Renewable Energy Development in Alberta

- September 12, 2020

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Outline

- Latest News
- Wind Energy
- Solar Energy
- Current Projects in Alberta
- Policy and Law
- My Thoughts

Latest News

Massive 340,000-panel solar farm to take flight at Edmonton International Airport

Lauren Boothby
Jul 07, 2020 • Last Updated 3 days ago • 1 minute read

A massive renewable energy project roughly the size of 313 CFL football fields could be arriving in Edmonton by the end of 2022.

Edmonton International Airport announced Tuesday plans to build a 627-acre, 120-megawatt solar farm — enough energy to power 27,000 or 28,000 homes — on the west side of its lands as part of an agreement with European-based renewable energy company Alpin Sun. Solar power from the farm would feed into Fortis Alberta and the airport.

If approved by local, provincial, and federal regulators including NAV Canada, construction is expected to begin early 2022 and the farm would be operational by the end of the year. Building the project would create 120 jobs for a year, with up to 250 jobs at its peak.

Latest News

Construction of Canada's largest solar farm in Alberta is poised to proceed with the infusion of $500 million from a Denmark-based investment group.

The decision by the world's large renewable energy fund, Copenhagen Infrastructure Partners, to bring global investors into the 1,900-hectare project on farmland near the village of Lomond in Vulcan County is a watershed for the industry, said Dan Balaban of Calgary-based Greengate Power Corp.

The Travers Solar Energy Project, to be one of the world's largest, will feature 1.5 million panels set amid grazing land. It should begin taking shape in the middle of this year and be completed in late 2021, he said.

It's projected to produce 400 MW (megawatts) of electricity with the potential of powering 100,000 homes and creating 500 full-time jobs during construction. The next-largest solar farm is in Ontario, with a capacity of 100 MW.

Latest News

RBC, Bullfrog Power and BlueEarth Renewables sign Power Purchase Agreement

THE POWER PURCHASE AGREEMENT IS THE FIRST OF ITS KIND FOR A CANADIAN FINANCIAL INSTITUTION AND WILL DIRECTLY SUPPORT THE CONSTRUCTION OF TWO NEW UTILITY-SCALE SOLAR FARMS IN THE FORTY MILE COUNTY IN ALBERTA.

July 28, 2020 AEN Staff News

Latest News

Alberta signs on to help develop nuclear reactor technology

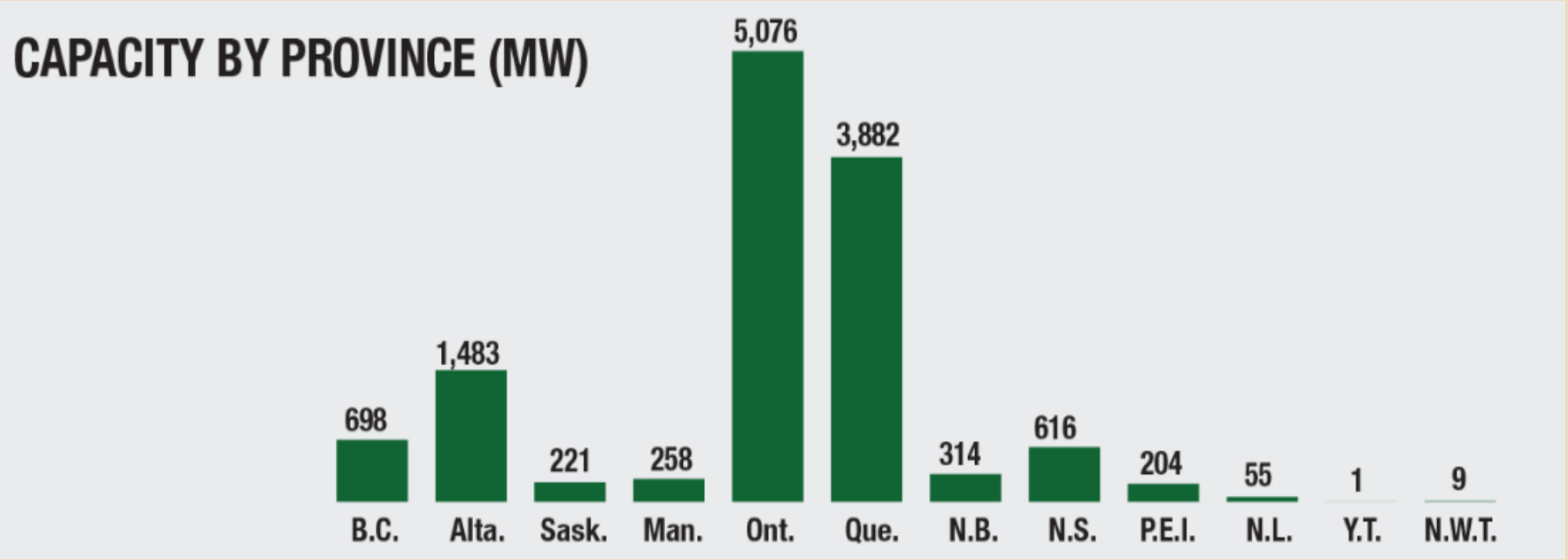
Province joins Ontario, Saskatchewan and New Brunswick in agreement on small modular reactors

Premier Jason Kenney announced Friday that his United Conservative government will sign on to an existing memorandum of understanding with Ontario, Saskatchewan and New Brunswick.

CBC

Wind Energy

Wind Capacity in Canada



Source: Canwea

Comparisons of Wind Capacity

Source: Canwea

WIND STUDIES AND LAND CONTROL	100%
SITE STUDIES AND PERMITTING	90%
ENGINEERING AND DESIGN	85%
CONSTRUCTION	0%
OPERATION	0%

OPERATING DATA

Rated power	4,000 kW/4,200 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	25 m/s
Re cut-in wind speed	23 m/s
Wind class	IEC IIB/IEC S

Standard operating temperature range from -20°C* to +45°C with de-rating above 30°C (4,000 kW)

*subject to different temperature options

SOUND POWER

Maximum	103.9 dB(A)**

**Sound Optimised modes dependent on site and country

Source: Alberta Wind Energy Corporation

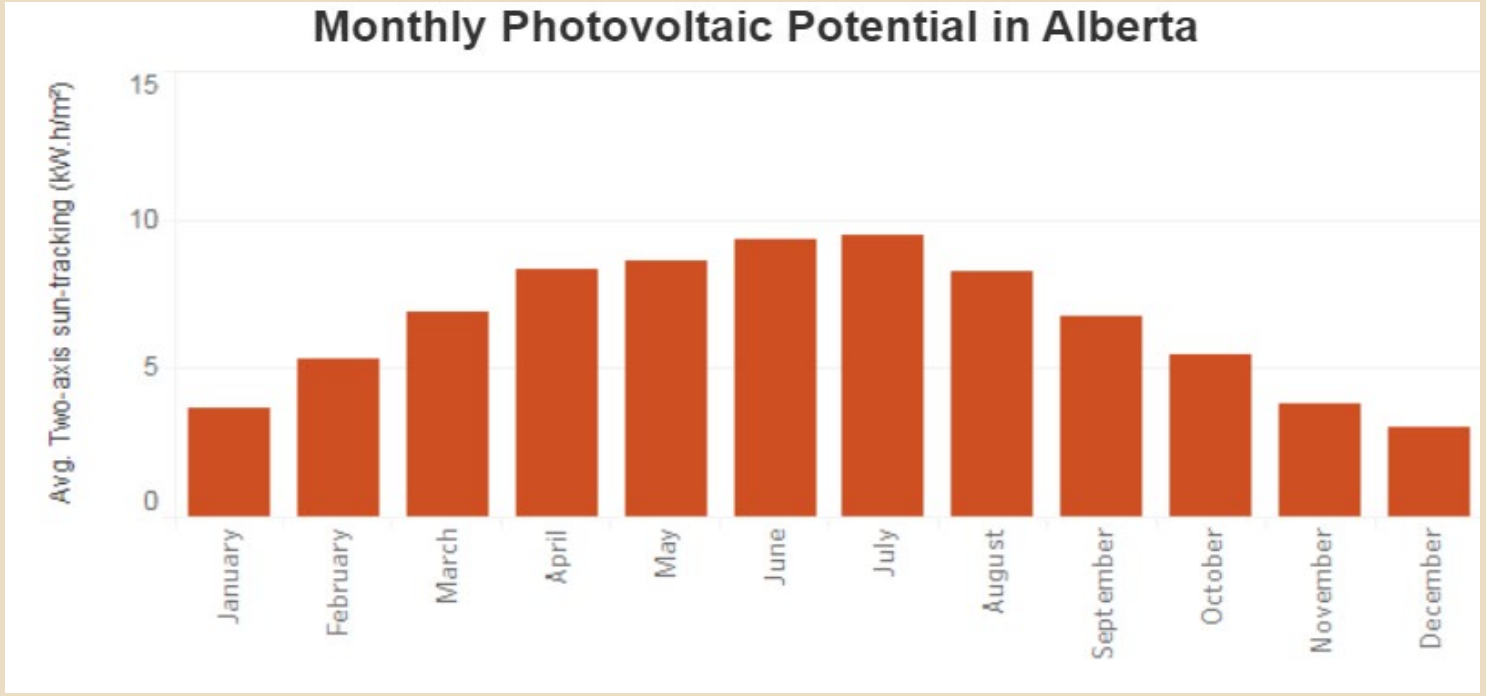
September 12, 2020

Solar Energy

Solar Company – Services and Duties

- Annual and monthly reporting
- Performance verification
- SCADA and communications system maintenance
- Meteorological station (pyranometer and anemometer) maintenance
- Ground circuit inspection and testing
- Inverter:
  - Calibration
  - Cleaning and filter replacement
  - Power and communications verification
  - Software and hardware upgrades
  - Thermal imaging
  - Torque verification
  - All preventative and reactive maintenance
- Mechanical:
  - Torque verification
  - Tracking system maintenance
  - Conduit and fitting integrity inspection

Photovoltaic Potential in Alberta



Major City	Average PV Potential (kW.h/m²)
Regina, Saskatchewan	7.15
Saskatoon, Saskatchewan	7.10
Calgary, Alberta	6.70
Winnipeg, Manitoba	6.61
Edmonton, Alberta	6.50
Yellowknife, Northwest Territories	6.18
Ottawa, Ontario	6.09
Montréal, Quebec	6.04
Toronto, Ontario	5.94
Mississauga, Ontario	5.93
Fredericton, New Brunswick	5.76
Québec, Quebec	5.75
Saint John, New Brunswick	5.68
Victoria, British Columbia	5.68

Source: Canada Energy Regulator

Alberta Utilities Commission (AUC)

AUC
Alberta Utilities Commission
www.auc.ab.ca

Calgary office
1400, 600 Third Avenue S.W.
Calgary, Alberta
T2P 0G5

Edmonton office
Tenth Floor, 10055 106 Street
Edmonton, Alberta
T5J 2Y2

Notice of application
Barlow Solar Park

Barlow Solar Park Ltd. has filed an application for a solar power plant in the city of Calgary

Proceeding 25690
Application 25690-A001

The Alberta Utilities Commission (AUC), the independent utilities regulator, will be considering the power plant development application in Proceeding 25690. If you feel you may be affected by this application you can provide input to the AUC to review before it makes its decision.

Written submissions are due August 25, 2020.

Barlow Solar Park Ltd. has applied to construct and operate a 27-megawatt solar power plant. The proposed power plant would be located west of Barlow Trail and north of 114 Avenue in the southeast part of Calgary, within the southeast quarter of Section 16, Township 23, Range 29, west of the Fourth Meridian. The proposed power plant would consist of 1,500 rack-mounted solar photovoltaic tables on a brownfield site. The application has been filed under the *Hydro and Electric Energy Act*.

Southern Alberta – Burdett Solar Project

Project Schedule:

- Alberta Utilities Commission (AUC) Approval – completed
- AUC Permit Administrative Amendments – completed
- Municipal Development Permit – completed (extension received May 2020)
- Project Construction – expected to begin August 2020
- Commercial Operations – April 2021 (expected)

The Project is expected to be operational in April 2021.

STAGE: Development

TECHNOLOGIES: Utility-scale solar

CAPACITY: 20 MW

POWER SALES: PPA with Bullfrog Power and the Royal Bank of Canada

Source: Blu Earth Renewables

As of Today

NextEra Energy is securing land for a solar-plus-storage project near Kansas City that would be one of the largest of its kind in the country.

The world's largest renewable energy developer is acquiring property in Kansas for a mega-project that would combine hundreds of megawatts of solar and storage capacity.

A spokesperson for NextEra Energy confirmed the company is seeking land near Kansas City for a project that could include up to 500 MW each of solar and storage capacity, making it among the largest such projects in the country.

"Amazing," said Zack Pistora, who represents the Sierra Club in Kansas. "It's one thing to have a solar farm that spans 3,500 acres. But the storage is the real game-changer in my mind."

Policy and Law

Some of Alberta's Renewable Laws

- Energy Efficiency Alberta Act

As announced June 11, 2020 by the Government of Alberta, Energy Efficiency Alberta will be dissolved Sept. 30, 2020 and our programs integrated into Emissions Reduction Alberta and other entities.

- Hydro and Electric Energy Act (RSA 2000)
- Renewable Electricity Act (SA 2016)
- Emissions Management and Climate Resilience Act (SA 2003)
- Responsible Energy Development Act (SA 2012)
- Environmental Protection and Enhancement Act (RSA 2000)

Province of Alberta

RENEWABLE ELECTRICITY ACT

Statutes of Alberta, 2016
Chapter R-16.5

Current as of January 1, 2020

(l) "renewable energy resource" means an energy resource that occurs naturally and that can be replenished or renewed within a human lifespan, including, but not limited to,

(i) moving water,

(ii) wind,

(iii) heat from the earth,

(iv) sunlight, and

(v) sustainable biomass.

Administration of renewable electricity support agreements

9 The ISO shall

(a) administer the renewable electricity support agreements that have been entered into,

Renewable electric energy targets, ministerial duties

2(1) A target is established that at least 30% of the electric energy produced in Alberta, measured on an annual basis, will be produced from renewable energy resources.

Source: Alberta Queen's Printer

Province of Alberta

EMISSIONS MANAGEMENT AND CLIMATE RESILIENCE ACT

RENEWABLE FUELS STANDARD REGULATION

Alberta Regulation 29/2010

(w) "renewable-blended fuel" means

(i) aviation fuel or gasoline fuel that is blended with qualifying renewable alcohol, and

(ii) aviation fuel or diesel that is blended with qualifying bio-based diesel;

Part 1
Renewable Fuels Standard and Requirements

Renewable fuel content of gasoline and diesel

2(1) A fuel supplier must ensure that the gasoline fuel that it places in the Alberta market in a compliance period contains, on

average, no less than 5% qualifying renewable alcohol content

Qualifying renewable fuels

3(1) A fuel is qualifying renewable alcohol if the fuel

(a) is produced from one or more renewable fuel feedstock types,

(t) "renewable fuel feedstock types" means

(i) vegetable or other plant materials,

(ii) animal materials or waste,

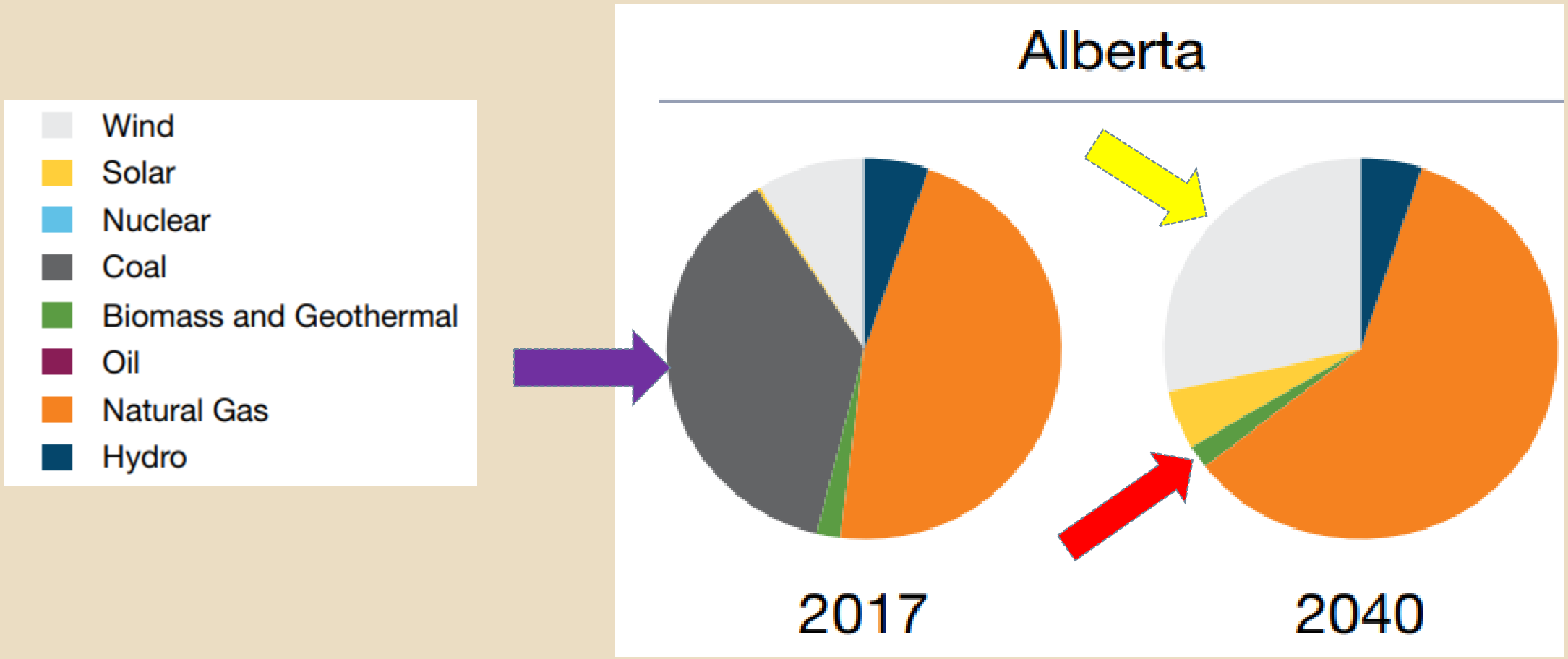
(iii) algae,

(iv) fungi, and

(v) municipal waste materials, if the ma

Source: Alberta Queen's Printer

GHG Emissions in Alberta (Projections 2017-2040)



Source: Canada Energy Regulator

Current Trends and Tech Innovations

Green Hydrogen – The Hydrogen Market

- Hydrogen is touted as the future of energy.
  - It is the oldest element in the universe – but found only as a compound, not by itself.
- Green hydrogen (H_2) is produced from electrolysis, using renewable energy (solar, wind, etc.) and water.
- The benefits are:
  - Hydrogen can be stored for long-term usage.
  - Hydrogen can decarbonize industrial and transportation sectors
  - Hydrogen can power Fuel Cell Vehicles (FCVs)

Blending Hydrogen with Natural Gas

- In a first of its kind project for Alberta, ATCO will blend hydrogen into a subsection of its Fort Saskatchewan natural gas distribution system at a concentration of 5 percent (by volume).
- Because combustion of hydrogen emits only water, blending hydrogen into natural gas reduces the greenhouse gas (GHG) intensity of the natural gas stream.
- Emissions Reduction Alberta (ERA) invested $2.8 million toward this project worth $5.7 million.

Source: Emissions Reduction Alberta

Emissions Reduction Alberta (ERA)

- ERA is an Alberta agency created in 2009.
- It invests in pilot projects dealing with innovative, clean technologies for deployment, thereby meeting climate change goals.
- There are funding partners for projects that diversify Alberta's energy portfolio.

PROJECTS TO DATE	ERA FUNDING	PROJECTS TOTAL	GHG REDUCTIONS
183	$607M	$4.1B	34,800,000

Source: Emissions Reduction Alberta

ERA Areas of Focus

CLEANER OIL & GAS

Transformative technologies and innovation to reduce the GHG footprint of Alberta's fossil fuel supply chain and explore alternative fuel and value-add opportunities that can help sustainability grow and diversify the province's energy economy.

LOW EMITTING ELECTRICITY SYSTEM

Technology and innovation to support a reliable, lower carbon electricity system, including reducing the GHG footprint of Alberta's electricity supply mix, increasing the deployment of renewable energy, and enabling a smarter electricity grid that can power Alberta's homes and businesses.

FOOD, FIBRE, & BIOINDUSTRIES

Innovation processes and technologies to advance Alberta's bioeconomy, and reduce GHG's, including novel agriculture and forestry practices; bioenergy and biomaterials; waste management and waste energy; and enhanced carbon retention.

LOW-CARBON INDUSTRIAL PROCESSES & PRODUCTS

Technologies to deliver GHG reductions through energy efficiency, industrial process innovation, and low-GHG materials and chemicals.

Source: Emissions Reduction Alberta (ERA)

Some ERA Projects in Alberta

ALGAE BASED BIOMASS FOR PRODUCTION OF FUELS AND CHEMICALS

University of Alberta

PROJECT TYPE	PROJECT VALUE	PROJECT STATUS	LOCATION	FUNDING AMOUNT
Research & Development	$426,000	Complete	Edmonton, AB	$86,250

A NEW WAVE IN HYDROGEN PRODUCTION

Standing Wave Reformers Inc.

PROJECT TYPE	PROJECT VALUE	PROJECT STATUS	LOCATION	FUNDING AMOUNT
Research & Development	$8,200,000	Contribution Agreement	Calgary, AB	$3,000,000

Source: Emissions Reductiion Alberta

Alberta Innovates

- This provincial agency researches emerging technologies, and provides funding to enable commercialization.

Source: Alberta Innovates

Alberta Innovates - Projects

Trash is biofuel treasure; Enerkem uses Alberta as a launching pad for expansion

Source: Alberta Innovates

Electric Vehicle Chargers

Level 1

Level 1 chargers are standard 120V outlets, typically limited to 15A. These will provide the slowest charge times.

Level 2

Level 2 chargers are 240V outlets with various amperages typically ranging from 20A to 80A. These are ideal for homes or businesses to charge any electric vehicle in a reasonable amount of time. Businesses can set up Level 2 chargers on a pay-per-use plan to **earn revenue from the EV chargers.**

Level 3

Level 3 chargers are the fastest chargers, generally outputting 480V DC or greater at varying amperages depending on the manufacturer. Level 3 chargers are pieces of major electrical infrastructure and cannot be installed at any business. Level 3 chargers will require substantial involvement of electrical utility companies and increased budget.

Charging units typically vary from $400 to $900CAD

Source: Kuby Energy

My Thoughts?

- **Alberta is scaling up greener measures.**
  - New sustainability projects are being embraced in the city and rural areas.
  - We are responding to:
    - (1) higher costs of maintaining an old electricity infrastructure;
    - (2) increasing demands for electricity from a growing population; and
    - (3) energy waste
- **Electrification of transport is the future.**
  - We are transforming how we live and commute – get used to it.
- **Alberta's energy base can export products and services**
  - This means focusing on funding R & D in collaboration with the private sector, academia, federal agencies, and community groups.
- **There are two major trends to watch for – Energy Storage and Renewable Hydrogen.**

My Thoughts?

- **Further integration of renewables with the petroleum industry shall continue towards a low-carbon future.**

- **Streamline agencies and regulations for quicker implementation of sustainability strategies.**
  - This means reducing bureaucracy and applying funds to emerging technologies.
  - After all, Alberta has the talent, resources and technology to develop clean technologies.