

Wind and Energy Storage

in your home and business

Increasing your Energy Security



Dr. JP Pinar, PhD, PEng
presented at
PNWER, Whitehorse, Yukon
Nov 14th, 2018

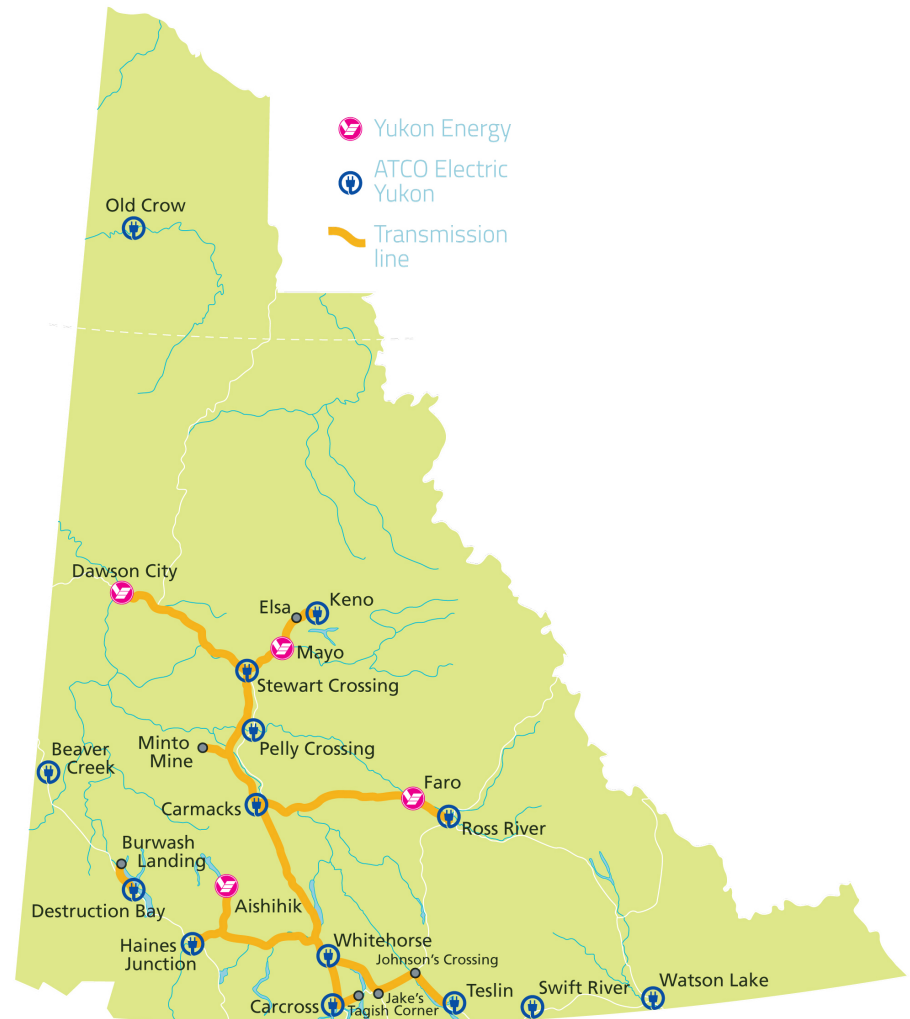
Climate Instability

- Humanity's biggest threat,
- Climate scientists: we all need to act now, and
- There's good news...

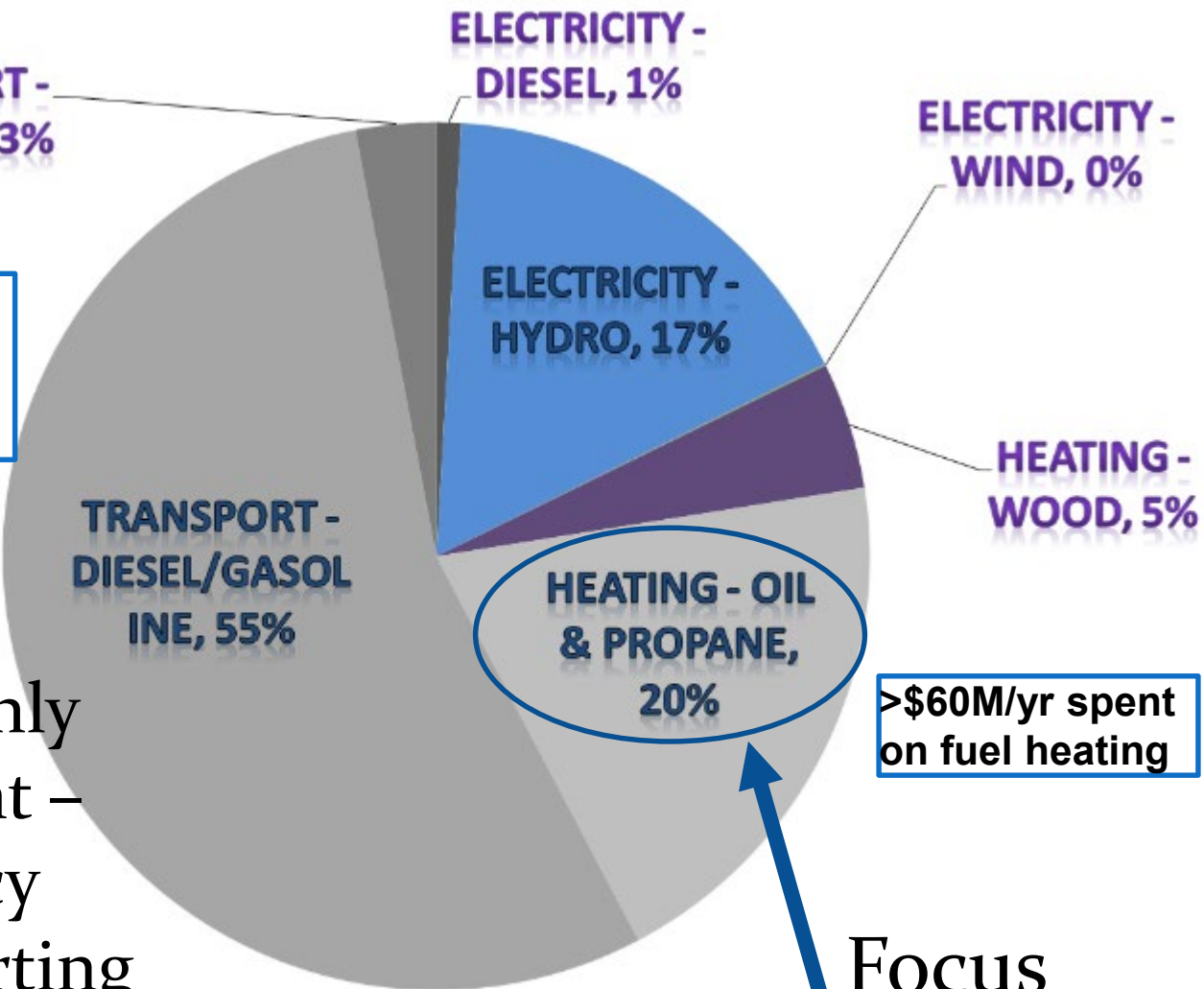


You CAN cut your GHG emissions

By bringing in more renewable energy into your home and business, through the **Electrical Grid.**



Yukon's Energy Mix



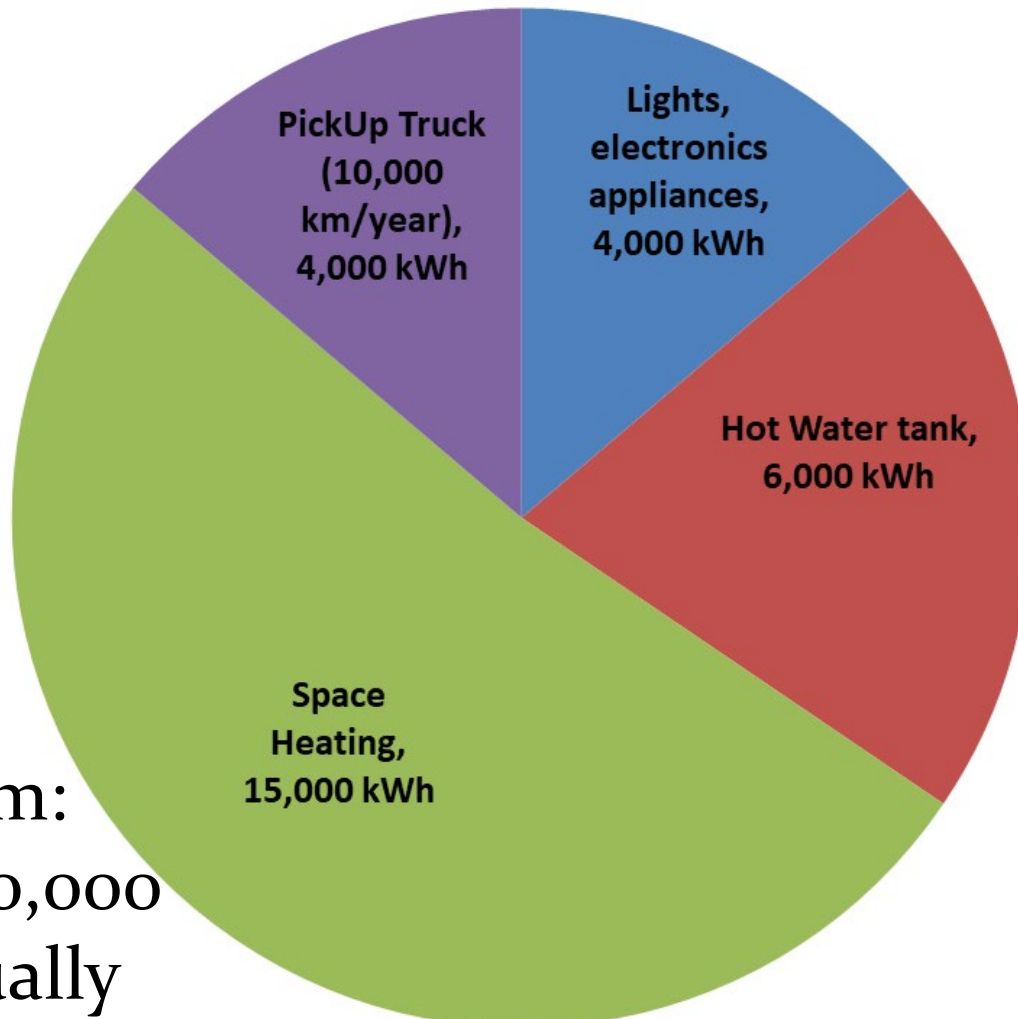
~\$250M/yr leaves the Yukon

Note:
Transport only 20% efficient – big efficiency gains converting to EVs

>\$60M/yr spent on fuel heating

Focus here first

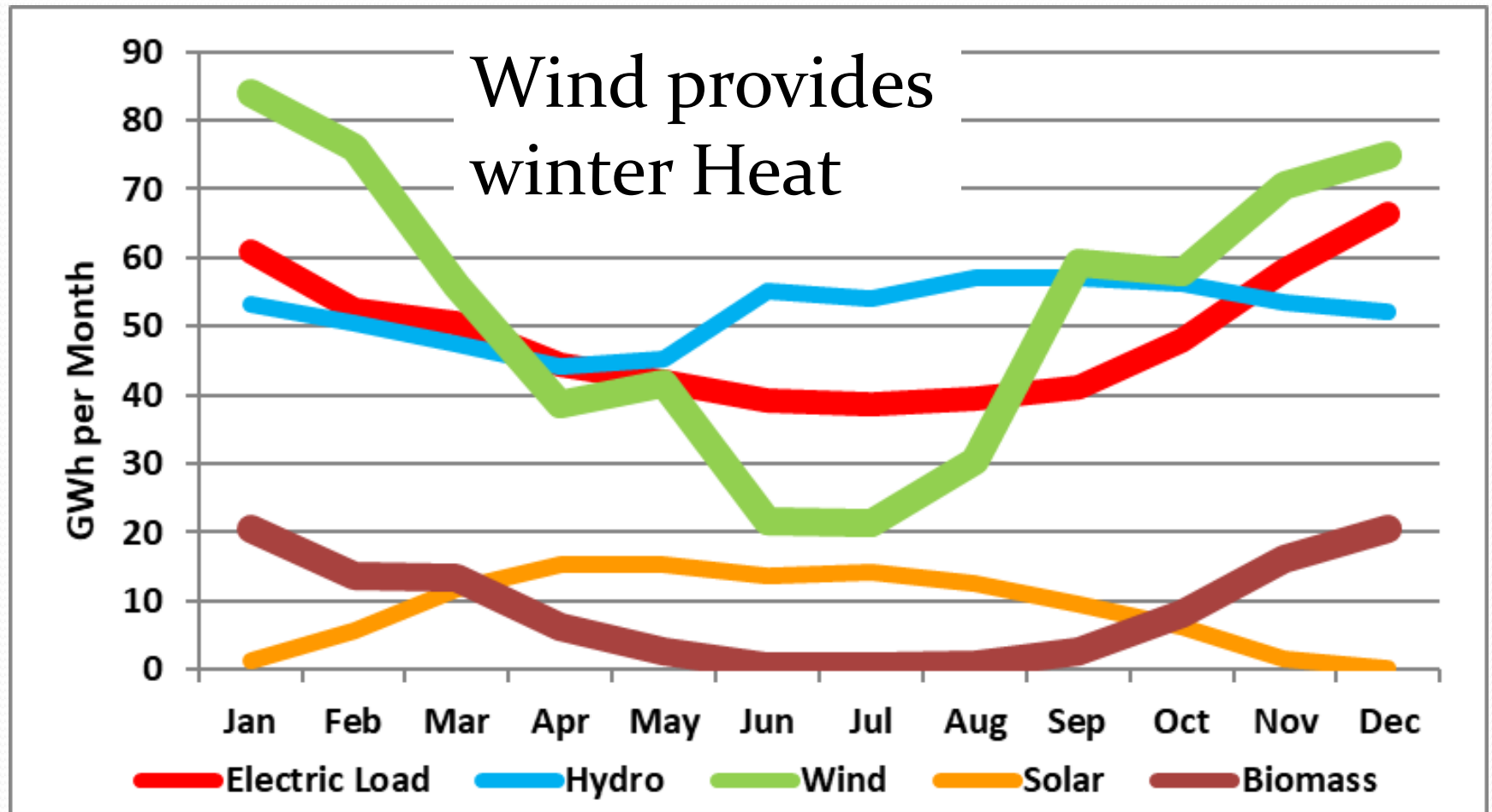
Energy Needs for a Yukon Homeowner



Heating ranges from: 5,000 to 40,000 kWh annually

Yukon's Electric Grid:

Existing Load and Hydro, and Wind, Solar, and Biomass scenarios



Bear Mountain Wind Farm
near Dawson Creek, BC

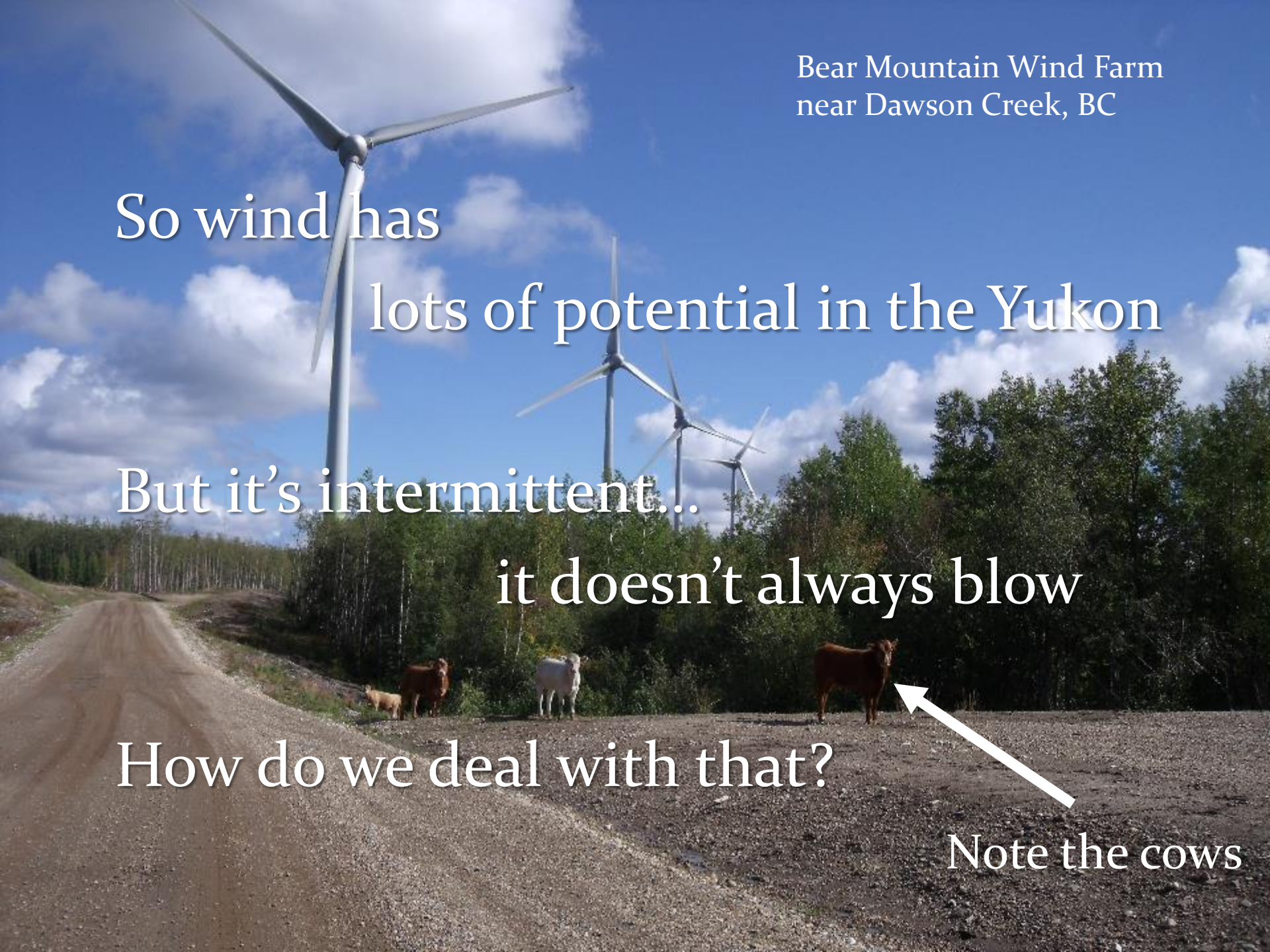
So wind has
lots of potential in the Yukon

But it's intermittent...

it doesn't always blow

How do we deal with that?

Note the cows



Securing your Home with Energy Storage



Fridge



ETS

Wood stove



DHW



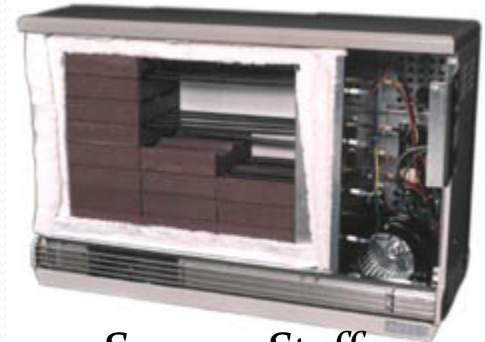
EV P/U

Home UPS



Electrical Thermal Storage

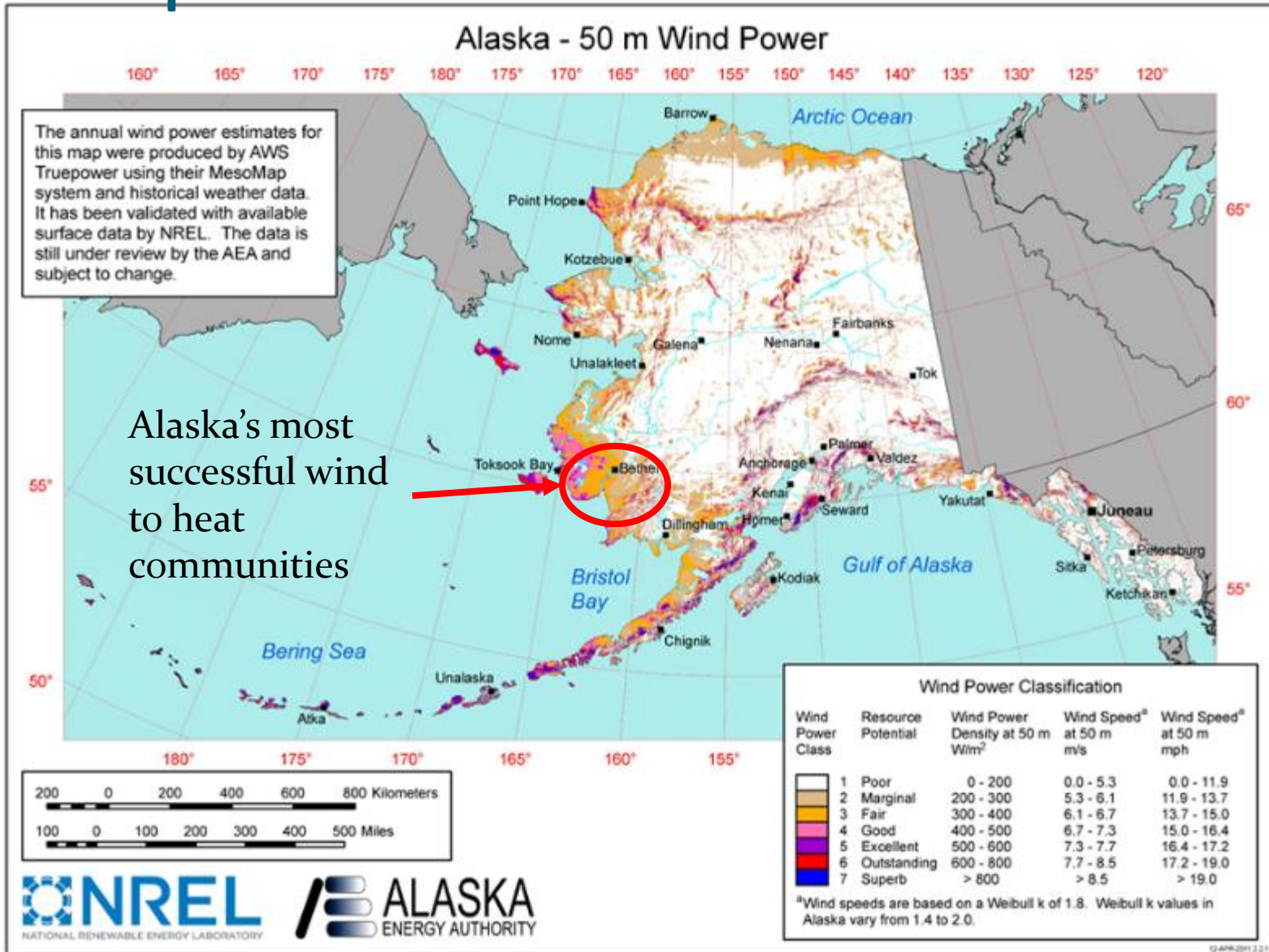
- Electrical Thermal Storage (ETS) turns electricity into heat and stores it in bricks,
- Very low cost energy storage,
- Well established since 1940s,
- Used for peak shaving and grid stability,
- Two dozen in Whitehorse.



Source: Steffes



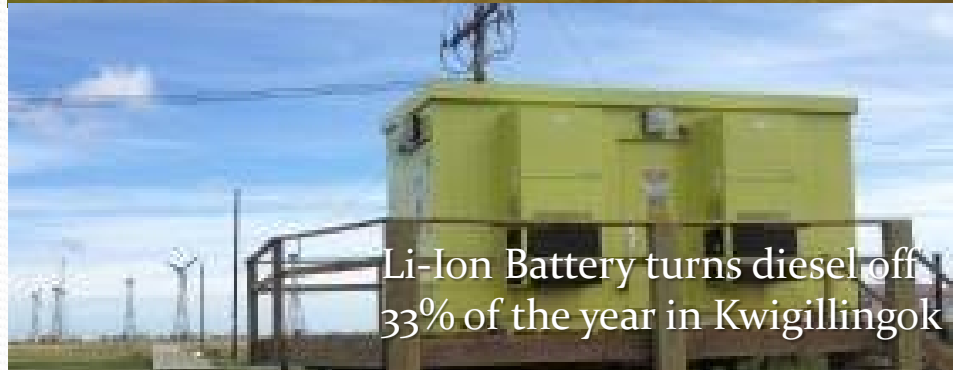
Champion communities



Success Story:

Alaska's Smart Wind to Heat Villages

- Chaninik Wind Group: group of 4 Native-owned utilities in SW Alaska,
- Four Villages each have 5 – 95 kW wind turbines, and ~ 2 dozen ETS appliances to store heat from wind,
- All are smart grids managing wind and ETS heaters,
- Now displacing 35% of diesel and heating oil and aiming for 65%



Following Alaska's footsteps: Wind to heat studies for Yukon hydro-diesel grid

- Energy Solutions Centre (YG) commissioned economic study
- YCS led a Whitehorse ETS workshop in 2014 brought experts to share success stories,
- At least 24 ETS units now in Whitehorse.

Initial Economic Analysis of Electric Thermal Storage in the Yukon

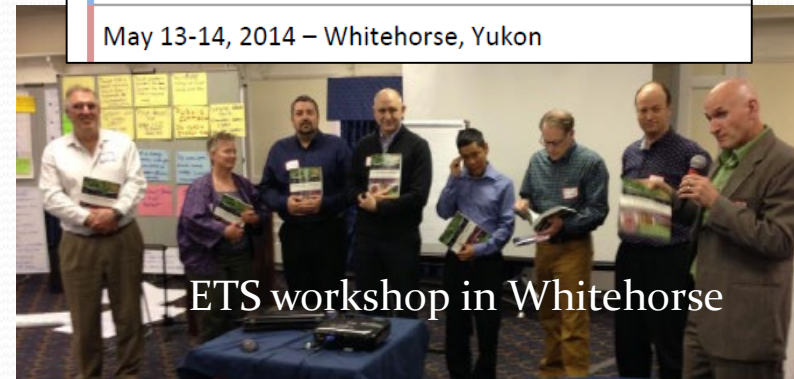
Submitted to the Energy Solutions Centre

By
Luigi Zanasi
Jean-Paul Pinard
Janne Hicklin
John Maissan

31 March 2014

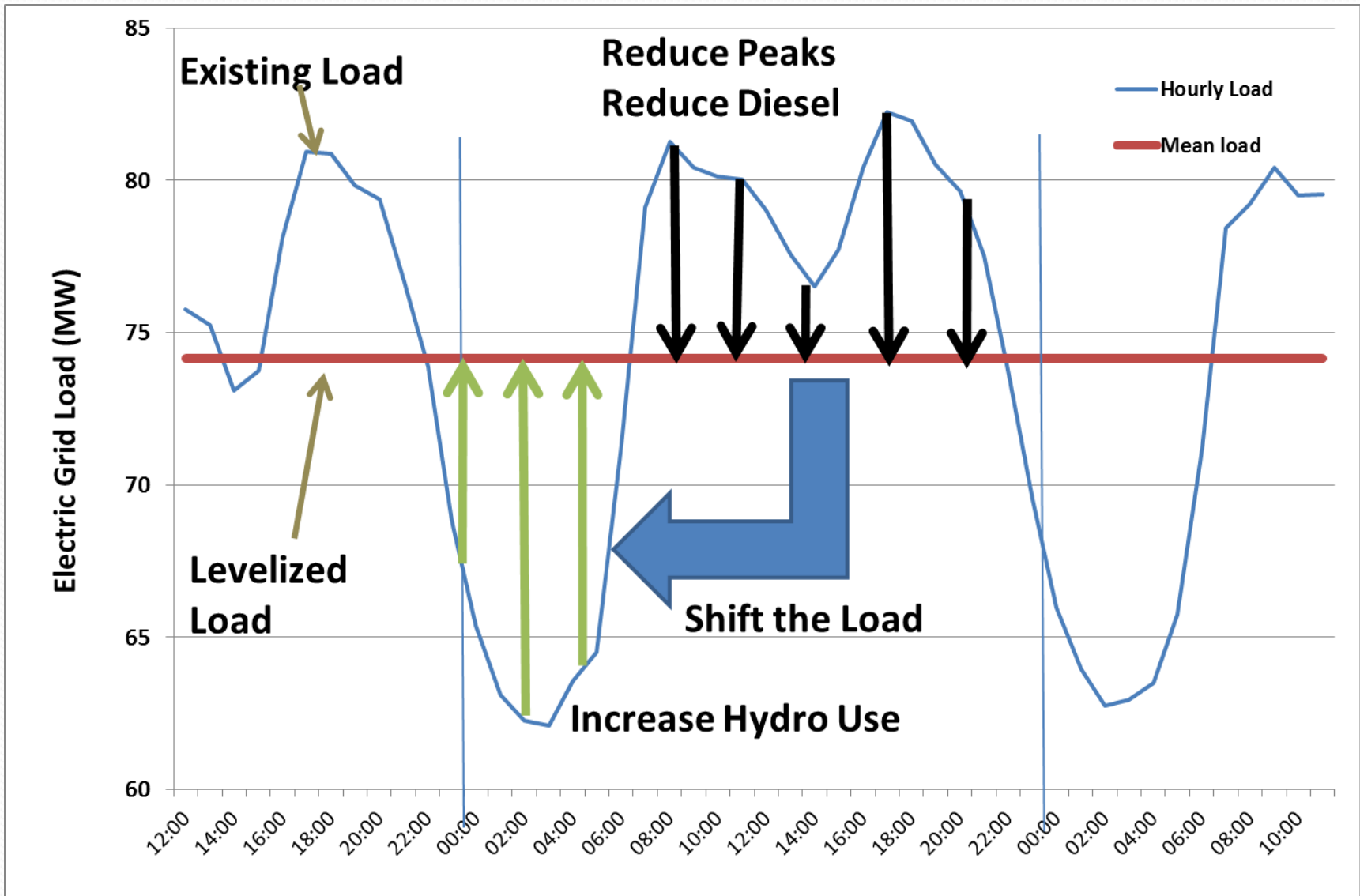
Electric Thermal Storage: Space Heating with Renewable Energy Workshop Report

May 13-14, 2014 – Whitehorse, Yukon



ETS workshop in Whitehorse

ETS: Reduce peaks on the Hydro Grid



NRCan/CanmetENERGY Collaboration

1014

IEEE TRANSACTIONS ON SMART GRID, VOL. 8, NO. 2, MARCH 2017

Opportunities for Smart Electric Thermal Storage on Electric Grids With Renewable Energy

Steven Wong, *Member, IEEE*, and Jean-Paul Pinard

- Part of a five-year (2011-15) Smart Zone research project that included Yukon, New Brunswick, and Ontario

Key Conclusion: A 50 MW wind farm
could heat ~5000 Yukon Homes

Obstacles to Energy Storage

- No rebates for installing energy storage like ETS (nor for EVs, home batteries),
- No energy management system yet (smart grid),
- Grid upgrades will be required,
- No cheap wind energy (scale too small).

How do we make this work?

- A **partnership** between Utilities, RE sellers, Customers,
- A **working group**:
 - Collect data, analysis, model, set pathway,
 - Coordinate activities,
- A **program**:
 - Pilot energy storage in home and businesses,
 - Coordinated role out of energy management,
 - Training associated with projects.

Where do we start?

- Start an ETS pilot right here in Whitehorse,
- Already >24 ETS owners,
- Ties in with planned wind project on Haeckel Hill,
- City of Whitehorse is a big customer and wishes to reduce its GHGs,
- Yukon Energy and ATCOEY looking into Energy management to shave their peaks & increase RE sales,
- Whitehorse has brainpower & skills

Program Benefits

Wind Producer

- Increased market for wind energy,
- More revenues and jobs.

Bigger Scale
Wind = Cheaper
Electricity,

Utility

- Increased sales,
- Lower peaks,
- More stable grid.

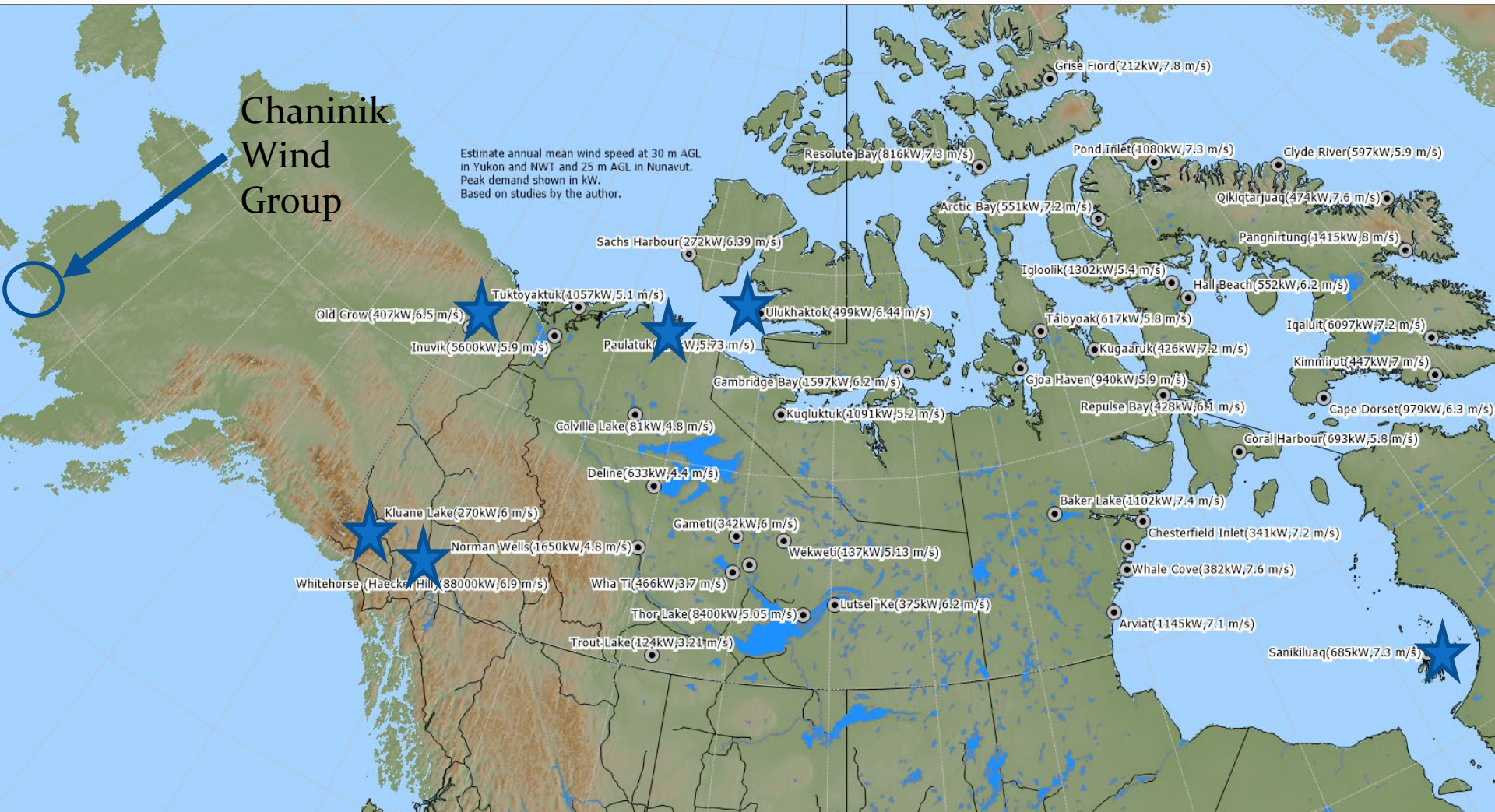
Government

- GHG reductions target,
- Economic boom.

- Lower energy costs,
- Energy security,
- Can achieve 100% renewables.

Customer

Next Steps: expand



Technology is not a barrier...

- Technology today is proven and off-the-shelf,
- It's a social engineering exercise.



Image courtesy of Forbes

Renewable Energy Economy

All truth passes through three stages:

- First, it is ridiculed.
- Second, it is violently opposed.
- Third, it is accepted as being self-evident.

Arthur Schopenhauer

A Cold Wind Heating Yukon Homes

**Thank you!
Merci!**

photo: www.fritzmueeller.com

