

NORTHWEST TERRITORIES'

Integrated Power System Planning GUIDE

for Community Governments

NAKA
POWER UTILITIES (NWT)

 NORTHWEST TERRITORIES
POWER
CORPORATION

DISCLAIMER

This guide has been prepared by Northwest Territories Power Corporation (NTPC) and Naka Power Utilities (NWT) Ltd. (Naka) to support community engagement related to the development of an Integrated Power System Plan (IPSP). The Government of the Northwest Territories (GNWT) has provided input and support to the IPSP process more broadly.

The content of this guide is intended to provide general information and to support discussion. Any interpretations, summaries, or examples included are provided for illustrative purposes only and may not reflect final regulatory outcomes or policy implementation decisions. This guide does not reflect final positions, commitments, or decisions of NTPC, Naka, the Public Utilities Board, or the GNWT.

References to GNWT policy directions are provided for context only and should not be interpreted as representing the views, endorsement, or official position of the GNWT.

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INTRODUCTION

Electricity systems around the world are undergoing major transformations, with the increasing integration of renewable energy, grid modernization, and drive for electrification.

The Northwest Territories (NWT) is experiencing these same pressures, compounded by unique challenges – cold climate, remote communities, small population density – which results in a higher cost per customer in providing electricity.

In 2025, the Government of the Northwest Territories (GNWT) issued a policy direction to the NWT Public Utilities Board (PUB) – the territorial public utilities regulator – with

11 directives to guide the development of affordable, secure, and sustainable energy in the NWT. These directives are intended to help drive toward the GNWT policy objective of net-zero emissions by 2050.

They include the development of a long-term Integrated Power System Plan (IPSP) as well as related electricity policy matters and potential changes in how some electricity rates are set.

This guide is intended to help community governments engage in discussions and provide input that is relevant to the IPSP.

GNWT's 2025 Electricity Policy Direction to the NWT Public Utilities Board is available on the GNWT website at:
<https://www.inf.gov.nt.ca/en/energy-policy-directions>

WHAT INTEGRATED POWER SYSTEM PLAN IS AND WHY IT MATTERS

The IPSP process is intended to develop the plan with an eye on ensuring reliability, affordability, and a pathway to decarbonization across the NWT. In combination with other policy objectives – such as establishing an Independent Power Producer policy to allow community participation – the IPSP will examine and assist the following:

- current system capabilities and capacities
- forecast how electricity demand will change over time
- identify required infrastructure to modernize the system to safely and reliably integrate additional sources of renewable electricity

It will also help the PUB decide:

- how utilities should plan future projects
- how costs should be recovered fairly
- which projects make sense to pursue and when

Who is involved?

Public Utilities Board

The PUB regulates electricity in the NWT and oversees the IPSP process.

Northwest Territories Power Corporation (NTPC)

Owned by the GNWT, NTPC is the leading electricity supplier in the territory. The NTPC system includes 3 hydroelectric systems, 27 diesel plants, 5 solar arrays, 1 wind turbine, 2 battery-storage systems and 1 natural gas plant. Together, these assets comprise a total generating capacity of 143 MW. NTPC generates power for more than 43,000 residents, which is delivered to customers through 565 km of transmission lines and about 650 km of distribution lines.

Naka Power Utilities (NWT) Ltd

Naka Power Utilities (NWT) Ltd. (Naka) is a partnership between Denendeh Investments Incorporated (DII) and ATCO. DII is an Indigenous-owned organization, made up of 27 Dene communities which owns 51% of the partnership. It has been serving customers in the NWT for more than 70 years and currently provides distribution services in Yellowknife as well as generation and/or distribution services in 8 other communities (Fort Providence, Dory Point, Kakisa, Sambaa K'e, Enterprise, Kátł'odeeche, Riverwoods, and Wekweètì).

Government of the Northwest Territories

The GNWT is supporting the utilities by providing planning, funding, and technical support throughout the development and implementation of the IPSP.



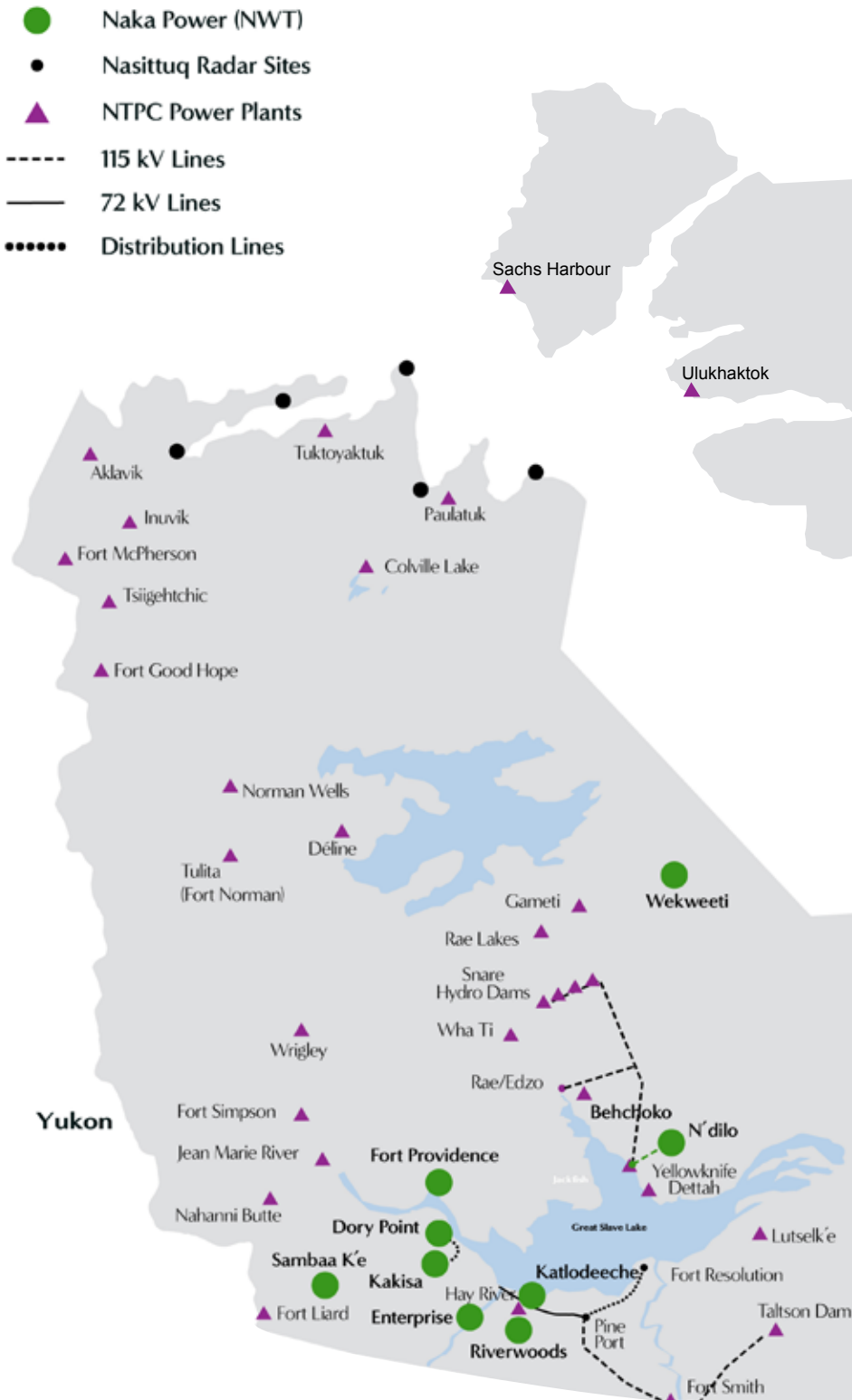
Engagement with Community Governments

The IPSP will be implemented through a phased approach, with the first stage focused on the period up to 2030. The emphasis of the first phase will be outlining the current system capacities by community, developing long-term demand forecasts, identifying grid modernization initiatives and community discussions around investment and opportunities.

Throughout the IPSP process, NTPC and Naka will, with support from the PUB and GNWT, conduct engagement activities with the communities they serve to provide information, share research results, and discuss community concerns, priorities, opportunities, and challenges related to the electricity system. Much of this discussion is expected to be focused on developing an understanding of the current system capabilities, community plans for new load, phases to modernize the grid, and current/future opportunities for community investment in renewable energy that meet the objectives of reliability and affordability. It is anticipated that the planning, completion, and initial implementation of an IPSP spans from 2026 to 2029.

Community input gathered through engagement will be documented and summarized to inform IPSP planning assumptions, system classification, readiness assessments, and future filings to the Public Utilities Board. Records of engagement activities and key themes raised will be maintained to support transparency and future IPSP filings.

Service Areas and Facilities



Responsibility for the planning, ownership, operation and maintenance of the overall electricity system is shared between NTPC and Naka, under the regulatory oversight of the PUB.

The NWT needs long-term system planning so that the utility companies can maintain safe, affordable, and reliable service as load grows and more renewable generation capacity is added to local power grids. The IPSP work is intended to address this challenge.

NWT Electricity System Challenges

A FRAGMENTED ELECTRICITY SYSTEM

- Unlike most of Canada, the NWT is not connected to the North American grid. Instead, it operates 27 isolated grids, limiting large-scale solutions and economies of scale.
- In southern parts of the NWT, 2 islanded hydro grids serve 8 communities, with diesel backup for peak demand, hydro maintenance, and low-water years. The remaining communities rely on local thermal generation using diesel or natural gas.
- On average, electricity supply across the territory is approximately 72% hydro, 21% diesel, 5% natural gas, and less than 2% intermittent renewables such as solar and wind.

ELECTRICITY COSTS AND AFFORDABILITY

- Due to remote location, unique weather and small customer base, the cost to serve customers is higher compared to other jurisdictions.
- Given the small customer base and zonal rate structures, the introduction of additional generation mixes and the system upgrades required must be carefully assessed as this could have an impact on affordability.
- Annual operating costs to serve NWT communities total about \$165 million, largely recovered through electricity rates.
- Despite ongoing territorial subsidies and targeted financial supports, electricity affordability remains a concern for many households and businesses.

RELIABILITY OF ELECTRICITY INFRASTRUCTURE

- While the NWT's power infrastructure is aging, diesel generation continues to be one of the most reliable source of generation for remote communities.
- Renewable sources of energy technology continue to be developed, with limitations to providing reliable generation to fully displace diesel generation.
- Low-water conditions in the Snare hydro systems has increased reliance on diesel generation to ensure safe and reliable generation.

Planning for the future

OWNERSHIP AND PARTICIPATION

Community and Indigenous governments and organizations are seeking increased ownership and participation in renewable energy projects.

INTEGRATION OF CLEAN ELECTRICITY

The demand to integrate clean electricity is to increase with electrification, and assessments are required to ensure the appropriate generation mix of different sources for reliability. The conversation around the world has now shifted to incorporating many generation mixes to ensure reliability, compared with years ago where the conversation was focused on complete elimination of one generation type for another.

NEW TECHNOLOGIES

New technologies and communication devices are unlocking new opportunities to use battery storage, distributed energy resources and flexible electric loads.

CHANGING CLIMATE

A rapidly changing climate requires new planning approaches for power infrastructure to account for higher peak temperatures, more extreme weather events, more variability in hydro availability, and increased wildfire and flooding risks.

How the IPSP Process Works



POTENTIAL IPSP ENGAGEMENT TOPICS

The remainder of this guide provides a summary of the different topics that are expected to come up when NTPC and Naka meet with the communities they serve to discuss renewable energy and the development of the IPSP.

Topics include:

ROLES AND RESPONSIBILITIES IN INTEGRATED POWER SYSTEM PLANNING INCLUDING RENEWABLE PROJECTS

ELECTRIC SYSTEM PLANNING INCLUDING RENEWABLE ENERGY PROJECTS

- Community energy planning / community concerns and priorities
- Future load growth
- Future electricity supply projects
- Benefits and challenges of renewable energy projects
- Future electric system improvements

OTHER POLICY DEVELOPMENT

- Self Generation
- Net Metering
- Net Metering participation limits
- Independent Power Producers (IPP)
- Intermittent Renewable Energy Cap

CHANGES IN RATE DESIGN

- Approaches to minimize cost-shifting
- Recovery of fixed vs variable costs



Key Principles

In January 2026, the PUB defined the key principles that will be used to assess NTPC and Naka's upcoming filings for the IPSP.

These principles include:

■ Reliability-first and paced transition

In all NWT communities, the reliability and stability of the electricity grid is of paramount importance. This means that the extent to which renewable energy is added to a local grid must be consistent with other factors, such as system readiness, operational capacity, and customer affordability.

■ Sequencing and system readiness

System readiness means that the necessary technical capability of a local electric grid, including system visibility, control, communications, and operator readiness, must be in place before a significant increase in renewable energy can be added to the grid.

■ Differentiated planning by system type

Planning for additional renewable energy in NWT communities will require different approaches that reflect the fact that communities are served by different types of electricity infrastructure.

This means that the IPSP will need to account for differences such as:

- Communities served by integrated hydro-based systems (*e.g. Snare and Taltson*)
- Communities served by larger isolated systems (*e.g. Inuvik*)
- Communities served by smaller isolated diesel-based microgrids (*e.g. thermal communities*)

■ Community and Indigenous participation

The GNWT, the PUB and NTPC and NAKA all recognize that meaningful community and Indigenous participation is essential to the successful development and implementation of an IPSP.

■ Affordability and regulatory certainty

The PUB places a high importance on avoiding significant impacts on electricity rates and cost shifting (among electricity customers) due to the addition of renewable energy on local grids. Related to this, the PUB expects clear, predictable regulatory and planning frameworks to be used to support community participation and informed investment in renewable energy projects.

Roles and Responsibilities in Integrated Power System Planning including Renewable Projects

Over the last 20 years, the NWT has experienced a slow increase in renewable electricity generation, in both hydro and thermal communities.

During this time, specific GNWT electricity policies (including net metering and limits on renewable energy penetration) were adopted to enable renewable energy adoption. However, few larger renewables projects have been developed.

The development of the IPSP and related policies, including net metering and independent power production, will require discussion between the utilities and communities regarding respective roles and responsibilities related to planning, funding, construction, operation and ownership of future renewable electricity projects.

The engagements between NTPC and Naka and the communities they serve are expected to include discussion of the following questions:

How do communities view their role in shaping local energy planning and in contributing to decisions related to local renewable electricity projects?

How do communities view their participation in a broader territorial planning framework, such as the IPSP?

What are communities' priorities related to electricity planning and system reliability?



Electric System Planning including Renewable Energy Projects

Integrated long-term planning will be informed by community input. As the IPSP progresses in the future and is enhanced, this information will be used to support planning decisions related to system reliability, affordability, and readiness for change.

The ongoing engagement discussions between the utilities and the communities they serve are anticipated to focus on a number of topics related to the demand for, and supply of, electricity in individual communities.

Key topics may include:

COMMUNITY ENERGY PLANNING / COMMUNITY CONCERNS AND PRIORITIES

In recent years, a number of NWT communities have undertaken efforts to develop a Community Energy Plan (CEP). A CEP can help a community understand its current energy use, identify local energy priorities and determine actions that can be taken to manage energy use and plan future energy-related initiatives.

For communities with a CEP, or in the process of developing one, this information will be very useful for the utilities and can provide a starting point for discussions about electricity planning.

For communities interested in community energy planning, the Arctic Energy Alliance has a program to assist a community or Indigenous government develop and implement a CEP. (Additional information is available at <http://aea.nt.ca>).

The utilities will need to hear and understand each community's concerns about their electricity system and what the community's energy priorities may be for the future.

Has your community developed a Community Energy Plan? If yes, is the community making progress in implementing the actions in the CEP?

Does your community intend to use a CEP to inform future electricity planning discussions?

What concerns does your community have about its electricity system, including reliability (outages), cost of electricity, or other system-related issues?

FUTURE LOAD GROWTH

One of the key inputs to the development of an IPSP is understanding how power is currently used in a community and anticipating how the community's power needs may change in the future. The level of demand that a community places on its electric grid is known as the 'electric load'.

Different actions can cause a community's electric load to increase or decrease over time. Implementing energy efficiency measures is one example that can reduce (or change) a community's electric load over time. Local actions, such as construction of new homes or buildings or switching to electric vehicles or electric heating, can increase the community's electric load.

NTPC and Naka pay attention to community load profiles to ensure the electricity supply systems that serve the communities are adequately sized to meet current and future requirements.

Questions that NTPC and Naka may need to discuss with communities include:

Are there ongoing or planned efforts to manage electricity use in the community through energy efficiency measures?

Does the community have plans for new construction related to housing or buildings or activities that may result in increased power usage in the future?

Is the community considering electrification of heating or transportation that could materially affect future demand?

FUTURE ELECTRICITY SUPPLY PROJECTS

Identifying the extent to which residents and/or local energy project proponents may be interested in or planning for local power generation and storage projects is another key input that NTPC and Naka need to determine in order to develop an IPSP for the NWT.

Distributed energy resources (DER) is a technical term that refers to a variety of small-scale generation and storage technologies that produce or manage electricity at, or near, the point of consumption. These resources are often known as 'behind the meter' because they operate on the customer's side of the electricity meter. In the context of the NWT, some DER projects are led by an Independent Power Producer (IPP) that negotiates a Power Purchase Agreement with the utility. Examples of DER in the NWT include:

- Rooftop solar panels – that convert sunlight into electricity
- Wind turbines – that generate electricity from wind energy
- Battery storage systems – that store excess electricity for later use
- Electric vehicles and chargers – that could serve as mobile energy storage and generation units

When a community's overall load is expected to increase over time, the utilities may need to either bring additional utility-owned generation capacity online or rely on customer- or community-led DER projects to meet the forecast load growth.

Is your community interested in developing local renewable electricity projects?

Is the community currently planning or advancing any renewable electricity projects?

Is there interest from the community or a third-party developer in a larger generation project that could supply some of the community's electricity needs?

BENEFITS AND CHALLENGES OF RENEWABLE ENERGY PROJECTS

In a typical year, the electricity supply to the NWT's communities primarily hydroelectric, diesel, and natural gas generation, with a small proportion from intermittent renewable sources, such as solar.

Adding renewable electricity resources to local grids presents both benefits and challenges that must be understood and managed to maintain system reliability and affordability.

POTENTIAL BENEFITS INCLUDE:

- **Enhanced resilience** through local generation
- **Reduced emissions** and associated GHG emissions
- Potential cost savings for participating customers

CHALLENGES INCLUDE:

- **Grid management** and reliability impacts associated with intermittent generation
- **Sequential investments** – if not implemented and managed properly electricity costs can go up while reliability decreases
- Risk of **cost shifting** among customers
- Need for **clear regulatory** and compensation frameworks and ensuring equitable access to opportunities across NWT communities through rate review

Does your community have any comments on the benefits and challenges described above?

If your community has experience with electricity-related renewable projects, what were the lessons learned?

FUTURE ELECTRIC SYSTEM IMPROVEMENTS

When originally designed and built, electricity generation and distribution systems in NWT communities did not anticipate significant levels of intermittent renewable energy.

As a result, existing infrastructure may require upgrades to maintain reliability and stability as renewable penetration increases. Typical enabling upgrades may include:

- Plant automation and microgrid control systems for centralized dispatch and fast curtailment
- Telecommunications and other control systems and devices for reliable system control
- Battery energy storage systems to store renewable energy and enhance grid stability
- Advanced data acquisition and grid visibility through Advanced Metering Infrastructure
- Space heating in the generation plant to support diesel-off operation

Future electricity demand growth, including from electrification of heating and transportation, may also require upgrades to local distribution infrastructure such as transformers, poles and wires.

NTPC and Naka will undertake technical evaluations to determine required upgrades in each community. Prior to undertaking detailed technical work, the utilities need to understand future community plans and discuss system improvements with communities. Community input will help inform assessments of system readiness and the sequencing of enabling investments required before additional renewable electricity resources can be added safely and reliably.

Does your community support the utility undertaking modernization efforts of the local power system?

Are there specific reliability or system performance issues that should be addressed?

Are these issues considered a high or low priority?



Other Policy Development

In parallel with the development of the IPSP, the NWT Public Utilities Board and utilities are also reviewing elements of the electricity policy framework that govern how intermittent renewable electricity resources may connect to and operate on local electricity systems.

These policy reviews are separate from the IPSP, but are closely related, as compensation frameworks and participation rules can influence the feasibility, timing, and scale of renewable electricity projects. This information is useful to understand how future projects may be enabled.

The existing electricity policy framework, in place since 2014, includes the following components, which are under review or development:

POLICY ELEMENT	CURRENT STATUS	POTENTIAL CHANGE	WHY IT MATTERS
Self Generation	Customers may generate electricity behind the meter without participating in a formal program.	Clarification of rules or conditions for unmanaged self-generation to address reliability and cost impacts.	High levels of unmanaged self generation can affect system reliability and electricity rates.
Net Metering	Allows customers to export excess electricity to the grid and receive energy credits.	Review of compensation structure and program design. Potential Introduction of a net billing framework where exported electricity is compensated based on system value, by community.	Compensation design affects project economics and potential cost shifting. Net Billing provides improved price signals and better reflects grid costs and benefits.
Net Metering participation limits	Net Metering allows for up to 15kW installation.	Consider participation limits based on community-level constraints, as well as government participation.	Communities have different technical limits for renewable penetration, and some customers could use a high proportion of allowed limits.
Independent Power Producers (IPP)	Larger projects currently negotiated through individual power purchase agreements with utilities.	Development of clearer rules and frameworks for renewable power generation projects.	Framework clarity can improve transparency and consistency.
Intermittent Renewable Energy Cap	Limits total intermittent generation to 20% of average annual community load.	Using a sequenced, reliability first approach, determine pathways for each community to increase renewable penetration.	Community engagement and modernization efforts must be understood.

How net metering and net billing compensation approaches could better reflect the value and costs of self-generation and exported electricity

How larger renewable electricity projects that exceed net metering thresholds should be addressed through Independent Power Producer (IPP) frameworks

Whether greater standardization of power purchase agreements, including process steps and template agreements, would improve transparency and fairness

How policy design can support renewable project development while maintaining system reliability and minimizing cost-shifting?

These discussions are intended to inform policy development, not to finalize program design through the IPSP process.

Changes in Rate Design

The current approach attempts to set power rates in the NWT based on key concepts such as cost causation, fairness to customers and the utility, rate stability, practicality and avoidance of discrimination between customer types. The rates charged by NTPC and Naka are reviewed and approved by the Public Utilities Board based on information provided by the utilities.

The development and implementation of the IPSP, together with related electricity policy frameworks, may require targeted changes to how certain electricity charges are calculated and recovered. Any such changes would be subject to PUB review and approval. Two areas where changes may be considered are described below:

APPROACHES TO MINIMIZE COST-SHIFTING

When a renewable energy project owned by a customer or project proponent provides electricity to a local grid, it is important that the compensation paid by utility reflects the value of that electricity to the system.

Factors that are typically considered in determining appropriate compensation include:

- The utility's avoided costs from not producing that electricity itself
- The value of any electric system services the project may provide
- Any incremental costs or operational impacts directly attributable to the project

If these factors are not appropriately reflected, renewable project participation may result in 'cost-shifting', where utilities or non-participating customers experience increased costs. Such outcomes are inconsistent with rate-setting principles and with the objective of maintaining affordability and fairness across customers.

RECOVERY OF FIXED VS VARIABLE COSTS

In the NWT, as in many jurisdictions, electricity rates recover two broad categories of costs: fixed costs and variable costs.

Fixed costs include investments in generation, transmission, and distribution infrastructure, as well as customer connection costs. These costs do not change depending on how much power customers use and are typically recovered through fixed charges that appear on customers' utility bills, such as demand (kW) or customer charges.

Variable costs change with electricity usage and include, for example, fuel costs for power generation. These costs are usually recovered through energy-based rates (per kilowatt-hour or kWh).

Currently, both NTPC and Naka recover a significant portion of their fixed costs through energy rates rather than fixed charges. As a result, current price signals in the NWT can diverge from underlying costs, and compensation for programs such as net metering may lead to unbalanced benefits and cost-shifting across customer groups.

Any potential changes to the balance between fixed charges and energy rates would be subject to review and approval by the Public Utilities Board. Such changes would not alter the total revenue a utility is allowed to recover in a year, but could affect individual customer bills depending on how electricity is used.

Improving the alignment between rate design and underlying cost structures would support the principles of cost causation, fairness, and affordability, and would provide a more stable foundation for the implementation of the IPSP and related policy initiatives.





