

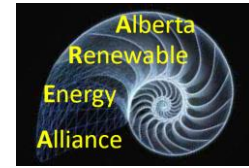
AREA's VISION OF RENEWABLE ENERGY IN ALBERTA BY 2020

VISION

AREA envisions an Alberta where power is supplied entirely by renewable and ecologically sound sources.

MISSION

AREA advances the deployment of renewable power through educational events, political advocacy, and support for installations.



<http://www.abrenewableenergy.ca>

OUR GOALS

- Integrate renewable energy with hydrocarbon energy, establish thousands of local diversified jobs, reduce health costs and advance Alberta's energy leadership on the world stage.
- Increase current renewable power generation to achieve 30% of Alberta's GHG emissions reduction goal by 2020.

TARGETS

1. By 2030 the GHG emission intensity of electricity generation in Alberta should be reduced by 75% from 670 kg CO₂e / MWh to meet the current average Canadian grid intensity of 170 kg CO₂e / MWh (Figure 1);
2. By 2030 coal power units should be progressively phased out. If coal units are permitted to operate for 50 years they will emit 575 million tonnes CO₂e. If coal units are closed after 40 years they will emit 318 million tonnes CO₂e thereby reducing GHG emissions by 45% equal to 257 million tonnes CO₂e (Figure 2);
3. By 2020 power generation in Alberta produced from renewable sources, including energy efficiency, should be increased from 10% to 25% (Figure 3);
4. By 2020 3,650 megawatts of solar, wind, bioenergy, hydro, geothermal, energy storage and energy efficiency should be added to the electricity system to replace reduced coal power. This investment opportunity of \$7.5 billion will create tens of thousands of jobs in a new energy sector;
5. By 2020 energy literacy and renewable energy awareness should be advanced across Alberta through school and public educational programmes;
6. A **20,000 Solar Rooftops by 2020** initiative should be promoted by government/s with a \$1.00 per Watt rebate, up to 3 kilowatts PV (photovoltaic); \$60 million over five years will foster a \$200 million investment in the nascent solar industry and create exponential job growth (Figure 4);
7. The SGER (Specified Gas Emitters Regulation) levy on power generators should be escalated in annual increments of \$3.00 per tonne CO₂e and 3% reduction to reach \$33 per tonne CO₂e on 30% of emissions in excess of the 2003-2005 baseline emission intensity by 2020. SGER fees should be used to pay for *carbon offsets* generated by renewable energy generators *in Alberta* and registered with AEOR; premiums for different renewable energy generators should be awarded via *differential carbon offsets* (outlined on Page 2).

Figure 1

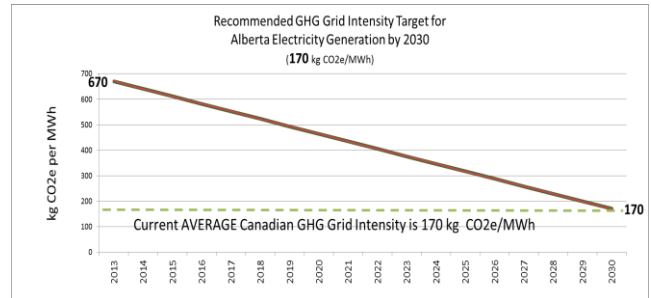


Figure 2

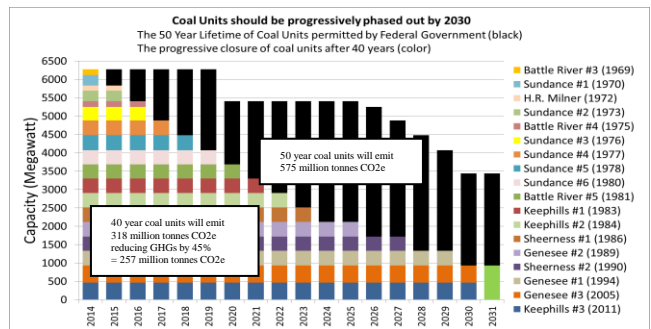


Figure 3

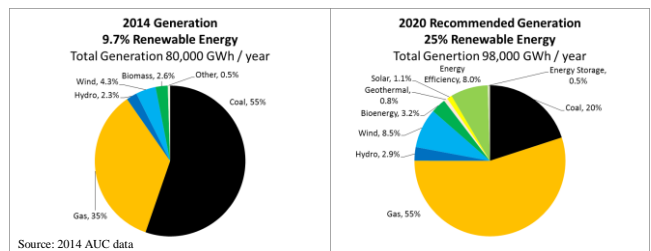
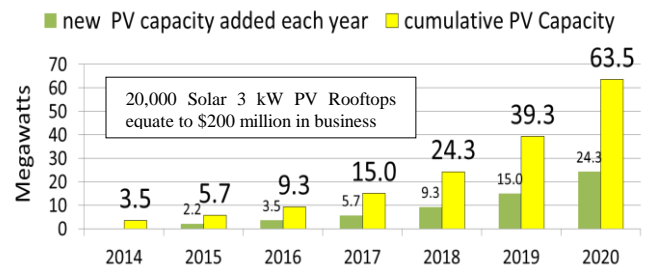


Figure 4



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Overcoming the Capital Cost Barrier of Renewable Energy in Alberta.

One of the main barriers to the deployment of renewable power from wind, solar, hydro, and geothermal power projects is their high capital cost compared to that of gas turbine power generators. Costs for renewable generation range from \$2,000 to \$6,000 per kilowatt while costs for combustion turbines (SCGT or CCGT) range from \$1,000 to \$1,500 per kilowatt. Notwithstanding gas turbines incur continuous operating costs due to the combustion of natural gas fuel, the high capital cost of 'zero fuel' renewable power does not compel investors to support renewable power projects in the absence of incentives.

Another barrier to renewable power deployment in Alberta is the fear of destabilizing the deregulated electricity market if electricity premiums were awarded to renewable power generators in addition to revenues accrued from participation in the power pool.

However, Alberta has in place a regulation that could be used to mitigate the high capital cost of renewable power generation and thereby encourage investors to 'buy in' to the Alberta Advantage. That empowering regulation is known as the SGER (Specified Gas Emitters Regulation), and has within it the tool to support renewable power generation – **the offset market**.

Emitters of GHGs exceeding 50,000 tne CO₂e per year, known as LFEs (Large Final Emitters), are required to report their annual GHG emissions to the Alberta government. LFEs emitting more than 100,000 tonnes CO₂e per year are required to reduce their emissions 12% below a baseline emission intensity established in 2003 to 2005. For those LFEs which exceed 88% of their baseline threshold, three options are available:

1. Purchase EPCs (Emission Performance Credits) from another SGER regulated facility that has achieved GHG reductions greater than 12% and has generated officially verified EPCs;
2. Purchase *Alberta based* carbon offsets generated by facilities or projects *outside of* the SGER regulation and which are registered by the AEOR (Alberta Emissions Offset Registry);
3. Pay a levy of \$15 per tonne CO₂e into the CCEMF (Climate Change and Emissions Management Fund).

The second SGER option, the **offset** option, is the tool which could foster renewable power deployment in Alberta. For example, the Oldman River hydro project generates and registers annual carbon offsets, replacing a fixed electricity grid GHG emission intensity of 0.65 tonnes CO₂e per MWh* with zero emission renewable electricity generation. In any given year the Oldman hydro project generates approximately 80,000 tonnes

CO₂e offsets from the 32 MW hydro project that operates at approximately 43% capacity factor. The carbon offsets are valued at the current SGER price of \$15 per tonne CO₂e; hence the Oldman hydro offsets earn approximately \$1,200,000 per year for the generator.

But the grid emission intensity offset factor (*reduced to 0.59 tne CO₂/MWh in March 2015) is set at such a low level that offset revenues for wind, solar, geothermal and energy storage do not provide a high enough income stream to encourage investment.

The solution to the single low grid offset factor lies in assigning differential offset factors to various renewable energy generators depending on their initial capital cost, capacity factors, and pool prices earned on the spot market. (The Shell CCS project was supported by being awarded *double* offset credits).

Given that the Alberta grid emission intensity is four times higher than the Canadian average due to coal power generation in Alberta, no offset factor should be less than the emission intensity of conventional coal – 1.0 tonne CO₂e per MWh. Establishment of this minimal offset will immediately improve the economics of marginal renewable energy projects. As shown in Table 1, projects such as solar power and electricity storage should receive higher offset factors due to their low capacity factors.

Technology	Capacity (MW)	Investment (\$millions)	Capacity Factor	Offset Factor (tneCO ₂ /MWh)
Wind	1,500	\$3,000	30%	1.0
Solar	800	\$2,000	16%	2.0
Geothermal	100	\$500	80%	1.0
Bioenergy	150	\$600	60%	1.0
Energy Storage	200	\$500	20%	3.0
Hydro	100	\$500	35%	1.0
Energy Efficiency	800	\$400	100%	*0.59
TOTAL	3,650	\$7,500		

AREA recommends that the SGER offsets have a fixed term of ten years after which the only revenues accruing to the renewable power generators will be those earned through participation in the power pool.

This SGER offset protocol can function separately from the Alberta power pool and will not interfere with electricity market dynamics. However the revenues from renewable power offsets will significantly buttress investment in zero emission power generation and will mitigate the risk to developers who wish to invest in low carbon generating projects.

Fees collected from coal and gas power generators via increased SGER levies are estimated to exceed \$3 Billion into the CCEMF by the year 2025. Those sectoral funds should be used to facilitate payment for carbon offsets generated by renewable power generators. Renewable power offsets should be reported in the AEOR registry and adjusted to the regulated grid intensity levels of the day to prevent overstating of GHG reductions.