

Technical Briefing on Proposed Clean Electricity Regulations

September 28, 2023

LAND ACKNOWLEDGEMENT



AESO is committed to actively taking part in reconciliation and believes in the National Truth and Reconciliation Centre recommendation of honouring the First Peoples of these lands.

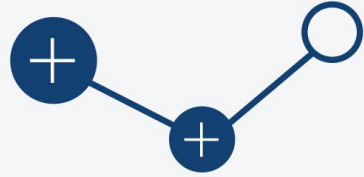
Indigenous Peoples have inherent kinship ties with the land, which we should all respect and help restore. We encourage everyone to think of their relationship with the land, when their ancestors first stepped onto Turtle Island, and recognize that First Peoples have been here since time immemorial.

We would like to acknowledge that we are on the Traditional Territory of Treaty 7, which settlers have renamed to Calgary, Alberta. These lands hold the hearts and footsteps of many First Nations, Métis and Inuit, and we would like to especially recognize the Tsuut'ina First Nation, the Blackfoot Confederacy, which is made up of the Kainai, Piikani, and Siksika Nations, the Stoney Nakoda tribes, and is also the homeland of the Métis Nation of Alberta, Region 3.

We are grateful to have the opportunity to work and be present in this territory together with many Indigenous Peoples from across Turtle Island. We offer this acknowledgement as a stepping stone towards reconciliation by honouring the First Peoples of the land that today we call home, and as an expression of our commitment to Indigenous communities.

aeso

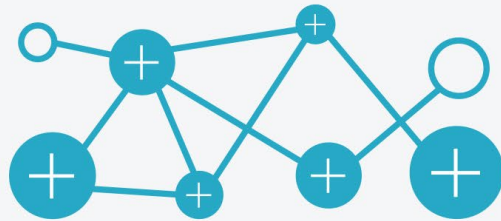
- Introduction
- Role of AESO
- AESO assessment of draft Clean Electricity Regulations (CER)
- AESO perspective on transition to carbon-neutral electricity system
- Q&A
- Close



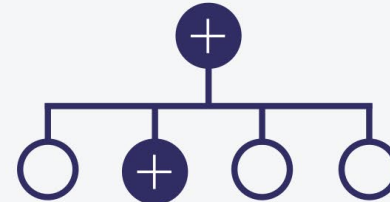
Connect
CUSTOMERS



PLAN
transmission



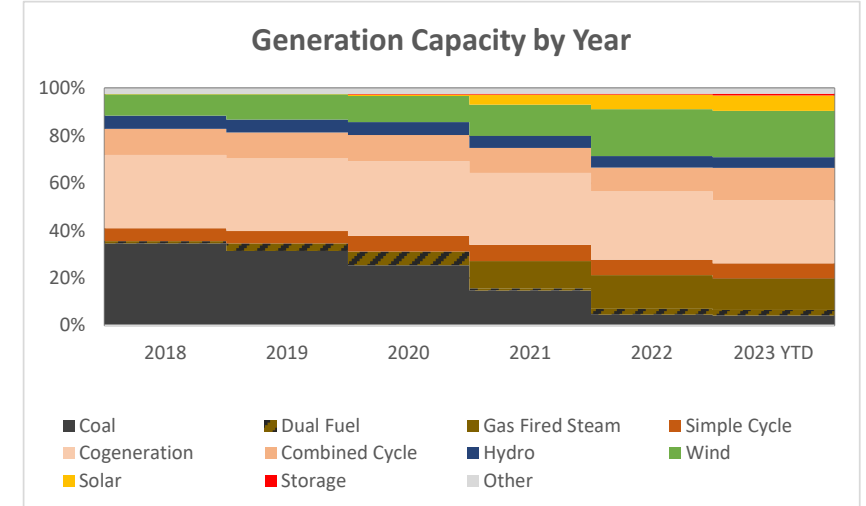
Operate the
GRID



Plan and Operate the
MARKET

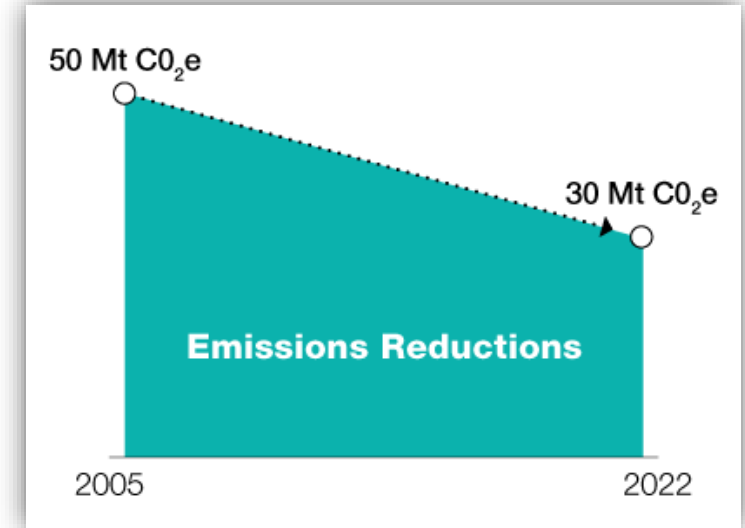
Where We've Come From

- Alberta's electricity generation capacity has adapted more quickly than any other province in Canada
 - Coal, once dominant in Alberta's supply mix, is expected to retire from the grid entirely in 2024
 - Renewables growth has dominated supply additions in the past few years
 - Natural gas cogeneration, combined-cycle and simple-cycle technologies continue to provide efficient, clean, reliable generation
 - Less efficient gas-fired steam generation has been displaced by more efficient cogeneration and combined-cycle supply in the near term
 - Many former baseload units are either running periodically or retired



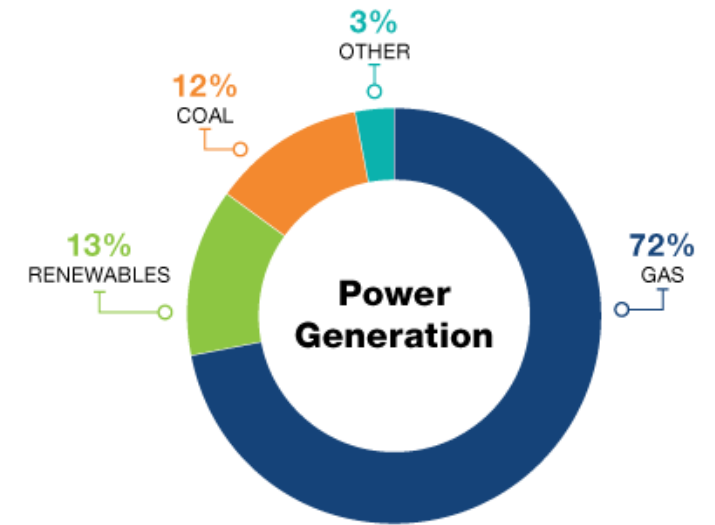
CER Does Not Recognize Alberta's Starting Point

- CER does not consider the vast difference between provinces in terms of generation resource mix
- Alberta's generation fleet was developed in part due to the abundance and availability of natural gas and coal reserves
 - In 2022, 72% of electricity was derived from natural gas-fired resources, 12% from coal-fired resources
 - Significant emissions reductions already achieved with coal phase-out (44% emissions reduction between 2005 and 2021)



Alberta faces the greatest challenge among provinces to decarbonize its electricity system by 2035

- Alberta does not have legacy hydro and nuclear like most other provinces
- Restrictions imposed on existing and future firm dispatchable natural gas assets create reliability concerns post-2034
- Unrealistic timeline to achieve 2035 target
- Alberta has limited intertie capacity with neighbouring jurisdictions
- Alberta would face disproportionate risk compared to other provinces
- Alberta would bear disproportionate cost compared to other provinces



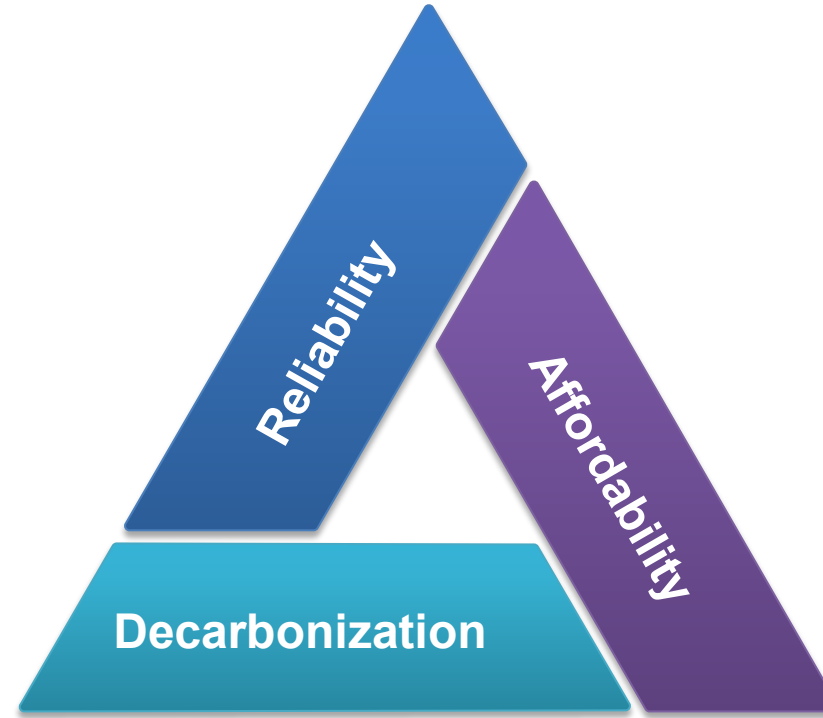
**Alberta must be able to meet peak demand at all times
with dispatchable generation (e.g. winter/summer peak demand)**

Key findings of AESO modelling of CER:

- Under CER, Alberta will **NOT** have sufficient resources to ensure reliability in 2035
- Severity of supply shortfall increases over time
- End of Prescribed Life will create asset retirement cliff
- Efficient cogeneration assets may be forced to retire or disconnect from the grid
- 30t/GWh emissions requirement unrealistic given technology, cost and financing
- Emergency circumstances unworkable
- Significant restrictions on maximum runtime when no other dispatchable resources available
- Criminal risk



As of 2035, Alberta's power system is at risk of supply shortfall (rotating outages, blackouts) under binding CER requirements

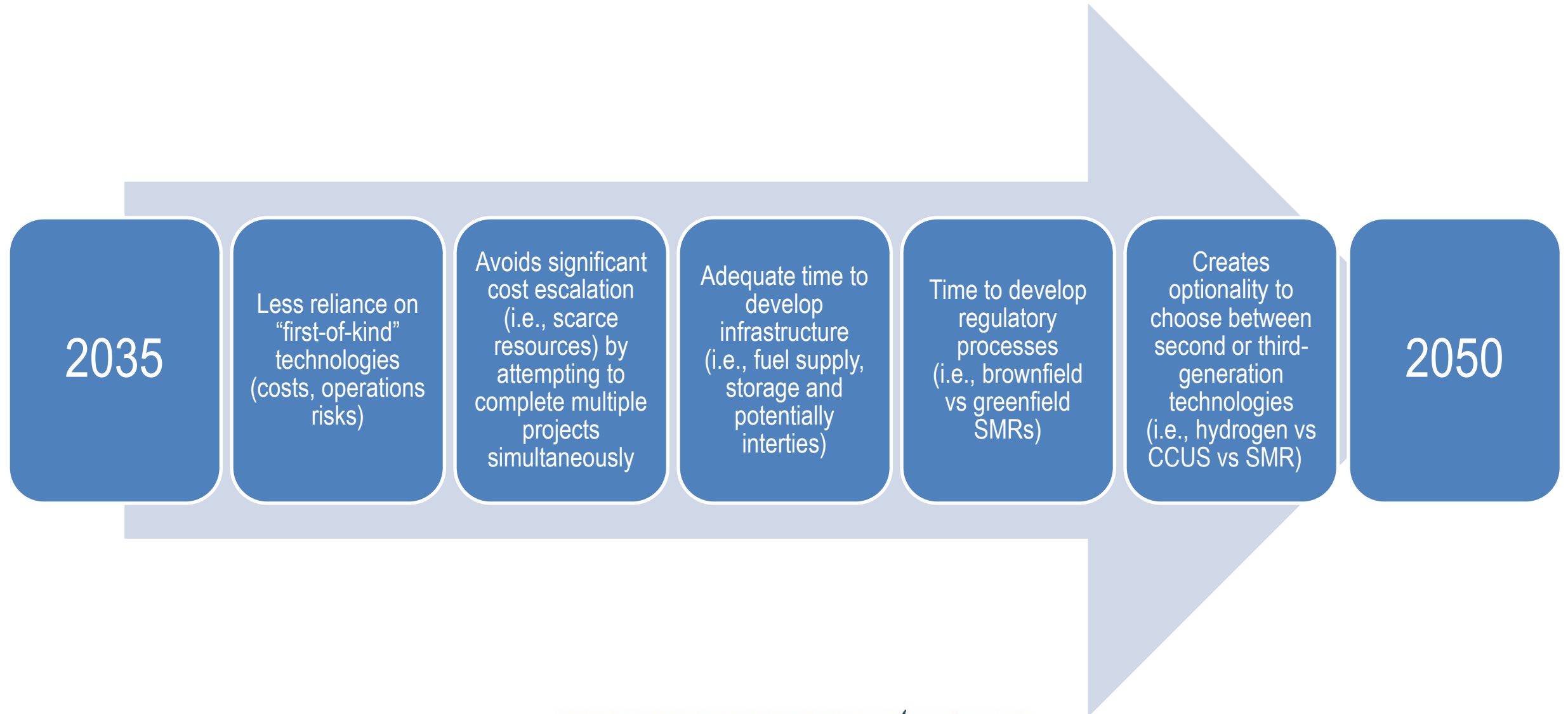


Undermining reliability and affordability will jeopardize the ability to electrify and decarbonize the broader economy by 2050

- Achieving a carbon-neutral economy by 2050 needs to be underpinned by a decarbonized grid that is reliable and affordable
- Key elements required to decarbonize Alberta's electricity system:
 - Adequate time to transition significant part of existing generation fleet while managing cost and reliability
 - Leverage province's available resources and infrastructure: natural gas reserves and related infrastructure, abundant wind and solar together with the existing transmission system
 - Dispatchable thermal generation assets must remain a significant part of province's resource mix in view of increasing penetration of intermittent renewables
 - Small modular reactors, energy storage, CCUS and hydrogen generation technologies may provide promising opportunities as cost declines materialize or technologies advance . . . **BUT underlying infrastructure still required!**



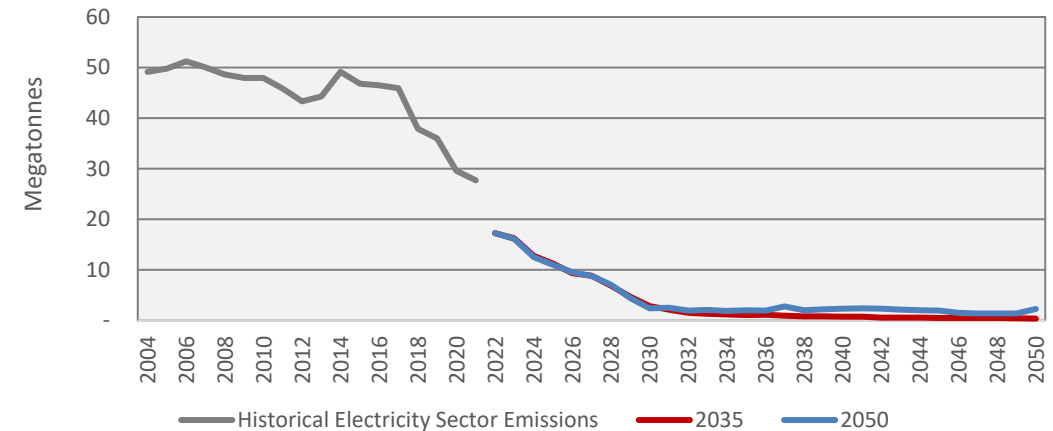
Reliability and affordability cannot be compromised in transition to a carbon-neutral grid



2035 CER vs 2050 Decarbonization Results in Marginal Emissions Savings

- Emissions are expected to reduce to less than 10 Mt per annum before 2030 without CER
- The expected emissions difference between the decarbonization by 2035 (CER scenario) and the decarbonization by 2050 scenario is negligible and amounts to 22 Mt between 2023 and 2050
 - Assumes carbon pricing of \$170 by 2030 in each scenario
 - Assumes supports including the Investment Tax Credits

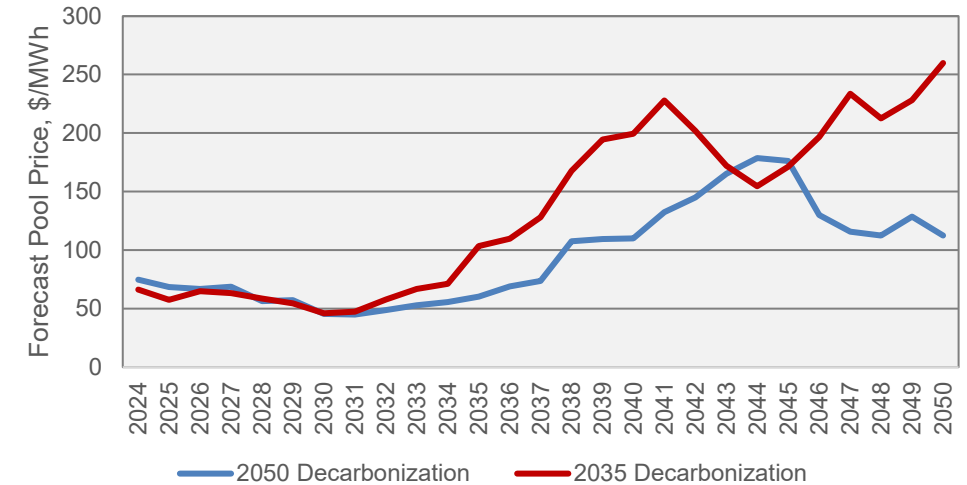
2035 Decarbonization vs 2050 Decarbonization:
Electricity Sector Emissions (Excludes Cogeneration)



**Significant emission reductions expected in Alberta's electricity sector
absent/without CER constraints**

- Prices are forecast to increase in any decarbonization scenario, with a more extreme trajectory with an earlier 2035 decarbonization scenario
 - Wholesale energy cost is \$118 billion higher in the 2035 decarbonization scenario compared to 2050 decarbonization (total energy x price differential)
 - This represents a cost of \$5,290 per tonne for each additional tonne abated with a 2035 decarbonization target compared to a 2050 decarbonization target, approximately 10X the cost of direct air carbon capture
- A 2050 decarbonization scenario enables opportunities for technological advancement and economic commercialization (i.e., lower costs)

2035 vs 2050 Decarbonization - Forecast Pool Price



CER offers limited emission reduction while exposing Alberta to significant cost and risks



- Please introduce yourself including the organization you work for before asking your question
- In-person
 - Raise your hand and the host will acknowledge you have a question and will indicate when it is your turn to speak
- Virtually (Zoom)
 - If you are accessing the session via your **computer or smartphone**
 1. Click “Raise Hand” and the host will be notified that you would like to ask a question.
 - *When it is your turn to ask a question, the host will unmute your microphone; you in turn will need to unmute your microphone before you can speak. Your name will appear on the screen, but your camera will remain turned off.*
 2. You can also ask questions by tapping the “Q&A” button and typing them in. Please include the organization you work for when typing your question into the Q&A.
- If you are accessing the session via conference call
 - If you would like to ask a question press *5 on your phone’s dial pad and the host will see that you have raised your hand.
 - The host will unmute your microphone, you in turn will need to unmute your microphone by pressing *6 before you can speak. Your number will appear on the screen.

Thank you