Key Policies to Unlock the Economic Value of GSHPs for Building Sector Decarbonization

OGA Annual Conference - April 26th 2022

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- Buildings + Industry
- Energy
- Mobility

SERVICES

- **Quantify** Opportunities
- **Design** Strategies
- **Evaluate** Performance

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EXPERTISE

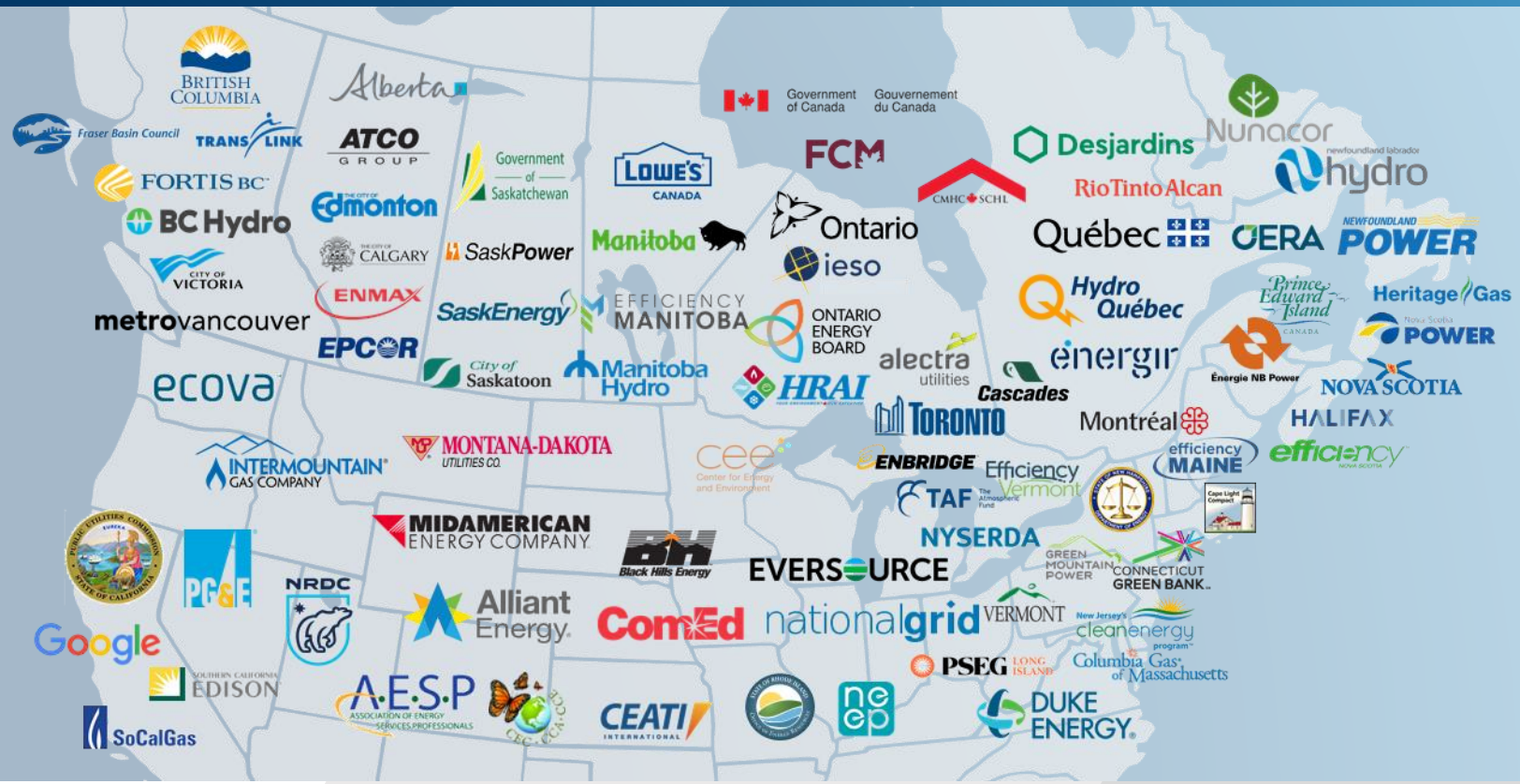
Buildings + Industry — **Energy** — **Mobility**

SERVICES

Quantify Opportunities

Design Strategies

Evaluate Performance



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Agenda

1. **Introduction**
2. Cost reductions of GSHPs vs ASHPs
3. Looking abroad for inspiration
4. Key policies

Context

CGA published a study in October 2019: *Implications of Policy-Driven Electrification in Canada*

- Main conclusion: $1.4T to decarbonize Canada in a scenario where electricity is fully renewable by 2050
- GSHPs were completely excluded from the analysis on the basis that these systems "require drilling and placement of underground heat exchangers, which results in much higher costs and limits their applicability."

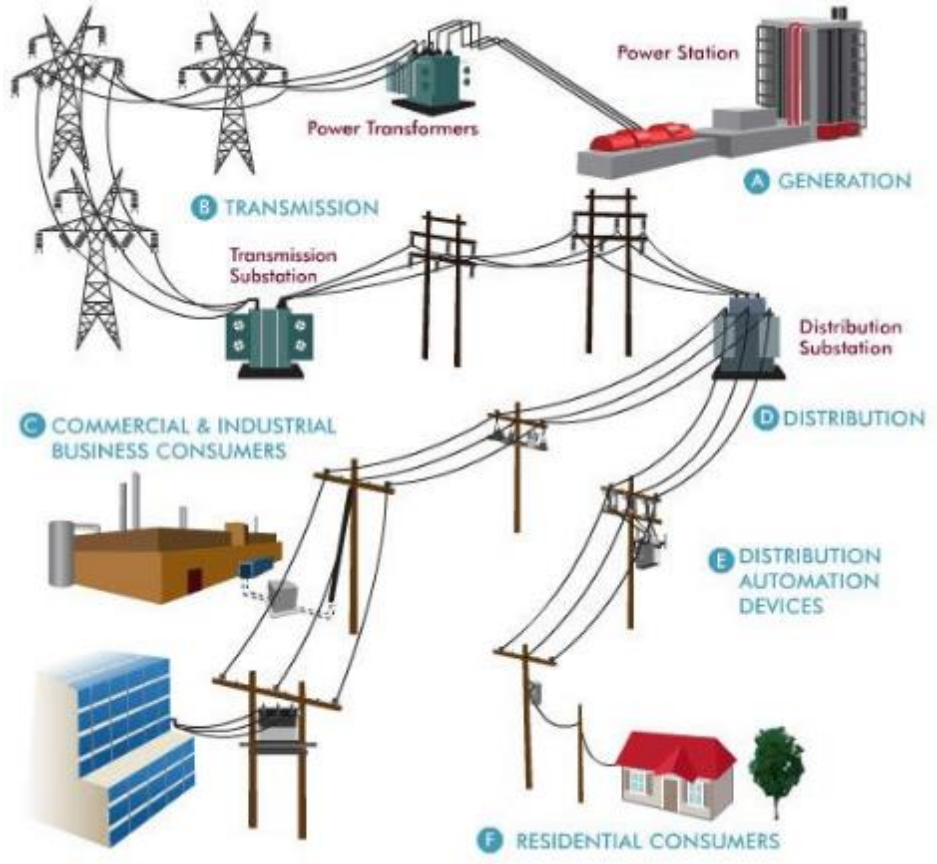
While GSHPs will never achieve 100% market penetration, nor is 0% a realistic outcome.

Introduction

Electrification of fossil-fuel consuming technologies is commonly recognized as one of the key tools to achieving Canada's GHG emission reduction targets.

Total cost of electrification in Canada could be exorbitant, as utilities and consumers are required to invest in infrastructure for power generation, transmission, distribution, building intake, and consumption.

Infrastructure needs are determined by the peak demand at each point on the grid; technologies that can reduce that peak, like GSHPs, create benefits for the entire system.



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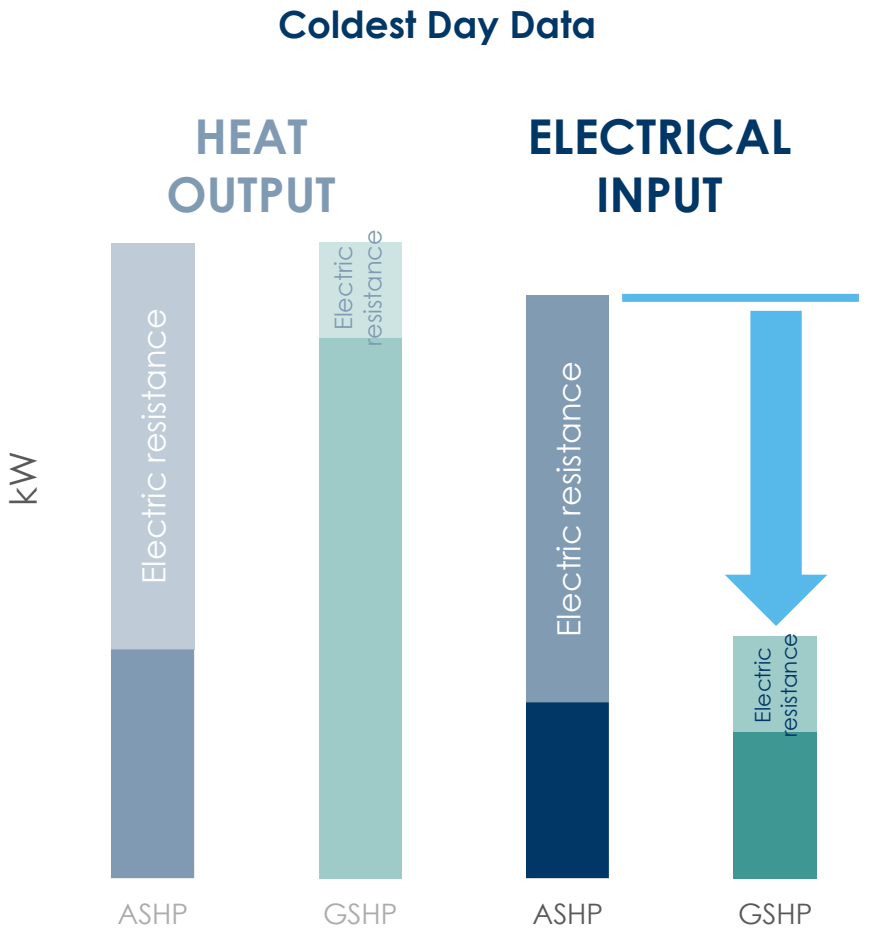
Different technologies yield different grid impacts

Original study: all buildings are assumed to use ASHPs with electric resistance back-up

- As temperatures drop, the capacity and performance of the ASHPs degrade, and the electric resistance has to provide more of the heating capacity

Our analysis: impact of using GSHPs with electric resistance back-up

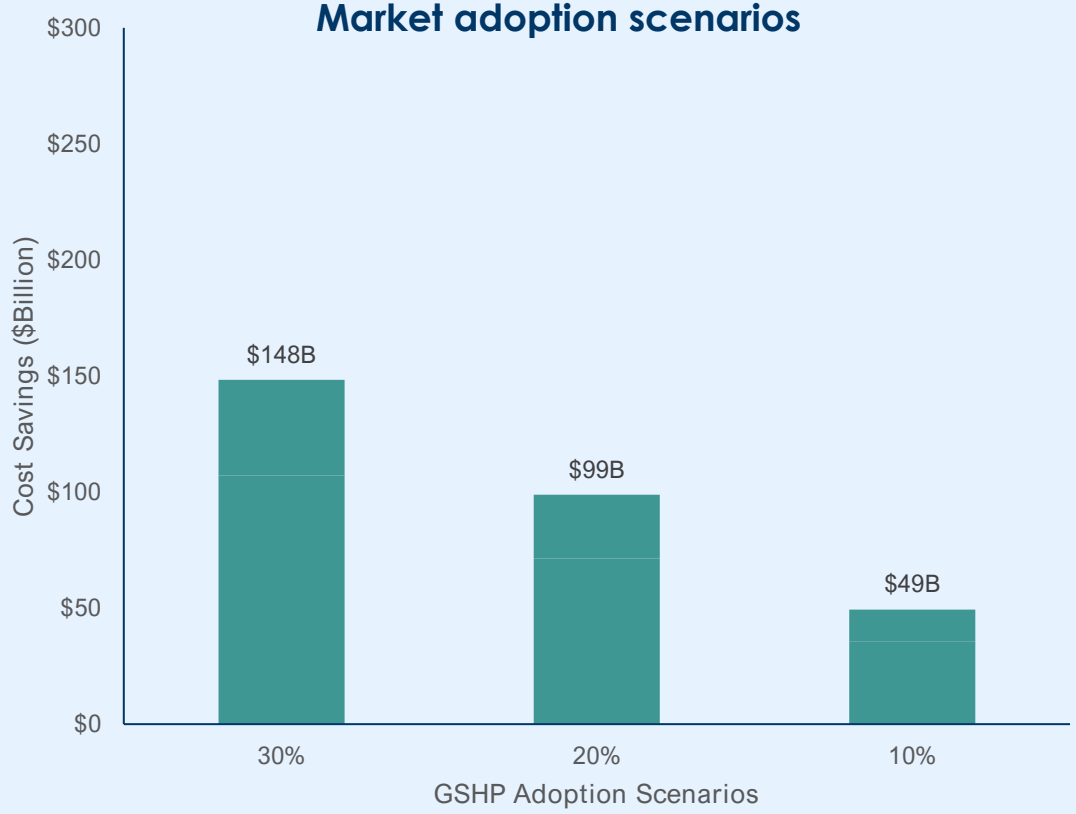
- GSHPs keep performing even during winter peaks; reducing how much energy is required from the electric resistance



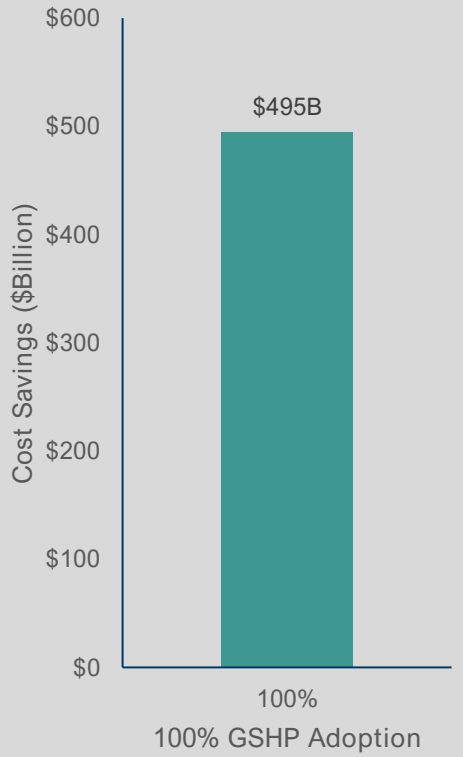
GSHPs can reduce electrification costs by ~$50-150B

Under a scenario in which Canada moves to 100% carbon-free electricity generation by 2050, **aggressive promotion of GSHPs could save Canadians between $49 and $148 billion** relative to the original study's findings.

Market adoption scenarios

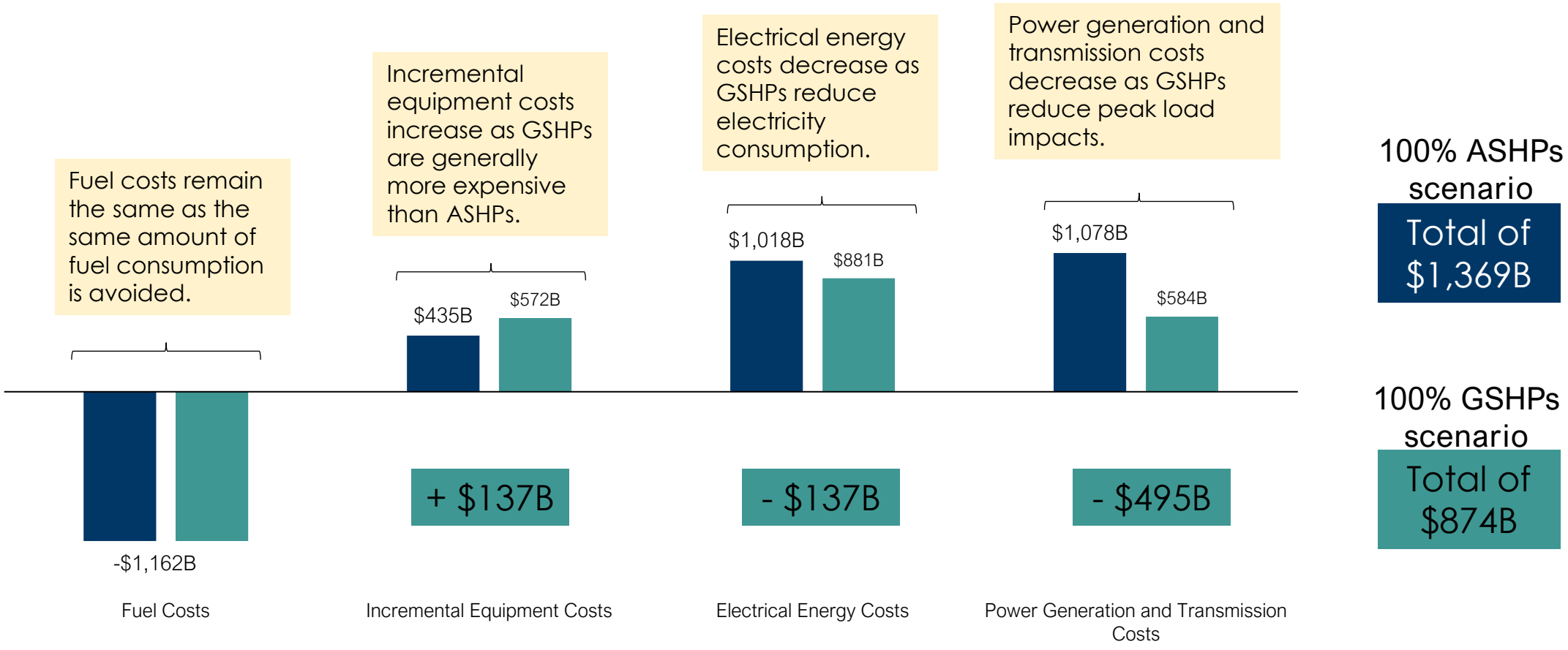


Hypothetical max potential



Main cost reductions come from grid infrastructure

Variation under a *hypothetical* 100% GSHP adoption scenario



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Canada is lagging in adopting GSHPs

For each installation in Canada, there are…

Canada

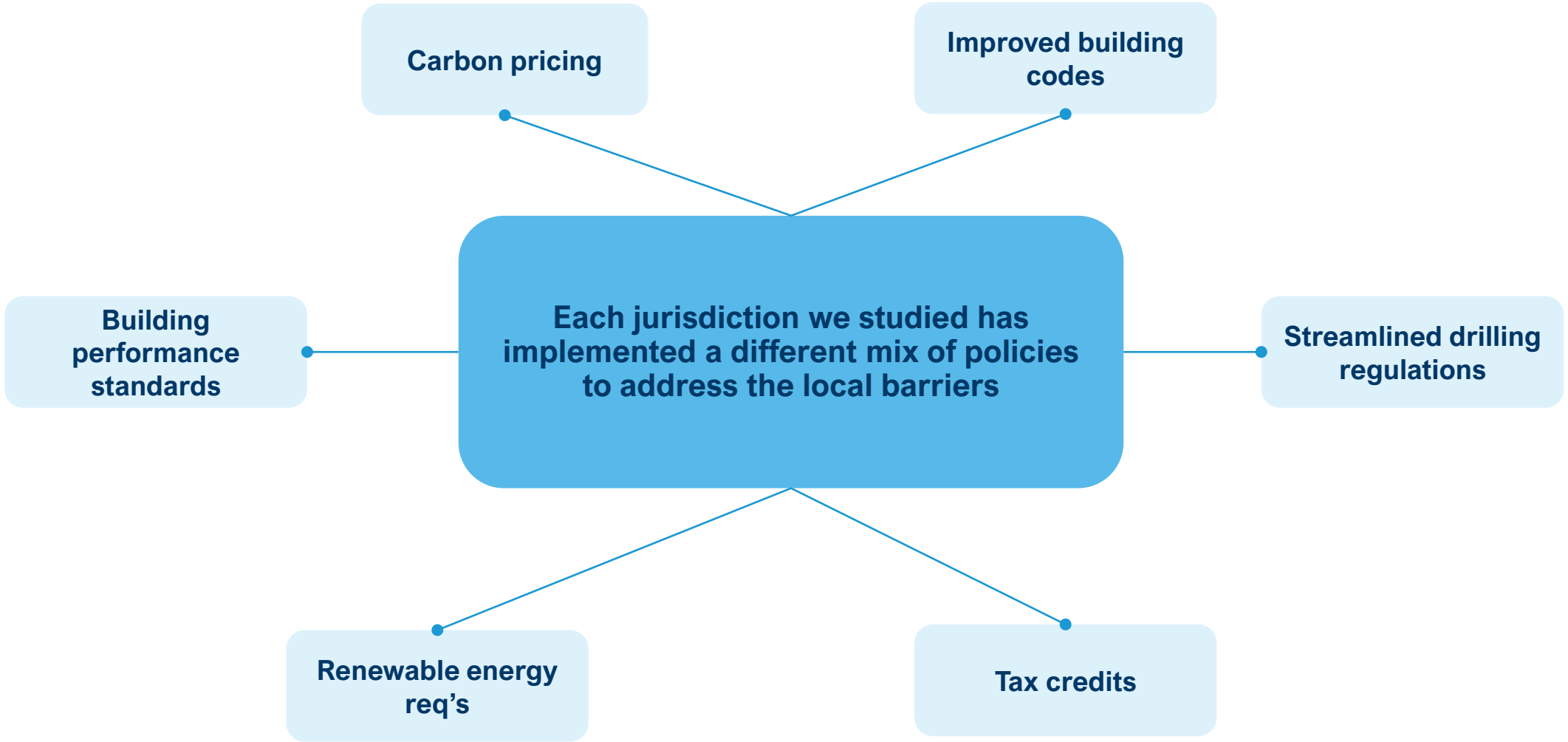
Austria

USA

Sweden

** Number of installations are weighted by population*

Effective and long-term policies made it happen



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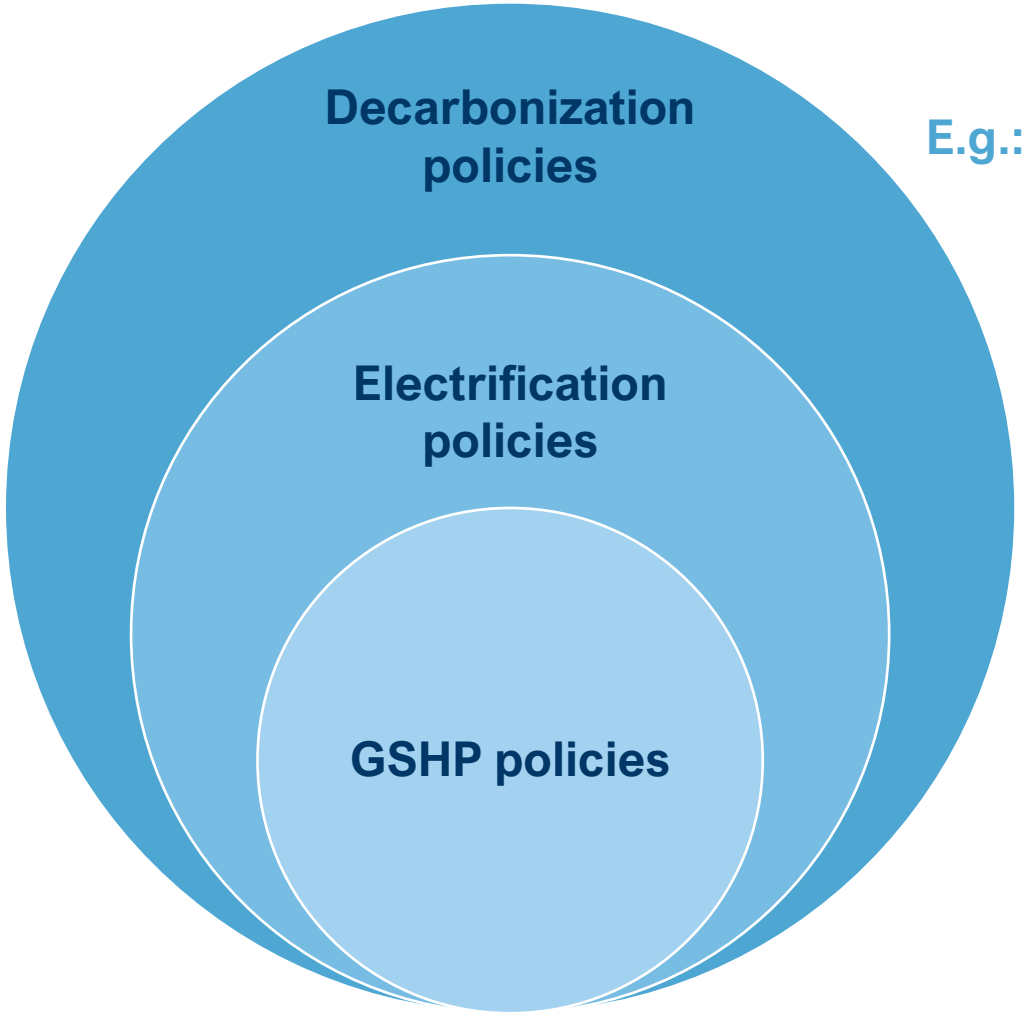
Various levels of policies can affect GSHPs



E.g.: Carbon pricing, RNG mandate

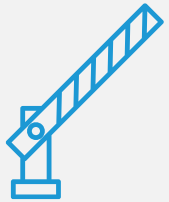
E.g.: Energy code, building performance standards

What makes a good GSHP policy

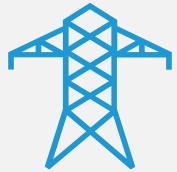
To maximize the impact on GSHP adoption, policies should respect

three main criteria.

Specifically target GSHPs,
and not just any electrification technology or HP

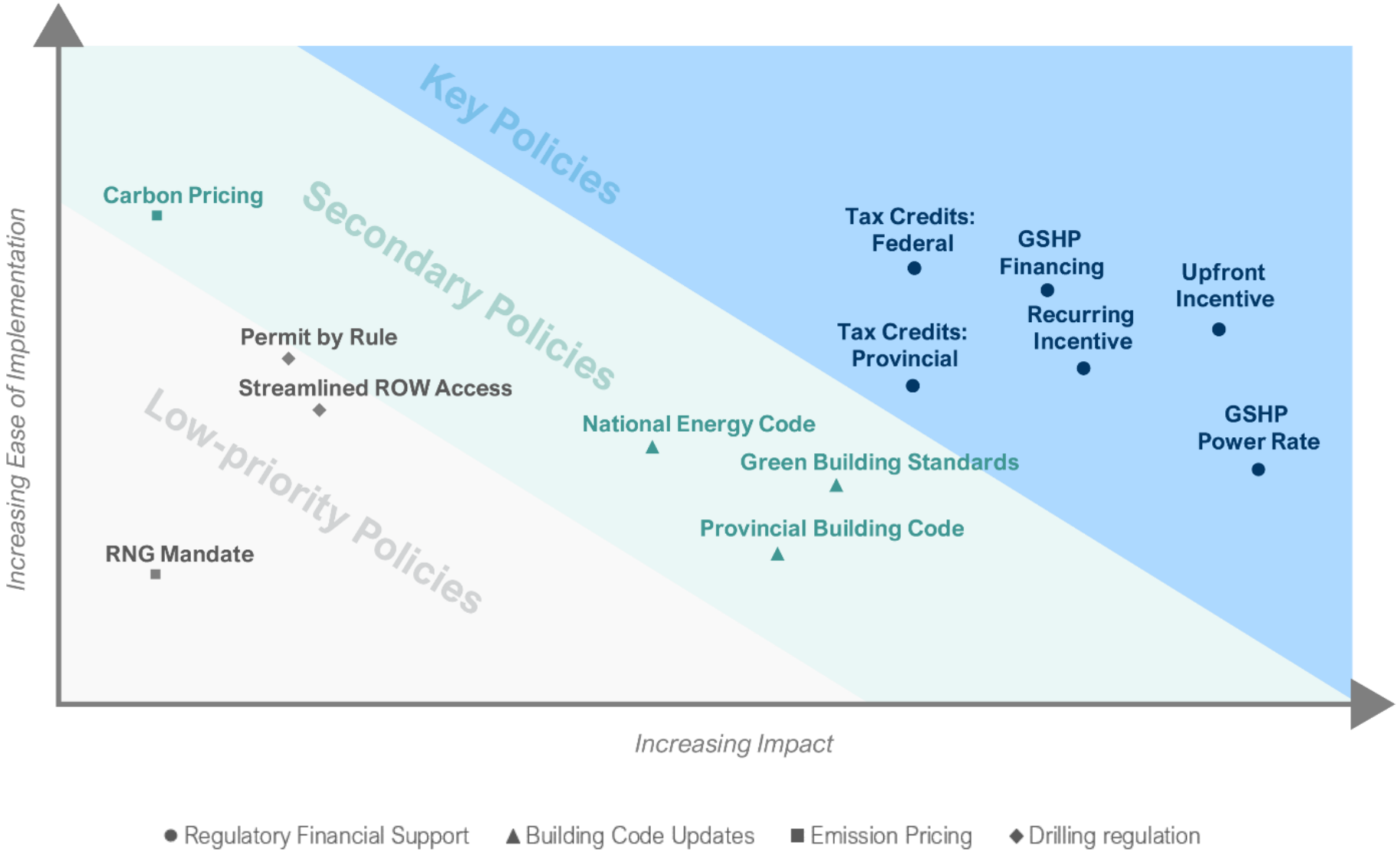


Effectively reduce barriers,
especially the first cost barrier which is deemed the most important



Recognize the value of GSHPs
for the grid, i.e. their ability to reduce peak demand and the need for additional infrastructure

Policies matrix



Key policies

Policy	Implementers	Timeline and Strength		
		Short (next 3 years)	Mid (3-10 years)	Long (10+ years)
GSHP-specific power rates		+ + +	+ + +	+ + +
Recurring peak demand incentives or penalties		+ + +	+ + +	+ + +
Federal tax credits		+ + +	+ +	+
Provincial tax credits	P T	+ + +	+ +	+
Upfront incentives	P T	+ + +	+ + +	+ + +
GSHP financing	P T	+ + +	+ + +	+ + +

Federal Government | P T | Provincial/Territorial Government | Utilities

Meetings with policymakers

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