Climate Change: Challenges and Opportunities

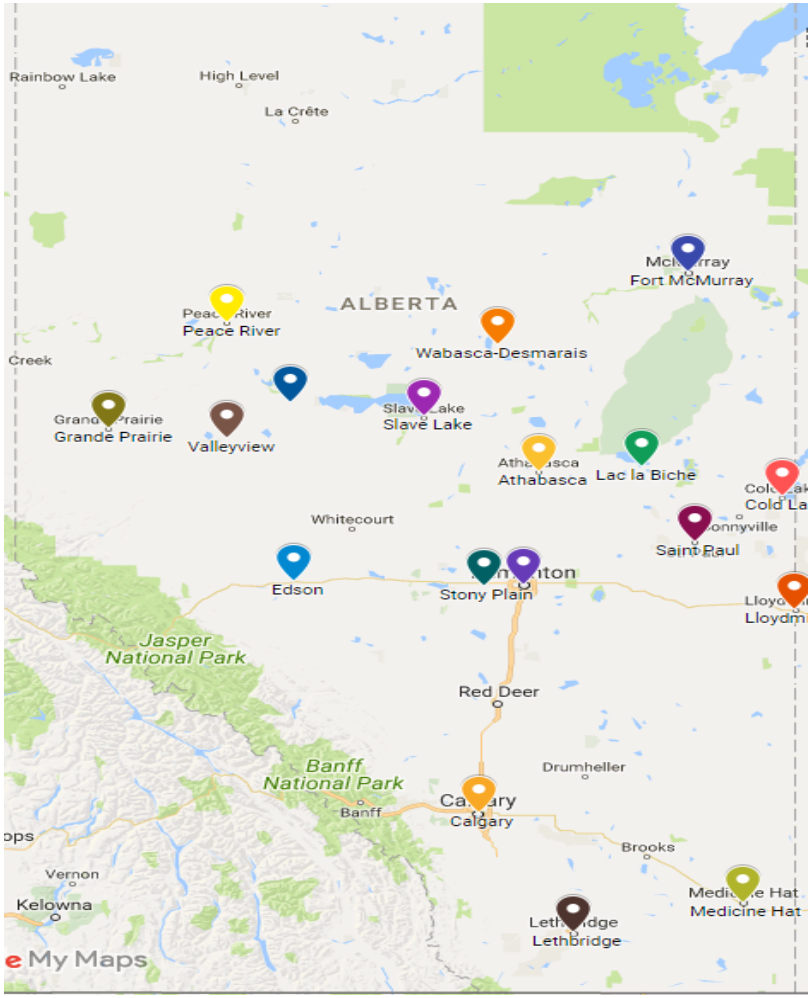
Andres Filella, Climate Change Consultant
Sustainable Development and Industry Relations
afilella@metis.org
780-455-2200 ext. 220

Climate Change Workshop Program

PROGRAM		
4:00 PM – 4:30PM	***Registration***	
4:30 PM – 4:40 PM	***Welcome***	
4:40 PM - 5:20 PM	***Presentation: Climate Change—Challenges and Opportunities*** This presentation will cover the basic concepts of climate change, its effects and the response from some jurisdictions around the world, including actions taken by the MNA. ***Presentation: The Alberta Climate Leadership Plan and Available Programs*** The Alberta Climate Change Leadership Plan includes a budget of over $5 billion over the next 3 years. This presentation will provide a brief overview of the Alberta Climate Change Leadership Plan and available programs that individuals, businesses and/or organizations may benefit from.	**Andres Filella** Climate Change Consultant *Métis Nation of Alberta* **Jade McLean** Climate Change Liaison *Métis Nation of Alberta*
5:20 PM - 5:40 PM	***Dinner Break***	
5:40 PM - 6:10 PM	***Dinner Presentation: Renewable Energy, Solar Energy 101, and Jobs and Training*** This presentation provides a brief overview of the pros and cons of renewable energy sources, including solar energy, which is explored in more detail. Jobs and training resources are also highlighted.	**Justice Dunn** **Eli Freeman** *Nu Energy*
	Break	
6:20 PM - 7:00 PM	***Presentation: Energy Efficiency and Self –Sufficiency in the Home*** The average Alberta family spends more than $6,000 per year on energy costs. This presentation will provide examples of what individuals are able to do to reduce their energy use, and detail what cost savings to expect.	**Godo Stoyke** *CarbonBusters*
	Break	
7:10 PM - 8:30 PM	**Breakout Discussions:** Climate Change and Métis Life and Culture Climate Change Related Initiatives and Programs Jobs and Economic Opportunities Renewable Energy and Energy Efficiency	
	Thank you and Closing Remarks	

MNA Climate Change Workshops

- Athabasca
- Calgary
- Cold Lake
- Edmonton
- Edson
- Fort McMurray
- Grande Prairie
- High Prairie
- Lac la Biche
- Lethbridge
- Lloydminster
- Medicine Hat
- Peace River
- Saint Paul
- Slave Lake
- Stony Plain
- Valleyview
- Wabasca-Desmarais



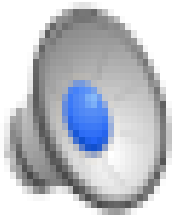
Climate Change

Climate change policy

- Plans at different levels
  - Federal
  - Provincial
  - Municipal
- Challenges
- Opportunities—Need to take action now

- The MNA Climate Change Action Plan
  - Indigenous Climate Change Leadership Initiative component of the Alberta Climate Leadership Plan

What is climate change? What are the effects?



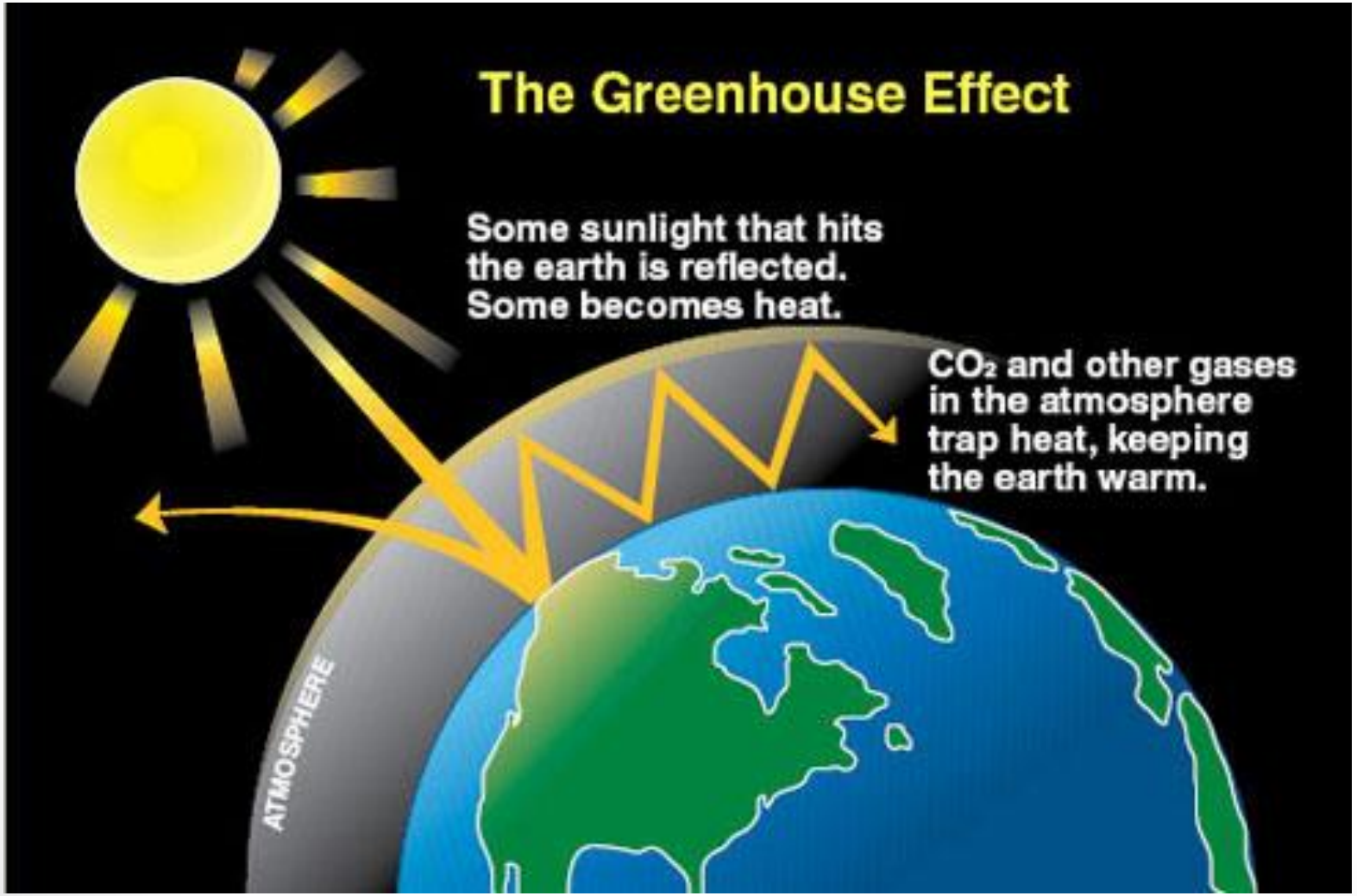
Source and credit: National Geographic's 101 Series: Climate Change 101,

Link to video:
https://www.youtube.com/watch?v=EtW2rrLHs08.

Climate Change

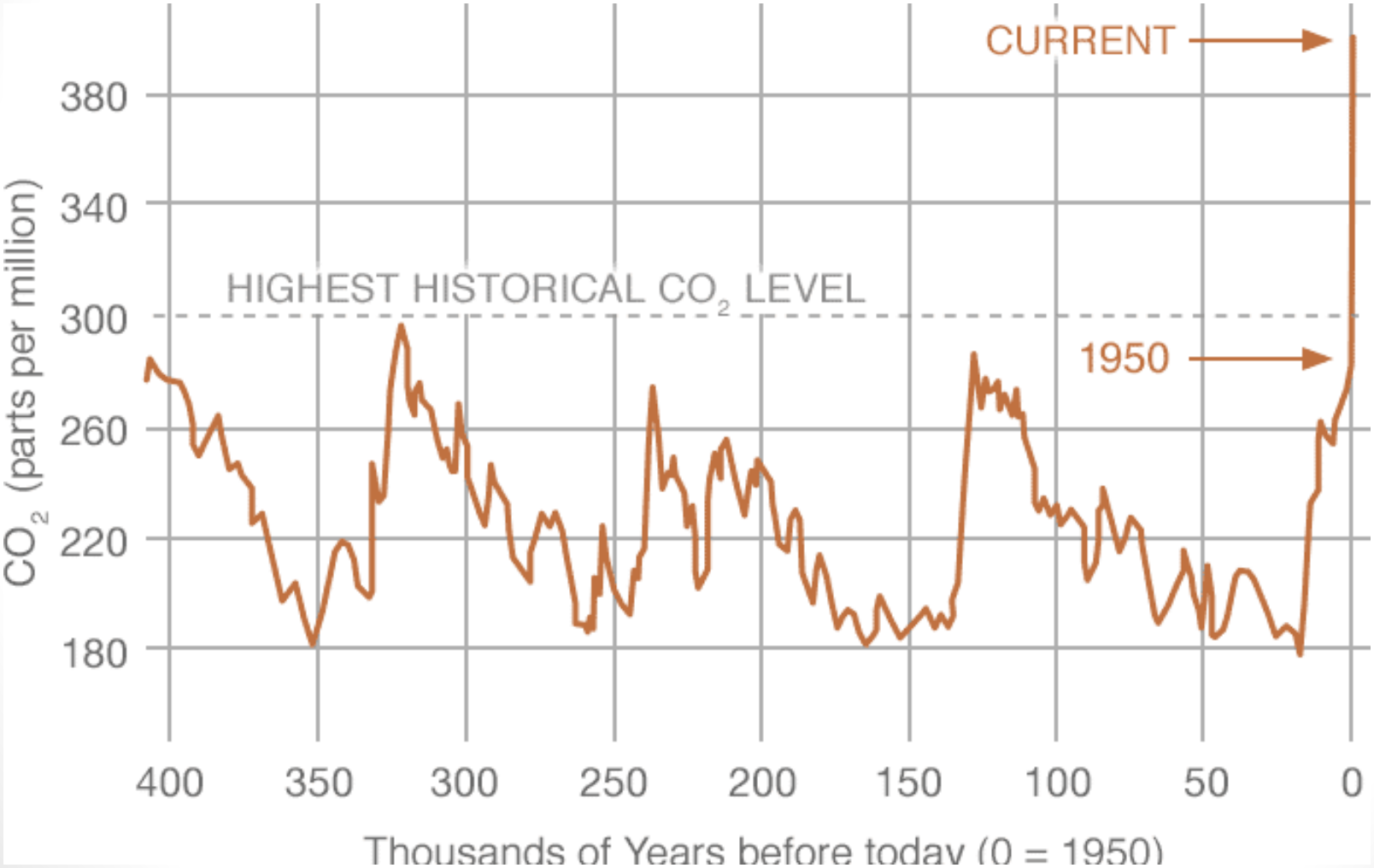
- Greenhouse gases
  - Carbon dioxide (and other gases)
  - Burning fuels
    - Diesel
    - Gasoline
    - Coal
    - Propane
    - Natural Gas
  - Sources
    - Electricity production
    - Transportation
    - Industry
    - Agriculture
    - Commercial and Residential

Greenhouse effect



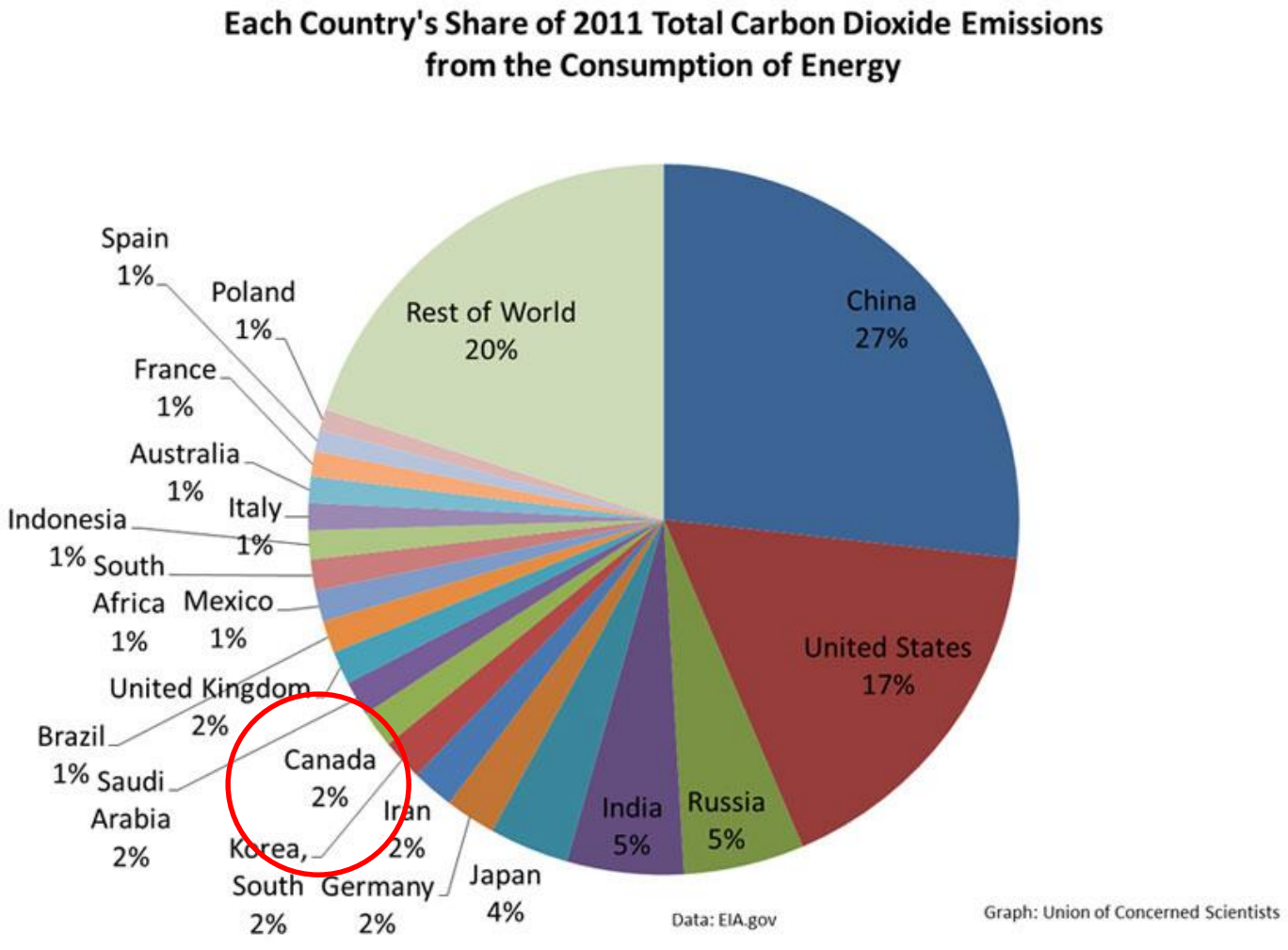
Source: Reducing your Carbon Footprint: http://reducingyourcarbonfootprint.weebly.com/

CO_2 concentrations



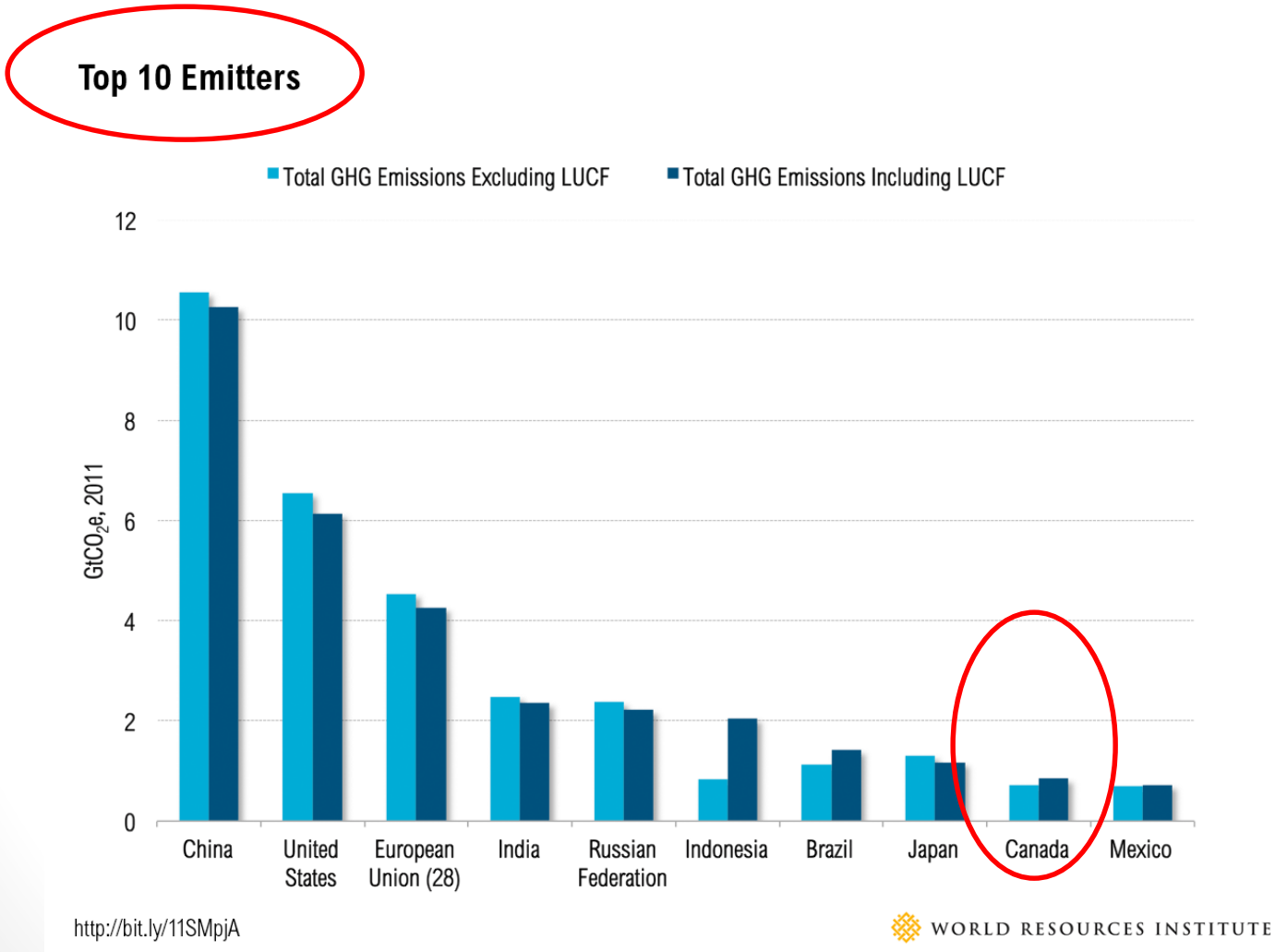
Source: NASA Global Climate Change: https://climate.nasa.gov/vital-signs/carbon-dioxide/

Canada's Share



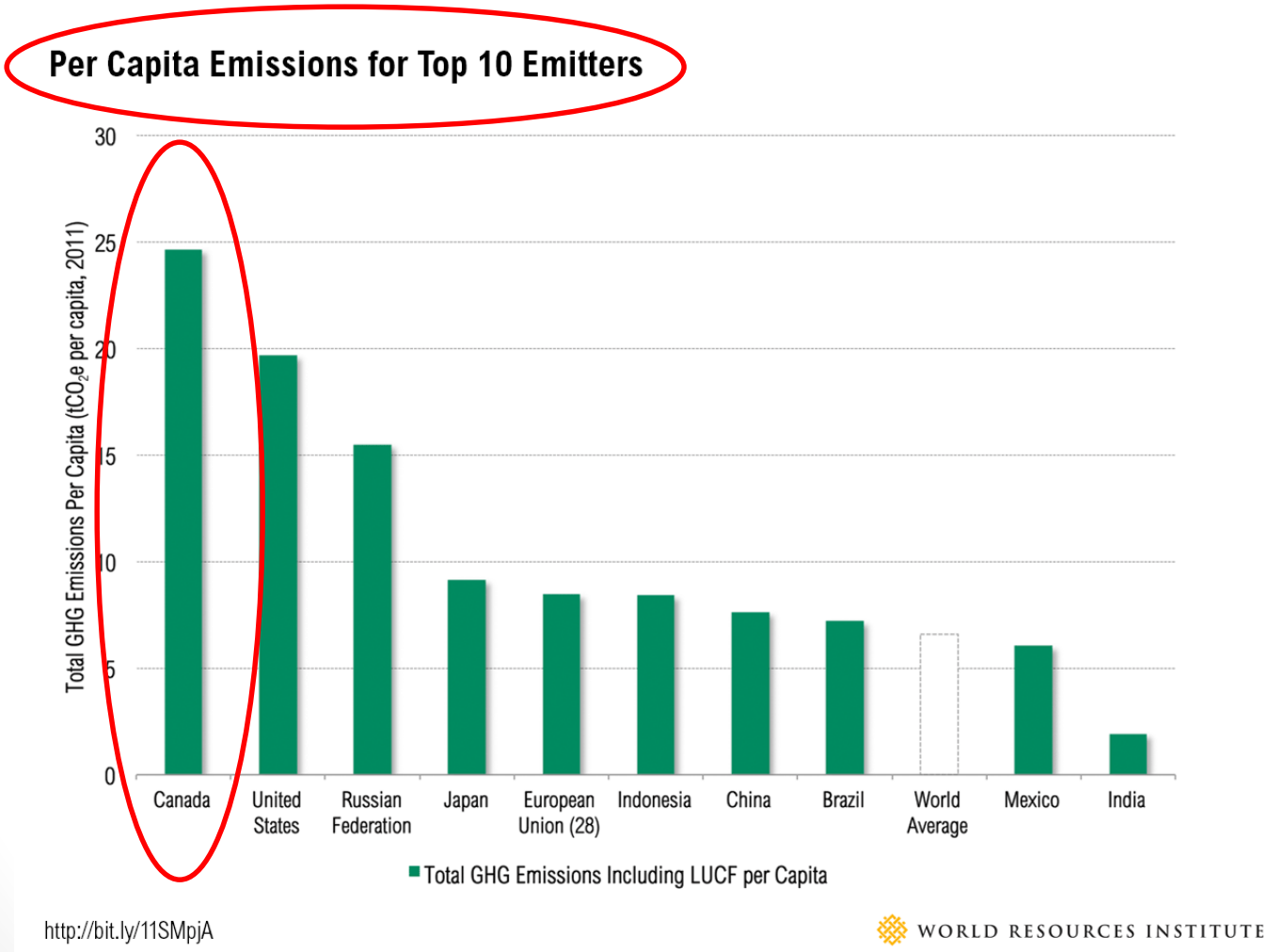
Source: Union for Concerned Scientists
http://www.ucsusa.org/global_warming/science_and_impacts/science/each-countrys-share-of-co2.html#.WO5UGfnyuM8

Canada's Share



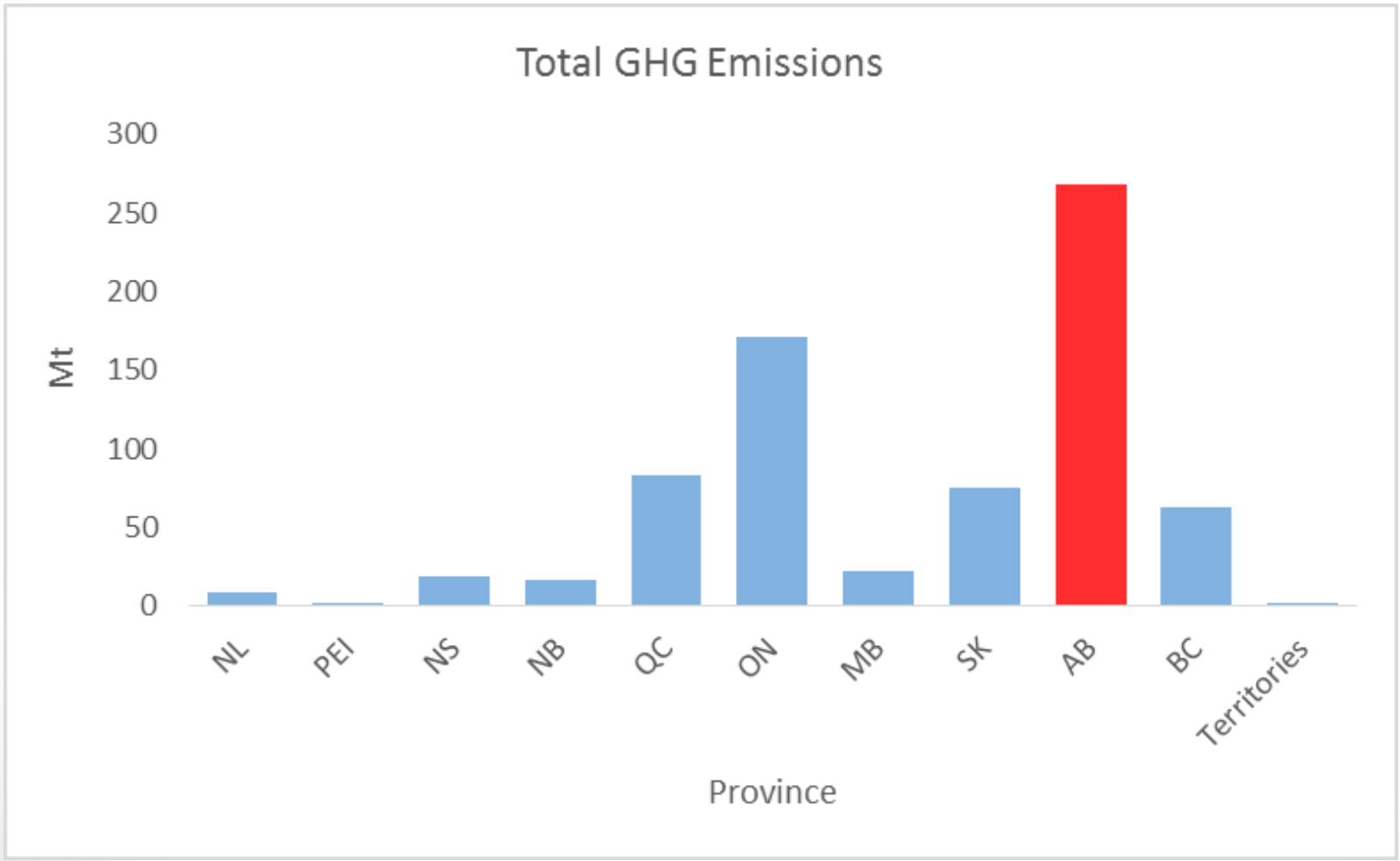
Source: World Resources Institute, https://wri.org/blog/2014/11/6-graphs-explain-world%E2%80%99s-top-10-emitters

Canadians' share



Source: World Resources Institute, https://wri.org/blog/2014/11/6-graphs-explain-world%E2%80%99s-top-10-emitters

Alberta's Share



Source: By the Numbers: Canadian GHG Emissions, Ivey Lawrence National Centre for policy Management, https://www.ivey.uwo.ca/cmsmedia/2112500/4462-ghg-emissions-report-v03f.pdf

Why should we care in Alberta?

- The earth warms and impacts weather
  - Extreme weather
  - Heat and dryness
  - Rain and flooding
  - Cannot predict weather

Effects on Métis Life

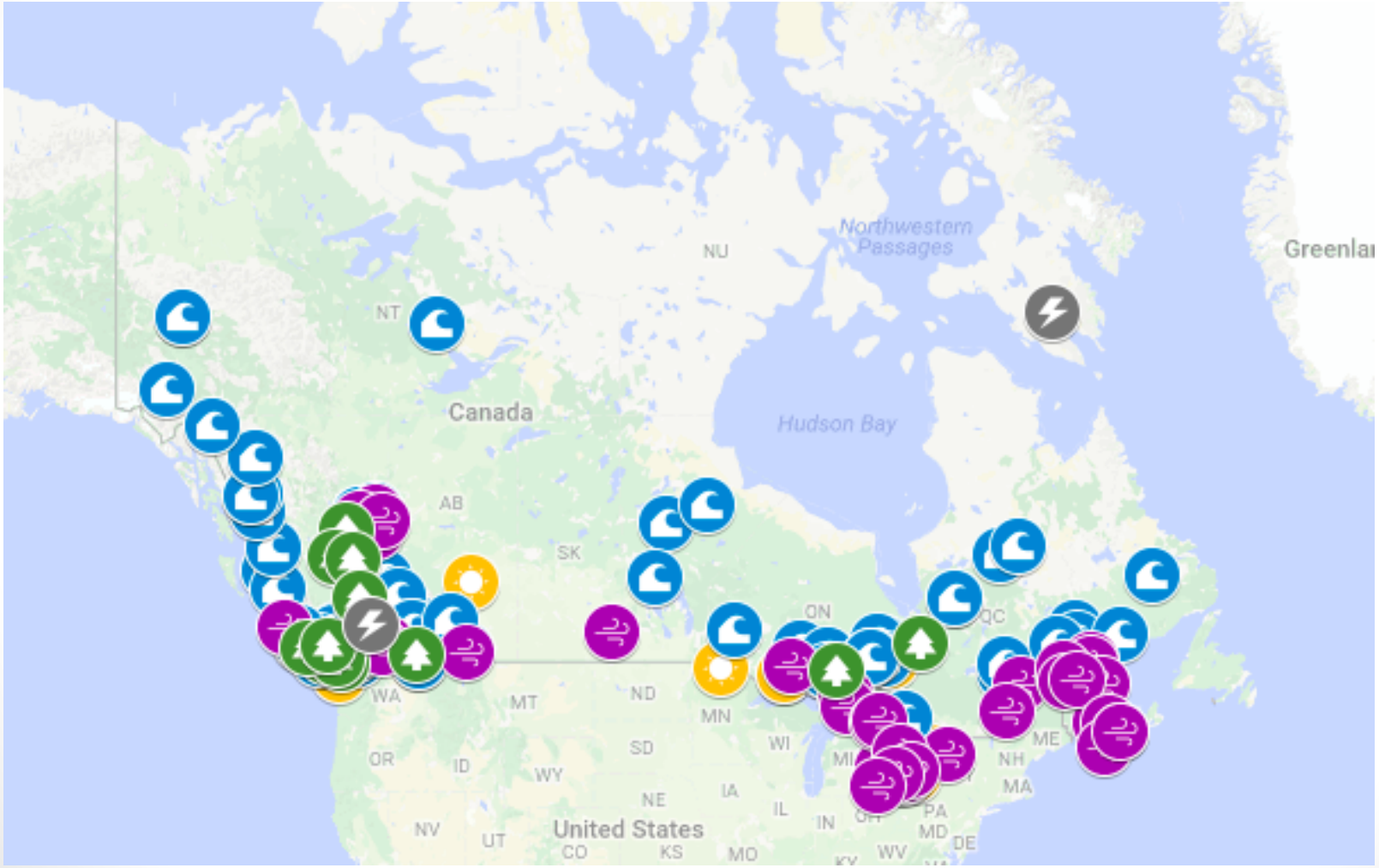
- Effects on traditional way of life
  - Hunting and trapping
  - Fishing
  - Gathering and harvesting

Opportunities

- Alignment with traditional values
  - Care for environment
  - Conservation
  - Food and energy self-sufficiency
  - Planning for future generations
- Jobs
- New industries

Piitapan Solar Project

Indigenous Renewable Energy Projects



Source: Indigenous Clean Energy Network

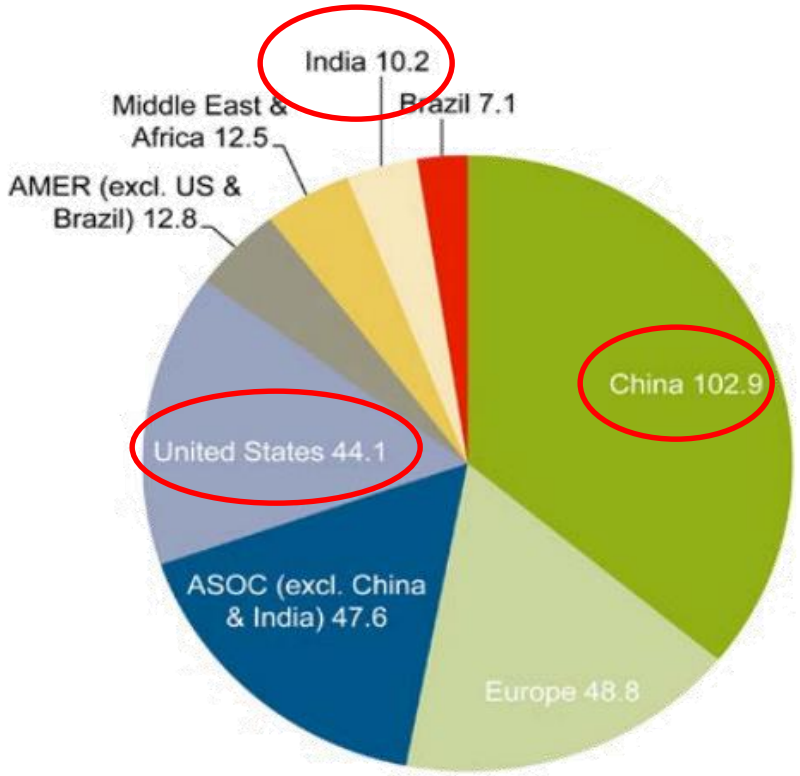
The world is moving…

- **CHINA'S ACTION ON CLIMATE CHANGE** - 13th Five-Year Plan (2016)
  - PM 2.5 to 25% below 2015 levels
  - For the first time in history, China is implementing a coal consumption cap (4.2 billion tons for 2020)

- **INDIA'S ACTION ON CLIMATE CHANGE**
  - In 2015 India pledged to reduce carbon emissions 33-35% by 2030
  - Committed to 40% of electricity from renewable energy by 2030

The world is moving…

FIGURE 13. GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY BY REGION, 2015, $BN



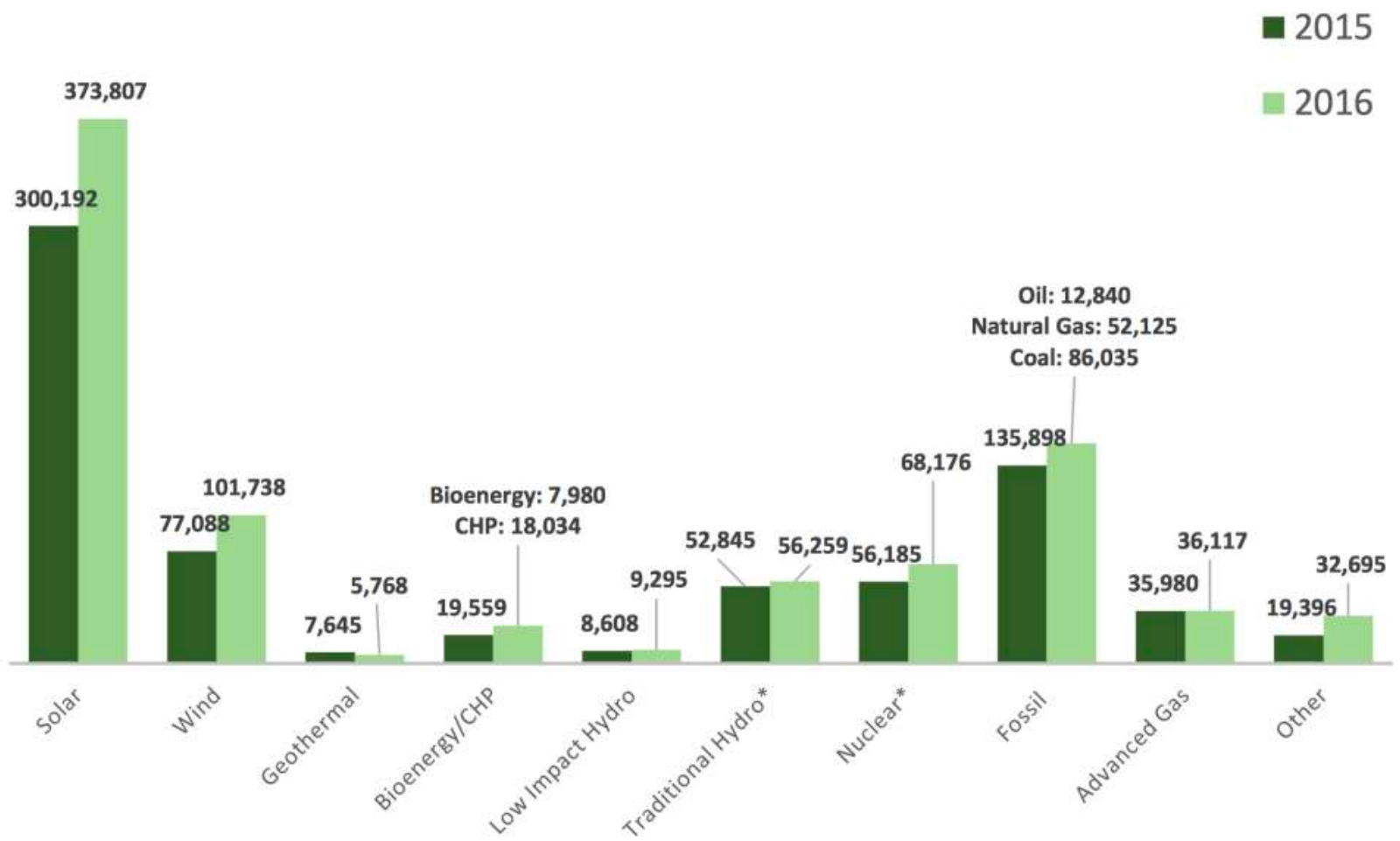
New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

Source: UNEP, Bloomberg New Energy Finance

Source: UNEP, Bloomberg New Energy Finance

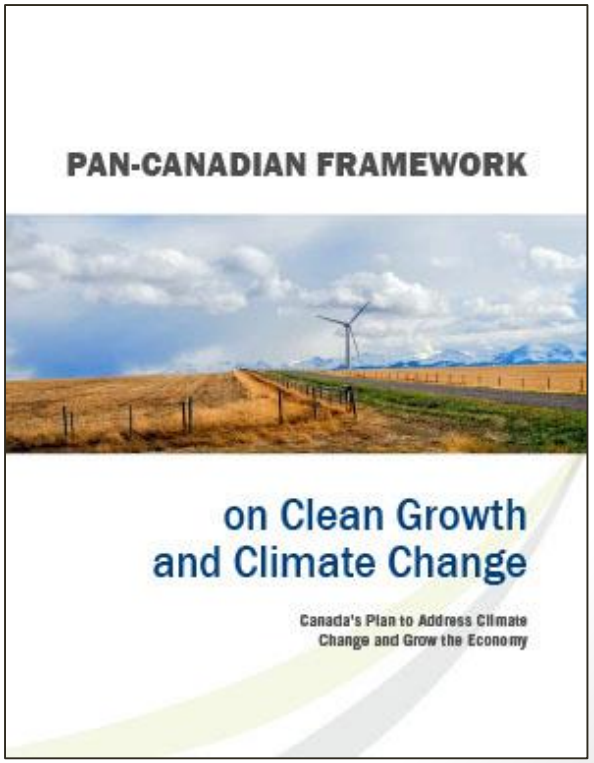
The world is moving…

Figure 12. Electric Power Generation Employment by Technology, Q2 2015 - Q1 2016[27]



Source: US Energy and Employment Report, US Department of Energy, https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf

- Federal: Pan-Canadian Framework on Clean Growth and Climate Change
  - $10/tonne CO2e in 2018
  - $10/tonne increase per year until $50/tonne
  - Investment in public transit
  - Energy labelling for buildings in 2019
  - Green technologies
- Alberta: Climate Leadership Plan



Thank you

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  Sustainable Development and Industry Relations
- afilella@metis.org
- 780-455-2200 ext. 220

The Alberta Climate Leadership Plan

Jade McLean, Climate Change Liaison
Sustainable Development and Industry Relations
The Metis Nation of Alberta
jmclean@metis.org

Objective: to reduce carbon emissions while protecting the environment and promoting economic growth

Bend the curve

Reduce GHG's

Environmental Leadership

Progressive, responsible

Reinvestment

Green infrastructure

Adjustment

Transition support

My Goal:

1. To introduce you to, and explore the different aspects of, the Alberta Climate Leadership Plan and determine **what it means for you**

2. Introduce you to **available programs and funding** designed to save you energy and money

The Alberta Climate Leadership Plan

Five key aspects:

1. Carbon Levy and Rebates
2. Ending coal-generated electricity by 2030
3. Developing renewable energy
4. Reducing methane emissions
5. Capping oil sands emissions

Carbon Levy

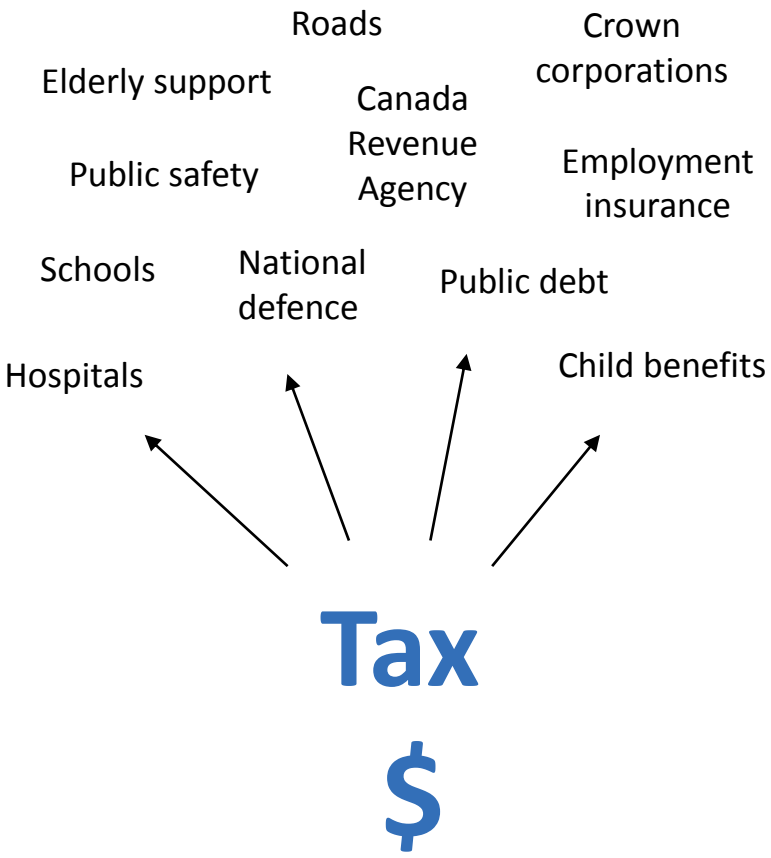
A province-wide price on carbon

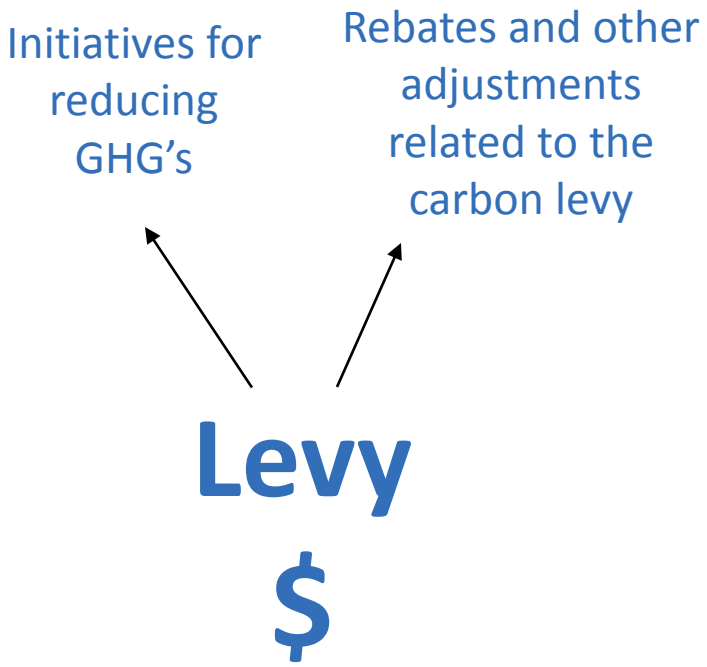
The most **effective** means to reducing greenhouse gas emissions

Incentivizes behavioural change (purchasing decisions) and technology change (energy efficiency)

Carbon Tax vs. Carbon Levy

REVENUE SPENDING





Question: how do I know that this money isn't just going into general government spending?

As specified in the *Climate Leadership Act, Section 3*:

(2) The revenue from the carbon levy may only be used

(a) for **initiatives** related to reducing emissions of greenhouse gases or supporting Alberta's ability to adapt to climate change, or

(b) to provide **rebates or adjustments** related to the carbon levy to consumers, businesses and communities, including adjustments in the form of tax credits or tax rate reductions

Carbon Levy

January 1, 2017: carbon levy comes into effect at **$20**/tonne

January 1, 2018: carbon levy will increase to **$30**/tonne

Federal government will impose $50/tonne by 2022

What's included?

The levy is placed on **heating** and **transportation** fuels

	2017
Gasoline	+4.49 ¢/L
Natural Gas	+ 1.011 $/GJ
Diesel	+5.35 ¢/L
Propane	+3.08 ¢/L

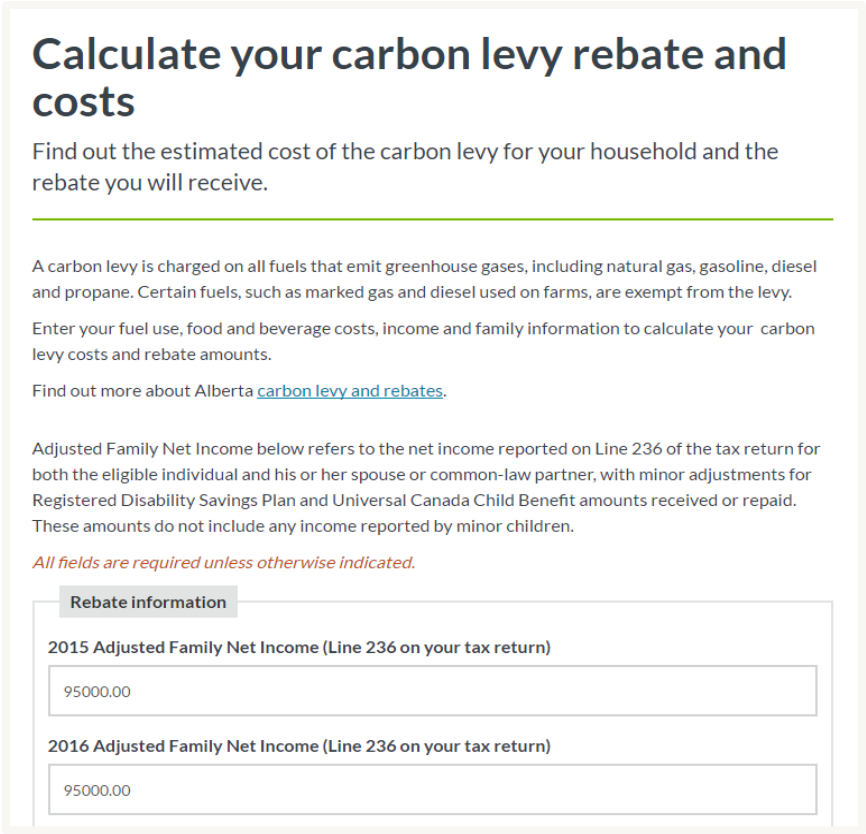
Carbon Levy: Exemptions

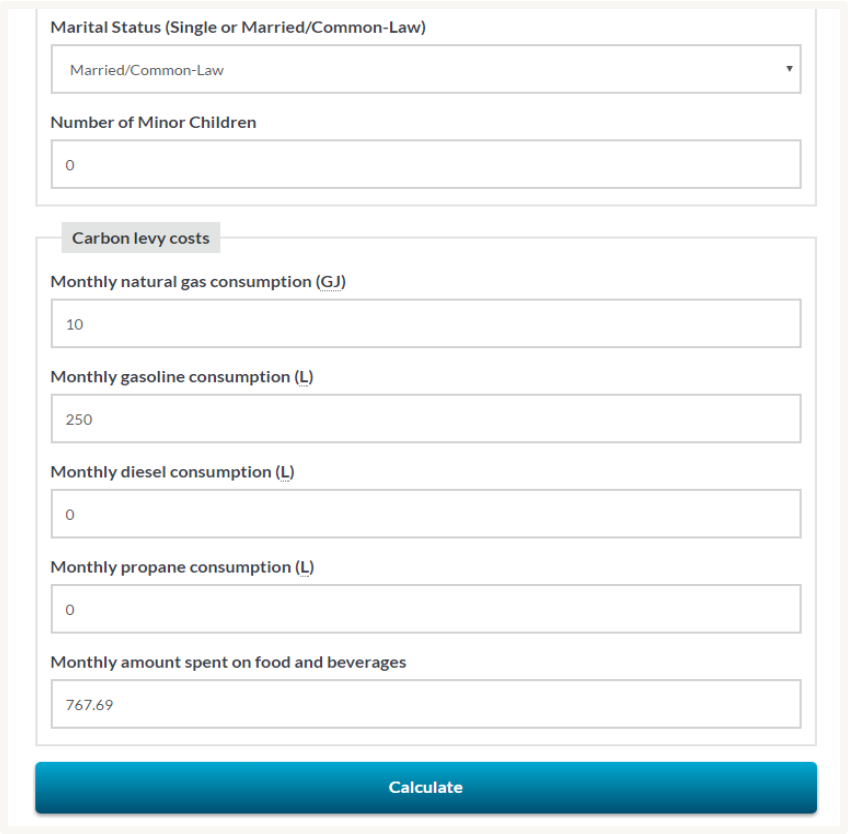
- Electricity
- Renewable fuels (biodiesel, ethanol, etc.)
- Marked gasoline and diesel used by farmers
- Eligible First Nations individuals and bands that purchase fuel on-reserve or band use
- Fuel that is exported
- Fuel used as feedstock in industrial processes rather than combusted
- Fuel consumed by on-site conventional oil and gas producers, under December 21, 2022
- Fuels used by entities subject to the Specified Gas Emitters Reg.
- Fuels used on inter-jurisdictional flights

Carbon Levy: How will it affect me?

Every household will experience different impacts based upon their household's **energy use** and **driving patterns**

Google:





Carbon Rebates

The carbon rebate is designed to offset the additional costs of carbon to lower- and middle- income Albertans.

	2017	2018
Adult	$200	$300
Spouse (or equivalent)	$100	$150
Per child (max. 4)	$30	$45

ELIGIBILITY:

Single Albertans earning **less than $47,500**
Couples, single parents, and families earning **less than $95,000**

*Additional households will receive a partial rebate

Carbon Rebates

Let's use an example:

Sally lives with her husband, Bob, and their two children

Prior to the carbon levy, their household paid $276/year for natural gas

The carbon levy will increase their natural gas costs by an additional $136/year

$

And $4,037/year for gasoline

And their gasoline costs by an additional $202/year

$

2017	
Gasoline	+4.49 ¢/L
Natural Gas	+ 1.011 $/GJ
Diesel	+5.35 ¢/L
Propane	+3.08 ¢/L

REBATE

Their household will be paying an additional **$338/year for their natural gas and gasoline**

These incremental costs are offset by a full rebate of $360/year for their family

Carbon Rebates

The rebate is tied to **income** and the **number of people** in a household, not energy use.

How do I apply?

You don't need to apply, however:

Households will automatically receive a rebate only if:

1. You're an Albertan resident
2. You have filed your tax return
3. You meet the income criteria

When and how will I receive my payments?

Payments will made by the Canada Revenue Agency upon filing of your tax return through direct deposit or by mail

The timing of your payments will depend on the amount you're eligible to receive:

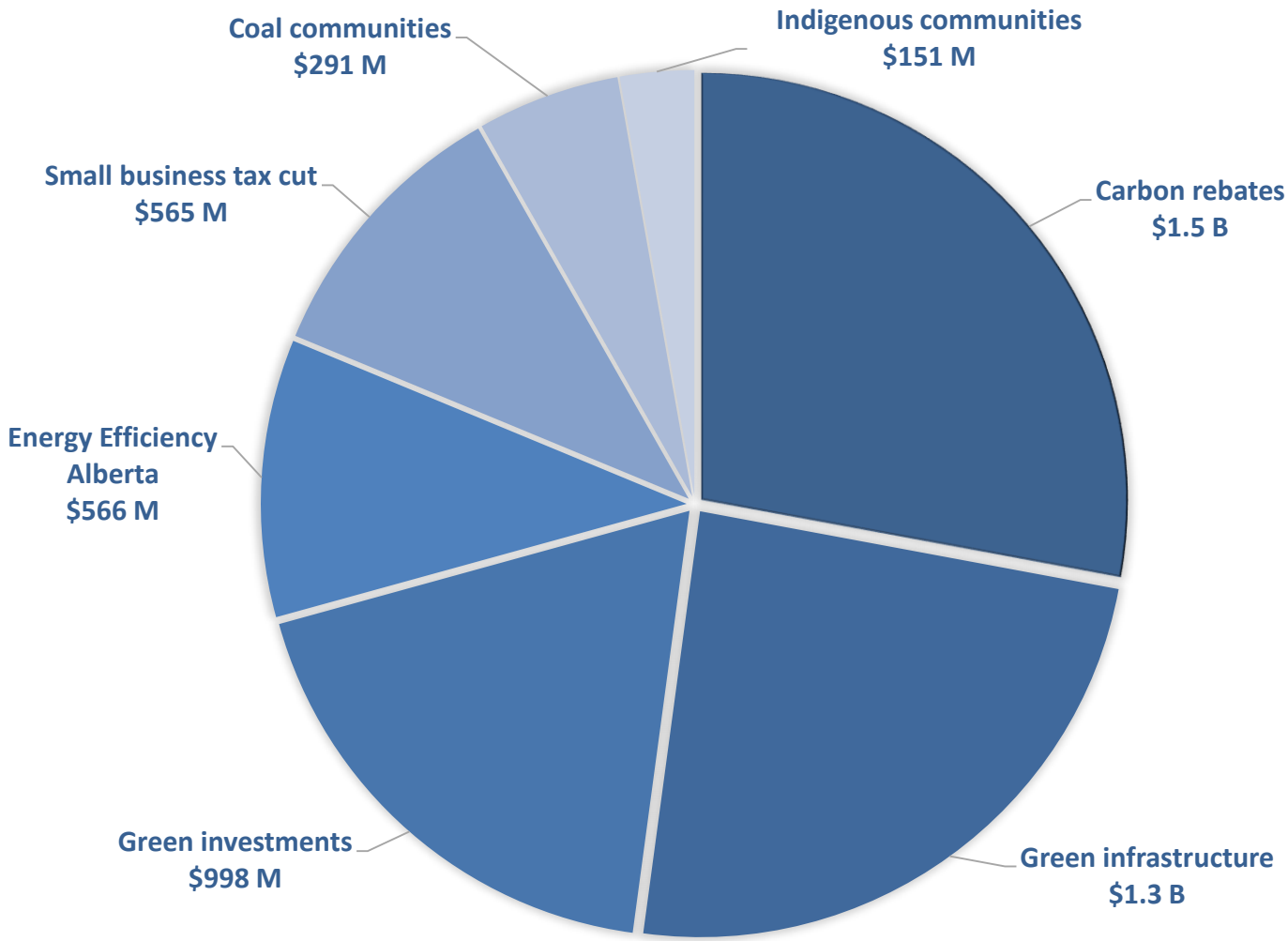
$400 or more: delivered in four payments (Jan, Apr, Jul, Oct)

$200 - $399: delivered in two payments (Jan, Jul)

$100 - $199: delivered in one payment (Jan 2017, July in subsequent years)

Carbon Levy: Where's the money going?

Reinvestment of $5.4 billion over the next 3 years



The Alberta Climate Leadership Plan

Five key aspects:

1. ~~Carbon Levy and Rebates~~

1. **Ending coal-generated electricity by 2030**

1. **Developing renewable energy**
   30% renewable energy by 2030

2. **Reducing methane emissions**
   45% by 2025

1. **Capping oil sands emissions**
   100 MT/year, $30/tonne

How can I benefit?

Available Programs:

HOUSEHOLDS

1. Residential No-Cost Energy Savings Program
2. Home Improvements, Instant Savings, and Online Rebates
3. Residential and Commercial Solar Program

BUSINESS AND NON-PROFIT

4. Non-Profit Energy Efficiency Transition Program
5. Business, Non-Profit, and Institutional Rebate Program
6. Community Environment Action Grant

OTHER

7. Bioenergy Producer Program
8. Renewable Electricity Program

FARMING AND AGRICULTURE

9. On-Farm Solar PV - On-Farm Energy Management Sub Program
10. Irrigation Efficiency Programs
11. Accelerating Agricultural Innovation Program
12. Agri-Processing Automation and Efficiency Program

COMMUNITY AND MUNICIPALITIES

13. Alberta Indigenous Solar Program
14. Alberta Indigenous Community Energy Program
15. Municipal Sustainability Program

ENERGY EFFICIENCY ALBERTA:

Residential No-Cost Energy Savings Program

ONGOING

Offer **direct, no-charge installation** of energy efficient products

ELIGIBILITY

- Available to all Albertans
- Rural or urban areas
- Homes, apartments, condos
- Owner or renter

Eligible products:

- Existing incandescent **lightbulbs**, night lights, and exit signs
- Inefficient **shower heads**
- **Faucets** without aerators
- Traditional **power bars** (or lack of)
- Non-programmable **thermostats**

LED lightbulb

Smart Thermostat

Advanced Power Bar

Shower Head

Faucet Aerator

Nightlight

ENERGY EFFICIENCY ALBERTA:

Residential No-Cost Energy Savings Program

DEADLINE

Registration is ongoing. Installations beginning April 2017.

FUNDING

Free of cost

HOW TO APPLY

Fill out the form at **www.efficiencyalberta.ca/residential-no-charge/**

You will receive a phone call to schedule your installation.

ENERGY EFFICIENCY ALBERTA

1. INSTANT SAVINGS

EXPIRED: June 11

To help Albertans save on energy-efficient products at participating retailers right at the till

WHAT'S INCLUDED?

- ENERGY STAR® LED Lighting A-Line (Standard Bulb) – $5 savings
- ENERGY STAR® LED non-A line (Specialty Bulbs) - $8 savings
- ENERGY STAR® LED Fixtures & Recessed Downlight Fixtures - $15 savings
- Programmable thermostats - $30 savings
- Dimmers (Hardwired) - $7 savings
- Motion sensors, hardwired indoor or outdoor - $5 savings
- Smart Power Bars - $18 savings
- Heavy Duty Times - $10 savings
- Clotheslines - $12 savings
- Low Flow Bathroom Faucet Aerators - $2 savings
- Low Flow Kitchen Faucet Aerators - $2 savings
- Low Flow Showerhead - $12 savings

ENERGY EFFICIENCY ALBERTA

2. ONLINE REBATES

ONGOING

Purchase any of the eligible products and upload your receipt to Energy Efficiency Alberta and receive a rebate!

WHAT'S INCLUDED?

- Refrigerators
- Clothes Washers
- Smart Thermostats

ENERGY EFFICIENCY ALBERTA:

3. HOME IMPROVEMENTS

ONGOING

Performance based rebates- the more energy your home-improvement project saves, the more money you'll get back in rebates

HOW DOES IT WORK?

Access the **contractor database** to find participating installers in your area

WHAT'S INCLUDED?

- **Insulation** (save up to $3,500)
- **Windows** (save up to $1,500)
- **Tankless Hot Water Heaters** (save up to $1,000)

ENERGY EFFICIENCY ALBERTA:

Residential and Commercial Solar Program

ONGOING

Offer rebates to homeowners, businesses, and non-profits that install solar PV systems.

- Cut solar installation costs by **up to 30%** for residences
- Cut solar installation costs by **up to 25%** for businesses and non-profits
- $0.75/W maximum, up to $10,000 (residential) or $500,000 (commercial and non-profit)

HOW TO APPLY

The program will be launching summer 2017. Details to come.

ENERGY EFFICIENCY ALBERTA:

Business, Non-profit, and Institutional Energy Savings Program

ONGOING

Offering rebates to encourage organizations to choose high-efficiency products.

- Schools, hospitals, colleges
- Co-operatives
- Non-profit organizations
- Individual businesses

WHAT'S INCLUDED?

Lighting – Interior
Lighting – Exterior
Lighting – Interior Control
Lighting – Exterior Control
Lighting – Fluorescent Measures
Heating, Ventilation and Air Conditioning (HVAC)
Variable Frequency Drives (VFDs)
Water Heating

www.efficiencyalberta.ca

Indigenous community-owned buildings

Alberta Indigenous Solar Program (AISP)

Alberta Indigenous Community Energy Program (AICEP)

Farming

On-Farm Solar PV Program

Irrigation Efficiency Program

Thank you

Jade McLean, Climate Change Liaison
Metis Nation of Alberta
780-455-2200 ext. 244
jmclean@metis.org

hubscale
SUSTAINABLE COMMUNITIES

MNA Climate Change Workshops

Renewable Energy, Solar Energy 101, & Jobs and training

Presented by: Justice Dunn
and Eli Freeman

Carbon Busters

NÜENERGY

Introduction

Eli Freeman

- Past
  - Grew up in BC on Vancouver Island
  - Come from an energy / socially conscious family
  - Worked in trades
  - Worked in the oil patch
- Present
  - Recently graduated from the Alternative Energy Technology Program at NAIT
  - Working with HubScale promoting sustainable living and alternative energy technologies
- Future
  - Looking to promote positive change in communities

Justice Dunn

- Graduated from NAIT's Alternative Energy Technology program in 2017
- Currently working as a consultant with Hubscale
- Energy nerd
- Hopes to combat climate change by helping in the energy transition

What Will be Covered

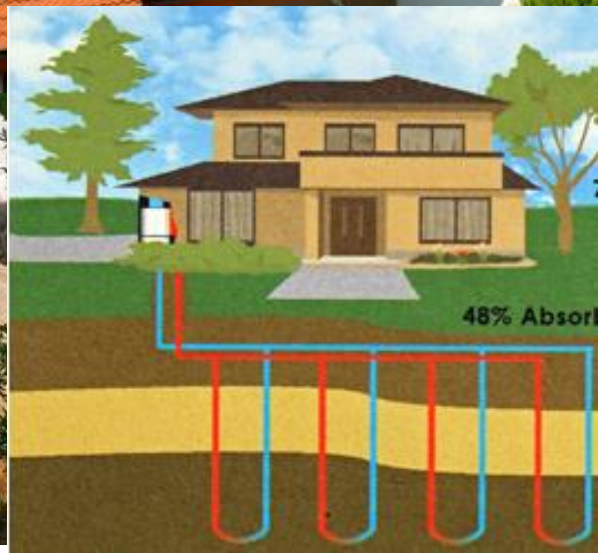
- Alberta's electricity market and Micro-Generation
- Renewable energy technologies
  - Wind
  - Bioenergy
  - Geo-exchange
  - Solar Photovoltaics
    - Solar 101
    - Solar on your roof
- Industry training

The Alberta "Grid"

Source: moorheadelectric.com

Intro to renewables

hubscale
SUSTAINABLE COMMUNITIES



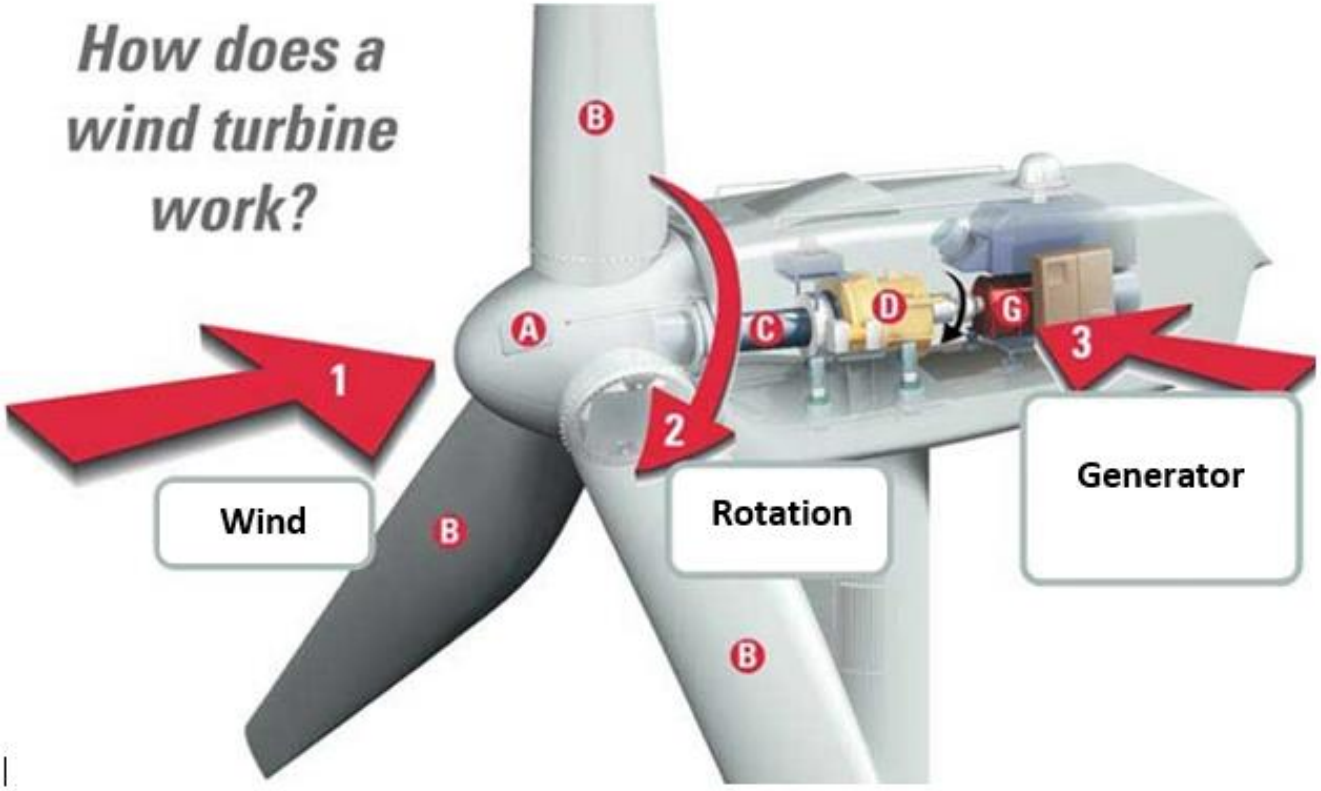
Micro Generation

Sources: inbalance-energy.co.uk, moorheadelectric.com

Wind in Alberta

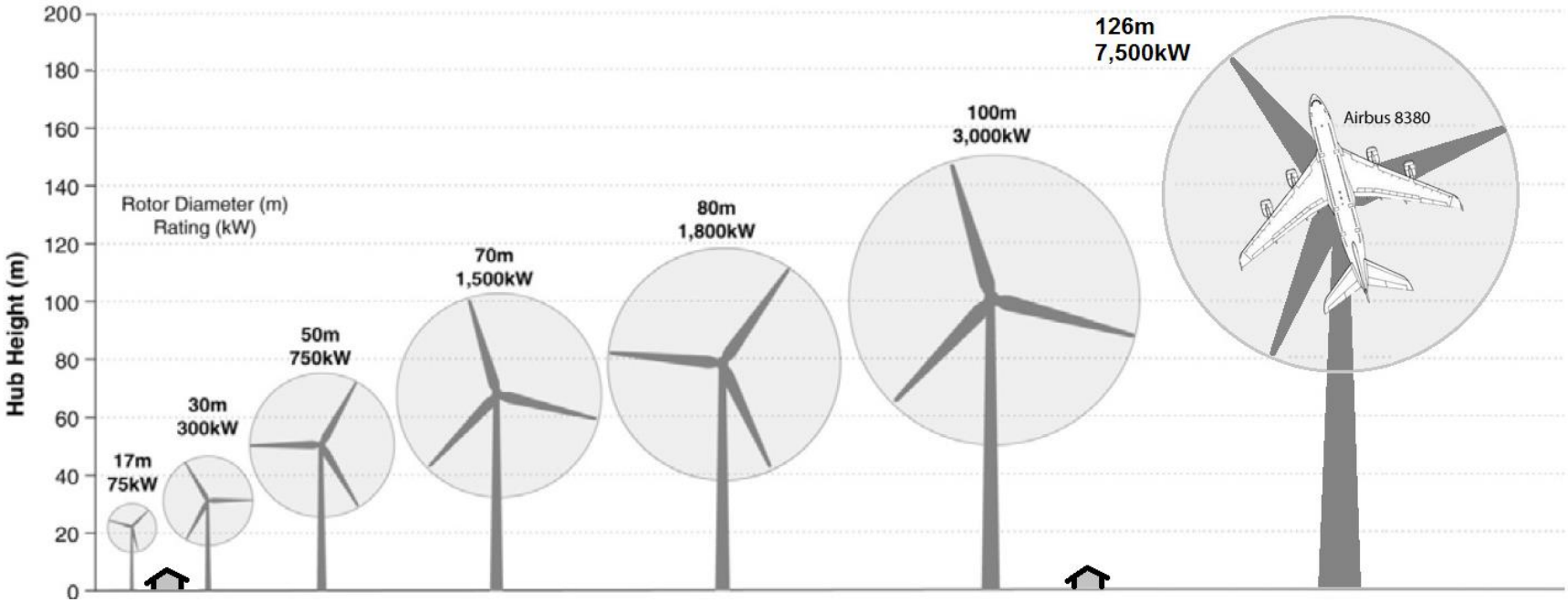
Sources: flickr.com, bluearthrenewables.com, s-media-cache-ak0.pinimg.com

Wind Technology



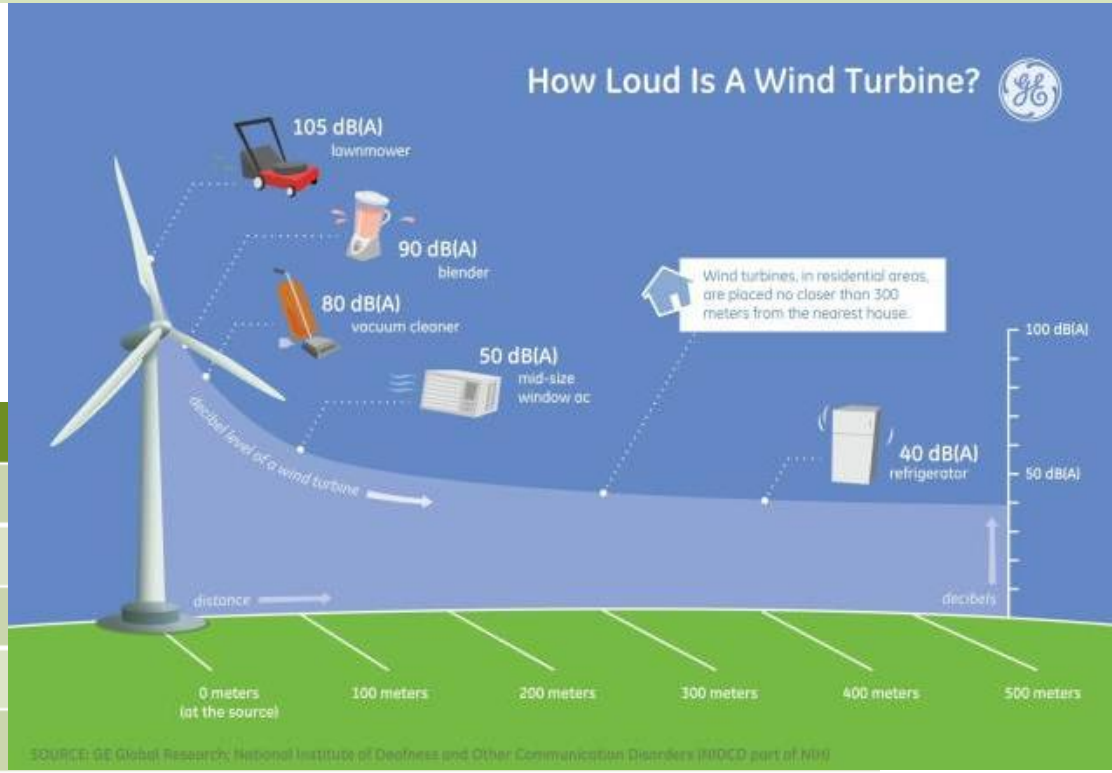
Source: mechanicalengineeringblog.com

Wind Economics



Source: windenergy.org

Wind Misconceptions



Sources: alternativeenergydiscounthouse.com, gereports.com

Wind Pros vs Cons

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SUSTAINABLE COMMUNITIES

Pros

Cons

Sources: wallshots.ca, madaketwind.org

Bioenergy Resource

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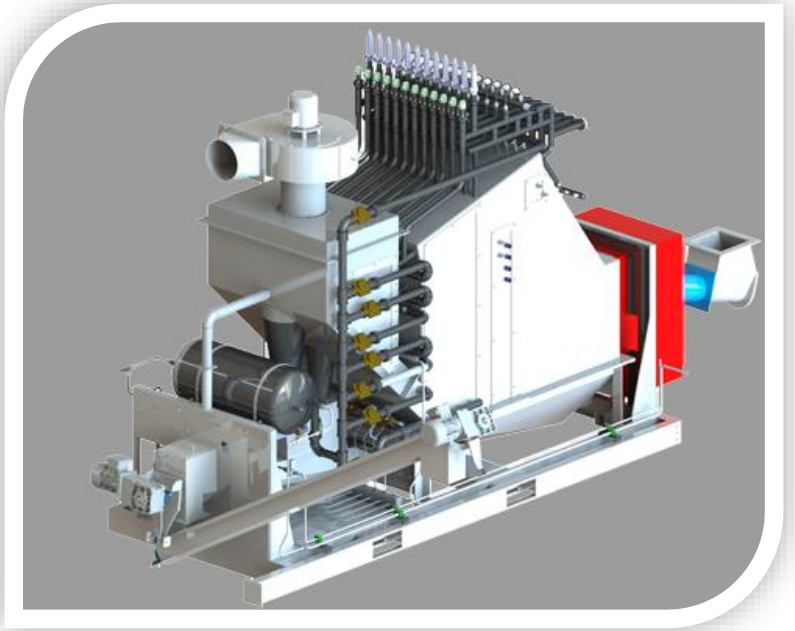
Sources: bamboo-jsc.com, strategiesonline.net, maxpixel.freegreatpicture.com, desmog.ca

Biomass for Heating

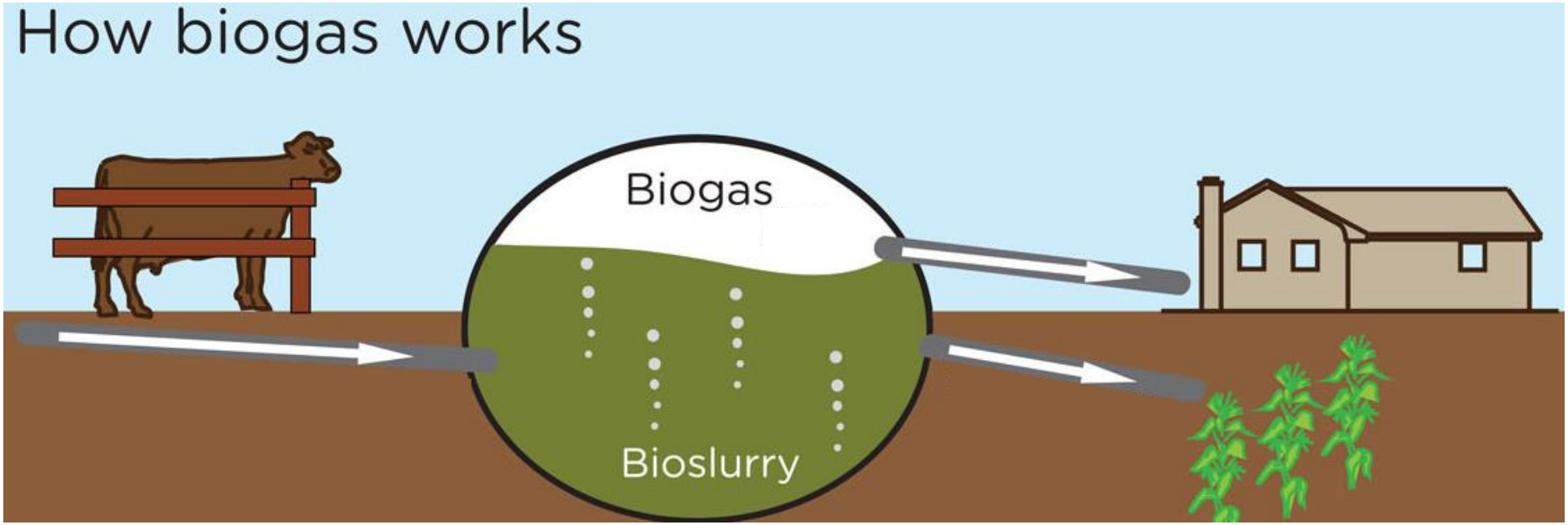
Sources: walltherm.ca

Biomass for Electricity



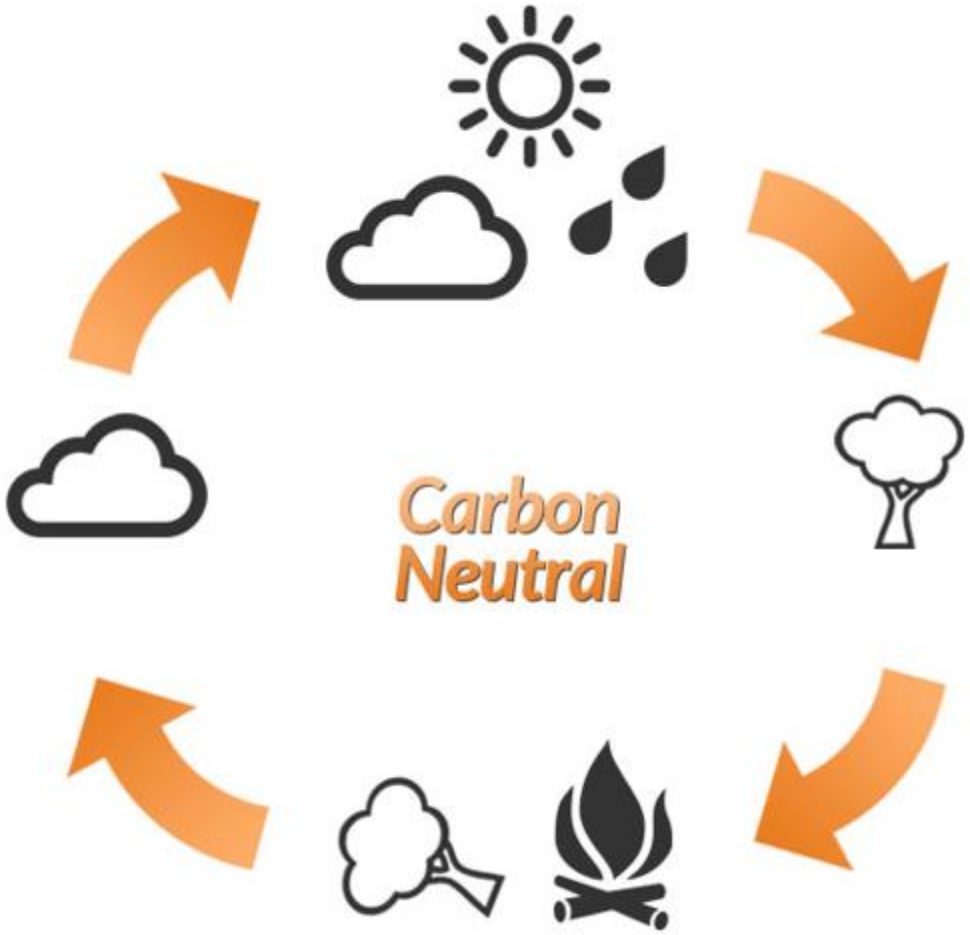
Sources: forestnet.com

Biogas



Sources: takamotobiogas.com

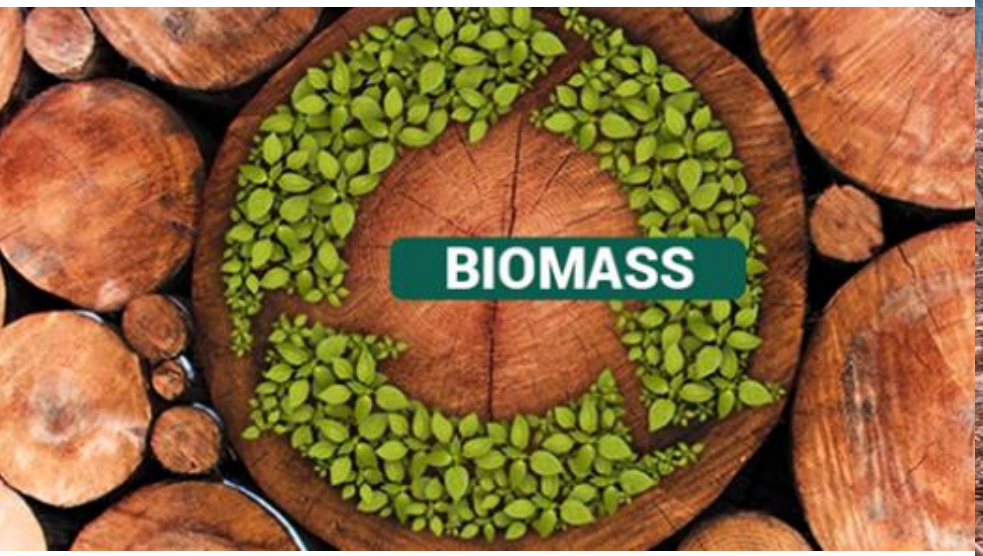
Bioenergy Misconceptions



Sources: wheildons.co.uk

Biomass Pros vs cons

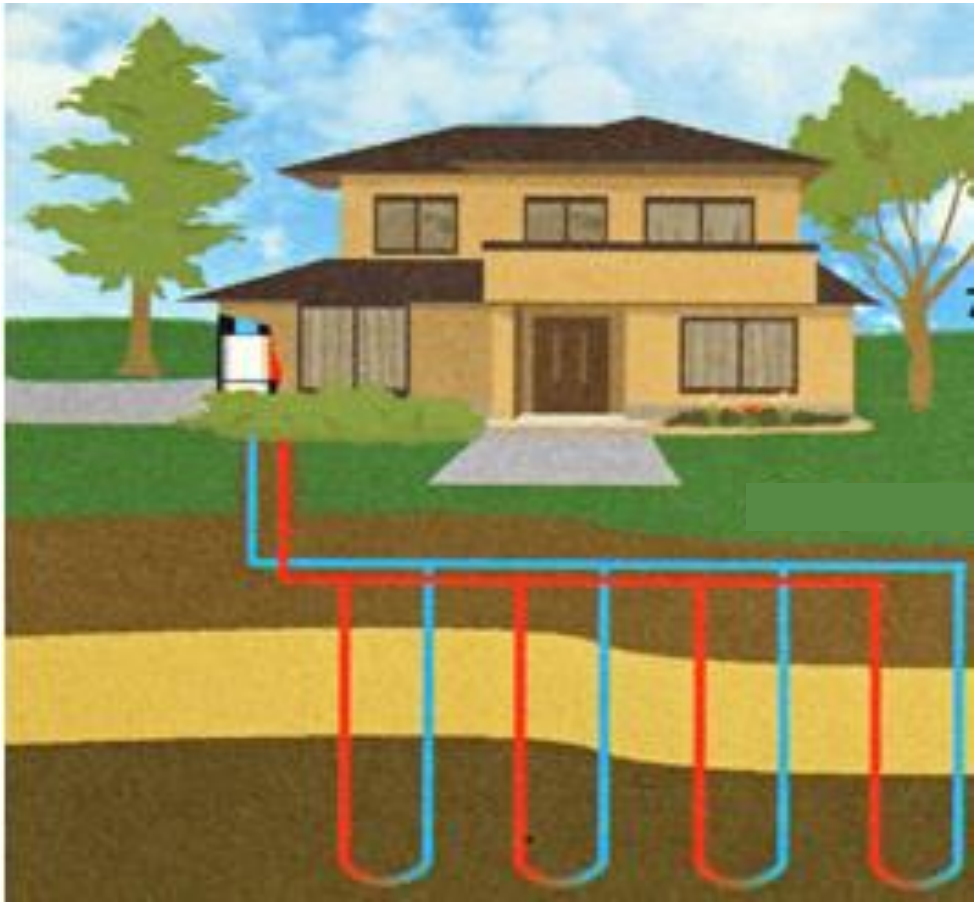
Pros



Cons

Sources: byjus.com, livescience.com

Geo-Exchange Technology

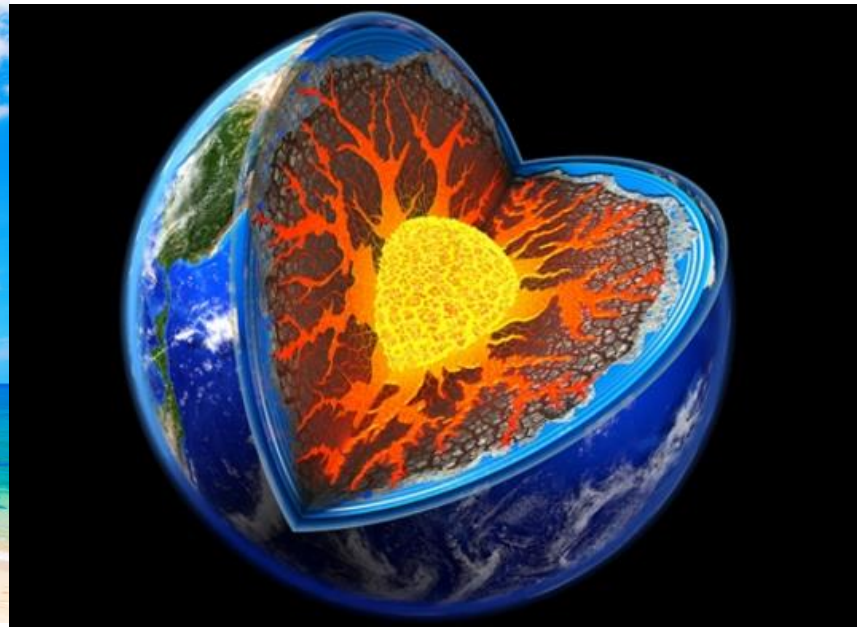


Sources: rmfaught.com

Geo-Exchange Economics

Sources: joebradshaw.ca

Geo-Exchange Misconceptions



Sources: gzhaixier.com, energy.gov

Geo-Exchange Pros vs Cons

Pros

Cons

Sources: sterlingheating.com, terratek.ca

Solar PV

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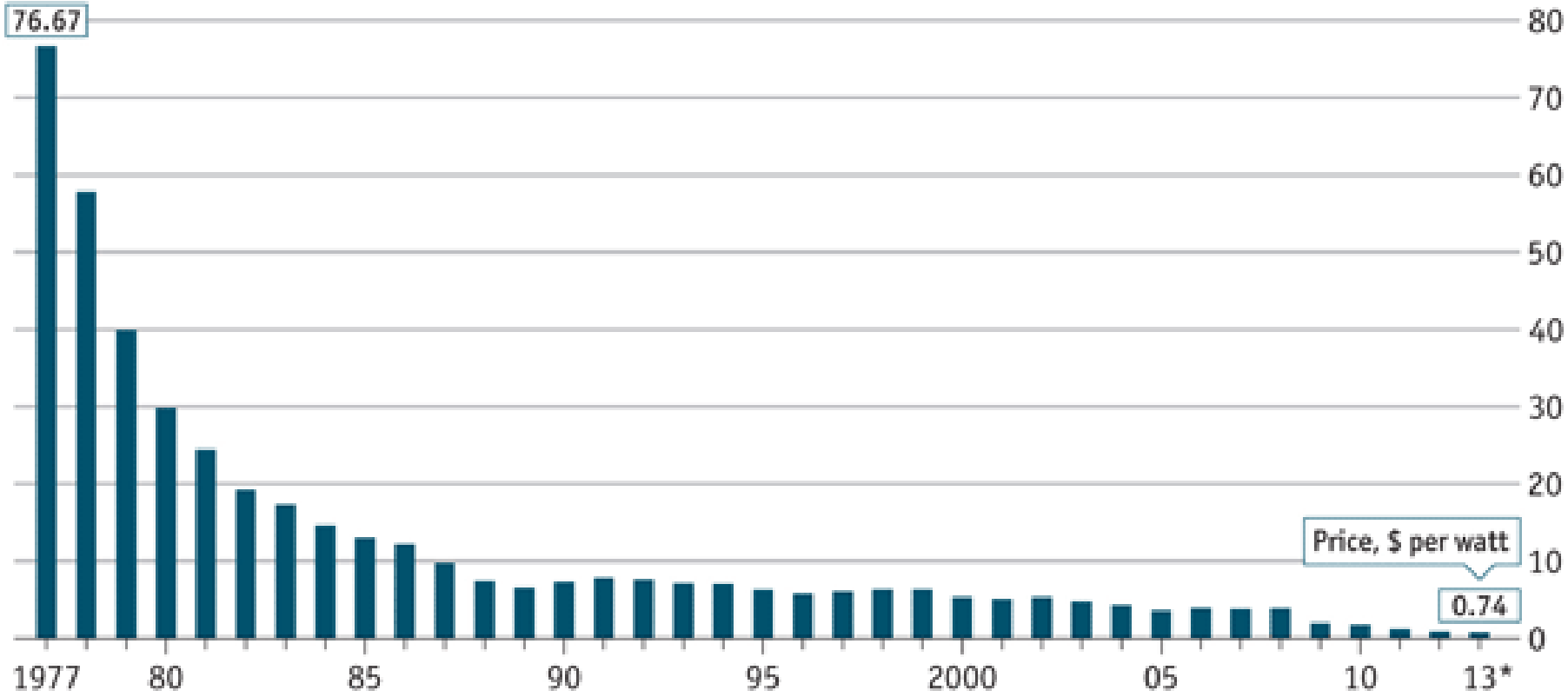
SUSTAINABLE COMMUNITIES

Cost of panels

The Swanson effect

Price of crystalline silicon photovoltaic cells, $ per watt



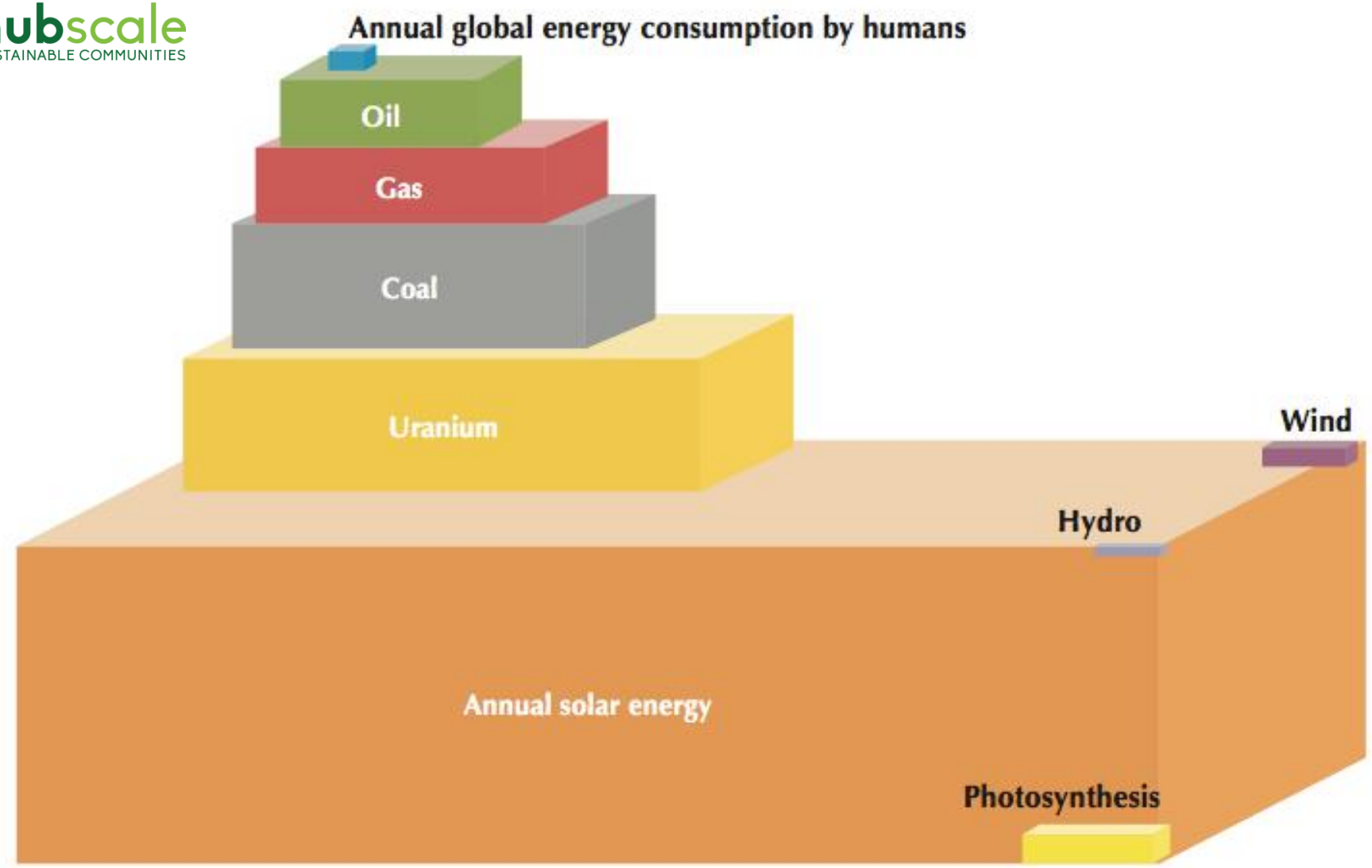
Source: Bloomberg New Energy Finance

*Forecast

Global Solar Capacity

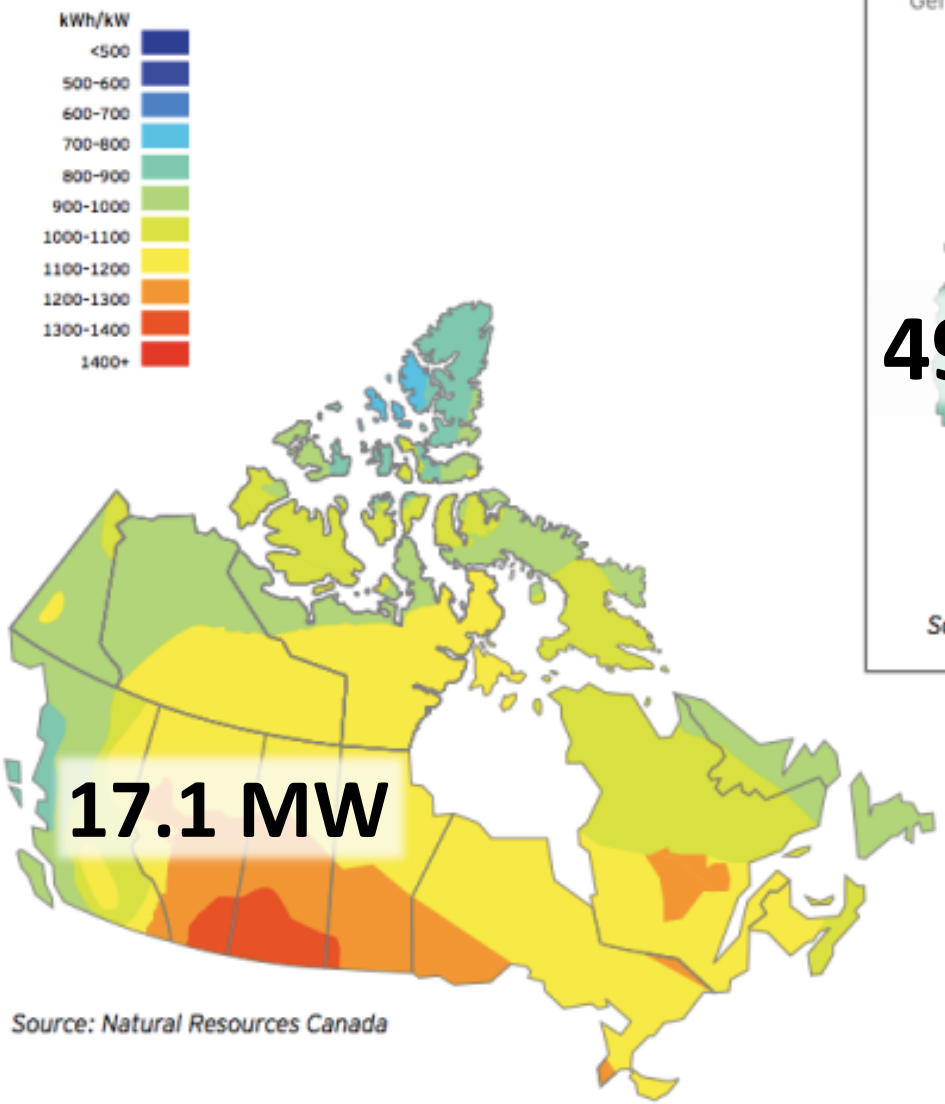
Source: REN21

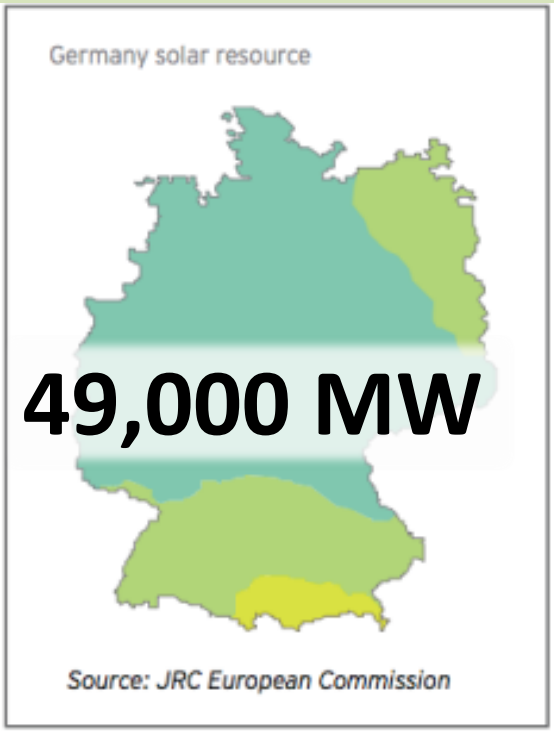
Solar Energy



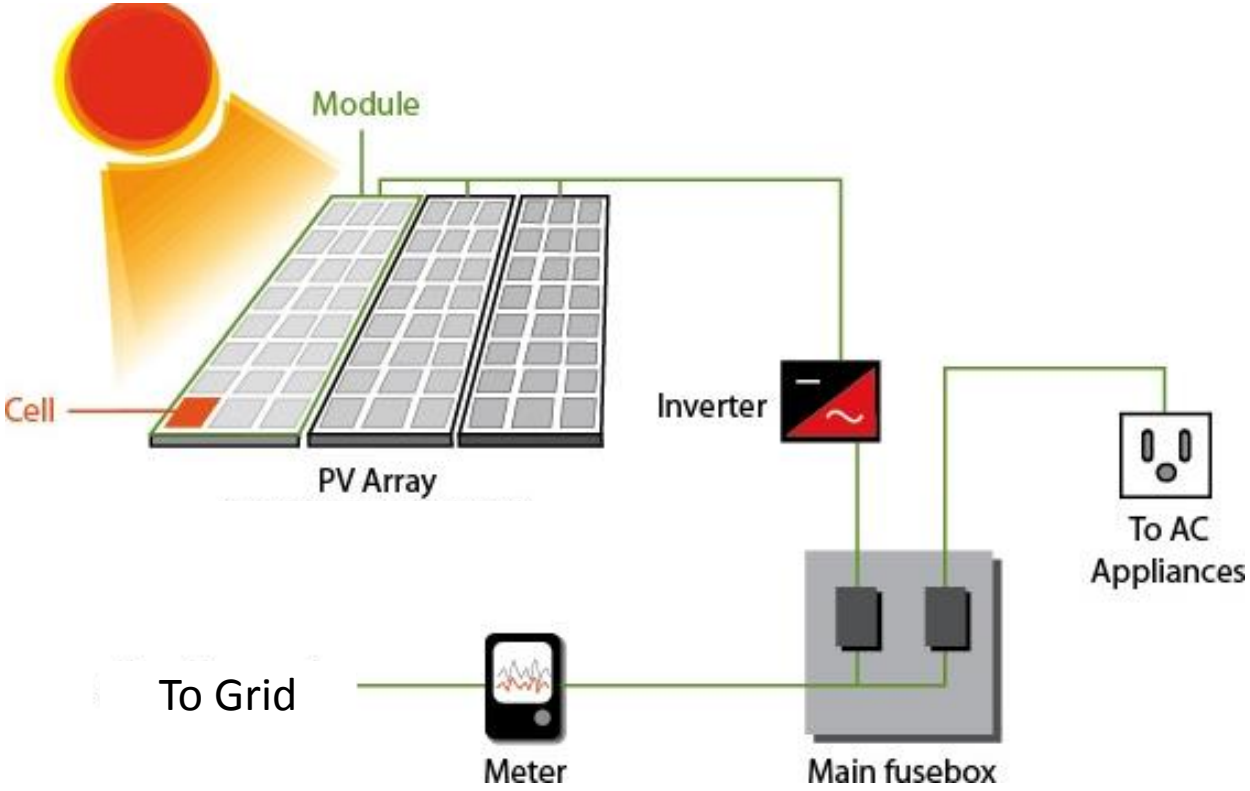
Source: IEA

Solar in Alberta



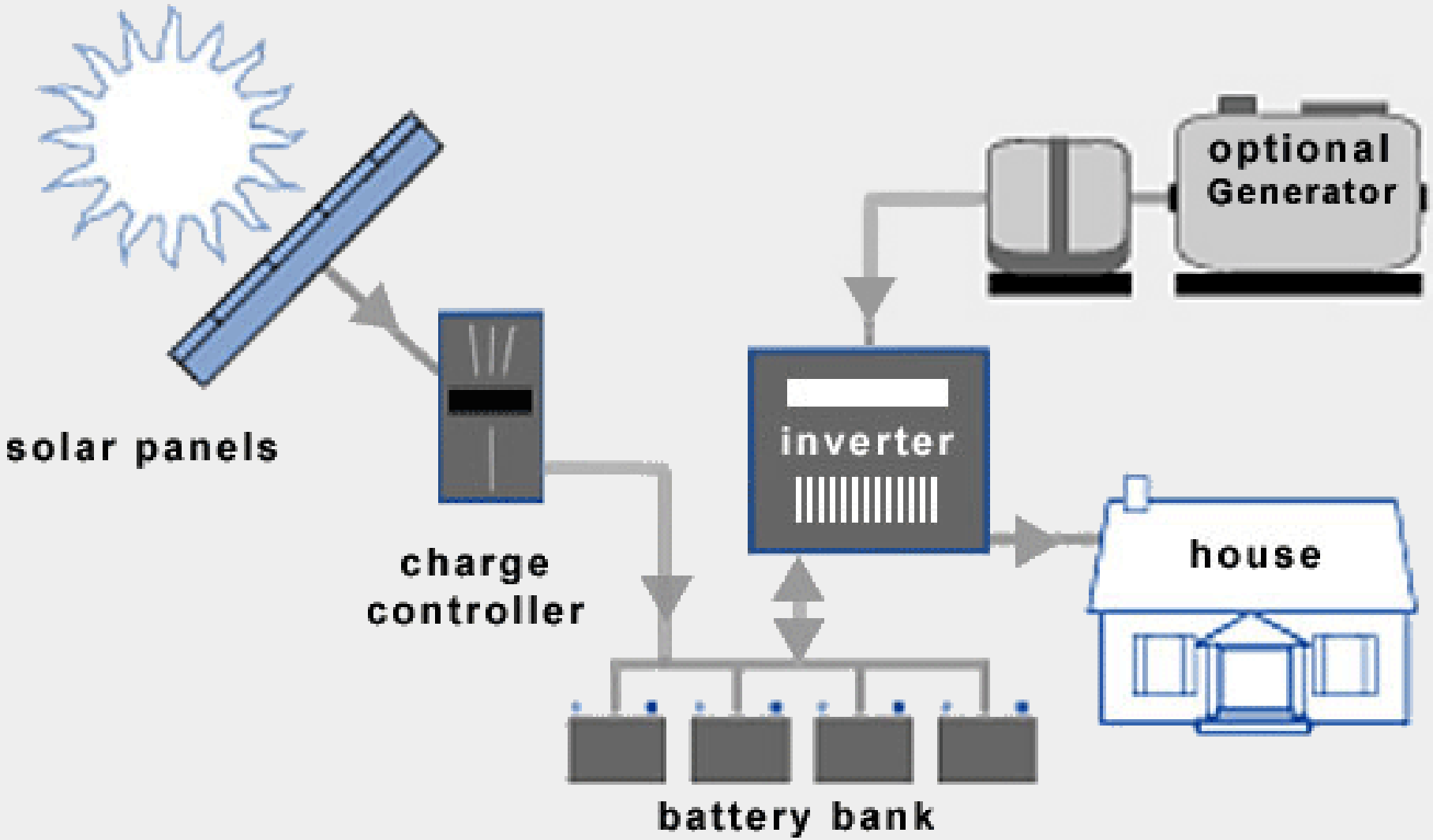


Solar 101



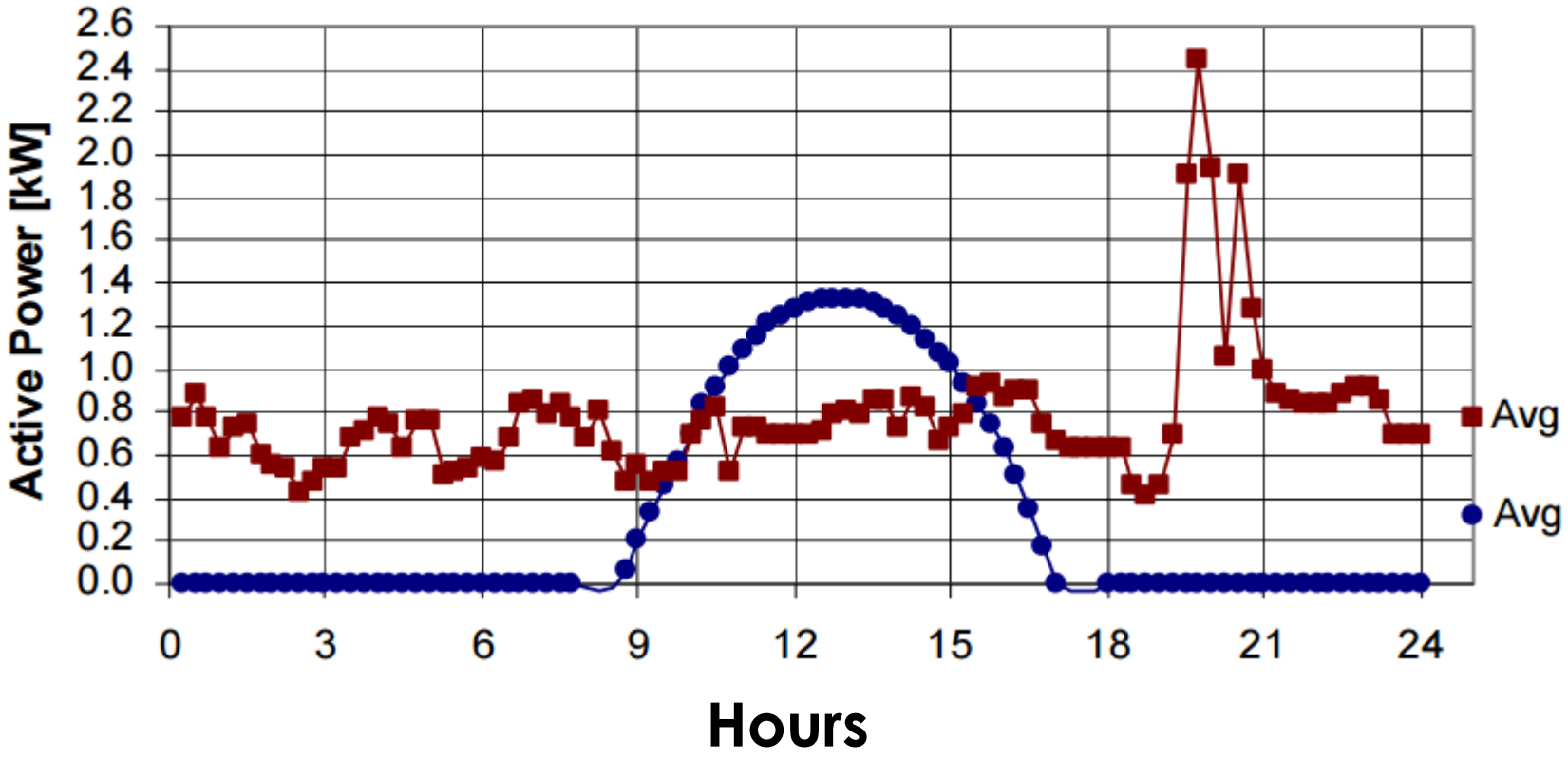
Source: noviusled.com

Off-grid system



Source: http://energyinformative.org/

Solar PV 101



Sources: solaralberta.ca

Average Alberta Home

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Annual Consumption = 7,200 kWh

Solar Misconceptions

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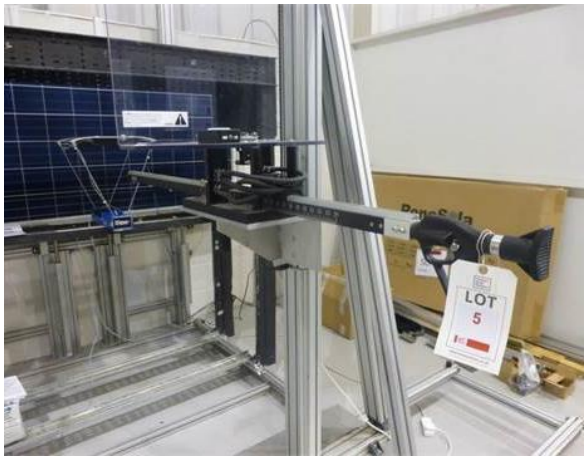
http://solarhelp.info/



https://www.bidspotter.co.uk/en-us/auction-catalogues/es-group/catalogue-id-ed10504/lot-a94079b1-53e4-4217-81ae-a695014273e1

http://techomebuilder.com/emagazine-articles-1/california-home-builders-fired-solar-safety

http://www.motherearthnews.com/renewable-energy/solar-panel-snow-removal

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SUSTAINABLE COMMUNITIES

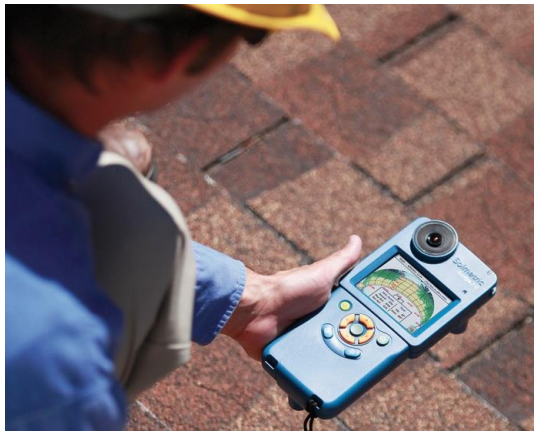
Where to start?

Source: Getty images

Choose a Contractor

Source: SESA

Site Assessment



Source: Home Power Magazine

Proposal

OPTION 1: SOLAREDGE SOLAR PHOTOVOLTAIC (PV) SYSTEM

6.36 KW DC (6.0 KW AC) SOLAR CAPACITY

Project Cost:
$16,660 Before Rebate
$11,890 After Rebate

Internal Rate of Return:
5.13%

Payback (Years):
17

Net Present Value (NPV):
$1,823

Lifecycle Energy Production Cost:
$0.06/kWh

System Capacity:	6.36 kW DC @ STC
Application:	Power Generation (On-Site) with Export Capability
System Type:	DC Optimizer / Central Inverter; Grid Inter-Connected
System Mounting:	Sloped Roof Mounting 26.5°Slope,180° Azimuth
Annual Electricity Production in Year 1:	~6,810 kWh/Year Under Ideal Conditions
System Includes:	Supply, Installation and Start-up Interconnection to Existing Electrical Panel Grid Interconnection Assistance 1-Year Warranty
System Does Not Include:	Roofing Modifications
Pros:	Improved Safety (Optimizers 1VDC Safety Voltage) Reliable Proven Technology Energy Production Stability Environmentally Beneficial Visually Impactful Long System Lifecycle Module Level Max PowerPoint Tracking Module Level Monitoring

Solar on your home

Confirm Designs

Source: Goodwill Construction Services

Permit and Micro-gen Application

Source: Garcia/Kraemer

Installation and Commission

Source: Thinkstock

Generate Electricity!

Source: Mays Building Services

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Industry Training

- Transitioning
  - Trades
  - Oil and gas (Iron and Earth)/ AGEN
- Green building design certifications
- Job opportunities
  - Networking events
  - LinkedIn

Source: CBC News

- Current programs and opportunities
  - NAIT- Alternative Energy Technology
  - SESA- PV for electricians
  - Lethbridge College- Wind Turbine Technician
  - Grid works
  - Lakeland College- Renewable Energy and Conservation

Source: www.benzinga.com


Thank You!

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SUSTAINABLE COMMUNITIES

Metis Nation Climate Leadership Workshop





Carbon Busters

Energy efficiency and self-sufficiency

Presenter: Godo Stoyke. B.Sc., M.Sc.

NÜENERGY


Carbon Busters

Self-sufficiency

Housing

Food

Water

Energy

Transportation

Food

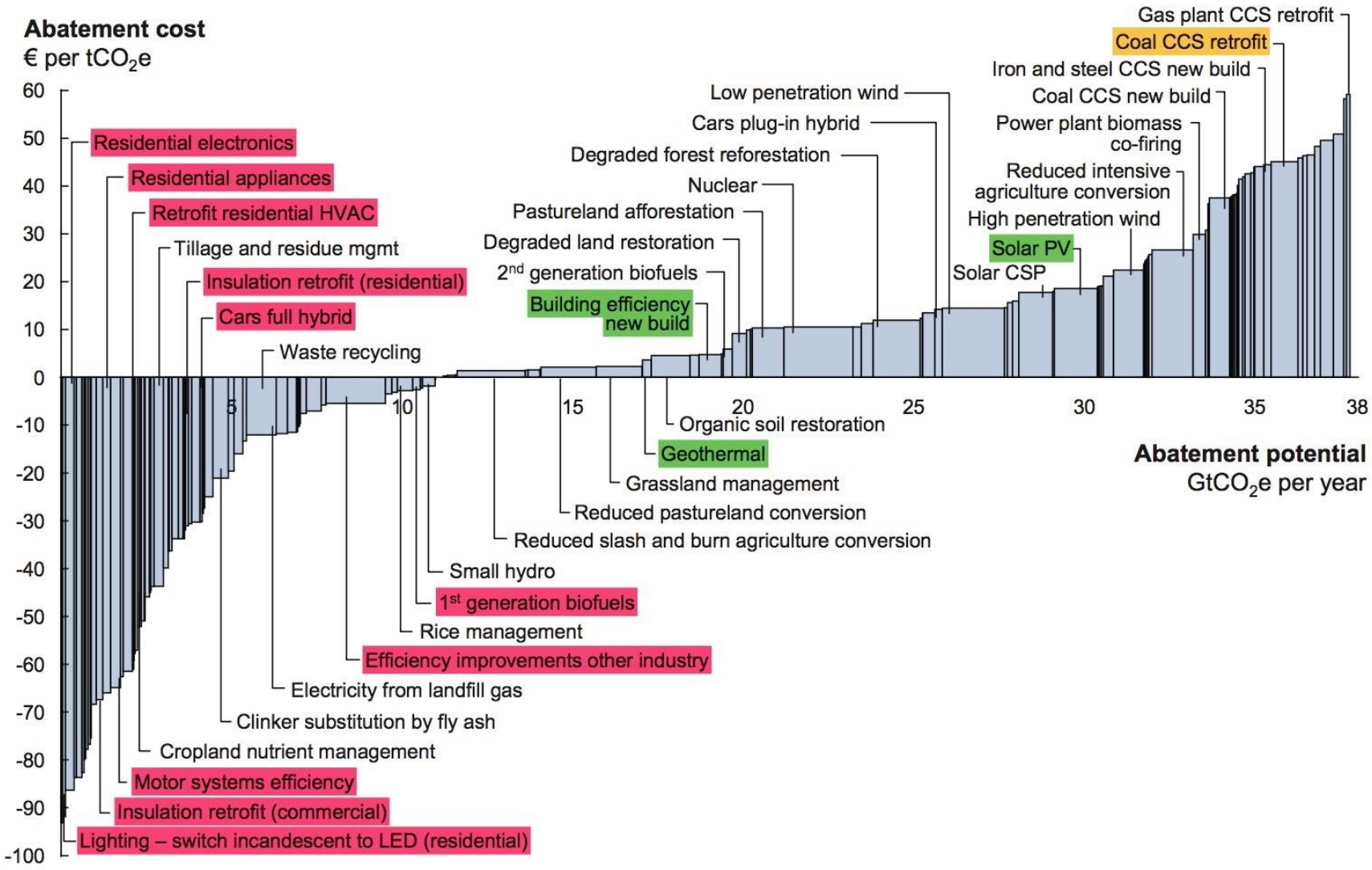
Food


Carbon Savings
82 Millions Kg CO_{2e}
$27.1 mio
CarbonBusters.org
CReturns.com

Canada's most abundant green energy?

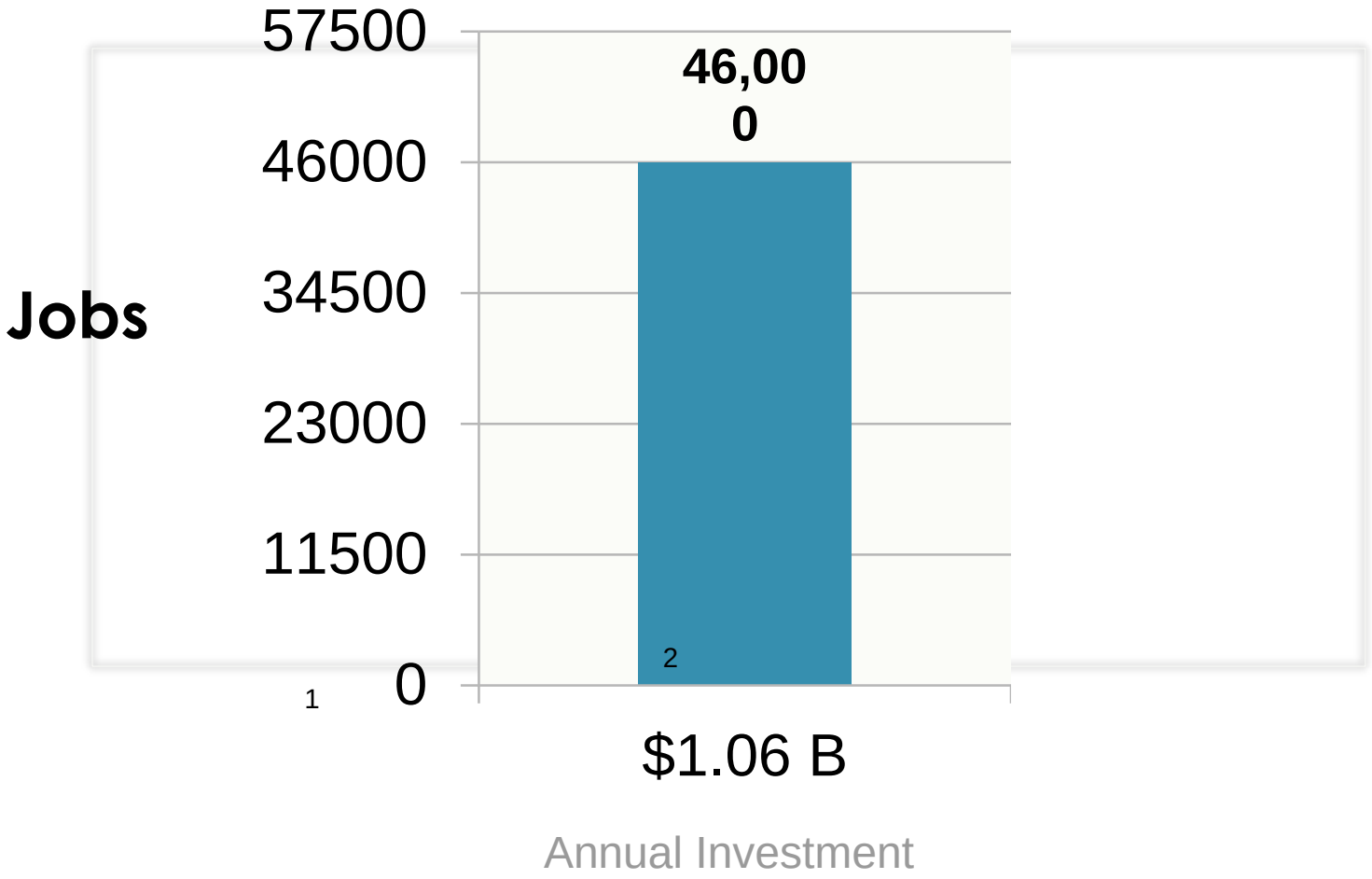
1. Negawatts
2. Negawatts
3. Negawatts

Global GHG abatement cost curve beyond business-as-usual – 2030



carbonbusters.org

Source: McKinsey 2009



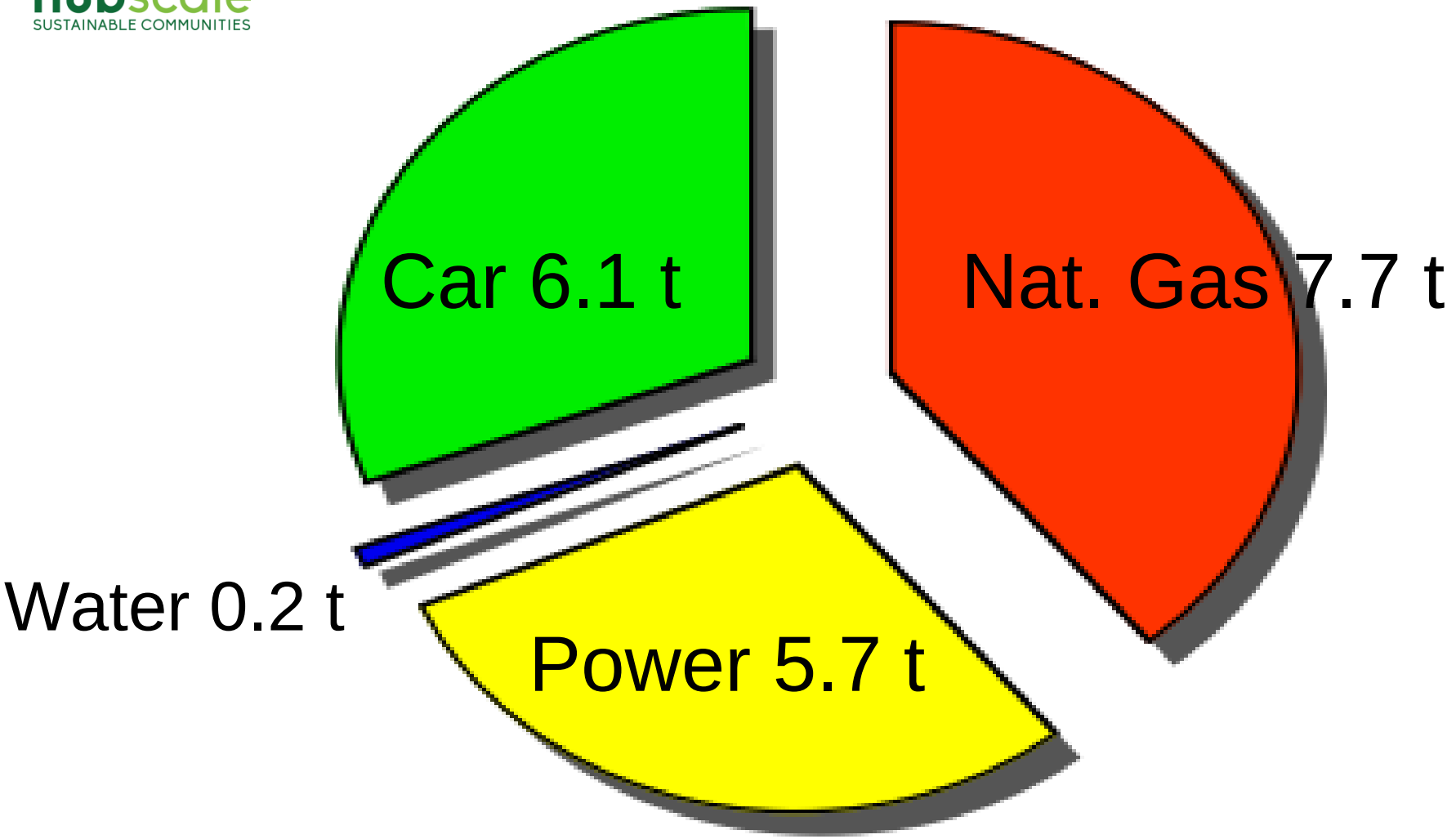
Canadian Ministers of Energy and Mines, http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/www/pdf/publications/emmc/14-0176_Energy%20Efficiency%20Update%202014_e.pdf

1 tonne of CO2 gas

3,903 bath tubs

1 m3 CO2 = 1.83 kg, 1 bath tub = 140 L

Alberta family carbon pie: 19.6 t CO2e

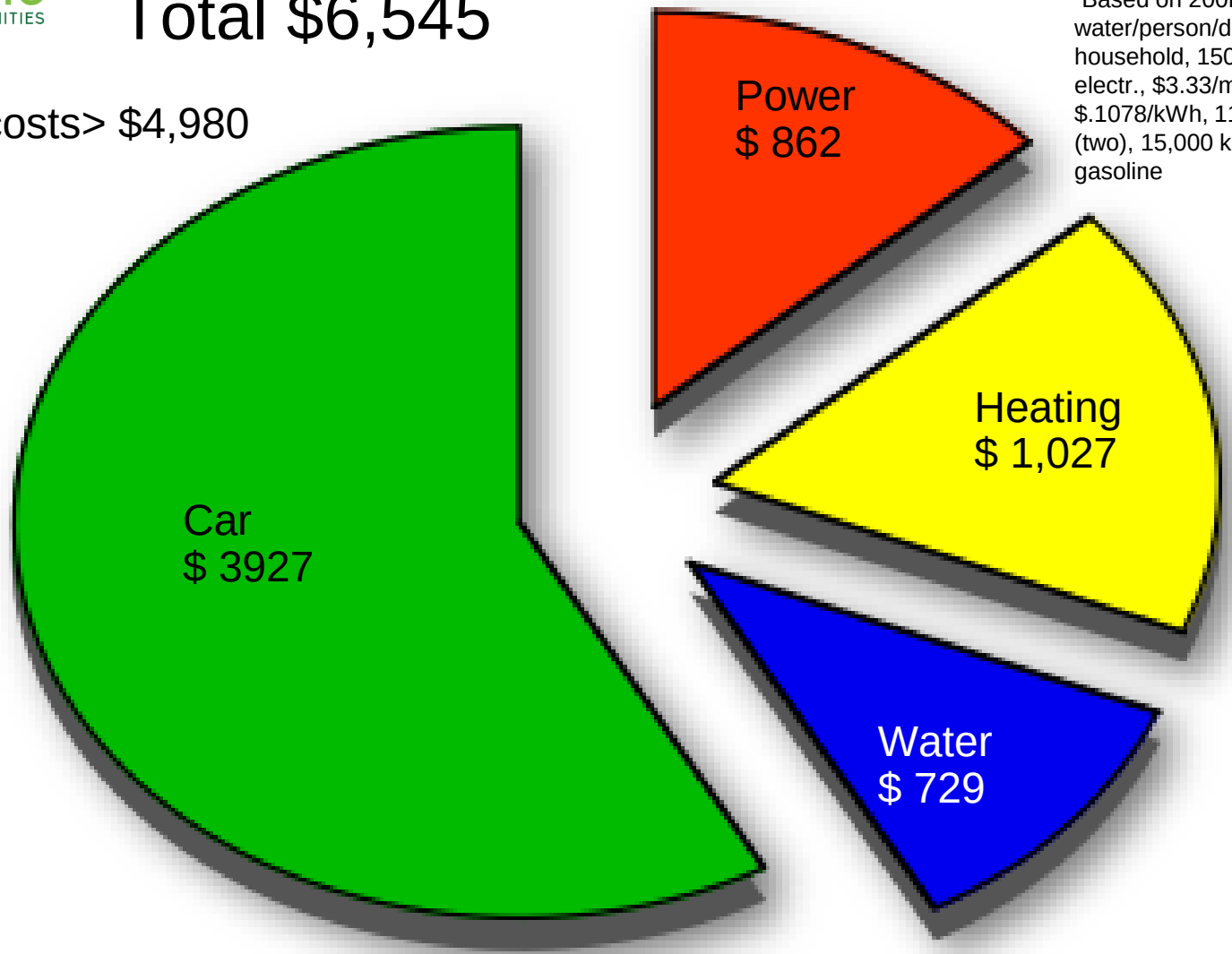


Detached home, 2 cars, Scope 1 & 2

Alberta family: energy costs/a

Total $6,545

Add fixed costs> $4,980



Based on 200L water/person/day, 3 person household, 150GJ NG, 8000 kWh electr., $3.33/m3 H20, $6.84/GJ, $.1078/kWh, 11l/100 km cars (two), 15,000 km/a, $1.19/L gasoline

Assumed energy prices

Electricity: **10.78 ¢**/kWh

Natural gas: **$6.84**/GJ (incl. $1.517/GJ carbon levy)

Water: **$3.33**/m3

Gasoline **$1.19**/L (incl. 6.73¢/L carbon levy)

- Cost: $27,000 ($3,900 incremental) • Savings/year: $1160
- Payback 3.3 years • CO2e: 38.0t (life)

Based on incremental cost of $3,900 and average Canadian fuel efficiency, 4.5l/ave.

Cost of energy 4-6 x lower

Zero Emission

- Cost: $32,000 ($9,000 incremental)
- Saved: $1,721/year
- Payback: 5.2 years
- CO2e: 64.4 (life)

Best in their class

Best: Electric Nissan Leaf 20 kWh/100 km

Best gas: Toyota Prius • 4.5L/100 km •

Cheapest: Mitsubishi Mirage • 6.0L/100 km • $9,998

Sedan: Toyota Yaris • 6.6L/100 km • $17,315

Sedan: Honda Fit LX: • 6.5L/100 km • $19,586

Pickup, small: • Chevrolet Colorado diesel • 9.5L/100 km

Pickup, standard: • Ford F-150 • 10.9:/100 km • $28,249

SUV small: • Toyota RAV4 hybrid • 7.3 L/100 km

SUV, standard: • Lexus NX300h • 7.5 L/100 km

Excludes delivery and taxes

Standard Pickup

Ford F-150 base model • 10.9L/100 km • $28,249 vs. GMC Sierra FFV 4.3L 17.1L/100 km • $30,745

Cost: $-2,496, Savings: $1,107/year Payback: zero years CO2e: 36.3t (life)

How to save energy

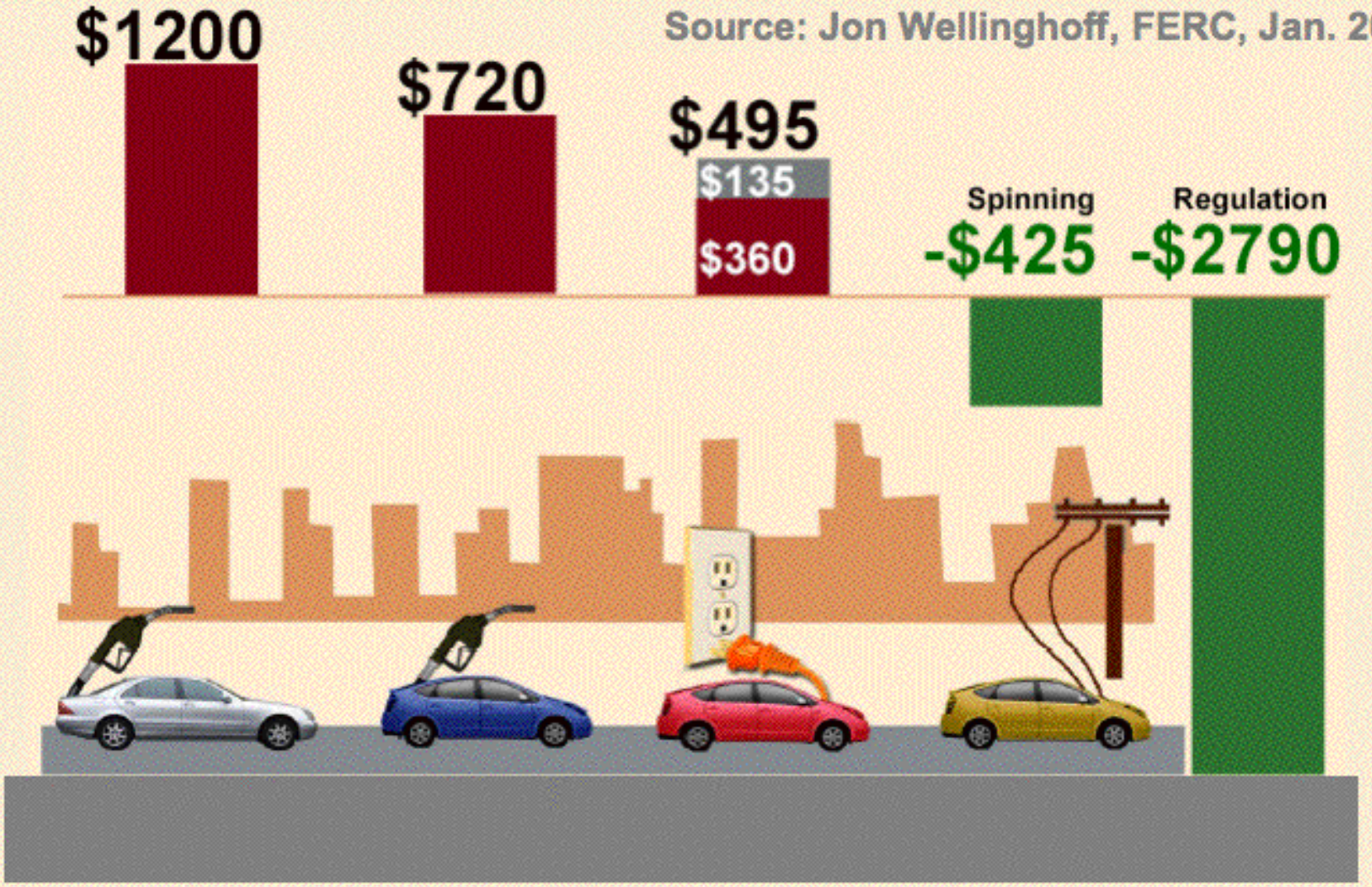
- **Properly inflated tire: 3% Cost: $0, Savings: $58/year, payback: 0 years, CO2e: 0.5t (5 years)**
- **Accelerate and break smoothly**
- **don’t speed —> 10%**

Cost: $0, Savings: $195/year, payback: 0 years, CO2e: 2t (5 years)

Based on 7psi under inflation, 0.4% per psi http://procarmechanics.com/how-tire-pressure-affects-mpg/ b, https://bucks.blogs.nytimes.com/2011/04/25/a-tire-engineers-tips-for-better-gas-mileage/?_r=0

Annual Fueling Costs

V2G



Kliesch and Langer, ACEEE, September 2006. Letendre, Denholm and Lilenthal, Public Utilities Fortnightly, December 2006.

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SUSTAINABLE COMMUNITIES

10,705 mpg

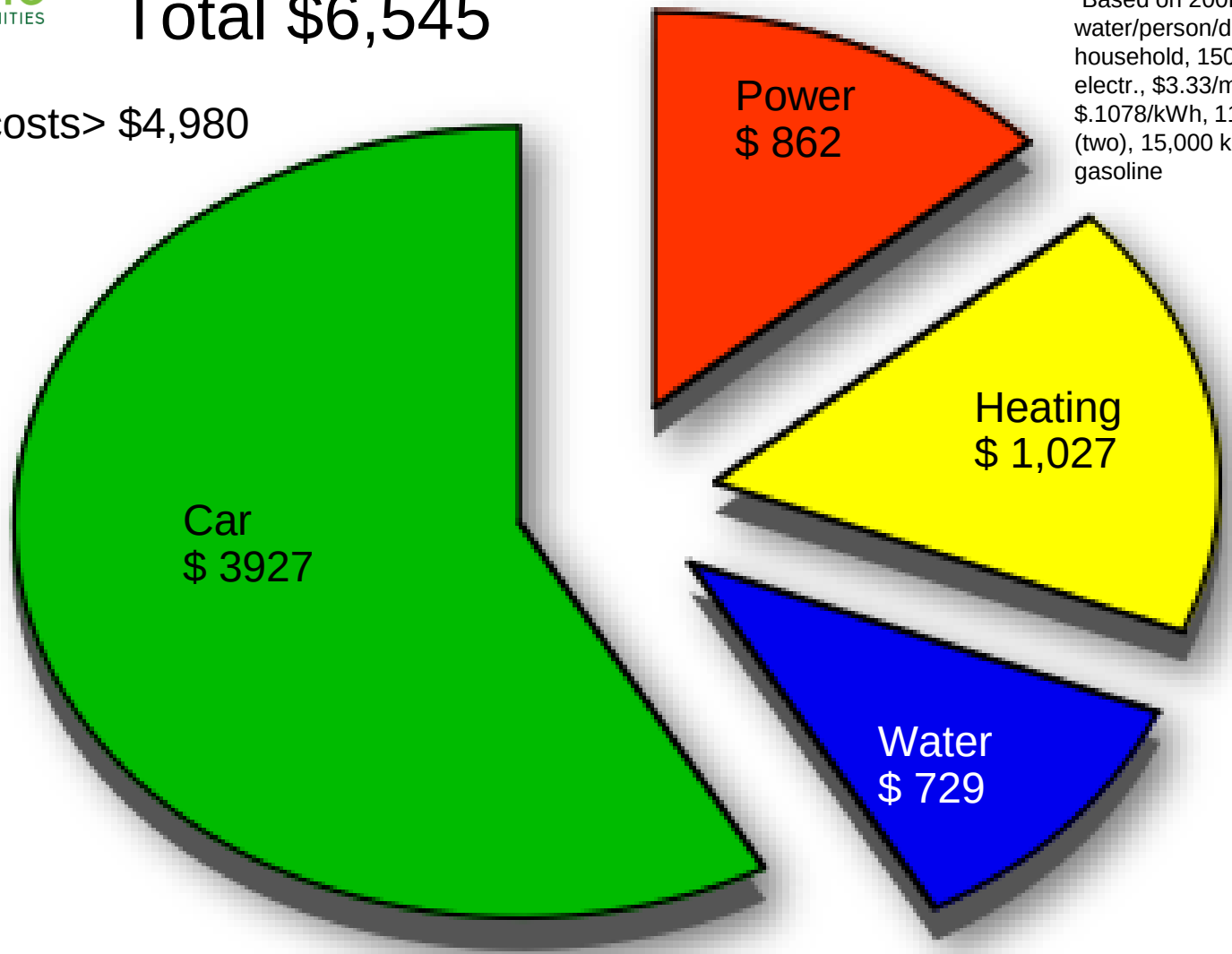
1.03L

$13.66

Alberta family: energy costs/a

Total $6,545

Add fixed costs> $4,980



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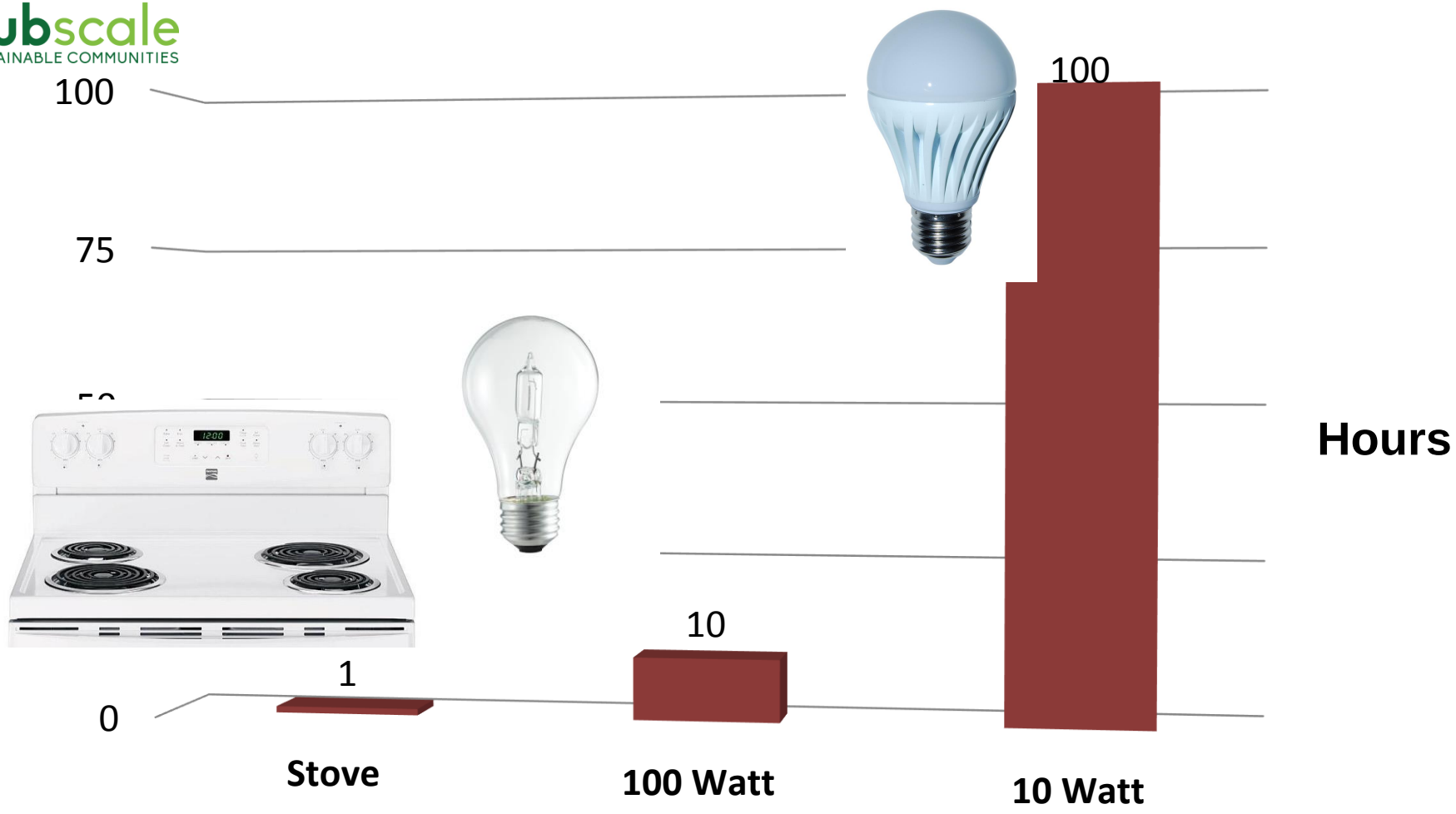
Watt is a kiloWatt-hour?



5-10x more efficient

A19

Cost: $0

Savings: $71/year

Payback: 0 years

CO2e: 5.2 t/life

GU10

Free from: efficiencyalberta.ca

Colour “temperature” ≤3000K

CarbonBusters.org

Power Vampires

- 2 x Genessee (TV)

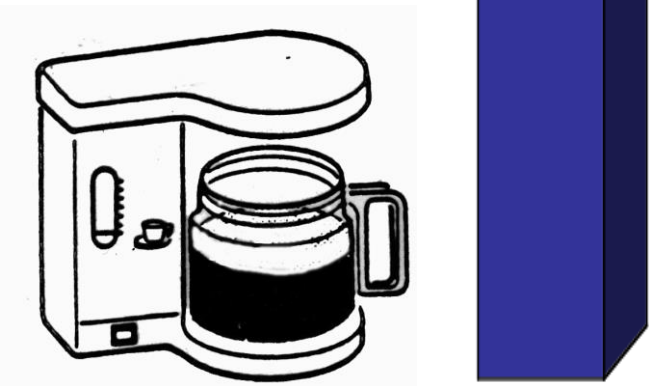
- Cost $ 0
- $86 saved/a
- Payback: 0 yrs
- 10.2t CO2e (life)

EcoFitt: Free

Principle of energy service

64 Watts

Energy Supply:



Heat Retention:

0 Watts

Front-loading washer

- Cost: $233 (incremental)
- Saved: $234/year
- Payback: 0.99 years
- CO2e (life): 23.3t

Condensing and heat pump dryer

- Condensing:
- Cost $ 139
- $20 saved/a
- Payback: 6.99 yrs
- 3.0t CO2e (life)

- Clothes line
- Drying rack

Fridge

- Cost: $664/$9 (incremental)
- Saved: $59/year
- Payback: 0.15 years
- CO2e (life): 7t

- Avoid basement trap

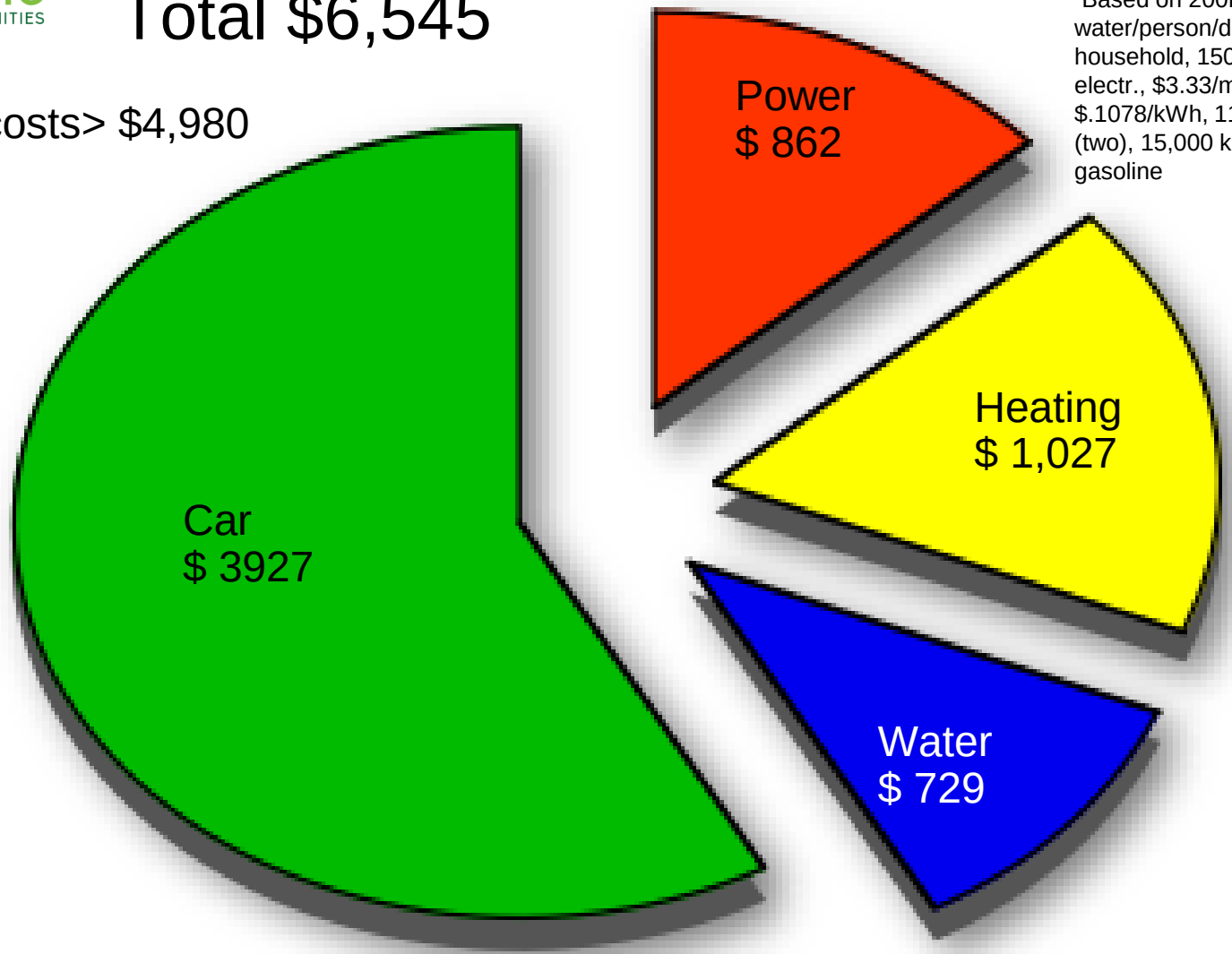
Compared to 2000 fridge, 17.5 cu ft. 850 kWh, replace 300 kWh

“Watts up?” meter

Alberta family: energy costs/a

Total $6,545

Add fixed costs> $4,980



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Cost: $150

Savings: $31/year

Payback: 4.9 years

CO2e: 4.5 t/life

Dog bonus: 300 kg

Pilot lights: Fireplace & Furnace May-September

Cost: free

Savings: $43/year

Payback: 0 years

CO2e: 6.3 t/life

6.33 GJ/year, 20 years

High-efficiency, condensing furnace

92-98% efficient

DC motor

Modulating fan and burner

Cost: $6,500/$1500 incremental

Savings: $180/year

Payback: 8.3 years

CO2e: 31.4 t/life

Insulate hot water tank and pipes

Cost: $60

Savings: $11/year

Payback: 5.6 years

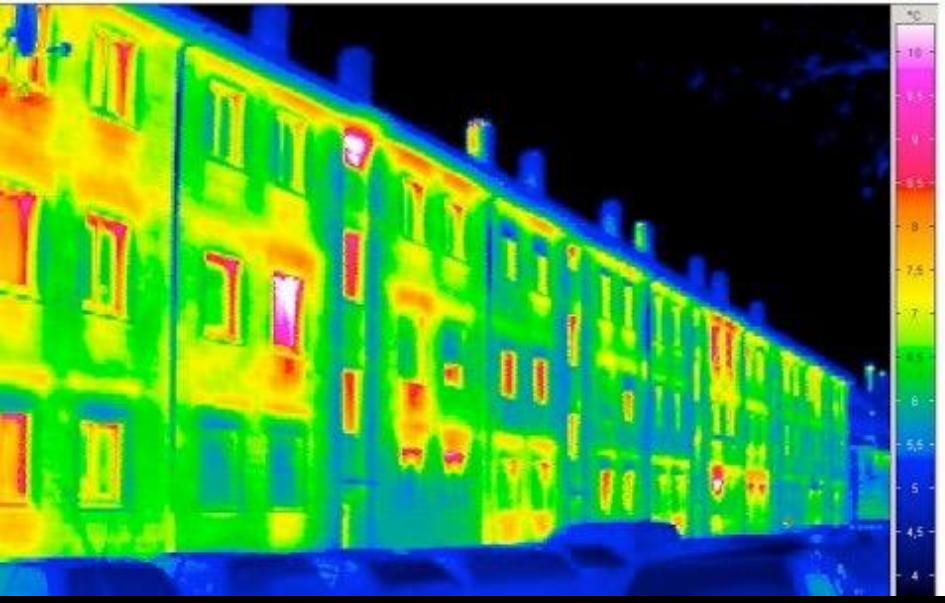
CO2e: 1.2 t/life

Cost: $3

Savings: $9

Payback: 0.3 years

CO2e: 1.3 t/life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°C
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0
-0,5
-1
-1,5
-2
-2,5

Free from efficiencyalberta.ca

Smart thermostat

Cost: free

Night setback saves $170/year

Low-flow shower head

Cost: free

Savings: 30%

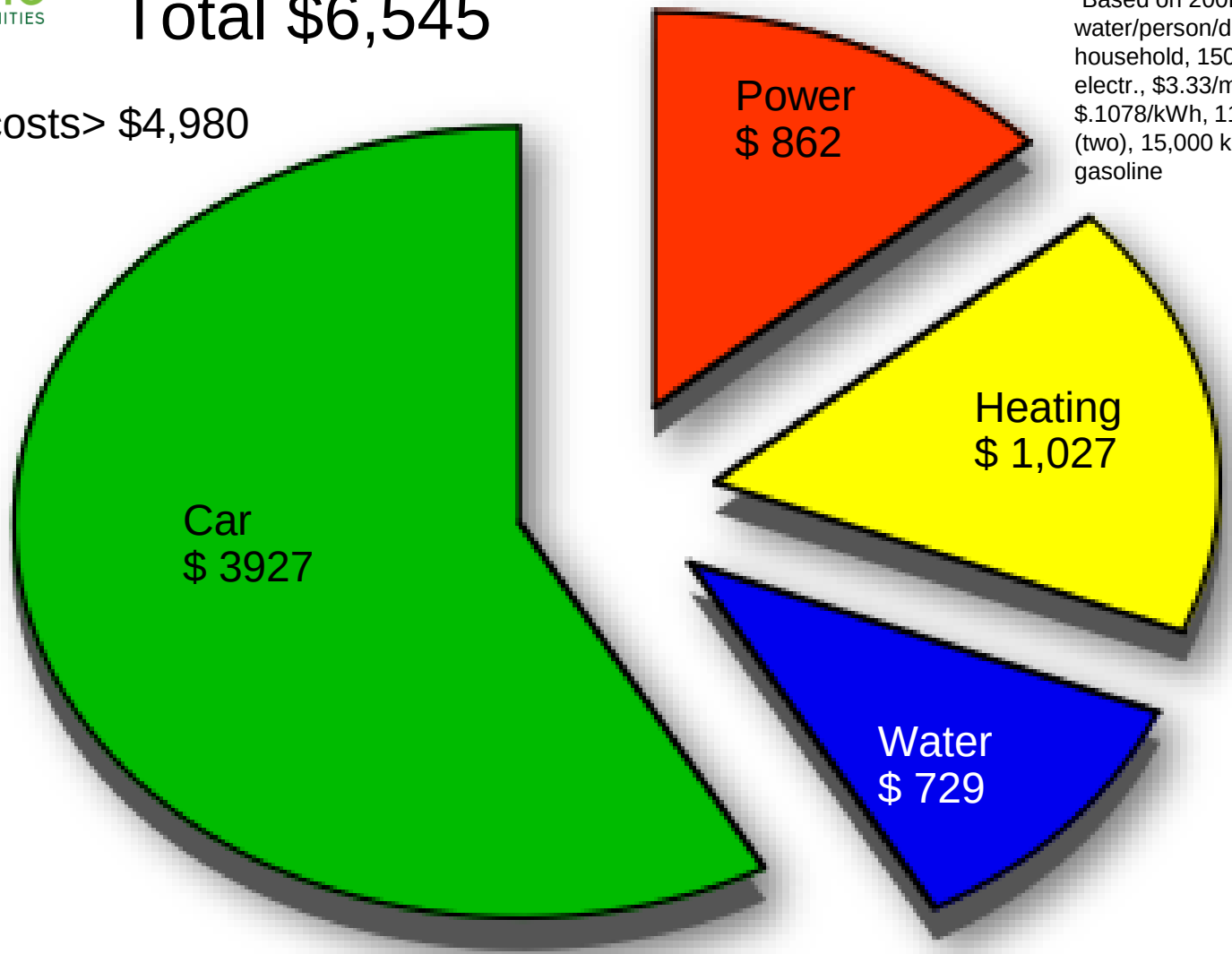
Payback: instant


greenenergyfutures.ca Episode 137
Carbon Busters Homes
OPEN HOUSE

Alberta family: energy costs/a

Total $6,545

Add fixed costs> $4,980



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0.58 kg/m3

Water-saving toilet

3L/flush

compressed air

cost: $425

savings: $83/a

19.6 kg CO2e/a

payback: 5.1 years


Carbon Busters Zero Carbon Sustainable Community