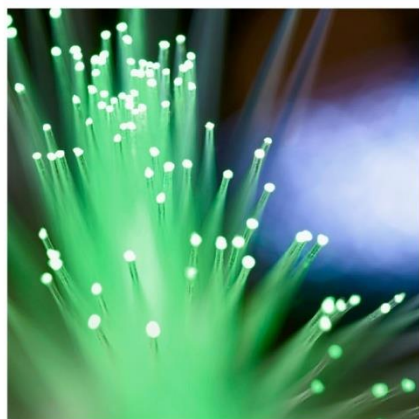


Advancing Alberta's Climate Change Strategy

Proposal to Accelerate Electricity Industry Coal Phase-out



prepared for
exclusive use by
the Alberta
Government

September 2015

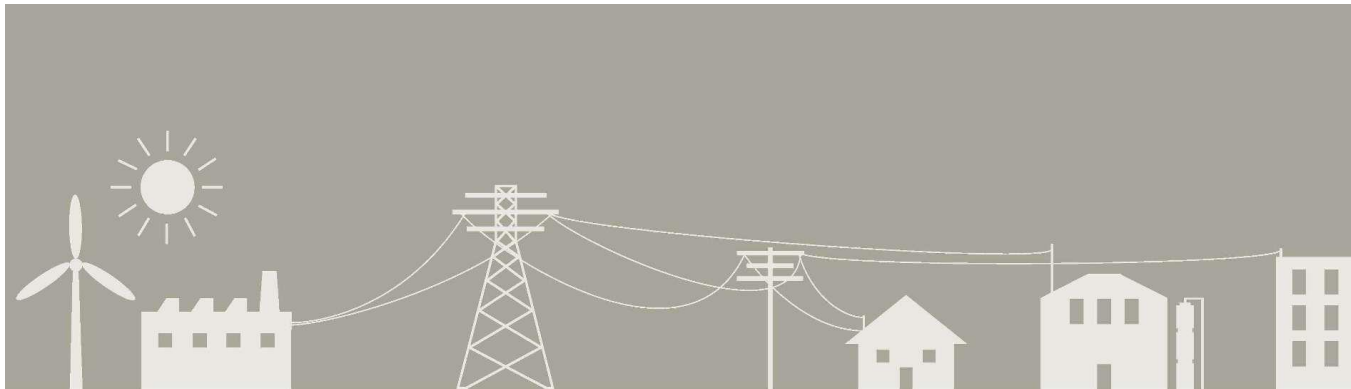
What we focused on:

- **Human health impacts** of NO_x, SO_x, and particulate matter (PM)
- Desire for **real physical reductions** in GHGs both immediately and over the longer term
- Accelerate **development of renewable** power generation
- **Simplicity** of design and implementation
- **Speed** of reductions and implementation
- Impact on **price**
- **No direct compensation** from Government or its agencies
- **Continued reliability** of the grid



Solution: Immediate Action on Coal and Enhance Incentives to Renewables Within Existing Framework

- 1) Hourly Cap at 25% below name-plate capacity for all coal- fired units starting January 1, 2016**
- 2) Incent immediate and longer-term investment in renewables by:**
 - a. Immediate - amending Renewables Offset Protocol under the Specified Gas Emitters Regulation (SGER)**
 - b. Longer term - 45 year end-of-life for coal assets beginning Jan. 1, 2021**



Simple, effective, verifiable framework



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Recommended Policy Action #1: Implement an 'Hourly Cap' at 25% below name plate capacity for all coal-fired units

Key Design Elements:

- ✓ All units required to dial down **by 25% in all hours** of the day
- ✓ Begins **January 1, 2016**
- ✓ PPA Buyers and Merchant coal facilities will receive **no compensation** for value of lost capacity from government or its agencies.
- ✓ PPA Owners will be **kept whole** by PPA Buyers as per PPA
- ✓ This action **meets the intent of the SGER intensity framework for coal units** by moving to a mass-based system with real GHG and CAC reductions in excess of 20%
- ✓ Clear allocation methodology that is significantly simpler to implement than dial down based on historical performance
- ✓ Coal Fleet-wide flexibility – Turn downs beyond 25% could create transferable credits that could be sold to more efficient coal units to run more



Immediate and ongoing reductions of GHGs and Air Pollutants

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Recommended Policy Action #2a: Immediately amend Renewable Offset Protocol under the Specified Gas Emitters Regulation (SGER)

Key Design Elements:

- ✓ Increase offset generation to **match actual grid intensity** of 0.8 tonnes/MWh (Currently 0.59 t/MWh)
- ✓ Offsets created over **life of asset** (currently granted for 8 yrs with a possibility of extension for additional 5 yrs)
- ✓ SGER price at \$30/tonne will yield an **automatic offset of \$24/MWh** to eligible renewable generation.
- ✓ Improvement in treatment of renewables can be achieved **within the existing SGER regulation** without having to resort to any changes to existing legislation. Provides time for Gov't to assess need for additional initiatives (e.g. RPS or FIT).

Open the door for renewable project financing within the current market framework



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Recommended Policy Action #2b: 45 year end-of-life for coal assets beginning January 1, 2021.

Key Design Elements:

- ✓ Provides space for renewables and cleaner generation
- ✓ No changes required to the current market framework
- ✓ Accelerates shut down of all coal facilities in AB – faster than Federal mandate
 - ✓ Human Health Benefits: Further expedites reduction of air pollutants such as GHG and CAC's
- ✓ 45-year life reduces GHG emissions by **70 MT compared to the Federal timeline** between 2021 and 2030

Provides space for renewables to grow and accelerates coal departure



Recognizing different levels of efficiency of units

- ENMAX clearly recognizes that a 25% *Hourly Cap* for all coal units is an approach that does not distinguish relative efficiency among individual coal facilities
 - This could be addressed in design by allocating +/- the 25% to each unit based on its specific intensity level but this was determined to add considerable complexity and therefore is not proposed
- **Should the Gov't wish to provide the opportunity for the more efficient coal plants to run more than less efficient units they could address the need in two ways:**
 - Provide Individual Coal Fleet flexibility – Companies could manage a dial down of 25% across their coal units to run the more efficient facilities.
 - Coal Fleet-wide flexibility – Turn downs beyond 25% could create transferable credits that could be sold to more efficient coal units to run more.

NOTE: Both these solutions would maintain the overall cap of a 25% capacity reduction in all hours.



What will it mean for Albertans?

Human Health Benefits – balanced approach to both GHG and CACs

- ✓ **Real and measurable emission reductions to immediately improve air quality** in stressed regional hotspots starting January 2016 and going forward
- ✓ **21% reduction of GHGs** compared to historical baseline
- ✓ **45 MT of reductions 2016 to 2020 (9 MT annually) +**
 - ✓ **22,500 Tonnes** of SO_x,
 - ✓ **14,000 Tonnes** of NO_x,
 - ✓ **1,050 Tonnes** of Particulate, and
 - ✓ **32 kg additional Mercury** eliminated in 2016 and every year going forward.
- ✓ Increases the reduction of GHGs a **full 5 years ahead** of the Federal coal-retirement schedule



What will it mean for Albertans?

Modest Pool Price Impact & Cost

- ✓ Modest pool price increase estimated at approximately \$15/MWh (1.5 ¢/KWh) (linked to human health benefits and incenting renewables) that would not impact those who have entered into a retail contract.
 - ✓ ENMAX willing to meet with the Alberta Government to share modelling assumptions that produced said estimate
- ✓ Despite increase, price still **well below historical average**
- ✓ **Not funded by the government** or its agencies



What will it mean for Albertans?

More Renewable Generation

- ✓ Renewable projects can be financed **within existing market framework as .8 tonnes/MWh** provides a \$24 /MWh payment to renewable generators for the life of the project that can be **sold forward** to others with SGER compliance requirements
- ✓ Renewables benefit from an assumed price increase of ~\$15/WWh.
- ✓ Combined approximate \$40 uplift to renewables is highly likely that could be taken to Banks for financing. (ENMAX's review resulted in positive Internal Rates of Return for such projects)
- ✓ Reduction of coal creates space in the market for a **significant expansion of renewables** (estimate renewable build-out to 30% of capacity by 2030)

Price signal to incent building of cleaner generation within the current market design



Ease of Enforcement and Reliability

- ✓ **Hourly Cap is straightforward to apply and enforce within the existing market.**

Alberta Electric System Operator (AESO) would only dispatch up to 75% of Maximum Capacity of coal unit every hour of the day. Companies can comply across coal portfolio.

- ✓ **In case of reliability issues for Alberta Grid, AESO** could dispatch (order up) full capacity from any or all coal facilities, in emergency circumstances.

- Facility(s) assisting in reliability circumstances would be exempt from penalties arising from generation of additional output during these periods.

- ✓ **No need for complex monitoring, enforcement and penalty regime.**

- AESO would ensure that no generator dispatches above the threshold level in all hours



Easy to administer on a real-time basis

Considering The Alternatives:

Why Hourly Cap and Not Annual Cap

Hourly cap	Annual cap with flexibility
✓ Results in real and measurable GHG reductions immediately. (9 million tonnes of GHGs each year. 45 million through 2020)	X Flexibility that allows for financial compliance <u>does not</u> guarantee real physical GHG reductions
✓ Defined drop in every hour will best help reduce criteria air contaminant (CAC) loading in airsheds during hours of stress e.g. North Saskatchewan airshed	X This approach will likely result in NO drop in CAC levels during the hours of highest pollutant loading on ambient air quality
✓ Price increase estimated at ~1.5 cents/KWh balanced against CAC reductions	X More muted price impact. Price increase estimated at ~0.8 cents/KWh without CAC reduction in critical hours
✓ Clear expectations up front with guaranteed reductions in emissions.	X Annual cap proposals provide opportunity for gaming of the system and could result in higher emissions than expected

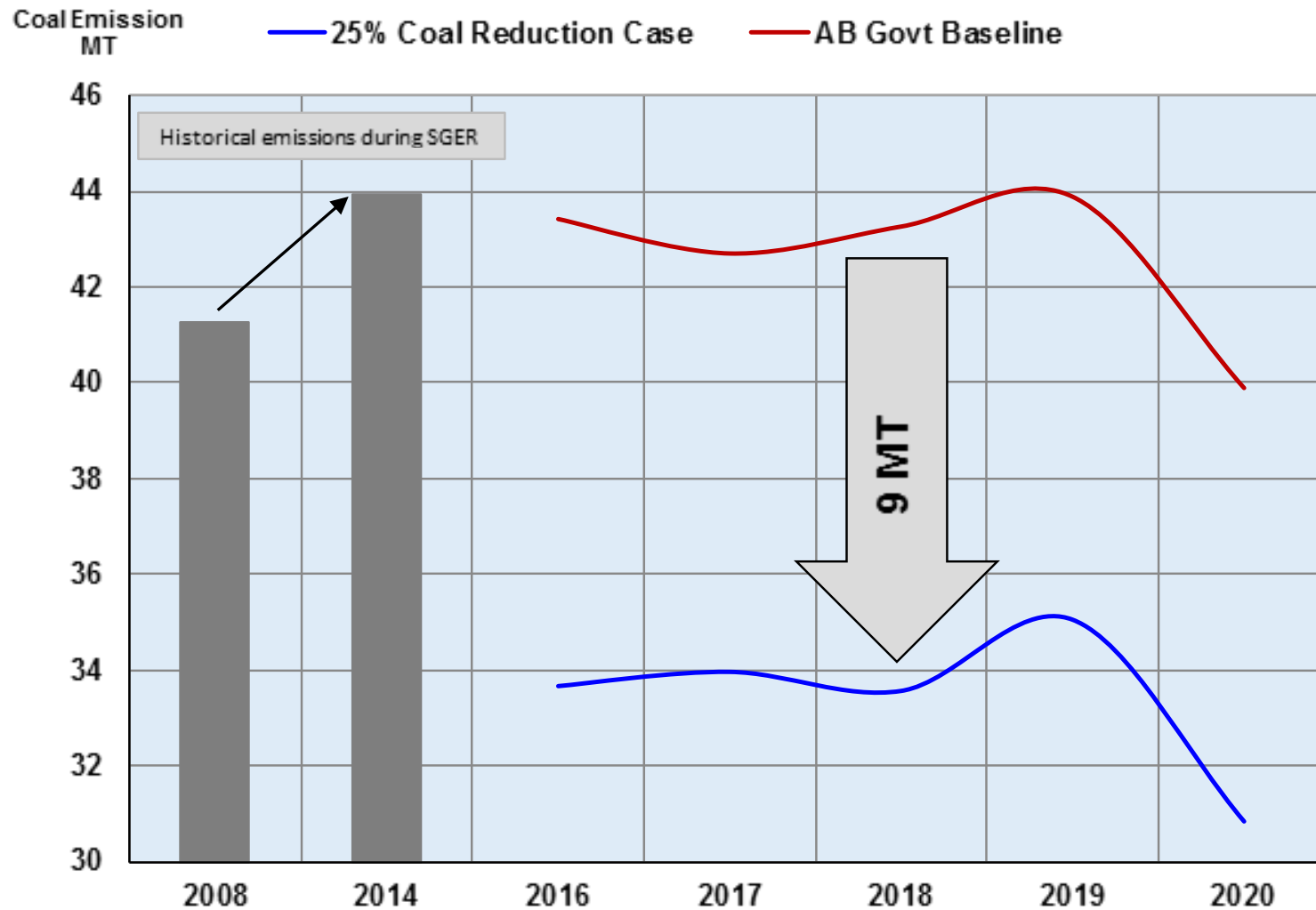
Considering The Alternatives:

Why Hourly Cap and Not Annual Cap?

Hourly cap	Annual cap
✓ Provides space and price signal to incentivize Renewables. Price signal is clear	X Coal will run at 100% capacity during high-price periods making it more difficult for renewables to capture higher price periods
✓ Simple to enforce and monitor through AESO dispatch controls	X Difficult to design in short period and then enforce, would require penalties, multiple year true ups, extensive monitoring, etc.
✓ Simple allocation based on full capacity – treats all players equally	X Difficult to allocate due to self interest of participants (major stumbling block in previous attempt to define this)



Proposal reduces GHGs from coal by 45 MT over 5 yrs.



Replaces Ineffective SGER Framework for Coal



Proposal's Impact on the Pool Price of Electricity

Prices to consumers remain lower than historical level

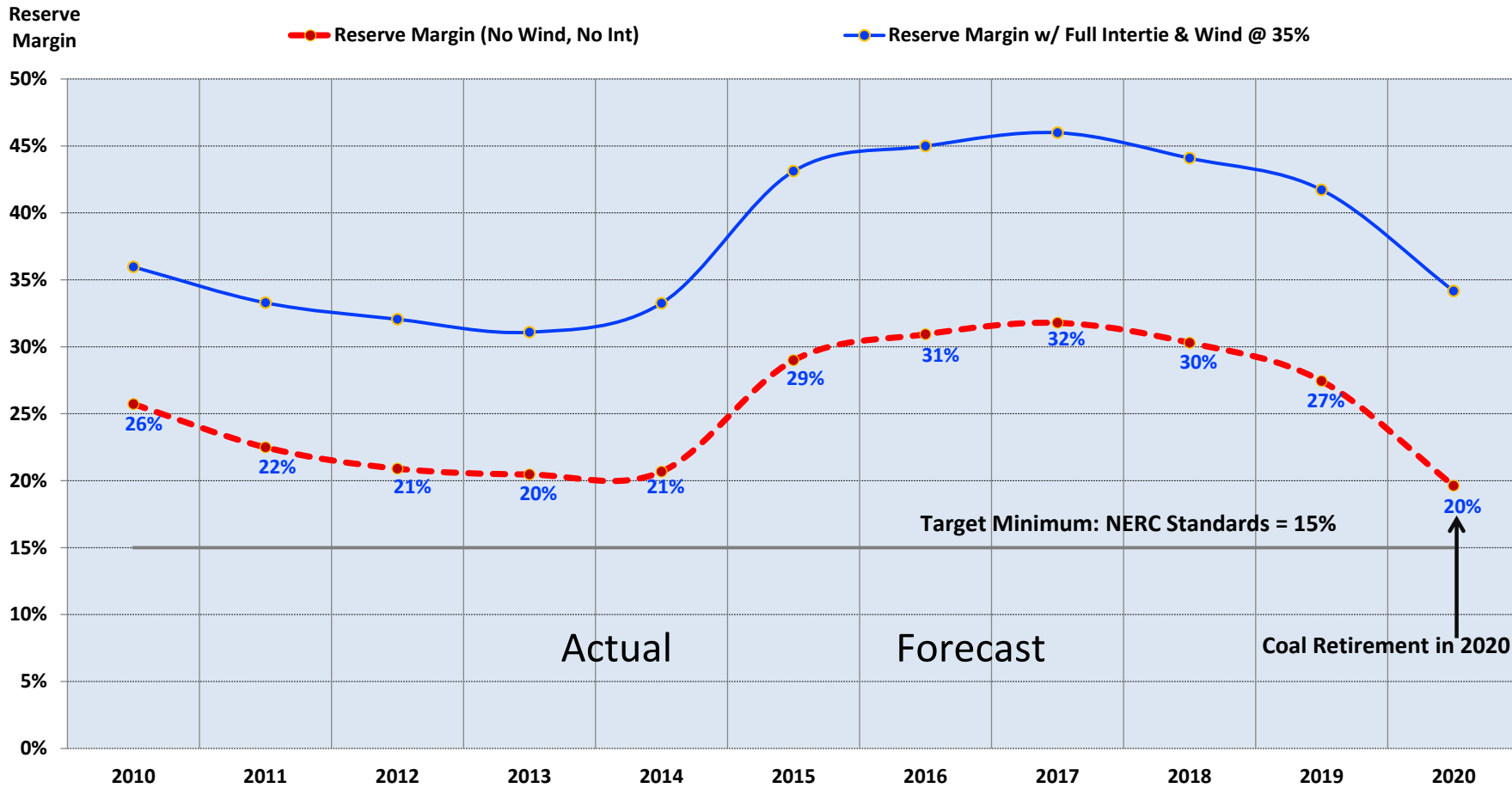
Pool Price increase from Hard Cap Proposal



With implementation of this policy action, the pool price remains below historical system averages- estimated impact is \$15 MWh. For residential customers not on a fixed price contract an increase of 1.5¢/KWh.



Hourly cap has minimal impact on Reliability



Reserve Margin remains healthy and well above the US Federal Electricity Reliability Councils' mandated 15%.



Key Conclusions

Hourly Cap Proposal aligns with **Government climate change strategy objectives**, offers many **advantages and benefits**, and would be efficient to implement and enforce:

- ✓ **Significant Health Benefits** from reduction of CACs
- ✓ **Delivers real and verifiable reductions of GHGs** in all hours.
9 MT/yr or 45 MT through end of 2020
- ✓ Provides **market conditions to support immediate and longer-term deployment of renewables**
- ✓ **Immediate implementation** possible: could be **announced in December in Paris** and **launched in January 2016**
- ✓ **Simple to implement** within existing regulatory and market structure (No need to delay implementation to design & pass legislation to institute a RPS, FIT or CES)
- ✓ Can be done while **keeping prices below historical average**
- ✓ **No compensation from Gov't or its agencies**
- ✓ **Grid reliability maintained**
- ✓ Retirement of coal facilities a full **5 years ahead of Federal regulation**

