

NB POWER

INTEGRATED RESOURCE PLAN PUBLIC ENGAGEMENT PROGRAM

What Was Said Final Report

Submitted by

N|A|T|I|O|N|A|L

ourenergyfuturenb.ca


Énergie NB Power

What Was Said Report

NB POWER OUR ENERGY FUTURE 2017

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What Was Said Report

METHODOLOGY

As the planning period of the Integrated Resource Plan is 25 years, it was important to gain a deeper understanding of what's important to customers as they consider New Brunswick's electricity future, and the role they're willing to play to achieve those objectives.

Customer engagement on the Integrated Resource Plan (IRP) was carried out between March 12, 2017 and May 15, 2017. The design of the engagement process was a collaborative effort between the NB Power team and NATIONAL, with survey design and data analysis services provided by Thinkwell Research.

Program goal

- To gather values-based input from New Brunswickers about the province's electricity future to inform NB Power's 2017 Integrated Resource Plan.

Objectives

- Gain a deeper understanding of what is most important to customers as they consider the province's energy future, and the role they're willing to play to achieve those objectives.
- Provide sufficient and appropriate contextual information, in an easy to understand format, about the province's energy landscape, the scope of the IRP process, and what can be influenced.
- Host a values-based engagement process in person and online that allows New Brunswickers to contribute based on their own perspective, experience, ideas, and what is most important to them.
- Be transparent in sharing what emerges from the consultation effort.

What Was Said Report

Scope of engagement

The engagement program consisted of an online survey hosted on the website OurEnergyFutureNB.ca and customer engagement sessions hosted in Fredericton, Moncton, and Beresford.

Efforts to raise awareness of the engagement process and to invite customer participation were extended through: newspaper advertising, social media advertisements (Facebook, Twitter, and YouTube), media relations, direct invitations to stakeholders, and via NB Power's own communications channels (e.g. website, social media).

Input was gathered from 1,221 New Brunswickers online, of which 16% of respondents were from Maliseet and Mi'kmaq communities (identified by their first three postal code digits). Three engagement sessions were held with 52 total participants, and three stakeholder organizations made formal submissions of input to the process.

Online engagement approach

The online engagement experience was designed with a general public audience in mind. Content was developed to be concise and used plain language. An informational video was produced to provide context for the discussion and the questions posed.

The survey was short and the questions direct. It explored the following topics:

- Affordability
- Clean Energy
- Customer Options

Participants were also provided with an open-ended opportunity to share additional information regarding what was important to them, and those qualitative inputs were coded into conceptually meaningful categories and quantified with NB Power.

In-person engagement approach

The customer engagement sessions were hosted in a world café format.

Representatives of the NB Power executive team served as hosts, and a presentation by Michael Bourque, Director of Integrated Resource Planning provided important context for the discussion. That presentation consisted of: an overview of the IRP, the current situation, outcomes of the 2015 IRP process, possible options for the future, and the increased role customers might play.

What Was Said Report

Participants were facilitated through an exploration of the following three questions:

- When considering New Brunswick's electricity future, what's most important to you?
- What do we need to be successful in advancing these priorities?
- What can customers do to help advance these priorities?

ONLINE ENGAGEMENT FINDINGS

Summary

The results of the online survey indicate that clean energy and affordable rates are both high priorities among New Brunswickers who participated. Respondents mostly agreed with statements related to these two considerations.

The one exception is that there was less agreement overall with the statement 'I am personally willing to pay more for clean energy' than other statements on this topic. This suggests that at least for some, there are limits to the degree to which they want NB Power to embrace this approach.

There were also some clear age divides on several questions. younger respondents (under the age of 35) expressed higher and more intense levels of agreement with statements that endorse clean energy, while older (55+) respondents did the same for statements that related to managing costs (keeping rates as low as possible, investing in options to allow them to better manage their energy use, etc.).

This should not be interpreted as meaning that younger respondents do not favour low rates, or that older respondents do not support clean energy. It does mean, however, that the age groups are more concerned and sensitive to one priority over the other.

The statements New Brunswickers had the highest level of agreement with, were:

What Was Said Report

Clean Energy

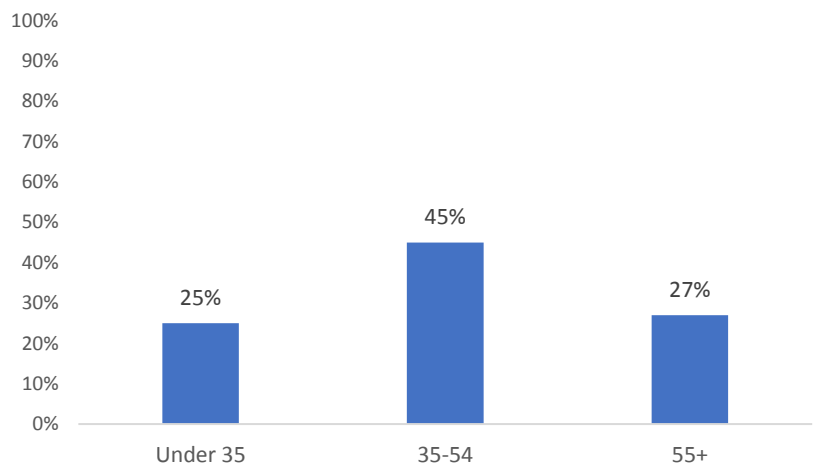
- I want NB Power to be a leader in energy efficiency
- I support using less fossil fuels as we transition to a cleaner energy future to meet our climate change commitments
- New Brunswickers have a responsibility to make changes to help address climate change

Customer Options

- I am willing to personally invest in equipment and technology to manage my electricity use and costs (e.g. insulation, programmable thermostats)

Detailed findings

The single largest group of respondents came from the middle age (35-54) category, at 45%. The proportion of younger (under 35) and older (55+) respondents was relatively equal (25% and 27% respectively).



What Was Said Report

Affordability:

Respondents were asked to rate their level of agreement with a series of statements on a scale of 1-5, where 1 means they *disagree*, and 5 means they *agree*.

Priority	4-5 rating (top-2 box)	3 rating	1-2 rating	DNK	Mean
I want NB Power to invest in providing more customer options to better manage my electricity use and costs	72%	17%	8%	3%	4.04
New Brunswick's transition to a clean energy future needs to minimize impacts on rates and the economy	68%	20%	10%	2%	3.99
NB Power's top priority should be keeping rates as low as possible	63%	22%	13%	2%	3.88
I am open to renewable power purchased from other jurisdictions rather than building new in New Brunswick to maintain stable rates	50%	20%	27%	3%	3.38
NB Power's top priority should be debt repayment	42%	37%	18%	4%	3.35

Clean Energy:

Priority	4-5 rating (top-2 box)	3 rating	1-2 rating	DNK	Mean
I want NB Power to be a leader in energy efficiency	86%	8%	3%	3%	4.49
I support using less fossil fuels as we transition to a cleaner energy future to meet our climate change commitments	79%	10%	8%	2%	4.29
New Brunswickers have a responsibility to make changes to help address climate change	76%	13%	9%	2%	4.17
NB Power's top priority should be moving away from fossil fuels to clean energy generation	74%	13%	11%	2%	4.12
I want NB Power to be a leader in clean energy	73%	15%	10%	2%	4.15
It is important to me that electricity for New Brunswick is made in New Brunswick	61%	19%	18%	3%	3.80
I am personally willing to pay for clean energy	51%	23%	23%	2%	3.51

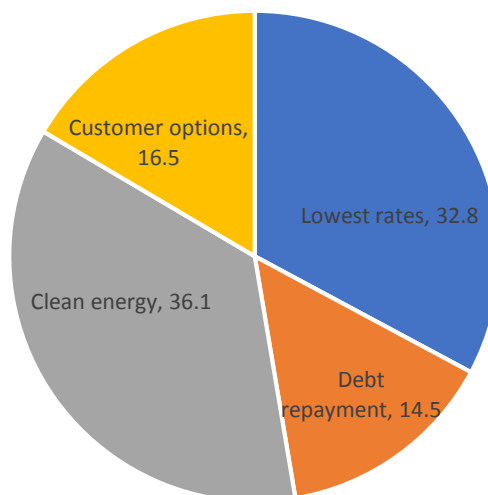
What Was Said Report

Customer Options:

Priority	4-5 rating (top-2 box)	3 rating	1-2 rating	DNK	Mean
I am willing to personally invest in equipment and technology to manage my electricity use and costs (e.g. insulation, programmable thermostats)	77%	13%	7%	3%	4.19
I would be interested in generating my own electricity	71%	12%	14%	4%	4.07
I would be interested in participating in a “time-of-use” rate program to help manage my electricity use costs	65%	16%	15%	4%	3.86
NB Power’s top priority should be offering customers options to better manage their electricity use	64%	22%	12%	3%	3.86
I would be interested in purchasing an electric car	50%	19%	27%	4%	3.40
I think it’s NB Power’s job to manage electricity use and costs	44%	33%	20%	4%	3.36

Establishing Priorities:

Respondents were also provided with an opportunity to indicate how much of a priority they place on four priorities for NB Power, out of a possible 100 points. The highest ‘weight’ was assigned to clean energy (36.1 average), followed very closely by the lowest rates (32.8). Customer options (16.5) and debt repayment (14.5) were not rated as strongly.



What Was Said Report

There were some age differences of note in two areas. Consistent with other findings on the survey, younger (under 35) respondents tended to place a higher weight on clean energy (41.8) than middle age (35.6) and older (32.5) respondents, while the reverse was true for the lowest rates (<35: 29.7; 35-54: 32.8; 55+: 35.5).

Other Comments:

Respondents were asked to indicate in an unaided fashion if there was anything else they wanted NB Power to know as they developed the IRP. The responses shown below are based on the 409 individuals who provided a response to this question.

There were some age differences of note in two areas. Consistent with other findings on the survey, younger (under 35) respondents tended to place a higher weight on clean energy (41.8) than middle age (35.6) and older (32.5) respondents, while the reverse was true for the lowest rates (<35: 29.7; 35-54: 32.8; 55+: 35.5).

Respondents from Maliseet and Mi'kmaq communities consistently articulated clean energy as a high priority, and the ability to generate power for sale back to the grid.

What Was Said Report

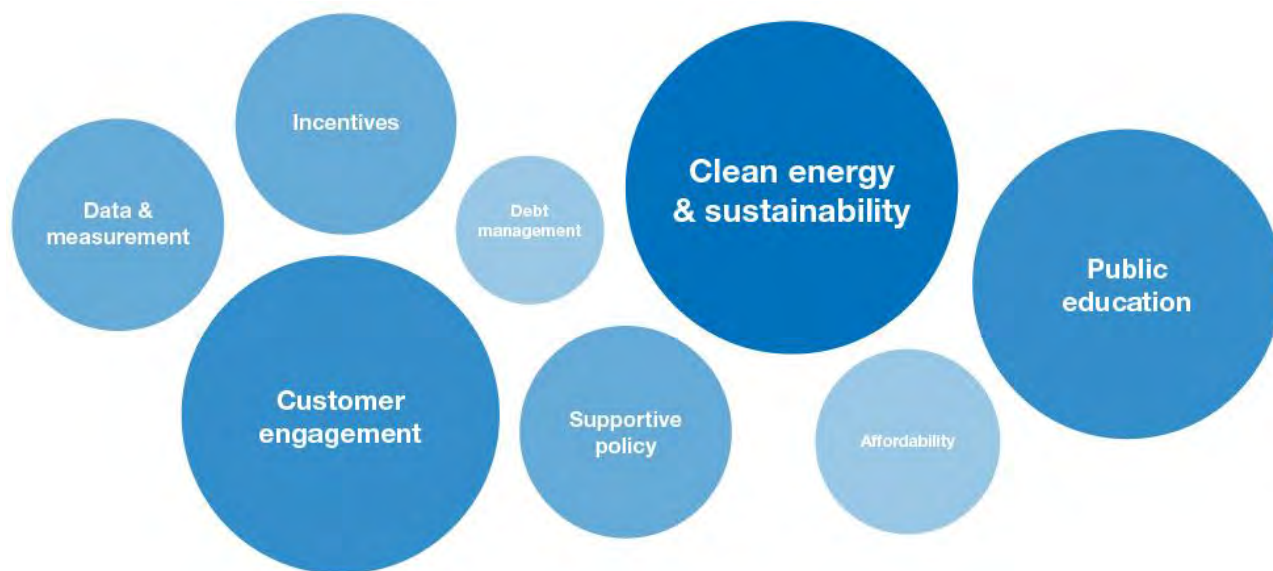
Category	Commenters (n=409)
Promote solar power	20%
Incentives/subsidies necessary to generate clean power	17%
Make clean energy a priority	11%
Allow consumers to sell excess power back to grid	9%
Make wind power a priority	9%
Keep rates low/minimize increases	8%
Promote tidal/hydro power	5%
Reduce management salaries	5%
NB Power needs to be a leader/is falling behind	5%
Focus on creating jobs/economy	5%
Invest in more nuclear power	5%
Rate protection for low income and seniors	4%
More education/awareness/ engagement	4%
Survey suggestions	4%
Better management of NB Power is needed	4%
Encourage consumers to generate their own power	4%
Focus on conservation programs	4%
Partner with leaders/others	3%
Avoid making the same mistakes as Ontario	3%
Make electric cars a priority	3%
No more nuclear power	3%
Incent time-of-day use	3%
Focus on debt reduction	2%
Praise for NB Power/survey	2%
Home energy report is a waste	2%
Invest in infrastructure for electric cars	2%
Better government leadership	2%
Avoid wind power	2%
Mismanagement of Point Lepreau	2%
Maintain grid/fewer outages	2%
Make Natural Gas a priority	2%
Take a balanced/careful approach	2%
NB Power is incompetent/corrupt	2%
Keep energy production in NB	2%
Other	14%

What Was Said Report

CUSTOMER ENGAGEMENT SESSION FINDINGS

Summary

Customers had deep discussions during the engagement sessions about their priorities when considering New Brunswick's energy future. The general themes are reflected below.



Detailed Findings

When considering New Brunswick's electricity future, what's most important to you?

These are the comments shared with NB Power by participants, organized by theme:

What Was Said Report

Engagement

- Customers to take more personal action to be part of future solutions
- Diversity is important
- Community engagement is important, and matters
- Provide user-friendly tools for customers, in order for them to be able to learn about energy options – how are they consuming?
- Get customers involved (e.g. pilot projects)
- Everyone needs to do their part

Education

- NB Power to provide leadership and education on a sustainable energy future
- Customer education on cost comparison
- Educate students from a young age
- Education to help visualize consumption
- Education to inform behaviour

Clean energy and sustainability

- Clean and cost-effective energy
- Environment and our environmental responsibility
- Lower or eliminate carbon emissions
- Stop fossil fuels
- Better, sustainable housing
- Modernization
- Renewable energy
- Resiliency to confront challenges and climate change
- Carbon offset
- Shape a new identity for New Brunswick which is clean and green

Affordability & debt management

- The cost of energy and affordability
- Tackle debt
- Identify savings
- Economic impact of Belledune
- Stable cost and rates
- Bulk purchasing to keep the energy price(s) down

What Was Said Report

- Getting notifications to save money with Smart Grid
- To get a good ROI with investments
- Invest locally, with a good ROI
- Concern around the real cost of nuclear
- Long-term view of costs
- Investment
- Holistic view of cost for generation
- Be prepared to pay a little bit of a premium

Incentives

- Incentives and rebates
- NB Power to move forward with incentives
- Development of grants/incentives for individuals to get involved with wind/solar
- Incentive programs and plans for customers that install energy-efficient products, and complete energy-efficient construction projects—something that works for all of New Brunswick
- Incentives to adopt more renewable energy
- Financial incentives so New Brunswick can make more responsible energy choices
- Incentives for lower-than-average consumption

Supportive policy

- Engage leaders and politicians
- Drive the policy, and “*the why*”
- We need development in the North
- Investment in New Brunswick, and produce 100% of New Brunswick’s power
- New Brunswick could be the lungs of Canada—buying credits from our province as they emit greenhouse gas emissions
- Government policies to support things like community-based projects
- Different levels of government to get aligned with the goals/visions of NB Power

Data & measurement

- Real-time data
- Notifications and opportunities to save/reduce
- Data-driven habits
- Real-time feedback and communications

What Was Said Report

First Nations

First Nations community representatives identified the following priorities during the Beresford engagement session:

- Inclusion of First Nations
- More green energy
- Affordability
- The environment
- Need for development in the North
- Opening markets
- Lower or eliminate carbon emissions
- Grants or incentives for wind/solar energy development

What Was Said Report

What do we need to be successful in advancing these priorities?

What can customers do to help advance these priorities?

A breakdown of responses below:

RESPONSE	THEME
Make efficiency the “norm”	Clean energy and sustainability
Integration of new technologies	Clean energy and sustainability
Encourage alternative forms of energy, and heating sources	Clean energy and sustainability
Electric transportation–non-carbon electricity	Clean energy and sustainability
Get rid of coal	Clean energy and sustainability
More eco-friendly lighting (<i>including the broad acceptance of other new technologies</i>)	Clean energy and sustainability
Reliability (<i>increased storms, climate change, etc.</i>)	Clean energy and sustainability
Get off the grid–decentralize	Clean energy and sustainability
Distributed generation	Clean energy and sustainability
Energy independence	Clean energy and sustainability
Appliances that shut down	Clean energy and sustainability
Eco-friendly choices that are easy to make	Clean energy and sustainability
Integrate technology into the building materials	Clean energy and sustainability
Community energy planning	Clean energy and sustainability
Take simple personal actions to save on energy	Clean energy and sustainability
Solar power	Clean energy and sustainability

What Was Said Report

RESPONSE	THEME
Make cost of electricity more visible—time of use rates, etc.	Data & measurement
A well-defined program with clear KPI's	Data & measurement
Breakdown of information on bills	Data & measurement
Demonstrated results	Data & measurement
Transparent result-reporting	Data & measurement
Accountability	Data & measurement

RESPONSE	THEME
Education for seniors (<i>energy reduction</i>)	Debt management and affordability

RESPONSE	THEME
Webmail portal to receive customer ideas, to drive change (<i>get away from the more traditional models</i>)	Engagement
More community dialogue	Engagement
Cooperation	Engagement
More people present at discussions	Engagement
Empower customers	Engagement
Customers become producers	Engagement

What Was Said Report

RESPONSE	THEME
Education leadership to create a change in mindset, develop a culture of respect, and not to waste resources	Education
Information	Education
Shifting education to avoid new builds	Education
Education models developed for schools (<i>by NB Power</i>) and have energy offering challenges between school districts	Education
Education for seniors (<i>energy reduction</i>)	Education
Dialogue on social media	Education

RESPONSE	THEME
Credits for energy efficiency in winter	Incentives
Incentives for wood pellet stoves and insulation in homes	Incentives

RESPONSE	THEME
Inform our government we want a change	Supportive policy
Carbon tax/pricing to change behavior	Supportive policy
Carbon tax/pricing to change behavior	Supportive policy

Appendix A

Submitted by

N|A|T|I|O|N|A|L



My name is Chris Rouse with New Clear Free Solutions. We would like to submit our fully integrated resource plan for consideration for your 2017 IRP process. We would like to be assured that this plan be presented to the government of NB as one of their choices in long term planning approval.

This is a link to our latest version of the IRP.

New Clear Free Solutions 2017 Integrated Resource Plan

In general, renewable energy is the same or lower cost than the fossil fuel and nuclear options. Given that these options are currently less expensive or similar cost there is no need to wait or defer their implementation, and there is no need for significant long term rate increase like currently planned by NB Power. Deferring the transition will only cost more in the long and short run, and is denying NB much needed jobs. It is a false choice to ask NB Brunswicker's if they are willing to pay more for green energy when it is less expensive.

Our plan has been misunderstood as only investing into renewables and not looking at energy efficiency and conservation. Our plan has also been misunderstood as ignoring the other sectors that make up NB emissions such as industry and Transportation. This is not true. There is \$4.7 billion in our plan to be invested in these areas and was the "Dividend" column in our previous plans. This is a fully integrated resource plan for New Brunswick and not just for the electricity sector. NB Power is responsible for both the generation of electricity as well as efficiency programs, and as such we believe the best way to invest the Carbon Tax is through our publicly owned utility for the benefit of all New Brunswicker's.

Some of the money will be used to invest into electrode boilers which is at least a 30% efficiency gain and has huge emissions reductions and will save industry in energy costs compared to what they are currently paying. This is the only credible method for eliminating the emissions from this sector without the extensive use of biofuels. Biofuels is a limited resource and we should be conserving it and using other methods first. The increase in electricity sales will also help with NB Powers bottom line and help keep rates low and stable. The approximate cost to supply all industry in NB with an electrode boiler is approximately \$200 million dollars.

The money will also be used to invest in the shift to electric transportation. This has another huge efficiency gain of more than 30%. At \$300,000 per electric school bus and approximately 1200 school busses, \$360 million of the 4.7 billion could be used to buy all new electric school busses. There are also approximately 1200 commercial busses. An electric commercial bus is approximately \$300,000 more than a normal fossil fuel bus which we can incentivise at a cost of another \$360 million. We can also use some of the revenue to incentivise the shift to electric cars and provide the infrastructure to make the shift like fast charging stations, and home charging stations.

Investing in these efficiencies have large emission reductions and benefits NB Power through increased sales and leads to lower overall energy cost for ratepayers while also maintaining low and stable rates. Investing in efficiency that reduces electricity consumption will make rates higher, choke the cash flow needed to make the transition, generally bad for business and only benefits those who get the efficiency. Also we have a very low carbon grid, already at around 75% carbon free, using less electricity has very little environmental benefits. Due to the high price of gasoline the shift in electric transportation should end up with consumers paying less overall energy cost. If we want to save money using efficiency the transportation sector is the place to do it in.

We should also use some of the money to invest in efficient government buildings that will make them more affordable. We all benefit from an efficient government. We can also offer low interest loans that can be paid back with energy savings and this should starting with low income families first. We can invest into efficiency but too much too fast creates a big problem, and it should not be the focal point of our long-term plans like the current RASD program.

We think NB Power should not be trying to change human behavior to accommodate their grid, although we do believe in education that may help integrate renewables. We object to time of use pricing as NB Power is telling me I must pay more to eat and shower at my normal times. NB Power should be focusing on demand side management technology that is transparent to the user and doesn't require behavior changes such as are award winning Power Shift Atlantic program, which NB Power has now defunded.

There is also ample money for climate change mitigation as the effects of global warming have already begun to affect New Brunswick.

We also think that people generating their own electricity is a large issue for NB Power especially if rates keep rising like currently planned. We suggest NB Power adopt the solar city business model for people who want to generate their own power. We also think the community power be limited as NB Power is community power. However, if there is a program most community energy projects are 70% debt financed and this source of financing should be the Carbon tax so that we all benefit.

We would like NB Power to consider all our evidence, IR's and testimony from the EUB matter 336 as part of this submission, as we made our detailed concerns very well known to senior management during that process. We requested that the board order NB Power to have a detailed stakeholder consultation with us, but their final decision has yet to be released. We would very much welcome and request a more detailed consultation about the IRP with NB Power. Interventions are by nature confrontational and we hope that our critique is not taken personally as it is meant to help and in the public's best interest

Both economic experts at the hearings thought that the best way to get NB Power out of the financial troubles was a large immediate rate increase because of the compounding nature of it. The carbon tax gives this large initial influx of cash recommended by them while keeping electricity rates low and stable.

We request that an option to phase nuclear out by 2030 be considered in the IRP. As stated by NB Powers own expert at the EUB hearings, the closing of Point Lepreau for any number of reasons poses a large financial risk on the Province. NB Power should be examining the potential early retirement of Lepreau. Nuclear technology has underperformed in every aspect of building and operating a generating plant and lifespan should not be overestimated either. From cost over runs, schedule delays, poor performance, increase ongoing capital cost and issues with waste and safety still not adequately addressed, NB Power has no logical reason for pursuing nuclear. It is an industry in decline and NB does not have enough money to prop up this failing industry. Given the recent bankruptcy of Toshiba there is currently not even any technology to buy. We cannot afford to be another nuclear guinea pig in NB. There is no technical need for nuclear power and we already have too much baseload. We request that geothermal be used to replace any base load requirements, as it is the same or less cost and more scalable to the size of our needs. According to the 2014 IRP we have a comparable geothermal resource to California.

As pointed out during the EUB hearings we have concerns with the fundamentals of NB Powers current business plans starting with NB Powers lack of vision, IRP methodology and concerns with the three strategic objectives and general management of our publicly owned utility. These concerns were mirrored by almost all interveners.

We also have the impression that NB Power is not properly using its strategist software and this software is largely responsible for our concerns with NB Powers three key strategies. Given the recent property tax software creating significant issues in the province we are also concerned with misunderstood software at NB Power. We object to NB Power blindly following the directions given by this piece of software.

We request that NB Power assess return on investment and not only the lowest cost option for this IRP process. The results of the IRP are currently being misrepresented as Net Present Value which they are not. Not considering lost revenue for the RASD program is a huge problem with the current 2014 IRP. While the RASD program claims to have saved approximately \$450 million over 25 years it did not consider the lost revenue from the 2TWh of efficiency that the program enabled. This is approximately \$200 million per year in lost revenue every year to save \$450 million over 25 years. Lost revenue puts undue pressure on rate and jeopardizes the legislated requirement of low and stable rates.

We also object to the use of 100% debt financing for the WACC in the strategist software. NB Power should be using the actual capital structure in their modeling and using 0% ROI for their equity.

If NB Power would like to optimize the Carbon Tax and Investment plan we have submitted we recommend that NB Power use a WACC of 0% in their strategist software.

We strongly object to the focus on debt repayment. Even NB Powers own economic expert agreed that debt repayment should only be done with any money that is left over. Debt repayment is the tail wagging the dog. NB Power has a legislated equity target and not a debt reduction target. There should be no focus on debt repayment. NB Powers current focus should be return on investment. Our largest financial risk in the province is the performance of Point Lepreau and debt repayment does nothing to mitigate this risk. We risk paying down a bunch of debt to build equity then losing all the equity when Lepreau has to be shut down for one reason or another or our coal plant has to be shut down. Paying down debt is essentially investing in the bad past investments that NB Power has made that are causing all the risk.

Thank you for this opportunity to submit our thoughts on NB Powers future.

Regards

Chris Rouse

New Clear Free Solutions



New Clear Free SOLUTIONS



Transitioning To A Low Carbon Economy Carbon Tax and Investment Plan 2017 Integrated Resource Plan

The purpose of New Clear Free Solutions is to:

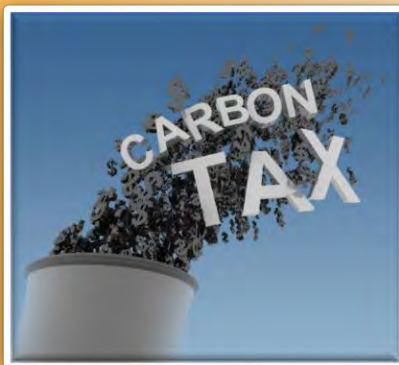
Provide energy oversight to the public and official decision makers using objective scientific, regulatory and financial information.

The objective of New Clear Free Solutions is to:

Ensure safe, affordable, and sustainable energy solutions for the public and environment.

Year-Technology Type	Carbon Tax \$/Year \$20/Ton	Revenue From Investments – (O&M+Fuel) \$/Year	Total Investment \$/Year	Dividend
2016 Hydro	\$300,000,000	\$0	\$300,000,000	
2017 Hydro	\$300,000,000	\$28,691,000	\$328,691,000	
2018 Wind	\$300,000,000	\$60,125,911	\$360,125,911	
2019 Wind	\$300,000,000	\$103,258,780	\$403,258,780	
2020 Wind	\$300,000,000	\$151,557,743	\$451,557,743	
2021 Natural Gas	\$300,000,000	\$205,641,552	\$505,641,552	
2022 Solar	\$300,000,000	\$207,440,231	\$507,440,231	
2023 Bio	\$300,000,000	\$234,443,008	\$234,443,008	\$300,000,000
2024 Bio	\$300,000,000	\$232,451,644	\$232,451,644	\$300,000,000
2025 Geothermal	\$300,000,000	\$230,477,194	\$330,477,194	\$200,000,000
2026 Geothermal	\$300,000,000	\$284,071,813	\$384,071,813	\$200,000,000

Economy Wide Carbon Tax \$20-30/Ton



Reinvestment ROI-O&M-Fuel-Dividend



Fuel Shift Efficiency Adaptation

Uncertainty

Public Investment Through NB Power



Priority

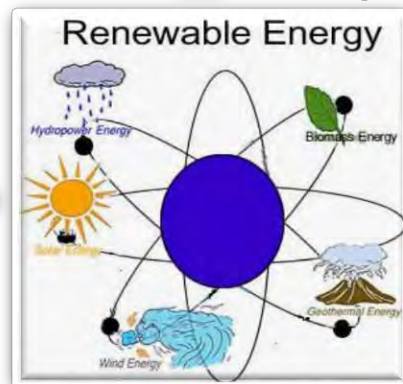
Displaced Cost + Increased Sales From Fuel Shift=ROI

Power Purchase Agreements



- * Solar Power
- * Wind Farms
- * Hydro
- * Geothermal

Jobs Social Policy



Economic Policy

Power Purchase Agreements



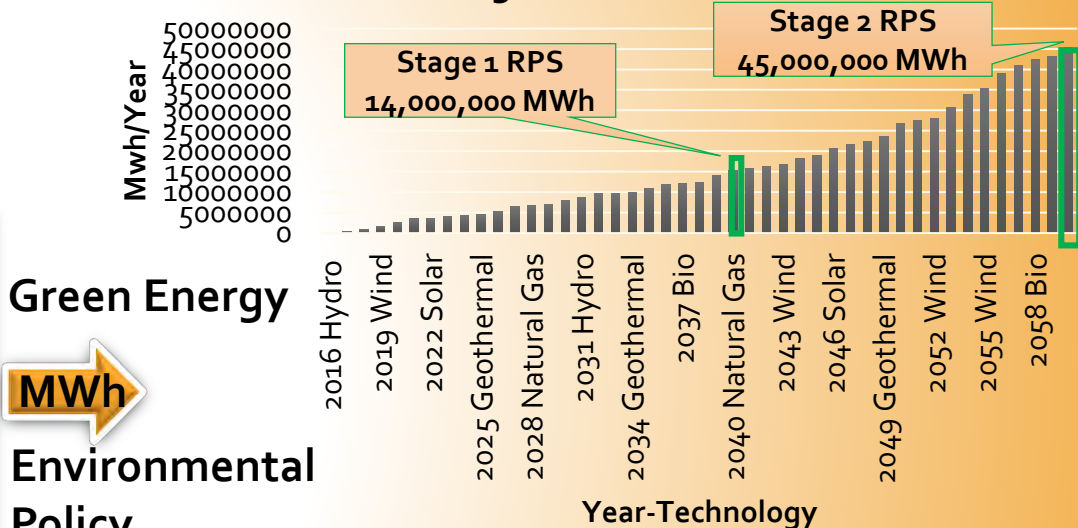
- * Solar Power
- * Wind Farms
- * Hydro
- * Geothermal

Summary



	Stage 1 Renewable Portfolio Standard 14,000,000 MWh/Year By 2040		Stage 2 Renewable Portfolio Standard 45,000,000 MWh/Year By 2060	
	% Generation	Capacity MW	% Generation	Capacity MW
Wind	30%	1,199	45%	5,779
Hydro	25%	999	10%	1,284
Solar	5%	320	15%	3,082
Geothermal	30%	533	20%	1,142
Bio	5%	320	5%	1,027
Natural Gas	5%	1,749	5%	6,235
Storage Tesla Power Wall	NA	400	NA	2,312

Integrated Resource Plan



Green Energy

MWh

Environmental Policy

IRP Financial Details

Year	Stage 1 RPS 2040	Stage 2 RPS 2060
Lifespan	30	30
Annual MWh	14,000,000	45,000,000
Total System Rate (PPA) \$/MWh	\$100.00	\$100.00
Total System Cost @ 0% Interest \$/MWh	\$46.02	\$49.11
Total Revenue \$/Year	\$1,400,000,000	\$4,500,000,000
Total System Capital Investment \$/Lifespan	\$10,519,002,664	\$38,649,355,023
Average Net Capital Investment \$/Year	\$350,633,422	\$1,288,311,834
Total Fixed O & M \$/Year (Generation)	\$190,299,020	\$655,488,139
Total Fuel \$/Year	\$51,730,000	\$166,275,000
Total Transmission Cost \$/MWh	\$3.69	\$3.69
Transmission Cost \$/Year	\$51,660,000	\$166,050,000
Total O & M \$/Year	\$241,959,020	\$821,538,139
Total Annual Expense \$/Year	\$644,322,442	\$2,276,124,973
Total Net Earnings (Interest) \$/Year	\$755,677,558	\$2,223,875,026.64
Total Net Profit/Interest \$/Lifespan	\$22,670,326,743	\$66,716,250,799
Total Dividend \$/Lifespan	\$4,310,000,000	\$27,374,153,558

Carbon Tax and Investment Plan Features

- Taxes the Problem and invests in the solutions
- Fully integrated plan for all sectors
- Creates much needed jobs in a multi-decade construction boom
- Compound interest is fueled with savings from displacing fossil fuels and purchased power and increased sales from fuel switching of the industrial heat and steam and automotive sectors to electricity.
- Lowest cost policy option and not dependant on the technology mix (Technology Neutral)
- Freezes electricity rates well into the future and is less than the current business as usual rate increases being proposed by NB Power (lower cost than doing nothing)
- Transition to debt free NB Power (Currently 95% in debt)
- No early retirement for existing power plants (No Premature Job Losses)
- Focuses on displacing fossil fuels not fossil fuel capacity. (Capacity doesn't emit CO₂ and fixed O and M is a small cost) This also addresses what happens when the wind doesn't blow.
- Significant new source of revenue for province. (\$1 to \$2 Billion Per Year for NB)
- Prioritizes Investments over subsidises/incentives
- Focuses on the efficiency gains in the transition of industrial heat and steam and transportation sectors. Reducing electricity usage has little environmental impacts and significant detrimental economic consequences.
- Minimal behavioural changes, focuses on transition from dirty energy to clean energy
- Fuels economic growth during multi decade construction boom
- Guaranteed to work if the policy is adhered too. All variables affect only "when" the objective is achieved not "if" the objective is achieved

Carbon Tax and Investment Plan

UNBSJ Professor of Economics, Dr. Rob Moir. "The concept of reinvesting in environmentally-friendlier energy production and energy efficiency to create a compound interest effect is founded economic theory. As such this policy should be considered by all provinces and not only New Brunswick."

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

Amount

Principal

rate of interest

time in years

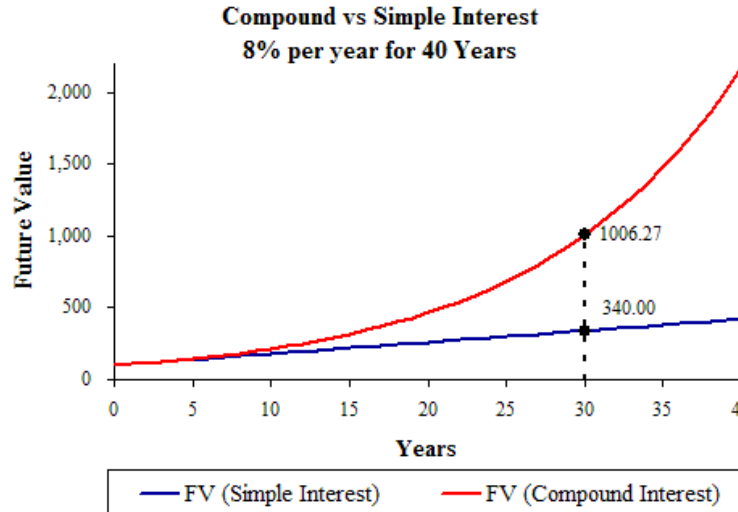
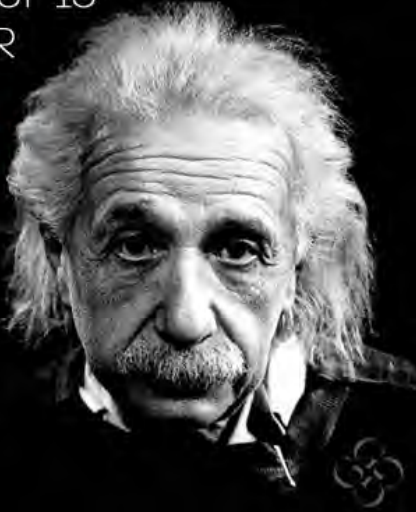
number of times per year, interest is compounded

© mathwarehouse.com

NB Power System Planning Engineer Darren Clark: "We reviewed Mr. Rouse's model and functionally I believe the majority of what he is setting out to do, the model is accomplishing."

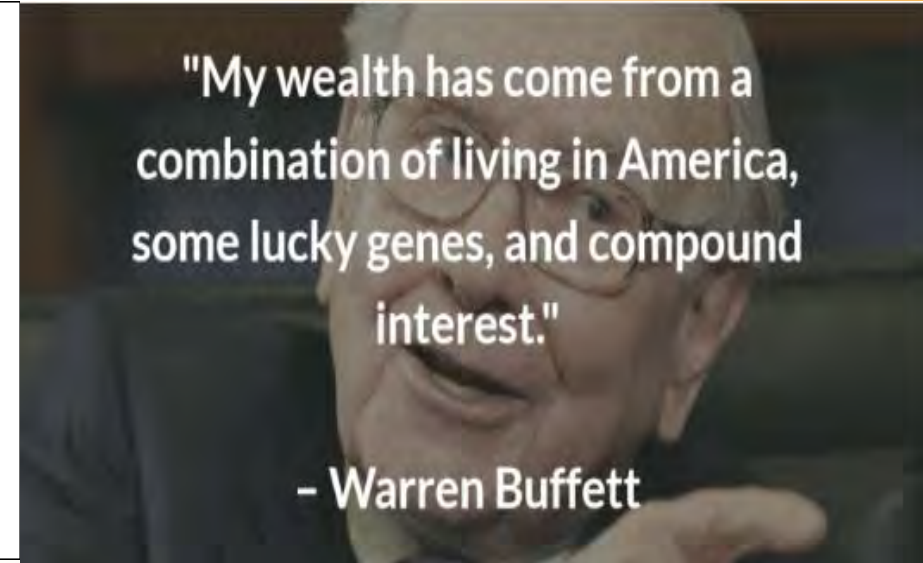
"COMPOUND INTEREST IS THE EIGHTH WONDER OF THE WORLD. HE WHO UNDERSTANDS IT, EARNS IT ... HE WHO DOESN'T ... PAYS IT."

-ALBERT EINSTEIN



"My wealth has come from a combination of living in America, some lucky genes, and compound interest."

- Warren Buffett



Modeling Objectives

The general purpose of the modeling is to reasonably demonstrate using today's technology and today's costs and today's rates that New Brunswick can reasonably transition to a low carbon economy by investing the carbon tax into renewable energy and fuel switching technologies such as electrode boilers and electric cars.



Stage 1 Renewable Portfolio Standard (Green The Grid)

The objective of this renewable portfolio standard (RPS) is to green the current "electricity" consumption to 95% renewable by 2040. 2014-2015 was used as the test year for comparison to the business as usual.

Stage 2 Renewable Portfolio Standard (Fuel Shift or Electrification)

The objective of this renewable portfolio standard is shift all remaining fossil fuel usage to 95% green "energy" by 2060 at the same or less cost than the fossil fuel equivalent. Stage 2 does not require the completion of stage 1 before commencing. The transition to stage 2 can begin as long as the fuel switch has a net carbon reduction. This is essentially the electrification of our transportation and industrial heat/steam.

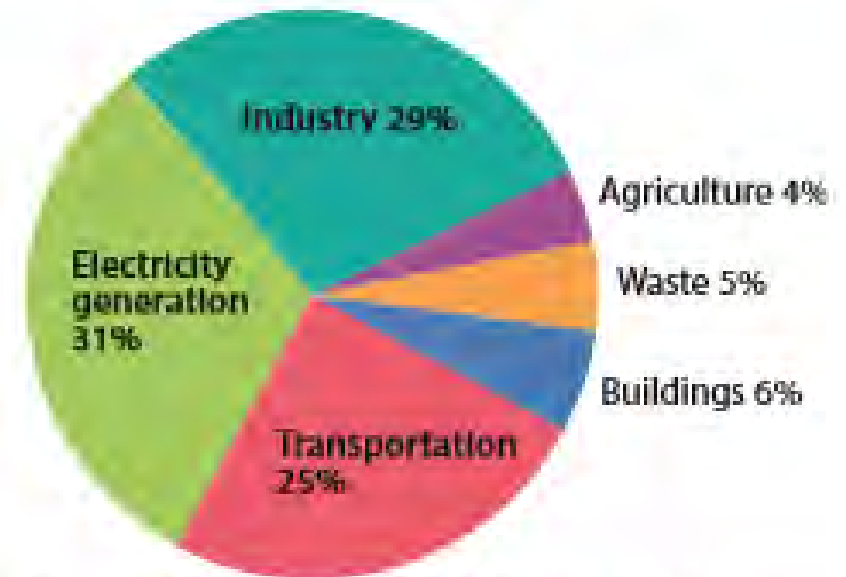
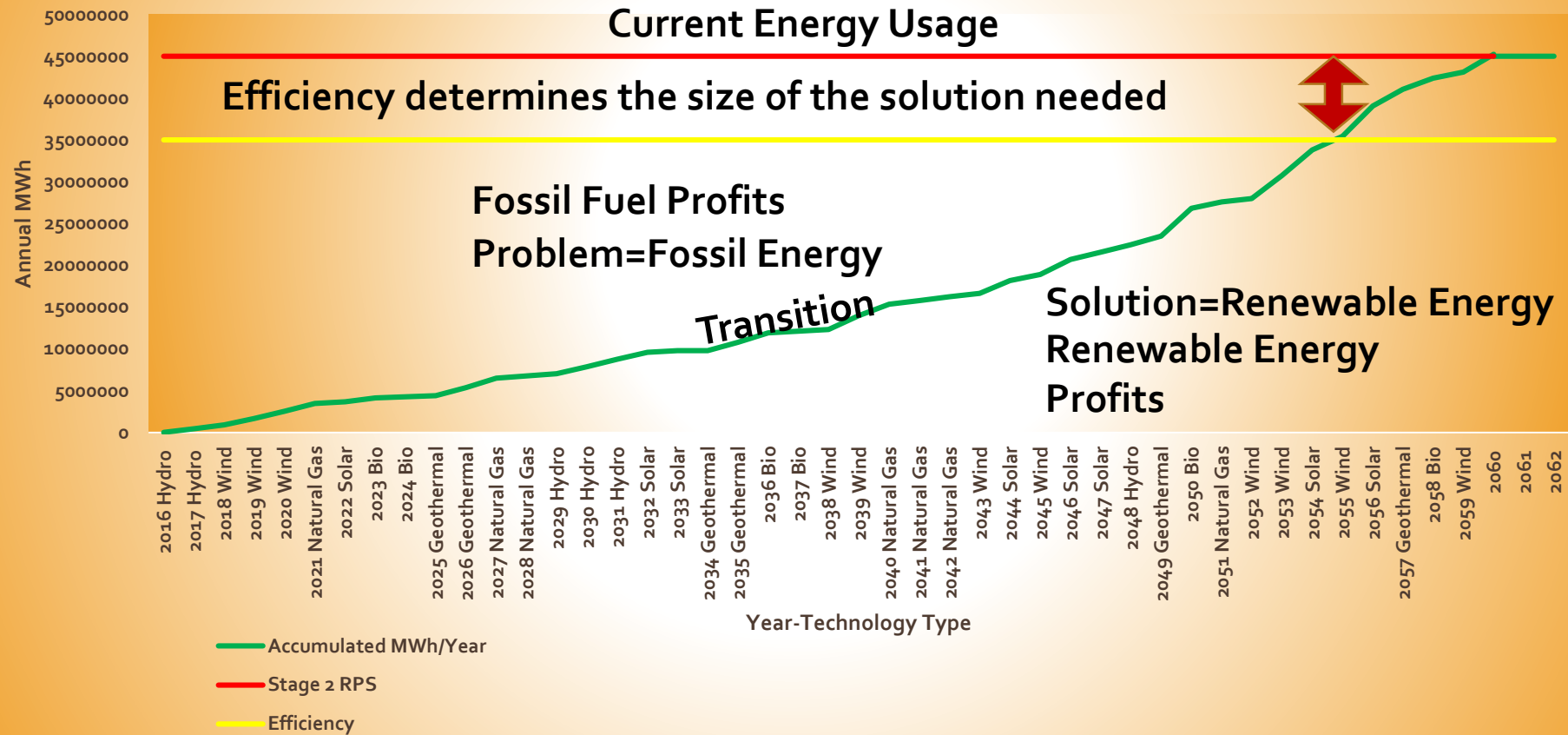


Figure 1: Distribution of GHG emissions in New Brunswick

Source: Environment Canada

The Solution = Renewable Energy

The Solution to Climate Change is fuel shifting from Fossil Energy to Renewable Energy



Technical Barriers? NO

Supply Side

Demand Side

At Least 30% efficiency Gain in Electric Car and Electrode Boilers

- Hydro
- Wind
- Solar
- Geothermal
- Biofuels
- Smart Grids
- Storage Thermal/Battery
- High Capacity Very Low Capacity Factor FF plants
- Enough Resources



Specs



Technology
Wall mounted, rechargeable lithium ion battery with liquid thermal control.

Models
10 kWh \$3,500
For backup applications
7 kWh \$3,000
For daily cycle applications

Warranty
Ten year warranty with an optional ten year extension

Efficiency
92% round trip DC efficiency

Power
2.0 kW continuous, 3.3 kW peak

Voltage
350 – 450 volts

Current
5 amp nominal, 8.5 amp peak output

Compatibility
Single phase and three phase utility grid compatible

Operating Temperature
-4°F to 110°F / -20°C to 43°C

Enclosure
Rated for indoor and outdoor installation

Installation
Requires installation by a trained electrician
AC/DC inverter not included

Weight
220 lbs / 100 kg

Dimensions
52.1" x 33.9" x 7.1"
130 cm x 86 cm x 18 cm

Certifications
UL listed



- Electrode Boilers
- Electric Cars
- Electric Trains
- Electric Busses
- Electric Arc Furnace
- Heat Pump

2017 BOLT EV

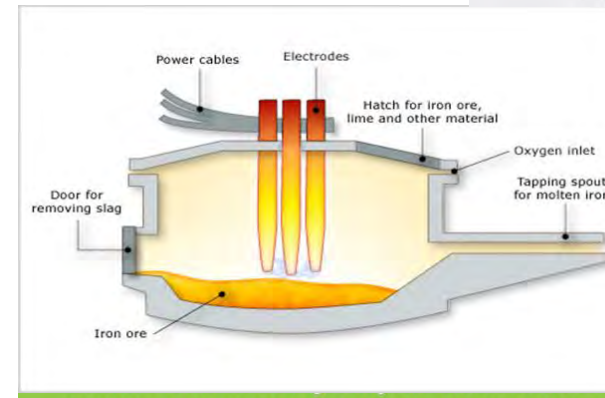
DESIGN RANGE CHARGING TECHNOLOGY SAFETY UPDATES

Cost \$5-\$6 to Charge

EPA-estimated 238 miles per charge¹

Starting MSRP \$37,495

Available late '16



Technology will only get better with time

	Business As Usual Comparison		
Assumptions	Year	Stage 1 IRP 2040	2014-15 NB Power Annual Report
Based on US Gov EIA Annual Energy Outlook 2016	Lifespan	30	NA
2014-2015 NB Power Annual Report	Annual MWh In Province	13,648,000	13,648,000
2014-2015 NB Power Annual Report	Annual MWh Export	4,575,000	4,575,000
2014-2015 NB Power Annual Report	Total Generation	18,223,000	18,223,000
Stage 1 RPS Mix No Capacity Value for Wind or Solar	Firm Capacity MW	4,237	NA
2014-2015 NB Power Annual Report	Firm Capacity Requirment MW	4,000	4,000
Does not include Interconnects	Total In Province Capacity MW	5,406	NA
Total Annual In Province Revenue Divided by Annual In Province MWh Generation	Total System Rate (PPA) \$/MWh	\$100.67	\$100.67
Total Annual Export Revenue Divided by Annual Export MWh Generation	Export Rate \$/MWh	\$75.63	\$75.63
2014-2015 NB Power Annual Report	Annual Export Revenue	\$346,000,000.00	\$346,000,000.00
2014-2015 NB Power Annual Report	Annual In Province Revenue \$/Year	\$1,374,000,000.00	\$1,374,000,000.00
2014-2015 NB Power Annual Report	Total Revenue \$/Year	\$1,791,000,000	1,791,000,000
Total Revenue/Year * Lifespan	Total Revenue \$/Lifespan	\$53,730,000,000	NA
Calculated Annual Export Cost Divided by Annual MWh Export	Export Total Cost \$/MWh	\$62.30	\$62.30
2014-2015 NB Power Annual Report	Annual Export Cost	\$285,000,000.00	\$285,000,000.00
Difference between revenue and cost	Export Margin	\$61,000,000.00	\$61,000,000.00
Total Annual Expense Divided By Total MWh Production Over Lifespan	Total System Cost \$/MWh	\$77.70	\$91.00
Total Capital Investment Stage 1 RPS	Total System Capital Investment \$/Lifespan	\$9,303,543,531	NA
Straight Line Amortization Over Life of the assets	Depreciation and Amortization Expense \$/Year	\$310,118,118	\$239,000,000
US Gov EIA Annual Energy Outlook 2016 and Energy Mix	Total Fixed O & M \$/Year (Generation)	\$176,097,556	NA
CTIP uses US Gov EIA Annual Energy Outlook 2016 fuel cost and 2014-2015 NB Power Annual Report	Total Fuel and Purchased Power Including Exports \$/Year	\$383,197,360	\$826,000,000
Based on Total Fuel Cost/Year * Lifespan	Total Fuel \$/Lifespan	\$11,495,920,800	NA
Approximate cost based on working papers provided by NB Power	Total Transmission/Distribution O&M Cost \$/MWh	\$14.00	NA
Approximate cost based on working papers provided by NB Power	Transmission And Distribution O&M Cost \$/Year	\$191,072,000	NA
Based on Total Fixed O & M (Generation)+Transmission Cost/Year	Total O & M \$/Year	\$367,169,556	\$477,000,000
Based on Total O & M/Year * Lifespan	Total O & M \$/Lifespan	\$11,015,086,676	NA
Based on Total O &M/Year + Total Fuel/Year + Average Capital Investment/Year	Total Annual Expense \$/Year	\$1,060,485,034	NA
Based on Total Annual Expense/Year * Lifespan	Total Expense \$/Lifespan	\$31,814,551,006	NA
It is assumed that all of the debt will eventually be paid off, but may not be untill after the transition is complete.	Debt to Equity Ratio	0:100	96:4
Based on 2015 NB Power Annual Report	Financing Cost/Interest	\$0	\$229,000,000
2014-2015 NB Power Annual Report	Taxes	\$37,000,000	\$37,000,000
It is assumed that all of the debt will eventually be paid off, but may not be untill after the transition is complete.	Net Debt	\$0	\$4,913,000,000
CTIP does not include infationary Increases, while the NB Power 10 Year Plan does.	Rate Increases	4-5% Once	2% Annually Forever
Based on Total Revenue/Year - Total Annual Expense/Year	Total Net Earnings (Interest) \$/Year	\$693,514,966	\$73,000,000
Based on Total Net Earnings * Lifespan	Total Net Profit/Interest \$/Lifespan	\$20,805,448,994	NA
Based on Integrated Resource Plan.	Total Dividends Paid during IRP	\$4,770,000,000	NA

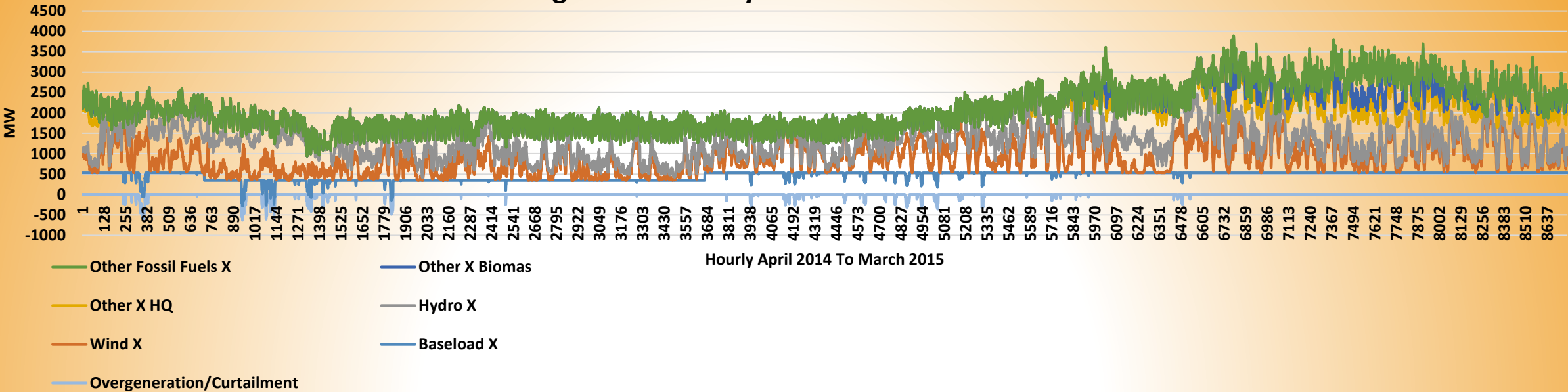
Integrated Resource Plan																	
Blue=Calculated						Yellow=Policy					Grey=Cost and Performance Data US Government 2016 Energy Outlook.						
Year-Technology Type	Accumulat ed MWh/Year	Carbon Tax \$/Year \$24/Ton	Accumulated Reinvestent \$/Year	Total Investment \$/Year	Dividend/Inves tment Energy Efficiency/ Mitigation	Technology Type Stage 1	Capacity Factor	In Service Capital Cost	Fixed O & M \$/kw	Fuel Cost \$/M Wh	Capacity MWh	Total Fixed O & M \$/Year	Total Fuel Cost \$/Year	Generation MWh/Year	Income From Investment	PPA \$/MWh	Income Minus (O & M + Fuel)
2016 Hydro	0	\$370,000,000	\$0	\$370,000,000		Hydro	0.40	\$2,411,000	14.7	0	153	\$2,255,910.41	\$0	537,735	\$26,349,034	49	\$24,093,123
2017 Hydro	537,735	\$370,000,000	\$24,093,123	\$394,093,123		Hydro	0.40	\$2,411,000	14.7	0	163	\$2,402,807.51	\$0	572,751	\$28,064,792	49	\$25,661,984
2018 Wind	1,110,486	\$370,000,000	\$49,755,107	\$369,755,107	\$50,000,000	Wind	0.34	\$1,664,000	45.98	0	222	\$10,217,151.35	\$0	661,826	\$32,429,478	49	\$22,212,327
2019 Wind	1,772,312	\$370,000,000	\$71,967,434	\$391,967,434	\$50,000,000	Wind	0.34	\$1,664,000	45.98	0	236	\$10,830,927.06	\$0	701,584	\$34,377,617	49	\$23,546,690
2020 Wind	2,473,896	\$370,000,000	\$95,514,124	\$415,514,124	\$50,000,000	Wind	0.34	\$1,664,000	45.98	0	250	\$11,481,574.18	\$0	743,730	\$36,442,786	49	\$24,961,212
2021 Natural Gas	3,217,627	\$370,000,000	\$120,475,336	\$340,475,336	\$150,000,000	Natural Gas	0.04	\$664,000	6.65	70	513	\$3,409,881.00	\$12,577,077	179,673	\$8,803,954	49	-\$7,183,004
2022 Geothermal	3,397,299	\$370,000,000	\$113,292,332	\$293,292,332	\$190,000,000	Geothermal	0.90	\$2,687,000	116.12	0	109	\$12,674,769.49	\$0	860,557	\$42,167,295	49	\$29,492,525
2023 Bio	4,257,856	\$370,000,000	\$142,784,857	\$212,784,857	\$300,000,000	Bio	0.25	\$3,765,000	108.63	35	57	\$6,139,394.17	\$4,331,995	123,771	\$6,064,792	49	-\$4,406,596
2024 Wind	4,381,627	\$370,000,000	\$138,378,261	\$208,378,261	\$300,000,000	Wind	0.34	\$1,664,000	45.98	0	125	\$5,757,952.18	\$0	372,977	\$18,275,875	49	\$12,517,923
2025 Wind	4,754,605	\$370,000,000	\$150,896,184	\$217,896,184	\$303,000,000	Wind	0.34	\$1,664,000	45.98	0	131	\$6,020,953.45	\$0	390,013	\$19,110,648	49	\$13,089,694
2026 Geothermal	5,144,618	\$370,000,000	\$163,985,878	\$333,985,878	\$200,000,000	Geothermal	0.90	\$2,687,000	116.12	0	124	\$14,433,360.70	\$0	979,957	\$48,017,897	49	\$33,584,536
2027 Bio	6,124,575	\$370,000,000	\$197,570,414	\$567,570,414	\$0	Bio	0.25	\$3,765,000	108.63	38.9	151	\$16,375,876.26	\$12,842,468	330,141	\$16,176,887	49	-\$13,041,457
2028 Wind	6,454,715	\$370,000,000	\$184,528,958	\$354,528,958	\$200,000,000	Wind	0.34	\$1,664,000	45.98	0	213	\$9,796,419.16	\$0	634,573	\$31,094,065	49	\$21,297,645
2029 Hydro	7,089,288	\$370,000,000	\$205,826,603	\$506,826,603	\$69,000,000	Hydro	0.40	\$2,411,000	14.7	0	210	\$3,090,149.76	\$0	736,591	\$36,092,949	49	\$33,002,799
2030 Hydro	7,825,879	\$370,000,000	\$238,829,403	\$539,829,403	\$69,000,000	Hydro	0.40	\$2,411,000	14.7	0	224	\$3,291,369.65	\$0	784,555	\$38,443,197	49	\$35,151,828
2031 Hydro	8,610,434	\$370,000,000	\$273,981,230	\$574,981,230	\$69,000,000	Hydro	0.40	\$2,411,000	14.7	0	238	\$3,505,692.28	\$0	835,643	\$40,946,486	49	\$37,440,794
2032 Natural Gas	9,446,077	\$370,000,000	\$311,422,024	\$381,422,024	\$300,000,000	Natural Gas	0.04	\$664,000	6.65	70	574	\$3,819,964.55	\$14,089,638	201,281	\$9,862,746	49	-\$8,046,856
2033 Geothermal	9,647,357	\$370,000,000	\$303,375,168	\$73,375,168	\$600,000,000	Geothermal	0.90	\$2,687,000	116.12	0	27	\$3,170,943.26	\$0	215,292	\$10,549,312	49	\$7,378,369
2034 Natural Gas	9,862,649	\$370,000,000	\$310,753,537	\$180,753,537	\$500,000,000	Natural Gas	0.04	\$664,000	6.65	70	272	\$1,810,257.56	\$6,676,992	95,386	\$4,673,894	49	-\$3,813,355
2035 Geothermal	9,958,035	\$370,000,000	\$306,940,182	\$26,940,182	\$650,000,000	Geothermal	0.90	\$2,687,000	116.12	0	10	\$1,164,232.94	\$0	79,046	\$3,873,250	49	\$2,709,017
2036 Bio	10,037,081	\$370,000,000	\$309,649,199	\$79,649,199	\$600,000,000	Bio	0.25	\$3,765,000	108.63	35	21	\$2,298,085.66	\$1,621,543	46,330	\$2,270,161	49	-\$1,649,468
2037 Bio	10,083,411	\$370,000,000	\$307,999,731	\$227,999,731	\$450,000,000	Bio	0.25	\$3,765,000	108.63	35	61	\$6,578,382.67	\$4,641,748	132,621	\$6,498,447	49	-\$4,721,684
2038 Geothermal	10,216,032	\$370,000,000	\$303,278,047	\$623,278,047	\$50,000,000	Geothermal	0.90	\$2,687,000	116.12	0	232	\$26,935,261.19	\$0	1,828,777	\$89,610,079	49	\$62,674,818
2039 Wind	12,044,809	\$370,000,000	\$365,952,865	\$435,952,865	\$300,000,000	Wind	0.34	\$1,664,000	45.98	0	262	\$12,046,341.78	\$0	780,314	\$38,235,372	49	\$26,189,030

Sensitivity Analysis

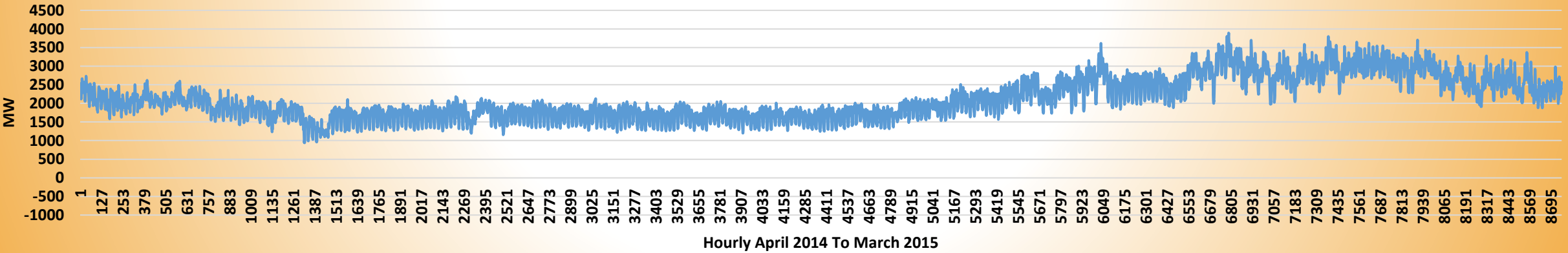
Sensitivity Case	Base Case Net Earnings	Business As Usual Net Earnings	Plus 10%-Net Earnings	Minus 10%-Net Earning	Plus 10% Difference From Base Case	Minus 10% Difference From Base Case
Capital Cost	\$693,514,966	\$73,000,000	\$662,503,155	\$724,526,778	-\$31,011,812	\$31,011,812
Wind Capacity Factor	\$693,514,966	\$73,000,000	\$704,291,306	\$680,343,885	\$10,776,340	-\$13,171,082
Fixed O and M	\$693,514,966	\$73,000,000	\$675,905,211	\$711,124,722	-\$17,609,756	\$17,609,756
Fuel Cost	\$693,514,966	\$73,000,000	\$683,695,230	\$703,334,702	-\$9,819,736	\$9,819,736
Lifespan	\$693,514,966	\$73,000,000	\$721,707,523	\$659,057,398	\$28,192,556	-\$34,457,569
Demand	\$693,514,966	\$73,000,000	\$762,208,949	\$624,781,097	\$68,693,982	-\$68,733,869
Rates	\$693,514,966	\$73,000,000	\$830,894,486	\$556,023,766	\$137,379,520	-\$137,491,200
Best/Worst Case Scenario	\$693,514,966	\$73,000,000	\$514,259,696	\$863,011,068	-\$179,255,271	\$169,496,101

Demand and Rates have the largest effects on the plan. Reducing Demand has significant impacts on the financial health of NB Power and generally lower demand = increase in rates. We strongly disagree with the reduce part of the RASD program at this current time.

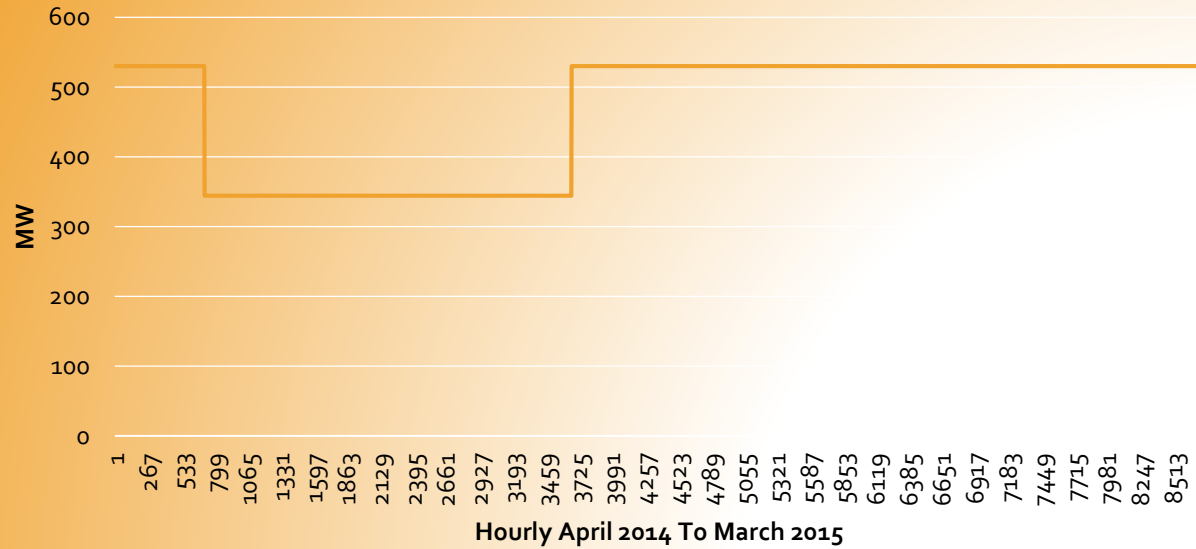
Stage 1 RPS Hourly Generation Stacked



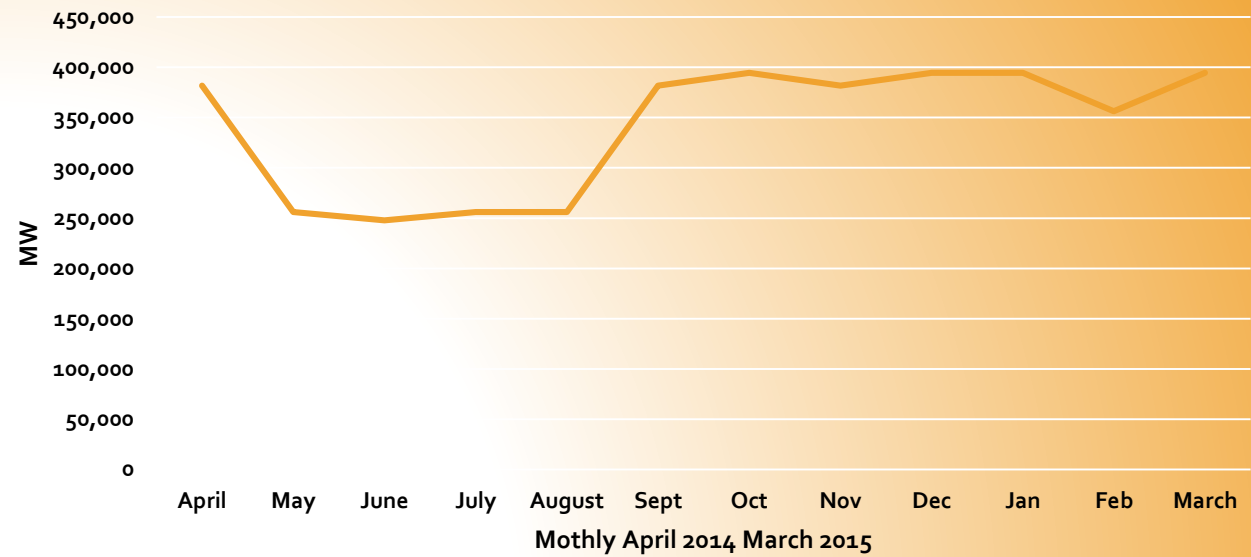
Total Demand BAU



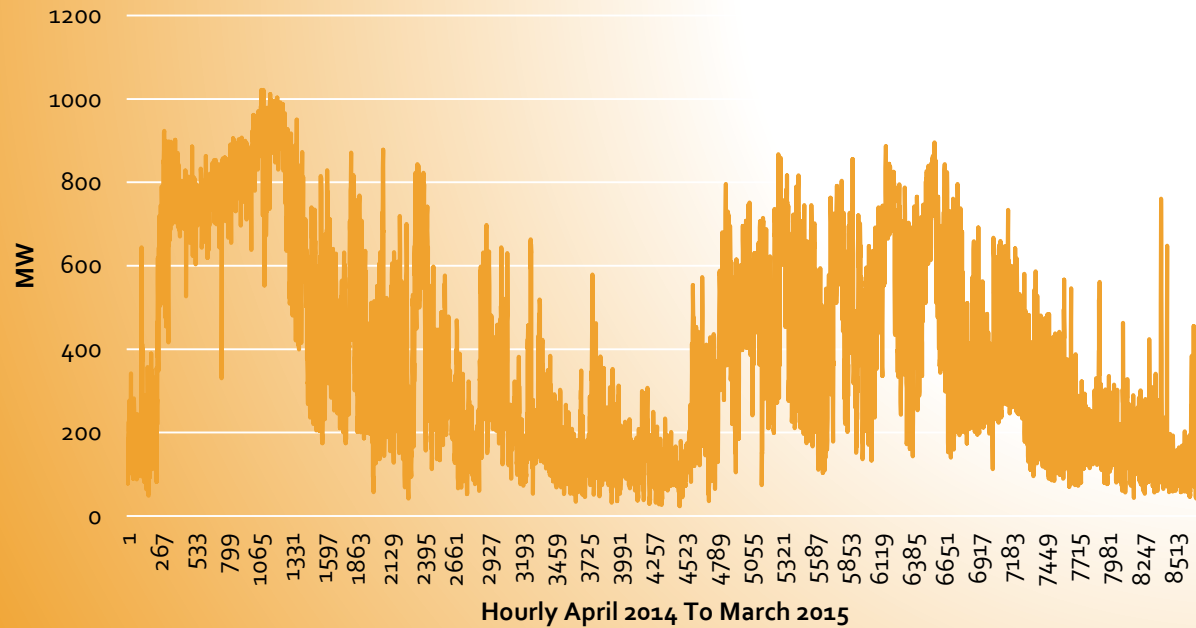
Baseload X



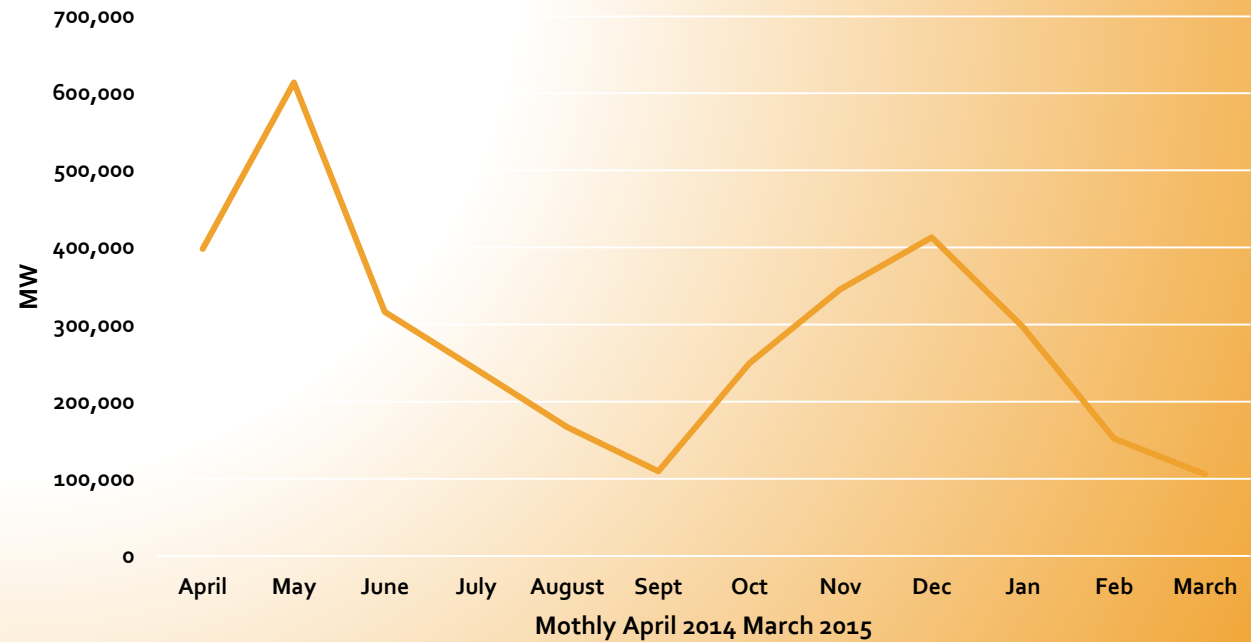
Baseload X



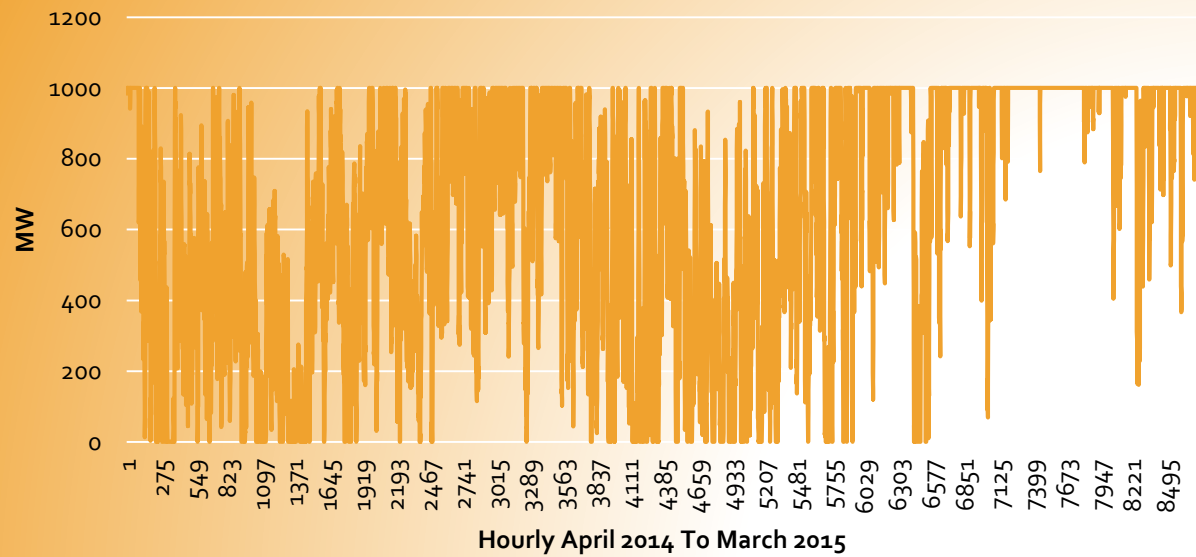
Hydro X



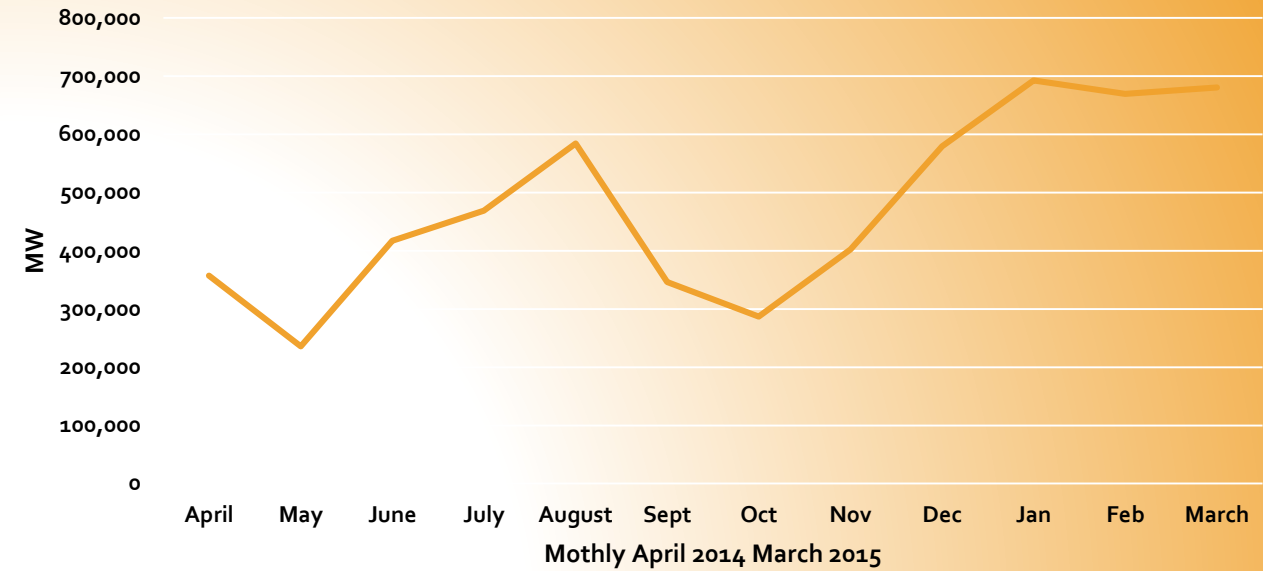
Hydro X



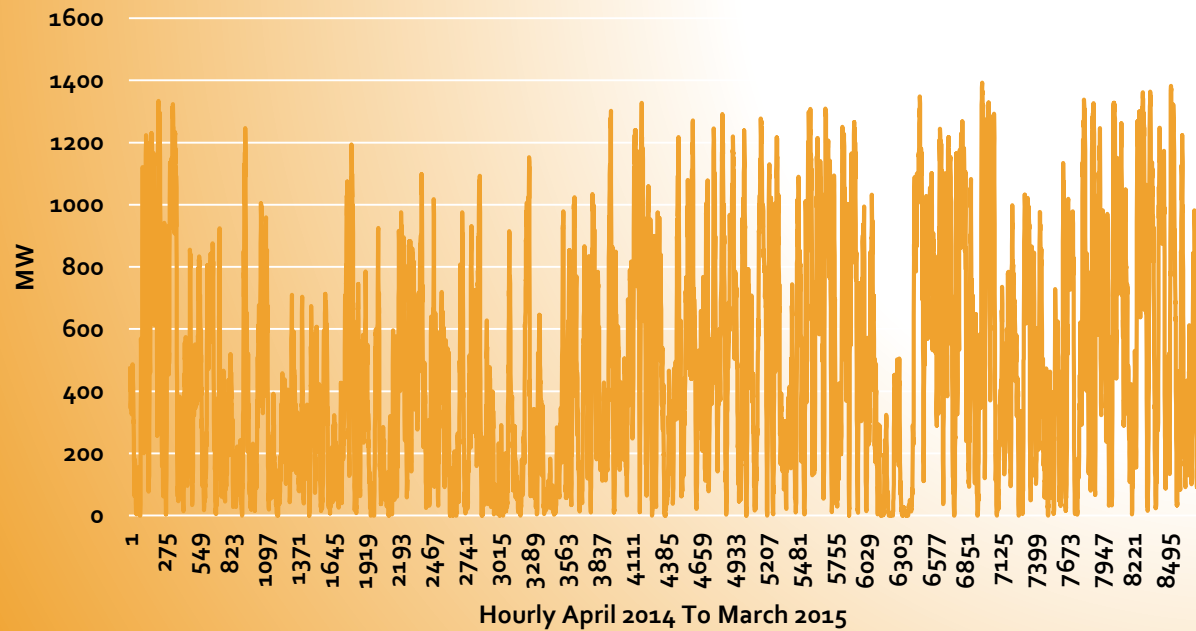
Other X HQ



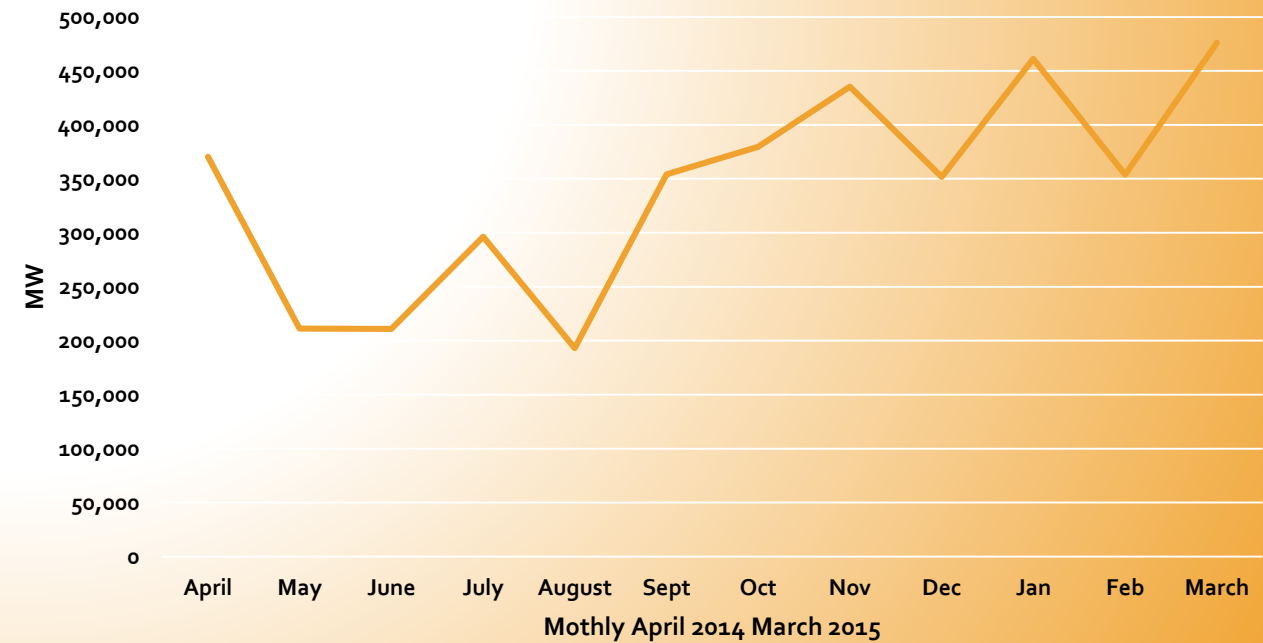
Other HQ X



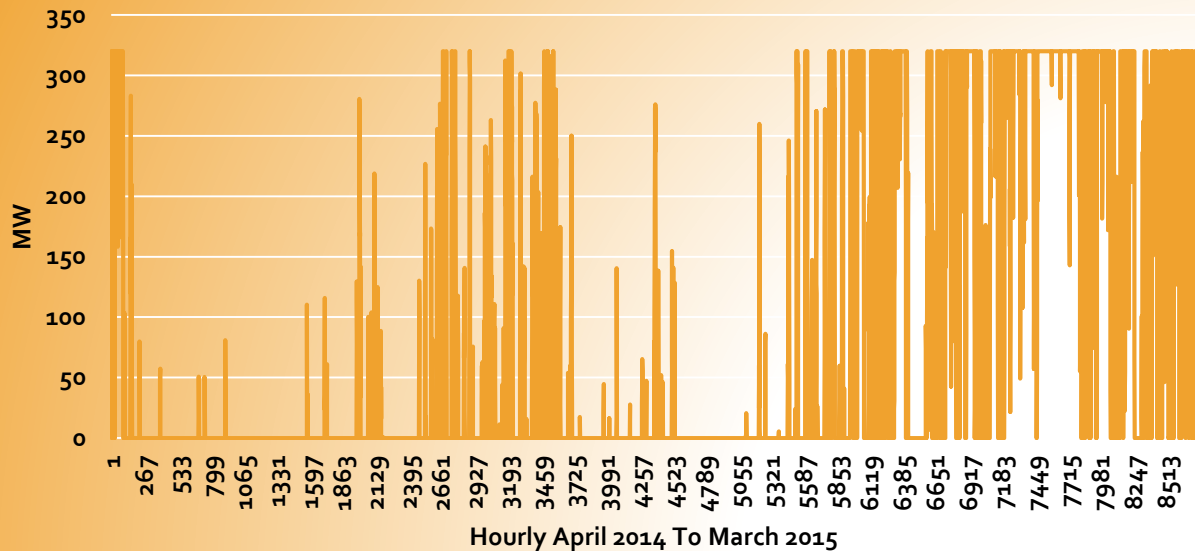
Wind X



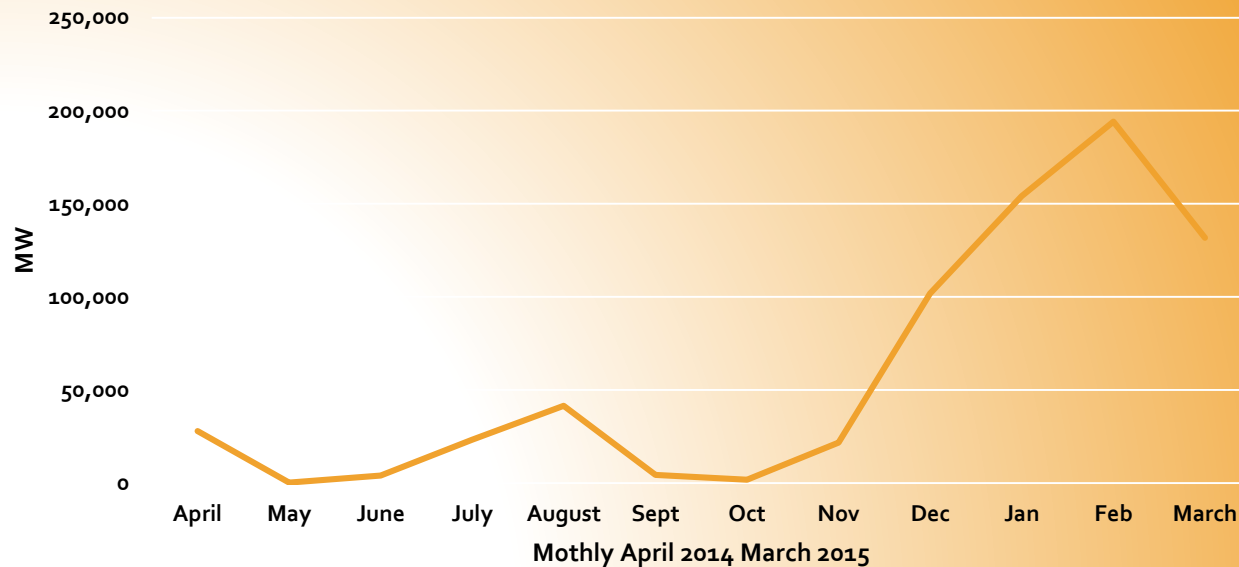
Wind X



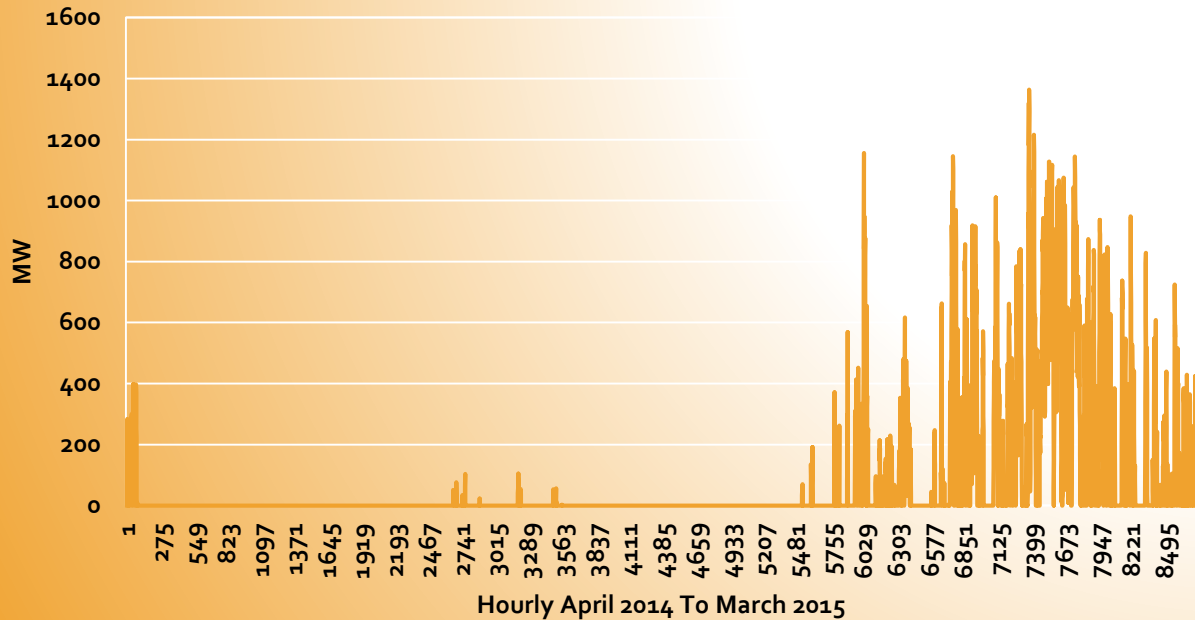
Other X Biomas



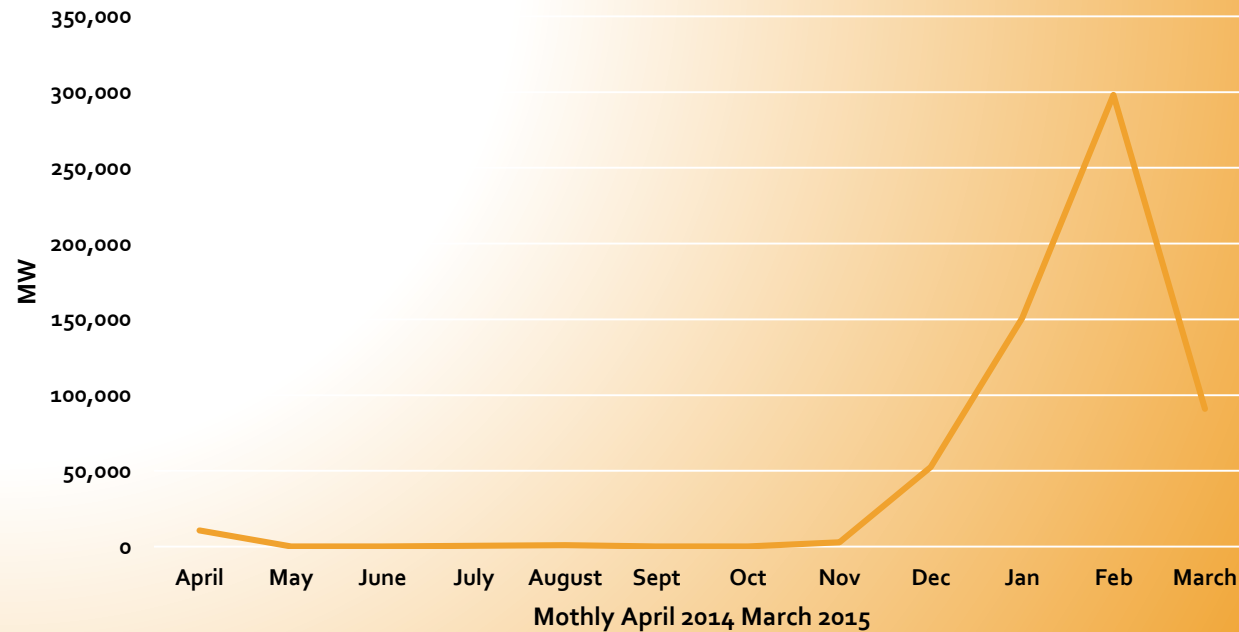
Biomass X



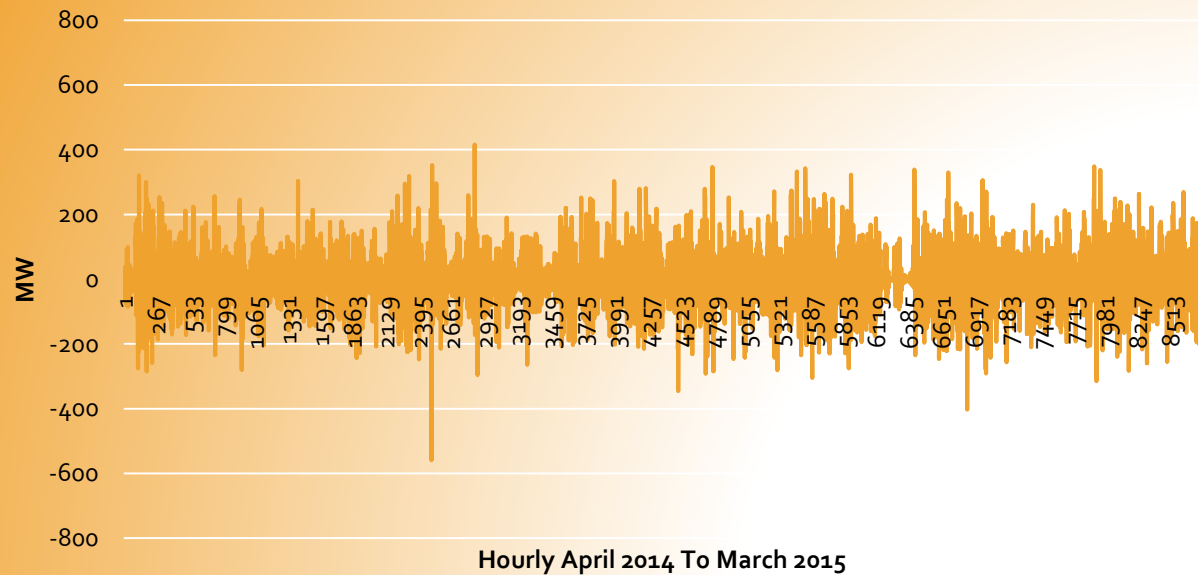
Other Fossil Fuels X



Other Fossil Fuel X

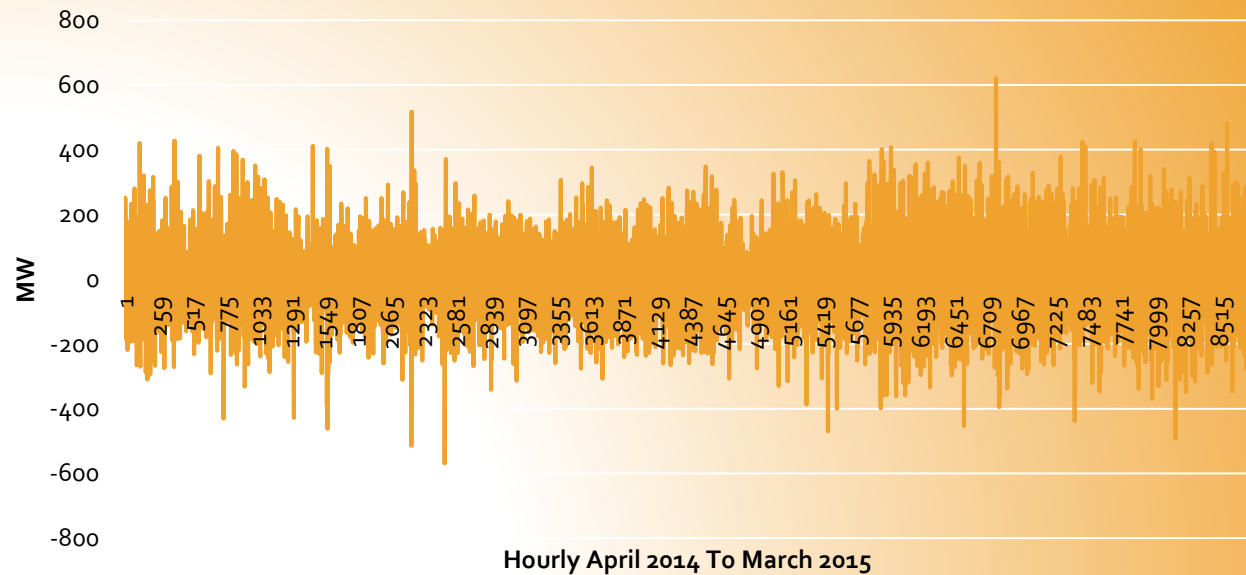


Wind Power Hourly Change



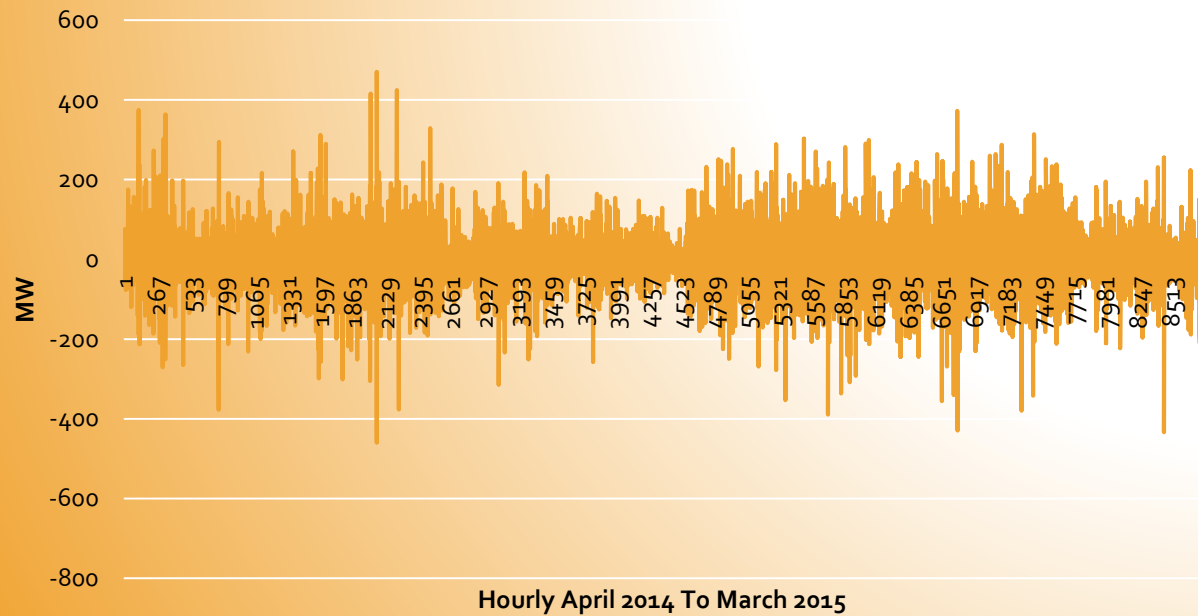
Hourly April 2014 To March 2015

Other X Hourly Change



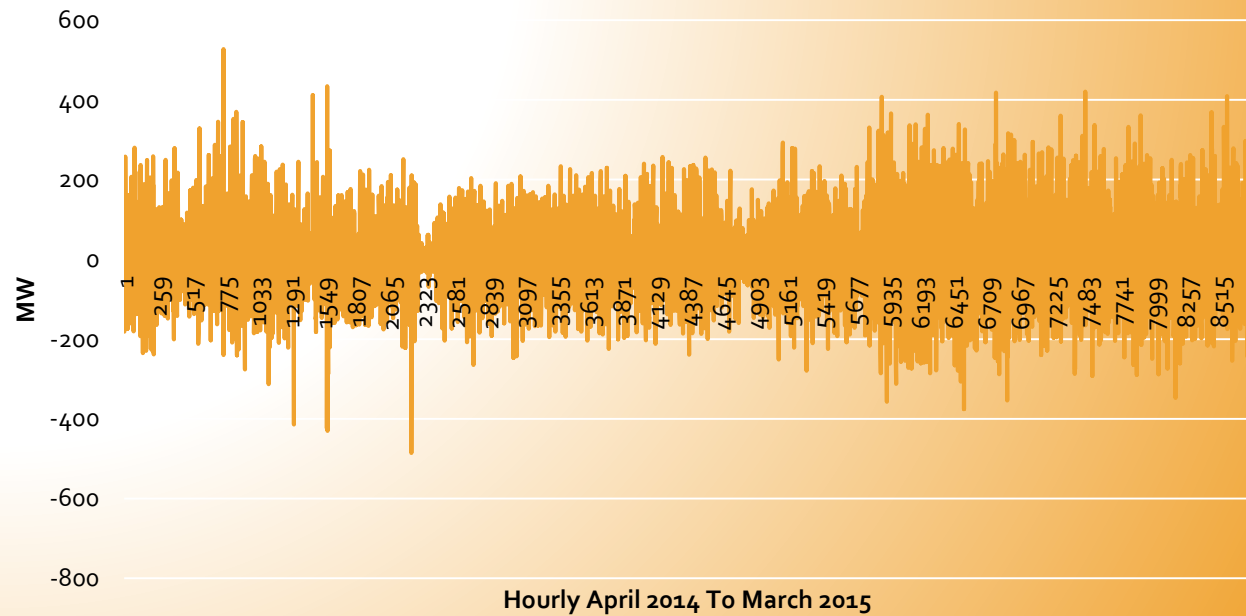
Hourly April 2014 To March 2015

Hydro X Hourly Change

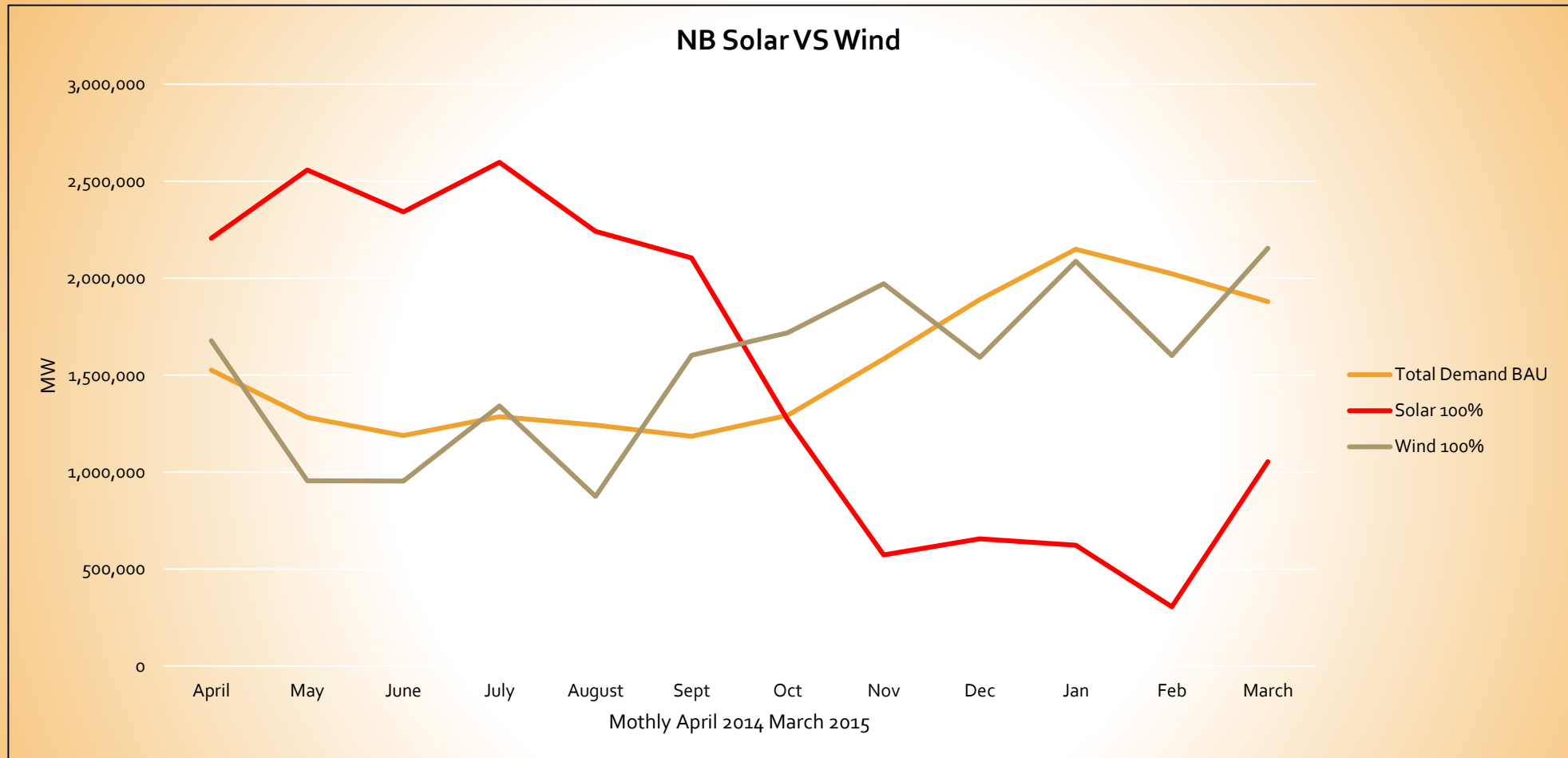


Hourly April 2014 To March 2015

Other Hourly Change BAU



Hourly April 2014 To March 2015



The above graph uses actual monthly Wind and Solar profiles scaled up to be 100% of our current usage. Please note that wind power closely matches our current energy usage while solar is opposite. It is much easier to integrated resources who's profiles closely match our usage. Hot climates generally will use more solar while colder northern climates more wind.

Hon. Donald Arseneault
Minister of Energy and Mines
PO Box 6000
Fredericton, NB, E3B 5H1
tyler.campbell@gnb.ca

Dear Minister and subsequent ministers of the Province of New Brunswick:

We are a group of 12 New Brunswick citizens randomly selected as part of a research project at the University of New Brunswick. The group deliberated over the weekend of October 3 and 4, 2015, to develop a 25-year electrical energy vision for the province.

We believe that there is a strong and immediate need for action on climate change and effort is needed toward the reduction of greenhouse gas emissions. Specifically, we are interested in the integration of renewable systems such as hydro, solar, wind, tidal, and biomass, while minimizing the use of non-renewable resources.

We respectfully present the following recommendations to maintain an affordable and renewable energy system, progressively built into the retirement of current assets over time.

- All major policy decisions regarding the future of the electricity systems should be open and transparent.
- Partnering and sharing assets with the Atlantic region (including options south of the border) will improve efficiency and reliability of the system.
- Grid reliability can be improved by including small sustainable systems to provide more flexibility.

The consensus of the committee is to establish pilot projects to implement these system changes, by setting up studies in the municipalities, including solar, wind, home-based energy systems, and consideration for electric cars (for example, the Halifax Solar City and Property Assessment Clean Energy program). We believe the benefits of this program will include employment, high skilled jobs, local training and will keep our youth in the province.

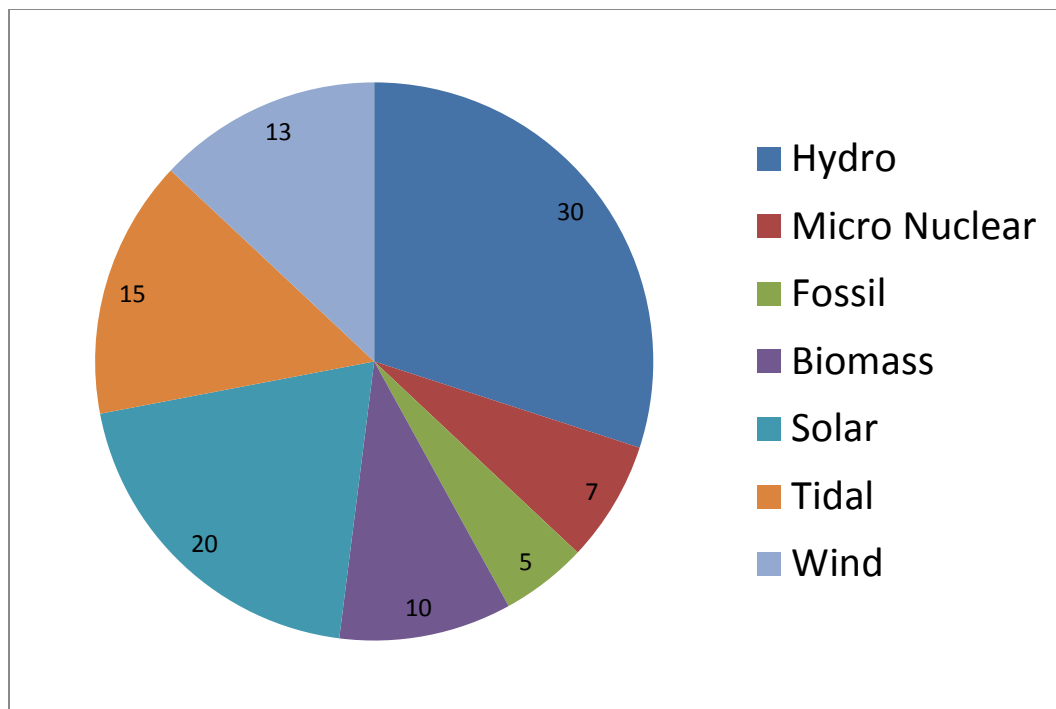
The size of the system will ultimately be affected by greater efficiency in the current system and electrification to support non-fossil fuel based transportation technologies. We also recognize there will be great gains made by energy saving technologies including reducing and shifting demand.

We have taken into consideration concerns for sustainability, climate change, cost effectiveness, and we are sensitive to the continuity and the reliability of the current electrical infrastructure in the Province of New Brunswick.

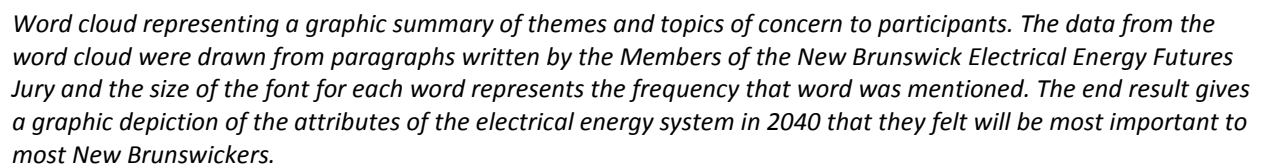
Sincerely,

The Deliberating Members of the New Brunswick Electrical Energy Futures Jury

cc: Gaeton Thomas, President and CEO, NB Power, gathomas@nbpower.com



Pie chart representing the consensus of the deliberating Members of the New Brunswick Electrical Energy Futures Jury on the 2040 fuel mix. The group began with a figure containing equal sized pie wedges for each of the seven categories of electrical energy generation and then negotiated this final graphic through a consensus process.





May 16, 2017

Mr. Gaëtan Thomas
CEO, NB Power
515 King Street
Fredericton, NB
E3B 4X1

Re: Comments on 2017 Integrated Resource Plan

Dear Mr. Thomas:

Thank you for the opportunity to provide input on NB Power's 2017 Integrated Resource Plan (IRP). The Conservation Council believes New Brunswick, and NB Power, have an important opportunity to create a clean electricity system in line with national and international climate change commitments, that improves the health and well-being of ratepayers, and that creates long-term sustainable jobs in our province. We believe we can achieve these objectives while maintaining reliability and managing rate impacts. Before summarizing the menu of options to consider, let's set the table by summarizing the context within which IRP planning is taking place.

Since the 2014 IRP, significant changes have occurred in the policy landscape with the 2016 national Pan-Canadian Framework resulting from the 2015 United Nations Paris Agreement being one of the most significant. NB Power must now explicitly plan for an electricity system operating under a nationally coordinated carbon price, as well as regulations aimed at significantly reducing greenhouse gas emissions intensity of coal-fired power plants. While questions remain with respect to how carbon pricing and coal-fired power plant regulations will be fully implemented, we know enough now to say that NB Power and the Province of New Brunswick should plan for a fossil-fuel free electricity system by 2030.

We also know from the response of New Brunswickers to the proposed sale of NB Power to Hydro Québec that ratepayers/citizens want their electricity produced in New Brunswick by New Brunswickers for New Brunswickers. Ratepayers/citizens also want reasonable power rates and electricity that is reliable. We know clearly from the 2017 ice storm on the Acadian Peninsula, as well as post-tropical storm Arthur, that reliability is not a certainty



with increasing exposure to extreme events and that power outages of a week or more is dangerous to public health.

NB Power argues that it is changing its culture to adapt to changing electricity market conditions, including the transition to significantly more electricity generated from smaller-scale, distributed renewable energy. Its commitment to Smart Grid technologies and to reduce and shift demand initiatives are positioned as evidence of cultural change within NB Power and an openness to developing a new business model. The Conservation Council is concerned that NB Power is not adapting quickly enough to changing conditions. We recommend an offensive, rather than defensive IRP, setting a clear direction toward a fossil-free electricity system by 2030.

Such a commitment would, for example, direct attention away from weakening proposed implementation of federal regulations affecting Belledune, and instead, would focus on transitioning the plant off coal by 2030 and the region toward a renewable, distributed and resilient electricity system in the Acadian Peninsula. Such an approach could ensure a just transition for Belledune workers, create jobs in Northern NB, and allow for federal-provincial partnerships that position our province, in the longer-term, to provide power in NB, for NB, produced by New Brunswickers.

We recommend that the IRP, should be positioned as an electrification strategy for the province, and include commitments to:

1. An economy-wide investment in energy efficiency through building retrofits in social housing, the residential, commercial/institutional/government (including municipal), and industrial sectors; and equipment and appliances. The goal would be to **advance NB Power's Reduce and Shift Demand objective of 609 MW by 2038 to between 2020 and 2025¹**.
2. **Accelerate investments in the Smart Grid** (the Energy Internet) to give the electricity system the capacity it needs to significantly increase the supply of renewable energy (aiming for 100% renewable). The Smart Grid is central to managing a more distributed energy system, as well as providing load balancing services to Nova Scotia, PEI and New England. The electrification strategy, or roadmap, can build on work completed under the Atlantic Energy Gateway Initiative and take advantage of new federal support aimed at identifying opportunities for regional electricity cooperation². Our electrification roadmap needs to be regionally focused, particularly because Nova Scotia will also need to reduce and then phase out the use of coal, and include a regional and long-term system investment plan (i.e. modernizing and

¹ <https://www.nbpower.com/media/102794/irpjuly2014-english.pdf>, p.128

² <http://www.acoa-apeca.gc.ca/eng/publications/ResearchStudies/Pages/Home.aspx#aeg>; Federal budget 2016 provided \$5 million over two years to engage provinces and utilities in assessing regional electricity cooperation opportunities

integrating regional transmission networks, as well as regional targets for renewable energy to replace the loss of coal-fired generation. Acceleration of Smart Grid investments could advance installation of additional renewable energy technologies along with installation of next generation meters, hot water heaters and storage devices using telecommunications systems to manage a distributed load (including micro-grids; beyond what is already currently funded).

3. Expand regional investment in renewable energy, including accelerated solar rooftop targets. **A stretch target for New Brunswick could be 200,000 kilowatts (kW) of cumulative installed commercial and residential solar power by 2025 (100,000 kW each for residential and commercial, grid connected and off-grid), with NB Power working with suppliers to develop home equity loan and/or leasing programs, and power purchase agreements aimed at lowering payback periods from the current 13 to 15 years to between 5 and 10 years.**³
4. Accelerated scale-up of electricity transportation infrastructure and incentives to increase the sale of electric plug-in and low-emission hybrid vehicles. Québec has a legislated target of putting 100,000 electric vehicles on the road by 2020: that's about 1.2% of the total fleet of over 8 million vehicles registered or about 16% of new car sales in 2020.⁴ A similar scheme for New Brunswick would **set a goal of 10,000 electric vehicles on the road by 2020, with the number of electric car sales increasing each year so that by 2030 there would be 140,000 to 150,000 electric vehicles on the road.**⁵ A fossil-fuel vehicle driven 20,000 kilometres a year generates about 5 tons of greenhouse gases. A rough estimate of the emissions reduction potential is at least 500,000 tonnes.⁶
5. Community economic development and worker transition investments to maximize job creation from energy efficiency and renewable electricity investments.

Electricity-related investments would be complemented by a provincial investment plan. To see the Conservation Council's full climate action plan, go to: <http://www.conservationcouncil.ca/our-programs/climate-and-energy/>.

³ <https://www.nbpower.com/media/169863/dsm-plan-2016-18.pdf>; represents stretch target for achievable potential

⁴ <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ58a-eng.htm>; assuming at 50,000 new car sales a month = 600,000 a year so 100,000 electric vehicles in 2020 would be equivalent to at least 16% of all new sales

⁵ Assuming at 5,000 new car sales a month or 60,000 a year that 16% would be 9600 vehicles so rounding to 10,000

⁶ Assuming 2017: 1k, 2018: 2k, 2019: 3k, 2020: 4k (cumulative = 10k), 2021: 6k, 2022-2030: 8k rising to 20k/year for a total of 140,000 to 150,000 electric vehicles on the road and declining greenhouse gas reductions from fleet fuel economy standards.

We also strongly encourage NB Power to more actively consider risks from climate change impacts in its IRP. Our infrastructure and our capacity to respond to these events has not kept pace with the changes in our climate. Individual extreme events need to be understood in the context of a rapidly changing climate. Scientists working on climate change adaptation increasingly urge a move from short-term emergency response to extreme events. Instead, we are being encouraged to move toward long-term risk reduction and preparedness. This change in focus opens the door to considering and planning for the long-term resiliency of New Brunswick communities and families. Solutions with the longer-term lens in focus encourage us to integrate climate change mitigation and climate change adaptation approaches.

The recent ice storm provides an opportunity think about how we can integrate mitigation and adaptation to climate change into electricity planning. We can develop a regional energy plan for the Acadian Peninsula that brings low to non-emitting sources (from wind, solar, hydro, biomass, if sustainably produced) of electricity and Smart Grid/micro-grid infrastructure into the system that also improves resiliency to extreme events. Priority for installation of new energy resilient technologies could be First Responder buildings like fire halls, city halls, and community centres used as warming centres. The shift to energy resiliency would also involve job-creating retrofits of homes in the region (and throughout the province) to improve energy efficiency and to install renewable energy and other modern technologies. A system-based assessment of options would ensure a sustainable energy system for, in the case of this example, the North that situates solutions within our climate change mitigation, as well as adaptation objectives.

The Conservation Council urges NB Power to advance an electrification strategy in its 2017 IRP that would form the basis of federal-provincial negotiations on how carbon pricing revenue and infrastructure dollars could be allocated within the electricity sector. A progressive and forward-looking IRP has the potential to satisfy the requirements for a reliable, cost-effective and sustainable electricity system based on a new model of delivery and financial operations.

We look forward to collaborating with you to make this vision a reality.

Sincerely,

A handwritten signature in black ink that reads "Lois Corbett". The signature is written in a cursive, flowing style.

Lois Corbett
Executive Director