Website: http://www.abrenewableenergy.ca

A Vision of Renewable Power in Alberta by 2020

Proposed by

Alberta Renewable Energy Alliance

May 5, 2015

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.*

AREA OBJECTIVES

- Integrate renewable energy with hydrocarbon energy, establish thousands of local diversified jobs, reduce health costs, and improve Alberta's energy leadership on the world stage.
- Increase current renewable power generation to reduce cumulative GHG emissions by 46 megatonnes CO2e by 2020

AREA GOALS BY 2020

Goal #1

- Power generation in Alberta provided by renewable energy should be increased from the current 10% to 25%.

Goal #2

- Coal power should be reduced by 2,982 megawatts by closing 40 year old units.

Goal #3

- 3,650 Megawatts of Renewable Energy, Energy Efficiency, and Energy Storage should be added to the electricity system.

Goal #4

- 20,000 rooftop solar photovoltaic systems should be installed across Alberta.

Goal #5

- Electricity generated via renewable energy systems within Alberta should receive differential offset prices in addition to the Alberta Pool prices. Renewable energy should be awarded an offset of at least that of coal ≥ 1.0 tne CO_2e/MWh.

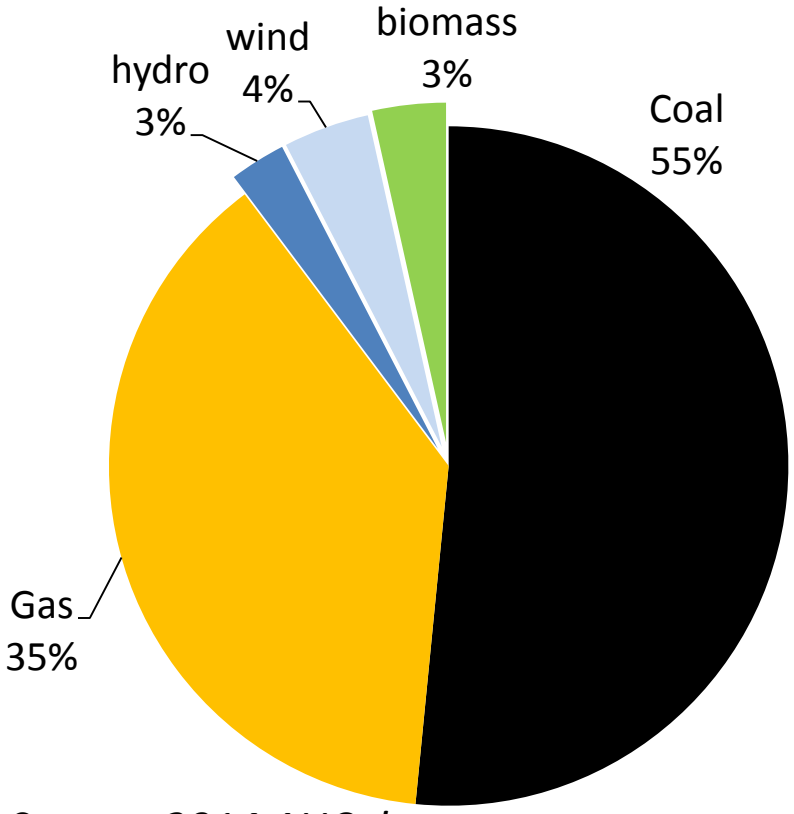
Goal #6

- The levy on final emitters should be escalated annually at $3.00 above the current value of $15/tne CO_2e and 3% beyond the current 12% reduction below the 2003-2005 baseline emission intensity.

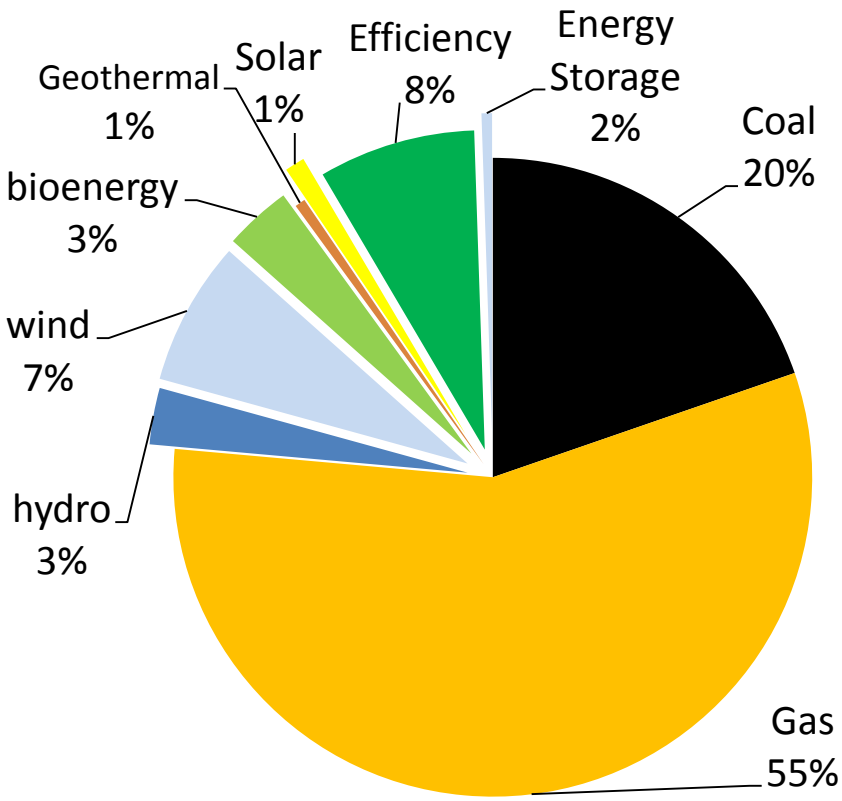
Goal 1 Objective

By 2020, power generation in Alberta provided by renewable energy (including energy efficiency) should be increased from the current 10% to 25%

2014 Generation Mix
10% was Renewable Power
(Total Generation 80,000 GWh / year)



2020 Proposed Generation
25% Renewable Energy
(Total Generation 95,000 GWh / year)



Source: 2014 AUC data

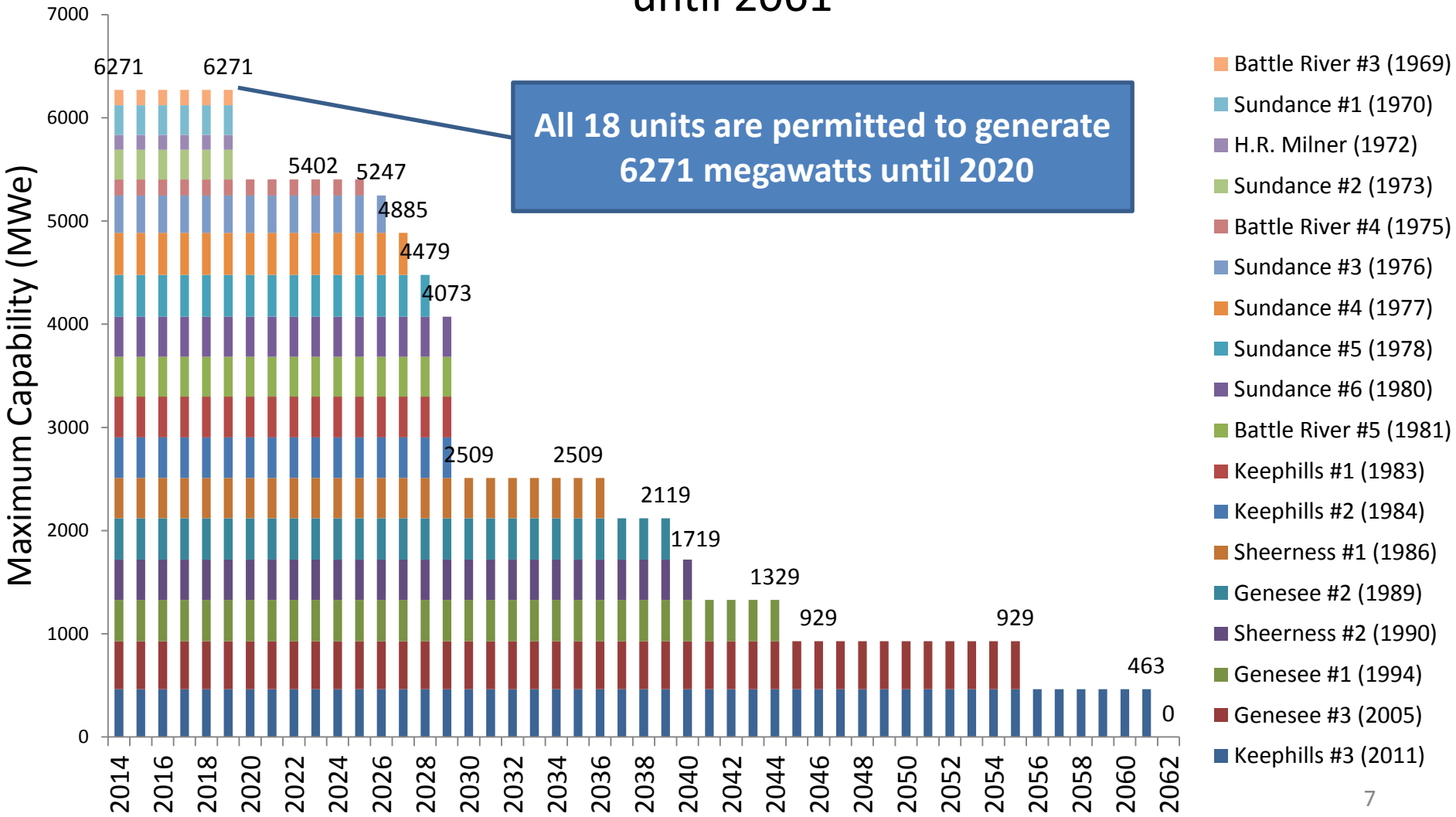
Goal 1 Benefit

More than ***46,000 local diversified jobs*** will be created in a *sustainable* energy sector across Alberta.

Technology	Investment $ Millions	Job Years per $ Million	Job Years* by 2020
Wind	$3,000	4.9	14,700
Solar Electricity	$2,000	7.2	14,400
Energy Efficiency	$400	17.7	7,080
Bioenergy	$600	8.5	5,100
Energy Storage	$500	6.1	3,050
Geothermal	$500	2.6	1,300
Small Hydro	$500	2.3	1,150
TOTAL	$7,500		46,780

*(*estimated applying data from the National Renewable Energy Laboratory)*

The 2012 Federal Coal Regulation Sanctioning 50 year 'Useful' Lifetime allows Alberta Coal Power to operate until 2061

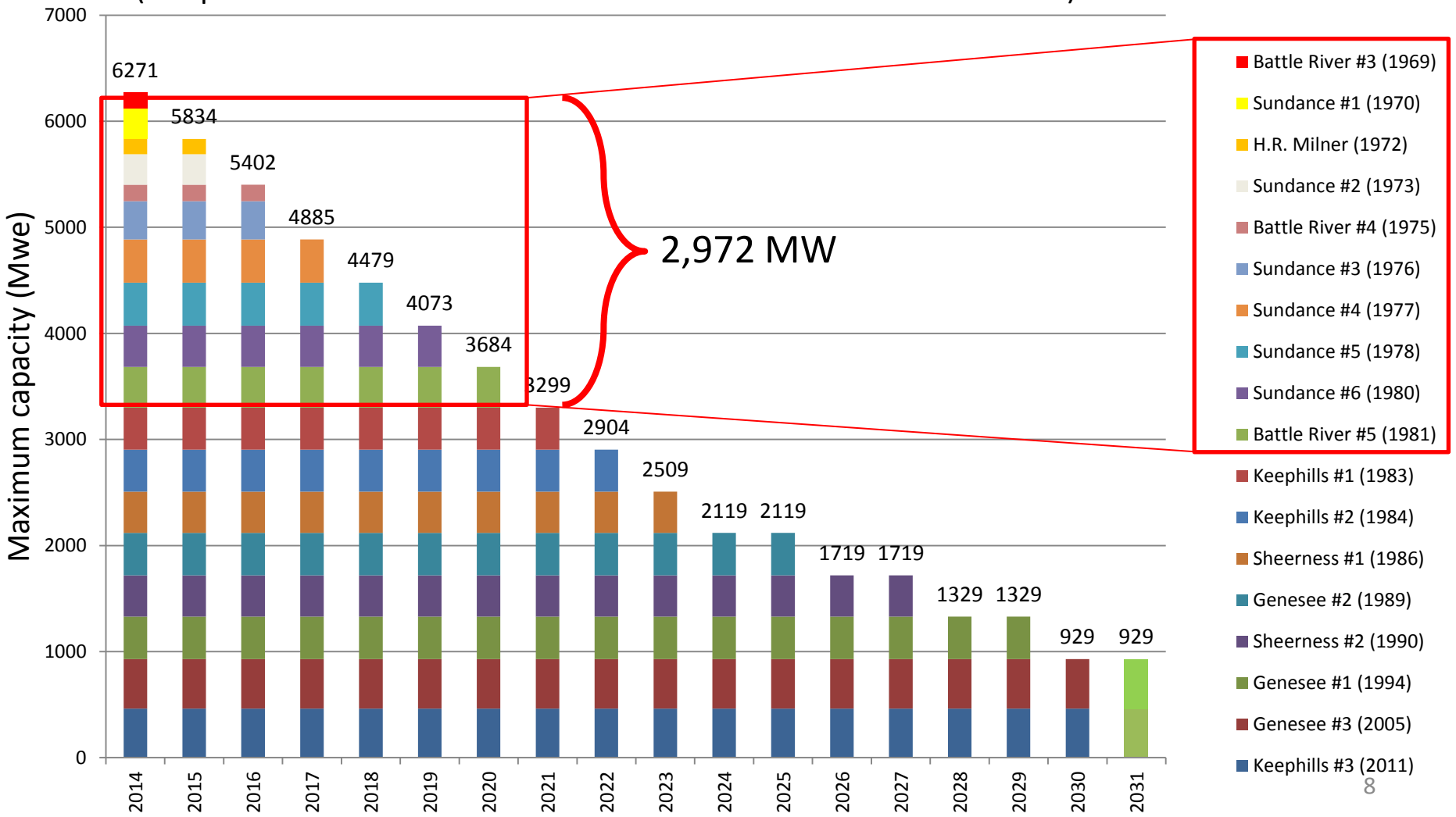


Goal 2 Objective

By December 2020, coal power should be reduced by 2,972 Megawatts by progressively closing ten coal units that have been operating for 40 years.

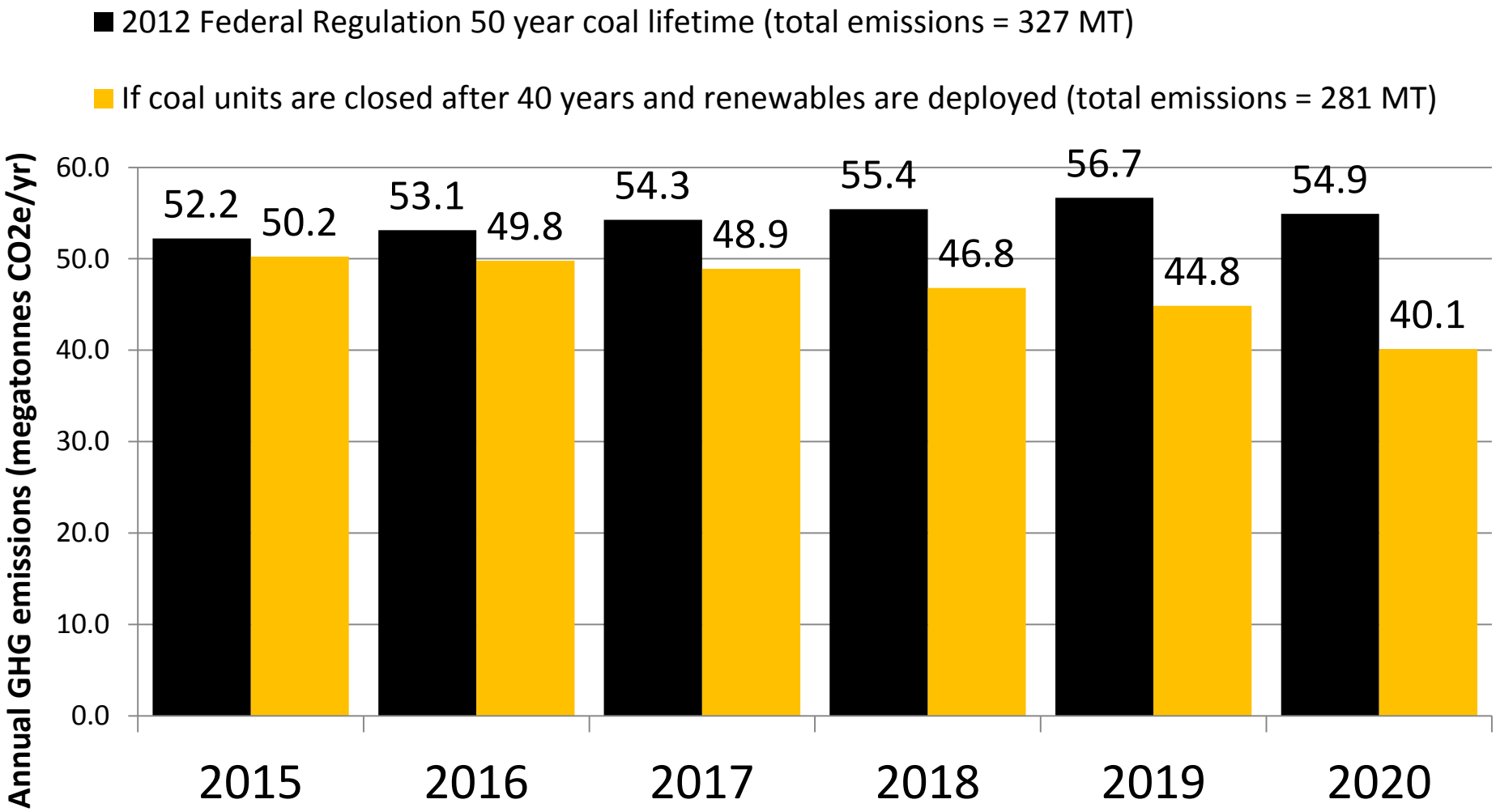
All Coal Units should be closed by 2030

(2 supercritical units should be converted to low carbon fuels in 2031)



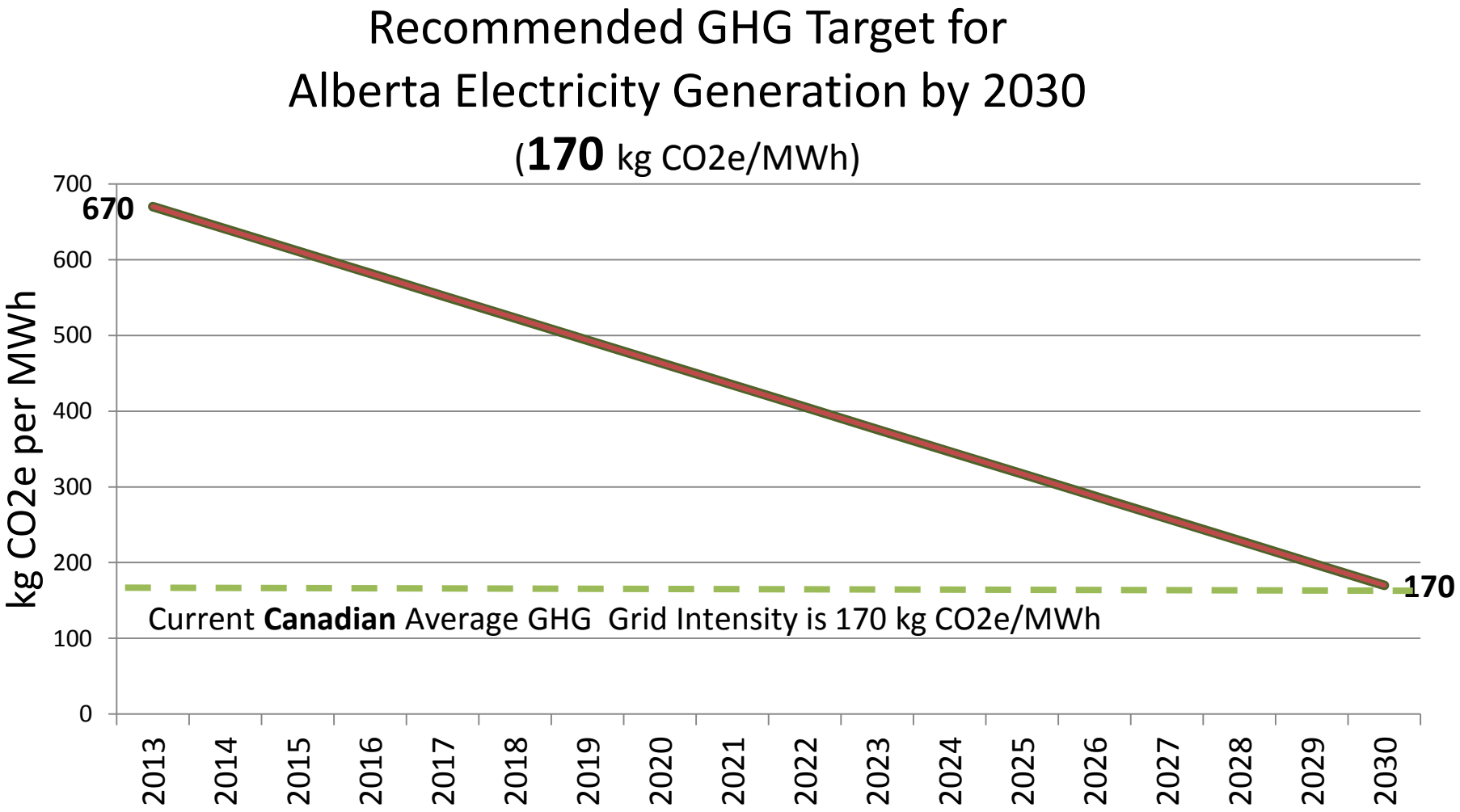
Goal 2 Benefit

Shuttering ten coal units by 2020 will reduce cumulative GHG grid emissions from 327 megatonnes to 281 megatonnes.



Goal 2 Benefit

Progressively shuttering coal units and adding renewable energy will reduce power generation GHG intensity **75% by 2030**



Goal 2 Benefit (continued)

Reducing coal power capacity by 50% by 2020:

will yield a significant reduction in impacts to health from criteria air contaminants NOx, SOx, mercury, and particulate matter; (and a toxic mixture of elements and compounds of lead, cadmium, dioxins and furans, hexachlorobenzene, arsenic, PAHs, and ground-level ozone)

**Coal emissions are estimated to cause more than 100 premature deaths and more than 4,800 asthma symptom days in Alberta annually.*
Models estimate that total economic damages in Alberta associated with the health impacts of air pollution from coal plants are in the range of $300 million annually.

**Source: Canadian Association of Physicians for the Environment*
Asthma Society of Canada
The Lung Association (Alberta and NWT)

Goal 3 Objective

3,650 Megawatts of Renewable Energy, Energy Efficiency, and Energy Storage should be **added** to the electricity system to replace ten coal units which should be decommissioned by 2020.

Technology	Capacity (MW)	*Investment ($ millions)
Wind	1,500	$3,000
Energy Efficiency	800	$400
Solar Electricity	800	$2,000
Energy Storage	200	$500
Bioenergy	150	$600
Hydro	100	$500
Geothermal	100	$500
TOTAL	**3,650**	**$7,500**

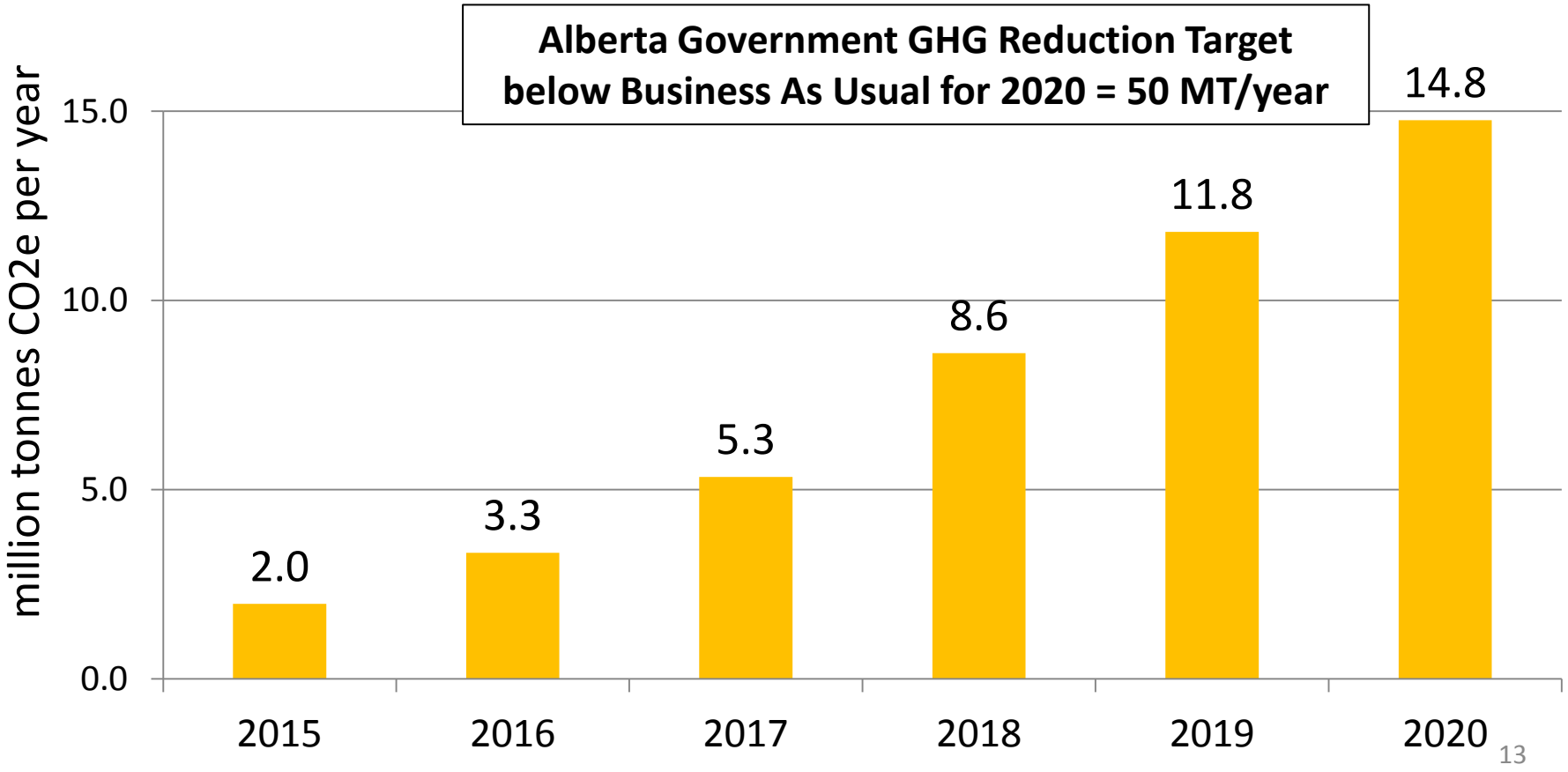
*estimated applying capital cost per MW information from NREL

Goal 3 Benefit

Replacing ten coal units with ***zero emission*** renewable energy by 2020 will achieve **cumulative** CO2e reductions of 46 megatonnes.

GHG reductions if coal units are decommissioned after 40 years as opposed to 50 years

(MT CO2e per year)

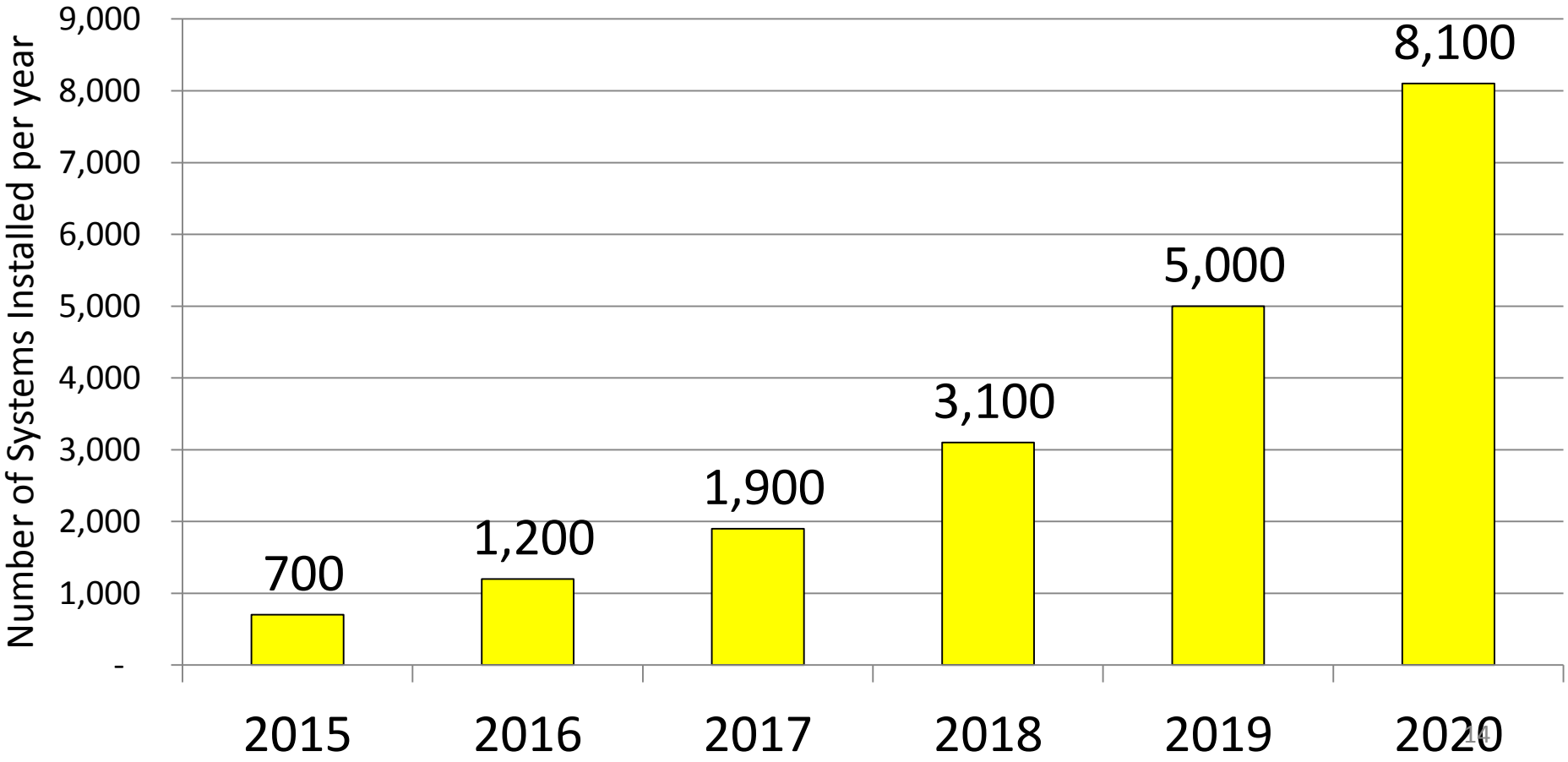


Goal 4 Objective

20,000 residential and commercial rooftop solar photovoltaic systems should be installed across Alberta by 2020.

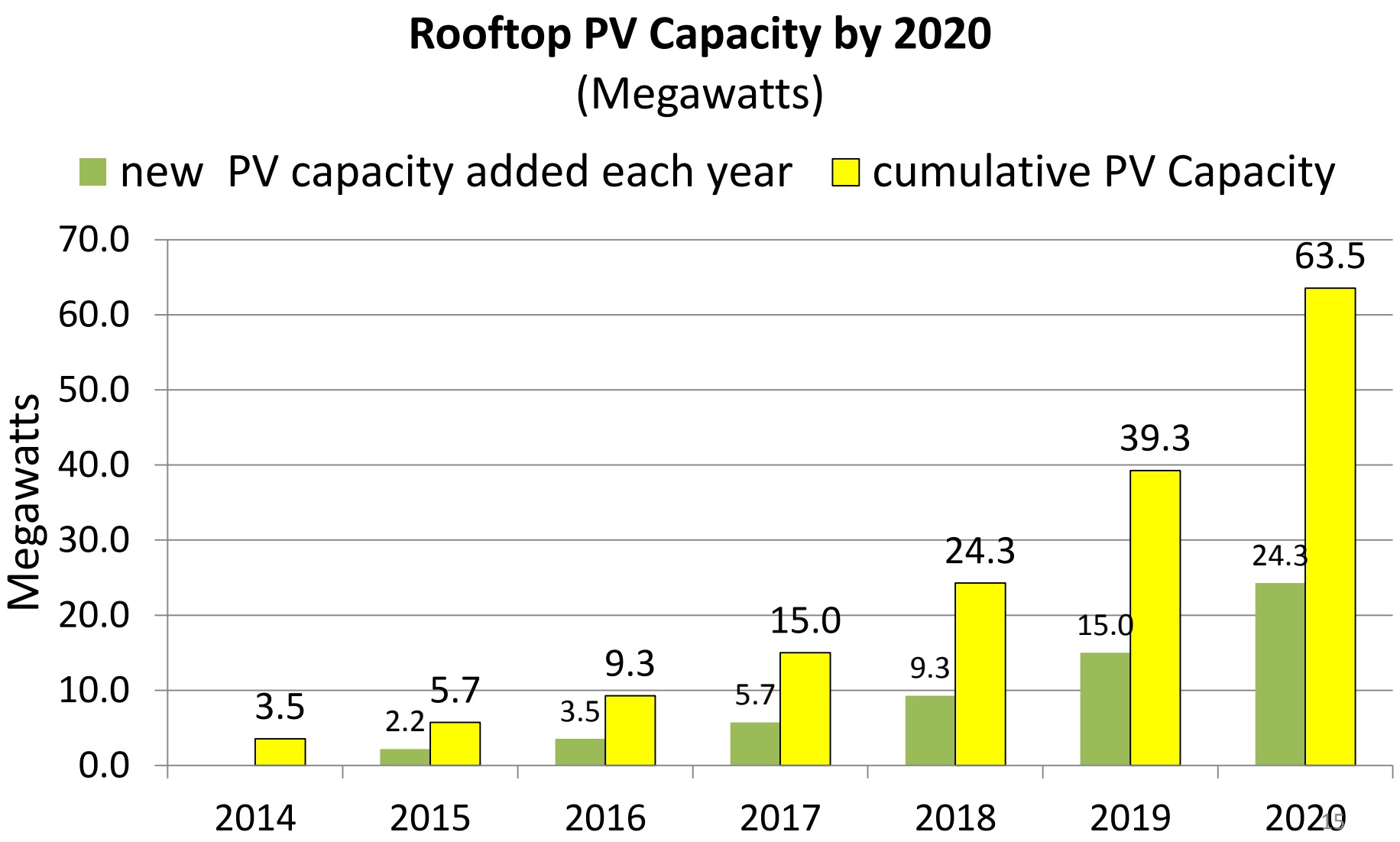
Number of rooftop PV systems installed annually

(Average system capacity = 3 kWdc)



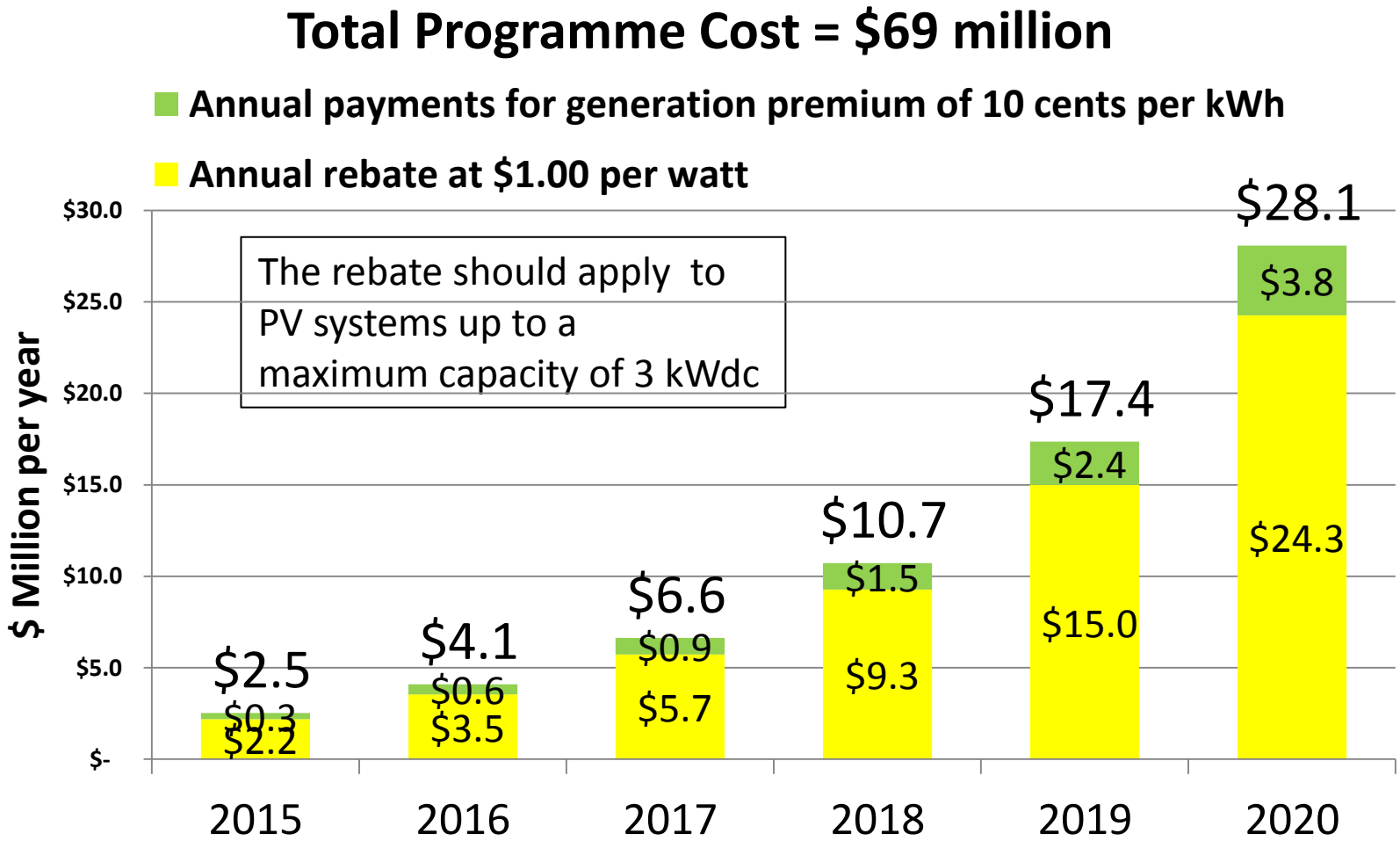
Goal 4 Benefit

By 2020, **60 Megawatts** of highly visible solar photovoltaic capacity will have been added to rooftops across Alberta.



Goal 4 Benefit continued

The programme should be supported by the government via a $1.00 per installed watt rebate (up to 3 kWdc) and a 10 cents per kWh generation payment premium, *in addition to* the energy retail price of electricity.



Goal 5 Objective

Electricity generated via renewable energy systems *within* *Alberta* should receive differential enriched Offset Prices in a ten year PPA , in addition to the Alberta Pool price.

Current SGER offset is too low

1 MWh of renewable energy (e.g. wind power) generates 0.59 tne CO2e grid emission offset.

At $15 /tne CO2e the maximum value per MWh of renewable power = 0.59 x $15 = $8.85 per MWh, or a minimal incentive of $0.0089 per kWh for **all** renewable power technologies

Enriched Offset prices are needed

The current *single* SGER offset price is not high enough to incent investment in renewable energy in Alberta.

Differential increased offset prices, fixed in the form of a ten year PPA, would encourage investment in varying renewable energy projects ***within*** Alberta.

Renewables should be awarded offsets ≥ coal of 1.0 tne CO2/MWh

Goal 5 Benefit

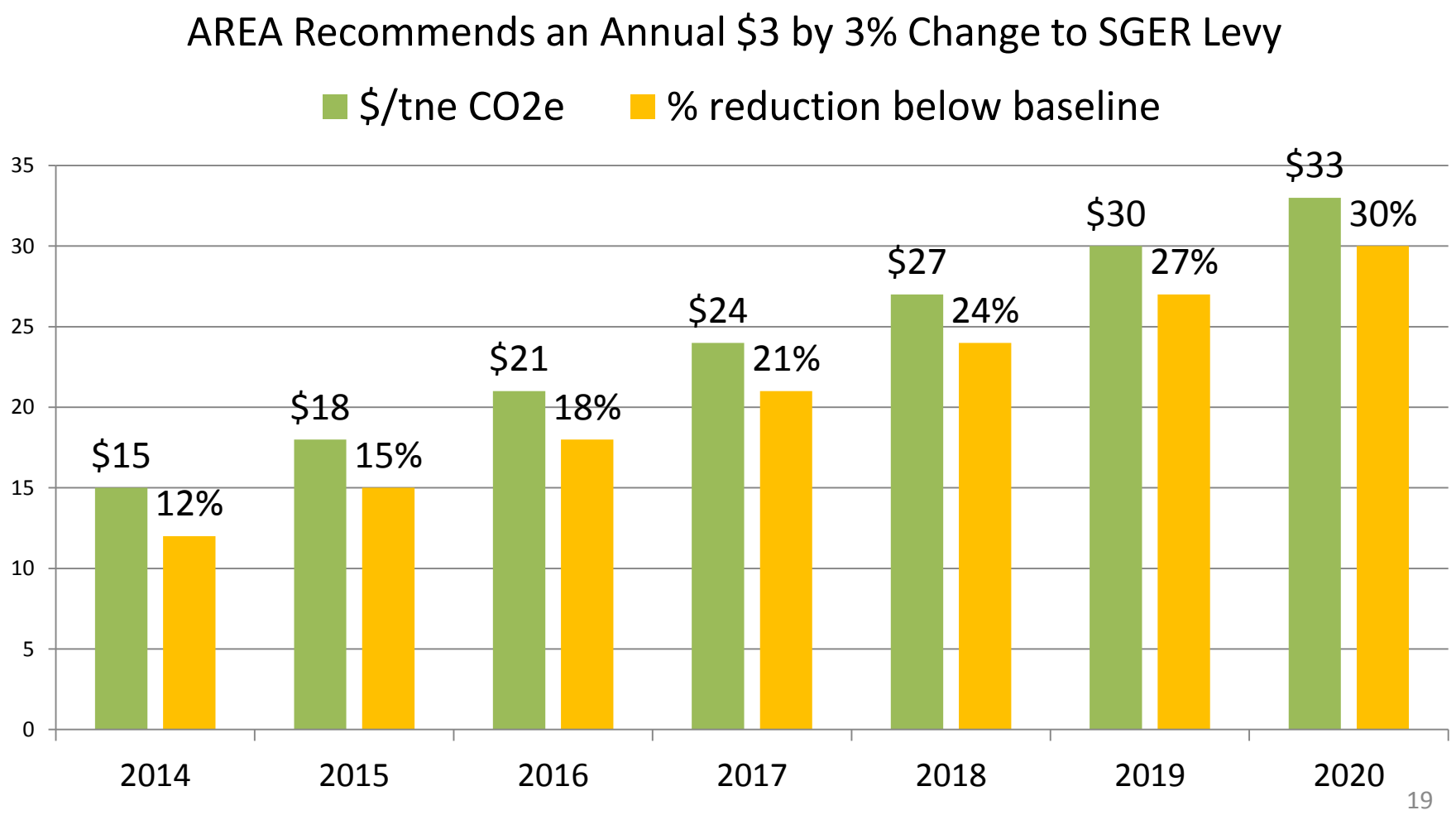
Enriched and differential offset prices should be paid via a ten year PPA (Power Purchase Arrangement), in addition to the Hourly Wholesale Market Price (pool price). Offsets should be purchased by the AEOR.

PPA Offset Premiums should be set to enable equity payback on technology investment in less than 10 years, or yield an internal rate of return ranging between 6% to 10%;

TECHNOLOGY	Added Capacity (MW)	Capacity Factor	Capital Cost $ / Watt	Differential Offset Prices ($/MWh)
Wind	1,500	30%	$2.00	**$30**
Energy Efficiency	800	100%	$0.50	**$10**
Solar Electricity	800	16%	$2.50	**$70**
Energy Storage	200	20%	$2.50	**$80**
Bioenergy	150	50%	$4.00	**$20**
Hydro	100	35%	$5.00	**$70**
Geothermal	100	70%	$5.00	**$30**

Goal 6 Objective

The levy on power generation emissions should be escalated ***annually*** until 2020 as follows: $3.00 above the current value of $15/tne CO2e; and 3% beyond the current 12% reduction below the 2003 to 2005 baseline emissions intensity.



Goal 6 Objective continued

The annual $3.00 and 3% increase to the current $15/tne CO2e and the 12% reduction below baseline SGER levy should be applied as well to final emitters **exceeding 50,000 tonnes** CO2e per year.

Currently, the levy is applied only to emitters exceeding 100,000 tonnes CO2e per year.

Emitters exceeding 50,000 tonnes CO2e per year have been required to report annual emissions since 2010.

These emitters should be required to participate in the SGER GHG reduction protocol, using their reported emission intensities since 2010 as baseline.

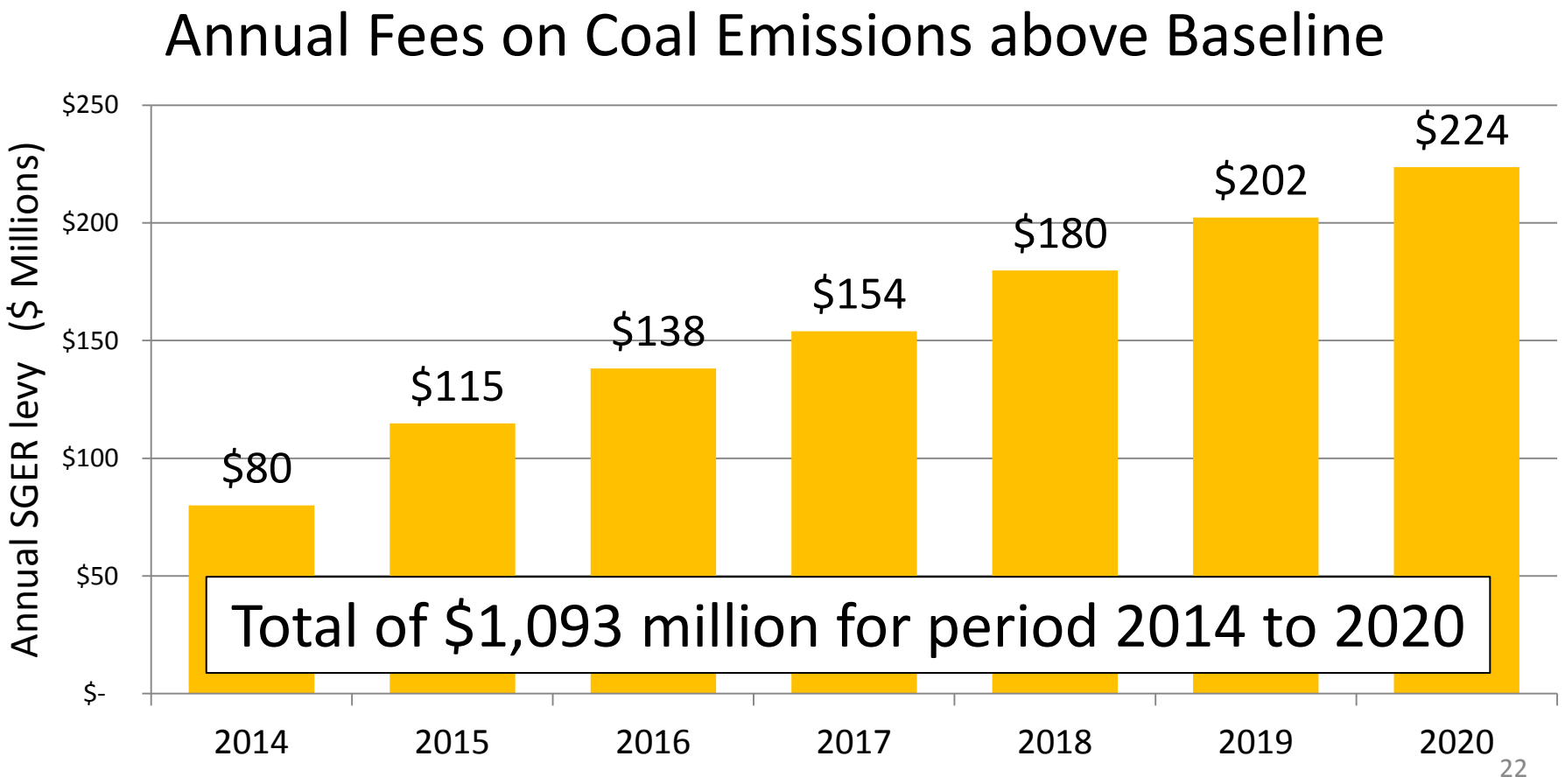
Goal 6 Benefit

An ***annual*** 'three by three' progressive levy will lessen the impact of the GOA draft 2014 'double double' option of $30 /tne CO2e and 24% reduction below baseline which would immediately quadruple the current levy.

AREA proposal	$/tne CO2e	% Reduction below Baseline	Effective Levy on *all* GHG emissions ($/total tonnes)
2014	$ 15.00	12%	$ 1.80
2015	$ 18.00	15%	$ 2.70
2016	$ 21.00	18%	$ 3.78
2017	$ 24.00	21%	$ 5.04
2018	$ 27.00	24%	$ 6.48
2019	$ 30.00	27%	$ 8.10
2020	$ 33.00	30%	$ 9.90

Goal 6 Benefit continued

An annual $3 by 3% SGER increase will progressively raise the amount of funding to **$1,093 Million** from **coal** power levies that should be appropriated to incent an investment of **$7.5 Billion** for proven, renewable and ecologically sound power generation technologies.



RECAP OF AREA GOALS BY 2020

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For further information

contact AREA via email at

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