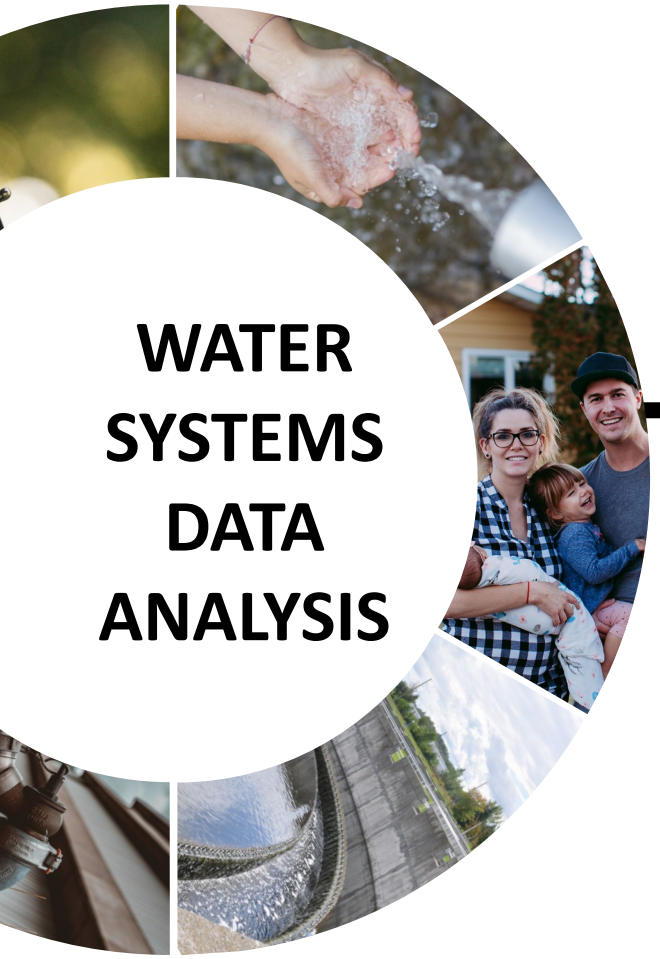

WATER
SYSTEMS
DATA
ANALYSIS



Introductions

Infrastructure Canada

- Analyst, Economic Analysis and Result, Data Analytics Team

Academics

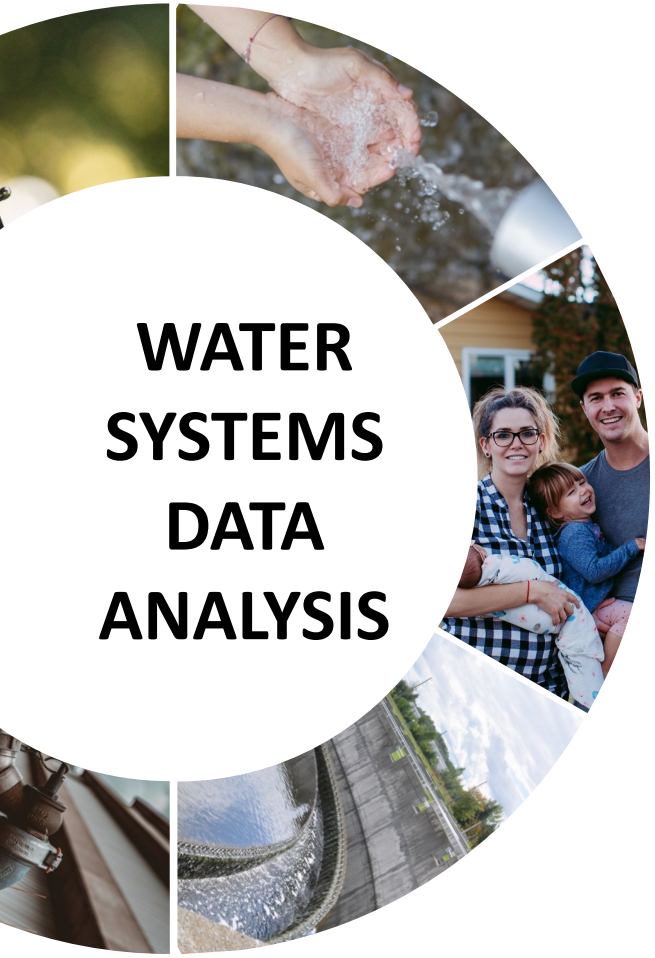
- Certificate in Data Science
- Bachelor of Science, Computer Science
- Master of Human Kinetics, Sport & Health Psychology

Previous career

- 15 years in Public Health – Health Promotion – Eastern Ontario Health Unit (EOHU)

Disjointed experience with a common thread... Water Assets?

ROPEC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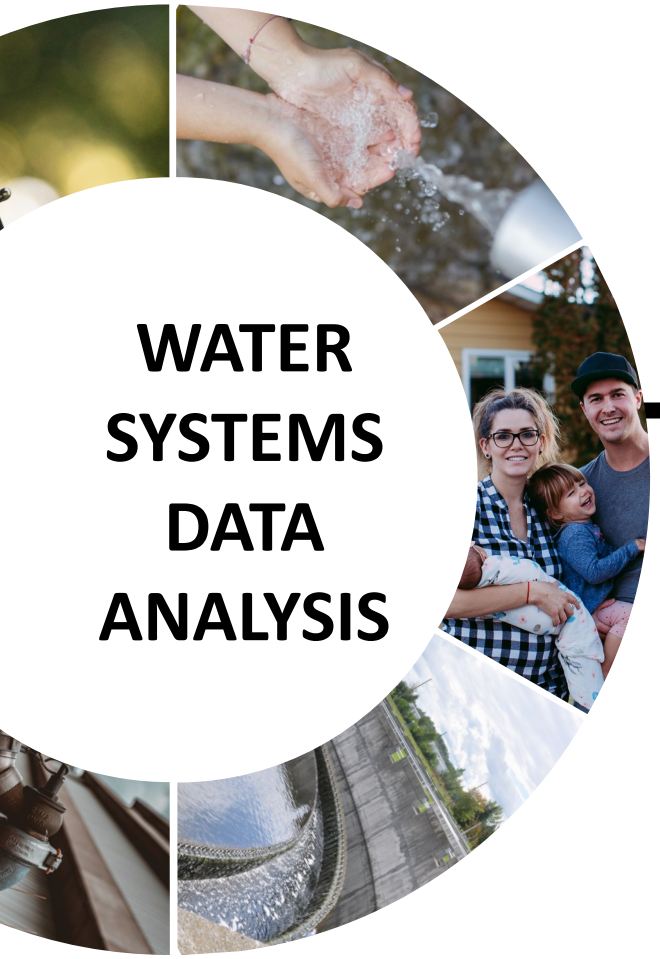


OVERVIEW

Data Priorities and Commitments (EAR-DA)

Data is used to support Infrastructure Canada's mandate of investing in projects to support **economic, environmental and social outcomes.**

1. Data-driven decision making
    - Base infrastructure decisions on robust data analysis and insights.
2. Place-based policy and resiliency
    - Different regions have unique needs and challenges – we prioritize tailoring analyses to specific locations to ensure effective infrastructure development that considers unique challenges and needs to enhance long-term resiliency.
3. Geospatial analytics for informed regional planning
    - Geospatial data provides spatial insights crucial for designing infrastructure that optimally addresses the needs of various regions and communities.
4. Open source and transparency
    - Embrace open-source data practices to enhance transparency and collaboration by openly sharing data, methodologies, and findings with stakeholders, researchers, and industry experts.

Data-Driven Decision Making: Understanding the State of Infrastructure

Canada's Core Public Infrastructure Survey (CCPI)	Infrastructure Economic Accounts (INFEA)	Capital Expenditure Survey on Infrastructure (CAPEX)
Purpose: Generate statistical information on the **stock, condition and performance** of Canada's core public infrastructure assets. Canada's core public infrastructure is broken down into the following **nine asset classes**: roads; bridges and tunnels; potable water; wastewater; storm water; public transit; solid waste; culture, recreation and sports facilities; and public social and affordable housing.	**Purpose:** Statistical statements that record the **economic, social and environmental impacts** related to the **production and use of infrastructure** in Canada and each province and territory. This statistical framework is consistent with the Canadian system of national accounts, Canadian government finance statistics and Canada's balance of payments.	**Purpose:** Infrastructure **capital and repair expenditures comprising all business and government entities** operating in Canada that own or operate infrastructure. Infrastructure is defined by its role in the Canadian economy – a supportive function – and, as such, the socio-economic objective of the tangible assets are important in determining the scope of infrastructure.

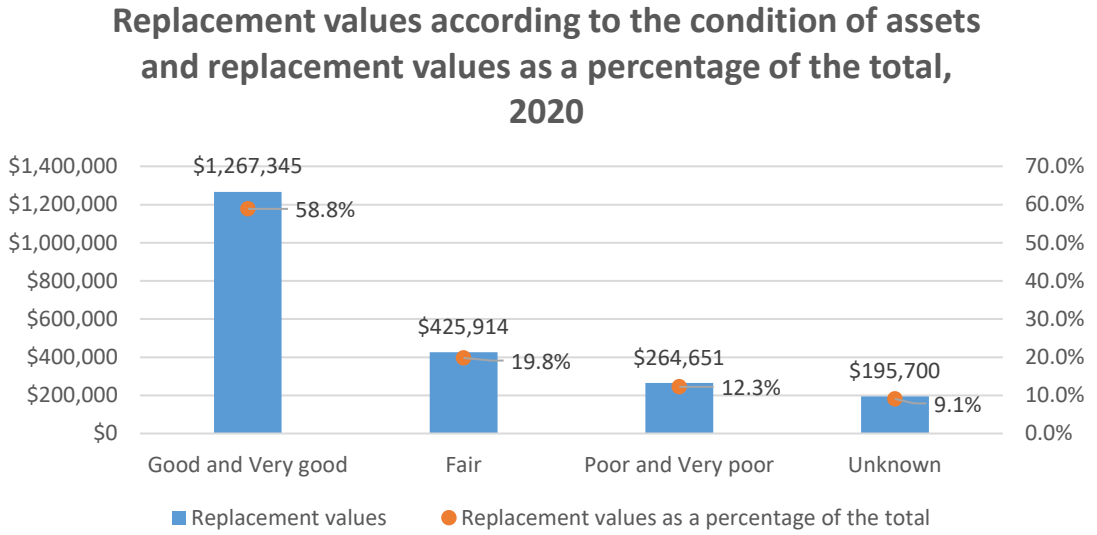
Canada's Core Public Infrastructure Survey (CCPI)

Canada's Core Public Infrastructure Survey captures stock, condition and performance of Canada's core public infrastructure assets.

In 2020, the total replacement value of Canada's core public infrastructure was estimated to be $2.15 trillion

- More than half (**58.8%**) of Canada's assets by replacement value are in good and very good condition.
- Approximately **12%** of assets are in poor and very poor condition, accounting for $260 billion to replace.

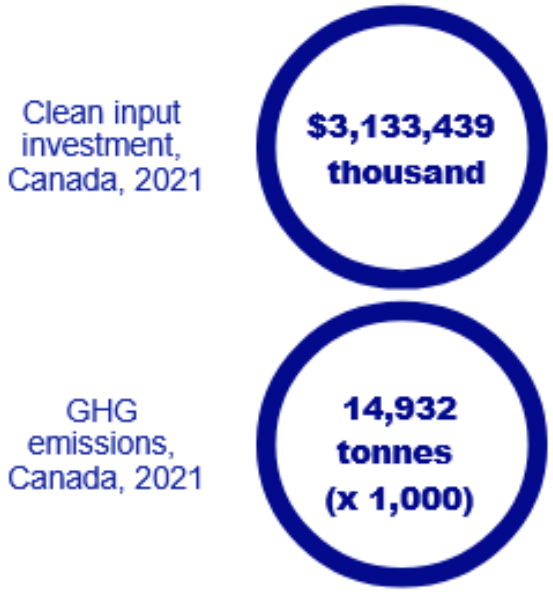
- **Roads and water infrastructure accounted for over three-quarters of the total replacement value.**
- Rural municipalities owned most of the municipally owned roads (79.1% by length, excluding sidewalks), but they accounted for only 55.8% of the replacement value.

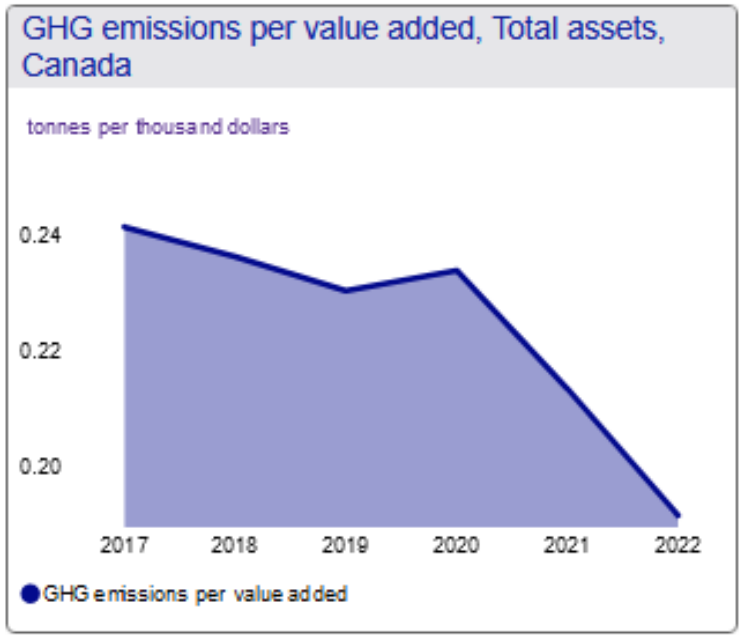


Gaps to Fill: Infrastructure Performance Data

Modelling impact of infrastructure investments on jobs, GDP, and environment (INFEA)

- **Development of proven input-output models**
  - The **environmental perspective** on infrastructure provides insights into the relationship between investment in infrastructure and the environment, including Canadian greenhouse gas **(GHG)** emissions attributable to the production of Canadian infrastructure assets, **greenhouse gas emissions per value-added, and clean input proportion**.
  - The **economic perspective** on infrastructure provides insight into the relationship between investment in infrastructure and the impact on the **number of jobs, salaries, and GDP value-added** to the economy.

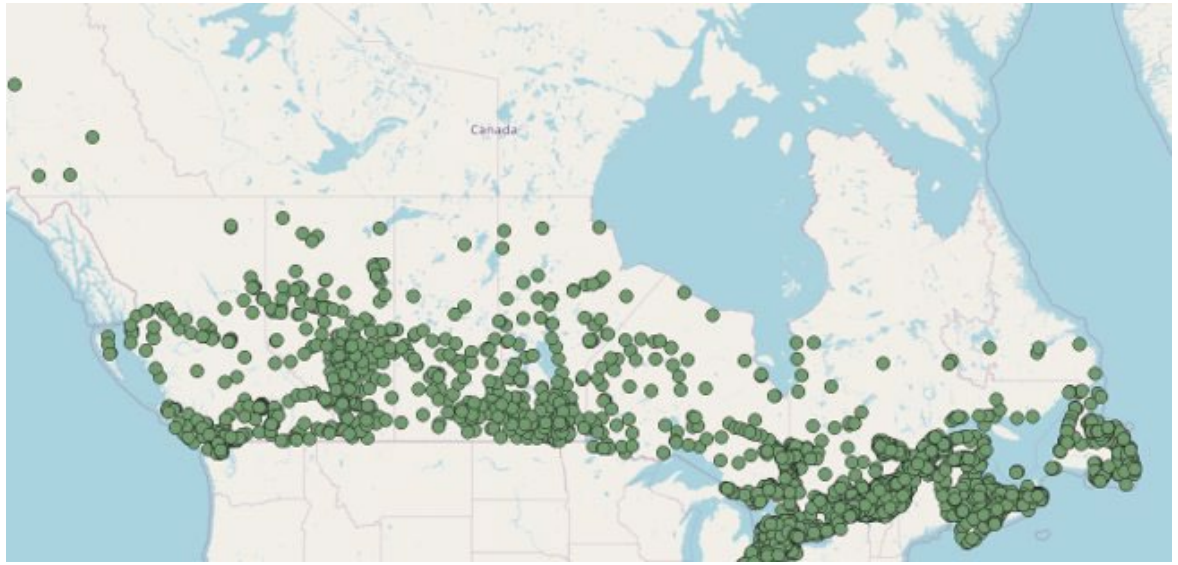




Figures: Environmental perspective on infrastructure

Gaps to Fill: Long-term economic and resilience impacts of infrastructure investment

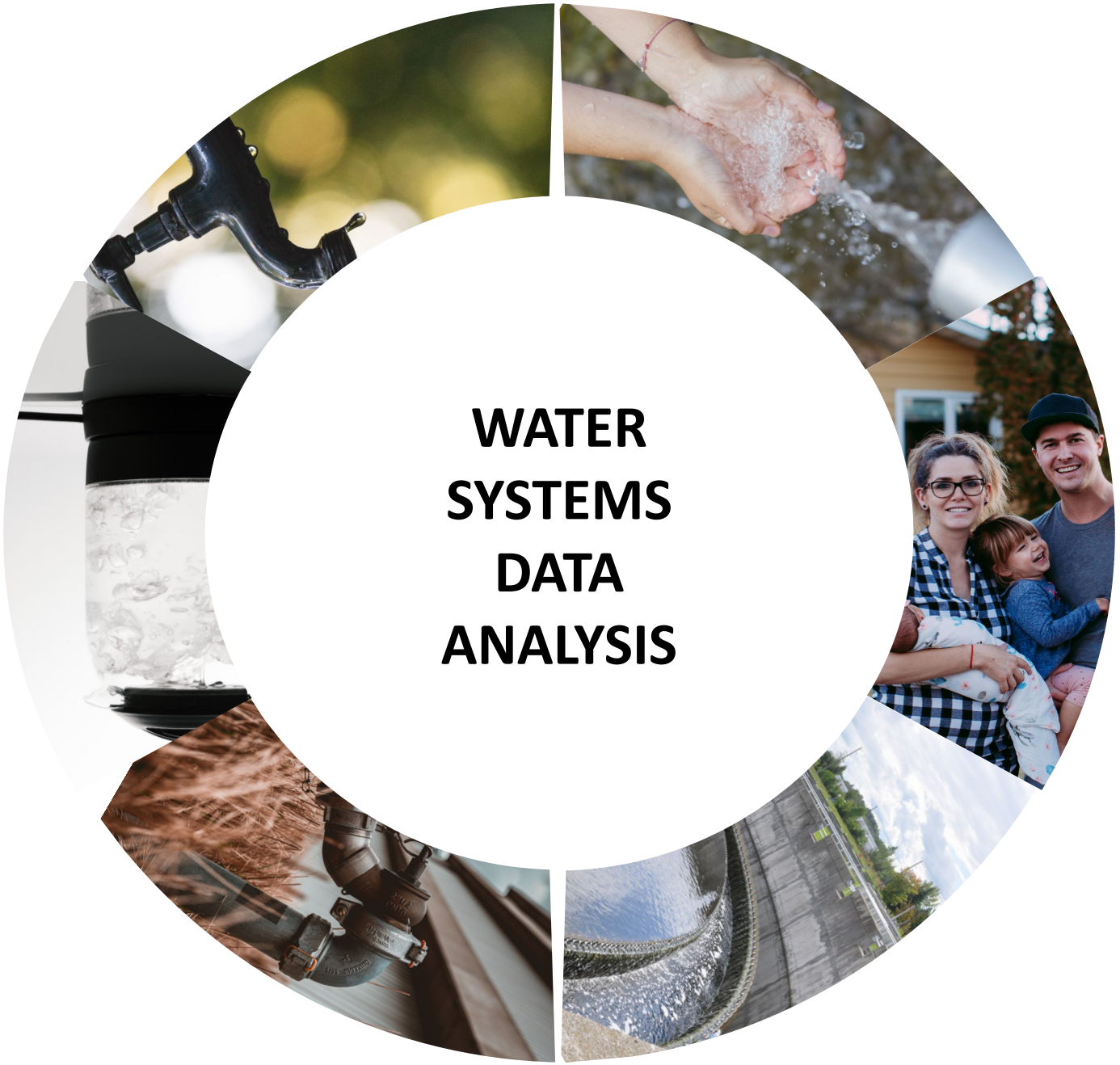
Driving Transparency and Accessibility: Open Database of Infrastructure



Source: Statistics Canada, Open Database of Infrastructure, Wastewater and Stormwater locations

- **Open-source and transparent**
  - Commitment to the creation of open-source data to foster collaboration, innovation, and data-driven decision-making that supports the public, researchers, and businesses.

- **Critical infrastructure mapping**
  - Understanding the location of **critical infrastructure** will support **risk assessment** and **vulnerability** analysis, emergency response planning, upgrades and retrofitting, and community preparedness for policy and programming.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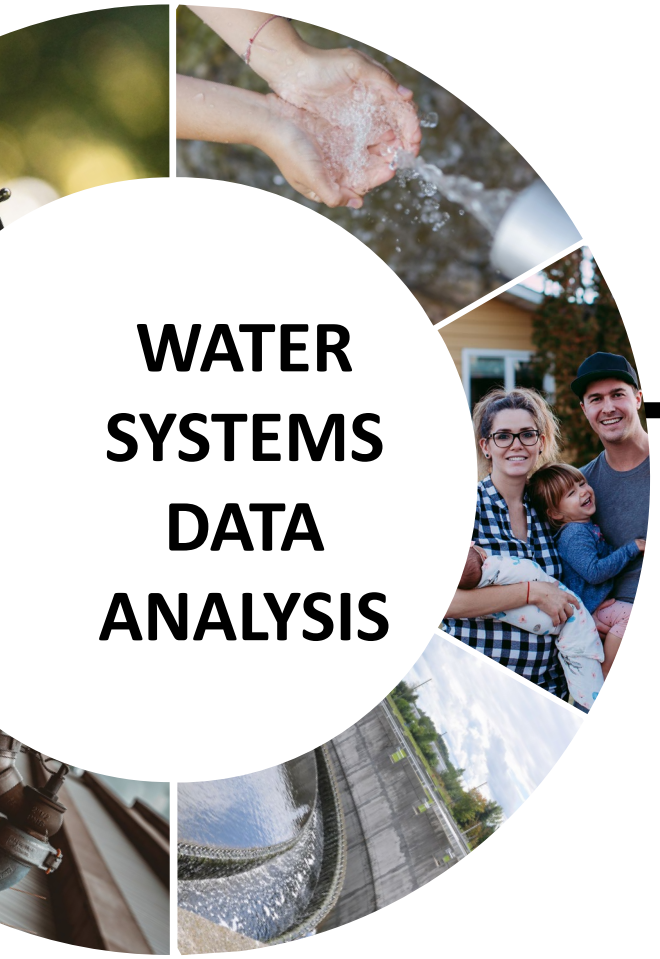
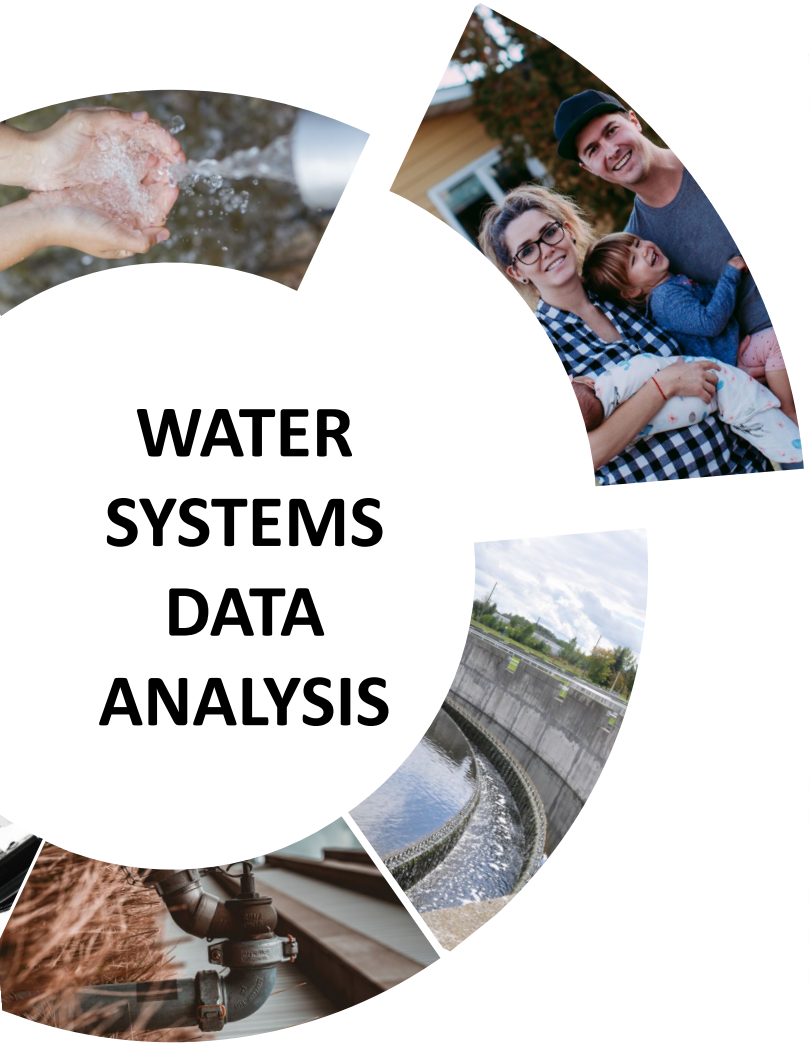


BI ANALYTICS TOOL

PER CAPITA ANALYSIS

- Presents an overview of 2 key metrics concerning the amount of assets per 1000 individuals, the capital and operating expenditures per capita.



WATER SYSTEMS DATA ANALYSIS

Asset

- (●) Km of pipes
- ( ) Storage tanks
- ( ) Water pump stations
- ( ) Water reservoirs
- ( ) Water treatment faciliti...

P/T

- [■] Select all
- [■] AB
- [■] BC
- [■] MB
- [■] NB
- [■] NL
- [■] NS
- [■] NT
- [■] NU
- [■] ON
- [■] PE
- [■] SK

Pop Indicator

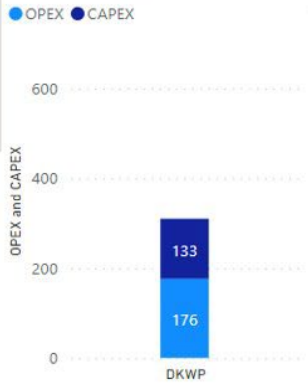
- [▣] Select all
- [■] 1. <5000
- [ ] 2. 5k-29,999
- [ ] 3. 30k-99,999
- [ ] 4. 100k+

Total Average of Selected Asset and Filters (km or count)

37.21

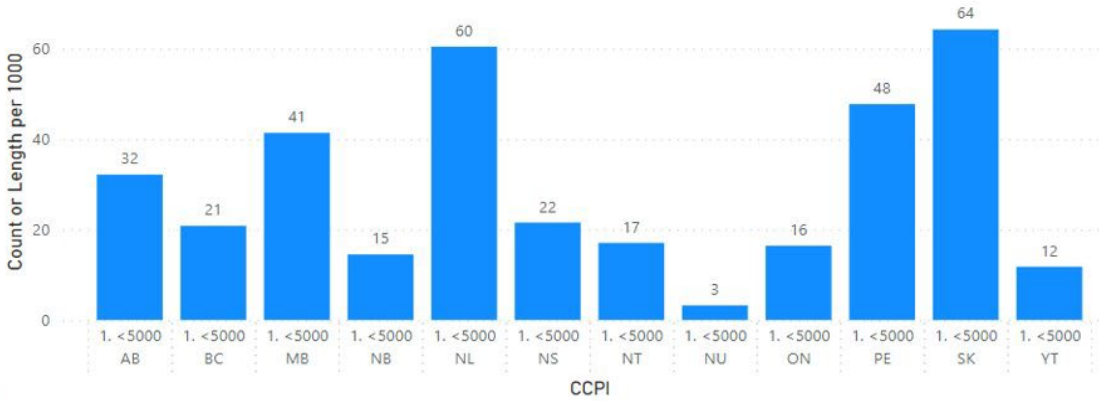
CCPI

Total Average for CAPEX and OPEX per capita

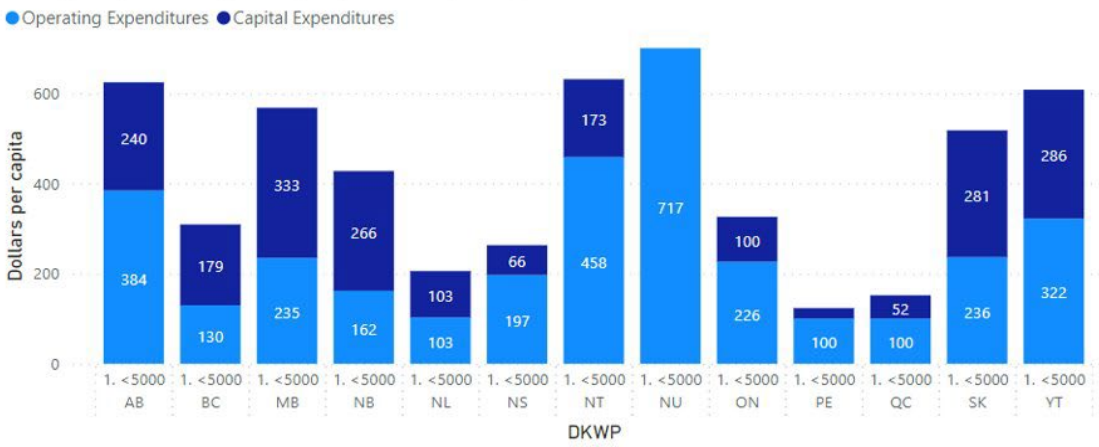


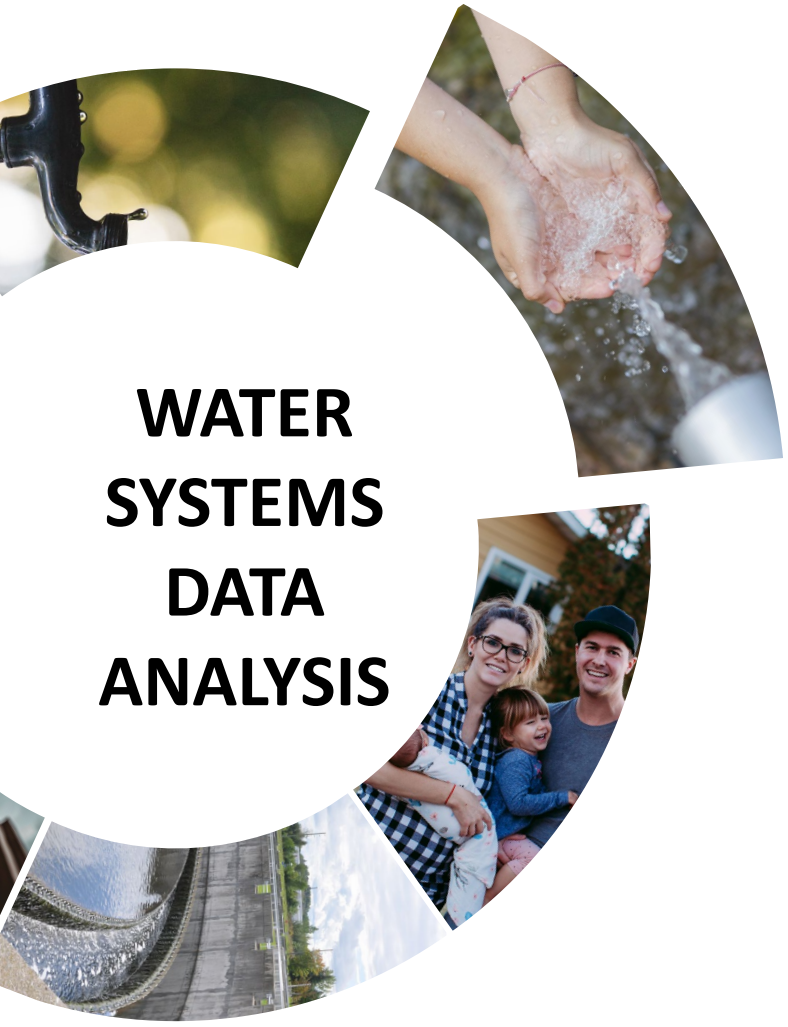
Average Asset Count/Length of Linear Assets (kms) of Selected Asset per 1000 Individuals

Average of Asset Count per 1k by P/T and Pop Indicator



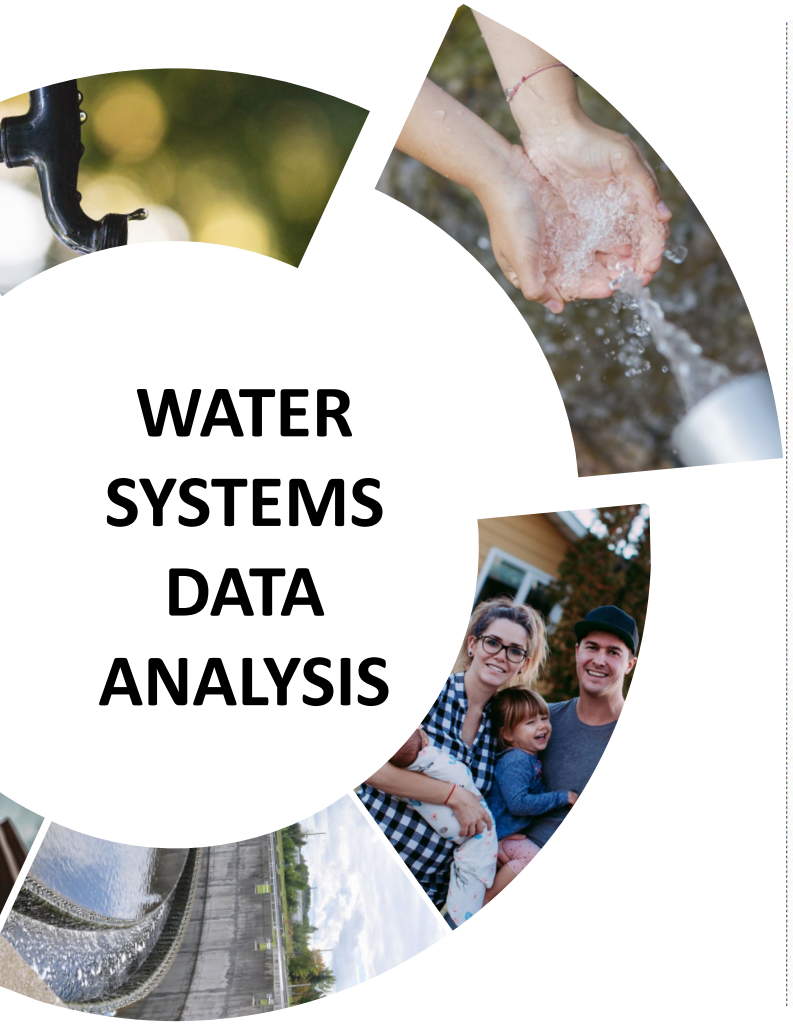
Average Capital and Operating Expenditures per capita for Water Treatment Plants





WATER PRODUCTION AND USE

- Looking at water production per capita.
- Presenting the breakdown of water usage per share with respect to residential, non-residential, loss, wholesaling, and unknown contexts.



WATER SYSTEMS DATA ANALYSIS

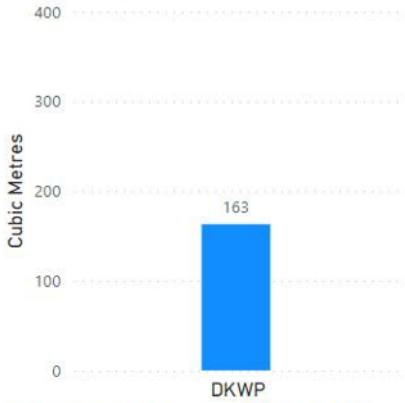
P/T

- Select all
- AB
- BC
- MB
- NB
- NS
- ON
- PE
- QC
- SK

Population Group

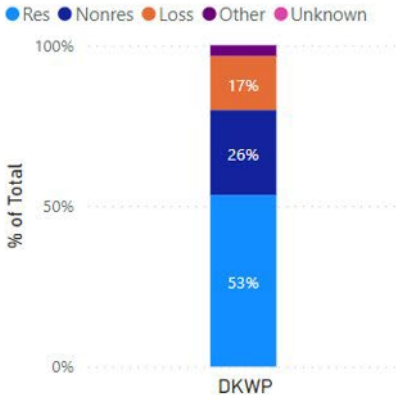
- Select all
- 1. <5000
- 2. 5k-29,999
- 3. 30k-99,999
- 4. 100k+

Total Average Water Production p.c.

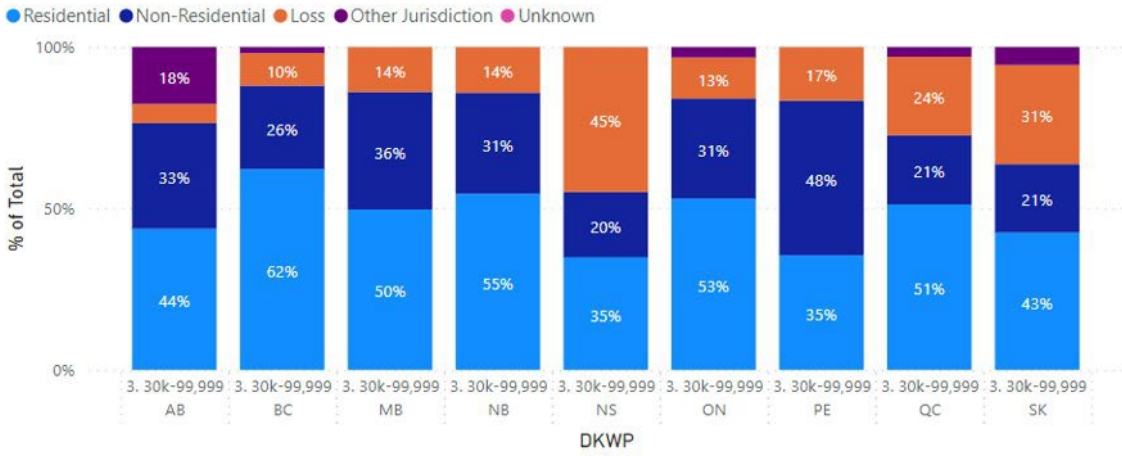


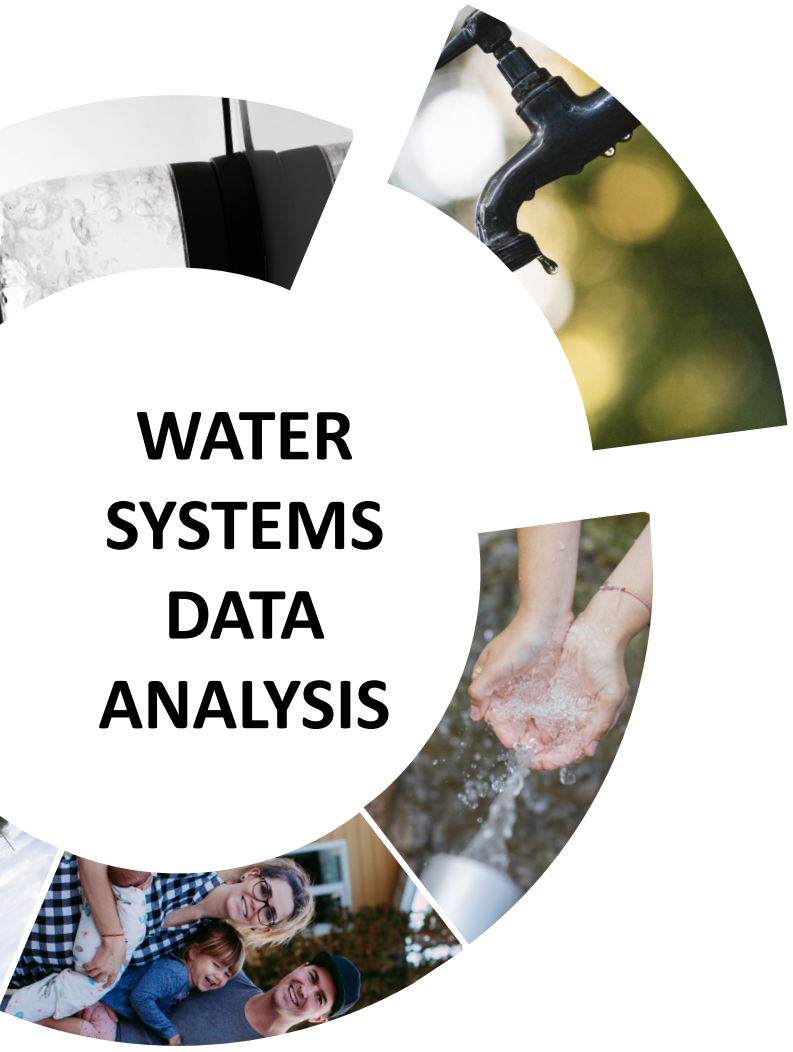
Average Water Production per capita

Total Average Shares of Water Usage Over Selected PTs and Population Groups



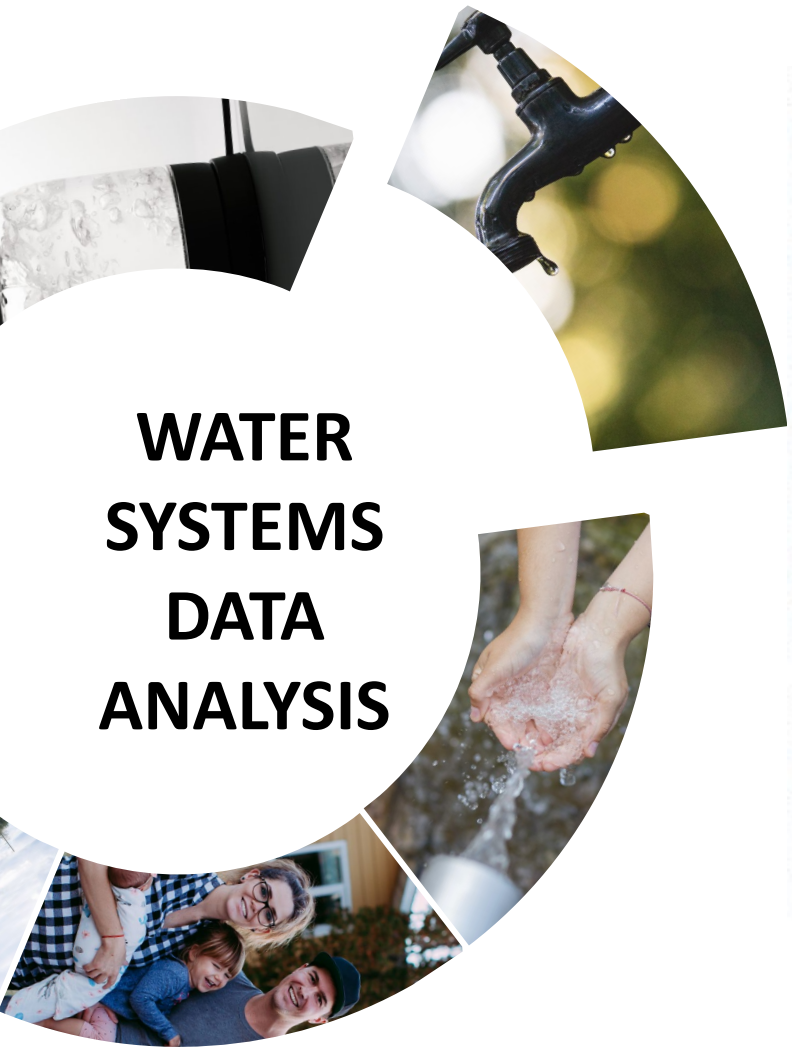
Average Shares of Water Usage per PT and Population Group



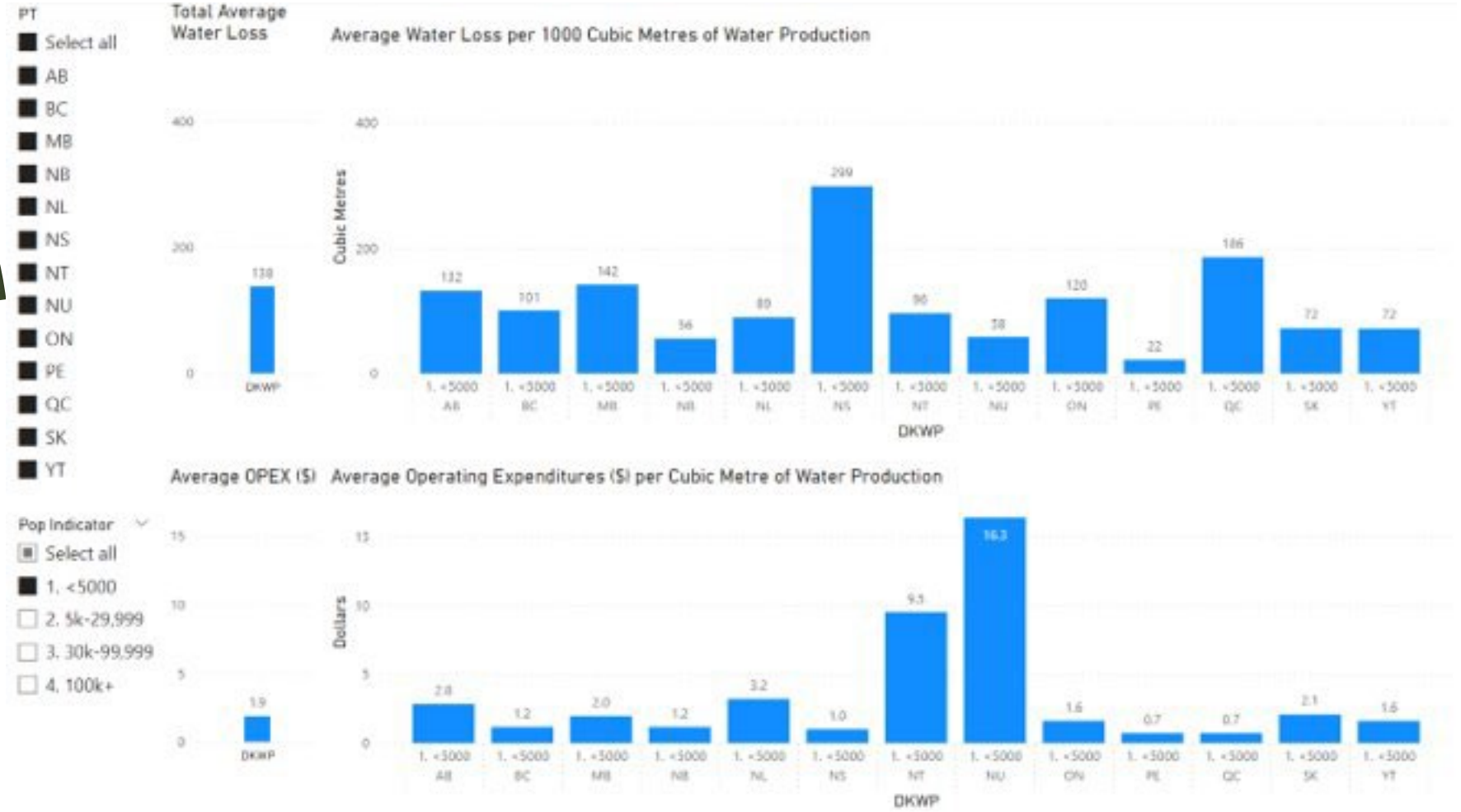


WATER LOSS AND OPERATING EXPENDITURES

- Loss is expressed in the production of cubic metres.



WATER SYSTEMS DATA ANALYSIS



WATER ADVISORIES AND CONDITION OF PIPES

- Displaying totals of average lengths of Very Poor and Poor Linear assets.
- Showing the Average count of Boil Water Advisories per population group for each province.

WATER SYSTEMS DATA ANALYSIS

P/T

- Select all
- AB
- BC
- MB
- NB
- NL
- NS
- NT
- NU
- ON
- PE
- SK
- YT

Population Group

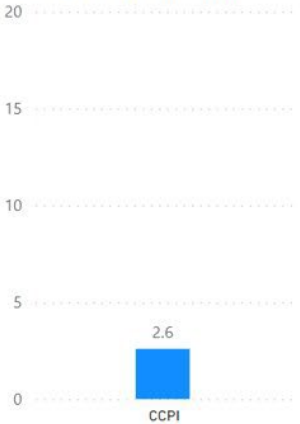
- Select all
- 1. <5000
- 2. 5k-29,999
- 3. 30k-99,999
- 4. 100k+

Total Average Length of Very Poor/Poor Linear Assets

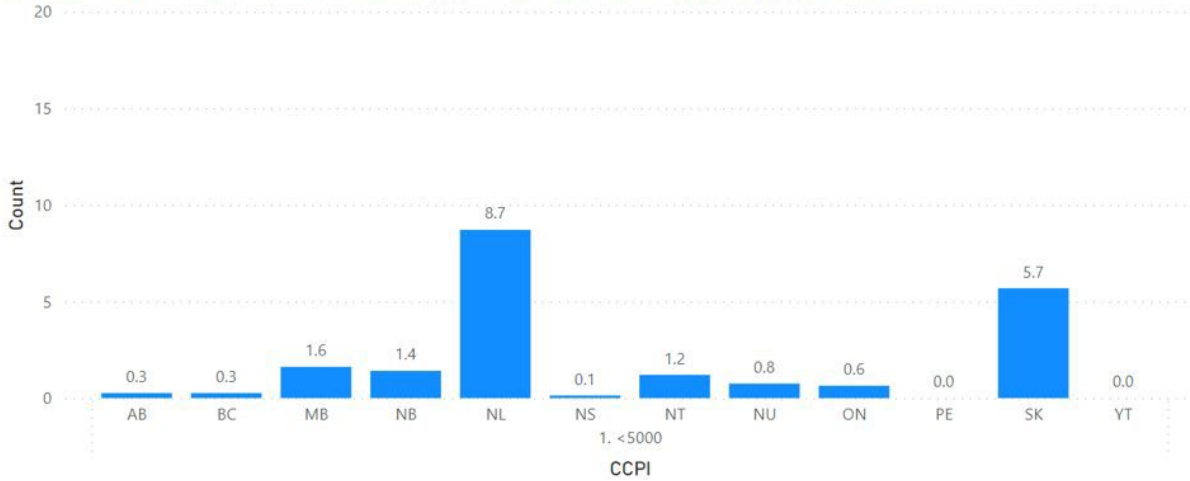
Average Length (kms) of Very Poor and Poor Linear Assets (Potable)

All Linear

Total Average Advisories



Average Count of Boil Water Advisories (Sum of Emergency, Precautionary, and Sustained)



REPLACEMENT VALUES

- Displaying the replacement value, that is the approximate cost at the present time (in current dollars) that would be required to replace the assets owned or leased by an organization, including demolition costs, and excluding land costs and overhead (administration).

WATER SYSTEMS DATA ANALYSIS

Asset

- (●) Linear
- ( ) Storage tanks
- ( ) Water pump stations
- ( ) Water reservoirs
- ( ) Water treatment facilities

P/T

- [■] Select all
- [■] AB
- [■] BC
- [■] MB
- [■] NB
- [■] NL
- [■] NS
- [■] NT
- [■] NU
- [■] ON
- [■] PE

Pop Indicator

- [■] Select all
- [■] 1. <5000
- [ ] 2. 5k-29,999
- [ ] 3. 30k-99,999
- [ ] 4. 100k+

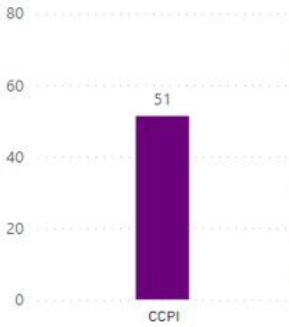
Total $ Average of Replacement Value of Selected Asset per Count or Length (km)

595,065.26

CCPI

Total Average Proportion of Selected Asset

Linear



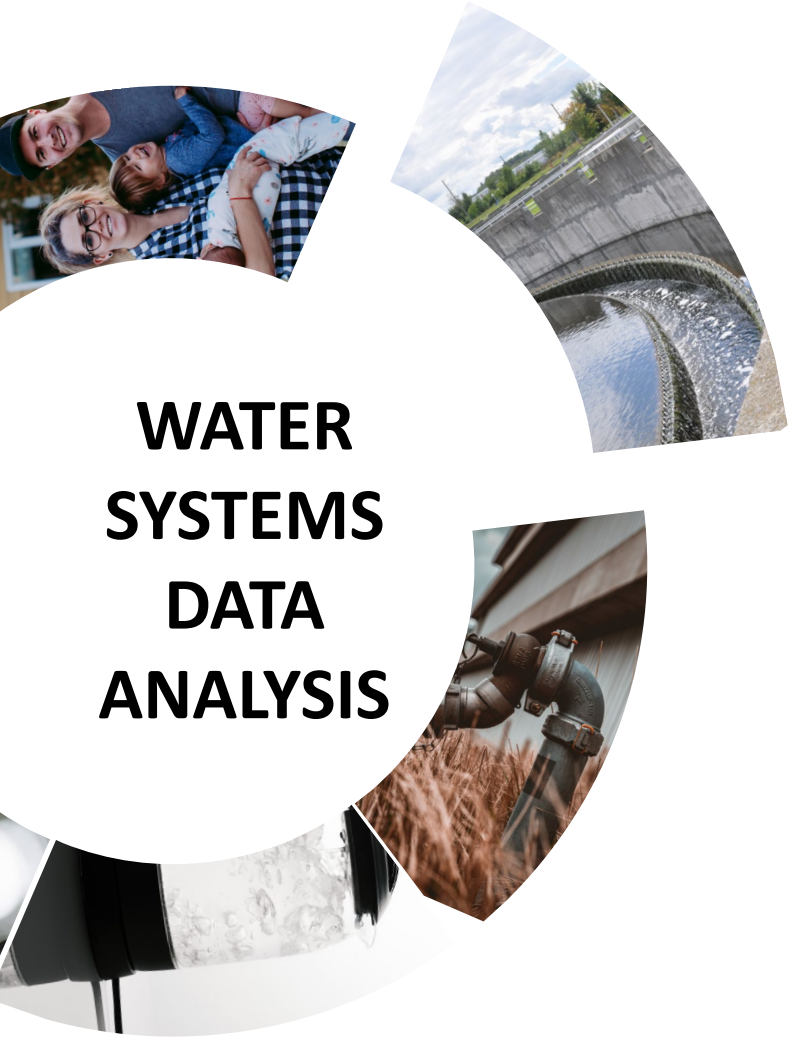
Average Replacement Value per Count/Length (km) of Selected Asset

Linear

Average Proportion of Selected Asset's Replacement Value to Total Potable Water Replacement Value

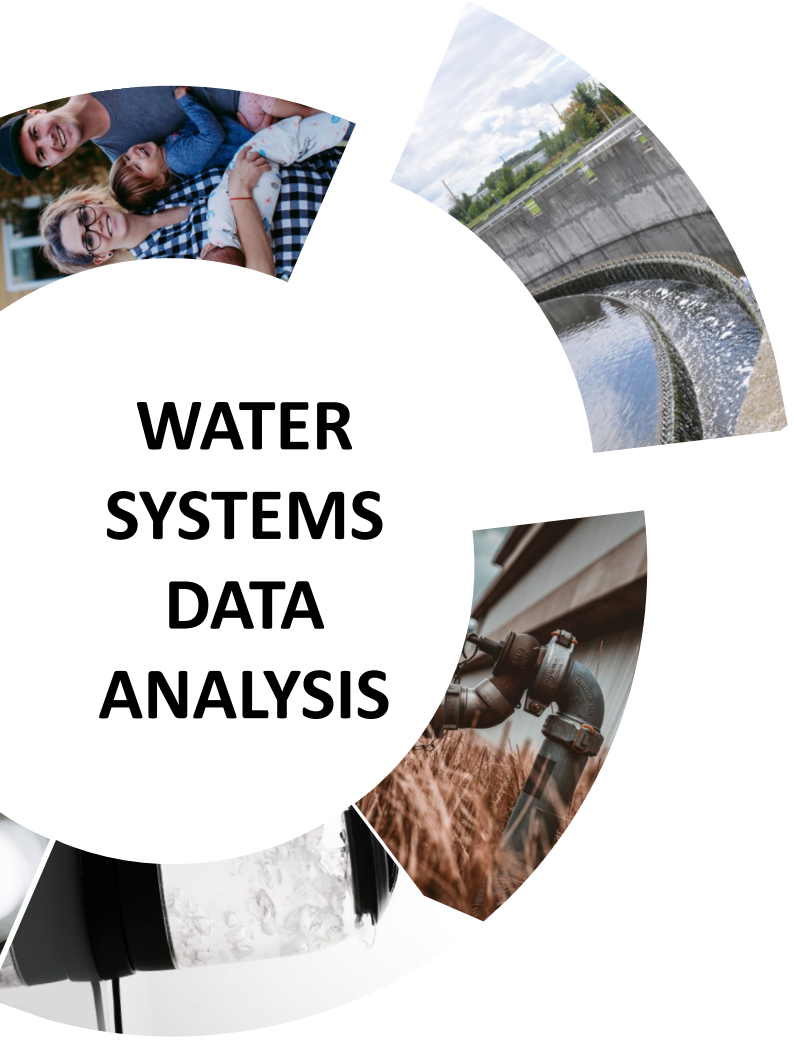
Linear

Note: The replacement value proportions shown in this dashboard only reflect entities that report positive replacement values for the selected asset. In other words, entities that have zero replacement values of a selected asset are likely not represented in this graph which can overestimate average proportions of all responding entities of the survey.



WASTEWATER INFRASTRUCTURE*

- The 2020 CCPI survey shows that the total replacement value of all wastewater assets in Canada is $304.9 billion.



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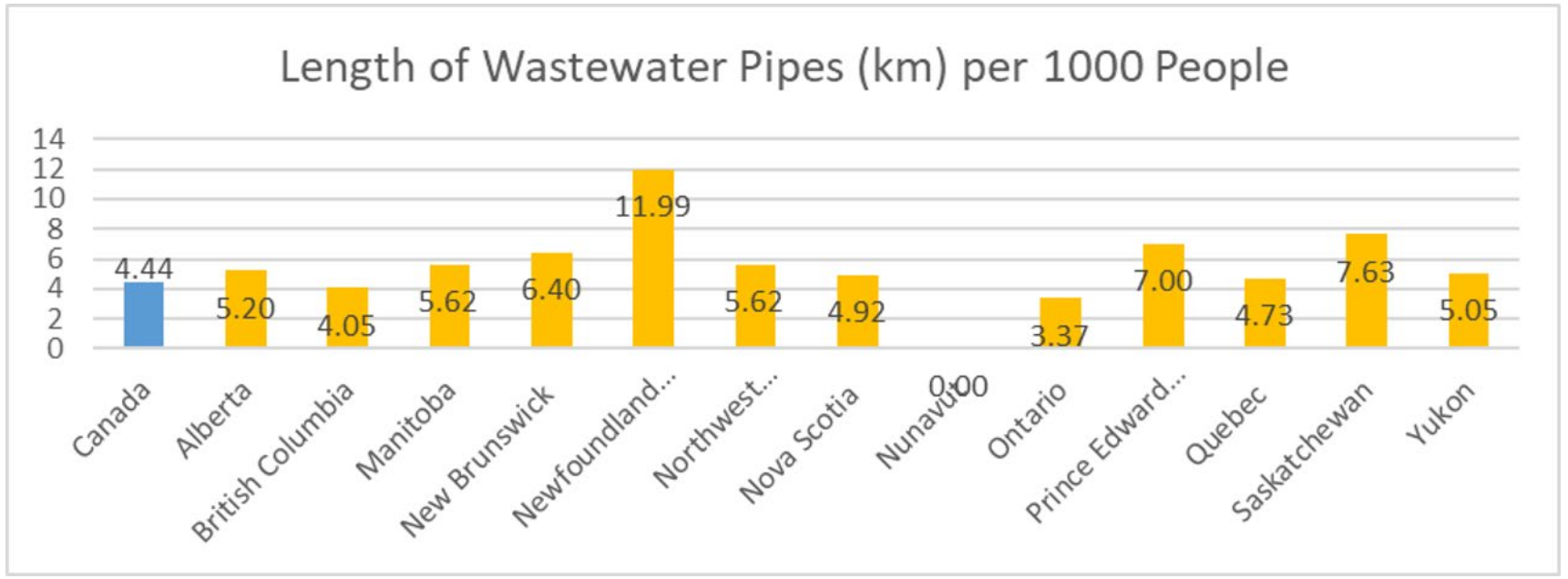

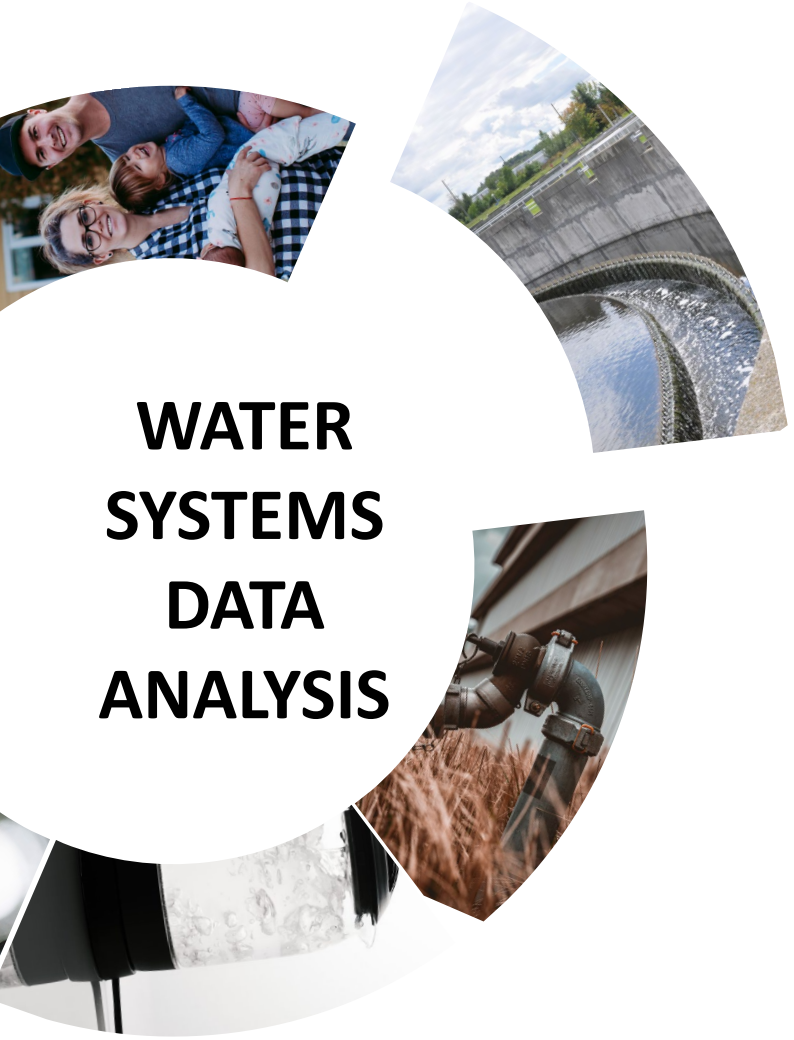

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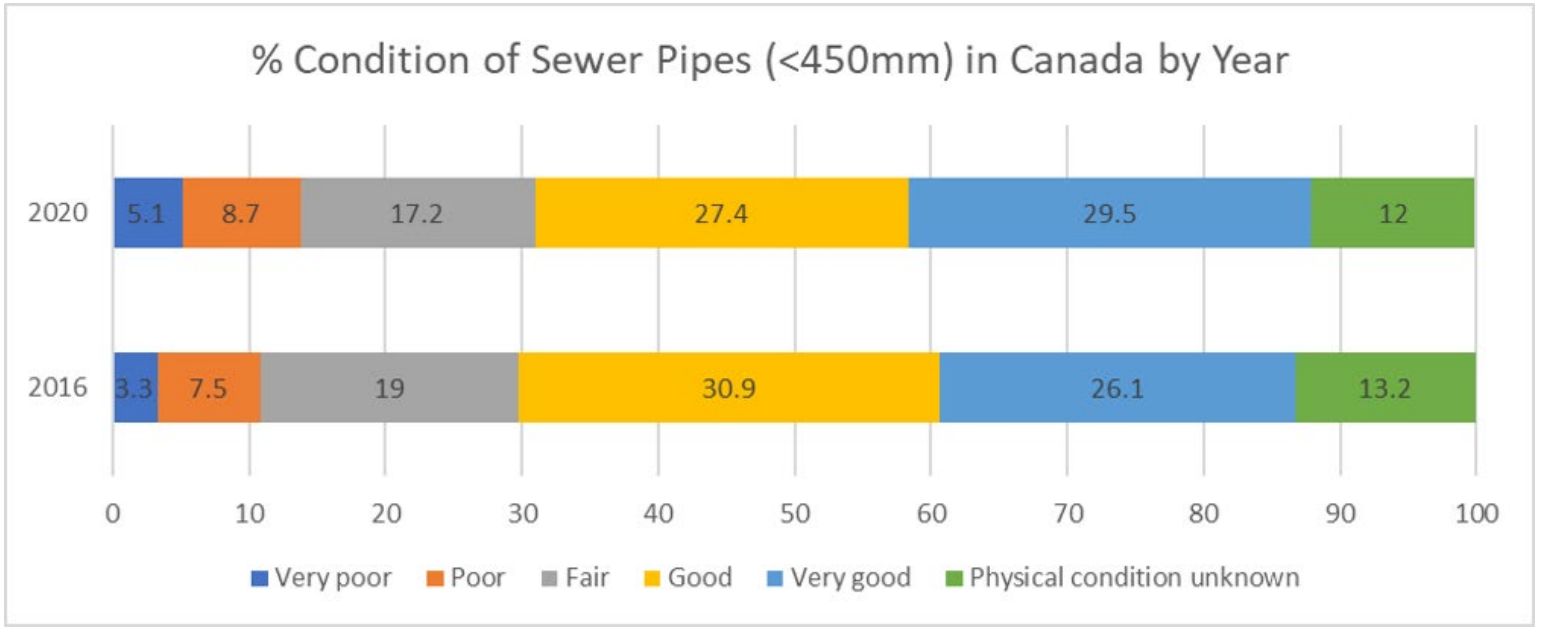

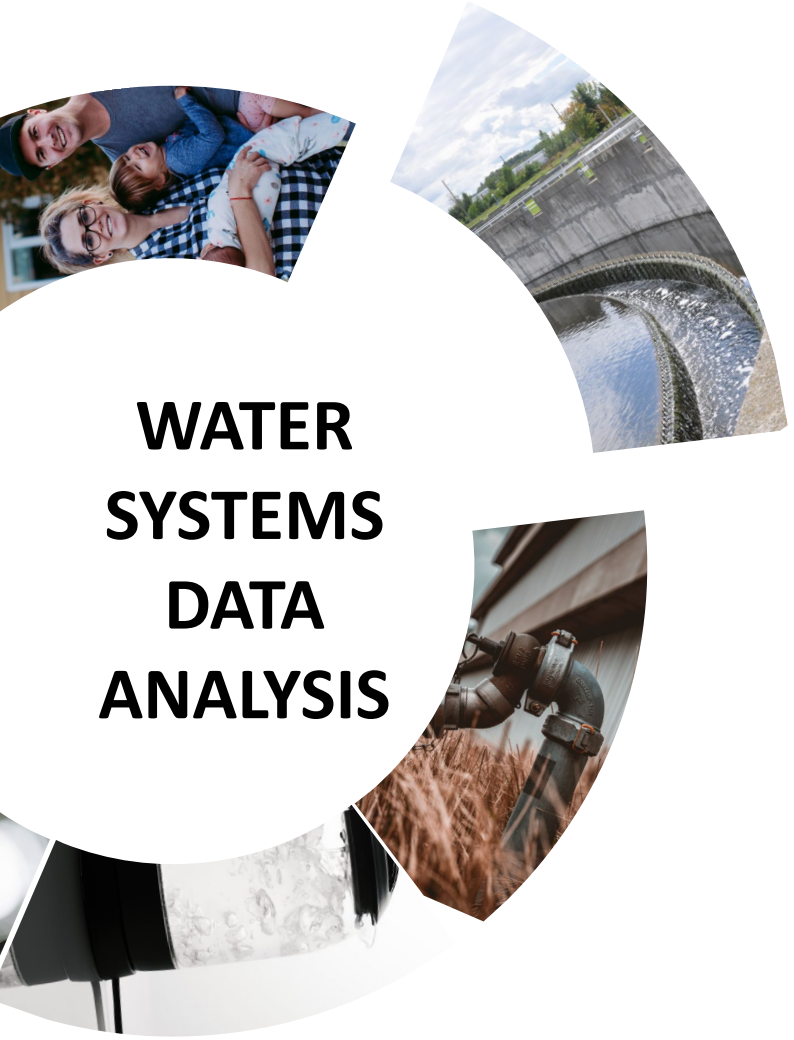

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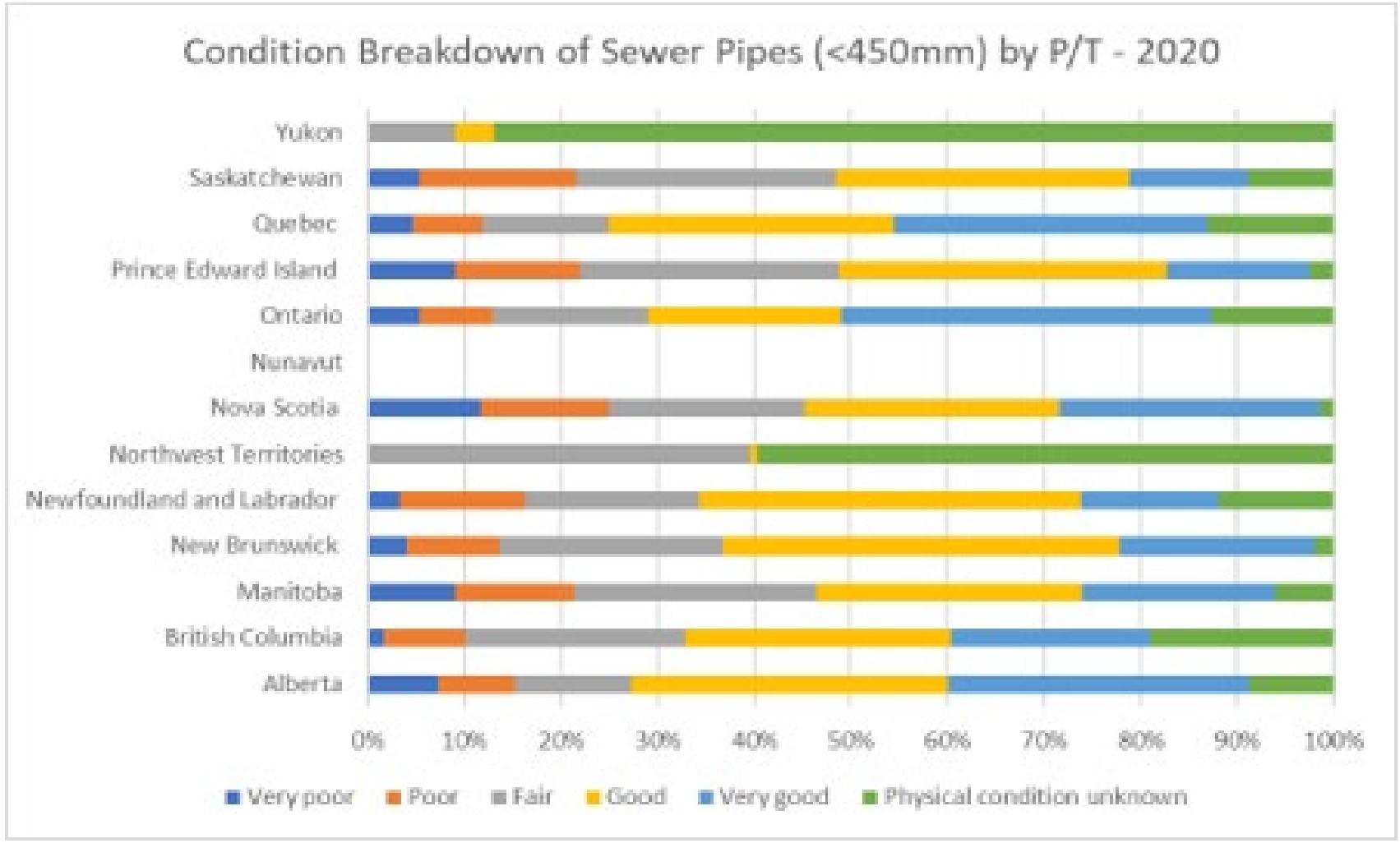

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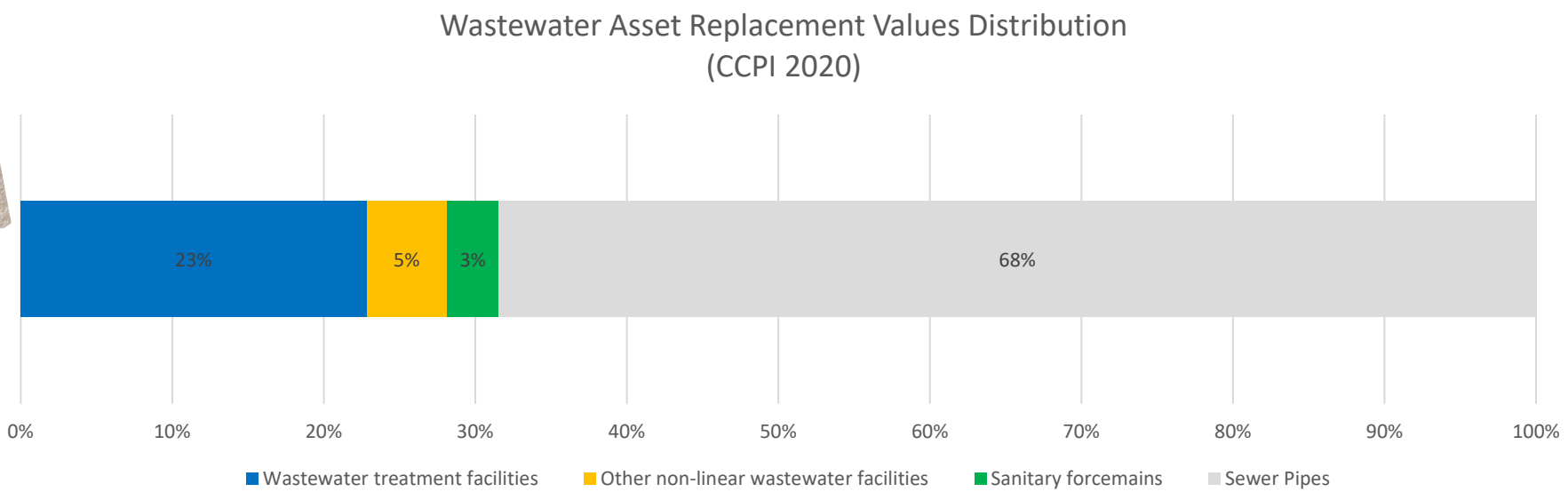
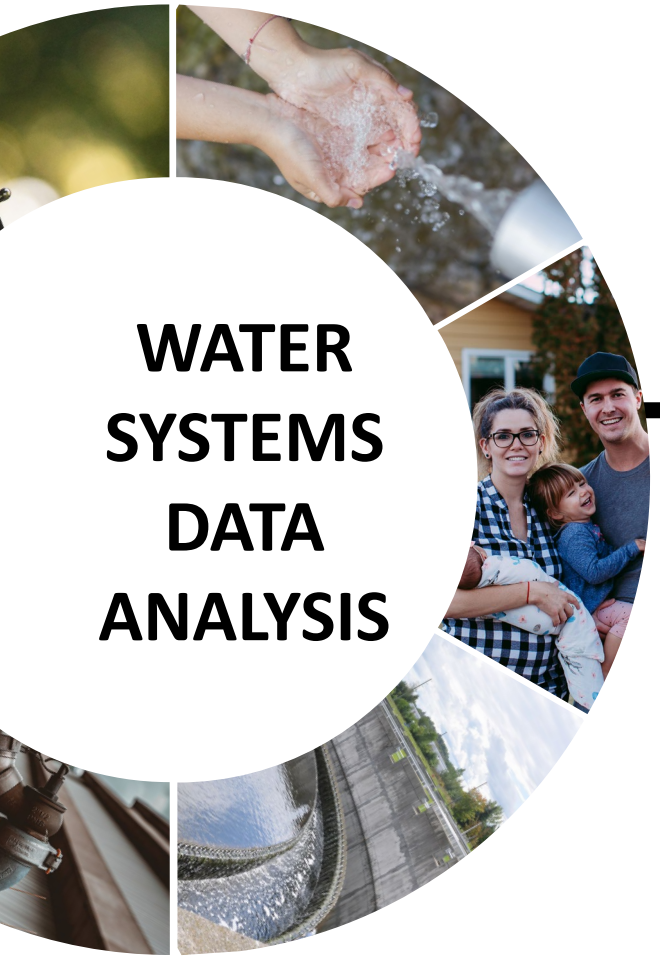




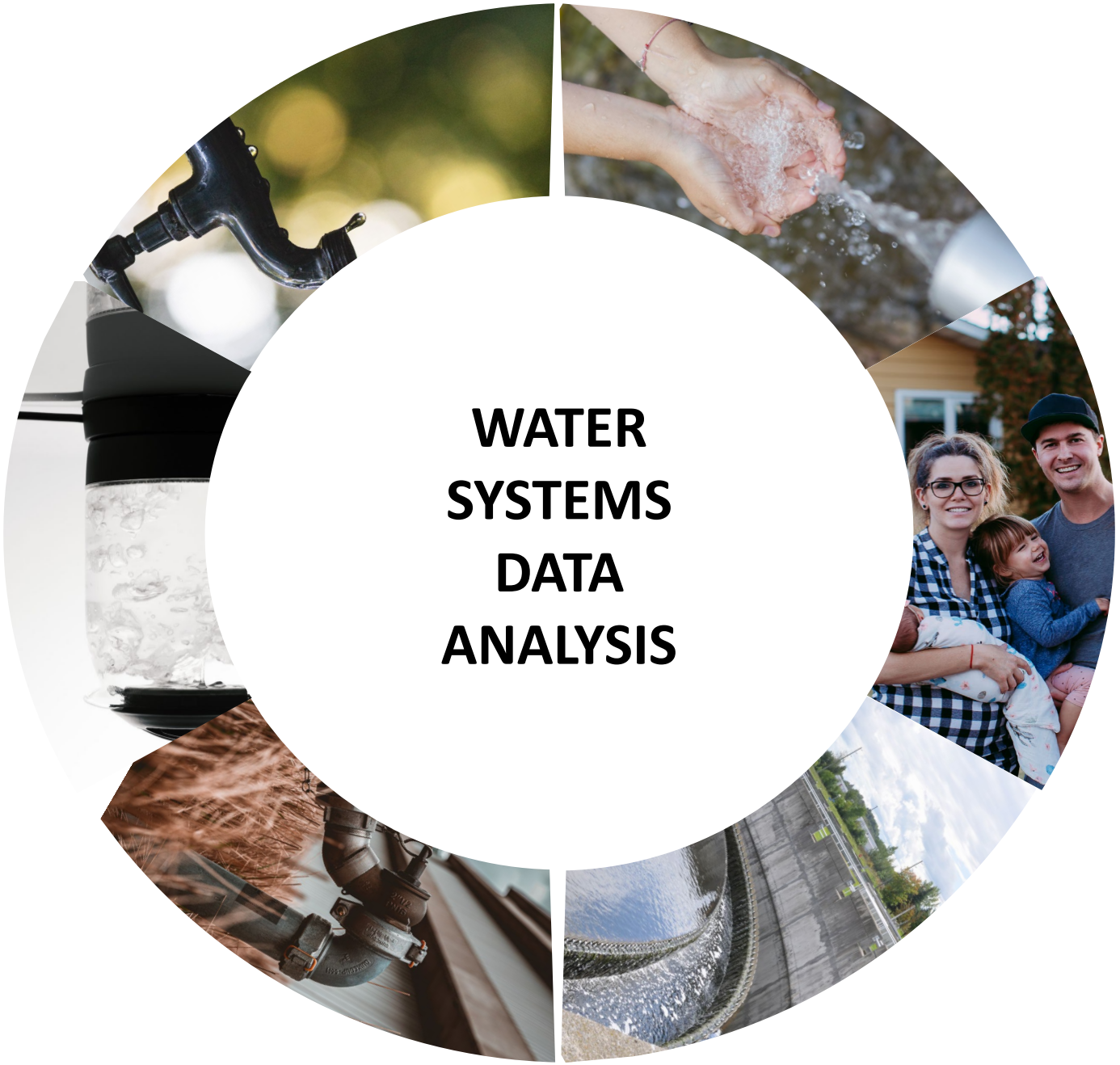
NEXT STEPS

2023

- prioritize remaining infrastructure assets through internal consultations.
- continue to expand the scope of the infrastructure asset performance framework to include additional assets.
- continue close collaboration with internal and external organizations, as well as subject-matter experts, using their expertise and deliverables to ensure best practices while developing a national performance framework.

2024 and Beyond

- receive the initial feasibility report from Statistics Canada. The study will be used to address issues related to data gaps, geographic coverage, and currently available data. Based on the results of this report, INFC will work with Statistics Canada to develop a multi-year project to provide recommendations and create performance measures for additional infrastructure assets.
- develop infrastructure performance frameworks for 3 assets by 2023/24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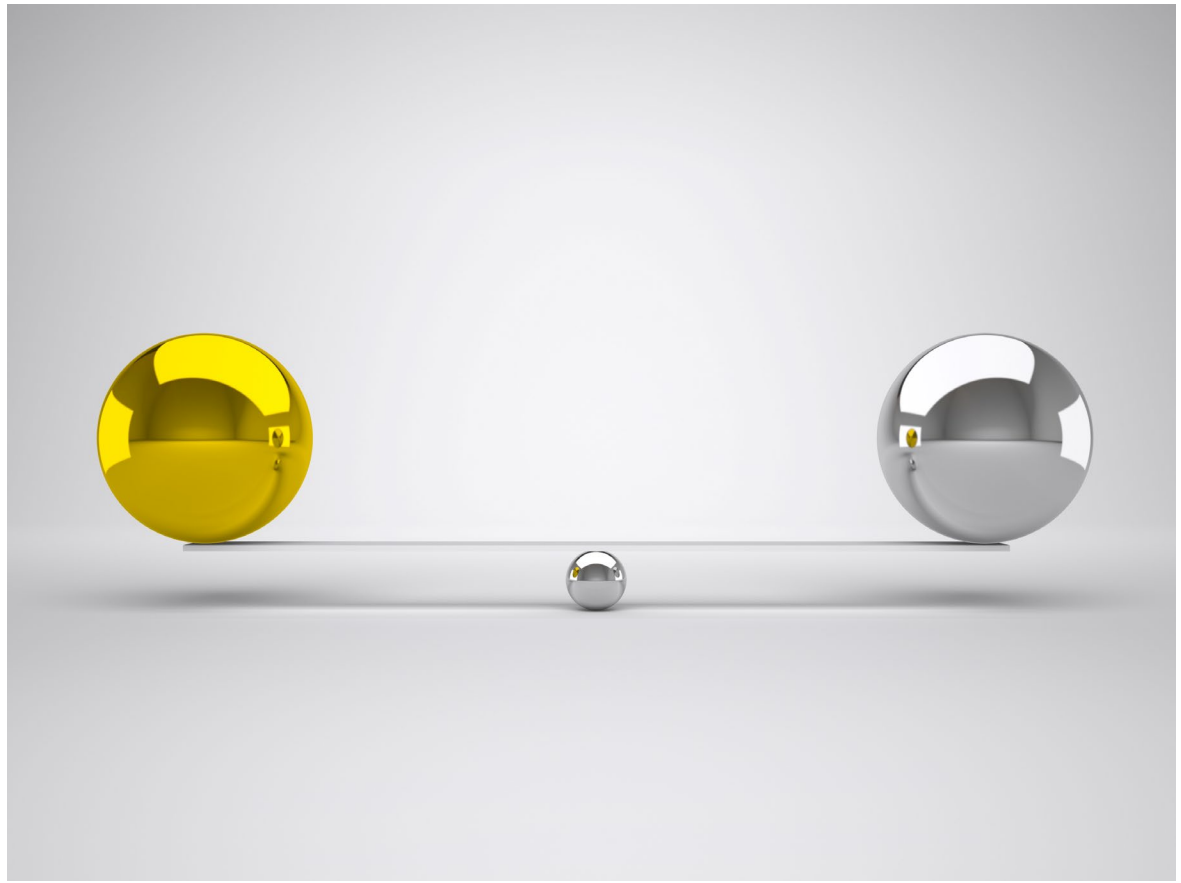
Help shape the reporting and measurement of drinking water systems!

Statistics Canada and Infrastructure Canada are working on a Feasibility Study on Drinking Water Systems Performance Indicators, and would like your help to define, enhance and harmonize data on drinking water systems across Canada. Together, we can improve data quality and availability of drinking water systems in order to better understand its state, as well as its potential risks and vulnerabilities.

What is the goal of this project?

The goal of this new project is to define indicators for reporting and measuring the performance of drinking water systems at the most granular level possible.



How will the data be used?

The data eventually produced from this project will be used:

- by Infrastructure Canada to understand the state of infrastructure assets and help inform policy decisions, and
- by Statistics Canada to present a clearer picture of water systems and the Canadian economy.
- The data may also be used by provincial, territorial and local governments to inform decision-making, planning, monitoring and evaluation.
- These data will also help municipalities see how their drinking water systems compare to other municipalities across the country. Relevant, accessible and accurate data on drinking water system performance will help municipalities inform decision-making, planning, monitoring and evaluation.

How you can help!

Your opinion matters. Let us know which data points or indicators are most important for your decision-making.

If you would like to share information on your current data holdings with respect to performance indicators related to Drinking Water Production and Distribution Systems, please participate in our consultations taking place Mid November 2023 to Mid-January, 2024

Contact Us

If you have any questions or would like to learn more about this new project, please contact us.

PSSD Info:
statcan.pssdinfo-dsspinfo.statcan@statcan.gc.ca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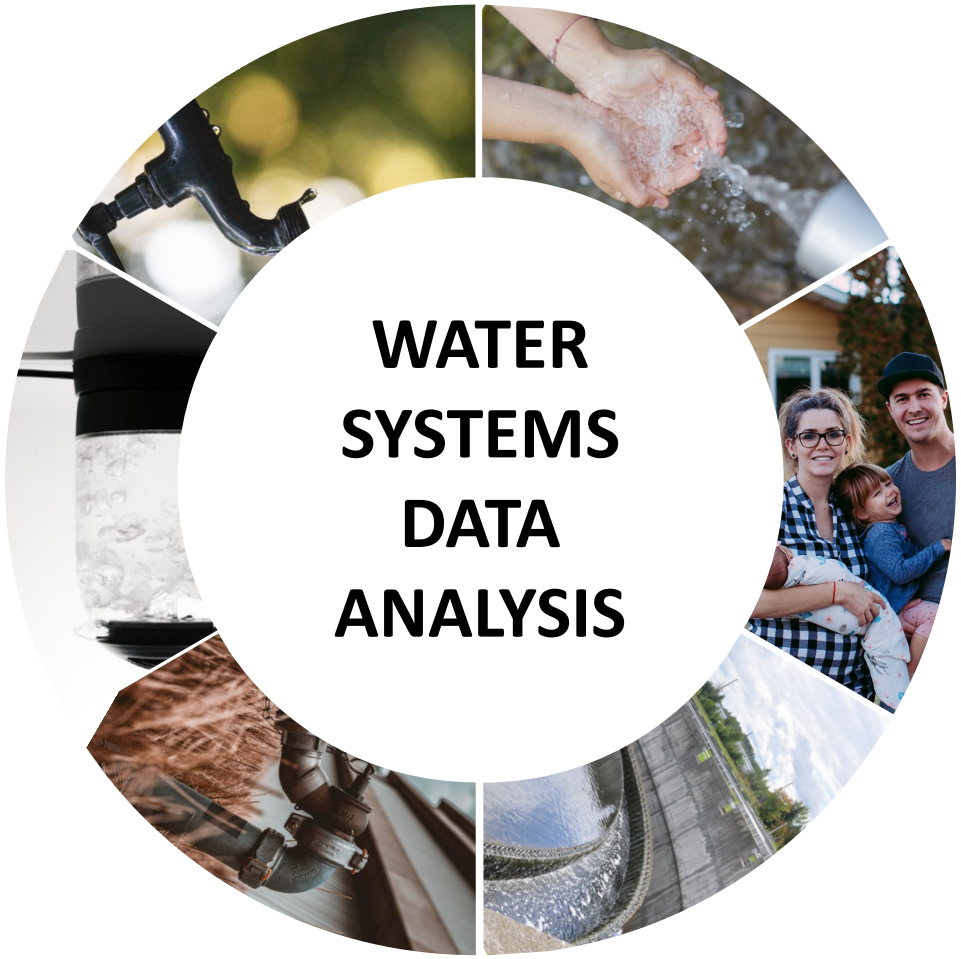
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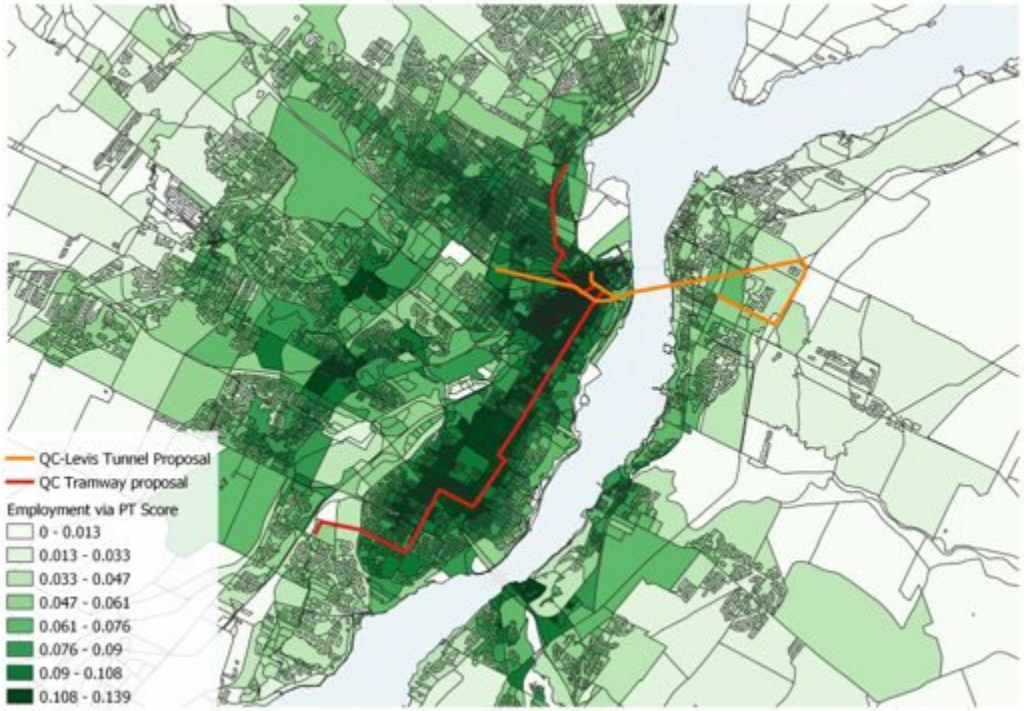
Place-Based Policy: Spatial Accessibility Measures

- **Objective measures of accessibility to infrastructure**
  - An objective measure of accessibility is critical to understanding disparities in access, inform equitable planning and policy decisions, and promote inclusive and sustainable development in cities and region.

- **Key partnership with Statistics Canada and Mobilizing Justice**
  - To create the Spatial Access Measures which contain 28 measures of access for 7 types of amenities and 4 modes of transportation.

- **Place-based decision-making** for public transit projects, active transport projects, and culture and recreation infrastructure.



Example: Measures of public transit access to employment opportunities in Quebec City.

Gaps to Fill: Transit and transportation mobility

Measuring Equity Distribution: Environmental Equity Index

- The **Environmental Equity Index** will function as a decision-making tool that supports policy planning and evaluation, research and analysis, and resource allocation.

- **Evaluating equity and access to the environment**
  - The built and natural environment has effects on individual physical and mental health, life satisfaction, and social connectedness. The tool will make the evaluation of a community's equitable access to the environment and allow users to obtain valuable information regarding **vulnerable populations**.

- **Collaborating and leveraging key stakeholders**
  - **Statistics Canada**, the **Public Health Agency of Canada**, and **Dalhousie University** to enhance the Environmental Equity Index.

Source: National Capital Commission Canopy Cover