UVRA Saturday Series:

"Living without Oil"

Low Carbon Electrification, the CleanBC Plan and BC Hydro

presentation by Tom Hackney

7 March 2020

BRITISH COLUMBIA
Sustainable Energy ASSOCIATION
Victoria Chapter

how to deal with climate change?

Wiseman, *et al*, U. Melbourne, 2013:

"The biggest roadblocks … are primarily political, not technological."

Key enablers:

- Understanding the need and possibility to move quickly
- Broad recognition of the great benefits
- Strong leadership and engagement of every level of society

What do you *think* about our world, what do you *feel*?

Victoria Chapter presents

Youth Involvement Project (Y.I.P)

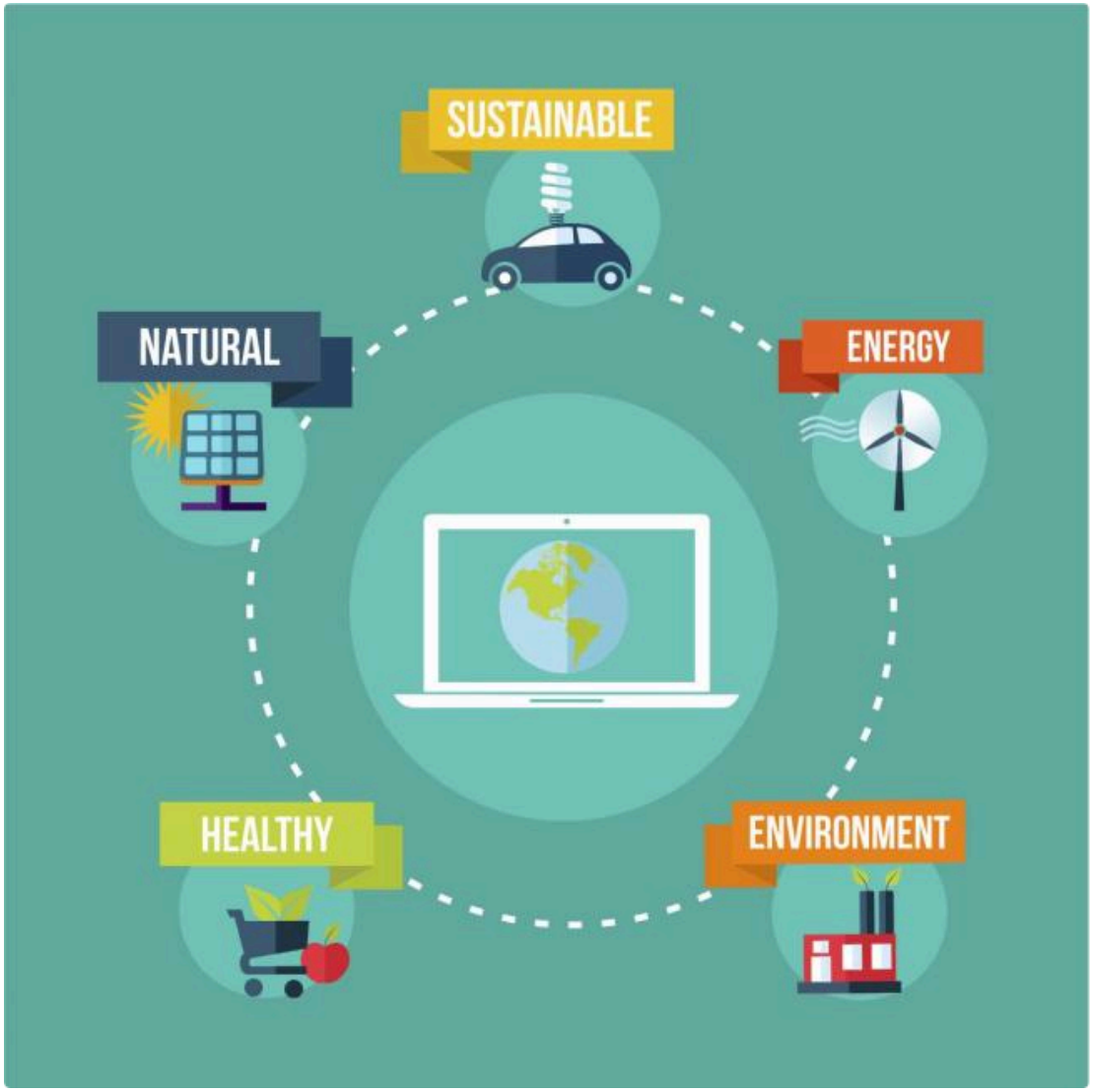
Connecting Students to the Low-Carbon Economy

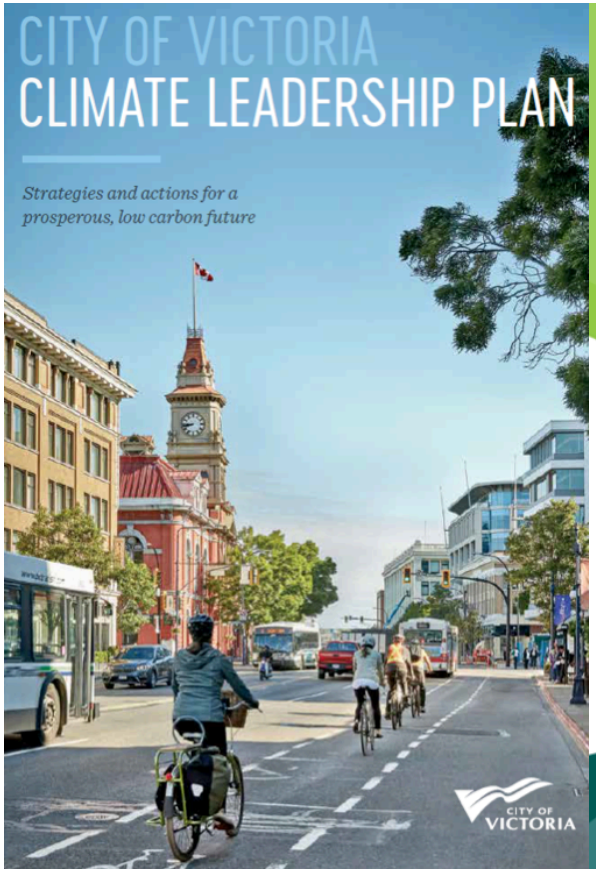
2015 federal candidates debates on energy

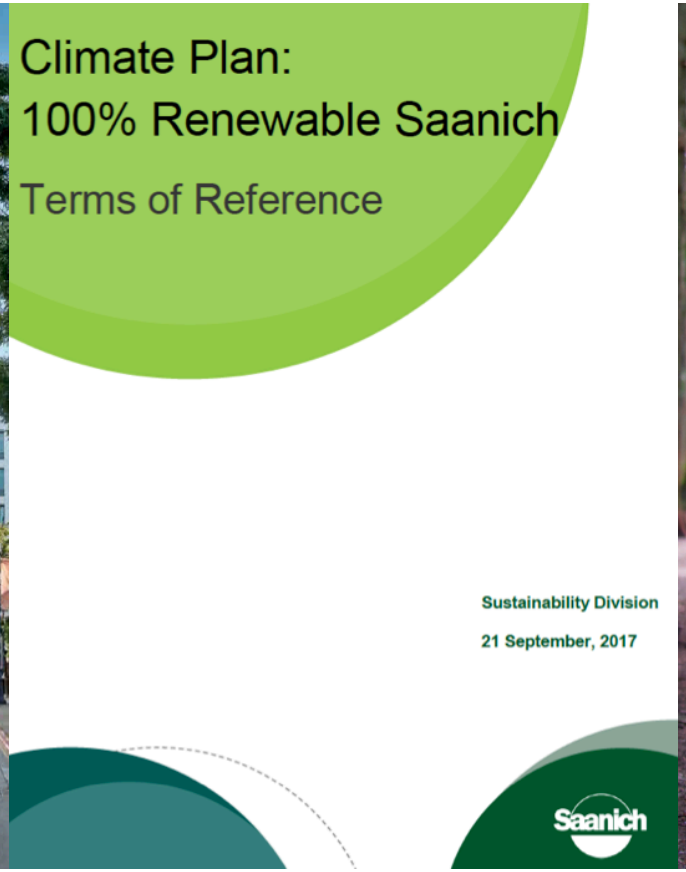
BC Utilities Commission interventions

intervention team: Bill Andrews & Tom Hackney

100% Renewable Energy by 2050







Victoria, Saanich, Central Saanich

CITY OF VANCOUVER

RENEWABLE CITY STRATEGY

2015-2050

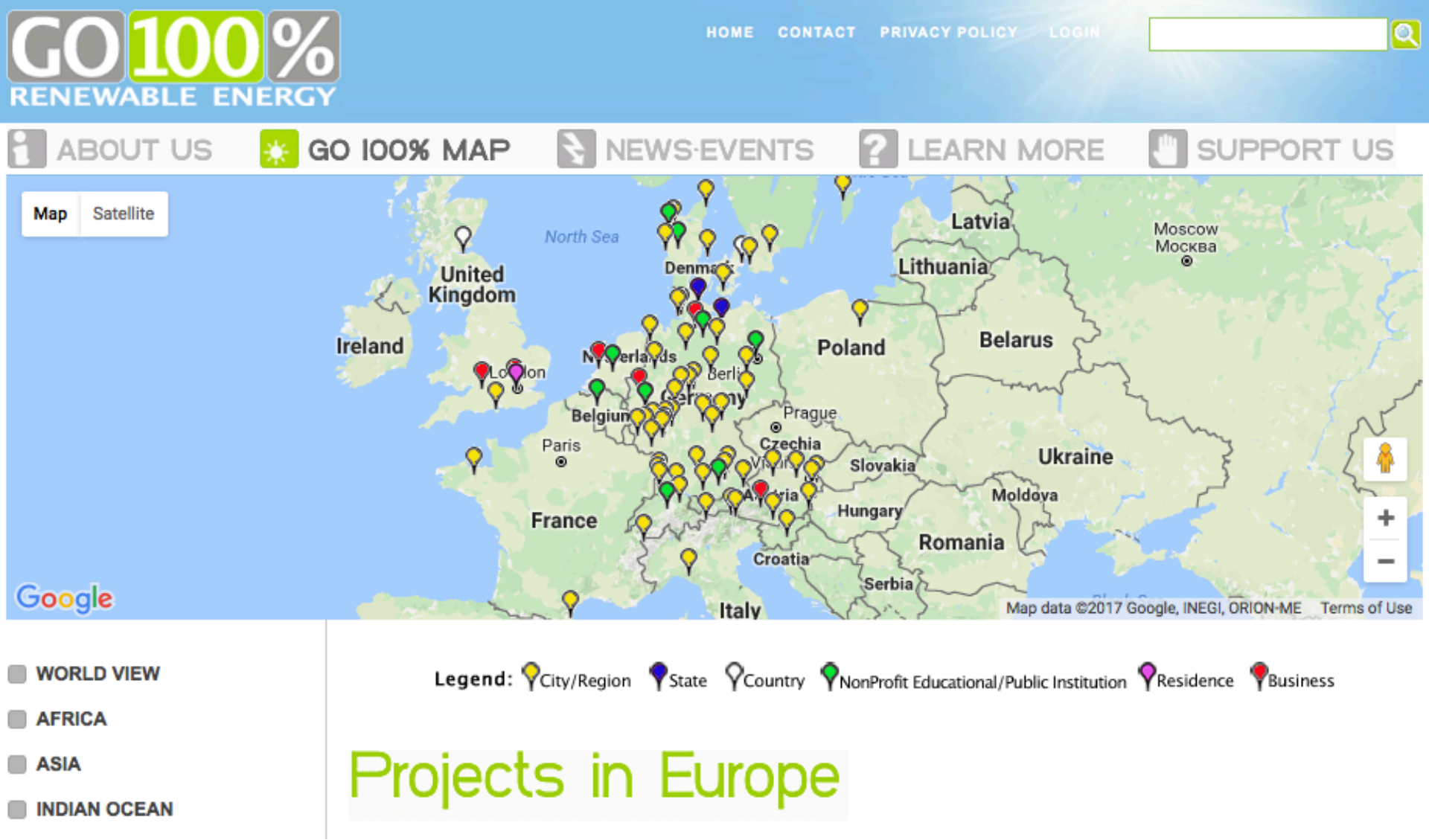

cleanBC
our nature. our power.
our future.
BRITISH COLUMBIA

PAN-CANADIAN FRAMEWORK

on Clean Growth and Climate Change

Canada's Plan to Address Climate Change and Grow the Economy

2015 Paris Accord parallel event: 1,000 mayors



Renewables 100 Policy Institute:

Go 100% Renewable Energy mapping project

IRENA

International Renewable Energy Agency

With 160 Members, IRENA plays a leading role in the energy transformation as a centre of excellence for knowledge and innovation, a global voice for renewables, a network hub and a source of advice and support for countries.

RE 100

ABOUT RE100 PARTNERS GOING 100%

RE100

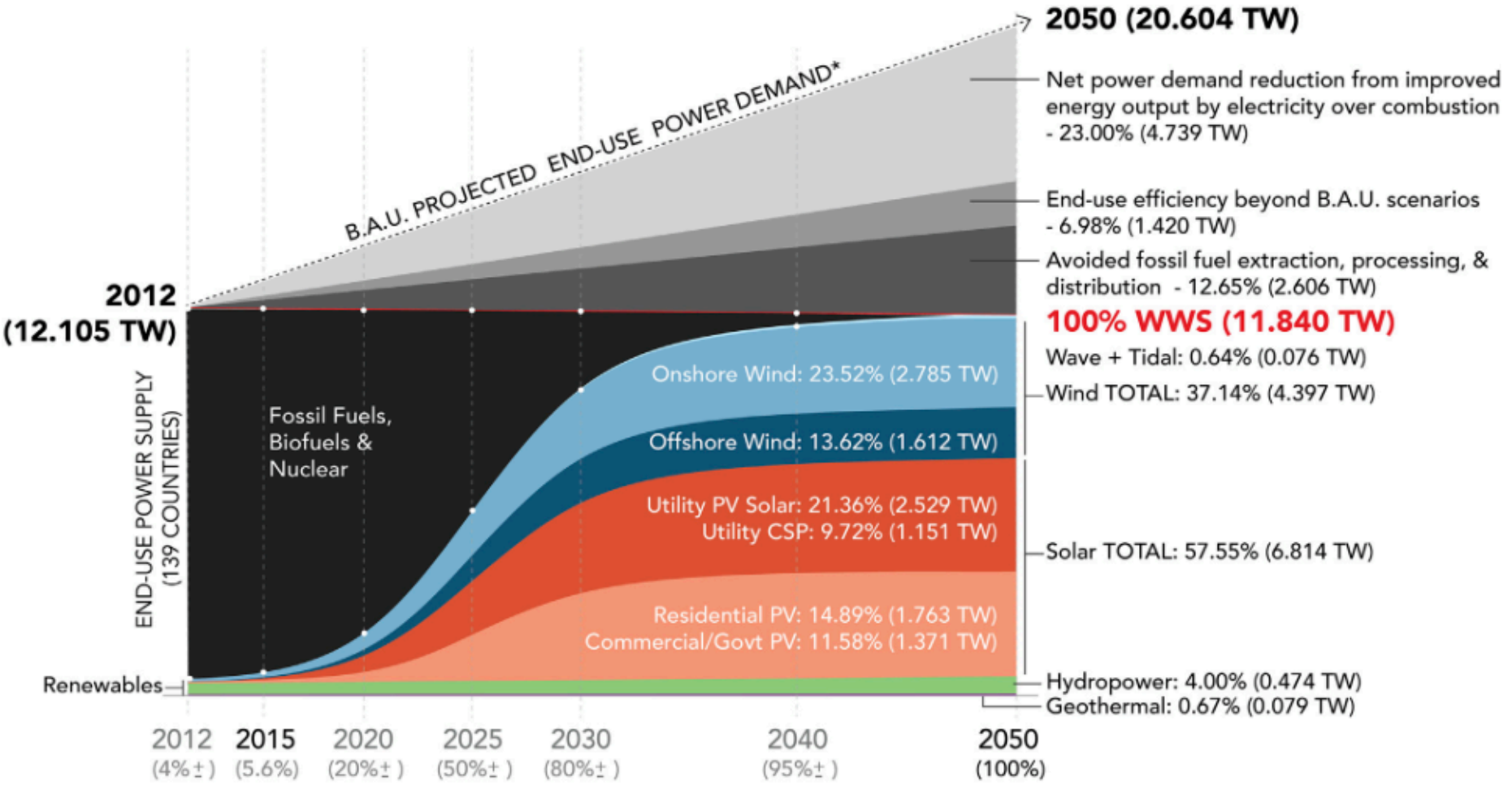
The world's most influential companies, committed to 100% renewable power.

RE100 is a collaborative, global initiative uniting more than 100 **influential businesses** committed to 100% renewable electricity, working to massively increase demand for - and delivery of - renewable energy.

RE100 is brought to you by **The Climate Group** in partnership with **CDP**. Both organizations are part of the **We Mean Business** coalition, working with leading businesses around the world.

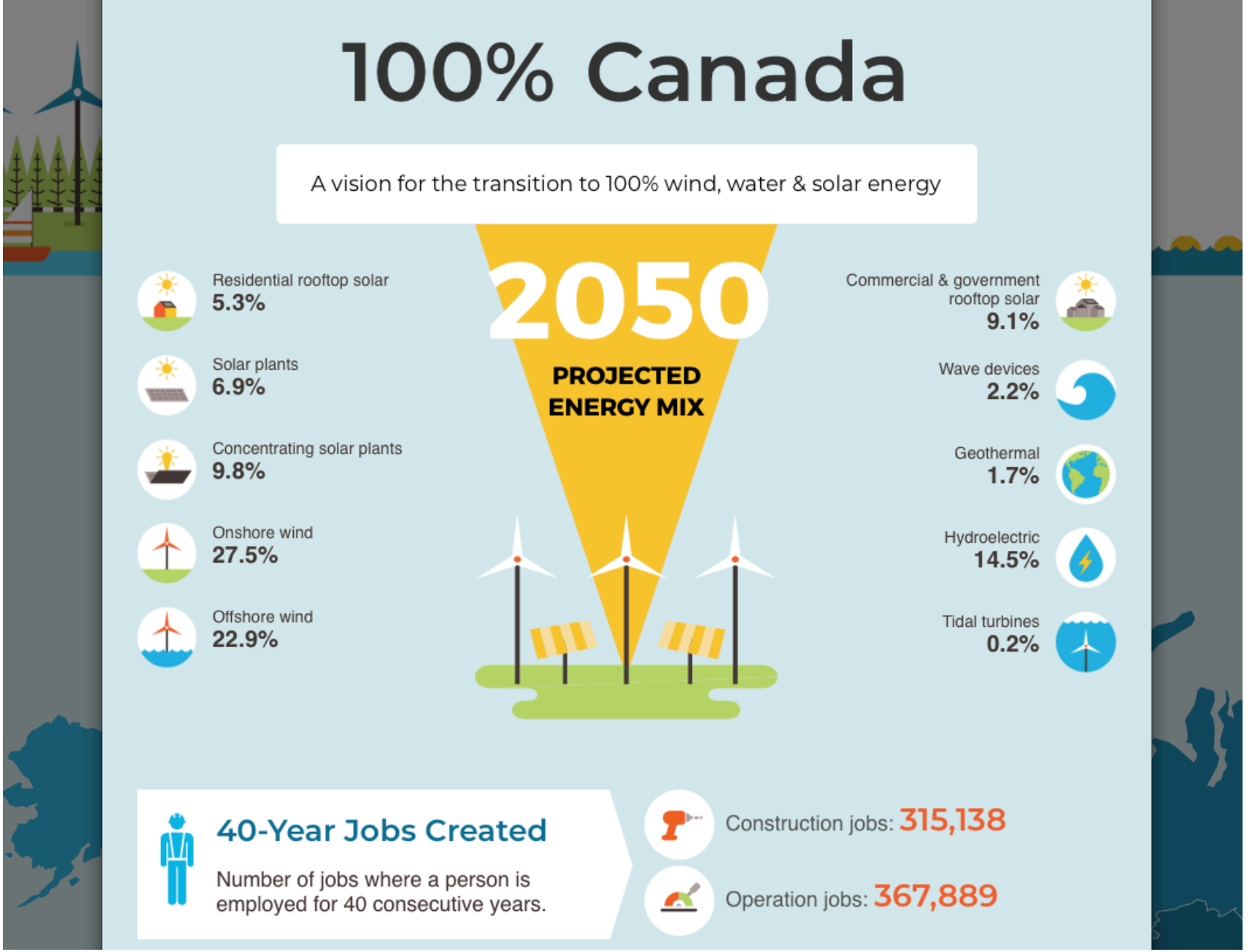
RE100: a project of The Climate Group in partnership with CDP

Mark Jacobson, *et al* - 2017

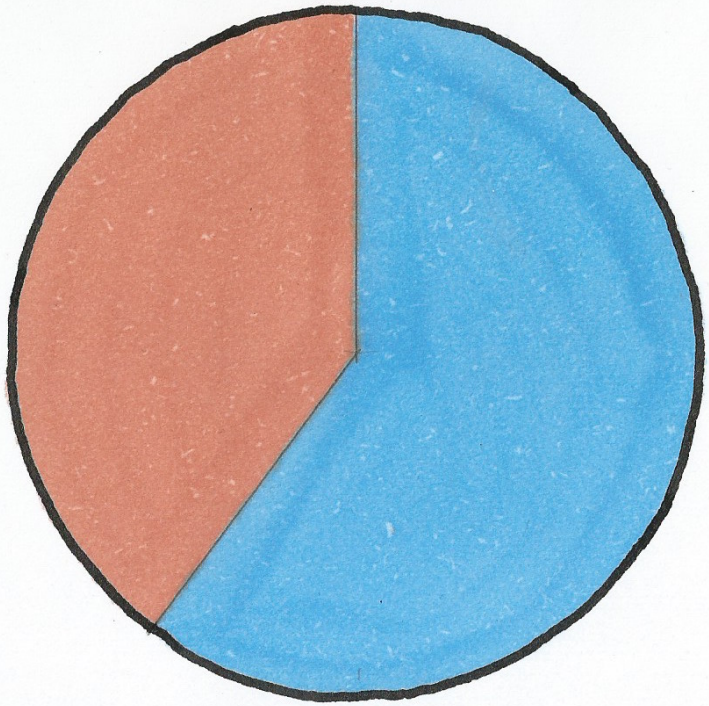


Projected Power Supply & Demand, 139 Countries

*ENERGY FOR ALL USES INCLUDING ELECTRICTY, HEATING, TRANSPORTATION, INDUSTRY



The Solutions Project, based on Jacobson's work

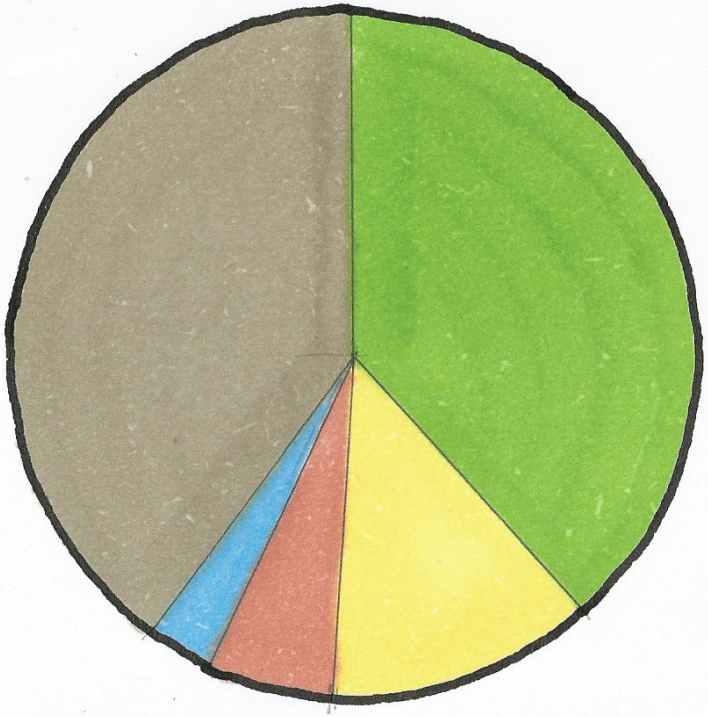


energy by end use

population: 111,000

total energy use: 10.3 million GJ/year

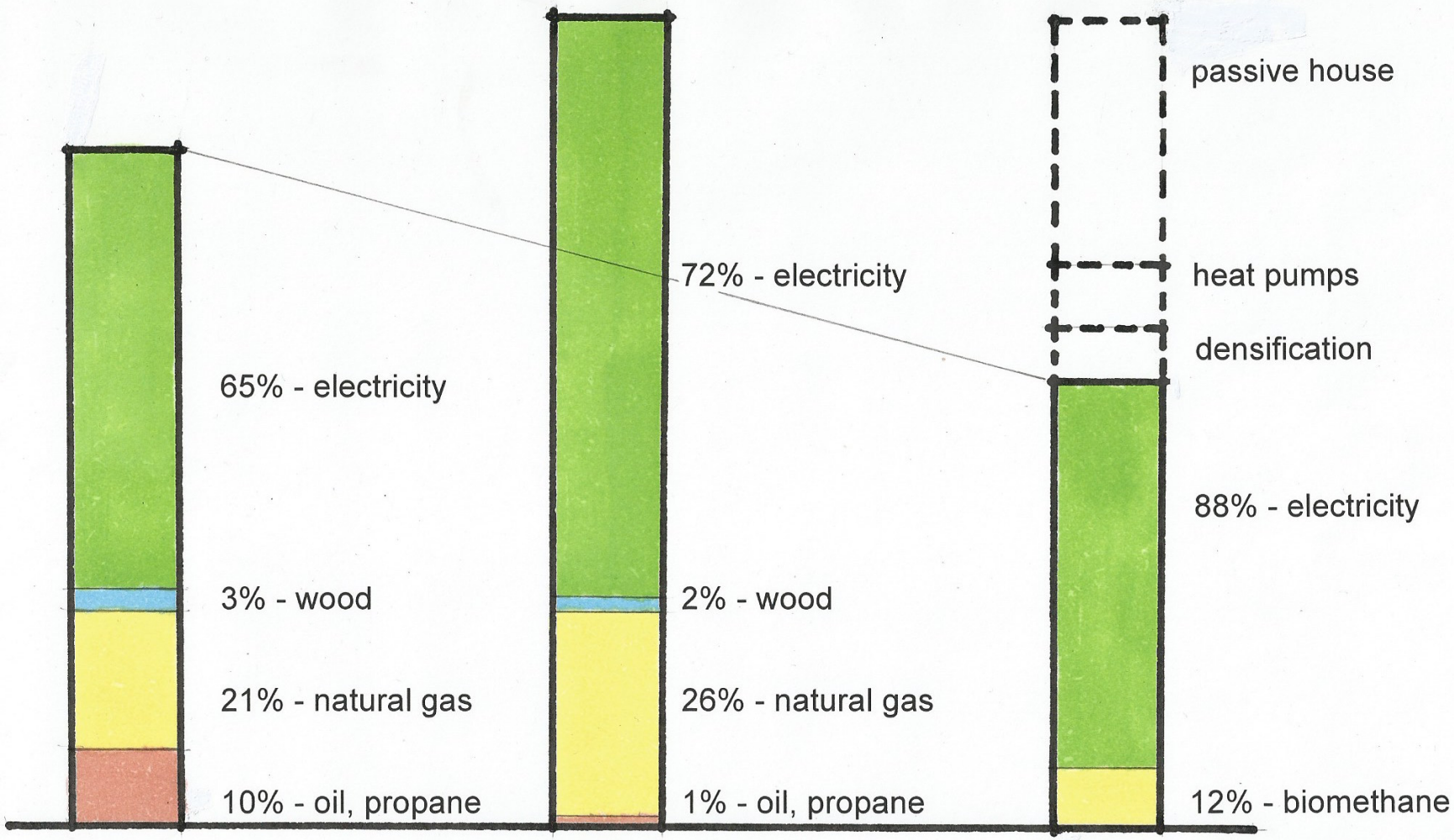
- buildings – 60%
- transportation – 40%
- waste – 0%



energy by source

- electricity – 39%
- natural gas – 13%
- oil & propane – 6%
- wood – 2%
- gasoline & diesel – 40%

District of Saanich – 2016 energy use



2016

population: 111,000

energy: 6.2 million GJ

2050 BAU

population: 130,000

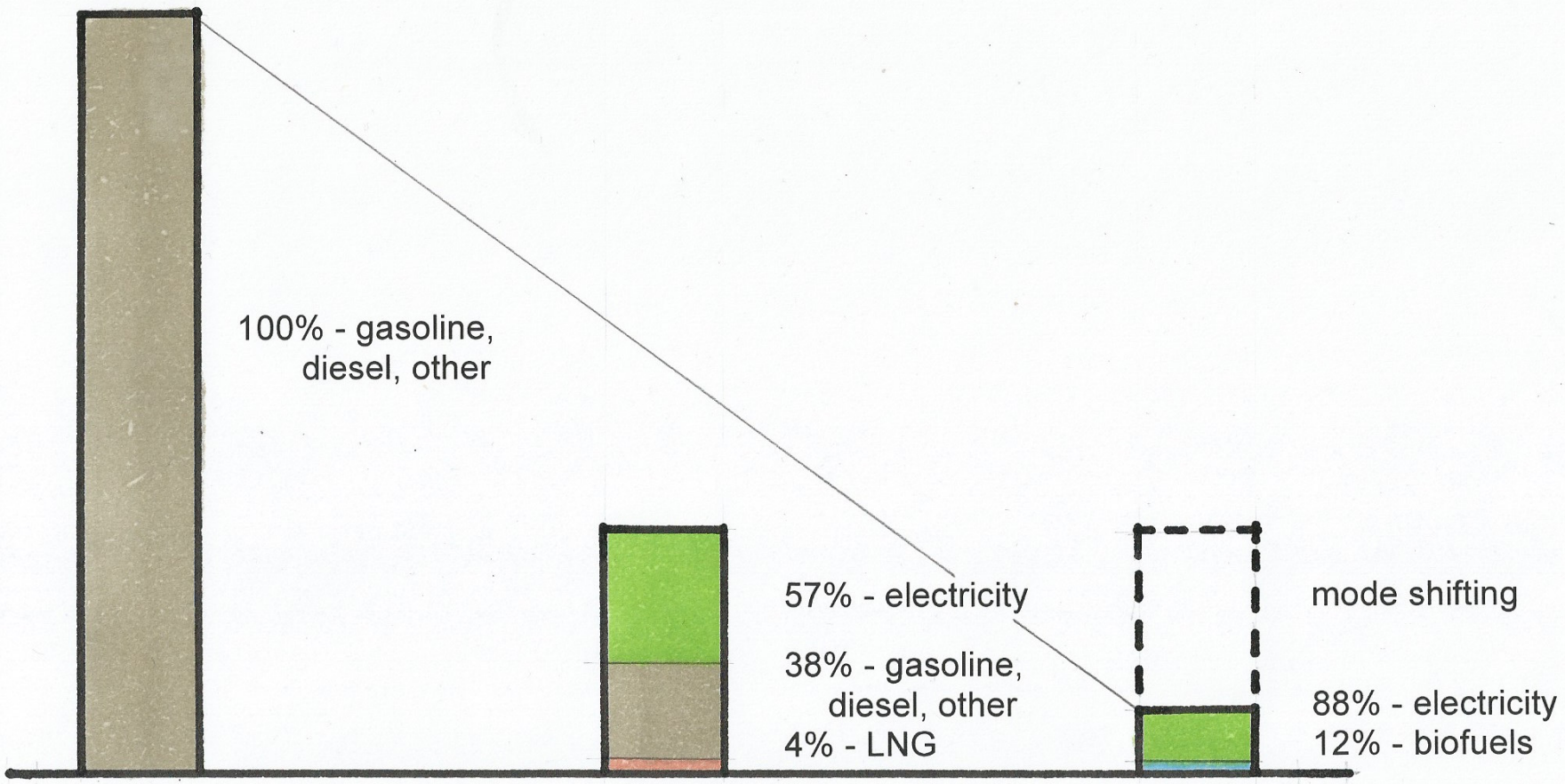
energy: 7.4 million GJ

2050 100% RE

population: 130,000

energy: 4.1 million GJ

District of Saanich – energy use – buildings



2016

population: 111,000

4.1 million GJ

2050 BAU

population: 130,000

1.3 million GJ

2050 100% RE

population: 130,000

0.3 million GJ

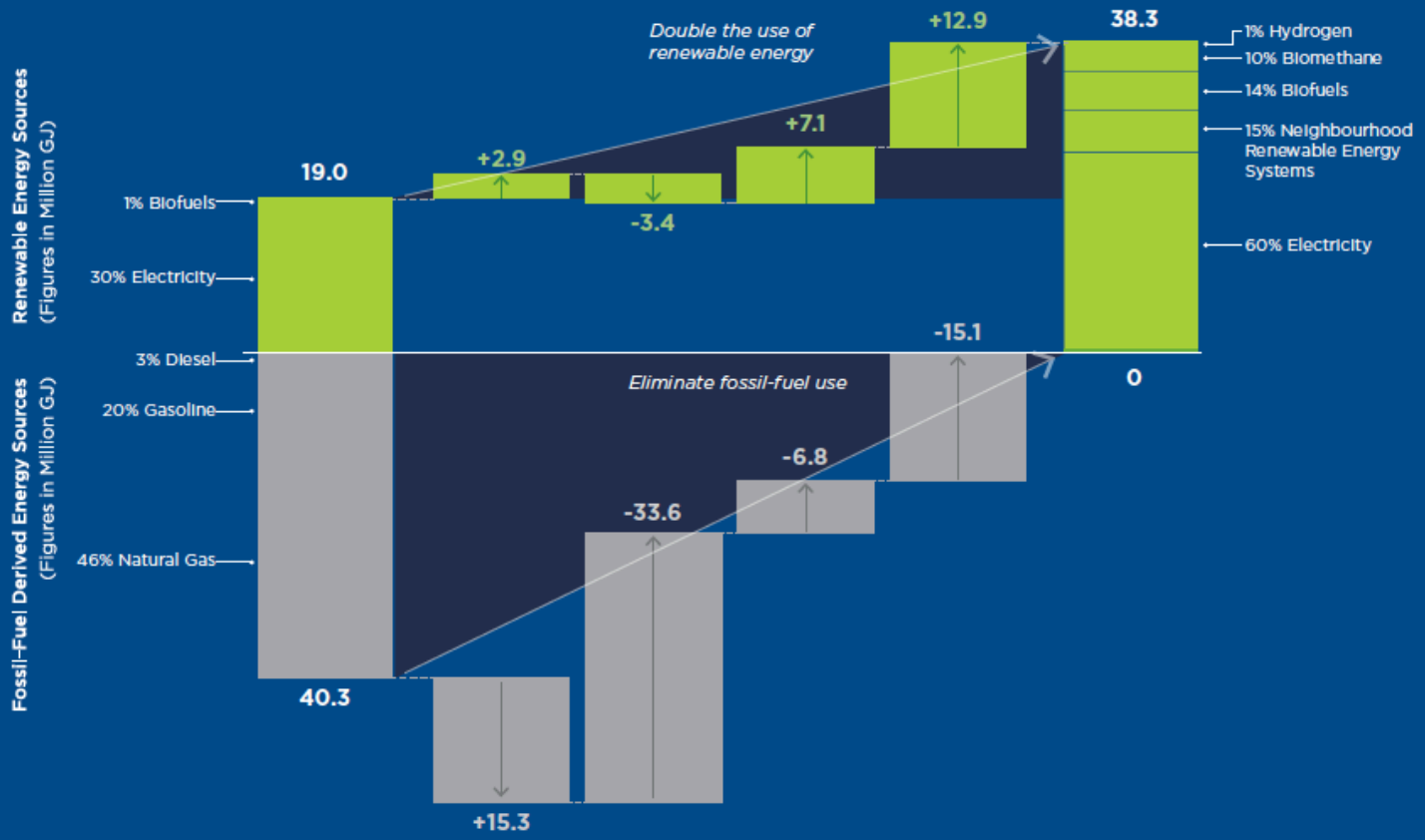
District of Saanich – energy use – transportation

HOW VANCOUVER WILL GET TO 100% RENEWABLE ENERGY BY 2050

2014
Total Energy Use
59.3 Million GJ

BUILDINGS AND TRANSPORTATION

2050
Total Energy Use
38.3 Million GJ

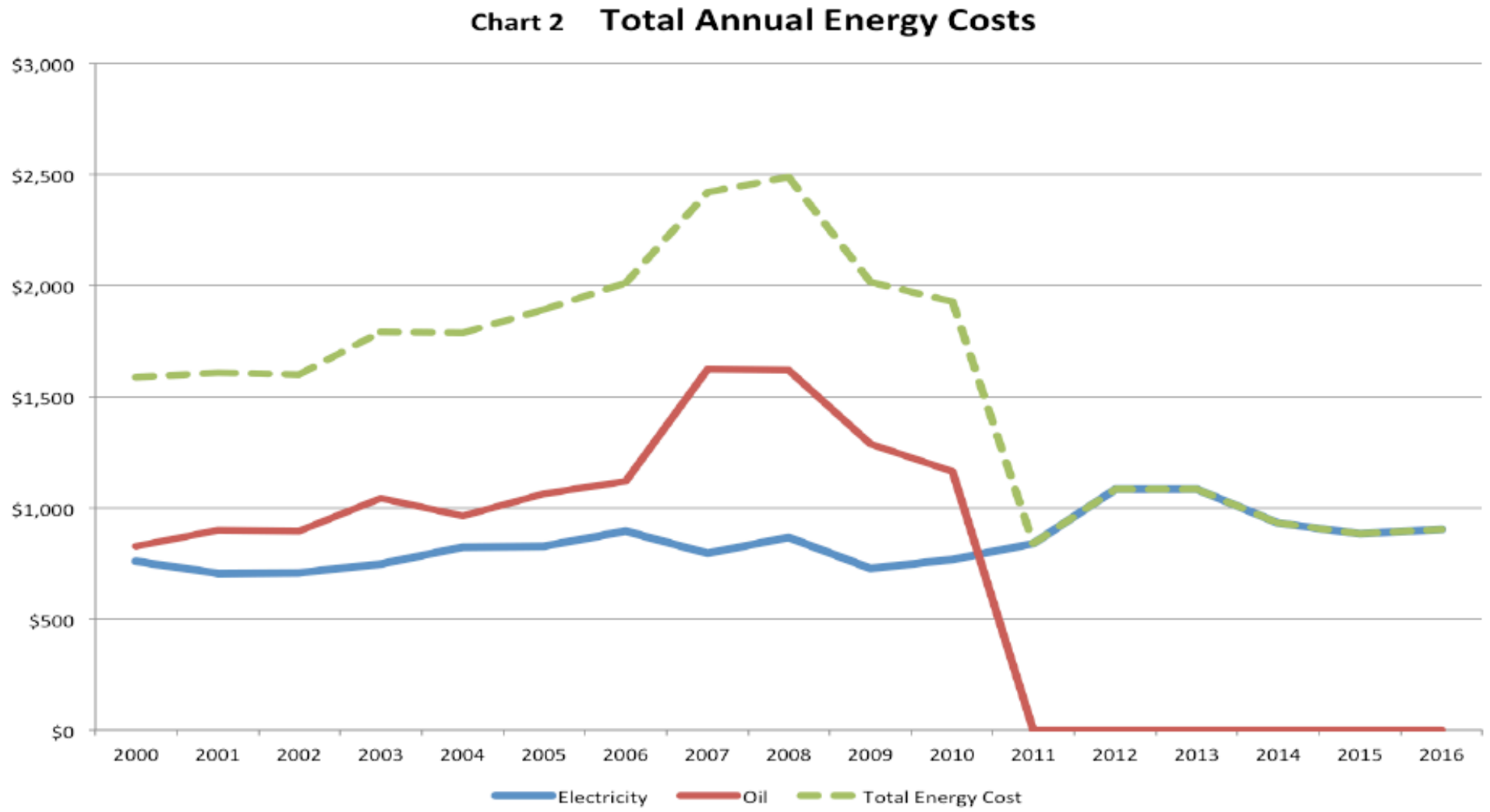


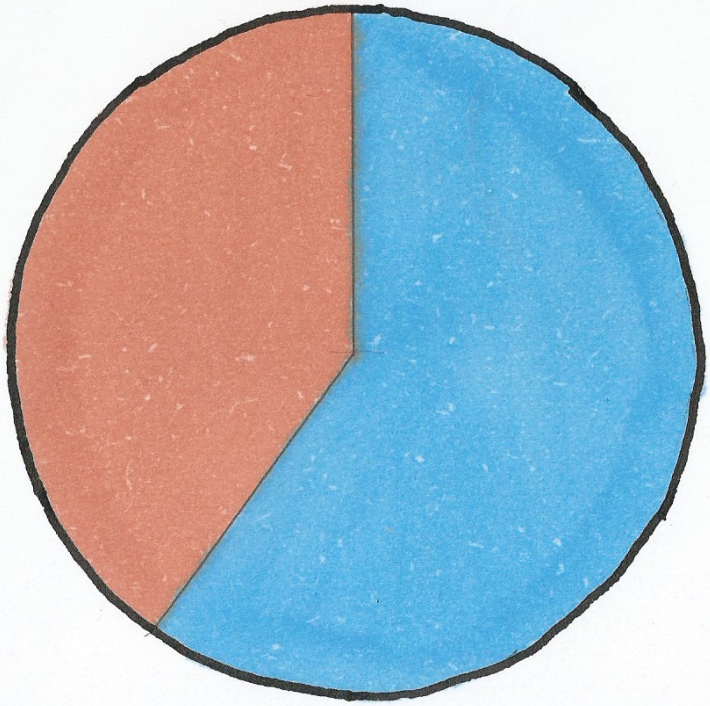
Due to rounding, numbers presented may not add up precisely to the totals provided.

case study: Don Scott

- Victoria, BC
- 1967 2,400 sq. ft. split-level
- oil furnace to central heat pump
- upgraded insulation, doors, windows
- efficient appliances

case study: Don Scott

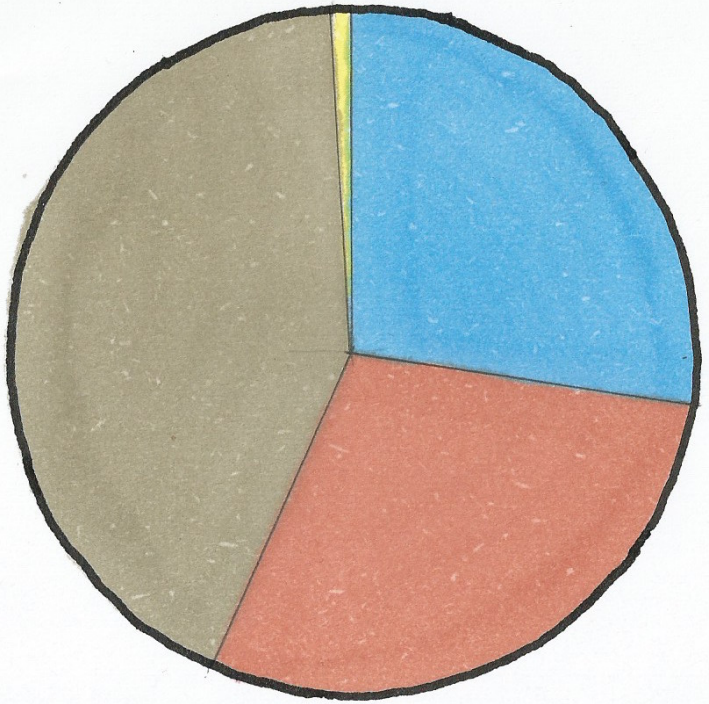




District of Saanich

total energy use: 10.3 million GJ/year

- buildings – 60%
- transportation – 40%



Province of BC

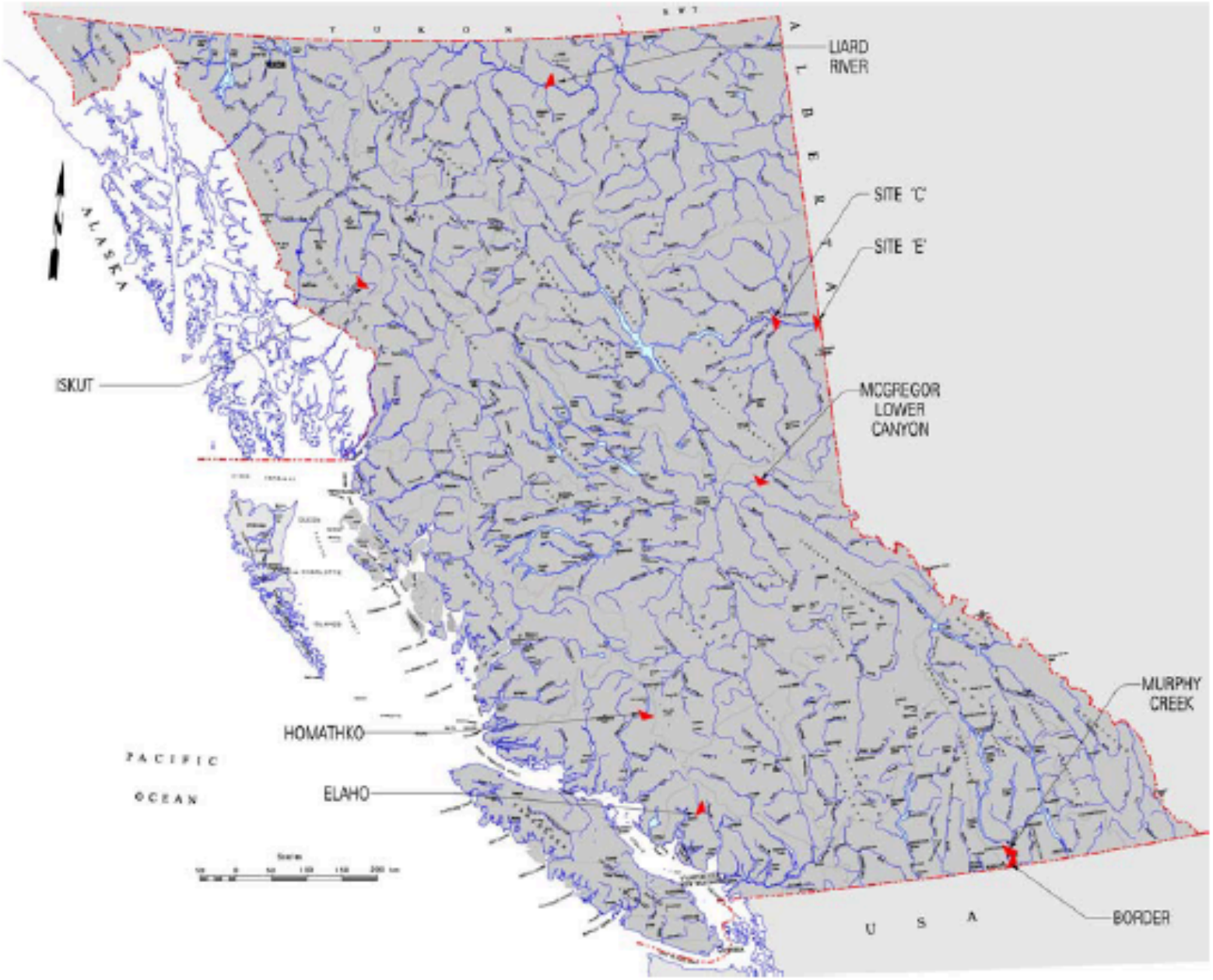
total energy use: 1,334 million GJ/year

- buildings – 27%
- transportation – 29%
- industry – 43%
- agriculture – 1%

Saanich & BC energy use by end use

BC total energy use (January 2017)				
2009 actual; 2017 estimate; BAU forecast; 100 % RE scenario (PetaJoules)				
Item	**2009**	**2017**	**BAU to 2050**	**100% RE**
Total energy	1,298	1,334	1,902	903
Total electricity	227	242	345	500
Total fossil fuel	1,037	1,058	1,509	363
total biomass	34	34	48	40
Buildings - tot energy	342	362	516	194
Buildings - electricity	124	132	188	192
Buildings - fossil fuels	218	230	328	0
buildings - biomass	0	0	0	2
Transport - tot energy	374	390	556	186
Transport - electricity	1	1	20	92
Transport - fossil fuels	373	389	536	94
transport - other	0	0	0	0
Industry - tot energy	571	571	814	512
Industry - electricity	101	108	154	209
Industry - fossil fuels	436	429	612	269
industry - biomass	34	34	48	34
Agriculture - tot	11	11	16	11
electricity	1	1	2	7
fossil fuels	10	10	14	0
agri - biomass	0	0	0	4

Figure 1 Location of Potential Large Hydro Projects



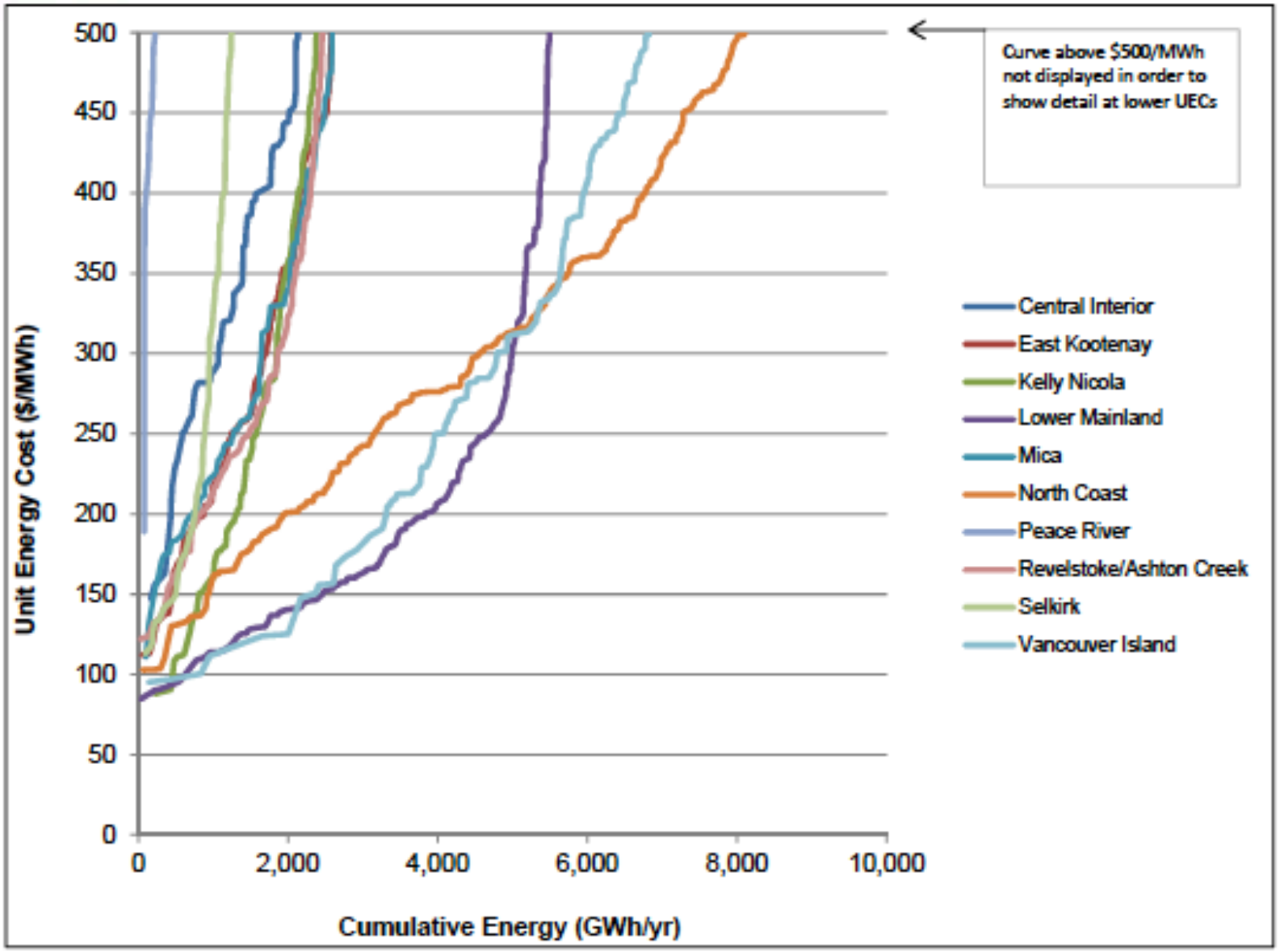
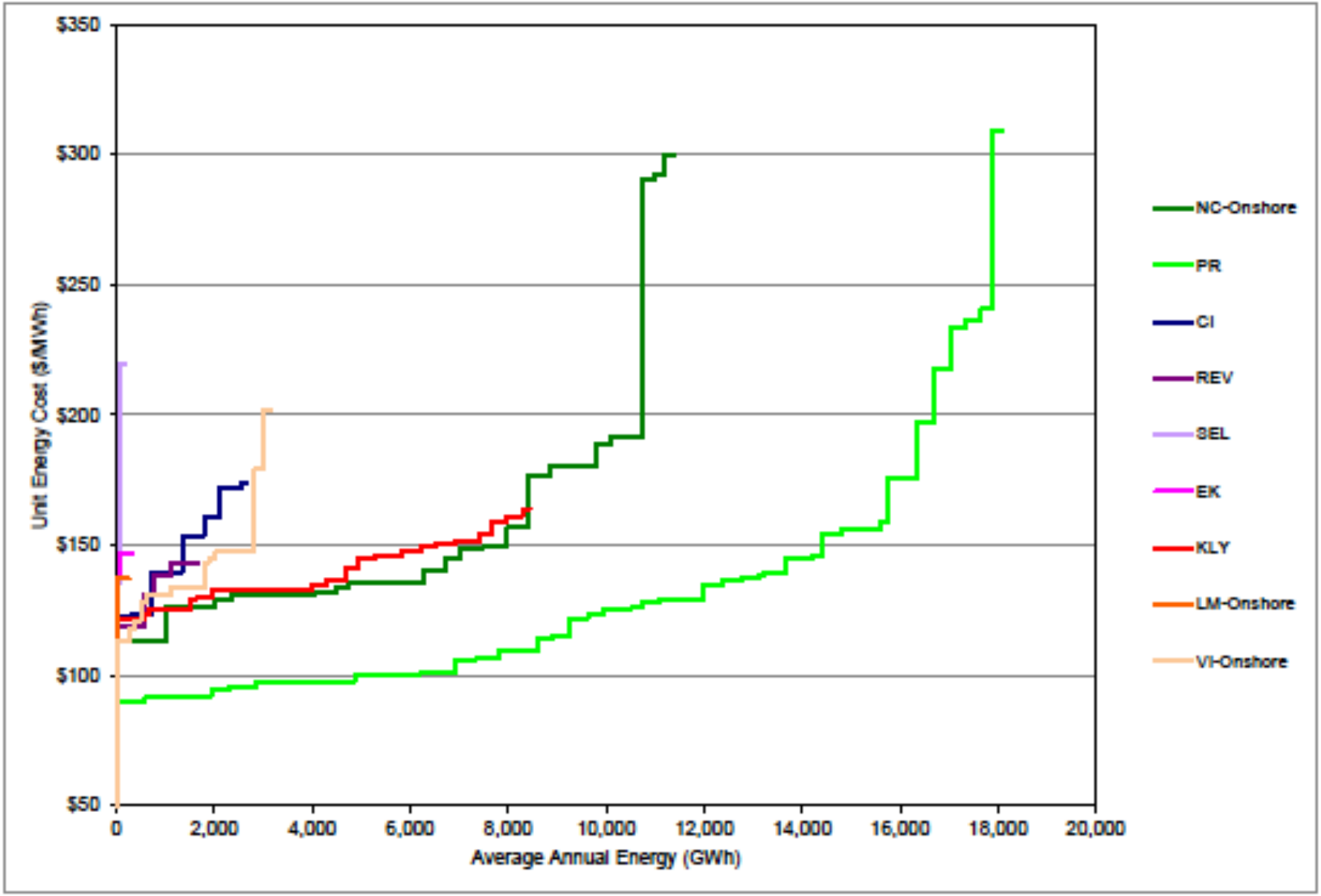


Figure 2: Run-of-River Potential Supply Curves by Transmission Region at 6% Discount Rate

Figure 5-6 Onshore Wind POI Supply Curves



Applied Energy 253 (2019) 113536

Contents lists available at ScienceDirect

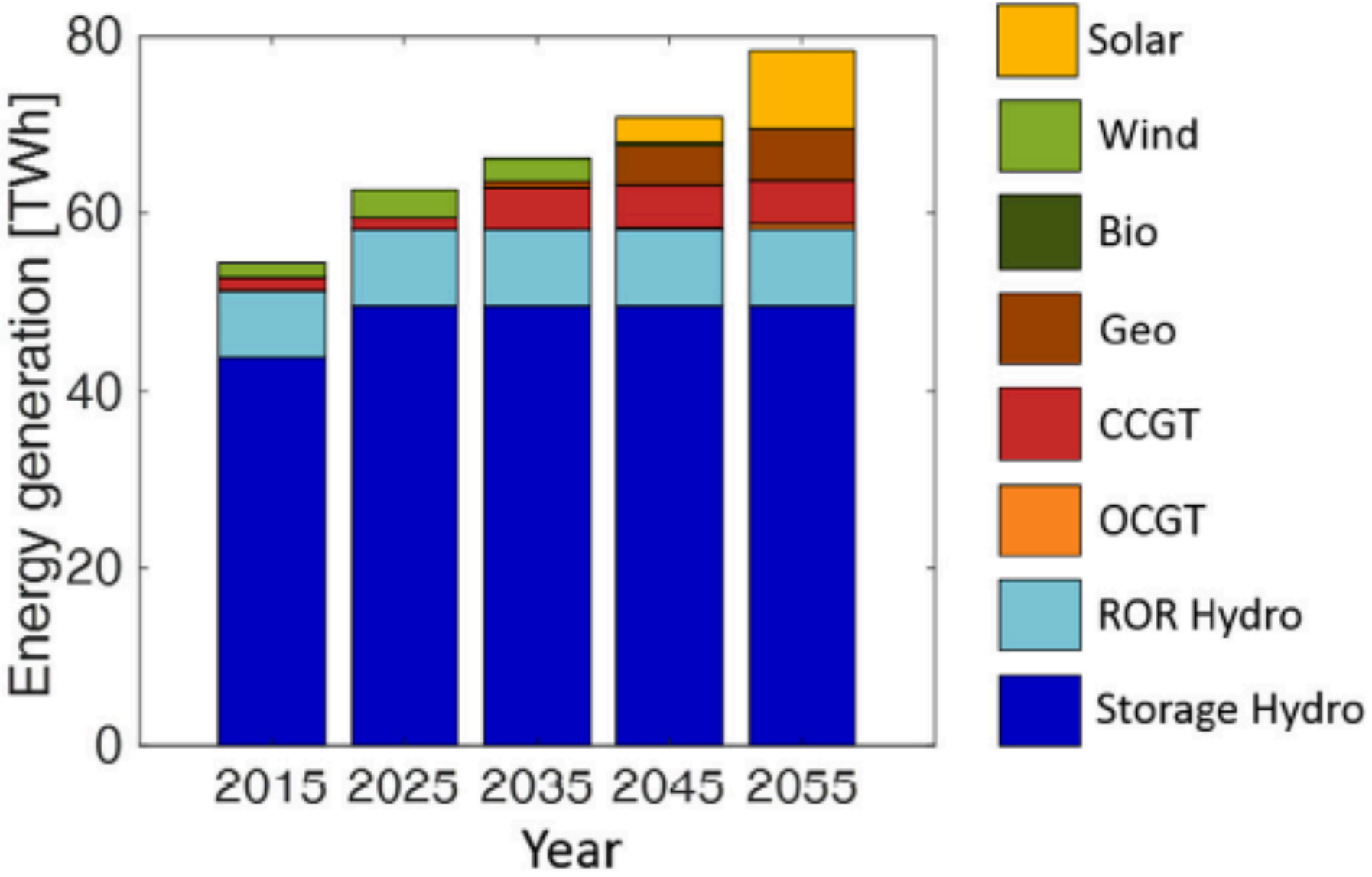
Applied Energy

journal homepage: www.elsevier.com/locate/apenergy

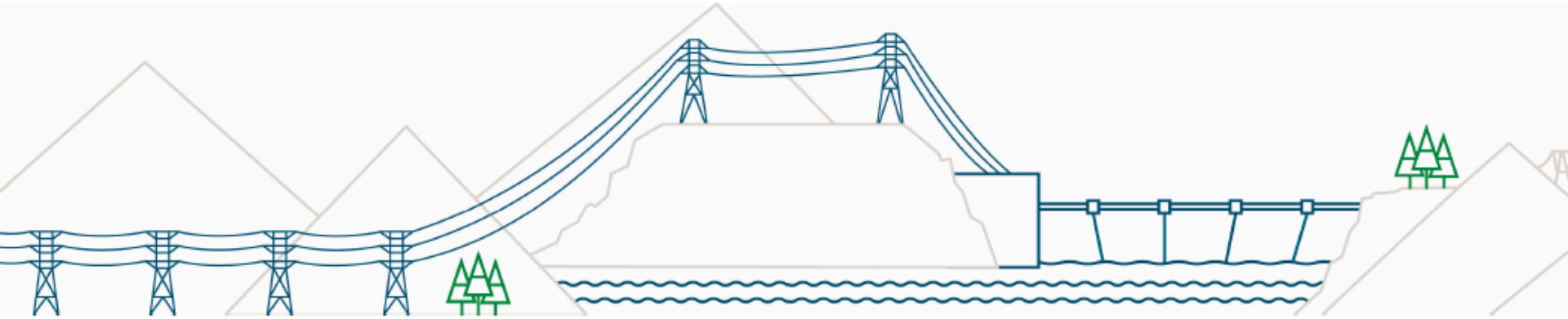
Electrification of road transportation with utility controlled charging: A case study for British Columbia with a 93% renewable electricity target

Victor Keller[a,*], Jeffrey English[a,b], Julian Fernandez[a,c], Cameron Wade[a], McKenzie Fowler[a], Sven Scholtysik[a], Kevin Palmer-Wilson[a], James Donald[a], Bryson Robertson[d], Peter Wild[a], Curran Crawford[a], Andrew Rowe[a]

[a] *Institute for Integrated Energy Systems, University of Victoria, PO Box 1700 STN CSC, Victoria, BC V8W2Y2, Canada*
[b] *B.C. Hydro, 333 Dunsmuir St, Vancouver, BC V6R 5R4, Canada*
[c] *University of British Columbia, Clean Energy Research Centre, 2360 East Mall, Vancouver, BC V6G 1Z3, Canada*
[d] *School of Civil and Construction Engineering, Oregon State University, Kearney Hall, 1491 SW Campus Way, Corvallis, OR, USA*


Energy generation [TWh]
0
20
40
60
80
2015
2025
2035
2045
2055
Year
Solar
Wind
Bio
Geo
CCGT
OCGT
ROR Hydro
Storage Hydro

2021 Integrated Resource Plan (IRP) Technical Advisory Committee (TAC) Meeting #1

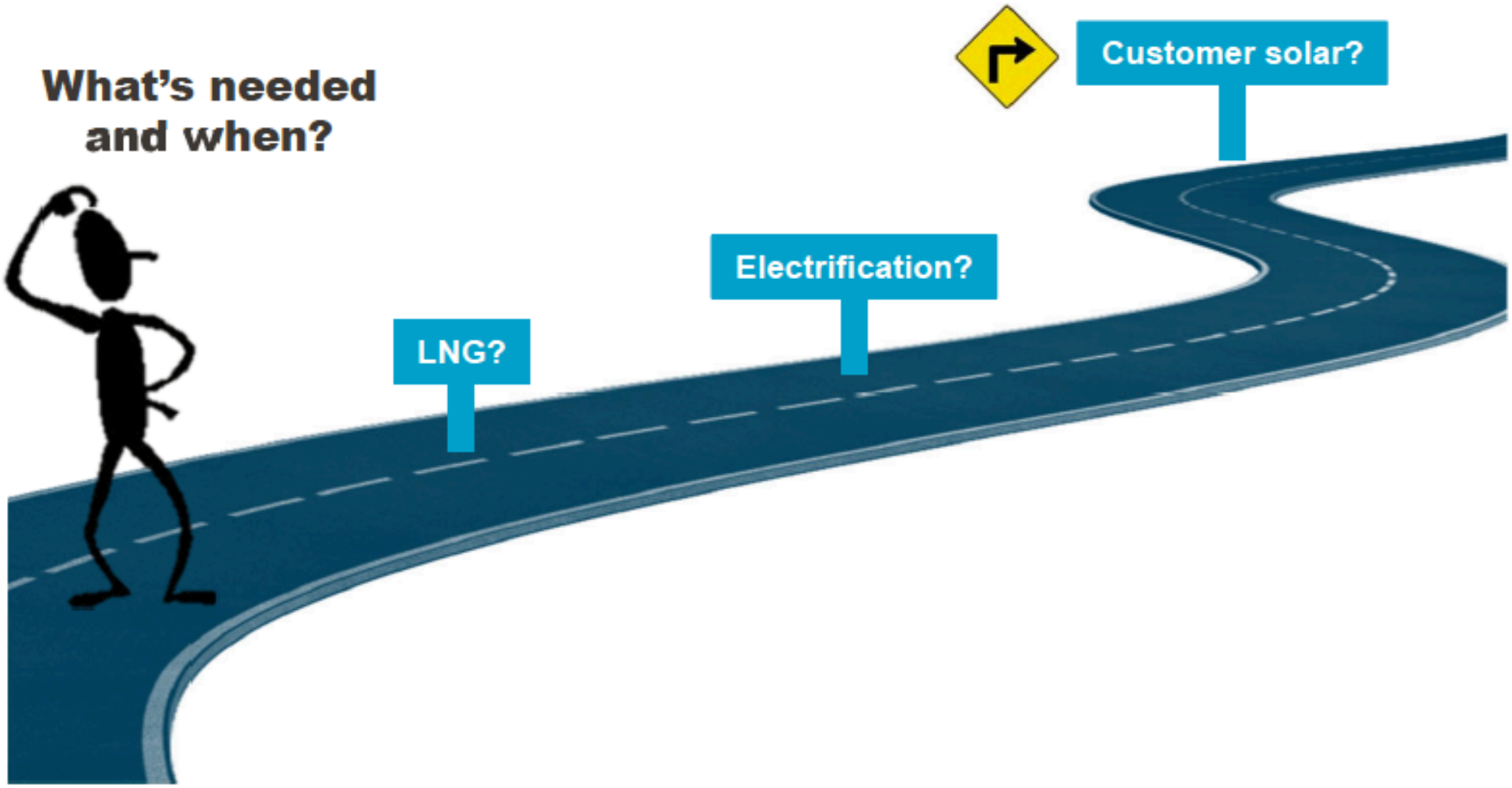


March 9, 2020

BC Hydro
Power smart

Dealing with uncertainties

Big challenge for this IRP is preparing for uncertain future



UVRA Saturday Series:

"Living without Oil"

Low Carbon Electrification, the CleanBC Plan and BC Hydro

presentation by Tom Hackney

7 March 2020

BRITISH COLUMBIA
Sustainable Energy ASSOCIATION
Victoria Chapter