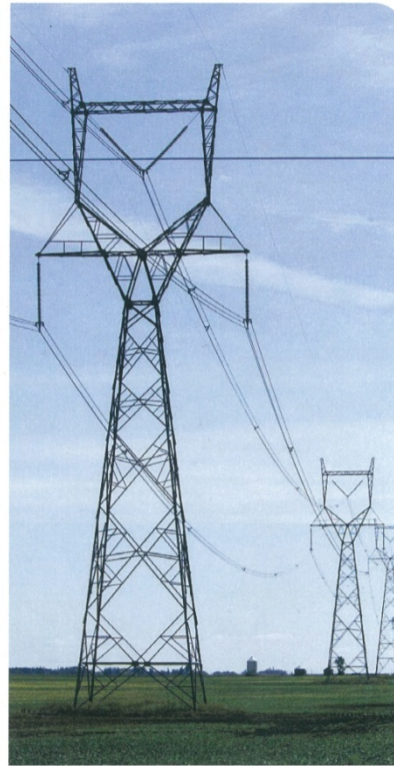


Needs for and Alternatives to Manitoba Hydro's Preferred Development Plan



Independent Expert Consultant
Socio-economic Review
Key Observations



Needs for and Alternatives to Manitoba Hydro's Preferred Development Plan

SOCIO-ECONOMIC SCOPE OF WORK

NFAT Scope of work

- Critical Analysis of socio-economic impacts and benefits of PDP and alternative plans:
 - Economic impact assessment modeling (GDP long term and short term induced employment benefits)
 - Determine gross financial provincial benefits by examining the costs and benefits over the life of the project
 - Determine Canadian benefits
 - Northern and aboriginal community based impacts in terms of employment opportunities, incomes, community tax base, skills development and community business opportunities
 - Community access improvements and related health, education and cultural benefits
- Consider economic displacement impacts and effects on consumer spending
- Identify and evaluate socio-economic impact of five key alternatives scenarios
- Provide a high level analysis on how other Canadian jurisdictions maximize provincial economic benefits from the large scale resource project development

Scope of work objectives

The scope of work was intended to:

- Provide a **high level review** of approach, methodologies and findings of the NFAT business case and EIS submissions
- Confirm **reasonableness of results**
- **Benchmark against best management practices in Canada**



NFAT business case and EIS reports referenced to determine socio-economic effects

Economic

- **Economic Impact Analysis**
 - Provincial Input Output Modeling
 - Standard for estimating project construction/operational benefits
 - A static tool based on proposed construction costs calculates:
 - Employment (person years)
 - Contributions to GDP
 - Benefits to province and rest of Canada
 - Federal and provincial taxes

Social

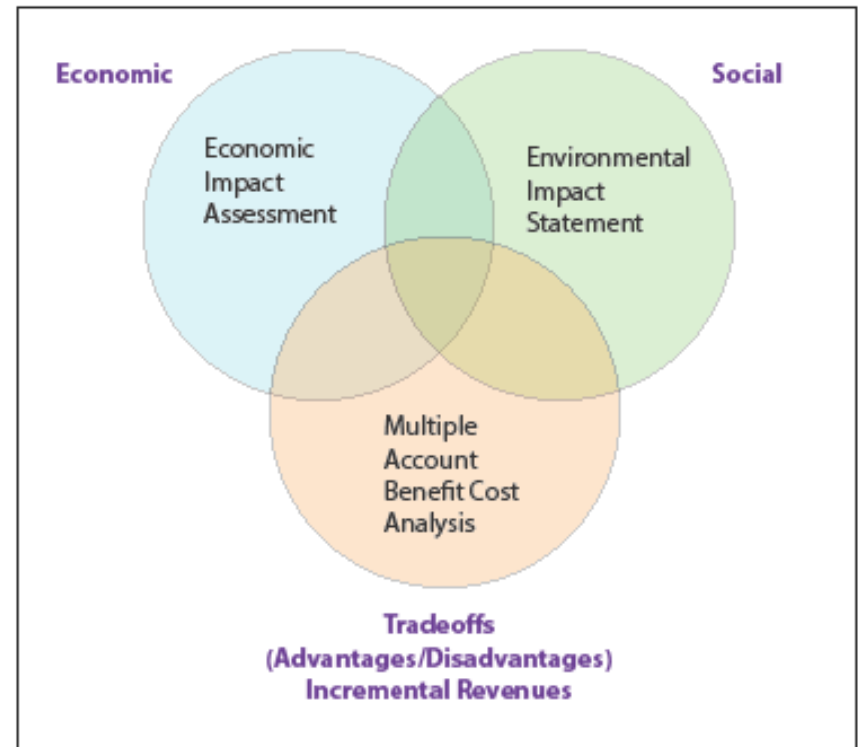
- **Environmental Impact Statement**
 - Socio-economic environment, resource use and heritage resources:
 - Section 3: Economy
 - Section 4: Population, Infrastructure and Services
 - Section 5: Personal, Family and Community Life
 - Reference to Environmental Management Plans (EMP's), specifically Socio-economic Environmental Management Plan (SEMP)
 - Adverse Effects Agreements

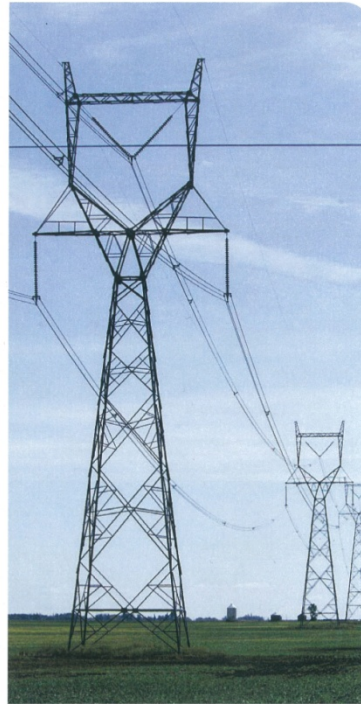
NFAT business case and EIS reports referenced to determine socio-economic effects

Multiple Account - Benefit Cost Analysis (MA-BCA)

- MA-BCA
 - Standard approach to evaluate program decisions
 - Highlights advantages/disadvantages
 - Enables trade offs to be stated
 - Incremental benefits
 - Broader non-monetized societal issues are included
 - Focus less on the numbers but on the trade offs

Interrelationships





Needs for and Alternatives to Manitoba Hydro's Preferred Development Plan

ECONOMIC IMPACT ASSESSMENT

Interpreting the results of the Input Output Model (IOM) for the various plans

Approach

- Manitoba Bureau of Statistics Input Output Model (MH IOM)
- PDP compared to Simple Gas Turbine and Combined Gas Turbine projects
- Varying levels of construction cost detail were provided
 - PDP (41 input commodity categories)
 - Simple Gas Turbine and Combined Gas Turbine (6 input categories)
- IOM's are linear and therefore scalable

Observations

- Scaling the gas options to match the Keyask Generating Project (KGP) construction costs (\$2.2 b) enables a comparison of economic impacts
- The KGP (and therefore the PDP) creates significantly greater economic benefits than that of the gas turbine projects (based on relative multipliers) (2x the employment)
- **The PDP due to its capital intensive nature and related construction costs creates the greatest benefits**

Interpreting the Results of the Input Output Model for the PDP

Approach

Reviewed key steps required to populate the IOM model

1. Construction cost inputs
2. Allocation of construction costs into input output commodity categories
3. Remove expenditures with no provincial economic benefit (leakage)
4. Margins (the difference between total sales and costs of goods sold- the wholesalers and retailers are viewed as intermediaries between suppliers and consumers)
5. Treatment of labour

Observations

- Construction costs based on class 2 and class 3 estimate AAECI for Keeyask
- Allocated cost input data in to IO commodity expenditure categories
- Manitoba Hydro removed expenditures with no provincial economic benefit and identified leakages (also reflected in the treatment of labor)
- Using such an approach:
 - **Treatment of many purchases as leakages may underestimate the contributions to the provincial economy and overstate the contributions to the Canadian economy**
 - **Key issue is how margins were treated is not known (e.g. transportation, wholesaling and taxes)**

Canadian vs. Provincial benefits

Analysis

- Generally accepted principle of IOM is that the direct benefits are incurred in the jurisdiction in which the project is developed
- We compared the MH IOM results with the Statistics Canada Interprovincial Input Output Economic Simulation (Stats Can) model, which uses the same data as the MH IOM
- Results presented in the main report (table 5)
- The key difference in approach is that the Stats Can model reflects typical interprovincial expenditure patterns in each industry whereas the MH IOM uses specific project expenditures
- Both approaches are reasonable

Observations

- The Stats Canada model results suggests significant difference between Manitoba and rest of Canada benefits based on structure of the Manitoba economy according to the Stats Canada model.
- Treatment of margins remains the issue
- **Overall however the results confirm the PDP creates the greatest economic benefits**
- **Stats Canada model results would suggest greater benefit to Manitoba**



Example: General Civil Contractor Award

A \$1.4 billion general civil contract has been awarded to a limited partnership between Bechtel Canada Co., Barnard Construction of Canada Ltd. and Ellis Don Civil Ltd.

Observations

Economic Impact Assessment

- Overall assumptions by Manitoba Hydro in the preparation of the economic impacts for construction and operation are **reasonable and the results (totals) derived are reasonable**
- The Stats Canada IOM model results suggest that there is likely a greater proportion of Manitoba benefits than rest of Canadian benefits, as the model reflects typical patterns in each industry rather than project specific expenditures
- The Stats Canada model does not consider local knowledge nor does it benefit from a review of recent contract awards (Wuskwatim).
- It is believed that the benefits to Manitoba are understated as the margins embedded in the purchase cost of these goods and services may not have been attributed to Manitoba producers whom may be providing services such as transportation or wholesaling.

Gross provincial benefits over the life of the project

Economic life

- Economic life considers 78 year life cycle
- Economic life of hydroelectric facilities is greater than the those other resource options (78 years hydro, 30 years gas)
- Past the “economic life”, literature regarding dam safety (provided maintenance and rehabilitation is maintained), suggests that dams continue to operate past 100 years and the concrete can last 150-200 years whereas the hydro mechanical parts must be replaced sooner

Key issue:

Bequest value

- Past the economic life dams continue to create revenues and values to provincial utility corporations
- Referenced as “bequest value”



- The Grand Anicut dam was built on the Cauvery River in the 2nd century. This massive structure was later reinforced by the British. Grand Anicut is believed to be one of the oldest water-diversion structures in the world that continues to be functional

Northern and aboriginal community based impacts of employment, incomes, community tax base, skills development

- The review was based in part on TyPlan's experience in developing benefit agreements with First Nations with other hydro projects and an independent review of similar projects, including:
 - Eastmain 1-A Rupert Diversion (Quebec Hydro)
 - Churchill Falls (Nalcor)
 - Site C Clean Energy Project BC Hydro
- It is noted that Manitoba Hydro reviewed other major projects in determination of their approach to best practices including:
 - Mackenzie Valley Gas Pipeline (Imperial Oil)
 - Eastmain 1-A Rupert Diversion (Québec hydro)
 - Churchill Falls (Nalcor)

Northern and aboriginal community based impacts of employment, incomes, community tax base, skills development

Best management practices

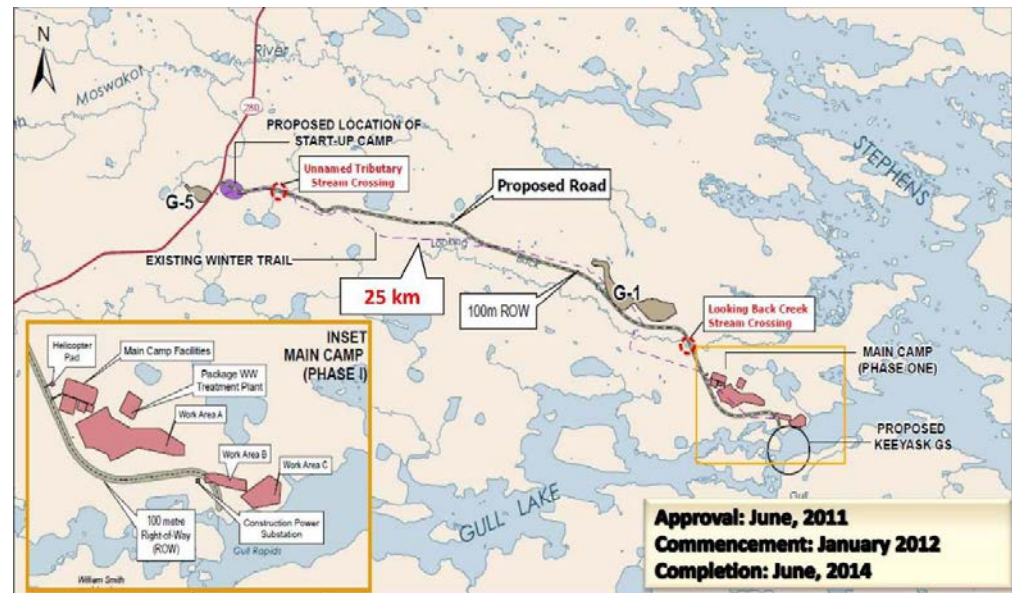
- Proactive approach to engagement
- Establishment of benefit agreements
- Community ratification and support
- Equity or ownership
- Identification of skill sets training, education and jobs
- Linkages with federal and provincial agencies
- Clear mandates and performance measures
- Provision of management and administrative support
- Pilot projects
- Post project funding opportunities

Manitoba Hydro's approach and direction

- It is noted Manitoba Hydro, internally focused on lessons learned and other Canadian benchmarks:
 - Wuskwatim Generating Project
 - Benchmark of the Lower Churchill Project
 - Eastmain 1A Rupert Diversion Project
- **Manitoba Hydro has exceeded the best management practices evaluated**

Key initiatives pursued by Manitoba Hydro to optimize benefits

- The Joint Keyask Development Agreement (JKDA) signed by four Cree First Nations, outlining:
 - Governance and ownership
 - Training and employment targets
 - Contracting (direct contract awards)
 - Keyask infrastructure project
 - Operational jobs
 - Etc.
 - (8 years)
- Development of the Keyask Infrastructure Project (KIP) represents a pilot project in which education, training is subsequently implemented by First Nations in preparation of the Keyask Generating Station construction



Northern and aboriginal community based employment, incomes, community tax base, skills development: Key observations: Lessons learned and project monitoring

Lessons Learned

- Ability to adapt and improve agreements via lessons learned (Wuskwatim)
- Effective implementation and on-going monitoring of:
 - Agreements
 - Partnerships
 - Performance measures
 - Training
 - Employment (retention)
 - Etc.

Monitoring

- Monitoring will be implemented via two committees:
 - **Advisory Group on Employment (AGE)**
 - **Construction Advisory Committee (CAC)**
- In addition standard EIS practices include a series of construction management plans be established inclusive of:
 - Socio-economic Monitoring Plan (SEMP)

Community access improvements related to health, education and culture

Reports

- Keyask Generation Project (EIS) Supporting Volume Socio-economic Environment, Resource Use and Heritage Resources
- Appendices:
 - Section 3: Economy
 - Section 4: Population Infrastructure and Services
 - Section 5: Personal Family and Community Life
- Standard procedural and regulated EIS format in which provides a comprehensive summary of:
 - Environmental setting
 - Environmental effects assessment
 - Mitigation
 - **Residual project effects**

Adverse Effects Agreements

- Designed to address and resolve all known and foreseeable project adverse effects
- Signed between Manitoba Hydro and KCNs

Health

Addressed in Section 5 Personal, Family and Community Life

Key valued environmental components (VEC's) identified:

- Community governance, goals and plans
- Community health
- Mercury and human health
- Public safety and worker interaction
- Travel access and safety
- Aesthetics

- Approach taken follows the standard methodology of an environmental impact assessment
 - Environmental setting (baseline)
 - Effects assessment
 - Mitigation
 - Residual effects assessment

Education

Addressed in Section 3: Economy of the EIS

Review is based on background research on other projects:

- Mackenzie Valley Gas Pipeline (Imperial Oil)
 - Eastmain 1–A and Rupert Diversion (Quebec Hydro)*
 - Lower Churchill Falls Project (Nalcor)
 - Recent experience with Wuskwatim
- Key valued environmental components (VEC's) identified:
 - Employment and training
 - Business opportunities
 - Income (construction and operation)
 - Cost of living
 - Resource economy
 - Joint Keeyask Development Agreement

Culture

Addressed in Section 5: Personnel
Family and Community Life

Key valued environmental components
(VEC's) identified:

- Community governance, goals and plans
- Community Health
- Mercury and Human Health
- Public Safety and worker interaction
- Travel access and safety
- Aesthetics

- Addressed via Adverse Effects Agreements signed with all Keeyask Cree Nations and Joint Keeyask Development Agreement (JKDA)

- In regard to community infrastructure development for housing, community centre development etc. in Canada is the responsibility of Indian and Northern Affairs Canada, not Manitoba Hydro



Community access improvements related to health, education and culture: Global perspective

Hydropower Sustainability Assessment Protocol

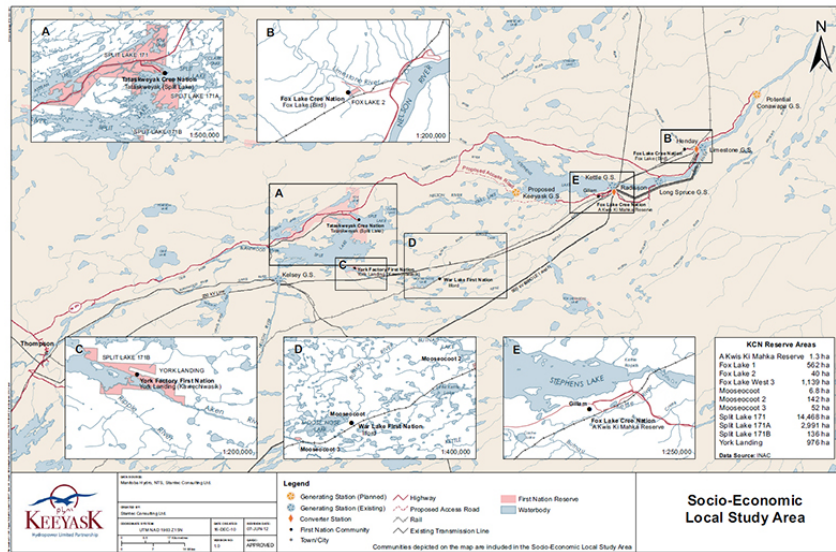
- The KHLP third party review: Hydropower Sustainability Assessment Protocol (based on the Preparation Tool of the Hydropower Sustainability Assessment Protocol) that confirmed that Keeyask project
 - meets or exceeds basic good practice in all of the 22 categories studied
 - meets proven best practice on 16 categories

Human Health Risk Assessment (HHRA)

- Based on Health Canada and World Health Organization (WHO) and United States Environmental Protection Agency (USEPA)
- The Habitat Health Impact Consulting report undertaken concludes:
 - “The approach to community health effects in the Keeyask EIS closely parallels HIA, and addresses a broad range of associated health issues and exemplifies the inclusion of stakeholders in the EIA/HIA process. While some small gaps remain in the assessment of health impacts and mitigation strategies, the overall quality of the assessment of community health is high”

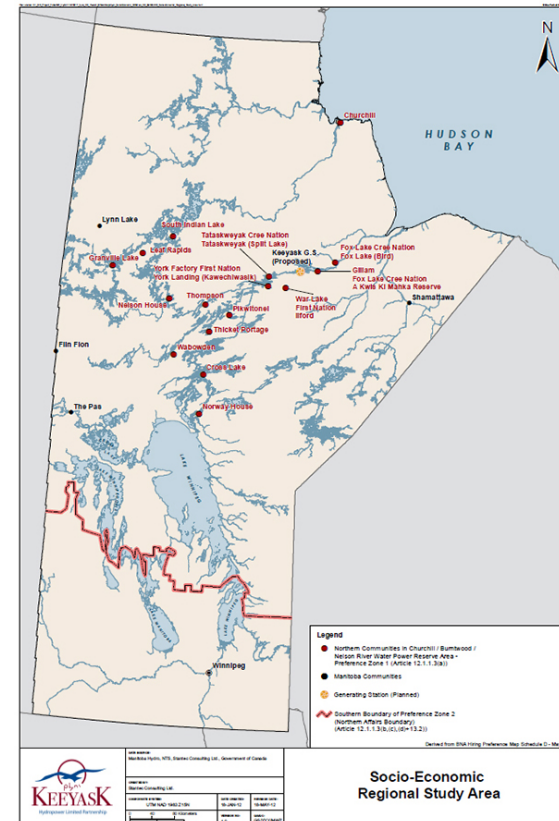
Key issues: Socio-economic local study areas, regional study areas

EIS Local Study Area



The project has the potential to affect in a material way the economy of the local study area communities and to a lesser extent the economics of other communities located in the regional study area

EIS Regional Study Area



On-going monitoring Socio-economic management plan (SEMP)

Monitoring plan

Monitoring Program	Construction ¹									Operation															
	Year(s)																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18-25	26-35						
Employment and training	•	•	•	•	•	•	•	•	•																
Business purchases	•	•	•	•	•	•	•	•	•																
Business KPIs (Thompson, Gillam and KCNs communities) in Yr 3 or 4			•	•																					
Business – KPIs with managers of DNCs				•					•																
Labour income	•	•	•	•	•	•	•	•	•																
Population trends (Gillam and KCNs communities)	•	•	•	•	•	•	•	•	•																
Population trends - Gillam										•	•	•	•												
Housing (one time set of KPIs in KCNs communities – exact timing to be discussed at MAC)				•	•																				
Infrastructure and services – KCNs communities (one time set of KPIs at peak workforce)		•	•																						
Road-based travel on PR 280	•		•		•		•		•																

Monitoring Program	Construction ¹									Operation															
	Year(s)																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18-25	26-35						
Culture and spirituality (worker family survey of KCNs workers)			•																						
Mercury and human health – country food survey and revised HHRA every 5 years after peak mercury levels reached (timing to be confirmed)									•					•				•	•						
Mercury and human health – voluntary mammal, waterfowl and plant sampling ²									•	•	•	•	•	•	•	•	•	•	•						

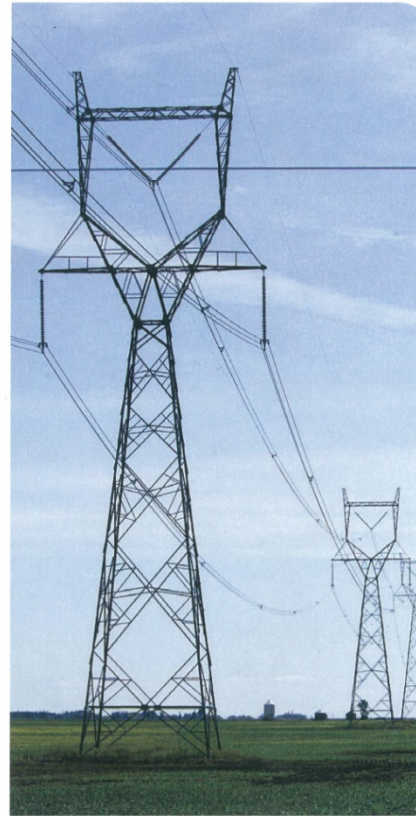
• = Economic
 • = Population, infrastructure and services
 • = Personal, family and community life
 • = Reporting product

¹ The construction phase is treated as the period that the access gates will be in-service up to the conversion of the access roads to the provincial highway system.
² Community-based voluntary sampling of waterfowl and plants is encouraged; samples will be tested for mercury at accredited labs in Winnipeg. Mammal testing will be undertaken under the Terrestrial Environment Monitoring Plan on an annual basis until peak mercury levels are reached and then every 3 years until mercury levels return to pre-impoundment conditions.
 Note: Fish from Gull and Stephens lakes will be monitored under the Aquatic Environment Monitoring Plan and results will be incorporated into the updated HHRA reports and communication products.

Observations

Community access improvements related to health, education and culture

- Issues identified based on discussions with affected parties, past experience and inclusive of traditional knowledge
- A Cree world view approach was taken
- Adverse effects agreements designed to address and resolve all known and foreseeable project adverse effects
- Specific to the environmental impact statement, the socio-economic environment resource use and heritage resources appendices were scoped and developed with project partners and included Sections 3, 4, and 5 and followed best practices in EIS documentation
- Independent third party reviews undertaken that supported in general the findings observed above

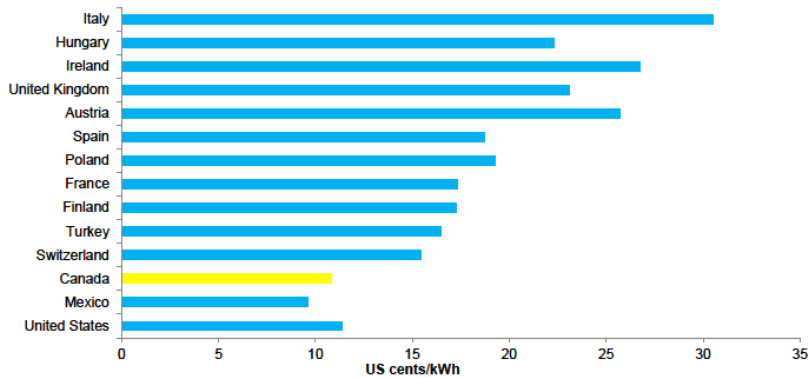


Needs for and Alternatives to Manitoba Hydro's Preferred Development Plan

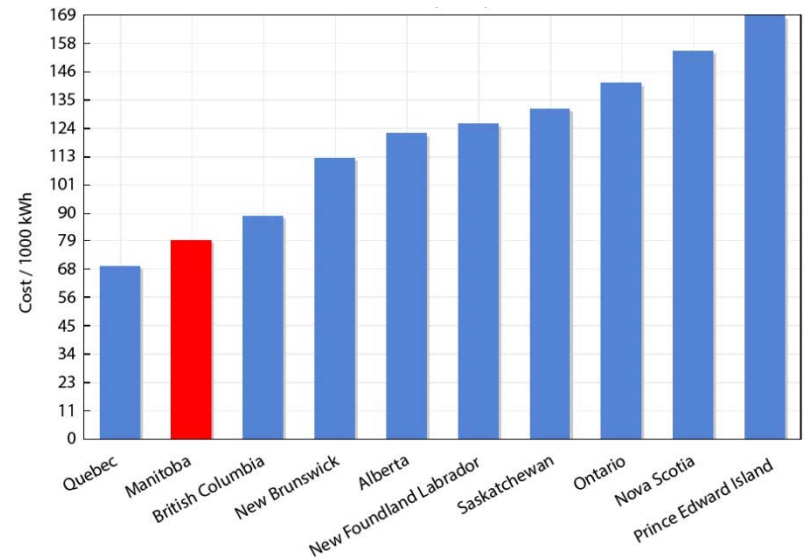
ECONOMIC DISPLACEMENT IMPACTS AND EFFECTS ON CONSUMER SPENDING

Review of Global, Canadian and Provincial utility rates

Global rates



Provincial rates



Current rate applications in Canada

- Pressure to increase energy prices is evident throughout Canada
 - Saskpower has applied for a 15.5 per cent over three years
 - BC hydro rates to increase 28 per cent over 5 years
 - Ontario Hydro bills to rise 42% in five years
 - Hydro Quebec rates to rise 4.3 % April 1st



Literature review of increased energy costs on consumers

The literature reviewed confirmed that the displacement effects of rate increases predominantly affect the poor and those with low incomes or fixed incomes

- The middle class and upper class are as affected as such costs are absorbed through greater disposable income
- Lower income, fixed income households and poor are most affected

Energy efficiency and reduction initiatives

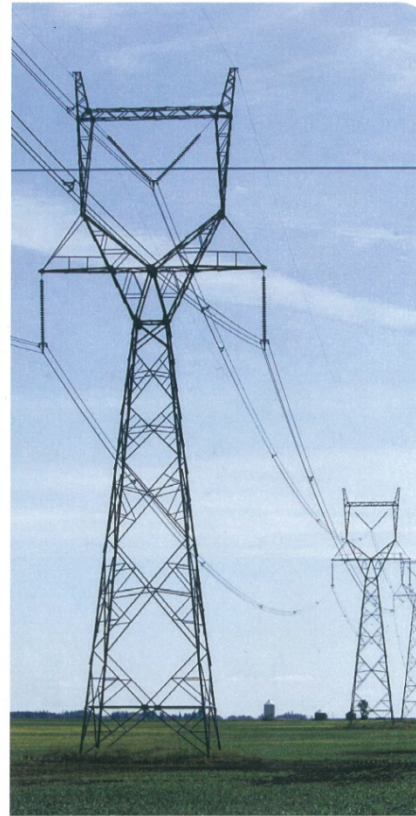
- The literature suggests that the best means of mitigating such affects on those most affected will be to aggressively pursue energy efficiency and reduction initiatives (demand side management and power smart programs)
- While Manitoba Hydro is known for such initiatives and programs:
 - Affordable energy program
 - Power Smart and First Nations
 - Refrigerator replacement programcontinued emphasis on such programs (and performance measures specific to key impacted groups) is suggested
- Optimizing demand side management and Power Smart programs will be critical moving forward to manage impacts to rate payers



Observations:

Economic displacement impacts and effects on consumer spending

- Canada exhibits one of the lowest utility rates globally
- Manitoba, Quebec, British Columbia have the lowest rates in Canada; presumably from historic investments in hydro projects
- Rates are expected to increase substantially over the next decades
- The literature suggests energy efficiency initiatives (DSM/Power Smart) are the solutions
- Key impacted socio-economic sectors are low income households and those on fixed income regardless of location
- Key issue is that success will be all about implementation and monitoring of specific programs



Needs for and Alternatives to Manitoba Hydro's Preferred Development Plan

SOCIO-ECONOMIC IMPACT OF KEY ALTERNATIVE SCENARIOS

Multiple account- benefit cost analysis

- Multiple Account Benefit Cost Analysis builds upon traditional cost benefit analysis
- MA-BCA is a standard method to assess net benefits of alternatives plans, as it recognizes and acknowledges non monetized advantages/disadvantages to calculate the bottom line.
- It also provides incremental benefits over time

MA-BCA accounts include:

- Market valuation
- Manitoba hydro customer account
- Manitoba government account
- Manitoba economy account
- Social account

•Source Wikipedia



Market valuation

- This account assesses the net benefit of cost of the preferred and alternative plans to Manitoba Hydro and its project partners.
- Quantifies **net incremental revenues** generated by surplus electrical supply relative to the incremental capital and operating expenses incurred, based on a net present value
- Key assumption is the discount rate utilized
- A rate of 6% has been used in the NFAT review that reflects the social cost of capital. Supporting references suggest that the social cost of capital can range from 5-7.3%
- Rate is reasonable



Manitoba hydro customer

- Account assesses the consequences of the alternative plans for Manitoba hydro rate payers
 - PDP is expected to result in a rate increase over the short and longer term to meet the 75:25 debt/equity ratio by the 20th year of the planning period (2031/2032)
 - Projected cumulative rate increase for the PDP would be 108% equating to a rate increase of 3.95% annually
 - Projected cumulative rate increase for the all gas plan and small interconnection would be 90% cumulative and 3.4% to 3.5 % increase annually
 - Projected cumulative rate increase for Keeyask but no interconnection at 92%, a 3.4% to 3.5% annual increase
- The key difference in the plans is that higher rates would be needed in the short to medium term with the PDP to cover the 75:25 debt ratio. After the debt ratio is achieved in year 20 there would be reduced inflationary pressure on costs. Conversely, lower rates increases would be required



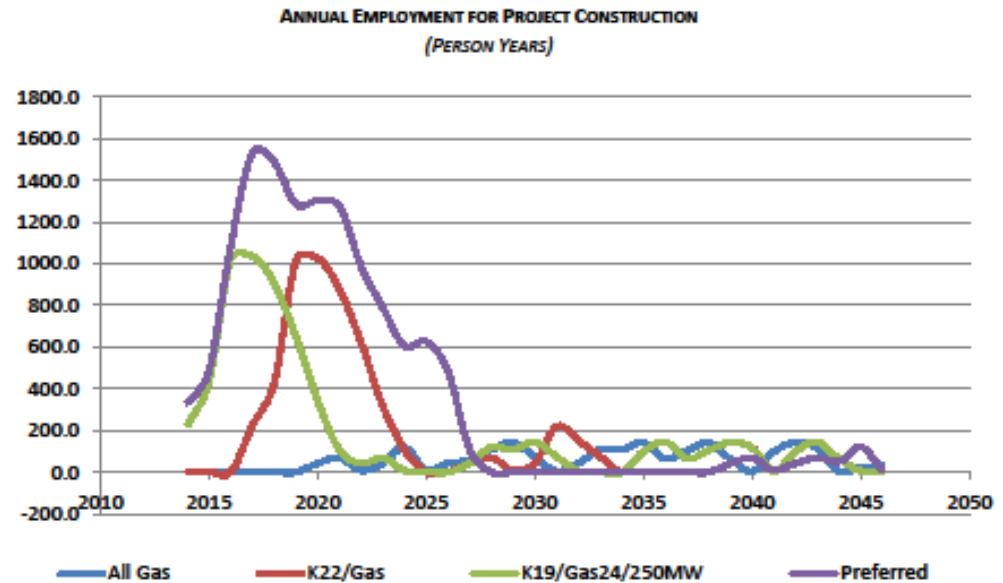
Manitoba government

- Account provides a summary of the total payments to government inclusive of:
 - capital tax
 - water rentals
 - debt guarantee fee
 - sinking fund administration fee
 - coal tax; and,
 - potential carbon charges
- The key assumptions is to remove tax impacts that do not constitute **incremental net revenue** of government
- The key generators of incremental revenues are:
 - water rentals; and,
 - capital taxes
 - which are greater in the hydro based options
- The Manitoba government account is specific to net benefits to government over the period of the plan (78 years)
- The PDP provides the greatest net benefit based on this accounts assumptions.
- The key generators of revenue of the Province of Manitoba are the capital taxes and water rentals



Manitoba economy

- This account assesses the consequences of each plan for the Manitoba economy and considers capital expenditures and employment with each plan over the alternatives life cycle for both construction and operation
- Comparison of gross wages over the alternatives life cycle
- Comparison of incremental income based on assumptions regarding the economic rent and jobs being filled based on regional employment differences
- Key is the value attributed to economic rent assumptions and the ability to build capacity in the north



Social

Social Account considers benefits to :

Project partners

Tataskweyask Cree Nation

War Lake First Nation

Fox Lake First Nation

York Factory First Nation

Local and regional partners

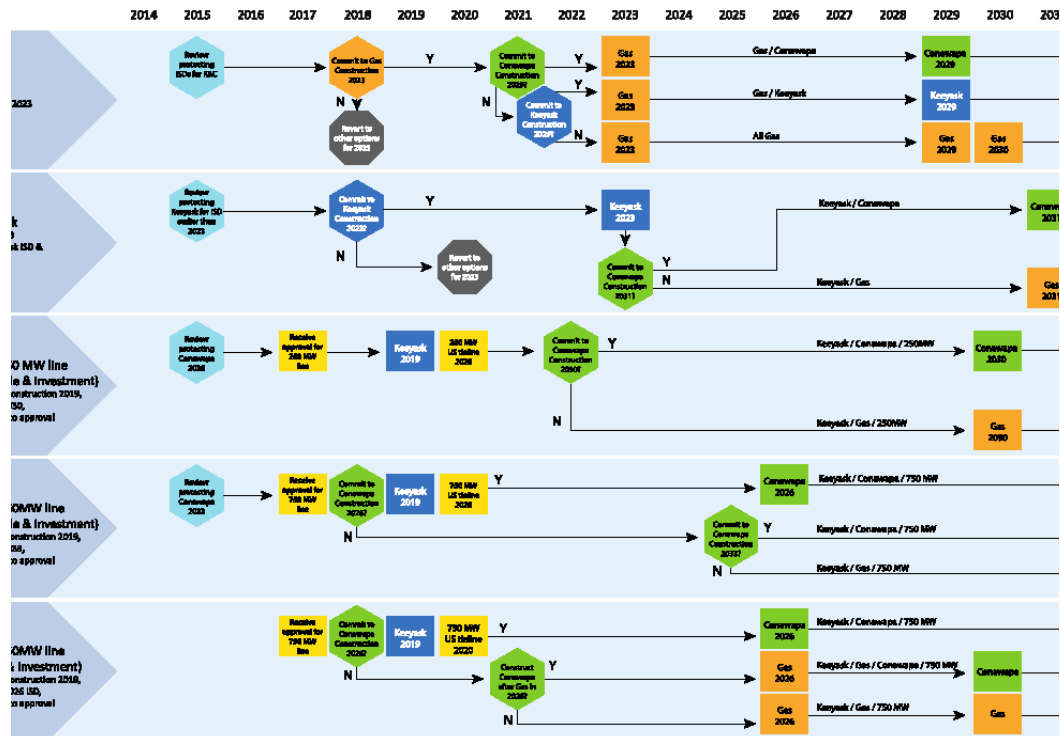
Focus on employment with the four First nations and communities of Gillam and Thompson

Key is capacity building when considering construction and operational employment differences

Manitobans as a whole

Looking at societal benefits and the concept of **bequest value** of the assets





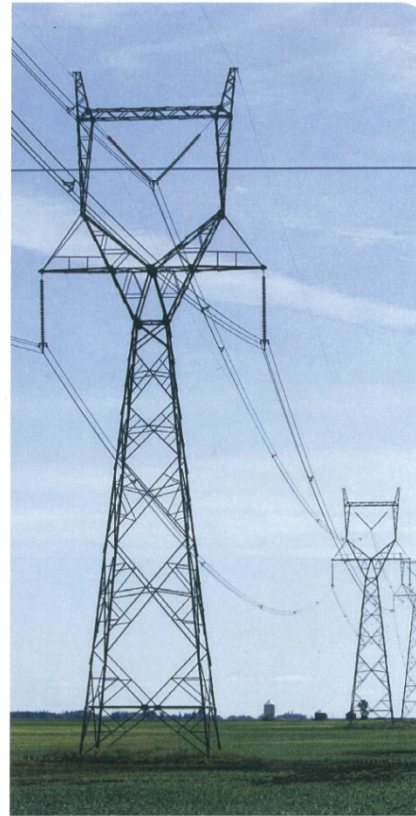
Risk and uncertainty: Significance of pathways

- Considerable risk and uncertainty exists in all plans especially over the long term
- Pathways enable MH the flexibility to modify the PDP to address changing market conditions
- Key decision point is 2018 re Conawapa
- Between 2014-2018 risk and uncertainty should be studied
- Government to provide PUB direction regarding addressing risk and uncertainty

Observations

Socio-economic impact of key alternative scenarios

- Multiple Account Benefit Cost Analysis is an appropriate tool to evaluate the alternative scenarios
- It provides trade offs to be identified, advantages/disadvantages to be highlighted and incremental revenues to be defined
- Issue is the 78 year metric utilized to evaluate options
- Pathways are more important than plans



Needs for and Alternatives to Manitoba Hydro's Preferred Development Plan

HIGH LEVEL REVIEW OF APPROACHES TO OPTIMIZING PROVINCIAL ECONOMIC BENEFITS OF LARGE SCALE RESOURCE PLANS

High Level Review of approaches to optimizing Provincial economic benefits of large scale resource projects

Approach

- To identify large scale hydroelectric projects with similar characteristics as the PDP based on:
 - Geographic location (northern and indigenous populations)
 - Similar forest ecology
 - Similar capital costs
 - Projects that build upon rivers with existing hydroelectric facilities

Benchmarks

- Newfoundland and Labrador Power (Nalcor): Churchill Falls

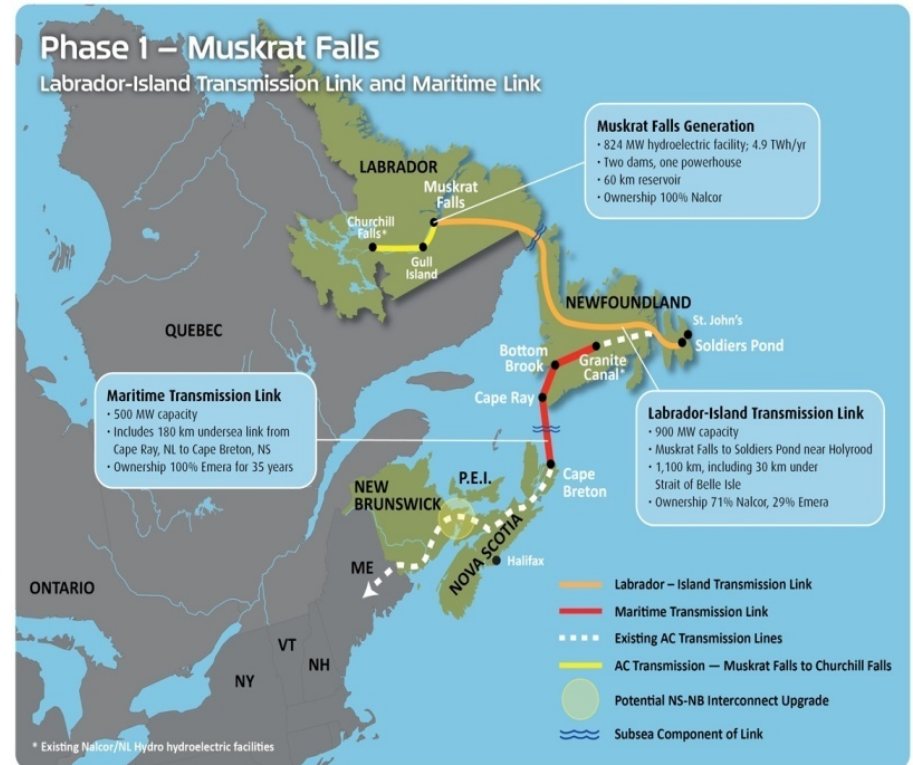


- Quebec Hydro Eastmain 1A Rupert Diversion



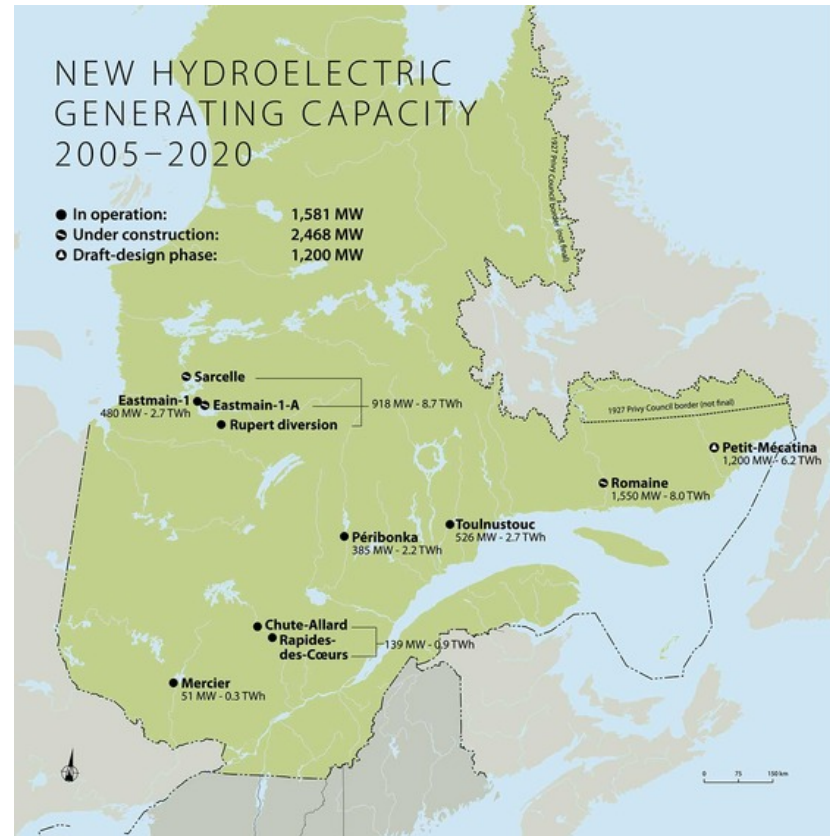
Nalcor

- Lower Churchill Hydroelectric Project: Muskrat Falls and Gull Island
- 3000 MW combined capacity developed in two phases Muskrat Falls (824 MW) and Gull Island (2,250MW)
- Use of provincial input output model
- Series of agreements set in place , Lower Churchill Projects Impacts and Benefit Agreement and Upper Churchill Redress Agreement
- Procurement process based on web site and vendor/contractor registration database
- Representatives from Nalcor and Engineering Procurement and Construction Management (EPCM) consultant managed procurement opportunities
- Manitoba Hydro used this project as a benchmark



Quebec Hydro

- Eastmain-1A and Rupert diversion Project costed at \$5 billion dollars consists of three components:
- 768 MW powerhouse, Eastmain 1 A
- (near existing)
- 150MW powerhouse at Sarcelle
- Partial diversion of the Rupert River to these two generating stations
- Use of Input Output Model
- The James Bay and Northern Quebec Agreement (JBNQA)
- 7 supporting agreements referenced
- Manitoba Hydro used this project as a benchmark



Key Conclusions

- Purpose was to provide a high level but critical review of the reasonableness of the approach, methodology and findings from a socio-economic perspective:
 - Economic Impact Assessment results are reasonable, however the Stats Canada model suggests greater Manitoba benefits actually most likely somewhere in the middle
 - MA-BCA is an appropriate methodology to determine socio-economic benefits in which tradeoffs, advantages/disadvantages and net incremental benefits can be identified. Use of 78 year metric restricts understanding or shorter term implications
 - Focus on energy efficiency program delivery will be critical to address rate increases
 - Manitoba Hydro has optimized northern and aboriginal benefits via partnership agreement, training etc.
 - Key is in implementation and ongoing monitoring
 - Manitoba Hydro has followed best practices exhibited throughout Canada

Thank you