



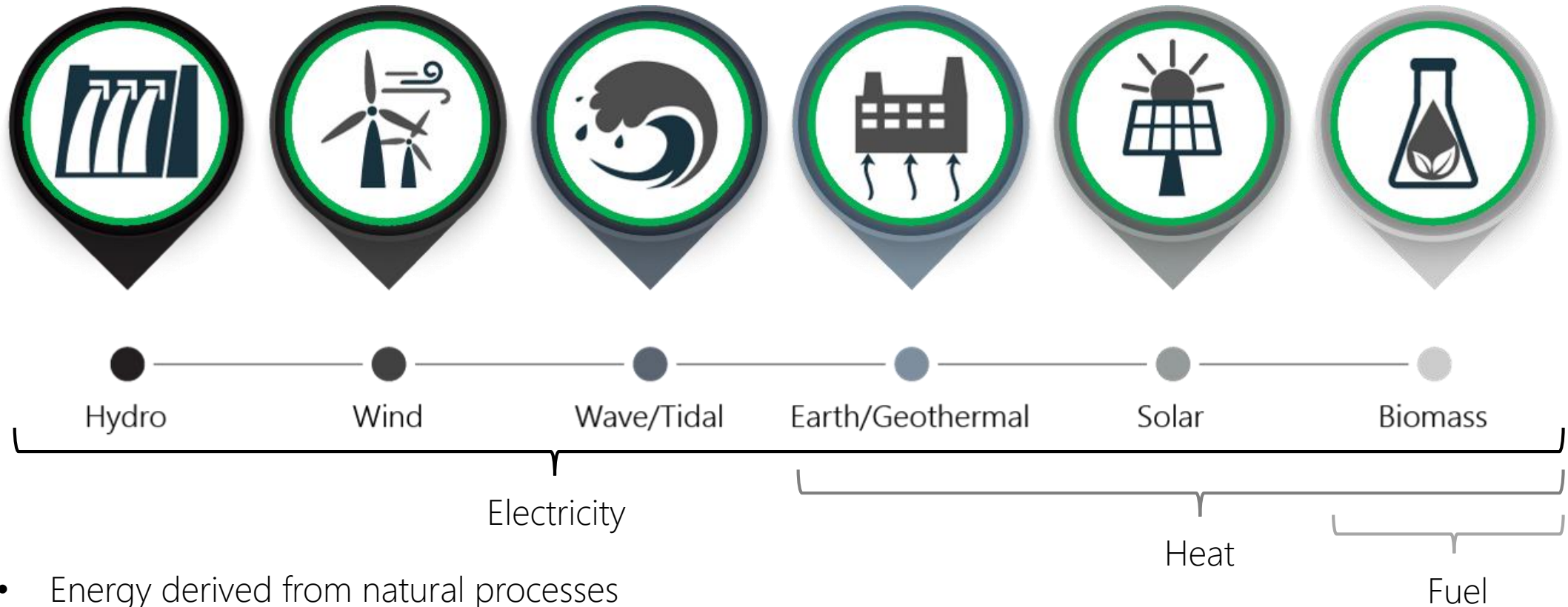
Renewable Energy Plan
Consultation

- Fall 2021 -

Overview

1. What is Renewable Energy
2. Why we need a Renewable Energy Plan
3. Newfoundland and Labrador's Electricity System
4. Developed Renewable Energy Resources
5. Undeveloped Renewable Energy Resources
6. Potential Opportunities
7. Next Steps – input from industry, stakeholders and public

1. What is renewable energy?



- Energy derived from natural processes
- Replenished at the same rate or faster than consumed
- Electricity generated from renewable energy can also be used to produce clean hydrogen
- Biomass can also be used to create biofuel such as ethanol or renewable diesel

2. Why do we need a Renewable Energy Plan?

Newfoundland and Labrador's abundant developed and undeveloped renewable resources present opportunities to:

- stimulate NL's economic growth
- create jobs
- lower greenhouse gas emissions
- further position province as an energy hub
- ensure our clean energy resources are developed in a responsible and sustainable fashion

3. Newfoundland and Labrador's Electricity System

Electrical Power and Control Act, 1994

- Least-cost, reliable power, regulated by the Public Utilities Board

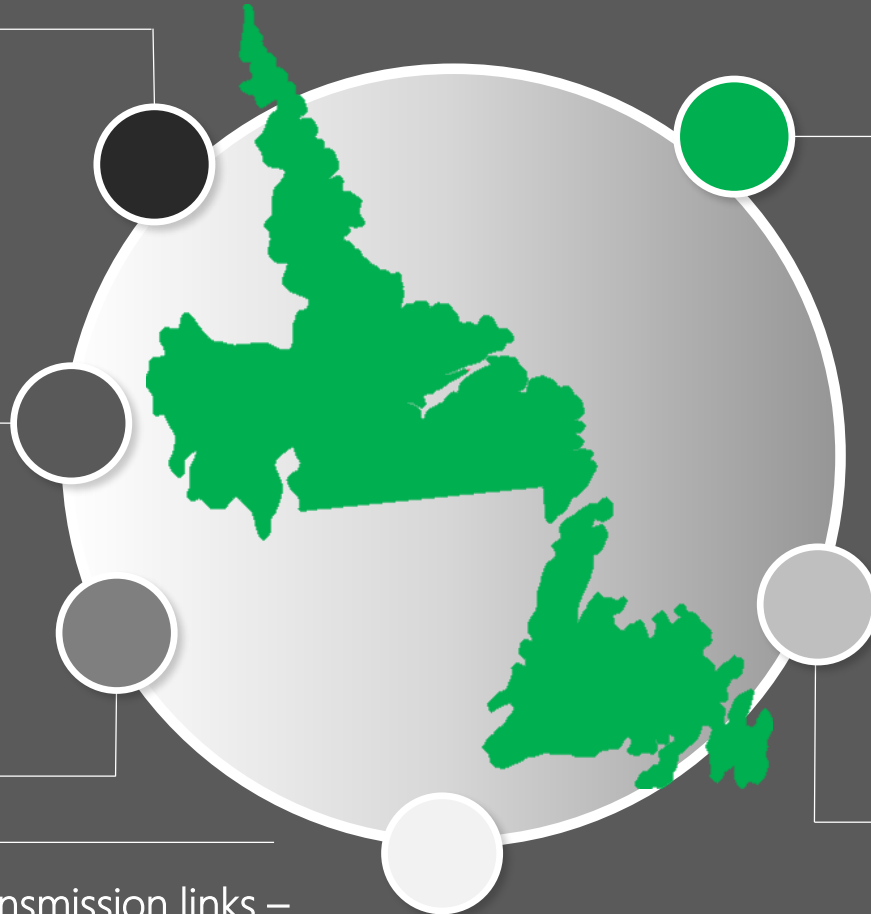
Newfoundland and Labrador Hydro (crown utility)

- Main generator and transmitter – 38,800 customers

Newfoundland Power (private)

- Main distributor to 268,000 customers - 90% of energy from NL Hydro.

External transmission links –
Maritime Link; Hydro Quebec



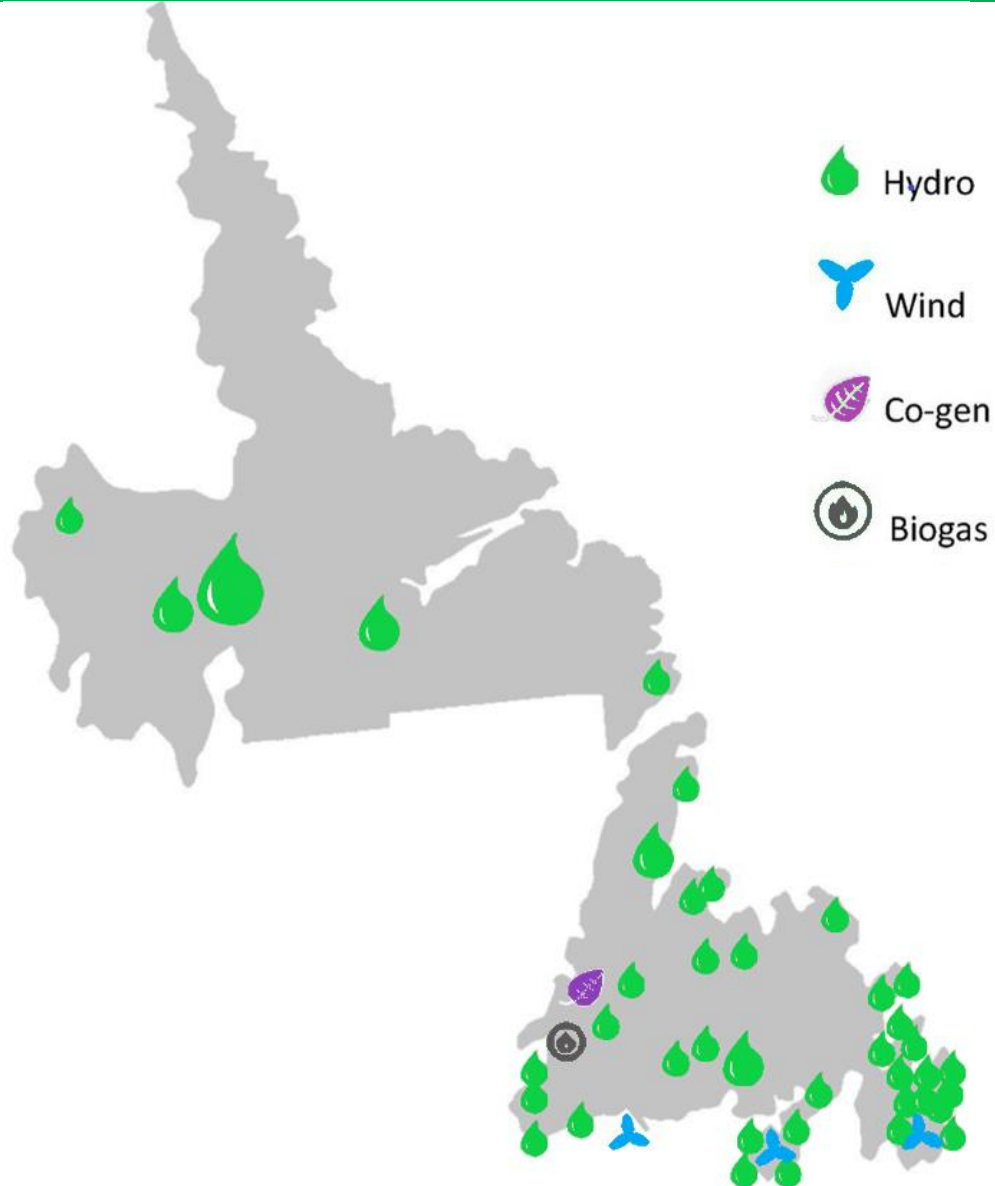
Over 80% of province's electricity generated from renewables

- Nine hydroelectric plants, number of power purchasing agreements regarding hydro, wind and biogas

Customer demand

- Highest between 7-10 am and 4-8 pm, especially in winter months

4. Developed Renewable Energy Resources



98% renewable electricity once Muskrat Falls is commissioned

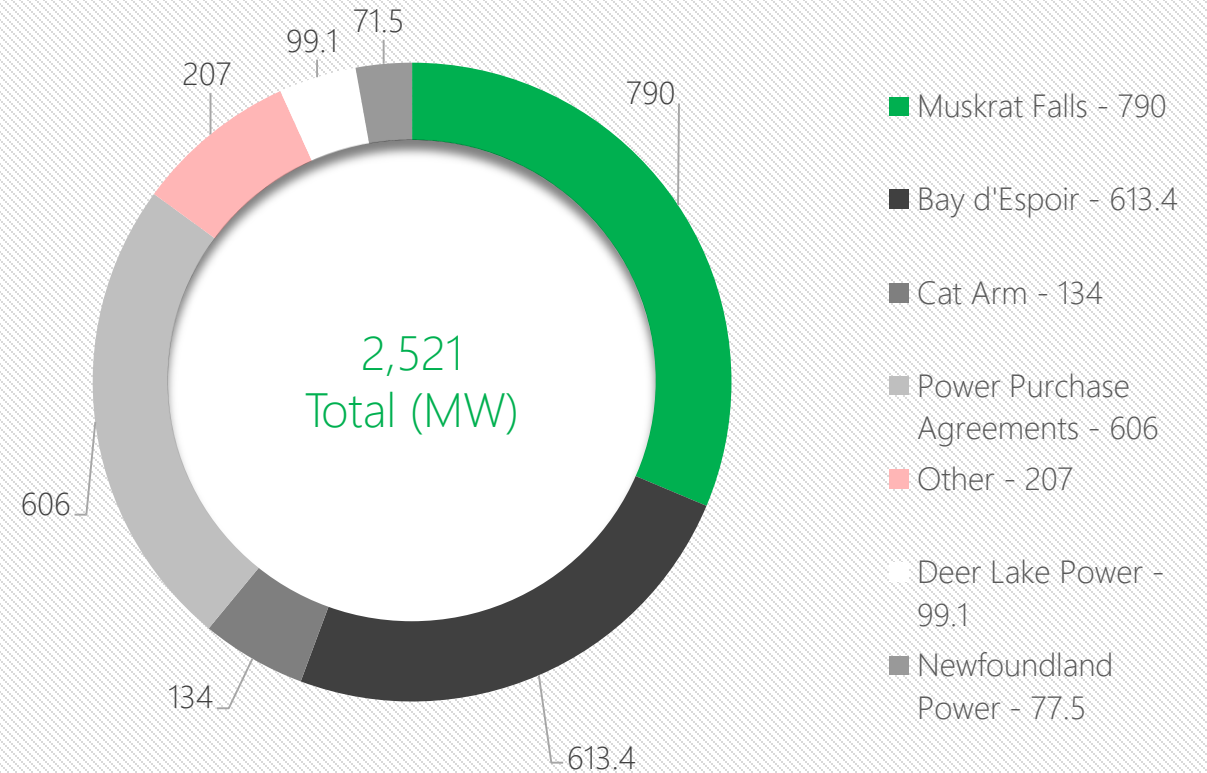
Over 7,400 MW installed generating capacity

Over 1.5 terawatt hours surplus electricity exported in 2018

~3.5 terawatt hours surplus after Muskrat Falls is in-service

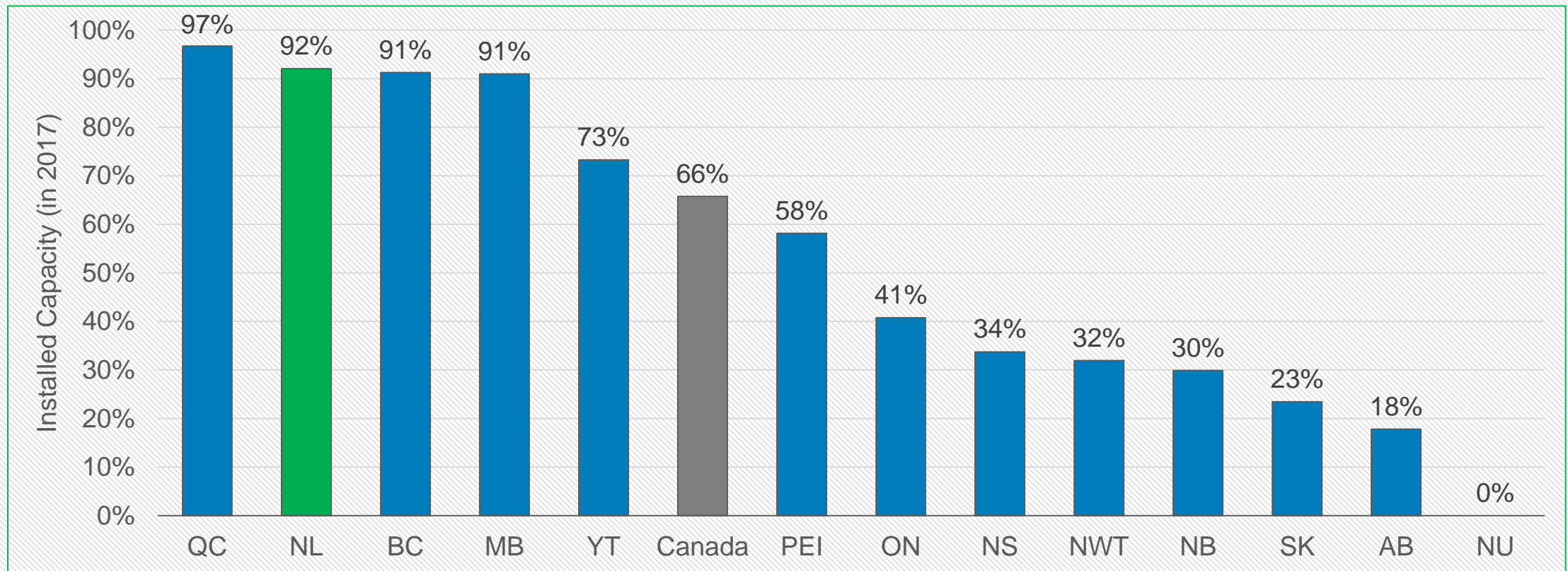
Hydraulic Assets* in Generation (MW)

- Total Wind Assets (12 MW) from Power Purchase Agreements
- * Plus Churchill Falls Generating Station (5,428 MW)
 - 65.8% owned by NL Hydro; nearly 5,000 MW to Hydro Quebec on contract till 2041



Electricity from Renewable Energy

NL has the second highest renewable energy mix in Canada

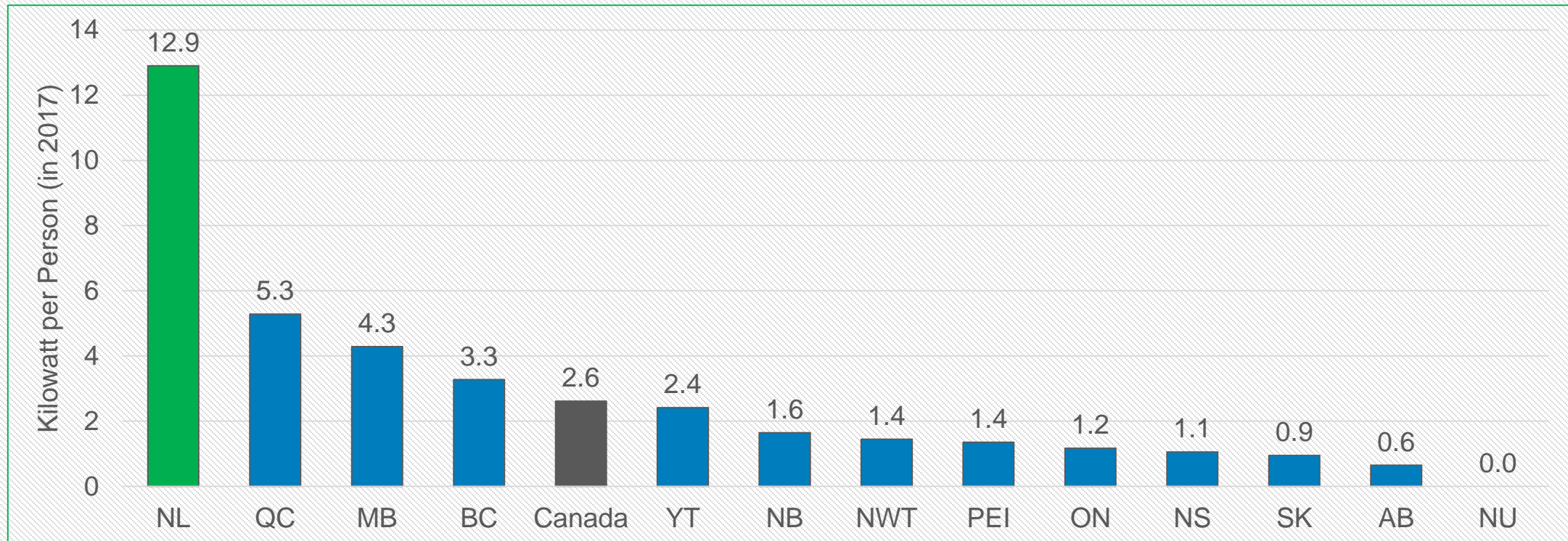


Sources:

1. Statistics Canada. Table 25-10-0022-01 Installed plants, annual generating capacity by type of electricity generation
2. Department of Finance; <https://www.stats.gov.nl.ca/Statistics/Statistics.aspx?Topic=population>

Renewable Electricity Per Capita

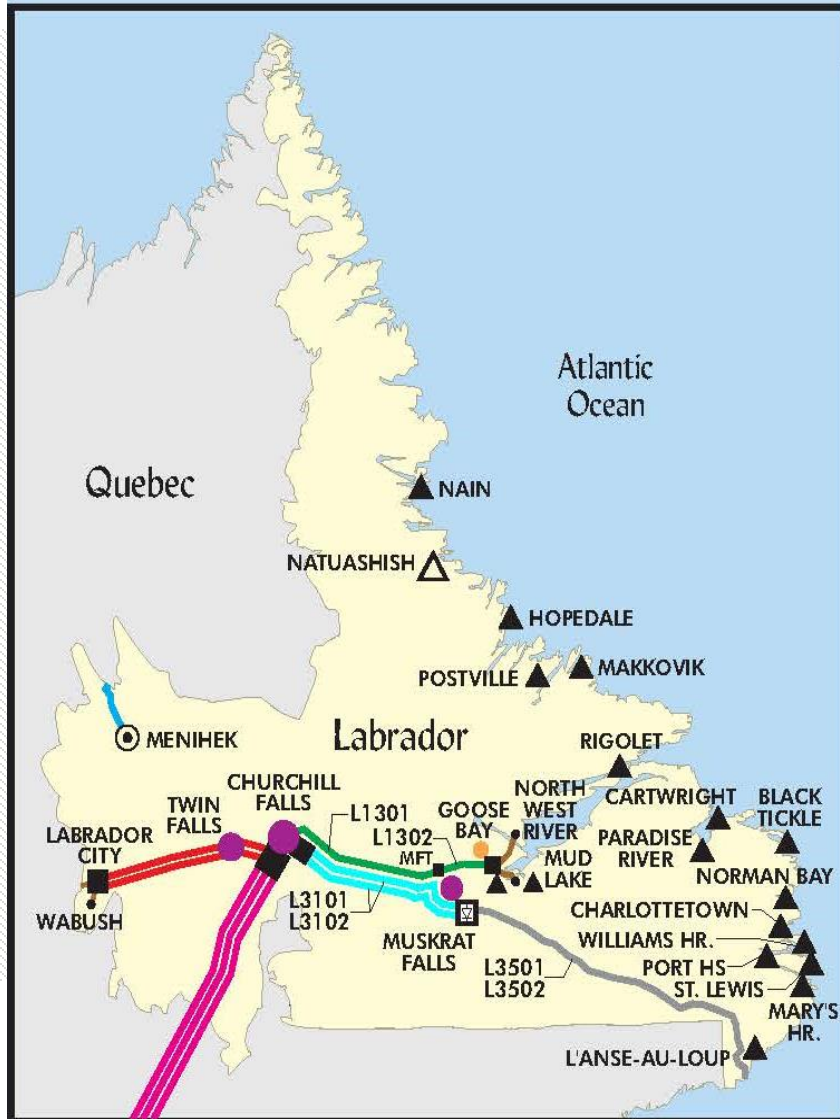
Per capita, NL has the highest amount of renewable energy installed in Canada.



Sources:

1. Statistics Canada. Table 25-10-0022-01 Installed plants, annual generating capacity by type of electricity generation
2. Department of Health; <https://www.stats.gov.nl.ca/Statistics/Statistics.aspx?Topic=population>

Labrador Electricity Grid



LEGEND

	735 kV		NF. POWER
	315 kV		CORNER BROOK PULP AND PAPER PULP AND PAPER
	230 kV		ALGONQUIN POWER
	138 kV		MUSHUAU 1st NATION
	69 kV		WIND GENERATION
	LOW VOLTAGE		OPERATED BY NALCOR
	138kV CUSTOMER OWNED		GAS TURBINE
	69kV CUSTOMER OWNED		DIESEL PLANT
	HYDRO PLANT		
	THERMAL PLANT		
	TERMINAL STATION		
	TERMINAL STATION & CONVERTER STATION		

DC LEGEND

	± 350 / ± 200kV HVdc
	SUBMARINE CABLE
	ELECTRODE LINE
	ELECTRODE STATION

Newfoundland Electricity Grid



LEGEND

	735 kV		FREQ. CONVERTOR
	315 kV		NF. POWER
	230 kV		CORNER BROOK PULP AND PAPER PULP AND PAPER
	138 kV		ALGONQUIN POWER
	69 kV		MUSHUAU 1st NATION
	LOW VOLTAGE		WIND GENERATION
	138kV CUSTOMER OWNED		OPERATED BY NALCOR
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	TERMINAL STATION		
	TERMINAL STATION & CONVERTER STATION		

DC LEGEND

	± 350 / ± 200kV HVdc
	SUBMARINE CABLE
	ELECTRODE LINE
	ELECTRODE STATION

Newfoundland and Labrador's Isolated Diesel-Generated Systems

Isolated Systems	Power Source(s)	Service Provider	Capacity (kW)	Annual Fuel Use (Litres)	Number of Customers
1. Francois	Diesel	NL Hydro	635	190,856	75
2. Grey River	Diesel	NL Hydro	522	159,370	66
3. McCallum	Diesel	NL Hydro	446	133,524	50
4. Ramea	Fossil-Diesel (Primary)	NL Hydro	2,775	1,051,003	319
	Renewable-Wind	Frontier Power	390		
	Renewable-Wind	Nalcor	300	0	
5. St. Brennan's	Diesel	NL Hydro	712	278,846	148
6. Charlottetown	Diesel	NL Hydro	2,545	1,484,621	230
7. L'Anse au Loop	Hydro (Primary)	Hydro Quebec (Lac Robertson)	4,000	0	1,041
	Diesel	NL Hydro	8,050	611,757	
8. Norman Bay	Diesel	NL Hydro	160	72,389	16
	Diesel	NL Hydro	2,615	1,309,722	
9. Mary's Harbour	Diesel	NL Hydro			269
	Hydro	St. Mary's River Energy Limited Partnership	175	0	

Source:

<https://opendata.gov.nl.ca/public/opendata/page/?page-id=datasetdetails&id=681>

Newfoundland and Labrador's Isolated Diesel-Generated Systems

Isolated Systems	Power Source(s)	Service Provider	Capacity (kW)	Annual Fuel Use (Litres)	Number of Customers
10. Port Hope Simpson	Diesel	NL Hydro	2,325	867,581	232
11. St. Lewis	Diesel	NL Hydro	1,020	429,572	127
12. Black Tickle	Diesel	NL Hydro	1,005	337,270	95
13. Cartwright	Diesel	NL Hydro	2,220	1,311,785	328
14. Hopedale	Diesel	NL Hydro	2,629	1,586,491	297
15. Makkovik	Diesel	NL Hydro	1,765	1,349,274	230
16. Nain	Diesel	NL Hydro	3,865	2,861,293	506
17. Paradise River	Diesel	NL Hydro	148	91,885	41
18. Postville	Diesel	NL Hydro	1,067	561,127	142
19. Rigolet	Diesel	NL Hydro	1,320	848,367	176
20. Natuashish	Diesel	Mushuau Innu First Nation	3,337	2,511,112	na

Source:

<https://opendata.gov.nl.ca/public/opendata/page/?page-id=datasetdetails&id=681>

5. Undeveloped Renewable Energy Resources: Hydro on Island

New Facilities

Facility	Capacity (MW)	Average Energy (GWh)	Firm Energy (GWh)
Island Pond	36	186	175
Portland Creek	23	142	125
Round Pond	18	139	129
Red Indian Falls	42	268	228
Badger Chute	24	154	131
Star Lake	TBD	TBD	TBD

Extensions

Facility	Capacity (MW)	Average Energy (GWh)	Firm Energy (GWh)
Bay d'Espoir Unit 8	154	N/A	TBD
Car Arm Unit 3	68	N/A	TBD

Source:

<http://www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/application/From%20NLH%20%20-%20Reliability%20and%20Resource%20Adequacy%20Study%20-%20November%202018%20-%202018-11-16.PDF>

5. Undeveloped Renewable Energy Resources: Hydro in Labrador

New Facilities

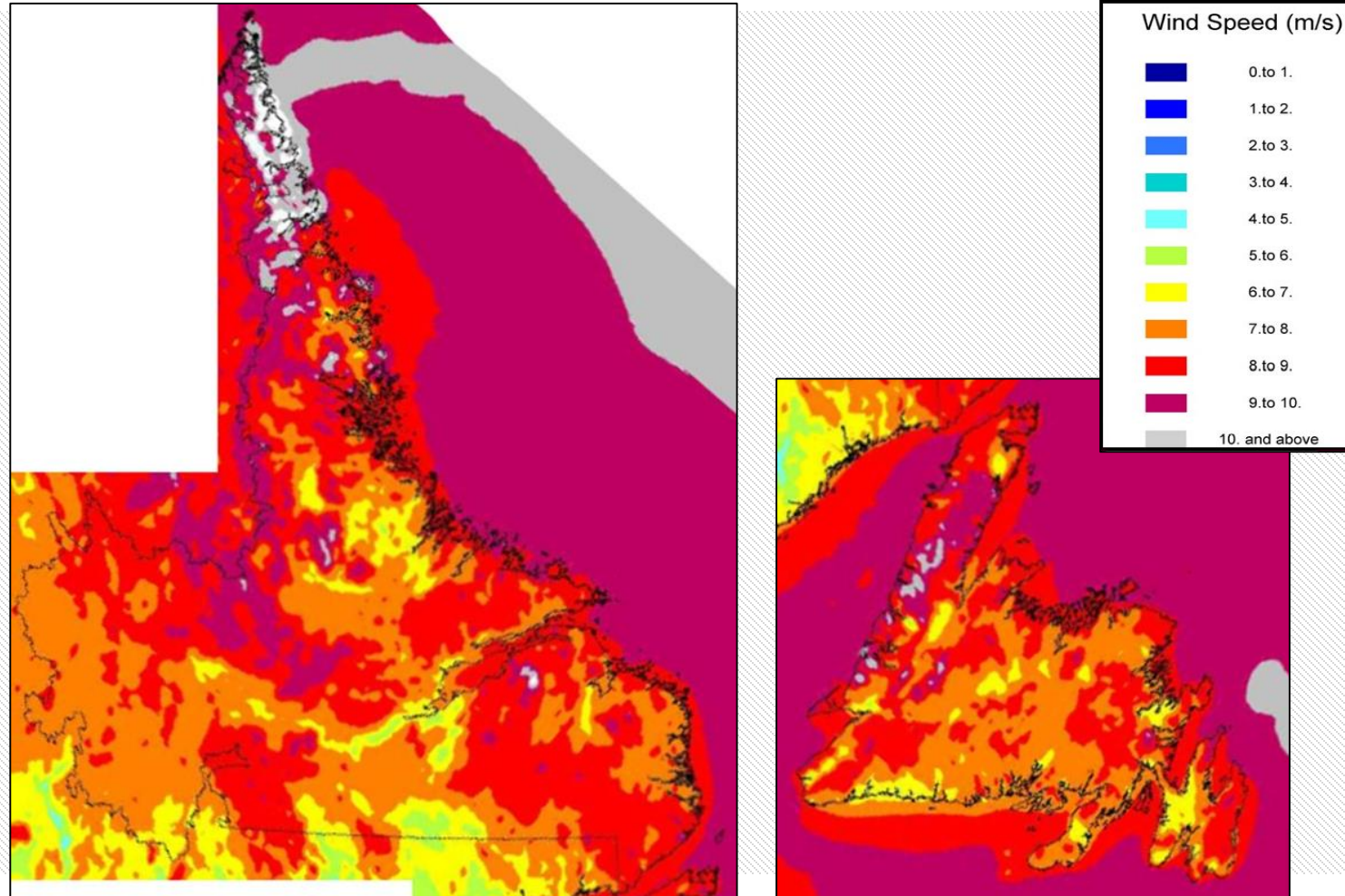
Facility	Capacity (MW)	Average Energy (GWh)	Firm Energy (GWh)
Gull Island	2,250	11,900	10,400
Dominion – Minipi	425	3,681	3,633
Lobstick	171	1,034	893
Fig	146	1,208	1,134
Julian River Diversion	N/A	594	TBD
Twin Falls Rebuild	225	TBD	TBD

Extensions

Facility	Capacity (MW)	Average Energy (GWh)	Firm Energy (GWh)
Churchill Falls - Unit Upgrades	200/290	1,000	TBD
Churchill Falls - Install 2 Additional Units	1100	N/A	N/A

Undeveloped Renewable Energy Resources: Wind Resources

Annual mean wind energy at 50 metres



Source:
<http://www.windatlas.ca/maps-en.php>

Undeveloped Renewable Energy Resources: Forestry Resources

Allowable cut

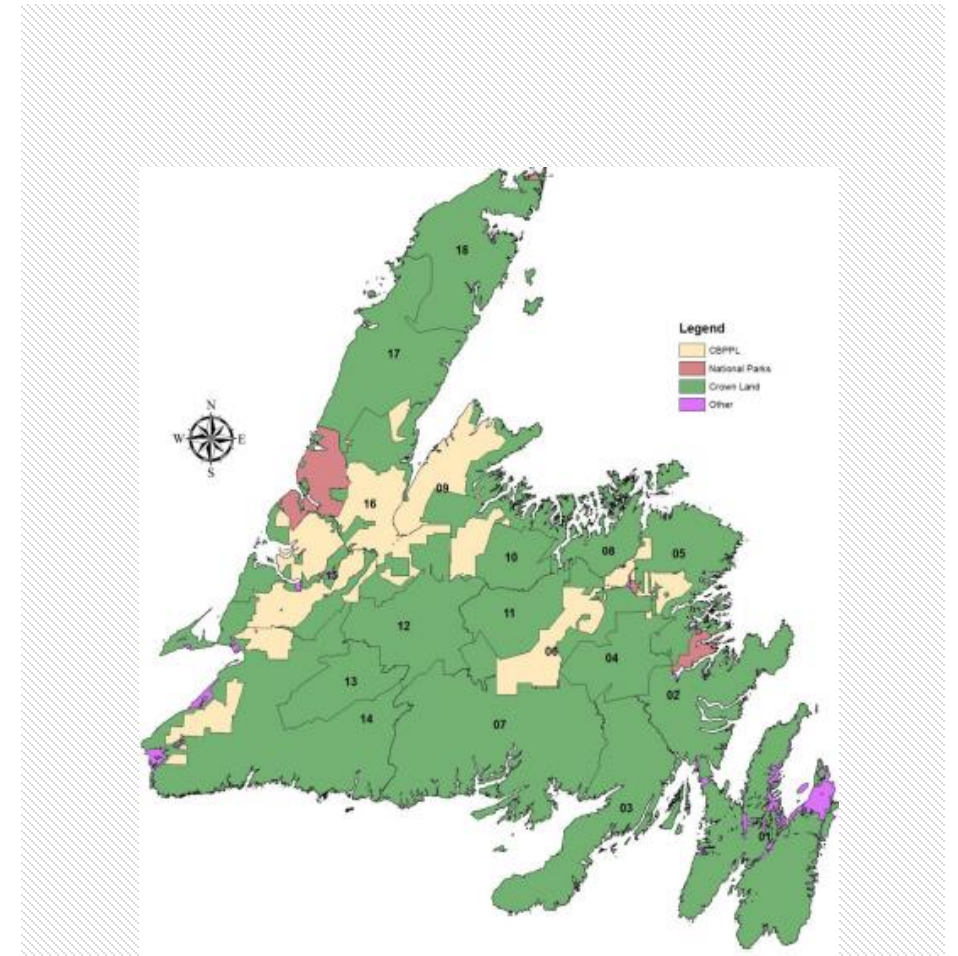
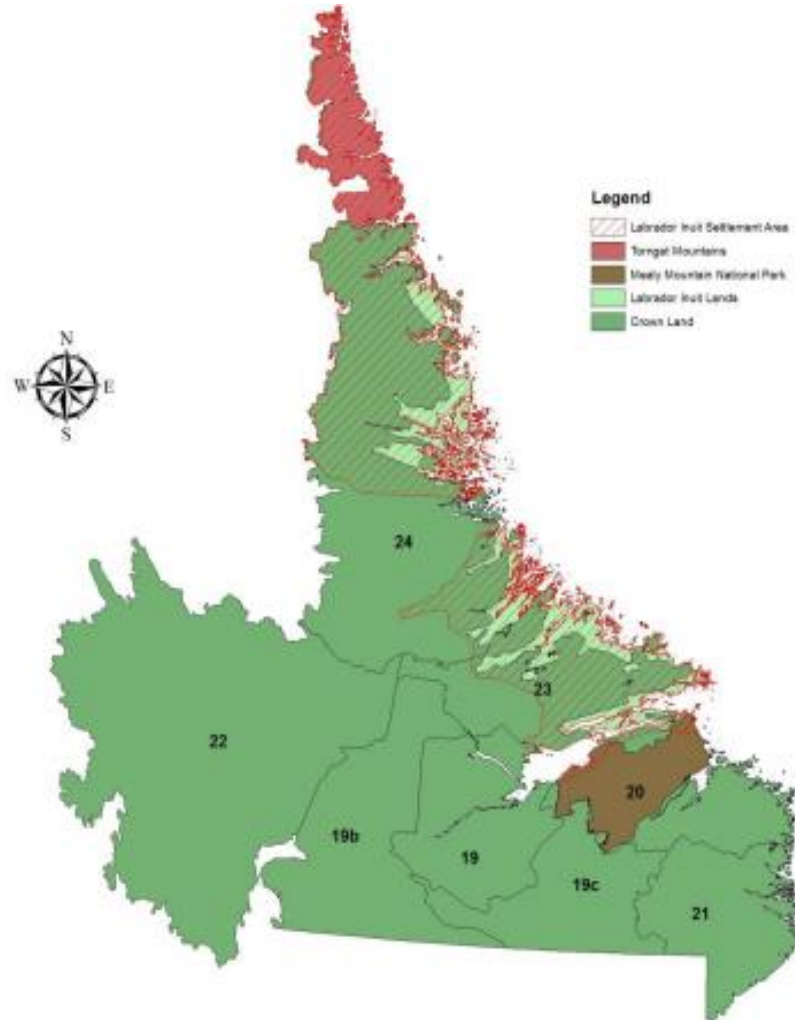
District	Hardwood AAC (m ³)			
	Core	Operational	Domestic	Total
Crown				
1	157	-	-	157
2	2,161	234	663	3,058
3				-
4	935	340	-	1,275
5	2,173	909	2,647	5,728
6	1,161	593	-	1,754
7	1,061	-	-	1,061
8	2,640	674	120	3,434
9	2,542	-	2,829	5,371
10	4,505	-	-	4,505
11	4,335	-	-	4,335
12	7,257	-	-	7,257
13	882	-	-	882
14	1,804	328	1,435	3,567
15	2,214	656	1,107	3,977
16	206	123	205	534
17	468	180	108	756
18	-	-	-	-
Crown Total	34,500	4,036	9,114	47,649
CBPPL				
5	3,795			3,795
6	2,730			2,730
9	5,084			5,084
14	5,002			5,002
15	3,116	82		3,198
16	1,312			1,312
CBPPL Total	21,039	82		21,121
Island Total	55,539	4,118	9,114	68,770

District	Softwood AAC (m ³)			
	Core	Operational	Domestic	Total
Crown				
1	21,080	85	101,320	122,485
2	60,840	8,112	32,292	101,244
3			13,391	13,391
4	41,140	13,345	1,275	55,760
5	35,155	21,251	41,001	97,407
6	61,699	4,740	-	66,439
7	22,308	2,652	858	25,818
8	75,840	22,640	-	98,480
9	38,376	1,968	53,874	94,218
10	74,885	3,060	-	77,945
11	169,745	4,930	-	174,675
12	180,072	6,478	-	186,550
13	18,942	287	-	19,229
14	41,164	8,774	43,706	93,644
15	6,109	12,546	35,916	54,571
16	14,596	54,940	18,696	88,232
17	79,492	17,964	25,344	122,800
18	73,365	13,213	40,081	126,659
Crown Total	1,014,808	196,985	407,754	1,619,547
CBPPL				
5	50,687	2,639		53,326
6	65,611	3,731		69,342
9	161,622	7,626		169,248
14	114,226	8,036		122,262
15	262,974	20,457		283,431
16	120,212	19,188		139,400
CBPPL Total	775,332	61,677		837,009
Island Total	1,790,140	258,662	407,754	2,456,556
Crown Labrador				
19	200000			200,000
20	30100			30,100
21	48700			48,700
22	13000			13,000
23	15700			15,700
24				
Crown Total	307500			307,500
Provincial Total	2,097,640	258,662	407,754	2,764,056

Source: <https://www.gov.nl.ca/ffa/files/forestry-managing-pat-timber-res-anal.pdf>

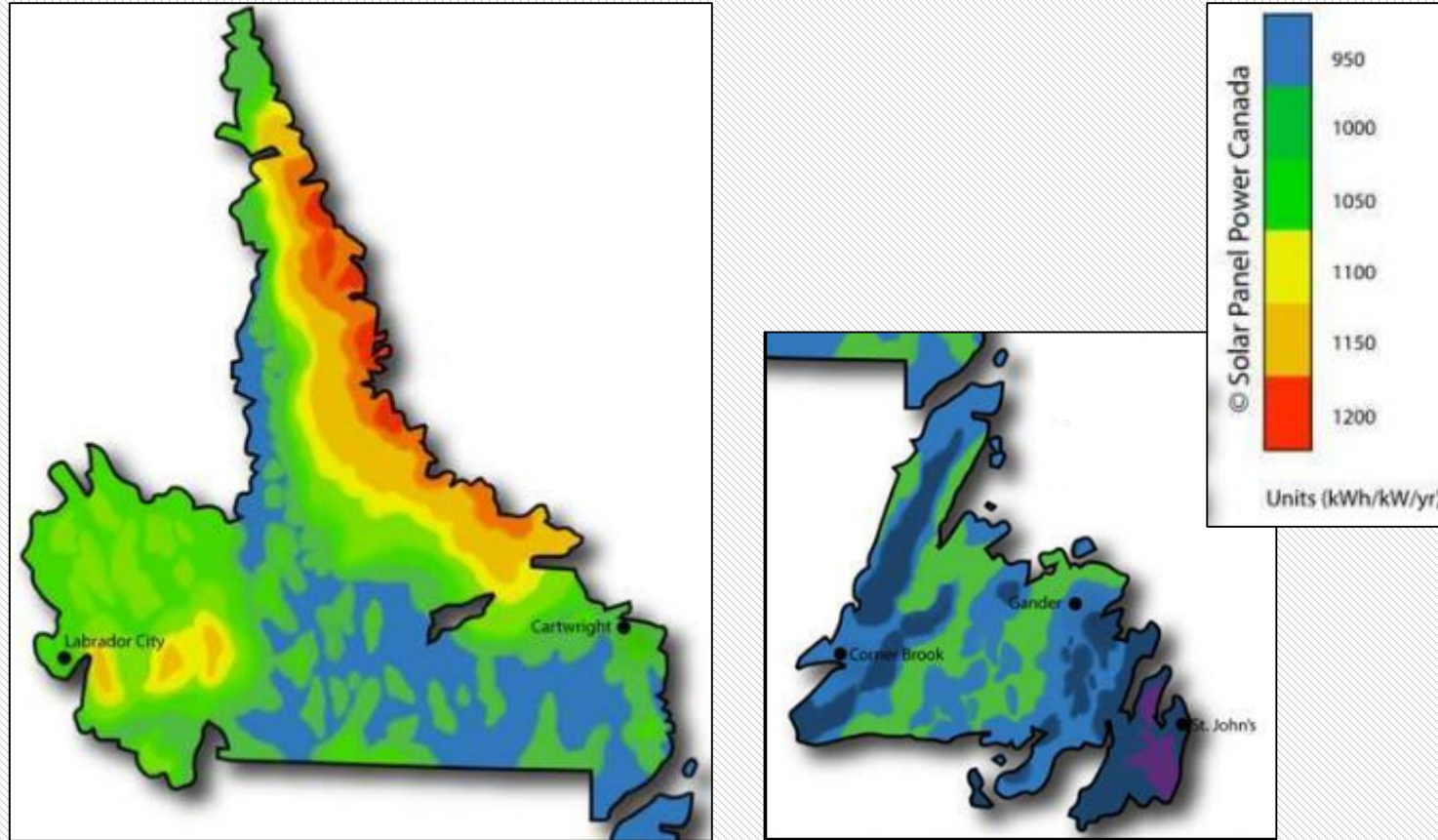
Undeveloped Renewable Energy Resources: Forestry Resources

Districts



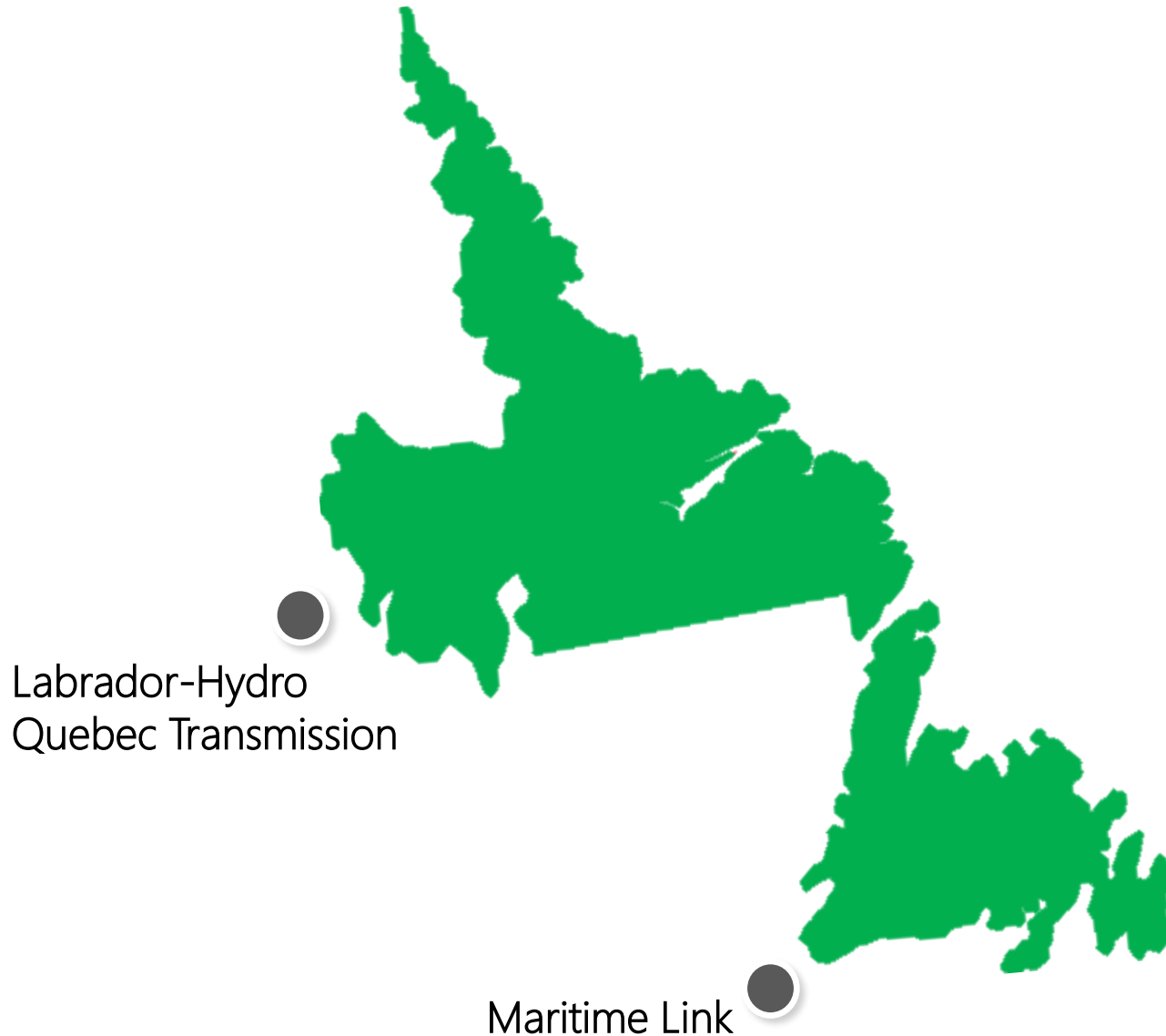
Source:
<https://www.gov.nl.ca/ffa/files/forestry-managing-pdf-timber-res-anal.pdf>

Undeveloped Renewable Energy Resources: Solar Resources



Source:

<http://www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/application/From%20NLH%20%20-%20Reliability%20and%20Resource%20Adequacy%20Study%20-%20November%202018%20-%202018-11-16.PDF>



Two export paths

- Maritime Link
- Labrador-Hydro Quebec Transmission (LAB-HQT) Point of Interconnection

Combined capacity

- Firm: 515 MW
 - Non-firm: 765 MW
 - Approximately 160 MW of firm capacity has been committed
 - Remaining capacity required to move 3.5 TWh of excess energy to market
-

Maritime Link

- High-voltage, direct current (HVdc) bipole
- 250 MW firm, 500 MW non-firm basis
- Export commitments:
 - Emera Block: firm export of 0.98 TWh/year, delivered 16 hour per day, 7 days per
 - Supplemental Energy to Emera: energy during off-peak hours during the first five years

LAB-HQT Point of Interconnection

- 735 kilovolt (kV) transmission lines connecting Churchill Falls to HQ network
- HQ has rights to 4,903 MW
- NL Hydro: has the rights to 265 MW of firm export capacity into the Hydro Quebec network and Twinco block (225 MW) and the Recapture block (300 MW) serving Labrador

Markets

- Fuel switching/electrification (electric vehicles, space/water heating)
- Attracting, building and retaining industry
- Isolated diesel-powered electricity systems
- Export electricity out of province

Considerations

- Economics – best return for electricity customers, create jobs
- Impacts on electricity system (e.g. load)
- Physical constraints of electricity system (e.g. transmission)

6. Next Steps

- Obtain input from industry, stakeholders and public
- Please click [here](#) to complete questionnaire

- *Reliability and Resource Adequacy Study*
 - November 16, 2018: [www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/application/From NLH - Reliability and Resource Adequacy Study - November 2018 - 2018-11-16.PDF](http://www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/application/From%20NLH%20-%20Reliability%20and%20Resource%20Adequacy%20Study%20-%20November%202018%20-%202018-11-16.PDF)
 - 2019 Update: [www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/application/From NLH - Reliability and Resource Adequacy Study - November 2019 Update - 2019-11-15.PDF](http://www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/application/From%20NLH%20-%20Reliability%20and%20Resource%20Adequacy%20Study%20-%20November%202019%20Update%20-%202019-11-15.PDF)
 - 2020 Update, Volume II: Near-Term Reliability Report [August 2, 2010 \(pub.nf.ca\)](http://pub.nf.ca)
- *Rate Mitigation Options and Impacts Muskrat Falls Project: Final Report (February 7, 2020)*
<https://www.gov.nl.ca/iet/files/Reference-to-the-Board-Rate-Mitigation-Options-and-Impacts-Final-Report-2020-02-07.pdf>
- *Energy and Capacity Agreement*
https://www.emeranl.com/docs/librariesprovider13/maritime-link-documents/commercial-agreements/amended-and-restated-energy-and-capacity-agreement.pdf?sfvrsn=dec21945_2

- *Final Report - Coastal Labrador Wind Monitoring Program (2015)*
 - https://www.gov.nl.ca/iet/files/labrador_wind_monitoring.pdf
- *Preliminary Assessment of Alternative Energy Potential in Coastal Labrador (2009)*
 - <https://www.gov.nl.ca/iet/files/publications-energy-preliminary-assessment-of-alternative-energy-potential-in-coastal-labrador.pdf>
- *Historical Climate Data*
 - <http://climate.weather.gc.ca/>
- *Photovoltaic potential and solar resource maps of Canada*
 - <https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/renewable-energy/solar-photovoltaic-energy/tools-solar-photovoltaic-energy/photovoltaic-potential-and-solar-resource-maps-canada/18366>