Energy storage economics canada

Energy storage economics canada

EF2023 focuses on the challenge of achieving net-zero greenhouse gas (GHG) emissions by 2050. We explore net-zero scenarios to help Canadians and policy makers see what a net-zero world could look like, visualize the goal, and make informed decisions along the different pathways we explore. Our scenarios cover all energy commodities and all Canadian provinces and territories. We use economic and energy models to do this analysis.

In EF2023, we do scenario analysis to explore uncertainties facing the future of the energy system. The results in EF2023 are not predictions about the future and nor are they policy recommendations. Rather, they are the product of scenarios based on a specific premise and set of assumptions. Relying on just one scenario to understand the energy outlook implies too much certainty about what could happen in the future.

In EF2023 the end point of our analysis is predetermined: net-zero GHG emissions by 2050. We then explore the question, "what might a pathway to that end point look like?" Previous Canada"s Energy Future reports contained scenarios assessing how varying levels of future climate action might affect Canada"s energy future. In those reports, we did not limit the outcome of our scenarios based on a particular goal or target.

In the Global Net-zero Scenario, we assume Canada achieves net-zero emissions by 2050. We also assume the rest of the world reduces emissions enough to limit global warming to 1.5 Celsius (°C). In the Canada Net-zero Scenario, Canada also achieves net-zero emissions by 2050, but the rest of the world moves more slowly to reduce GHG emissions.

The pace of action outside of Canada to reduce GHG emissions is the main difference between the net-zero scenarios in EF2023. As a trading nation, what happens globally affects Canada"s economy and energy system. EF2023 focuses on Canada, and we do not model global energy markets for the scenarios. Instead, international factors relevant to the Canadian energy outlook, such as global prices for crude oil and natural gas, and costs for many low-carbon technologies, are inputs into our models. For some of these inputs, we rely on scenarios from the International Energy Agency"s World Energy Outlook 2022.

The third scenario, the Current Measures Scenario, assumes limited action in Canada to reduce GHG emissions beyond measures in place today and does not require that Canada achieve net-zero emissions. In this scenario we also assume limited future global climate action. FigureES.1 shows the three scenarios.

In addition to the three main scenarios in EF2023, you will find five cases in this report that ask: "What if?". There are many uncertainties on the pathway to net-zero. These cases explore some of them by changing some key assumptions in EF2023 and showing what it could mean for Canada"s pathway to net-zero:

As shown in FigureES.2, electricity, hydrogen, and biofuels make up a much greater share of energy use. By

2050, we project that electricity makes up 41% of total end-use energy consumption in the Global Net-zero Scenario, and 39% in the Canada Net-zero Scenario, up from 17% in 2021. Hydrogen and biofuels emerge as important alternatives when electricity may not be the best option to use, for example in heavy freight transportation, aviation, or certain industrial processes. By 2050, hydrogen makes up 12% of the energy mix and biofuels make up another 13% in the Global Net-zero Scenario.

Description: These three stacked area charts show end-use energy use by fuel in each scenario. The fuels are hydrogen, fossil fuel with CCUS, fossil fuel, bioenergy, and electricity.

Total energy use is similar to current levels until the mid-to-late 2020s in the net-zero scenarios, and then declines gradually. The decline is due to lower fossil fuel consumption, which is largely compensated by increasing electricity, bioenergy, fossil fuel with CCUS, and hydrogen consumption.

Total energy use increases modestly over the projection period in the Current Measures scenario, mostly from higher electricity use.

Description: This stacked area chart shows projected electricity demand in the Global Net-zero Scenario in the residential, commercial, industrial, transportation, and hydrogen sectors.