up the Greener Homes incentives so customers could access as much as $10,000 in grants. This raised the question of whether this "enhanced" incentive should be available for customers who exited the gas system and would no longer be Enbridge customers. The OEB ruled that the DSM plan should not require program participants to remain Enbridge customers after efficiency measures (including electrification measures) have been implemented. This would allow customers to make their own decisions, maximize efficiency improvements, and reduce GHGs.[63] Customers would have paid a share of the natural gas DSM costs while previously using gas equipment and thus should be able to benefit from energy efficiency programs. The OEB further ruled that a new housing program (called Building Beyond Codes) should be available to builders whether they connect to the gas system or not.[64]

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[59] Except for low-income qualified customers.

[60] "Ontario Energy Board Decision and Order EB-2021-0002 Application for Multi-Year Natural Gas Demand Side Management Plan (2022 to 2027)." Pg. 21.

[61] Ibid. Pg. 16.

[62] Ibid. Pg. 17.

[63] Ibid. Pg. 25.

[64] Ibid. Pg. 49.

The OEB acknowledged policy ambiguity "on the role of natural gas DSM as part of the broader issue related to the electrification of the energy sector" and noted it would not impose "broad new requirements" without further guidance from the government on electrification.[65] It also acknowledged the need for further consideration of relevant avoided costs between electricity and natural gas with increased fuel switching, asking that an updated proposal on cost-effectiveness testing be included in the next DSM application.[66]

The co-funded residential whole-home program saw overwhelming demand and was closed to new applications in February 2024 when federal government funds were exhausted. Enbridge wrote to the OEB to express its intention to re-introduce a similar, albeit smaller version of the residential whole-home program, which will still allow customers to participate even if they exit the gas system and the new program will provide no incentives for natural gas equipment.[67]

Ontario provides an interesting case of how a parallel program outside the utility can enhance and expedite changes to DSM programming. Without the Canada Greener Homes Grant Program funding and its interaction with Enbridge's DSM programming, it is uncertain whether the OEB would have approved funding for electrification measures or placed restrictions on incentives for gas-fired heating equipment. A federal program helped instigate new electrification protocols, demonstrating federal spending power can be strategically used to create policy changes within DSM institutions. Whether these changes are structural and long-lasting remains to be seen. The recognition that electrification is a legitimate natural gas DSM measure consistent with the primary objective of reducing gas demand to avoid costs is significant.

To truly break fuel silos, the province should be considering how natural gas DSM strategies (such as improved building envelopes and/or strategic use of hybrid heating)

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[65] Ibid. Pg. 16.

[66] Ibid. Pg. 84.

[67] "Letter from Haris Ginis to Nancy Marconi Re: Enbridge Gas Inc. Ontario Energy Board File No. EB-2021-0002, 2022-2027 Demand Side Management Plan Application Residential DSM Program Update," April 22, 2024.

could benefit the electricity system and how customers can access fuel-neutral energy efficiency services, as well as the role of both gas and electric programs in achieving beneficial electrification. Some movements towards these objectives are outlined in a letter from the energy minister on post-2024 electricity energy efficiency, calling on the examination of "objectives and targets for beneficial electrification," and enhanced electricity and natural gas program coordination, with specific mention of a hybrid heating pilot project.[68]

Nova Scotia

Nova Scotia is home to Canada's first energy efficiency utility, Efficiency Nova Scotia.[69] This organization is a franchise to operate electricity DSM. The province has a limited natural gas distribution network and no regulated gas DSM program. Non-electric energy efficiency programs targeted primarily at heating oil are also operated by Efficiency Nova Scotia and funded by a contract with the provincial government. The organization can manage funding from other levels of government and the private sector.[70]

The majority of residential homes use fuel oil for heating. This means electric heat pumps can produce significant bill savings. With a carbon-intensive electricity system based on coal power plants, GHG emission benefits are less pronounced, yet lifecycle GHG benefits are projected due to the electricity system reducing coal use and increasing renewable energy generation.[71]

The administrative arrangement means Efficiency Nova Scotia can provide one-stop-shop services for customers, regardless of fuel used. This can include guiding

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[68] "Letter from Energy Minister Todd Smith to IESO President and CEO Ms Lesley Gallinger," February 9, 2024.

[69] Note that this report lead author (Brendan Haley) was involved in advocating for the creation of this organization and sat on the Board of Directors for 6 years.

[70] Haley, "Case Study: Nova Scotia."

[71] For space heating cost and GHG comparison, see Efficiency Nova Scotia, "Home Heating Cost Comparison for Nova Scotia."

customers through different programs operated by the same organization. When a program's efficiency measures save multiple fuels, savings are attributed based on the level of funding. For example, an insulation upgrade might save fuel oil and electricity in a home that uses a fuel oil boiler and ductless heat pumps.

Yet, Nova Scotia still experiences fuel silos. Government funding is predominantly focused on the residential sector, with little support for fossil fuel reduction in commercial and industrial sectors. Electricity DSM has robust electricity-saving programs in non-residential sectors. This means energy efficiency experts working in large energy-consuming buildings and industrial projects identify non-electric savings opportunities that are neglected due to program and funding gaps. In addition, electricity DSM has been traditionally focused on reducing demand, with little guidance for ratepayer-funded strategic electrification.

In April 2023, the government changed the legislated definition of DSM to include "strategic electrification of energy end uses currently powered by fossil fuels in a manner that reduces overall greenhouse gas emissions and electricity costs."[72] The "electricity cost" term leaves some ambiguity over situations where system or customer electricity costs could increase, despite fuel-neutral energy costs decreasing, or concerning the definition of baseline electricity costs from which to reduce costs.

The Nova Scotia Utility and Review Board ruling on the 2023-2025 DSM plan[73] also concluded that consideration of other fuel impacts and other non-energy benefits of savings in cost-effectiveness testing was outside their regulatory jurisdiction. This ruling provides little guidance for selecting beneficial electrification measures. The energy supply utility (Nova Scotia Power) argued that there are positive rate impacts on increasing electricity loads over fixed costs. However, this is not always the case. Such a strategy could encourage the uneconomic build-out of electricity infrastructures

[72] Nova Scotia Public Utilities Act, section 79A (b) (iv).

[73] Nova Scotia Utility and Review Board, "IN THE MATTER OF AN APPLICATION by EFFICIENCYONE (E1) for Approval of a Supply Agreement for Electricity Efficiency and Conservation Activities between E1 and Nova Scotia Power Inc. (NS Power), the Establishment of a Final Agreement between the Parties, and Approval of a 2023-2025 Demand Side Management (DSM) Resource Plan." Section 4.4.1.

(increasing future fixed costs) that ultimately increase province-wide total fuel energy costs.

Growing electrification of heating and vehicles is assumed in Nova Scotia Power Integrated Resource Plan scenarios and electricity planning. These new systems need to contribute to a growing emphasis on demand response within Efficiency Nova Scotia's DSM plans. In 2021, Efficiency Nova Scotia coordinated with Nova Scotia Power to launch a domestic hot water direct load control pilot and a commercial demand response pilot.[74]

Nova Scotia presents a case where fuel silos still exist despite an administrative model and fuel mix that should encourage cross-fuel energy efficiency strategies. Electrification is actively encouraged by government-funded programs rather than regulatory mandates. Yet, it needs to be planned in a manner that considers how to achieve economy-wide energy efficiency for all sectors while strategically managing additional electricity load growth in a carbon-intensive electricity grid.

Manitoba

Manitoba could reduce GHG emissions through electrification because 99 per cent of its electricity production is from hydroelectricity or wind power. Manitoba Hydro is a crown corporation that generates and distributes electricity and owns the natural gas distribution company Centra Gas. Since 2020, both electricity and natural gas DSM programs have been administered by Efficiency Manitoba; the province has no “fuel silos” due to administrative separation. The province is one of the few places where full electrification to air-source heat pumps is unlikely to be economical.[75] The cold climate means electrification using electric resistance solely or combined with air-source heat pumps could drive winter peaks and create a capacity supply challenge for Manitoba

[74] Efficiency Nova Scotia, “2022 DSM Annual Progress Report.”

[75] Ferguson and Sager, “Cold-Climate Air Source Heat Pumps: Assessing Cost- Effectiveness, Energy Savings and Greenhouse Gas Emission Reductions in Canadian Homes.”

Hydro. Coupling any electrification with other load reduction is likely an important strategy.

Manitoba has a history of encouraging ground-source heat pumps. A March 2024 letter from the government's new Environment Minister mandated Efficiency Manitoba to integrate climate and energy priorities, to co-deliver a program with the federal government to switch from fossil fuels to both ground source and air source heat pumps and to target beneficial electrification and increase the uptake of geothermal heat pumps. Since its first plan, programs have indirectly supported fuel switching by opening participation in ground source heat pump programs to electric and natural gas customers.

The Efficiency Manitoba Act includes specific targets for electricity and natural gas savings, expressed as a percentage of the previous year's consumption. A parallel Affordable Energy Fund enables programs to reduce home heating fuel consumption besides electricity and gas. Efficiency Manitoba can reduce the consumption of other fossil fuels used for residential space heating for different sectors and count them towards the natural gas heating savings target based on an equivalent heating value. This combination of funds covers all fuels across the province, yet there are ambiguities concerning fuel switching.

The Act's definition of demand-side management does not explicitly exclude fuel switching unless the switch increases GHG emissions. However, any program-induced electrification is counted as a minus sign in Efficiency Manitoba's electricity savings because of the Act's definition of "net savings," which states a change in one fuel must take "into account any other adjustments in consumption that are attributable to, or influenced by, the change."

This definition has created multiple disincentives for encouraging fuel-switching in Manitoba, including savings determination, cost allocation, and cost-effectiveness determination. Regarding energy savings, the net savings definition has been interpreted to mean that a reduction in natural gas due to a heat pump counts towards savings for the natural gas target. Yet, the increase in electricity consumption counts as a negative towards the electricity savings target. Thus, the policy of separate electricity

and natural gas targets (no fuel-neutral target) expressed as a percentage of provincial consumption, combined with this savings attribution protocol, discourages Efficiency Manitoba from fuel switching because it reduces its ability to meet its legislated electricity savings target. Furthermore, this approach results in natural gas customers bearing 100 per cent of the fuel switch-related program costs, and the negative electric energy savings results in relatively large negative avoided electric costs used in cost-effectiveness determination.

Manitoba could significantly reduce GHGs due to fuel switching. Yet, the customer benefits of switching from natural gas to electricity are not strong, and electrification could drive electricity peaks in a cold climate. This provides an excellent context for a sophisticated beneficial electrification program able to target customer segments that would benefit from electrification, value climate benefits, and match electrification with building envelope improvements, demand shifting, and alternative fuel supplementary heat to reduce peak demands. There are few administrative barriers for Efficiency Manitoba to follow such a strategy, if definitions of beneficial electrification with DSM portfolios, energy saving targets, and savings attribution policies can be reformed. At the time of writing, Efficiency Manitoba reports that it is developing an interim beneficial electrification policy to be reviewed by the regulator and government.

The Manitoba case demonstrates that fuel silos can exist under a single independent administrator and that it is important to avoid unanticipated disincentives when attributing savings to fuel-specific targets.

British Columbia

BC has a hydroelectric-based electricity system, and parts of the province have a relatively mild coastal climate, a context that can make electrification with heat pumps cost-effective from a customer perspective. Electricity DSM programs are administered by BC Hydro (a crown corporation) and FortisBC Inc. (an investor-owned utility) in the southern interior region. The primary natural gas distribution network is owned by FortisBC Energy, which also administers natural gas DSM. In addition, the government has funded rebate and incentive programs under its CleanBC climate plan.

The Clean Energy Act of 2010 listed "switching from one kind of energy source or use to another that decreases greenhouse gas emissions" as one of the province's energy objectives. The definition of a "demand side measure" precluded fuel switching if it increased GHG emissions.

The 2012 Greenhouse Gas Reduction Regulation (under the Clean Energy Act) directs the BC Utilities Commission (BCUC) to allow collection of electrification costs from rates[76] and defines the cost-effectiveness of electrification programs as a net increase in revenues after considering any losses in export revenues and program costs.[77]

Electrification in BC has been driven by policy, and BC Hydro, as a crown corporation, has been a key implementer. BC Hydro reports that it began to promote electrification in 2016[78] after a provincial climate plan sought to expand the DSM mandate to include "efficient electrification".[79] In fiscal year 2018, electrification was integrated within BC Hydro's DSM plans, with load increases and GHG reductions reported separately. Additionally, in fiscal 2019 the government launched $24 million in government programs (under EfficiencyBC, later renamed CleanBC), with BC Hydro delivering fuel switching on the government's behalf (FortisBC also delivered fuel switching programs in the area where it provides electricity distribution service).[80] The BC Hydro initiatives aimed to target customers and initiatives not addressed by government programs, with

[76] Which meet the description in the Act of "prescribed undertakings".

[77] This definition of cost-effectiveness is quite distinct from typical DSM cost-effectiveness tests, typically aiming to minimize energy costs (and thus utility revenue requirements) and/or maximize customer or societal benefits. The definition of costs is also restricted to program costs, rather than considering any additional supply side costs required to service new loads. The definition remains within a "fuel silo" because it does not consider benefits of reducing non-electric energy costs, other than GHG reductions. In the context of an electricity surplus and additional load growth not requiring more capital expenditure or significant supply side costs, increasing revenues is likely to put downward pressure on electricity rates.

[78] BC Hydro, "BC Hydro's Electrification Plan: A Clean Future Powered by Water."

[79] Office of the Premier, "B.C.'s Climate Leadership Plan to Cut Emissions While Growing the Economy."

[80] BC Hydro, "Fiscal 2020-2021 Revenue Requirement Application." Chap 10 DSM.

programs related to energy management studies (especially for industrial electrification), public awareness, research, standards, and contractor education.[81]

BC Hydro released a $190 M electrification plan in 2021. The government required the BC Utilities Commission to allow electric utilities to collect the full cost of the plan in rates (amortized over time from a DSM regulatory account) through a June 2022 directive.[82]

At the same time that BC Hydro added electrification to its DSM mandate, it also increased "capacity focused DSM" with peak demand savings that more than offset any induced load increase.

The BC government has signaled that mandatory regulations will be an important part of its policy mix to promote efficient electrification and reduce natural gas use. The 2021 Clean BC Roadmap included a plan to make all new space and water heating equipment sold and installed at least 100 per cent efficient, prioritizing electricity resistance and (electric or gas) heat pump technologies over conventional fossil fuel equipment.[83] In addition, the plan said it would introduce a GHG emissions cap for natural gas utilities, which could be met through energy efficiency and options such as renewable gas.[84] However, a recent Clean Energy Strategy included the "highest efficiency" equipment standards and made no mention of the GHG emissions cap.[85]

The government introduced restrictions on gas equipment DSM incentives in June 2023. Any incentives for gas-fired equipment must have a benefit-to-cost ratio of 50 or higher, and a dual-energy heating system must have a seasonal coefficient of

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[81] BC Hydro. Appendix Y. FortisBC supported electrification on a similar timeframe, with its first application for interim rates for DC Fast Chargers for electric vehicles in 2017. See FortisBC Inc., "Application for Approval of Rate Design and Rates for Electric Vehicle (EV) Direct Current Fast Charging (DCFC) Service."

[82] Direction to the British Columbia Utilities Commission Respecting Load Attraction and Low Carbon Electrification, B.C. Reg. 156/2022. June 27, 2022.

[83] Ministry of Environment and Climate Change Strategy, "CleanBC Roadmap to 2030." Pg. 41.

[84] Ministry of Environment and Climate Change Strategy. Pg. 29.

[85] Government of British Columbia, "Powering Our Future, BC's Clean Energy Strategy."

performance of 1.5 or higher.[86] These are not legislated bans on gas equipment but rather requirements that such installations have very high benefits relative to costs and high system efficiencies, which have the effect of eliminating incentives for stand-alone gas equipment.

The government also changed cost-effectiveness screening to a utility cost test limited to utility costs and benefits, rather than a Total Resource Cost Test that includes customer costs yet has difficulty accurately counting customer benefits. Policymakers anticipate that this cost-effectiveness change will justify higher levels of DSM. Furthermore, the regulator evaluated recent DSM plans on a portfolio level, which enables some measures or programs that would otherwise be screened out to be included. In addition, changes to the regulation require that the avoided cost of natural gas is set to reflect the cost of renewable and low-carbon gas.[87] These changes use a new test more restricted to fuel-specific utility systems, yet combined with the overall policy mix, it encourages alternative natural gas DSM strategies and electricity system savings.

The impact of this mix of policies is demonstrated in the FortisBC Energy Inc. 2024-2027 natural gas DSM plan, which moves away from conventional high-efficiency gas space and water heating equipment towards “advanced DSM”, which includes gas heat pumps, dual fuel hybrid heating systems and deeper energy retrofits.[88] Estimated savings decrease compared to 2023 due to phasing out gas equipment incentives and estimated lower initial participation by early adopters of advanced DSM. Targeted savings rise in future years with anticipated increased uptake of hybrid heat pumps, significant industrial savings, commercial strategic energy management, and residential

[86] Based on utility cost test and applied only to gas equipment under 100% efficiency (titled Class B measures). The seasonal coefficient of performance of 1.5 or higher is for climate zones 4 and 5, which covers south-western areas of the province. See Demand-Side Measures Regulation 4 (2.1) (b) & 1.1 (2) (i)(i), respectively, changed via under Ministerial Order No. M193, dated June 27, 2023, amending the Demand-Side Measures Regulation, B.C. Reg. 326/2008.

[87] Demand-Side Measures Regulation, Section 4.1.1, & FortisBC Energy Inc., “Application for Acceptance of Demand Side Management (DSM) Expenditures Plan for the Period Covering 2024 to 2027 (Application).” Pg. 3.

[88] FortisBC Energy Inc. Pg. 1.

deep retrofit pilot projects. The overall DSM budget increases compared to 2023 because initial incentives for advanced DSM are large to facilitate early adoption and due to commitments under legacy DSM plans. The gas-electric hybrid heating system measure is on the threshold of cost-effectiveness,[89] showing that partial electrification is significantly enabled by the rules based on avoided cost of renewable natural gas and the protocol to evaluate cost-effectiveness at a portfolio level.[90]

The natural gas DSM plan claims savings from electrification, similar to any other DSM measure. There is no consideration for negative impacts on the electricity system from growing electric loads (e.g. peak demands), which could be mitigated through additional DSM measures such as building envelope upgrades. Thus, there is also no additional compensation for these natural gas DSM measures that could make electrification "beneficial" by reducing costs on electricity systems. Thus, the DSM plans still stay within fuel silos but are both directed towards electrification and energy efficiency within each utility boundary.

BC presents a case of policy-driven electrification via government parallel funding and regulatory mandates, with the strategic use of utilities to implement. Policy direction to natural gas DSM avoids incenting the installation of less efficient new gas equipment in homes and businesses while encouraging partial electrification and higher gas savings to reduce GHGs.

This is not a case of a jurisdiction breaking fuel silos. Rather it shows a pragmatic and strategically designed policy mix directing utility DSM towards GHG reduction goals given the fuel silos that typically exist. Electrification that reduces GHGs is considered beneficial by definition, while other energy savings and supply-side strategies are

[89] A benefit-cost ratio under the utility cost test of 1 reported in BCUC, "FortisBC Energy Inc. 2024-2027 Demand Side Management Expenditures Plan. Reasons for Decision." Pg. 24.

[90] Portfolio level evaluation is enabled by the BC DSM regulations and was proposed by FortisBC and accepted by the BC Utilities Commission. Note that Pacific Northern Gas is another natural gas distributor with a separate DSM plan. This plan is not discussed in this report because the FortisBC case provides adequate insights.

expected to manage the potential electricity system implications of more electricity demand.

Newfoundland and Labrador

Newfoundland and Labrador has a primarily hydro-based electricity system and no natural gas heating distribution network. The electricity system faces cost pressures and an electricity surplus since the commissioning of the Muskrat Falls generating station which experienced significant cost overruns.[91] This context creates the potential to mitigate electricity rates and reduce combined electricity and fossil fuel bills through increased electrification. For instance, Synapse Energy Economics suggested a fuel silo-busting "bill mitigation" strategy to the utility regulator.[92]

Electricity DSM is jointly administered under the takeCHARGE banner by the investor-owned Newfoundland Power and publicly owned Newfoundland and Labrador Hydro.

In 2020, the Board of Commissioners of Public Utilities recommended utilities incorporate electrification into DSM, leading to a 2021 Electrification, Conservation and Demand Management Plan submitted jointly by Newfoundland Power and Newfoundland and Labrador Hydro. The measures in this plan included support for electric vehicle charging (some with demand response capabilities), education on fuel switching and custom electrification for commercial customers, and research and pilot projects on demand and energy impacts of heat pumps.[93]

The utilities proposed assessing the cost-effectiveness of electrification programs using a Modified Total Resource Cost Test that differed by considering customer cost savings from lower non-electric fuel and maintenance costs. The utilities proposed that

[91] Newfoundland and Labrador Board of Commissioners of Public Utilities, "Rate Mitigation Options and Impacts Muskrat Falls Project Final Report."

[92] Synapse Energy Economics, "Phase 2 Report on Muskrat Falls Project Rate Mitigation."

[93] Newfoundland Power and Newfoundland and Labrador Hydro, "Electrification, Conservation, and Demand Management Plan 2021-2025."

this test be approved rather than specific programs to enable electrification initiatives to be flexible as market conditions change.[94]

The regulator rejected the use of the new cost-effectiveness test, stating that it was not consistent with the Board and utility's mandate to provide the least cost electricity service.[95] Stakeholder intervenors argued against electrification and the use of the modified cost-effectiveness test, emphasizing the need to focus on short-term rather than longer-term rate and bill impacts.

Approval of the plan took two years, from filing in December 2020 to a Board order in November 2022. However, this did not stand in the way of some electrification programming. The Board approved capital expenditure on electric vehicle charging in September 2021 because delay could have resulted in losing matching federal government funding.[96]

Newfoundland and Labrador Hydro and Newfoundland Power partnered to deliver government-funded programs, including insulation and thermostat rebates for oil-heated customers, electric vehicle rebates, commercial EV chargers, and oil-to-electric rebates.[97]

In May 2023, the government made changes to the Electrical Power Control Act that gave the utility board the ability to consider "environmentally responsible decisions."[98] This could enable consideration of the environmental benefits of electrification programs that reduce other fuels. However, the rejected modified cost-effectiveness

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[94] See An Order of the Board – PU33(2022) Newfoundland and Labrador Board of Commissioners of Public Utiltiies, November 2022.

[95] An Order of the Board – PU33(2022) Newfoundland and Labrador Board of Commissioners of Public Utiltiies, November 2022, p. 15.

[96] Newfoundland and Labrador Board of Commissioners of Public Utilities. Order No. P.U. 30(2021).

[97] See Newfoundland and Labrador Hydro, "Conservation and Demand Management Report for the Year Ended December 31, 2022."

[98] See Newfoundland and Labrador, "Amendments Being Introduced Following Review of Public Utilities Legislation.", Subparagraph 3(b)(iii) of Electrical Power Control Act, 1994 https://www.assembly.nl.ca/Legislation/sr/Annualstatutes/2023/2310.chp.htm.

test was focused on customer total energy and equipment bill reductions rather than environmental benefits.

Newfoundland and Labrador presents an energy context with a strong reason to increase electrification and break fuel silos to achieve more considerable customer and environmental benefits. However, the electricity regulator decided it could not consider benefits outside of the electricity silo, which led to a stalled incorporation of electrification into utility DSM. Programs have been introduced quicker and more comprehensively through outside government funding, taking advantage of the delivery capabilities of existing DSM programs, and ratepayer funds supporting electric charging infrastructure were expedited to match federal government funding. Thus, parallel funding programs have primarily driven electrification, while DSM governance still needs to be clarified.

Province	Beneficial electrification definition	Regulatory mandates	Cost-effectiveness testing	Savings attribution	Parallel programs
Québec	Government plan to reduce building heat GHGs by 50 per cent through partial conversion of natural gas to electricity.	Government directive for regulator to support dual fuel program.	No. Dual fuel program considered balancing increase in revenue requirements between electric and gas utilities.	Dual fuel program reported separately.	Government co-funding dual fuel program and funds fuel switching programs.
Ontario	Ministerial request for beneficial electrification objectives and targets noted making better use of existing generation, reducing overall emissions, energy use, and energy costs.		Consideration for future gas DSM plans.	Electrification counts towards gas savings.	Full and partial electrification included within gas DSM after co-delivery with federal program.
Nova Scotia	Yes. Reduce fossil fuels and GHG emissions and electricity costs.		Limited to electricity system, excluding non-energy benefits and other fuel savings.	Non-electric savings performance reported to government funder.	Governments fund non-electric energy efficiency.

Manitoba	Excluded if it increases GHGs.			Electricity increase counted against electricity-specific savings targets.	Potential to co-deliver Federal government supported ground source and air source heat pump program.
British Columbia	Precluded if increases GHGs. GHG reduction targets in BC Hydro electrification plans.	• Proposed GHG cap on gas utilities. • Restrictions on DSM incentives for gas heating equipment. • Proposed 100 per cent efficient requirement for new residential gas and water heating installations.	• Electrification cost-effectiveness based on increasing BC Hydro net revenues. • Change to utility cost test and renewable gas avoided cost encourages more electricity and gas DSM.	• Natural gas DSM includes savings from electrification. • BC Hydro reports increased load from electrification and GHG reductions separately.	Government programs under CleanBC brand administered by utilities.
Newfoundland and Labrador			Proposal to consider customer non-electric fuel and maintenance savings rejected by regulator.		Utility DSM programs administer government funded electrification and efficiency programs.

Table 2. Demand-side management fuel silos and Canadian provincial policy.

Lessons on managing fuel silos in demand-side management

American and Canadian cases show distinct approaches to changing DSM governance to consider multiple fuels, given the growing importance of policy objectives to reduce GHGs and promote beneficial electrification and economy-wide energy efficiency.

For instance, Minnesota and Ontario have changed policies and protocols to encourage natural gas utilities to promote electrification through their DSM programs. BC and California encourage electric utilities to promote electrification. Québec sees both utilities promoting partial electrification through a negotiated agreement. In Canada, governments task crown corporations like BC Hydro and Hydro-Québec to deliver government-funded programs and complement policy priorities.

Table 2 summarizes the Provincial cases explored along the policy dimensions outlined in the first section. It highlights both actions that can break fuel silos and areas where barriers exist.

One insight is that you do not necessarily have to “break” fuel silos by coordinating across fuels. BC presents a case where a robust policy mix, working across several dimensions, significantly changes the nature of both gas and electric DSM. This is done without a formal integration of gas and electric utility initiatives, in contrast to a joint program in Québec.

Given that each jurisdiction will likely integrate DSM across fuels and meet net-zero emission policy objectives in different ways, a universal list of policy recommendations is unlikely to be useful. However, it is possible to learn from early experience to suggest the key lessons below.

Reach people with existing energy efficiency program infrastructure

Utility DSM providers have expertise in program design and delivery, as well as existing marketing channels and relationships with customers and trade allies. Even when multi-fuel energy efficiency and electrification initiatives are delivered outside of DSM governance structures, governments have used DSM delivery channels. Jurisdictions have simply made electrification and multi-fuel efficiency parallel objectives with the same administrator. The most enduring example of this is likely Efficiency Nova Scotia, which was created as an electricity DSM "efficiency utility" that could also cover other non-regulated fuels. This enabled provincial and federal governments to partner with this organization to provide one-stop-shop energy efficiency solutions, thereby supporting the take-off of heat pumps in the province.[99]

Whether policymakers decide to break DSM governance fuel silos or simply work around them, it is possible to leverage existing program infrastructures to deliver fuel-neutral energy efficiency. However, incentives need to be aligned, which is why changing DSM governance is still advisable.

External funding can get around and/or change DSM policies

The Canadian cases demonstrate that government funding outside of DSM governance can be faster and more flexible. For example, the Québec dual fuel program was not supported by the regulator yet went ahead with the support of government funds, and because gas and electric utilities negotiated a common objective.

Newfoundland and Labrador sped up approval of its electric vehicle charging program when federal government match funding was available. When multi-fuel energy efficiency strategies are tied to wider objectives, such as GHG reductions and economic development, it can be more appropriate for governments rather than utility ratepayers

[99] https://climateinstitute.ca/publications/heat-pumps-are-hot-in-the-maritimes/.

to fund or co-fund programs. We see many examples of blended funding throughout all Canadian cases explored.

However, the cases also demonstrate that government funding can change DSM policies. The best example is how the federal Canada Greener Homes Program co-delivery arrangement with Enbridge Gas triggered the Ontario Energy Board to rule that natural gas DSM includes incentives for full electrification.

Update DSM governance

Government funding is a more immediate way to support electrification and fuel-neutral energy efficiency, given that DSM governance institutions can act slowly. However, updating DSM governance is likely a longer-term benefit to enabling net-zero-aligned energy efficiency that acts across traditional boundaries.

Canadian cases reveal misaligned incentives that work against GHG reduction electrification. For example, under legacy saving attribution policies electrification driven by Efficiency Manitoba comes with a penalty against its electricity savings goal. While electrification can impose costs on the electricity system, a more nuanced approach would likely focus on mitigating peak demands and/or time and location-specific demand management.

Nova Scotia's DSM governance systems are also contradictory. While electricity DSM now includes strategic electrification, the electrification definition and cost-effectiveness testing rules preclude consideration of the fossil fuel reduction benefits of electrification.

The BC case presents a mix of policies that directs all players towards promoting electrification to reduce GHGs. Electrification is supported if it increases net electric utility revenues, but the electrification strategy was developed under the prevailing planning assumption that the province did not have near-term energy or capacity needs. Yet, this planning assumption does not match the level of electrification estimated to be

required to achieve government climate goals.[100] A different electricity system context would suggest the need for more electricity savings and sophisticated time and location-specific DSM. In this context, a definition of beneficial electrification supported by either the electricity or gas utility could include maximizing opportunities for demand flexibility and/or ensuring the portfolio of options avoids unnecessary electricity system supply costs.

Québec also provided inadequate direction to DSM governance for the regulator to integrate the dual fuel program. The focus on a program, negotiated between government and utilities, also fails to take advantage of the ability of DSM governance systems to provide an evidence-based assessment of how to electrify while mitigating peak demands and other electricity system costs, while managing natural gas system rate and bill impacts.

Changing DSM governance systems through policies like beneficial electrification definitions and mandates, cost-effectiveness testing changes, and clarifying savings attribution rules are still desirable, even in cases where multi-fuel efficiency and electrification initiatives have progressed. Such changes can avoid unnecessary costs that could ultimately reduce political support for net-zero emission transitions, avoid unnecessary installation of fossil fuel equipment or electricity system capital expenditures, and enable flexible and goal-oriented demand-side strategies as energy system contexts change.

Set rules and baselines

Regulatory mandates have a powerful role in directing energy efficiency programs towards net-zero emission goals and helping to break fuel silos. No Canadian jurisdiction has yet to introduce a fuel-neutral savings goal similar to Massachusetts or New York.

[100] Richard Mason, “BC Hydro’s Integrated Resource Plan Illustrates a Serious Disconnect between BC’s Climate Policy and Energy Planning.”

In BC, the prospect of “highest efficiency” equipment regulations and a GHG cap on natural gas utilities has put natural gas DSM on a different trajectory, supporting partial electrification and deeper energy savings. This is despite these regulations not yet coming into force.

By establishing clear baselines, DSM strategies know where to seek future energy savings. Policies that clarify baselines and DSM strategic directions can include restrictions on the installation of high-efficiency gas equipment to avoid fossil fuel lock-in, or clear electricity equipment baselines that enable DSM programs to promote more efficient and demand responsive equipment.

No jurisdiction in Canada has actively explored a clean heat standard, which is one option to direct natural gas DSM programs towards higher energy savings and GHG reductions while enabling flexibility and involvement of multiple players delivering specific measures like heat pumps, thermal networks, low-carbon fuels, and expanded energy efficiency.

Take a portfolio approach

Successfully breaking DSM fuel silos to meet net-zero emission goals requires consideration of an entire policy mix and a portfolio of strategies. Electrification and multi-fuel efficiency can introduce multiple objectives that can offset and compete and pull a program administrator in different directions.

However, this is not an uncommon experience for DSM policy, and the reason why a portfolio of programs is required. Traditional DSM portfolios have had to meet multiple, competing, objectives related to cost-effective energy savings vs. universal access to services and equitable participation, or trading off short-term resource acquisition savings compared to longer-term market transformation.

It might appear to be contradictory to have one element of a DSM portfolio encouraging more electricity use, while another aims to save electricity, yet the two are complementary if electricity savings expand the potential for more beneficial electrification.

Natural gas DSM serving economy-wide goals could also ensure that heating fuel is reserved for high-value purposes. This could be a stepping stone for traditional natural gas distribution companies providing a larger portfolio of zero-carbon heating options, such as weatherization, district energy, and geo-exchange heating. Using DSM governance systems to explore these “clean heat” options can ensure they receive stakeholder scrutiny and compete against other methods to reduce electricity peak demands and supply zero-carbon heat.

Fuel neutral DSM portfolios are likely going to be based on a mix of ratepayer funding linked to utility system objectives and government funding. This introduces an ability to balance out respective strengths and weaknesses and increases the probability of stable programs for customers and service providers. While government funding can be fast and come with comprehensive objectives, it can also be fickle and go away quickly as budgets run out or government priorities change. While utility system funds can be slower, they can be more durable and long-term.

A benefit of DSM strategies is to consider how a large portfolio of strategies, funding sources, and programs delivers on high-level objectives. Thus, breaking fuel silos likely requires larger portfolios of solutions.

Design federal funding and standards strategically

Utility DSM is under provincial jurisdiction. Yet, the lessons above point towards a potentially transformative federal policy role.

First, federal government energy efficiency programs can be strategically designed to break fuel silos in DSM programming. Federal funding outside of DSM governance systems can be fuel-neutral and come with different objectives. The Ontario case shows that a co-delivery partnership triggered a potentially long-term change in DSM governance in Canada’s largest province, whereby gas energy efficiency programs promote full electrification. This could be one of the longer-lasting and more impactful legacies of the short-lived federal program.

In addition, we have seen that mandatory equipment standards can influence DSM, which is under the federal government's authority through the Energy Efficiency Act. Federal requirements for high-efficiency gas equipment have led to gas DSM programs in B.C. and Ontario phasing out incentives for gas equipment and transitioning to incentivizing heat pumps.[101] Likewise, B.C.'s "highest efficiency" requirements for new space and hot water heating installations to have a coefficient of performance of at least one (i.e. 100 per cent efficient) further influenced gas DSM and will provide a clear baseline for electric DSM savings. The federal government could influence DSM plans nationwide by using the Energy Efficiency Act to implement this standard nationally.

Conclusion

Energy efficiency and more extensive demand-side solutions are needed to achieve net-zero emissions in a way that is affordable and empowering to citizens, and utility demand-side management (DSM) is a long-standing governance system to deliver energy efficiency programs. Yet, net-zero emission goals can fit awkwardly with traditional utility DSM governance, which is bounded by utility system fuel silos.

Existing DSM infrastructures present an excellent way to reach customers to achieve energy savings, and breaking fuel silos can produce a better customer experience and manage the systemic impacts associated with growing certain types of energy demand while simultaneously reducing other forms across specific times and locations. While GHG caps, high-efficiency equipment standards, building codes, and performance standards are all indispensable to direct energy systems towards net-zero emissions, DSM is needed to ensure the actions these regulations trigger can affordably and smoothly coordinate utility system changes. Reforming DSM to break fuel silos and align with net-zero emissions can be complicated. Still, it is not as complicated as the problems likely to be created if we fail to manage the demand side of energy systems throughout the net-zero transition.

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[101] Amendment 15 to the Energy Efficiency Act in 2019. See https://canadagazette.gc.ca/rp-pr/p2/2019/2019-06-12/html/sor-dors164-eng.html.

This report reviewed the experience in several American states that have directed their DSM governance systems towards net-zero emissions and breaking fuel silos, demonstrating multiple policy dimensions. It then surveyed the Canadian experience thus far, revealing several innovation approaches and relevant examples of institutional misalignments.

To break fuel silos and align DSM with net-zero emissions, both provincial and federal governments have several options to choose from and to match with their given contexts. There is a portfolio of policies and potential pitfalls that policymakers should navigate to create effective DSM strategies for a net-zero emission future.

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