Key Input Assumptions

2023 Integrated Resource Plan (IRP)

December 2022

Manitoba Hydro

Purpose of this document

- This document summarizes the key input assumptions developed for each scenario of the 2023 IRP analysis.
- The assumptions for each scenario, when paired with other data, result in the electric and natural gas demand projections for each scenario. The demand projections for each scenario were shared in the content of the Initial Modelling Results Conversation.
- Further information on other modelling assumptions were shared in the content of the Modelling Process Information Session.

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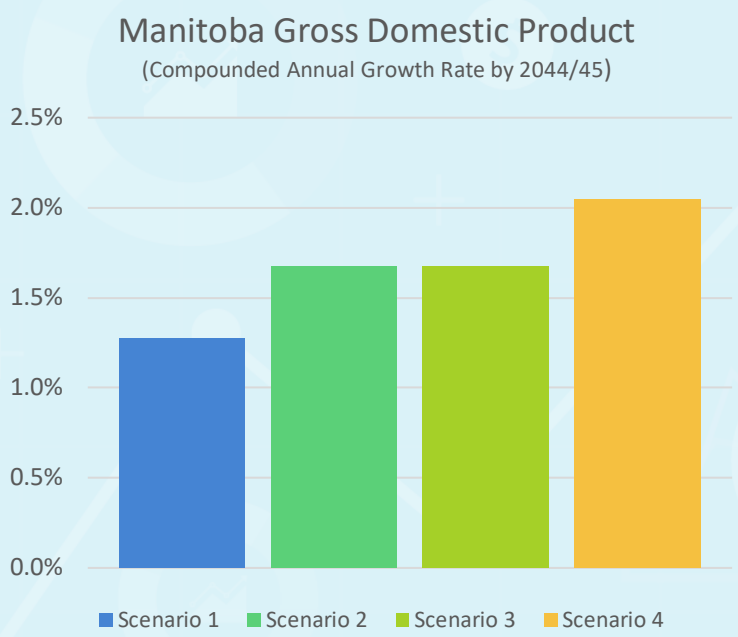
Scenarios
Key input comparisons

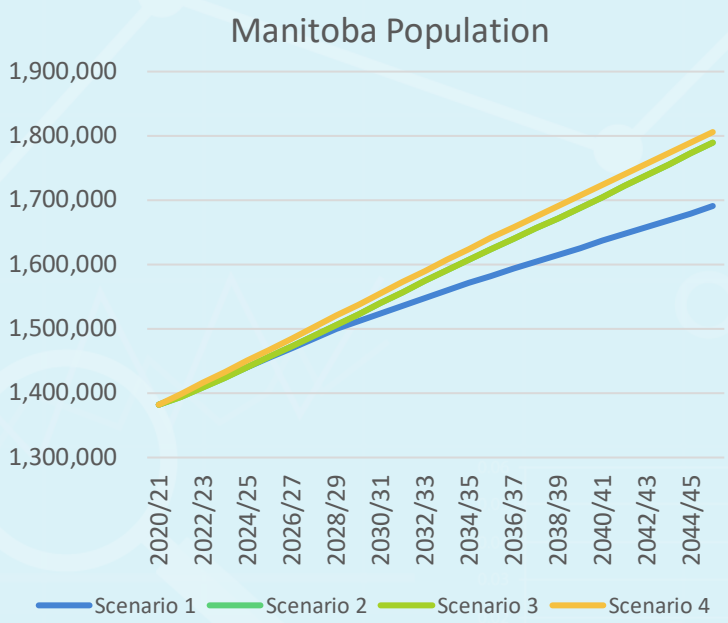
	Scenario 1: Slow decarbonization & slow decentralization	Scenario 2: Modest decarbonization & modest decentralization	Scenario 3: Steady decarbonization & modest decentralization	Scenario 4: Accelerated decarbonization & steady decentralization
Economic growth	●	●●	●●	●●●
Decarbonization policy	●	●●	●●●	●●●●
Electric vehicles	●	●●	●●●	●●●●
Natural gas changes	●	●●	●●●	●●●●
Customer self-generation	●	●●	●●	●●●

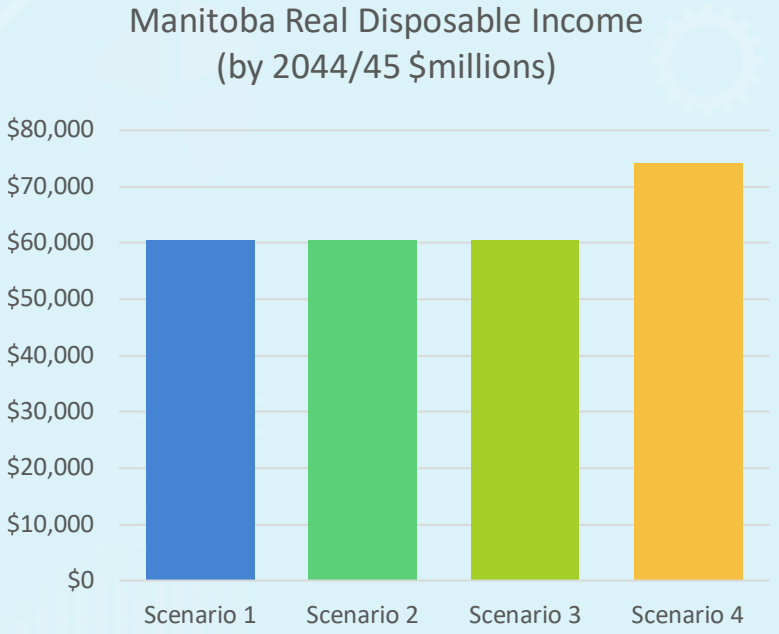
● represents amount of change

Economic Growth
Input comparisons

Scenario 1: Slow decarbonization & slow decentralization	Scenario 2: Modest decarbonization & modest decentralization	Scenario 3: Steady decarbonization & modest decentralization	Scenario 4: Accelerated decarbonization & steady decentralization
Real GDP: 1.3% (20-yr avg) MB Population: 0.8% (20-yr avg) Income: 1.3% (20-yr avg)	Real GDP: 1.7% (20-yr avg) MB Population: 1.0% (20-yr avg) Income: 1.3% (20-yr avg)	Real GDP: 1.7% (20-yr avg) MB Population: 1.0% (20-yr avg) Income: 1.3% (20-yr avg)	Real GDP: 2.0% (20-yr avg) MB Population: 1.1% (20-yr avg) Income: 2.2% (20-yr avg)







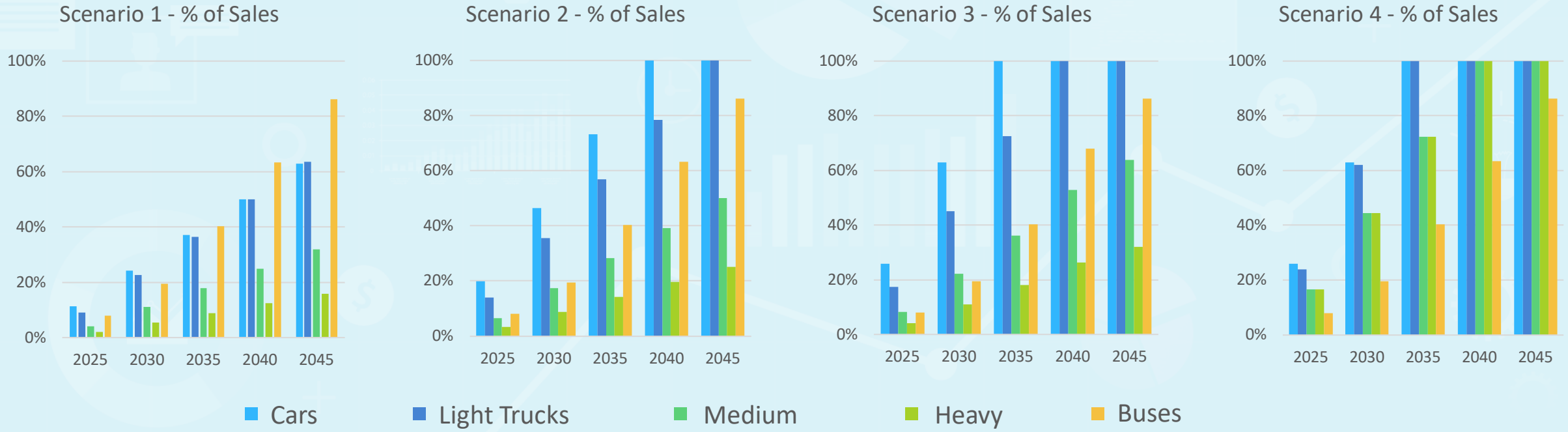
Decarbonization policy
Input comparisons

One of the ways governments drive emission reductions is through policies and funding that encourages a switch from fossil fuels to electricity. Decarbonization policy is reflected in Electric Vehicles and Natural Gas Changes.

Scenario 4 reflects policies that could move the economy toward Net Zero by 2050.

Scenario 1: Slow decarbonization & slow decentralization	**Scenario 2:** Modest decarbonization & modest decentralization	**Scenario 3:** Steady decarbonization & modest decentralization	**Scenario 4:** Accelerated decarbonization & steady decentralization
Reduced ambition to address climate change.	Addressing climate change is one of several priorities for governments.	Addressing climate change is a priority for governments.	Addressing climate change is an urgent and key focus for governments.

Electric Vehicles
Input comparisons



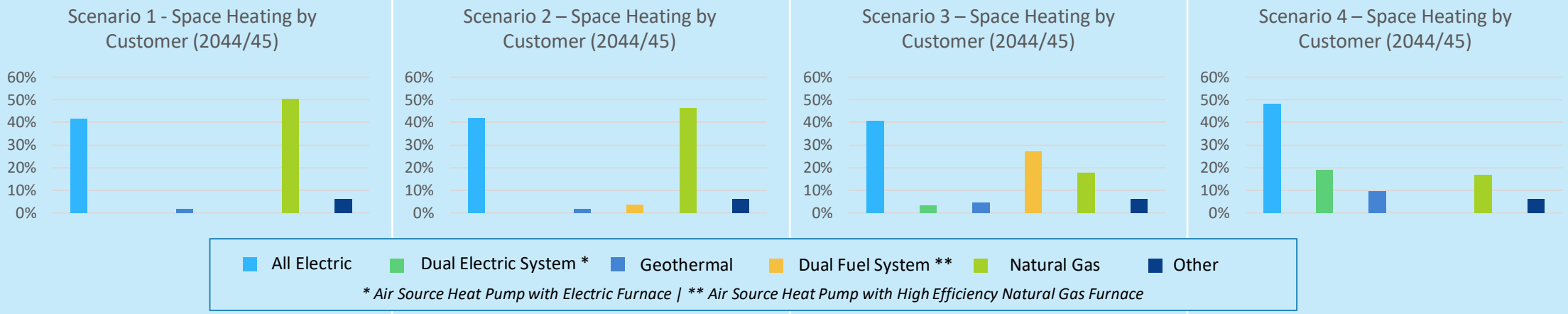
The Federal government has proposed all new vehicle sales be zero emission by 2035 for cars and light trucks, 2040 for medium and heavy (incl. buses). This target has been reflected for cars in Scenarios 3 and 4 and for all other vehicles in Scenario 4.

Type	Annual km driven	Annual kWh	Peak kW
Cars	15,000	3,225	0.4
Light trucks	15,000	4,473	0.55
Medium	14,260	7,812	0.98
Heavy	88,615	135,612	16.95
Buses	55,000	78,160	9.77

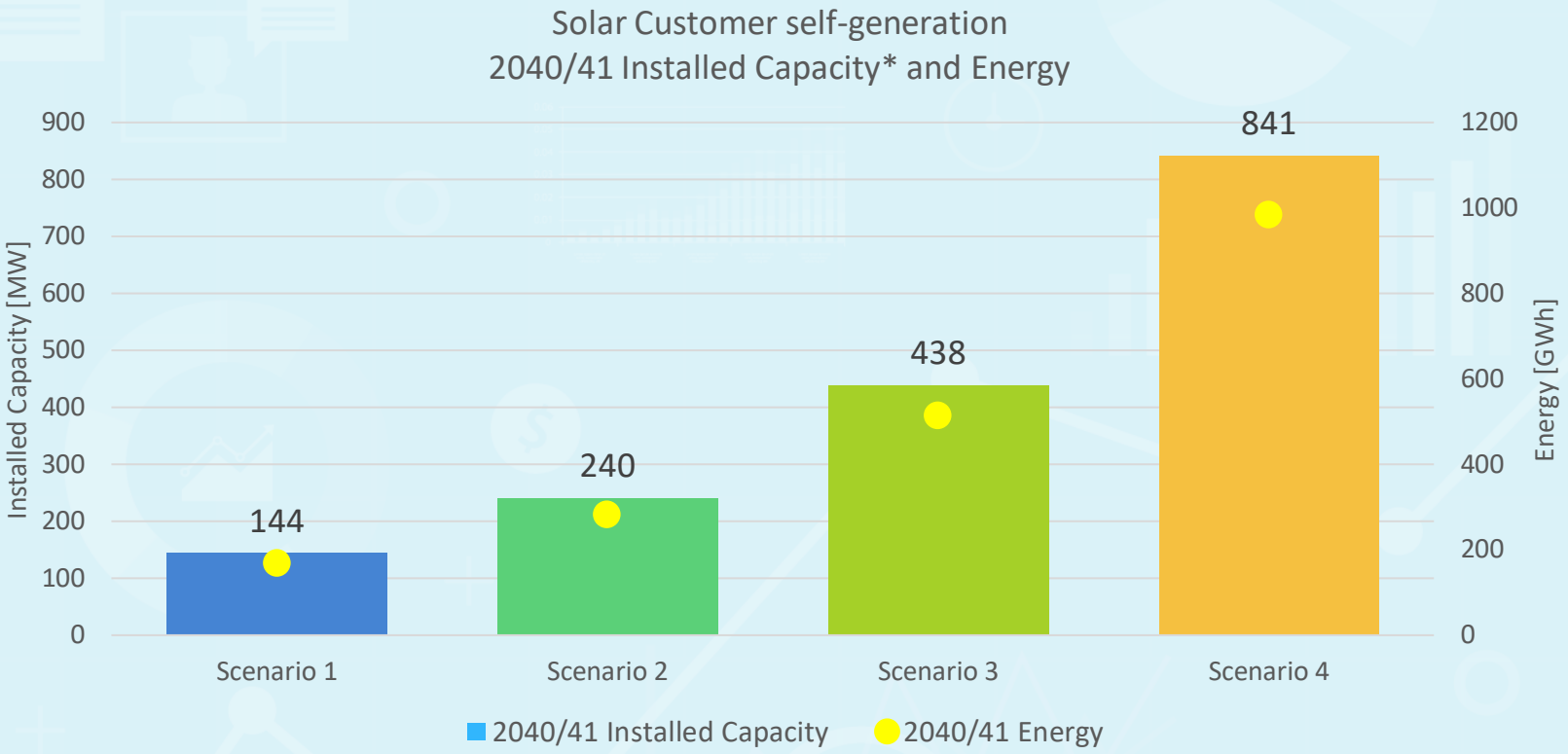
Natural Gas Changes
Input comparisons

Policy and funding can decrease use of natural gas for heating and industrial processes and increase use of electricity.

	Scenario 1: Slow decarbonization & slow decentralization	**Scenario 2:** Modest decarbonization & modest decentralization	**Scenario 3:** Steady decarbonization & modest decentralization	**Scenario 4:** Accelerated decarbonization & steady decentralization
Residential/ Commercial	**New** buildings use natural gas for heating (where available) **Existing** customers with natural gas furnaces continue to use natural gas furnaces	**New** buildings use dual fuel (air source heat pump with natural gas furnace) **Existing** customers with natural gas furnaces continue to use natural gas furnaces	**New** buildings use dual fuel in the near term and all electric in the long term **Existing** customers with natural gas furnaces convert to dual fuel when air conditioners reach end of life in the near term and use all electric in the long term	**New** buildings use electric as of 2025 (all or dual electric) with some uptake of geothermal **Existing** customers with natural gas furnaces replace them with electric at end of life as of 2030
Industrial	No specific assumption	No specific assumption	50 MW increase every 5 years starting 2026/27	Increases every 5 years starting 2026/27 (50/75/100/125 MW)



Customer self-generation
Input comparisons



Number of installations:

Scenario 1	Scenario 2	Scenario 3	Scenario 4
11,996	21,557	41,450	81,866

Indicative size of each new installation:

- 10 kW installed capacity
- 11,680 kWh annual energy produced (13% based on installed capacity)

Customer self-generation in the form of solar is included in two ways in the modelling:

1) Different amounts of customer owned solar is assumed in each Scenario as shown, and

2) Additional amounts of solar are available as a resource option for the model to select and are evaluated based on cost relative to alternatives.

* Installed capacity is based on the size of the solar panel; solar generation contributes 0 MW to meeting winter peak demand