# FUTURE SUPPLY PLAN

## 2030 AND BEYOND

**What We Heard Report**

Stage 3, Exploring Future Power Supply Scenarios

September 2023 – January 2024

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# CONTENTS



# SUMMARY


FUTURE SUPPLY PLAN
2030 AND BEYOND
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# WHAT WE DID

In 2022, we started talking to Saskatchewan people about how the province is powered. That's because our power system is changing and we're updating our long-term supply plan.

In Stage 1 and 2, over 15,000 people shared their values, priorities and preferences for power sources. We took this input and developed scenarios to show what our power system could look like in the future. This set in motion Stage 3 of our 5-stage process to develop a long-term supply plan.

In Stage 3, we shared four potential power mix scenarios and continued to provide learning opportunities about supply planning.

These scenarios explored timelines to reduce greenhouse gas emissions, supply mix options, impacts on power rates, land use, roles for imported power and more. Participants were invited to ask questions and provide feedback on scenario strengths and possible areas of improvement. This feedback informed key recommendations in our draft Long-Term Supply Plan.

We actively promoted opportunities to get involved in Stage 3 and over 25,000 people participated. We encouraged participants to check out our future supply planning resources to see where we've been and what we've learned from the public to get here.

# WHAT WE HEARD

Ensuring affordability, now and into the future, was the top priority for most participants. Specific concerns revolved around the potential effect on low-income customers and users of electric heat. Participants supported energy efficiency actions and demand side management programs to aid in reducing consumption and supporting affordability.

Reliability emerged as another priority, with participants concerned about the ability of the grid to support the future demands of electrification. Most participants recognized the transition to net-zero greenhouse gas emissions is important. However, there are concerns about potential negative impacts during the transition. There are competing priorities when trying to accomplish goals for affordability, reliability and emissions reduction at the same time.

# WHAT WE HEARD


Assessing priorities is challenging without considering specific power generation scenarios. In discussions, participants often advocated for power generation methods they believed in. Where our power is generated was also important, with many supporting power being generated in the province. Many participants supported more use of renewable power while some expressed concerns about reliability. While opinions on nuclear power remain divided, many participants want to see SaskPower explore nuclear power as an option. Participants supported imported power used for specific purposes, such as to improve reliability and affordability. Participants want more opportunities to learn about future power technology.

# NEXT STEPS

Based on what we've heard, we'll be focusing on the following key areas throughout Stage 4 and into Stage 5:

1. Gather feedback on the draft Long-Term Supply Plan to ensure we've captured and addressed input we've heard to date.

2. Continue education on supply options (those available now and in the future) and how they fit into an overall supply plan. Add more focus on education about distribution.

3. Launch an interactive tool to help participants better understand the benefits and trade-offs of available supply options.

4. Continue discussions about the impacts of future cost increases, and the role that efficiency programs and new technology can play to manage affordability.

5. Engage customers to understand their interest and projected uptake for potential efficiency, demand response and self-generation programs.

# Customer Values and Priorities

The topics on this map show some of the values and priorities we've heard so far in our engagement.

These are shown here in binary terms although some of these may, in fact, be complementary.

This inventory isn't comprehensive, but it does capture many perspectives we have heard so far.

# STAGE 3 OVERVIEW

# PROJECT INFORMATION

We're planning how to supply power to Saskatchewan beyond 2030 and have invited our customers to participate. There are five stages in the process.

**September 2023 – January 2024**

In Stage 3, we focused on providing education about supply planning. We also developed and shared four future scenarios. In our in-person and online workshops, we invited participants to discuss the scenarios as a group and provide feedback.

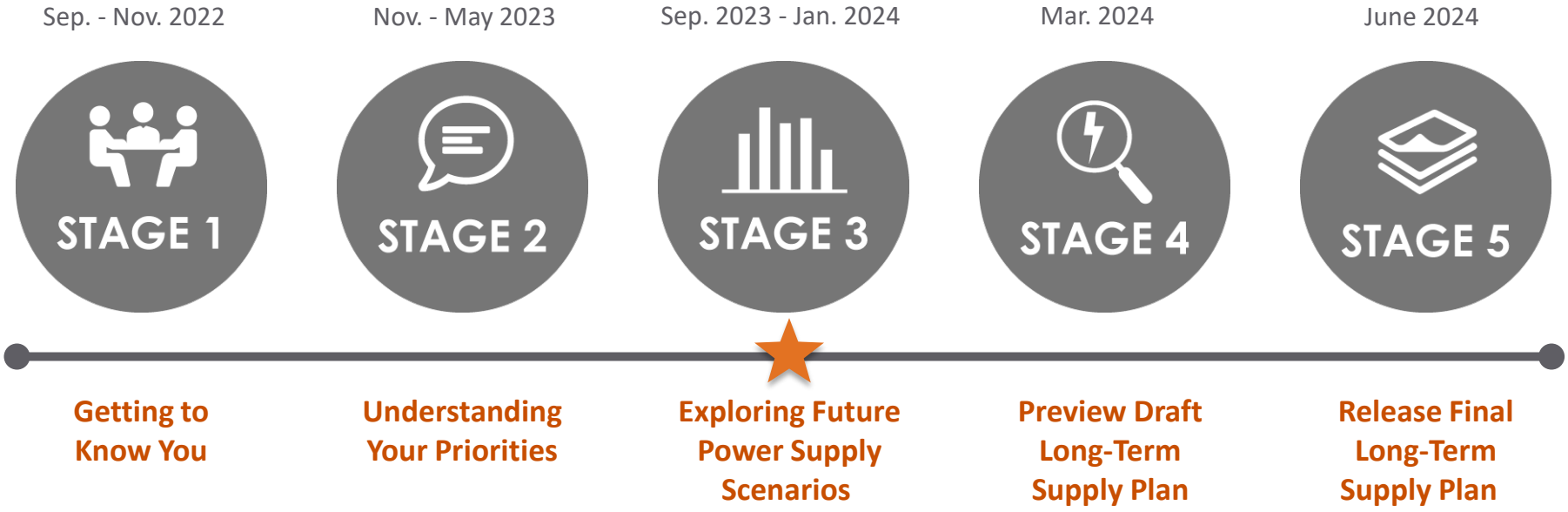
**November 2022 – May 2023**

In Stage 2, we shared information about the supply options we're considering. We also dug deeper into customer's values and priorities when evaluating power supply options.

**September – November 2022**

In Stage 1, we started engaging with customers by asking them how they want to participate, what supply options they'd like to learn more about and what opportunities they see for the future.

# PROCESS


Sep. - Nov. 2022
Nov. - May 2023
Sep. 2023 - Jan. 2024
Mar. 2024
June 2024
STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
Getting to Know You
Understanding Your Priorities
Exploring Future Power Supply Scenarios
Preview Draft Long-Term Supply Plan
Release Final Long-Term Supply Plan

# ONLINE ENGAGEMENT OVERVIEW

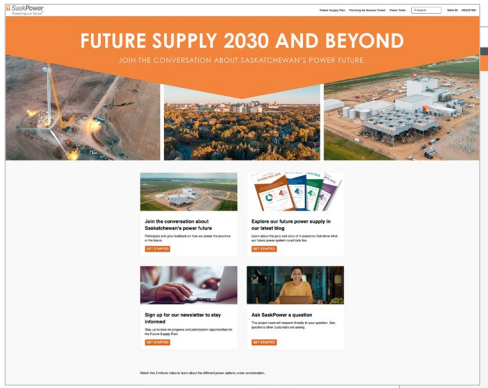
## Online Engagement

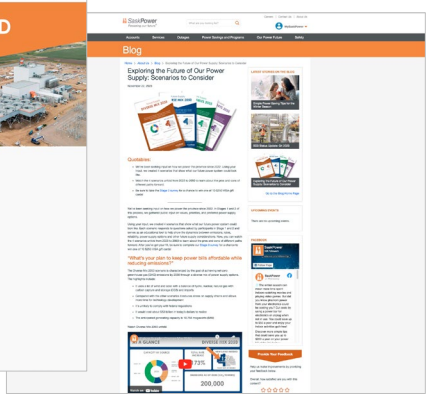
In Stage 3, [saskpower.com/engage](saskpower.com/engage) continued to be the primary hub for all project related updates and engagement opportunities. The site featured online tools such as quick polls, ask a question, and submit an idea. Information about the PowerTalks learning series was hosted on [saskpower.com/powertalks](saskpower.com/powertalks).

Survey participation increased over Stage 2 with 25,212 surveys completed in Stage 3. This was an increase of 10,000 over the previous stage.

Online tools in Stage 3:

- 25,212 completed surveys
- 10,400 site visits
- 475 Discovery Kits requested
- 55 questions & five new ideas submitted



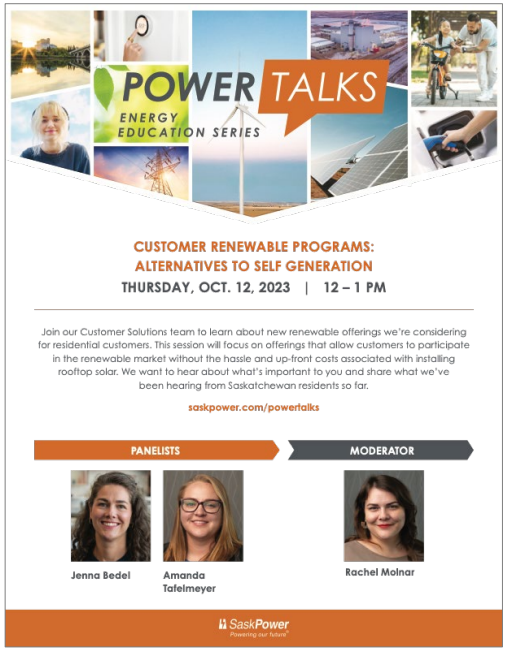
# EDUCATION OVERVIEW

## PowerTalks: Energy Education Series

During Stage 1, participants told us they wanted to learn more about supply planning. The PowerTalks series launched in Stage 2 and continued in Stage 3.

There were a total of 619 attendees at the following sessions held during Stage 3:

- Sept 20 – The Business of Power: Cost, Competitiveness and Funding the Clean Energy Transition *(165 attendees)*
- Sept 26 – Power and the Environment: Impacts, Trade-offs and Making Sound Choices *(129 attendees)*
- Oct 4 – Connecting Power Grids: Imports, Exports and Interties *(123 attendees)*
- Oct 12 – Customer Renewable Programs: Alternatives to Self Generation *(202 attendees)*




Session recordings are available online at [saskpower.com/powertalks](saskpower.com/powertalks).

# COMMUNITY OUTREACH

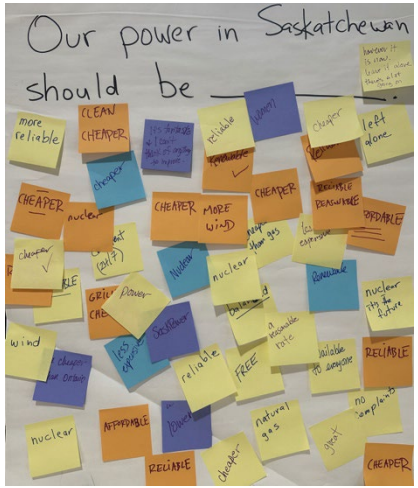
## Pop-Up Events

Our team hosted pop-up events at malls in Swift Current (85 interactions), Saskatoon (125 interactions) and Prince Albert (65 interactions). We answered questions and shared information about future supply scenarios being considered.

Outreach activities were held during the day and used to promote the in-person workshops happening later in the day.

We also invited people to answer the following question:

*“Our power in Saskatchewan should be _____.”*







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# IN-PERSON WORKSHOPS

## Workshops

In-person workshops were held in six communities across the province. Sessions were open to the public and advertised.

Sessions were about two hours long and included:

- Process background and recap of previous input
- A supply planning technical overview by SaskPower subject matter expert
- Breakout groups and facilitated discussion on questions, concerns and ideas/suggestions
- Walk-through of four discussion scenarios
- Feedback and reaction to provided scenarios

## Locations & Attendees

Swift Current – Nov 9 (27)

Yorkton – Nov 16 (23)

Saskatoon – Nov 21 (26)

Saskatoon – Nov 22 (50)

Prince Albert – Nov 23 (32)

Regina – Nov 29 (50)

Regina – Nov 30 (48)

Moose Jaw – Nov 30 (32) – *Student Session*

Total registrations: 411

Total attendees: 288

# ONLINE WORKSHOPS

## Immersion Workshops

Two separate two-hour sessions (totalling 4 hours).

The first session was informative, followed by an interactive session with discussion to give feedback on scenarios.

Information provided included presentations and Q&A with SaskPower internal experts on: Environment, Finance, Generation & Distribution

Workshop: Part A – Nov. 7, 8

Workshop: Part B – Nov. 14, 15, 17

Total registrations: 152

Total Part A attendees: 117

Total Part B attendees: 86

## Essentials Workshops

A single two-hour session with a brief presentation and Q&A, and a primary focus on gathering feedback on scenarios.

Workshops: Nov. 28, Dec. 5, 6, 7

Total registrations: 167

Total attendees: 121

# ACTIVITY OVERVIEW

## Promotional Tactics

During Stage 3 the following tactics were used to promote the engagement opportunities:

- Direct mail to over 263,000 households
- Province-wide print ad buy
- Province-wide online and social media promotion
- Radio ads in Yorkton, Saskatoon, Prince Albert and Regina
- Project-specific online newsletter
- Distribution by community organizations

*Throughout Stage 3 our newsletter subscription grew by 5,763 to 13,516.*

# SURVEY RESULTS

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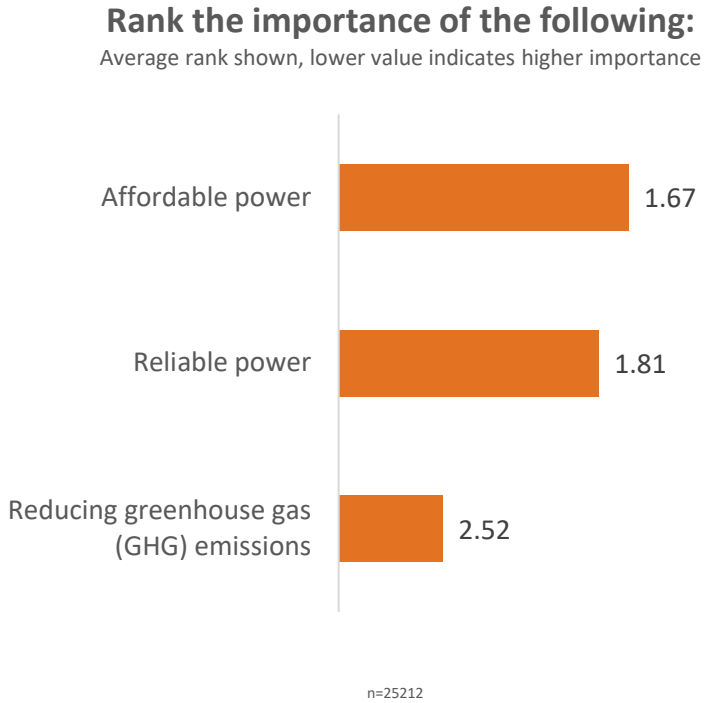
# PRIORITIES

Among the three priority areas, participants placed the highest priority on affordable power. Female participants, and those aged 35-54, were more likely to rank affordability highest.

Reliable power followed closely. Male participants, and those aged 55+, tended to place a higher priority on reliability.

The reduction of greenhouse gas (GHG) emissions ranked third overall. This response was ranked third most often by participants (68%). A total of 16% ranked it number one.

Concerns about cost and reliability appear to be a higher priority for most.



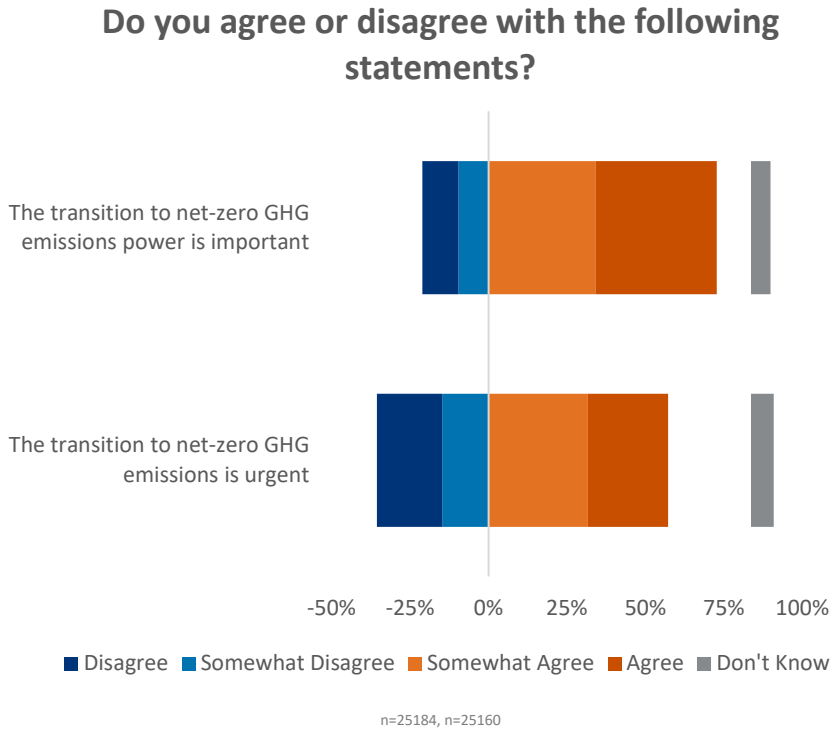
# IMPORTANCE AND URGENCY OF TRANSITION

A total of 73% of participants agreed that the transition to net-zero GHG emissions power is important. There were 21% in disagreement.

There was less agreement on the urgency of the transition with 57% in agreement. A total of 36% disagreed.

There was a similar level of uncertainty in “Don’t know” responses to both questions at 6% and 7%, respectively.

The difference in results suggests potential concerns resulting from the transition.

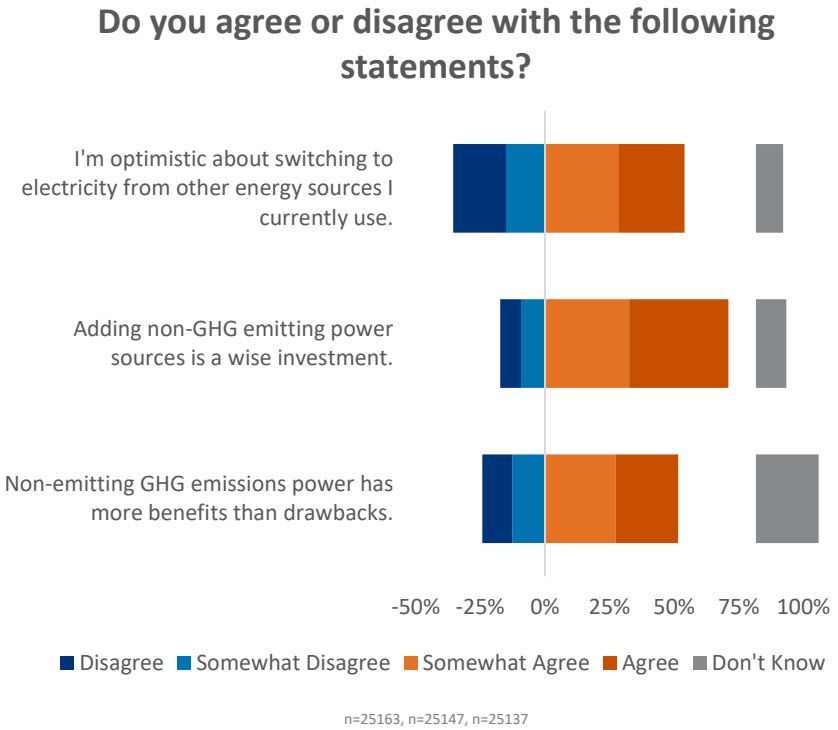


# PERCEPTIONS OF ELECTRIFICATION

Of those surveyed, 54% felt optimistic about using electricity more than today, but 36% did not agree. Responses to this question were similar to the previous question about the urgency of the transition.

Most participants (71%) thought that investing in non-emitting power was a sound investment. Another 17% disagreed and 11% were unsure.

More than half (52%) thought there were more upsides than downsides about non-emitting power, but 24% disagreed. Another 24% were unsure.

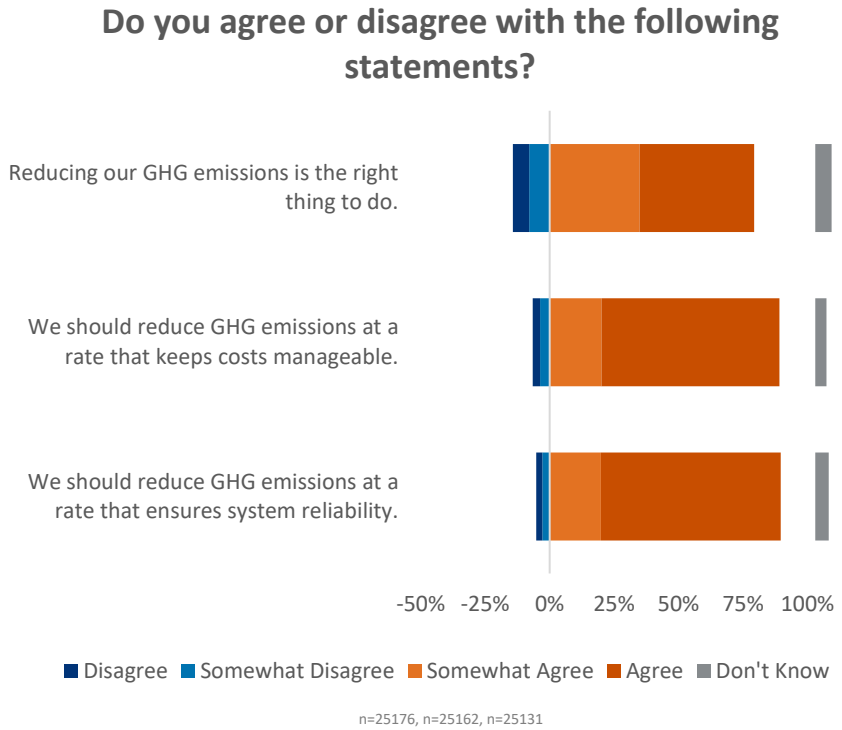


# TRANSITION FACTORS

Participants generally agreed that reducing GHG emissions is the right thing to do. A total of 79% agreed and 14% disagreed.

More participants agreed with the follow-up questions. Specifically, 89% agreed the speed of transition shouldn't come at the cost of affordability. And 90% agreed it shouldn't come at the cost of reliability.

Responses to this question were consistent across demographic groups.



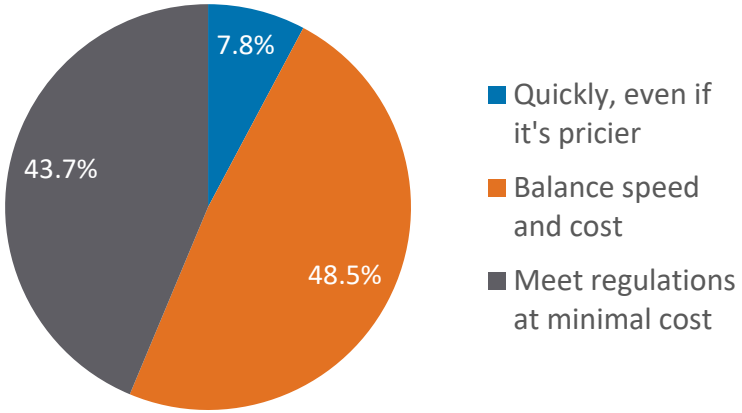
# SPEED OF TRANSITION

About half of participants support an approach that balances cost and speed.

For participants who held one priority higher than the other, 44% support not spending more than required by regulations. A total of 8% support a faster transition to net-zero, regardless of higher costs.

Participants who support a faster transition tended to be younger in age and were more likely to live in large urban centres.

**How fast should SaskPower be moving to a net zero emissions power system?**

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# PRICING PRIORITIES

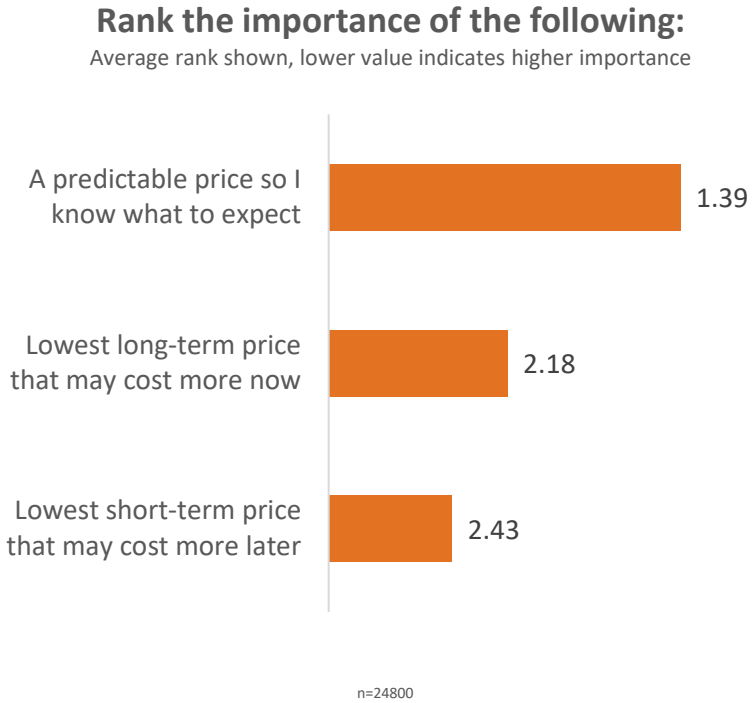
Among price-related priorities, predictability emerged as the most important priority.

A total of 71% chose predictability as their top priority with another 20% ranking it second.

The second priority was the best price in the long-term. A total of 19% ranked it number one.

Lowest short-term price was ranked third. It was selected as the top priority by 10% of participants.

Participants appear to prefer a stable price and plenty of notice of future cost changes.



# PRICE SENSITIVITY

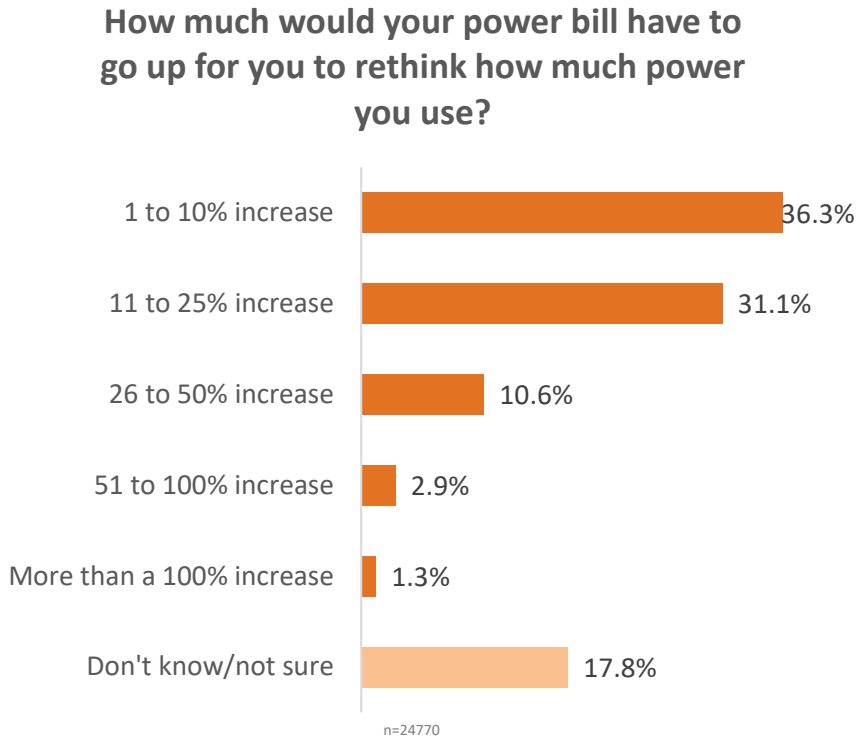
Participants indicated that relatively small price changes will result in having to rethink their power use.

The response of “1 to 10%” was the most common response at 36%. And “11 to 25%” was the next most common answer at 31%. These two responses alone made up over two-thirds of the results.

Only 4% would require a power increase of 50% or more before needing to rethink their usage.

A total of 18% were unsure of their response to the question.

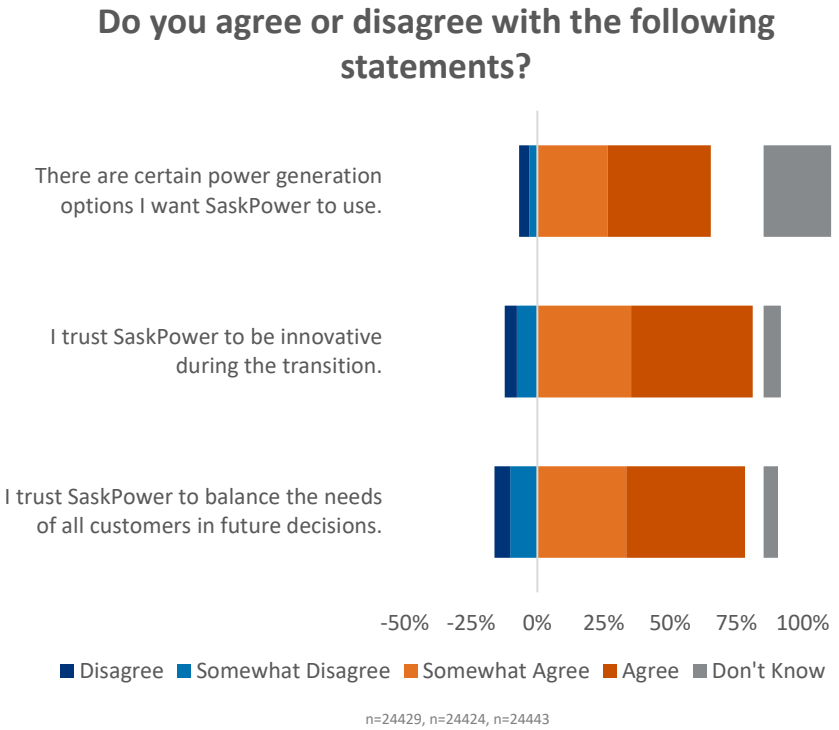
Price sensitivity increased with age, with participants age 65+ being the most affected.



# SUPPLY PREFERENCES

When asked about having preferences for generation options used by SaskPower, 65% agreed. Only 7% disagreed and 28% were unsure. Agreement levels were higher among those 55+ and male participants. These results support what we heard in Stage 1 about support for various supply options.

A total of 81% expressed confidence that SaskPower will be innovative during the transition. And 78% agreed that they trust SaskPower to balance the needs of all customers when making decisions.



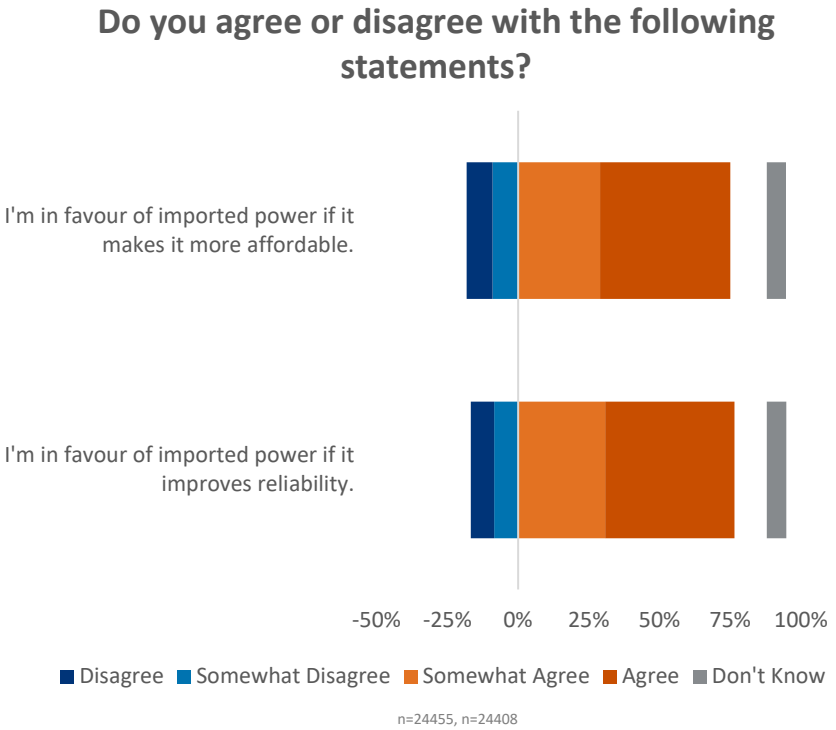
# IMPORTED POWER

A total of 75% support the use of imported power for purposes of affordability and 77% for reliability.

The level of disagreement to these questions was similar. There was slightly less disagreement about reliability (17%) than affordability (18%).

In both cases, a total of 7% responded with “Don’t know”.

Participants aged 65+ were most supportive of imported power.



# PRIORITY AREAS

Participants were asked to select what was most and least important from the list provided.

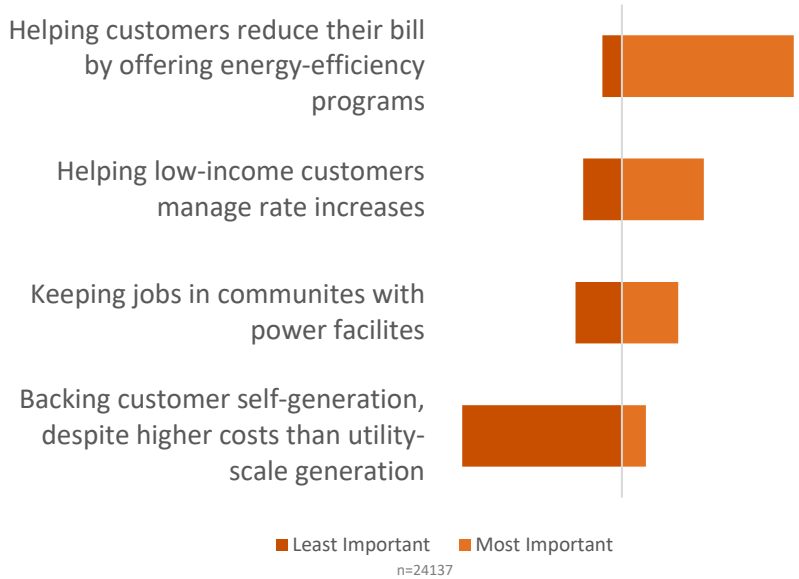
Helping customers use less power and lower their bill was most important to the largest number of participants.

Helping customers who can't afford rate increases was second.

Keeping jobs in existing communities got a more even set of responses.

Helping customers who want to make their own power was lowest.

**When it comes to the following, what's most and least important to you?**



# SCENARIO ASPECTS OF INTEREST

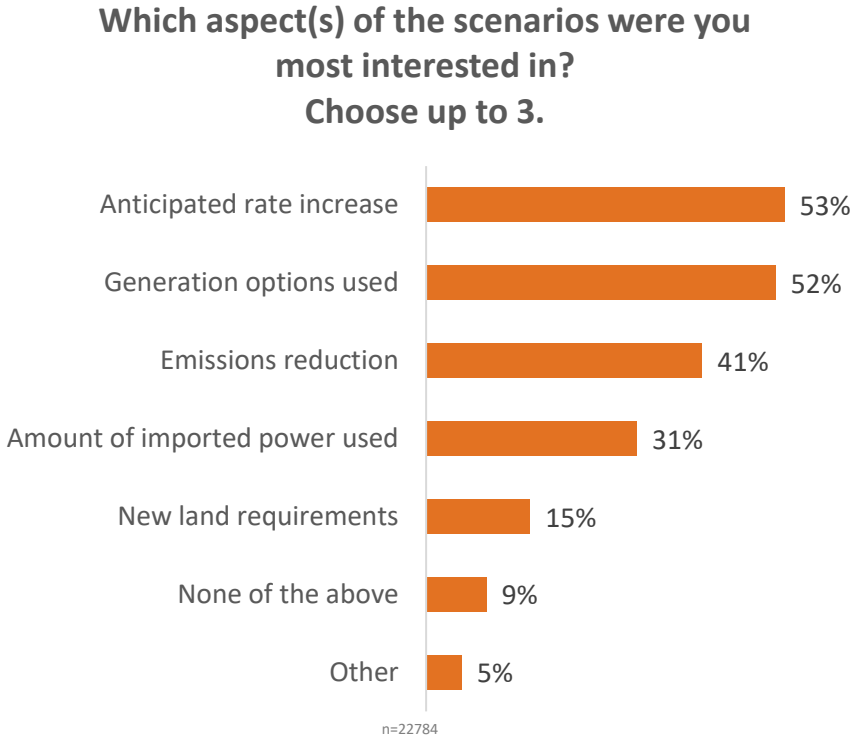
After sharing information on scenarios, we asked participants to choose aspects of interest.

The top two aspects were selected by over half of respondents. Rate increases was most common, closely followed by generation options used.

Emissions reduction was third in this list. Other environmental priorities like land use, were listed separately. When combined, aspects about the environment added up to 56%.

A total of 31% noted the amount of imported power was of interest to them.

In open-ended comments, participants most often mentioned two areas. Specifically, they voiced support for or against a particular supply option. Or, they raised concerns about affordability.



# FACTORS INFLUENCING SCENARIO APPEAL

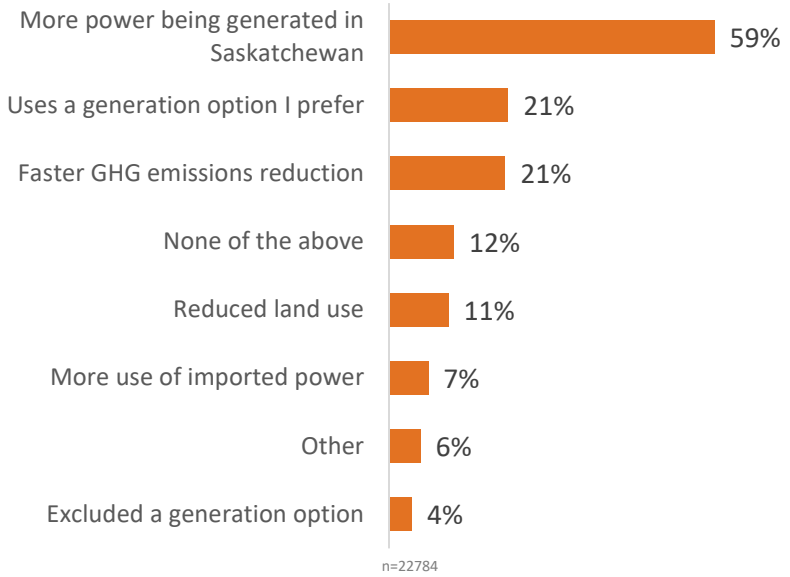
When thinking about scenarios, having more in-province generation had the biggest impact. This aspect influenced 59% of participants.

The next two aspects were much less important by comparison. Reducing emissions faster and using a favoured generation option influenced the views of 21%.

For 12%, none of the aspects listed changed the appeal of a given scenario.

All other factors influenced fewer than 10% of participants.

**What makes one scenario more appealing than another?**
**Choose up to 3.**



# WILLINGNESS TO PAY MORE

The options presented to each participant for this question were based on their answer(s) to the previous question. That question asked about the aspects of a scenario that made it more appealing. Participants who selected "None of the above" previously were not asked this question.

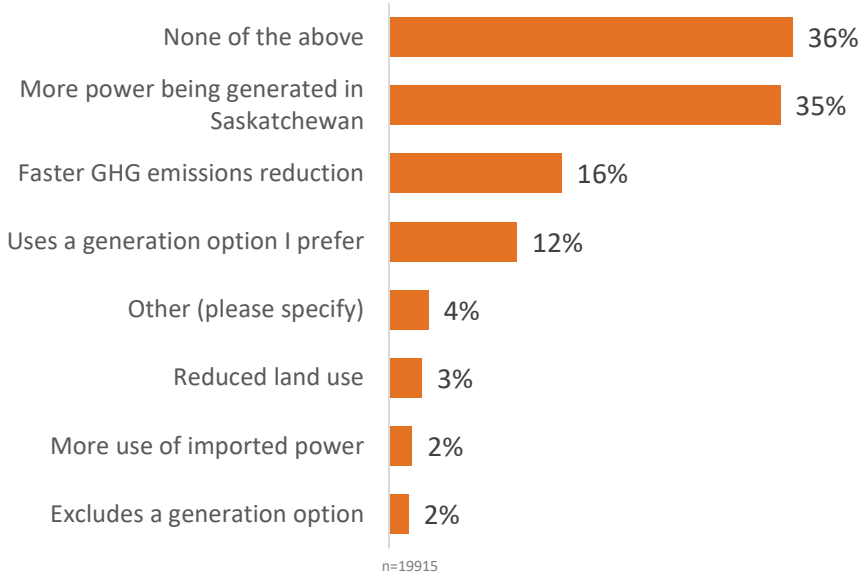
For over a third of participants (36%), none of the aspects would motivate them to pay more.

The most popular option was more in-province generation. That option was chosen by 35% of the participants who answered this question.

Faster GHG emission reduction was chosen by 16% and use of a preferred generation option was chosen by 12%.

Other options received less than 5% support.

**Which of the aspects you picked would you be willing to pay more for? Choose up to 3.**



# DEMOGRAPHICS

The survey and the supporting contest were both intended for Saskatchewan residents.

A question about being a Saskatchewan resident was first in the survey. It acted as an eligibility question.

The remaining demographic questions were at the end of the survey.

Demographic questions were optional and were answered by 90% of participants.

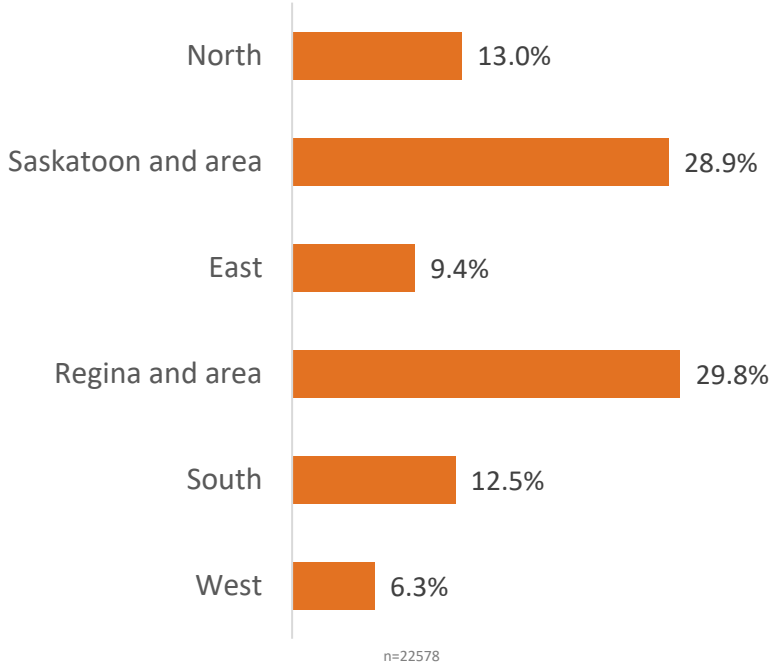
Of all the surveys so far, this survey had the most equal participation. This includes the following:

- Most similar number of male and female participants
- Higher share of participants from the North
- Increase in share of participants who identify as Indigenous
- Increase in share of participants from outside large urban centres

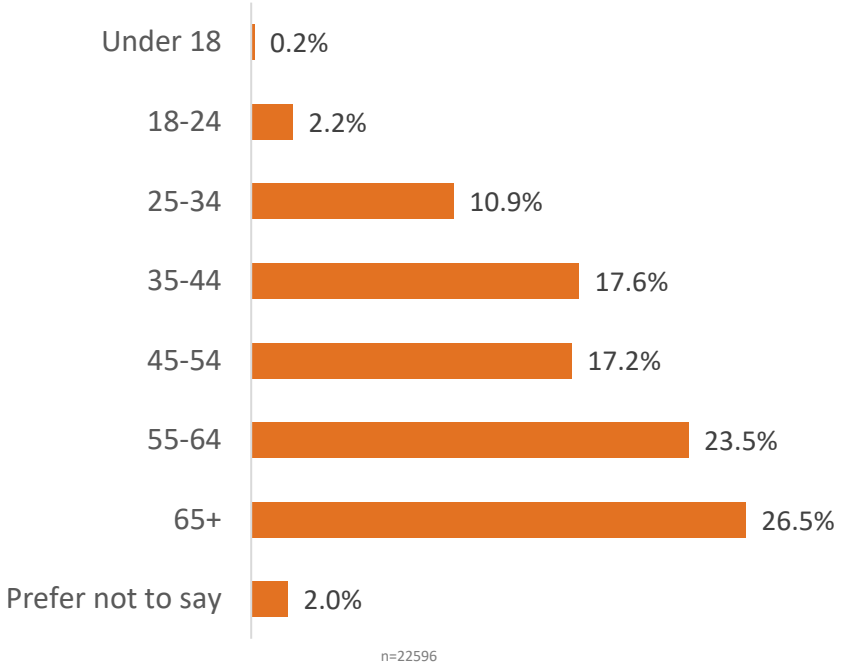
Participants under age 25 continue to be under-represented.

# DEMOGRAPHICS

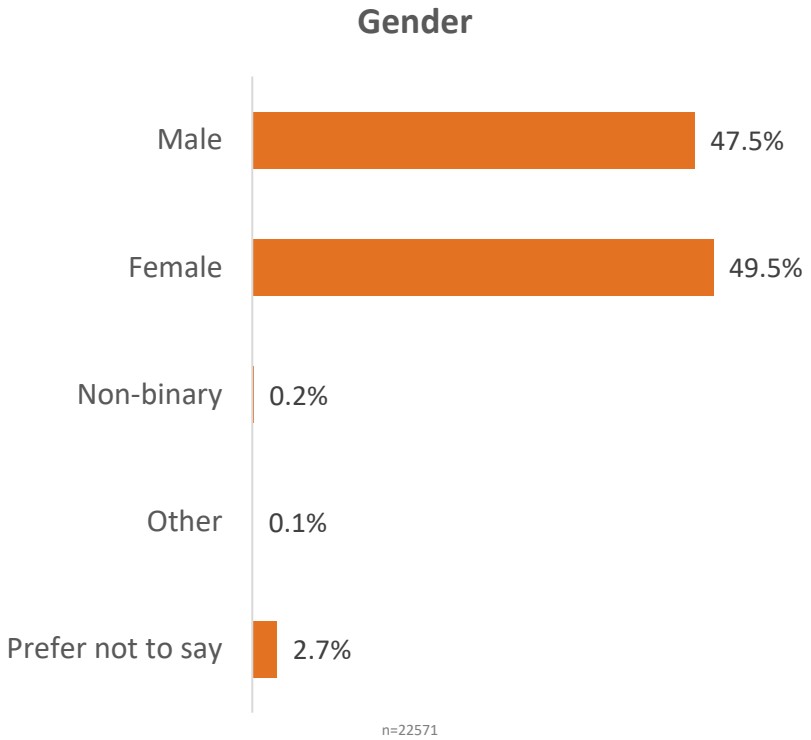
## Location

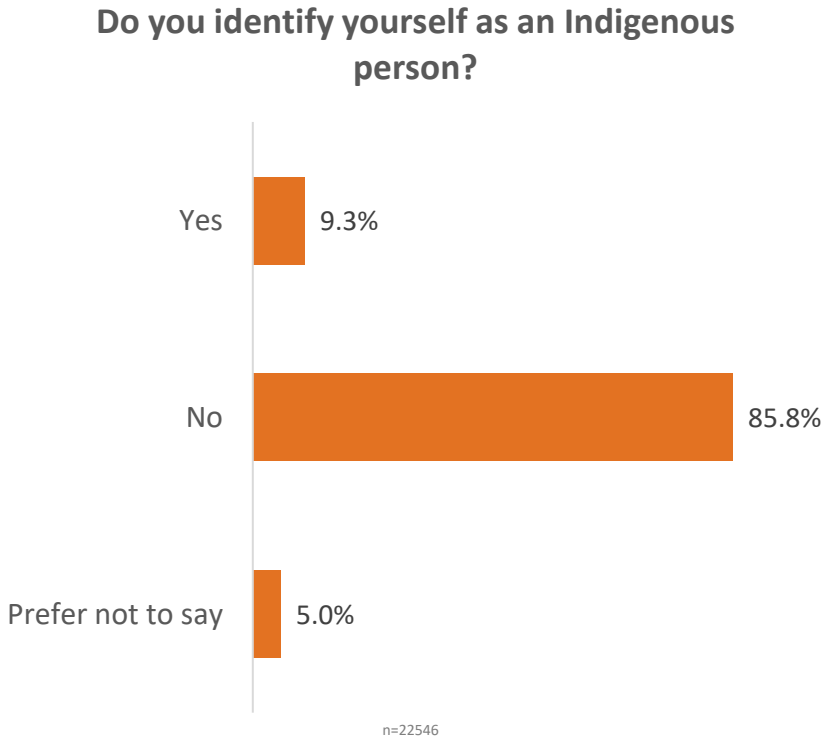



## Age



# DEMOGRAPHICS



# FACILITATED WORKSHOPS

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# IN-PERSON DISCUSSION THEMES

## Concerns

- Significant concerns about affordability and costs
- Can’t lose sight of importance of reliability in our cold weather climate
- Shortages of people available to complete transition
- Saskatchewan is lagging with lack of urgency
- Ability of the grid to support the future demands of electrification i.e. electric vehicle adoption
- Perceptions that decisions have already been made
- The path to change is being imposed on us
- Disproportionate impacts to lower income customer and users of electric heat

## Suggestions/Ideas

- More focus on conservation vs new generation
- Look at biomass with CCS and geothermal
- Find federal funding to help pay for transition
- Help customers generate their own power
- More use of decentralized storage and vehicle-to-grid in plan
- Incentives for individuals to install rooftop solar
- Use local companies and people to do the work
- More education so people understand the options
- Move to time-of-day billing
- Work with education partners to ensure we have sufficient talent and labour in the future

# PRIORITY AREAS: IMPORTANCE

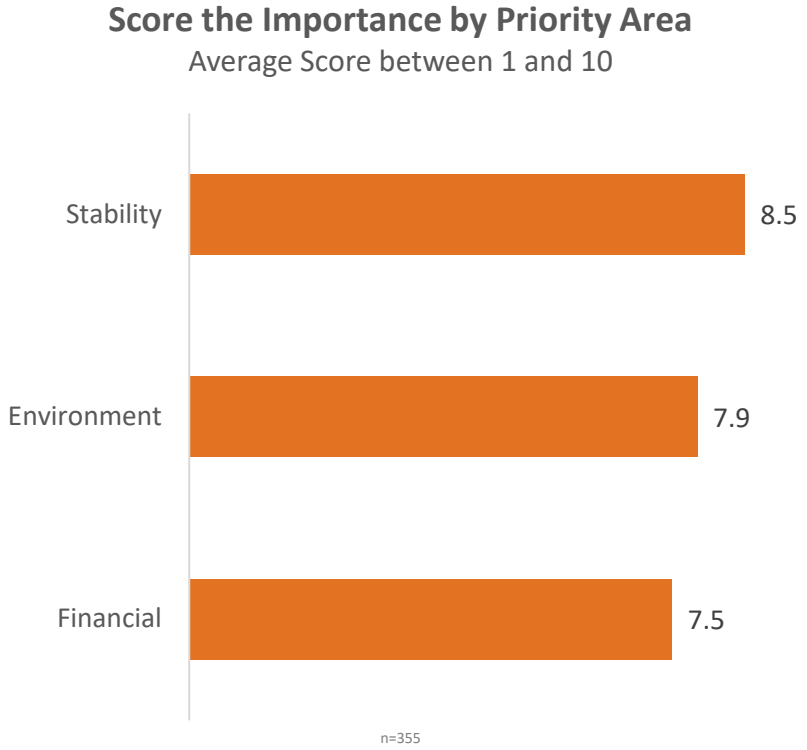
Prior to exploring the four scenarios for discussion and feedback, we asked participants to rate the importance of three aspects of power supply planning.

Results are combined for the in-person and online sessions.

While all areas were rated as relatively high (out of a possible 10), stability was rated highest by a margin of 0.6 at 8.5.

Environment was the second highest rated at 7.9.

Financial received a rating of 7.5.



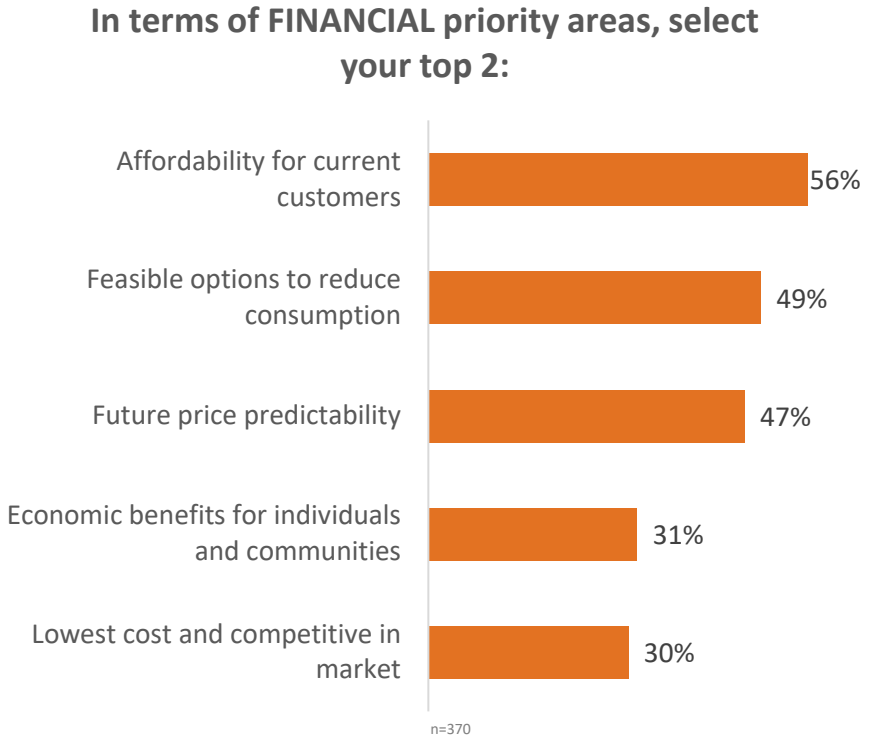
# PRIORITIES - FINANCIAL

Among financial aspects, affordability was rated highest at 56%.

Options to use less power was next at 49%. This result is consistent with other input about the importance of efficiency.

Future price certainty followed. Consistent with other input, predictability was rated higher than cost. Economic benefits for individuals and communities received a response from 31%.

Cost competitiveness was ranked lowest in this list at 30%.

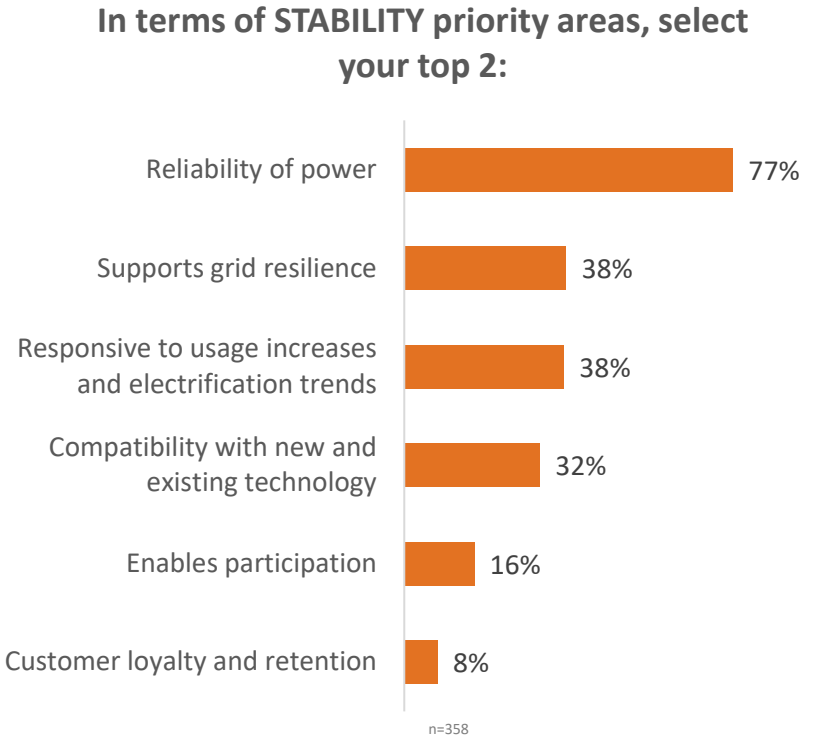


# PRIORITIES - STABILITY

Reliability of power had the highest number of participant responses at 77%. This was the highest ranking of any aspect among all categories.

Responses to other aspects in this category were lower.

Aspects that were not as technically focused were rated lower. This includes enabling participation and customer loyalty and retention.

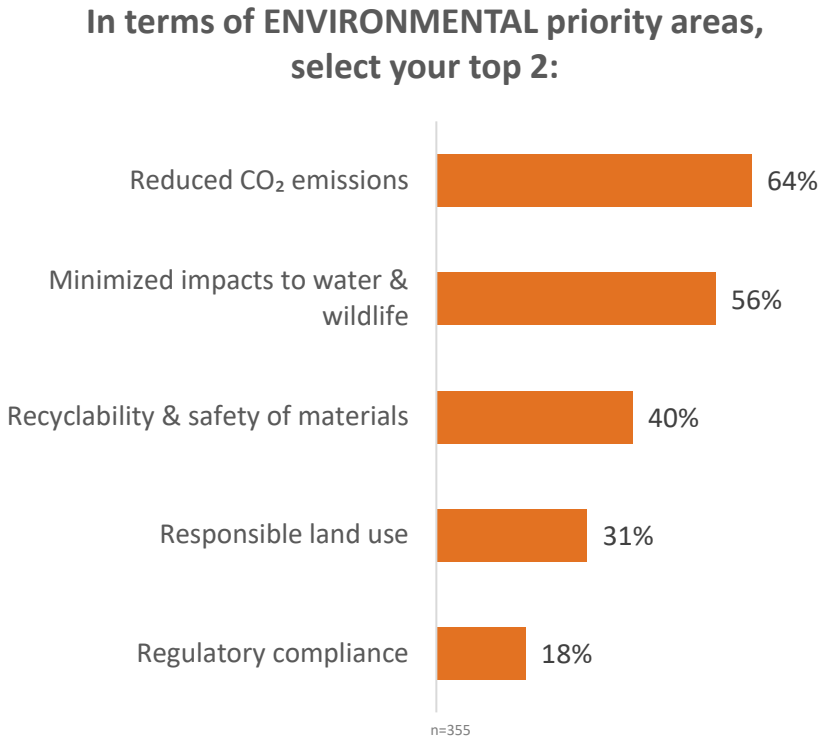


# PRIORITIES - ENVIRONMENT

Reducing $CO_2$ emissions and minimizing wildlife and water impact were rated highest. They were selected by 64% and 56% of participants, respectively.

Recyclability and safety of materials was the third most common priority area at 40%. Responsible land use was 31%.

Regulatory compliance was lowest at 18%.



# SCENARIOS FEEDBACK

## Session Overview

Up to four scenarios were presented to participants for discussion and feedback.

The scenarios were presented as directional options towards a future state of lowered emissions. There was no single path selected at the end of this process.

The scenarios included a set of supply options, implemented over the time between now and 2050. Calculations were made regarding power rates, land use, and $CO_2$ emissions. Related considerations and risks such as technological, logistical and financial were discussed.

Feedback was collected on the scenarios where the transition was completed by 2035.

## Participation Methods

Following the presentation of a scenario, participants were invited to ask questions and provide feedback in a break-out discussion.

Feedback areas included: Pros, Cons, Suggested Improvements and Questions Raised.

Following the open-ended discussion, participants were asked to rate the scenario on a scale of 1 to 10 in terms of how well they thought it performed in terms of financial, stability and environmental performance areas.

# DISCUSSION SCENARIOS


Scenario info sheets included in appendix.

# DIVERSE MIX 2035 FEEDBACK SUMMARY

## Pros

- Diversity of supply options lessens risk
- Reliability from having more diverse supply mix
- Use of intertie connections
- Uses existing investments in carbon capture
- Uses wind and solar
- Puts a stake in the ground with a specific date
- Centralized generation leverages economies of scale
- Decarbonization at the utility level helps the entire economy reduce GHGs

## Cons

- Timeline is unrealistic
- Speed of transition drives costs up
- Concerns about continuing to use natural gas that may become a stranded asset
- Reliant on the price and availability of imports
- Renewables may not be sufficiently reliable
- Speed of transition (too fast or too slow)
- Timeline introduces risks
- Need more emphasis on technologies like biomass and geothermal

# DIVERSE MIX 2035 FEEDBACK SUMMARY

## Suggested Improvements

- Capitalize more on additional hydro power potential in province
- Look at potential for more imports from hydro utilities
- Ensure that we are studying what is working elsewhere

## Questions Raised

- How does the increased land use impact agriculture?
- How robust are the risk assessments?
- How can we be confident in the volume of imported power available if everyone is in the same transition?
- How do changes in government affect these plans?

# RENEWABLES 2035 FEEDBACK SUMMARY

## Pros

- Is an environmentally-friendly approach
- Wind turbines and solar technology are a known quantity
- Makes good use of our abundant sun and wind resources in Saskatchewan
- Excludes nuclear which avoids any potential safety issues
- May introduce economic opportunities to export excess renewable sources

## Cons

- Increased reliance on outside power sources
- A lot of the technology comes from foreign manufacturers
- Lifespan of wind turbines and PV cells is not long enough
- Intermittent sources require battery storage technology to provide reliable power which are energy-intensive and require raw minerals
- Concerns about value for money with intermittent sources
- May work better in southern areas of province than in the North

# RENEWABLES 2035 FEEDBACK SUMMARY

## Suggested Improvements

- Build this out with a more distributed approach vs centralized
- Solar technology can be deployed on rooftops to reduce land use
- Develop programming to support more residential participation with incentives for net metering
- Look at related opportunities for home battery storage to help improve grid stability

## Questions Raised

- How much should we be relying on import contracts, especially during extreme weather conditions?
- When factoring in the manufacturing aspects which are not accounted for, is this as environment-friendly as it seems?
- Do we know enough about the future impacts of this choice in terms of recyclability of materials in solar panels and turbines?
- Given the up-front costs associated with renewables, how do we capitalize this?

# LOW IMPORTS 2035 FEEDBACK SUMMARY

## Pros

- Provides reliable power output when operating
- Adopting nuclear as a broader strategic direction presents new economic opportunities
- Uranium can be locally sourced in Saskatchewan
- Less reliance on imports due to more in-province capacity
- Risks and experiences can be shared with partnering utilities like OPG
- Saskatchewan could be an energy exporter if this technology works as intended

## Cons

- Inclusion of nuclear is polarizing
- Concerns over safe operation of nuclear facilities
- Concerns about unpredictable costs as nuclear projects have a reputation of overruns
- Uranium is not a renewable resource
- Concern about safe storage of spent fuel
- Technology not commercially proven
- No fuel enrichment is currently available in Canada

# LOW IMPORTS 2035 FEEDBACK SUMMARY

## Suggested Improvements

- Need to understand more about the safety implications of nuclear power
- If potential export opportunities are available with nuclear, elaborate on that in more detail
- Update as predictable cost information becomes known
- Among supportive participants, the nuclear option should be pursued sooner rather than later

## Questions Raised

- Can we recruit the technical expertise we would need to construct and operate nuclear facilities?
- Has the decision regarding nuclear already been made?
- What are the opportunities for energy exports going to be in the future?

# FINANCIAL PERFORMANCE

Financial performance was the first area participants were asked to rate.

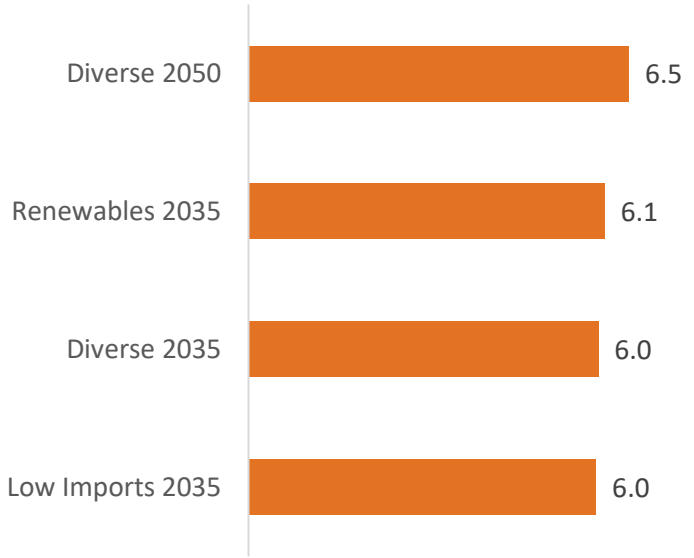
Performance ratings in this area were the lowest of all priority areas. They were also the most similar among all scenarios.

The Diverse 2050 scenario had the lowest costs associated with it due to the longer transition time.

Low Imports 2035 was among the two of the more costly scenarios. However, it also had possible opportunities for exports which was well-received by some participants.

**Financial: Avg Performance Rating by Scenario:**

From 1 to 10



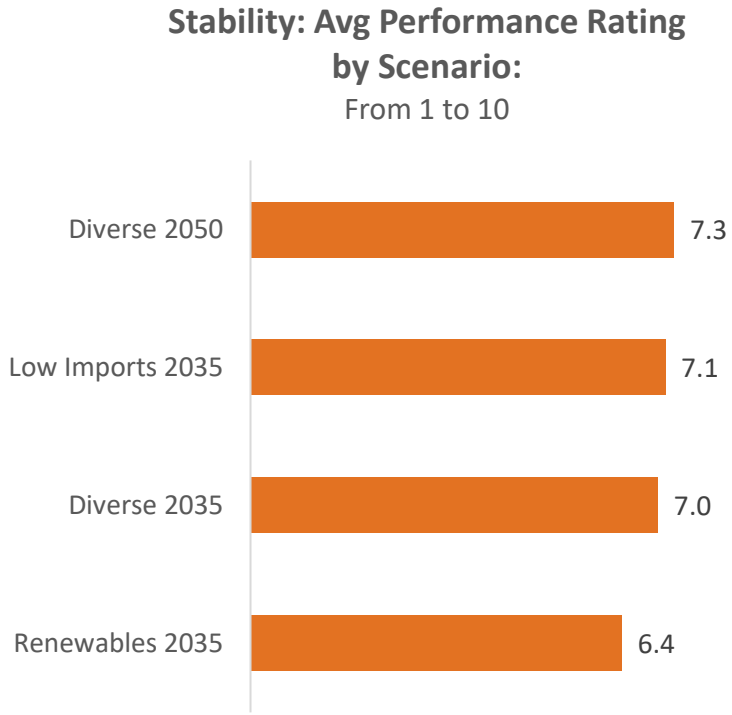
# STABILITY PERFORMANCE

There was more variation in stability ratings compared to financial ratings. This was the case despite all scenarios meeting a common standard for reliability when modelled.

Among the 2035 scenarios, Low Imports 2035 was often seen as the best option for stability. This was influenced mostly by two aspects of this scenario. The first was the minimal use of imports. The second was the significant amount of nuclear power included.

Diverse 2035 has the most varied supply mix. It relied more on imports and renewables.

The Renewables 2035 scenario was rated lowest by a margin. Renewable supply options were often associated with a lack of reliability. Reliance on imports was also a common area of concern.



# ENVIRONMENTAL PERFORMANCE

Ratings on environmental performance varied the most and had the highest score received.

Participants ranked Renewables 2035 highest at 8.0 on average. This was higher than the nearest scenario by a full point. It was the only option presented without nuclear power included.

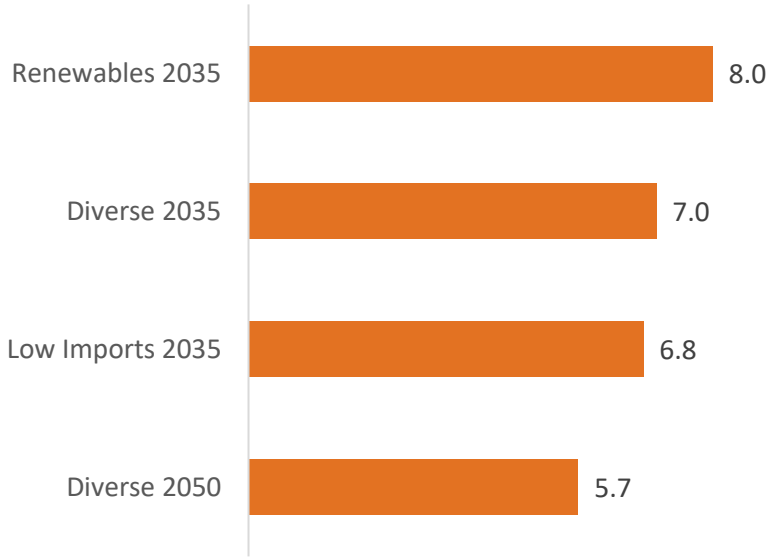
The Diverse 2035 scenario was second with a score of 7.0. Its supply mix shared aspects of both the Renewables and Low Imports options.

Low Imports 2035 was rated slightly lower than Diverse 2035 at 6.8 but still higher than the Diverse 2050 option.

The Diverse 2050 option was rated over two points lower than the leading option in the category. This option had the highest emissions and allowed for the slowest transition.

**Environment: Avg Performance Rating by Scenario:**

From 1 to 10



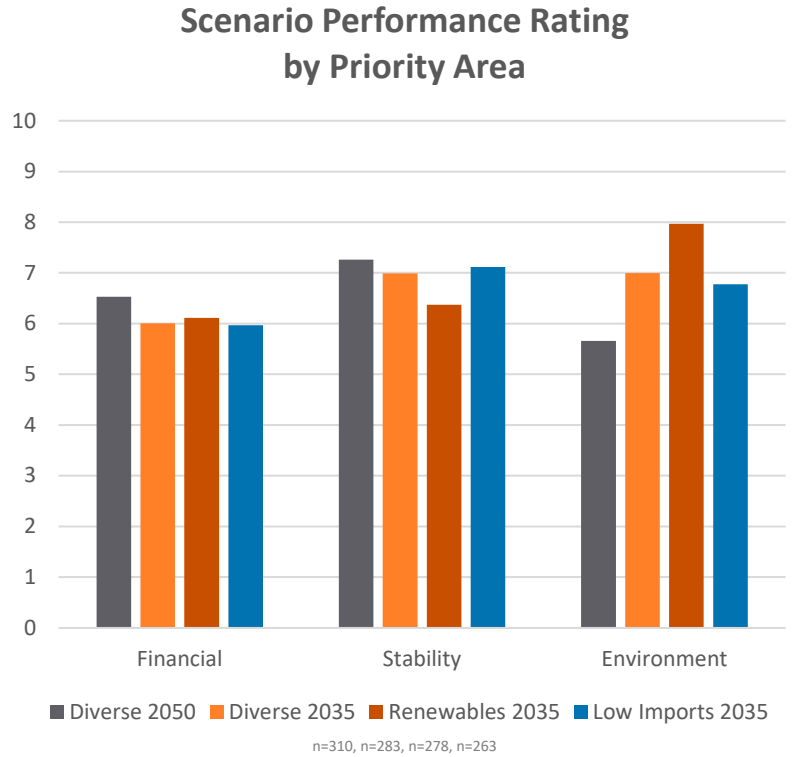
# SUMMARY OF SCENARIO RATINGS

The Diverse 2050 scenario received the highest ratings for financial performance. It also was rated lowest on environment performance.

Diverse 2035 was similar to Diverse 2050 in terms of the approach but with a faster timeline. The Diverse 2035 scenario received mid-level but consistent ratings in each area.

Renewables 2035 received the lowest rating on stability and the highest for environment. Its score for environment was the highest score in any category.

Low Imports 2035 has the highest ratings for stability and the lowest rating on environment. Among the 2035 scenarios, Low Imports 2035 was rated lowest for financial performance, just slightly below Diverse 2035.



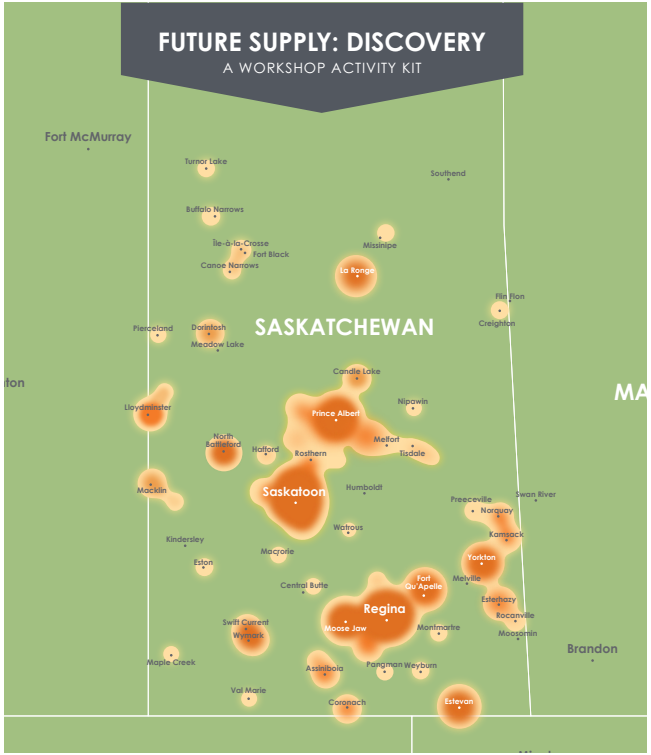
# OTHER PARTICIPATION METHODS

# DISCOVERY KITS

Discovery kits were developed to allow groups of customers the option to learn about future scenarios and discuss on their own.

Discovery kits could be requested by phone or online. They included printouts of the scenarios used in SaskPower's hosted session. They also included a discussion guide and a printed form to capture feedback.

We received 475 requests for Discovery kits which were mailed to customers. Each kit included a self-addressed, stamped envelope for participants to send their feedback to SaskPower. Just under 10% (40) of the kits were returned for review.



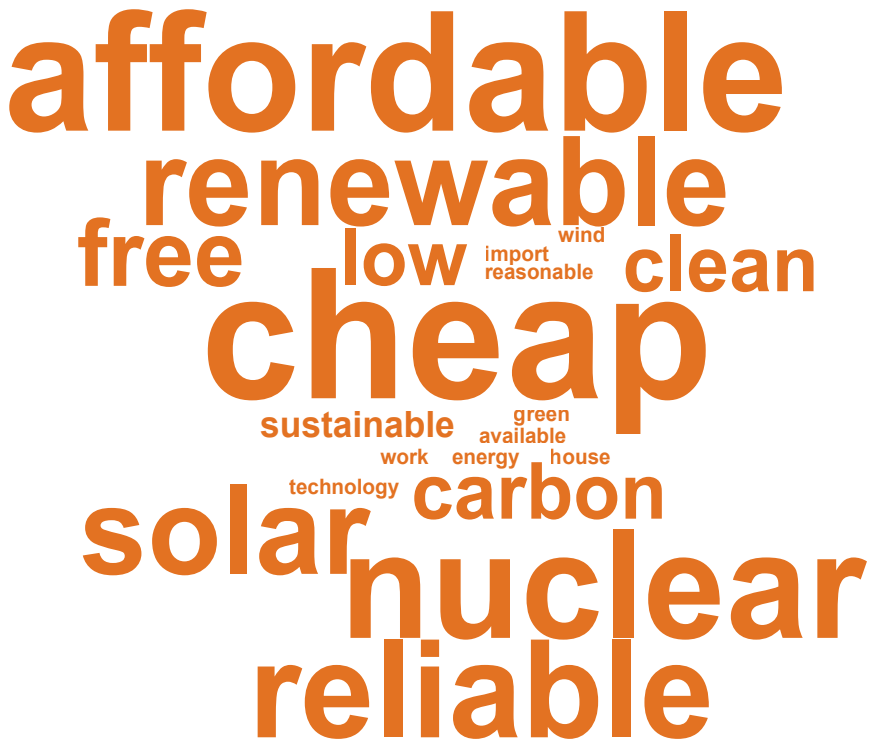

Mailing locations for requested kits.

# WORD EXERCISE

We asked the following question to participants in workshops and at outreach events in communities we visited.

**“Our power in Saskatchewan should be_____”.**

The most common responses included mentions of costs, preferred supply options, reduced environmental impacts and reliability.



# APPENDICES

## Diverse Mix 2050

In 2022, SaskPower started asking Saskatchewan residents for their input to help shape how the province is powered from 2030 and beyond. These discussions are helping inform our long-term power supply plan. We gathered input on values, priorities, and preferred power supply options, which informed the creation of four scenarios that show potential future power supply mixes.

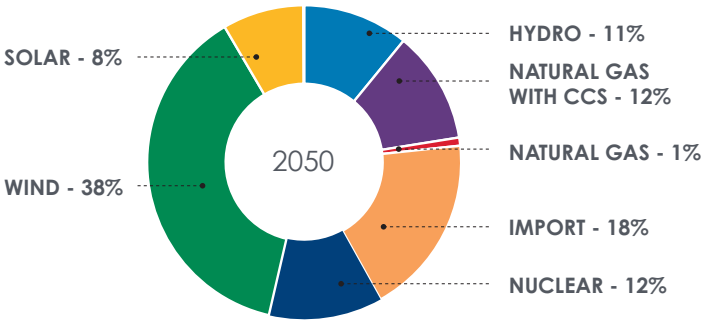
Not all power supply technologies are included in this scenario. That's because our supply planners can only use technologies that have enough data that they can model today. The model combines technologies to provide the lowest-cost path that also meets reliability and sustainability requirements.

Diverse Mix 2050 responds to participants who asked:

***"What's your plan to keep power bills affordable while reducing emissions?"***

### CAPACITY BY SOURCE IN 2050

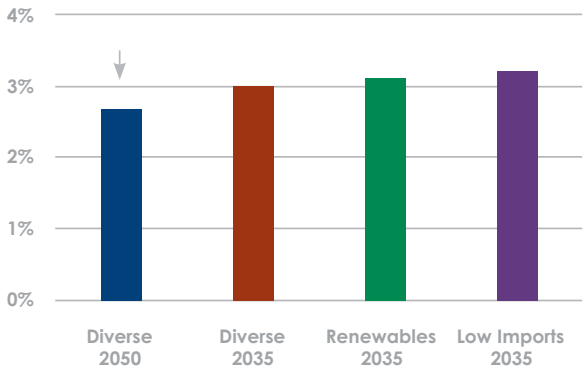
ANTICIPATED GENERATING CAPACITY: 10,758 MW




Diverse Mix 2050 is characterized by the goal of achieving net-zero greenhouse gas emissions by 2050 through a diverse mix of power supply options.

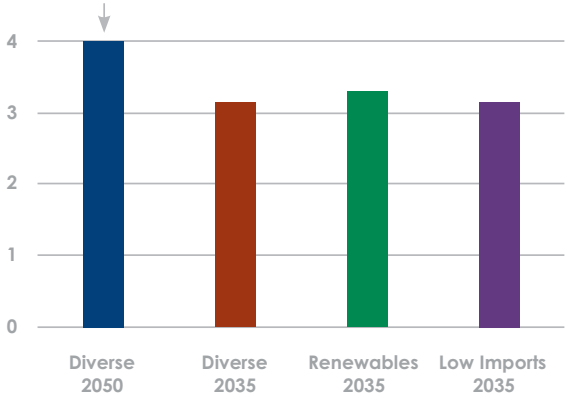
- It uses a lot of wind and solar with a balance of hydro, nuclear, natural gas with carbon capture and storage (CCS) and imports
- It would cost about $53 billion in today's dollars to realize
- Compared with the other scenarios it reduces stress on supply chains and allows more time for technology development
- It's unlikely to comply with federal regulations

### ANNUALIZED INCREASE/YEAR




- The annualized rate increase per year is 2.7%
- This doesn't include inflation which is assumed to be 2% to 3% per year

### MILLION TONNES OF $CO_2$/YEAR




- 200,000 tonnes of $CO_2$ emissions in 2050



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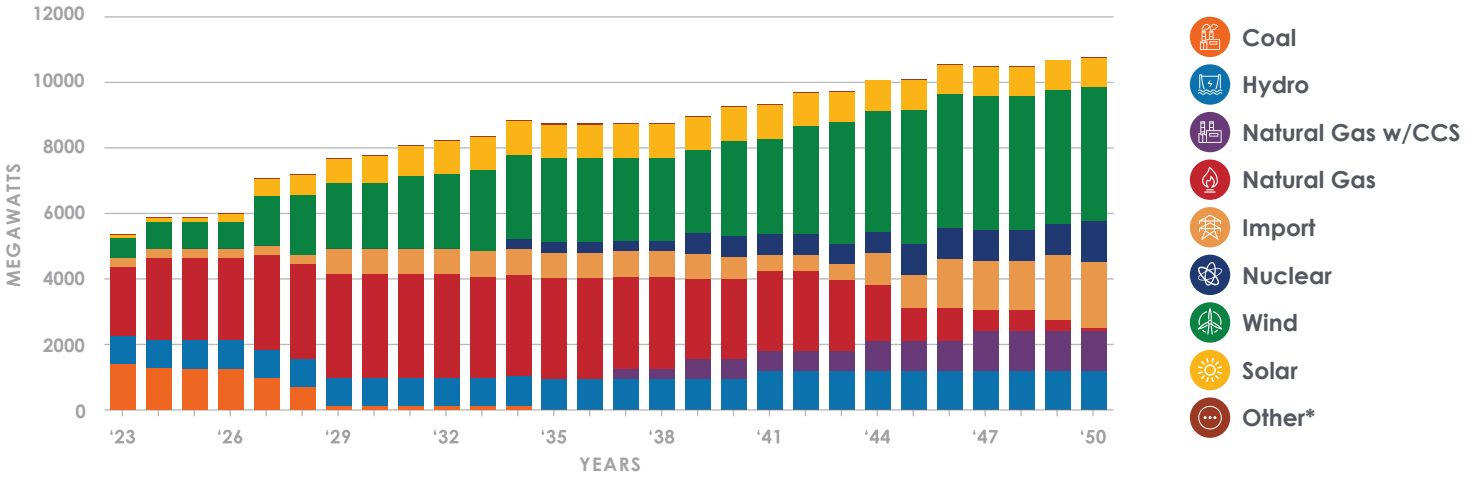
Powering our future®

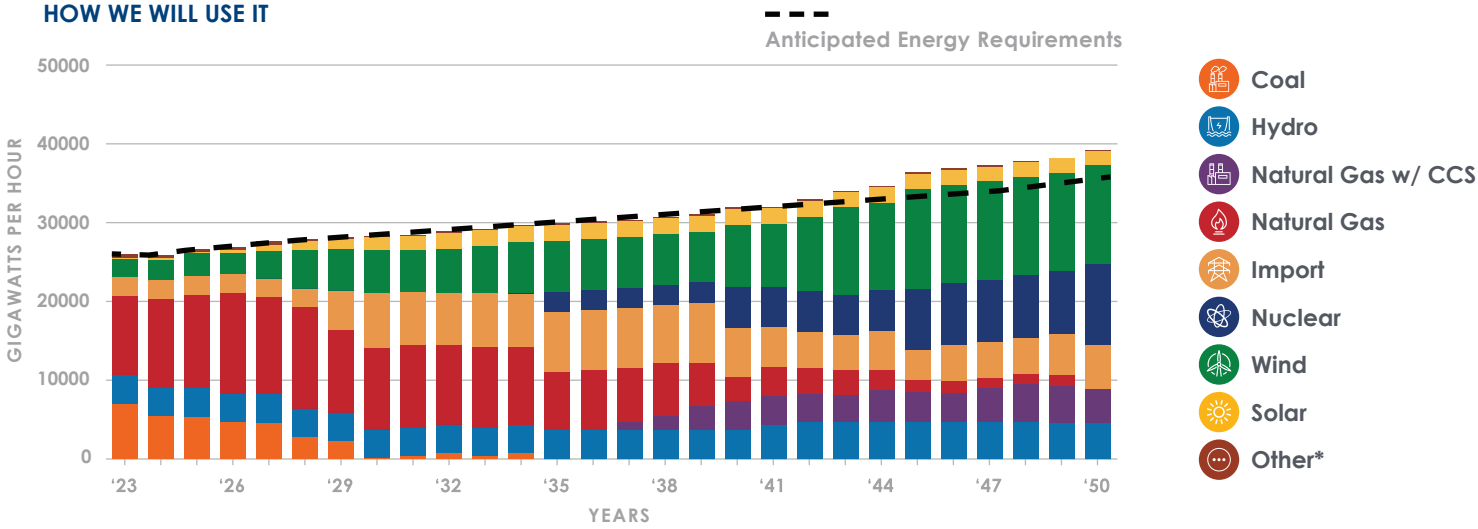
## WHAT WE WILL HAVE




Some of the key dates in this scenario are:

- 2030 – conventional coal retires as required by federal law
- 2034 – first nuclear small modular reactor (SMR) comes online
- 2034 – hydro generation increases by 60 megawatts (MW)
- 2037 – first natural gas facility with carbon capture and storage (CCS) comes online
- 2040 – wind is the largest source of generation by 2040
- 2050 – most unabated natural gas (that's natural gas without CCS) is offline

## HOW WE WILL USE IT




Highlights of how we plan to use the power supply are:

- Coal is replaced with natural gas and imported power
- Over time CCS on natural gas and nuclear develop
- Some natural gas remains for use at peak demand or when wind/solar aren't available
- Nuclear to operate about 90-95% of the time
- It also includes:
  - 2,400 MW energy storage added to ensure reliability and make better use of wind and solar
  - 4,000 MW transmission interconnection capability with our neighbours to ensure reliability, facilitate imports and exports, and to help balance variable wind and solar

*Includes biomass, geothermal, flare gas, waste heat and solar from net-metering customers

## NEW LAND NEEDED


**THAT'S 46% OF REGINA**

This figure includes new land only (not land used for existing facilities). The land used for wind is based on the wind turbine footprint. This figure doesn't account for when facilities are retired.

## LET'S EVALUATE

We've identified some of the pros and cons of Diverse Mix 2050. Please record any pros and cons that we're missing on your feedback form.

| Pros | Cons |
|---|---|
| Diverse supply mix means reduced risk of relying too heavily on one or two supply options. | Doesn't comply with pending federal regulations so there are legal risks to SaskPower. |
| Allows time for new technologies to develop, become commercially available, and for costs to potentially improve. | Results in more GHG emissions being released into the atmosphere. |
| More time means less strain on the supply chain. | |

Want to watch this scenario unfold year by year?
**Scan the QR code to view the Diverse Mix 2050 video.**

*The purpose of this scenario is to serve as an educational tool to help show the dynamics between emissions, rates, power supply options and other future supply considerations.*

## Diverse Mix 2035

In 2022, SaskPower started asking Saskatchewan residents for their input to help shape how the province is powered from 2030 and beyond. These discussions are helping inform our long-term power supply plan. We gathered input on values, priorities, and preferred power supply options, which informed the creation of four scenarios that show potential future power supply mixes.

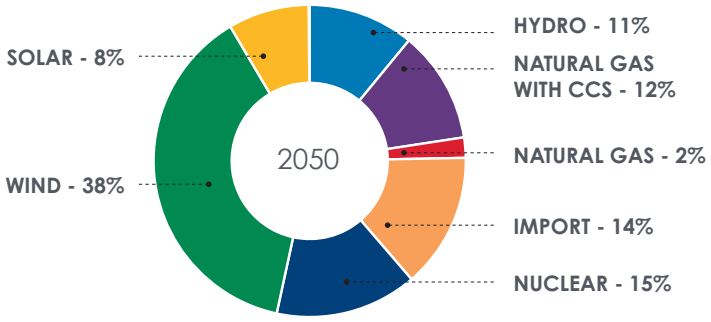
Not all power supply technologies are included in this scenario. That's because our supply planners can only use technologies that have enough data that they can model today. The model combines technologies to provide the lowest-cost path that also meets reliability and sustainability requirements.

Diverse Mix 2035 responds to participants who asked:

***"What could net zero by 2035 look like?"***

### CAPACITY BY SOURCE IN 2050

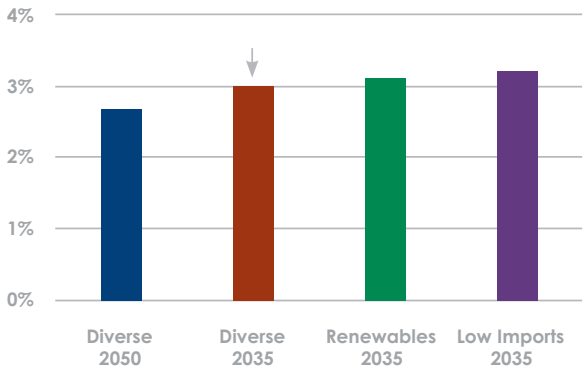
ANTICIPATED GENERATING CAPACITY: 10,708 MW




Diverse Mix 2035 is characterized by the goal of achieving net-zero greenhouse gas (GHG) emissions by 2035 through a diverse mix of power supply options.

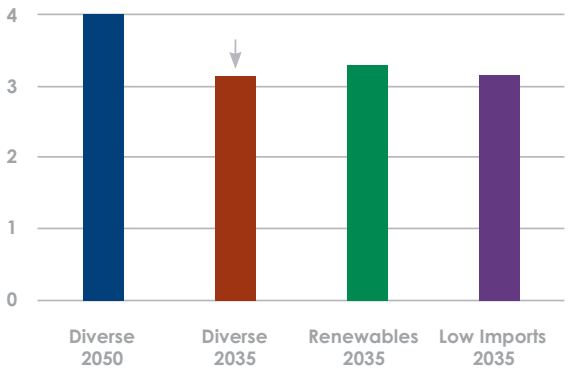
- It uses a lot of wind and solar with a balance of hydro, nuclear, natural gas with carbon capture and storage (CCS) and imports
- It would cost about $56 billion in today's dollars to realize

### ANNUALIZED INCREASE/YEAR




- Increase to rates of 3% per year
- This doesn't include inflation which is assumed to be 2% to 3% per year

### MILLION TONNES OF $CO_2$/YEAR




- 200,000 tonnes of $CO_2$ emissions in 2050



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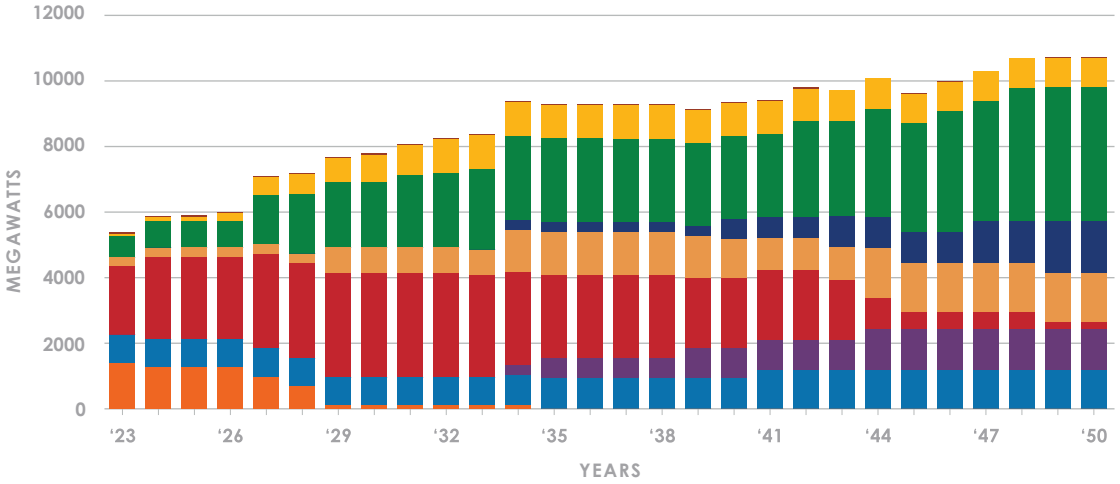
## WHAT WE WILL HAVE

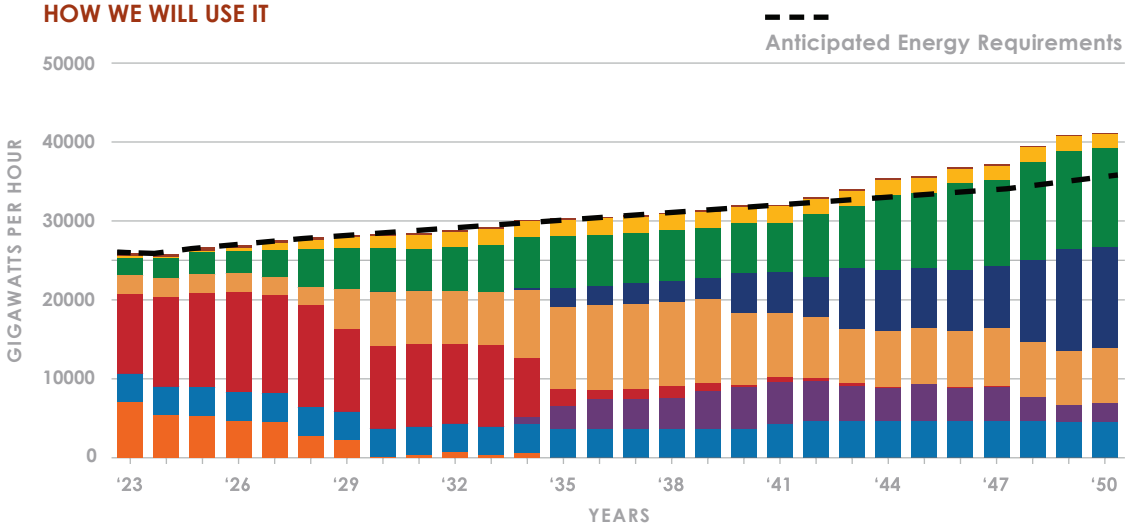



Coal
Hydro
Natural Gas w/CCS
Natural Gas
Import
Nuclear
Wind
Solar
Other*

Some of the key dates in this scenario are:

- 2030 – conventional coal retires as required by federal law
  2034 – first nuclear small modular reactor (SMR) comes online
- 2034 – hydro generation increases by 60 megawatts (MW)
- 2034 – imports increase by 500 MW
- 2034 – increase transmission interconnections to our neighbours by 2,000 MW
- 2035 – first natural gas facility with carbon capture and storage (CCS) comes online
- 2039 – wind is the largest source of generation by 2039
- 2050 – most unabated natural gas (that's natural gas without CCS) is offline by 2050

## HOW WE WILL USE IT




Coal
Hydro
Natural Gas w/ CCS
Natural Gas
Import
Nuclear
Wind
Solar
Other*

*Includes biomass, geothermal, flare gas, waste heat and solar from net-metering customers

Highlights of how we plan to use the power supply are:

- Coal is replaced with natural gas and imported power
- Over time CCS on natural gas and nuclear develop
- Unabated natural gas is used very little after 2035
- Nuclear to operate about 90-95% of the time
- It also includes:
  - 2,400 MW energy storage added to ensure reliability and make better use of wind and solar
  - 4,000 MW transmission interconnection capability with our neighbours to ensure reliability, facilitate imports and exports, and to help balance variable wind and solar

## NEW LAND NEEDED


**THAT'S 46% OF REGINA**

This figure includes new land only (not land used for existing facilities). The land used for wind is based on the wind turbine footprint. This figure doesn't account for when facilities are retired.

## LET'S EVALUATE

We've identified some of the pros and cons of Diverse Mix 2035. Please record any pros and cons that we're missing on your feedback form.

| Pros | Cons |
|---|---|
| Diverse supply mix means reduced risk of relying too heavily on one or two supply options. | Some of the technologies needed to realize this scenario aren't commercially available yet, which can add further risk to cost estimates and timelines. |
| Very low emissions by 2035. | Tight timeline means no room for error. |
| | The number of projects coming online 2034-2037 would cause significant strain on the supply chain and may cause unintended cost pressures. |

Want to watch this scenario unfold year by year?
**Scan the QR code to view the Diverse Mix 2035 video.**

*The purpose of this scenario is to serve as an educational tool to help show the dynamics between emissions, rates, power supply options and other future supply considerations.*

## Renewables 2035

In 2022, SaskPower started asking Saskatchewan residents for their input to help shape how the province is powered from 2030 and beyond. These discussions are helping inform our long-term power supply plan. We gathered input on values, priorities, and preferred power supply options, which informed the creation of four scenarios that show potential future power supply mixes.

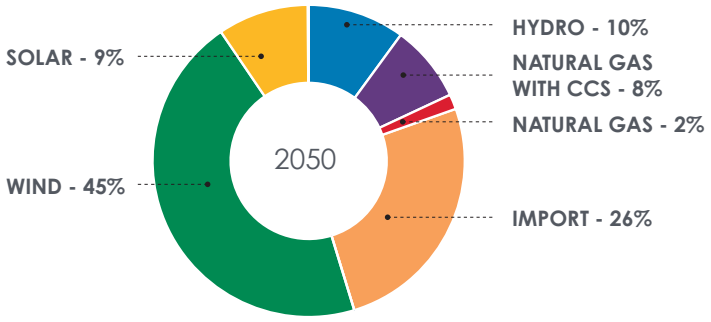
Not all power supply technologies are included in this scenario. That's because our supply planners can only use technologies that have enough data that they can model today. The model combines technologies to provide the lowest-cost path that also meets reliability and sustainability requirements.

Renewables 2035 responds to participants who asked:

***"What if you maximized wind and solar resources?"***

### CAPACITY BY SOURCE IN 2050

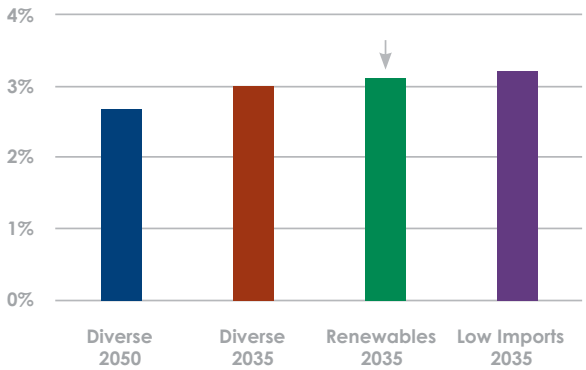
ANTICIPATED GENERATING CAPACITY: 11,677 MW




Renewables 2035 is characterized by the goal of achieving net-zero greenhouse gas (GHG) emissions by 2035 by increasing renewable options with no nuclear generation.

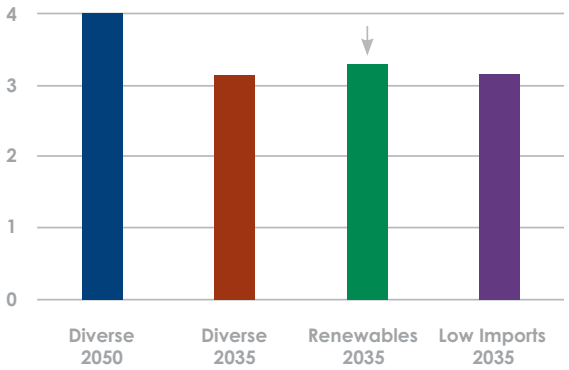
- It uses increased wind, solar and imported power
- It relies on increased transmission interconnections with our neighbours for reliability, to balance increased wind and solar, and to access dispatchable (we can control how and when we use it) imported power
- Adds a new hydro facility earlier than other scenarios
- No nuclear generation -- GHG reductions are realized through renewables paired with dispatchable generation
- It would cost about $57 billion in today's dollars to realize

### ANNUALIZED INCREASE/YEAR




- The annualized rate increase per year is 3.1%
- This doesn't include inflation which is assumed to be 2% to 3% per year

### MILLION TONNES OF $CO_2$/YEAR




- 300,000 tonnes of $CO_2$ emissions in 2050



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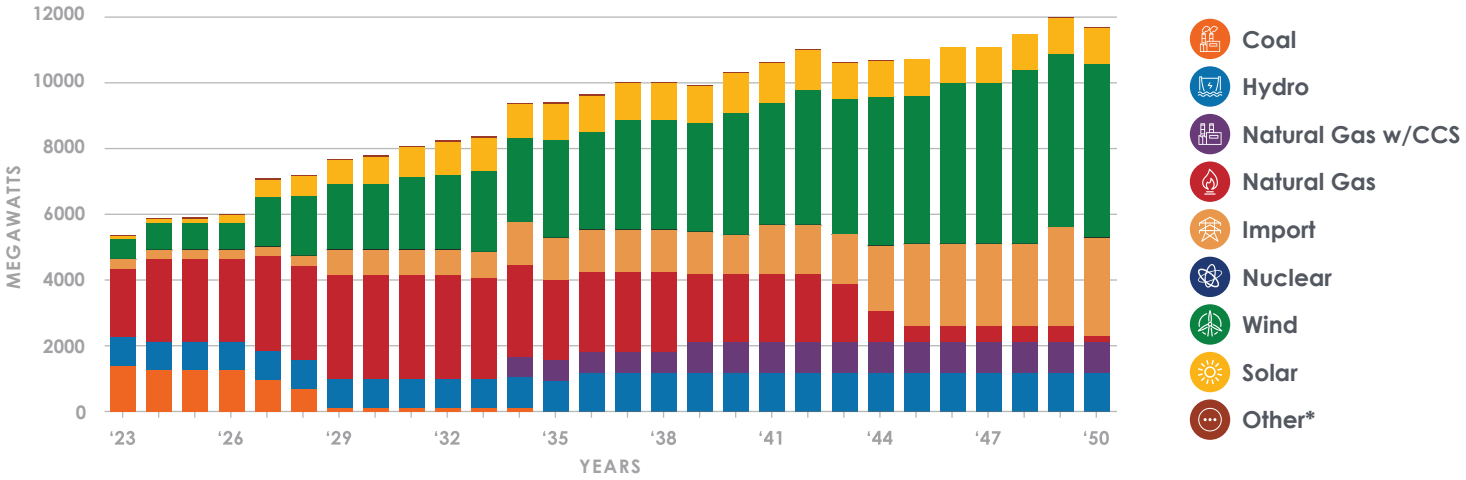
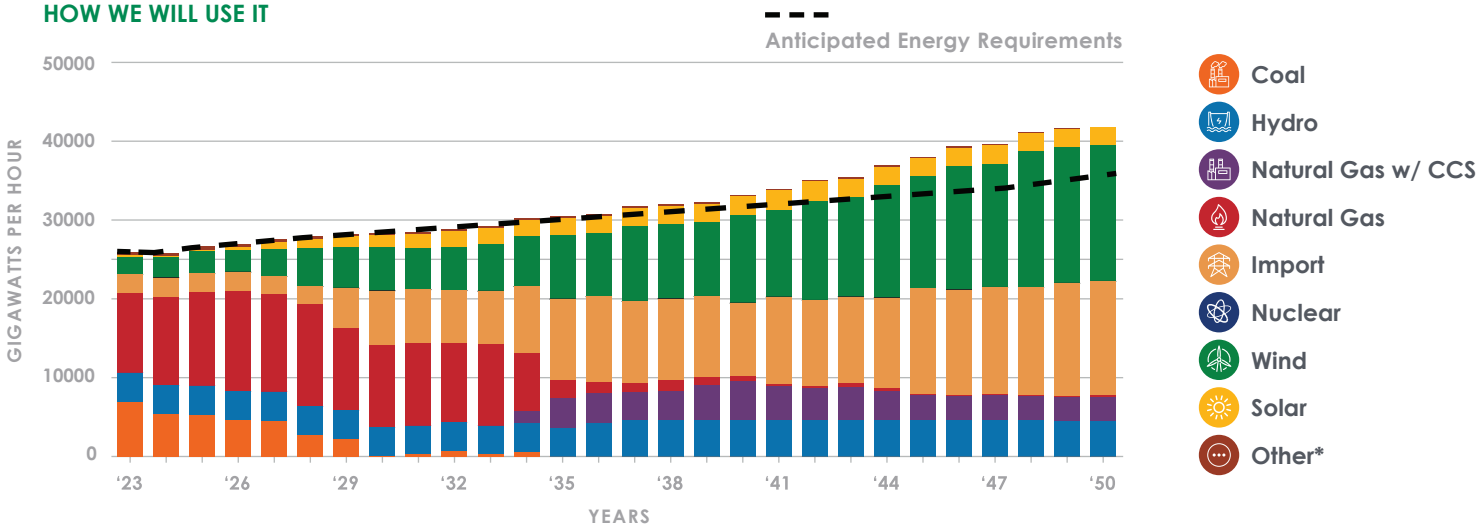
## WHAT WE WILL HAVE




Some of the key dates in this scenario are:

- 2030 – conventional coal retires as required by federal law
- 2034 – hydro generation increases by 60 megawatts (MW)
- 2034 – first natural gas facility with CCS comes online
- 2034 – add CCS to existing natural gas
- 2034 – imports increase by 500 MW
- 2034 – increase transmission interconnections to our neighbours by 2,000 MW
- 2035 – 400 MW wind/600 MW storage facility comes online
- 2035 – 90 MW natural gas comes online
- 2036 – new hydro comes online 250 MW
- 2037 – 400 MW wind/ 600 MW storage facility comes online
- 2050 – most unabated natural gas (that's natural gas without CCS) is offline by 2050

## HOW WE WILL USE IT

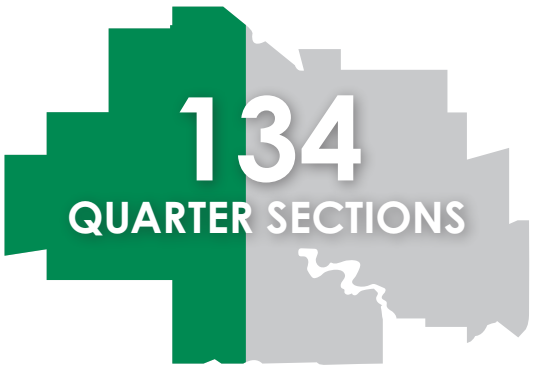



*Includes biomass, geothermal, flare gas, waste heat and solar from net-metering customers

Highlights of how we plan to use the power supply are:

- Coal is replaced with natural gas and imported power
- Some natural gas remains to be used at system peak or when wind/solar aren't available
- Renewables make up 2/3 of the system capacity
- It also includes:
  - 4,200 MW energy storage added to ensure reliability and make better use of wind and solar
  - 6,000 MW transmission interconnection capability with our neighbours to ensure reliability, facilitate imports and exports, and to help balance variable wind and solar

## NEW LAND NEEDED




**THAT'S 48.5% OF REGINA**

This figure includes new land only (not land used for existing facilities). The land used for wind is based on the wind turbine footprint. This figure doesn't account for when facilities are retired.

## LET'S EVALUATE

We've identified some of the pros and cons of Renewables 2035. Please record any pros and cons that we're missing on your feedback form.

| Pros | Cons |
|---|---|
| Very low emissions by 2035. | Some of the technologies needed to realize this scenario aren't commercially available yet or are still developing. |
| Takes full advantage of Saskatchewan's excellent wind and solar resources. | Tight timeline means no room for error. |
| Greater interconnections with our neighbours may increase diversity of renewables as when it's windy in another market it may not be windy here. This could result in increased trading opportunities between Saskatchewan and other markets. | The number of projects coming online 2034-2037 would cause significant strain on the supply chain and may cause unintended cost pressures. |
| | The lack of diversity in supply options means that we're counting on fewer technologies. This carries risk as we're subject to any negative developments that impact those few technologies. Potential negative developments could be rising fuel costs, supply chain issues, changing regulations, competition for similar resources, etc. |
| | The financial burden is high and immediate. |

Want to watch this scenario unfold year by year?
**Scan the QR code to view the Renewables 2035 video.**

*The purpose of this scenario is to serve as an educational tool to help show the dynamics between emissions, rates, power supply options and other future supply considerations.*

## Low Imports 2035

In 2022, SaskPower started asking Saskatchewan residents for their input to help shape how the province is powered from 2030 and beyond. These discussions are helping inform our long-term power supply plan. We gathered input on values, priorities, and preferred power supply options, which informed the creation of four scenarios that show potential future power supply mixes.

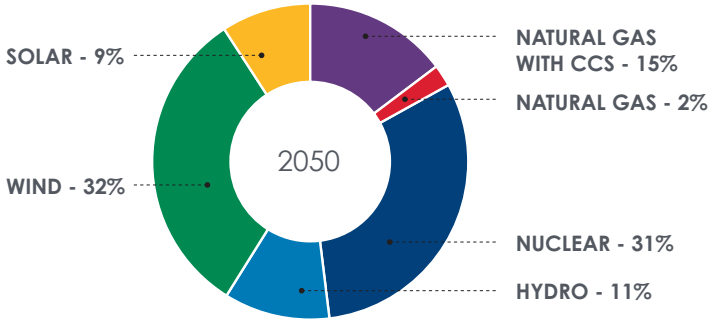
Not all power supply technologies are included in this scenario. That's because our supply planners can only use technologies that have enough data that they can model today. The model combines technologies to provide the lowest-cost path that also meets reliability and sustainability requirements.

Low Imports 2035 responds to participants who asked:

***"What if you reduced imported power and relied on in-province generation?"***

### CAPACITY BY SOURCE IN 2050

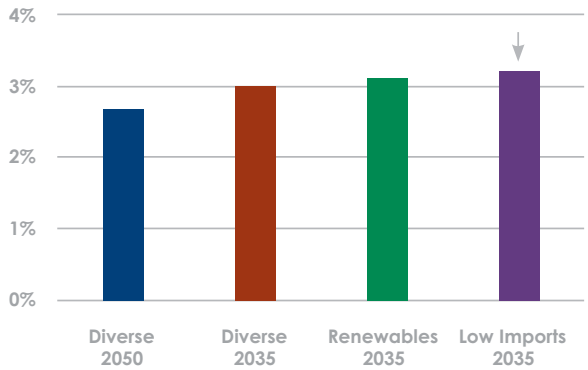
ANTICIPATED GENERATING CAPACITY: 10,294 MW




Low Imports 2035 is characterized by the goal of achieving net-zero greenhouse gas (GHG) emissions by 2035 with no new import contracts leading to significant nuclear generation.

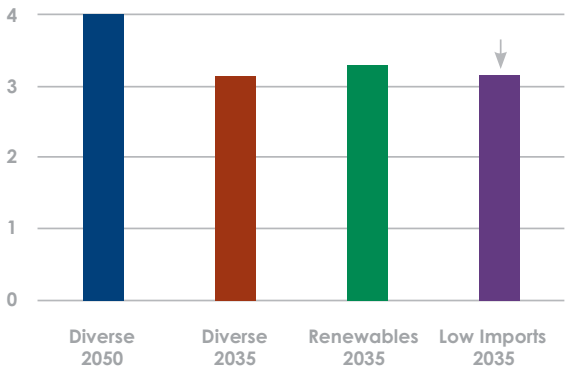
- It results in increased nuclear power – 31% nuclear by 2050
- Increased transmission interconnections with our neighbours are still necessary for reliability, to support renewables, and to provide a path for excess energy from nuclear facilities in times of low provincial demand
- It would cost about $57 billion in today's dollars to realize
- Counts on fewer technologies

### ANNUALIZED INCREASE/YEAR




- The annualized rate increase per year is 3.2%
- This doesn't include inflation which is assumed to be 2% to 3% per year

### MILLION TONNES OF $CO_2$/YEAR




- 10,000 tonnes of $CO_2$ emissions in 2050



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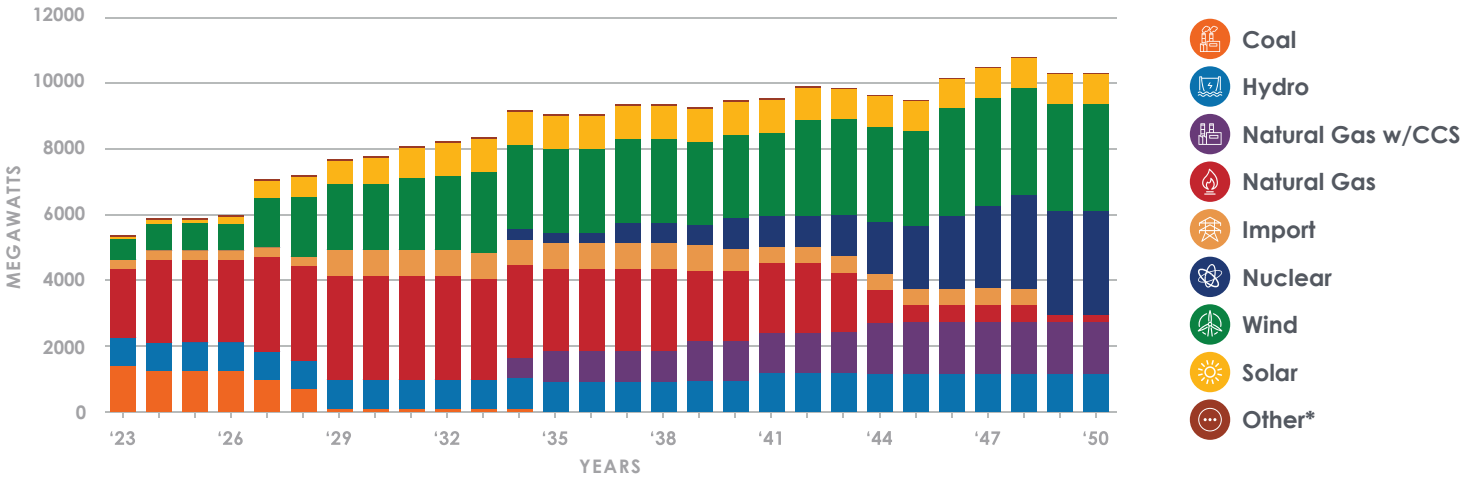
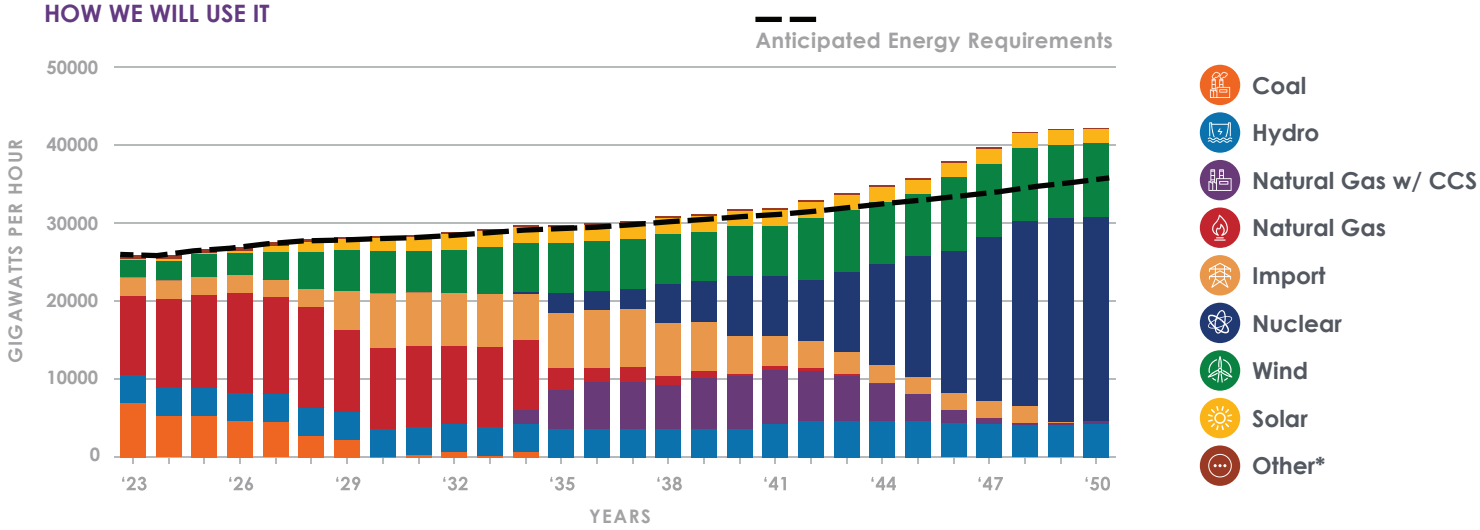
## WHAT WE WILL HAVE




Some of the key dates in this scenario are:

- 2030 – conventional coal retires as required by federal law
- 2034 – hydro generation increases by 60 MW
- 2034 – first natural gas facility with carbon capture and storage (CCS) comes online
- 2034 – CCS added to existing natural gas facility
- 2034 – first nuclear small modular reactor (SMR) comes online
- 2035 – second natural gas facility with CCS
- 2035 – natural gas without CCS (135 MW) comes online
- 2036 – increase transmission interconnections to our neighbours by 2,000 MW
- 2037 – more nuclear power from SMR comes online
- 2050 – most unabated natural gas (that's natural gas without CCS) is offline

## HOW WE WILL USE IT




*Includes biomass, geothermal, flare gas, waste heat and solar from net-metering customers

Highlights of how we plan to use the power supply are:

- Coal is replaced with natural gas and imported power
- Some natural gas remains to be used at system peak or when wind/solar aren't available
- Renewables make up 2/3 of the system capacity
- Nuclear to operate about 90-95% of the time
- It also includes:
  - 1,200 MW energy storage added to ensure reliability and make better use of wind and solar
  - 4,000 MW transmission interconnection capability with our neighbours to ensure reliability, facilitate imports and exports, and to help balance variable wind and solar

## NEW LAND NEEDED


**THAT'S 44.5% OF REGINA**

This figure includes new land only (not land used for existing facilities). The land used for wind is based on the wind turbine footprint. This figure doesn't account for when facilities are retired.

## LET'S EVALUATE

We've identified some of the pros and cons of Low Imports 2035. Please record any pros and cons that we're missing on your feedback form.

| Pros | Cons |
|---|---|
| Very low emissions by 2035. | Some of the technologies needed to realize this scenario aren't commercially available yet or are still developing. |
| Focuses on Saskatchewan-owned generation. | Tight timeline means no room for error. |
| | The number of projects coming online 2034-2037 would cause significant strain on the supply chain and may cause unintended cost pressures. |
| | The lack of diversity in supply options means that we're counting on fewer technologies. This carries risk as we're subject to any negative developments that impact those few technologies. Potential negative developments could be rising fuel costs, supply chain issues, changing regulations, competition for similar resources, etc. |

Want to watch this scenario unfold year by year?
**Scan the QR code to view the Low Imports 2035 video.**

*The purpose of this scenario is to serve as an educational tool to help show the dynamics between emissions, rates, power supply options and other future supply considerations.*