

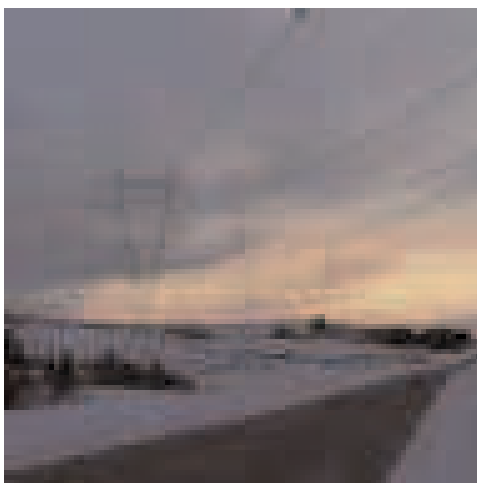


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**ORIGINAL**

**Northwest Ontario Transmission Line Study  
Executive Summary to  
Ontario Ministry of Energy and  
Chiefs Steering Committee**



**Project No. 331527**

July, 2006





## DISCLAIMER

This report was prepared by the consulting team of SNC-Lavalin Inc. and McLeod Wood Associates, under contract to the Ontario Ministry of Energy.

The Ministry of Energy conducted the study process in conjunction with and for the purposes of engaging First Nations Chiefs and their representatives in the discussion of the implications to First Nations of clean energy transfer (transmission) between Manitoba and Ontario. The Chiefs Steering Committee forum has been an open sharing of views and opinions.

This report has been developed to reflect technical analyses conducted in accordance with the Terms of Reference, as well as a broad array of issues and opinions respecting a variety of energy policy, land use and revenue benefits issues, some of which are controversial. A number of issues and opinions are presented in this report to ensure that the input of the study participants has been reflected, primarily for the purposes of continuing to engage First Nations peoples in the discussion of the Clean Energy Transfer Initiative (CETI) and to solicit further input on the CETI initiative and related matters.

Although the Ministry of Energy, the contracting agent and Government agency responsible for delivering this report, and the Chiefs Steering Committee, which has provided on-going advice, direction and comment, have sponsored the study process, and have participated in development of this report, the report is not intended to officially represent Government of Ontario policies or positions, nor the specific opinions of Government of Ontario staff. The report also does not intend to represent the policies or positions of any particular First Nation organization, nor the specific opinions of any representatives of the First Nations of Ontario.

The document has been prepared for the purposes of further engaging First Nations in the review of the CETI initiative.



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In March of 2006, SNC-Lavalin and McLeod Wood and Associates Inc. were retained by the Ontario Ministry of Energy (MOE) on the behalf of the Nishnawbe Aski Nation (NAN) Chiefs Steering Committee, and the MOE to undertake a report to identify and review the potential impacts, on the Ontario First Nations affected, of the proposal to import renewable power and energy, from Manitoba into Ontario. This energy transfer proposal is known as the Clean Energy Transfer Initiative, or CETI<sup>1</sup>. The CETI involves the transfer of up to 1500 MW of hydro electric power, by way of a high voltage (HV) transmission line corridor, from the proposed new Conawapa hydro electric facility on the Nelson River in North-eastern Manitoba, through northern Ontario, to Sudbury.

## 1.0 THE ROUTE OPTIONS

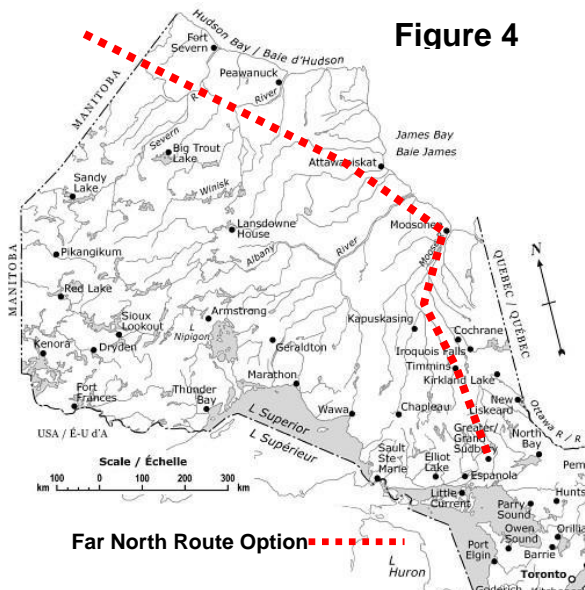
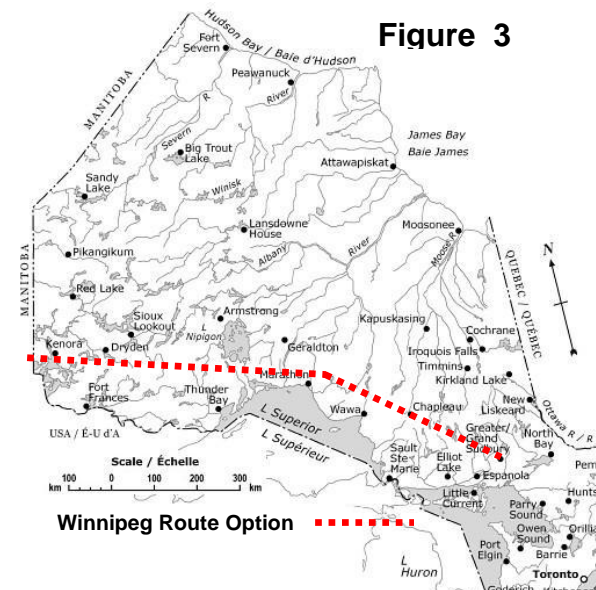
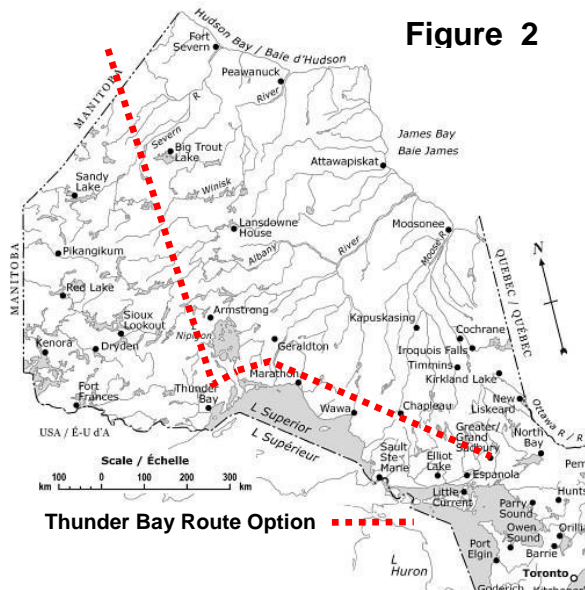
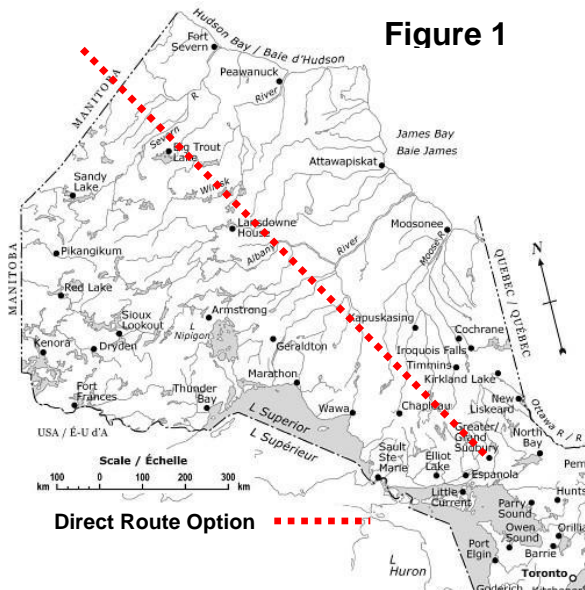
The four Route Options for the CETI were selected for study by the Ontario Ministry of Energy<sup>2</sup> with input from concerned First Nations. Each Route Option traverses some portion of northern Ontario en route to existing HV interconnections with the provincial grid in Sudbury serving southern Ontario loads. All Route Options examined have the potential to affect a number of first Nation communities in the far north. Table 1 and Figures 1 to 4 provide a basic linear and graphical representation of each of the selected routes. This is followed by brief description of each Route Option.

Table 1 - CETI Route Options

Route Option	Name/Segments	Line Length (km)	Termination Locations if 2-Terminal DC Line
1	<i>Direct</i>	1,600	Conawapa - Sudbury
2	<i>Thunder Bay</i>	1,750	Conawapa - Sudbury
	Conawapa - Thunder Bay	900	
	Thunder Bay - Sudbury	850	
3	<i>Winnipeg</i>	2,400	Conawapa - Winnipeg Winnipeg - Sudbury
	Conawapa - Winnipeg	900	
	Winnipeg - Thunder Bay	650	
	Thunder Bay - Sudbury	850	
4	<i>Far North</i>	1,750	Conawapa - Sudbury
	Conawapa - James Bay	750	
	James Bay - Sudbury	1,000	

<sup>1</sup> *The Clean Energy Transfer: Preliminary Assessment of the Potential for a Clean Energy Transfer between Manitoba and Ontario*; Joint Manitoba/Ontario Study Team; September 2004.

<sup>2</sup> *Request for Proposal No.:* OSS-073124; p. 5.



Note: Maps shown here include information from The Atlas of Canada (Natural Resources Canada) website [atlas.gc.ca]

**Route Option 1: Direct** – The direct route from Conawapa to Sudbury is presented in Figure 1, following a roughly direct path southeast from the Conawapa site southeast to Sudbury. The total route length would be roughly 1,750 km, consisting of 900 km from Conawapa to Thunder Bay, 850 km from Thunder Bay to Sudbury.

**Route Option 2: Thunder Bay** – The Thunder Bay route option shown in Figure 2 involves routing the new transmission line from Conawapa, Southeast to the vicinity of Thunder Bay, and then East from Thunder Bay to Sudbury. The total route length would be roughly 1,750 km, consisting of 900 km from Conawapa to Thunder Bay, 850 km from Thunder Bay to Sudbury.





Route Option 3: Winnipeg – This route option would include a transmission connection from Conawapa to the Winnipeg area down the West side of Lake Manitoba, and then a long transmission corridor from the Winnipeg area through the Thunder Bay area of Ontario and on to Sudbury. The total route length would be roughly 2,400 km, consisting of 900 km from Conawapa to Winnipeg, 650 km from Winnipeg to Thunder Bay, 850 km from Thunder Bay to Sudbury.

Route Option 4: Far North – This option arose after the release of the CETI report. The proposed line route starts at the Conawapa site and travels in an easterly direction towards James Bay. At some point north of Timmins (not yet determined), the line route would take a major deflection southward, and would travel south through the vicinity of the James Bay communities and Kapuskasing to Timmins and Sudbury. Physical corner locations have not been chosen, but sites as far north as Attawapiskat or further north might be contemplated.

Depending on final routing and corner locations, the total route length would be roughly 1,750 km, consisting of 750 km from Conawapa to James Bay, 850 km from James Bay to Timmins, and 150 km from Timmins to Sudbury.

## 2.0 STUDY OBJECTIVES AND FINDINGS

As stated above, the main objective of this study is to determine the potential costs and benefits to First Nations of a decision to construct a high voltage transmission line within one of the CETI Route Corridor Options described above. To do this, three basic questions<sup>3</sup> were addressed as follows:

**Question 1** - To what extent could new energy resources be developed or local loads be served in conjunction with the proposed transmission corridor from Manitoba to southern Ontario?

**Question 2** - What effect would the proposed transmission corridor have on First Nation communities?

**Question 3** - How could First Nations participate financially in the proposed transmission corridor?

In order to address these questions, the study team was required to determine the:

- Estimated costs associated with each route;
- Technical demands;
- Existing and potential load demands;
- Potential to connect off-grid first Nations to CETI;

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<sup>3</sup> Request for Proposal No.: OSS-073124; p. 5.



- Potential hydro and wind power resources in the vicinity of each route, and off grid First Nation;
- Technical and cost requirements of realizing the potential of these prospective power sources in relation to providing energy to the Ontario grid and off-grid First Nations;
- Existing environmental conditions;
- Existing socio-economic conditions;
- Impact to affected First Nations; and,
- Financial participation options available to affected First Nations.

All information related to geographic entities such as environmentally significant areas or industrial/commercial endeavours were required for a significant portion of the Province, and as such were solely derived from existing data sources. Costing and technical data were developed at a very coarse resolution given the early stage of study, and impacts to First Nations as well as the financial models cited are based on the consultant's previous experiences with development in the far north.

What follows is a brief description of the relevant conclusions found in this report as they relate to the questions above. It should be noted that the conclusions presented here are very preliminary and based on information at a very coarse level of detail. No field studies have been conducted and no detailed design has been carried out to determine the validity of the environmental conclusions or costs associated with either the CETI line or the potential energy resources cited in the document.

**Question 1** - *To what extent could new energy resources be developed or local loads be served in conjunction with the proposed transmission corridor from Manitoba to southern Ontario?*

There are three main points which need to be addressed in relation to this question. These are:

- Which route would provide the greatest potential for the servicing of local loads and the development of new energy resources;
- Is it possible and/or economic to connect to CETI for the servicing of local loads, and the transmission of new energy resources; and,
- What options are available to First Nations in the event that connection to CETI is not possible and/or not economically feasible?

To do this evaluation, the report assesses which route is closest to the majority of off-grid First Nation communities, has the greatest amount of energy generation potential near it, and is the most economical to construct. It also addresses the technical requirements, and cost implications of connecting to the proposed line for either load servicing (e.g., Off-Grid First Nations), generation input from potential hydro sources, and combinations of the two. Finally, the potential for development of a separate or parallel system to service loads and access potential generation in the north was examined.



## **2.1 The Economical and Technically Preferred Route**

At this level of study it appears that the most technically and economically attractive method of delivering power from Conawapa to Sudbury is a Direct Current (DC) line following Option 1, which is the Direct Route, with no generation or load connections.

The direct route is shorter, which reduces construction costs, and DC transmission is the technically preferred method of transmission. This is due to limitations of transmitting Alternating Current (AC) over long distances, necessitating the use of DC technology for transmission, and the significant costs and technical difficulties associated with an AC/DC conversion station, which is required for power to be either drawn off or input into the CETI line. All energy generation is produced as Alternating Current (AC), and all consumer power is also delivered in the form of AC current. For community loads to be serviced by, or potential generation to be input into the CETI line, a conversion must take place to change the DC current to AC. Therefore, if connection to the high voltage transmission line were to be considered, a conversion station would have to be constructed at some point on the CETI line, close enough to both the loads/generation and the receivers to be economically viable. This would be determined by the load requirements, the location of new energy resource sites, and the physical limitations of AC transmission.

## **2.2 Connection to CETI and Load Servicing Options**

The report also concludes however, that though the least cost method of connecting new generation and off grid community loads to the Ontario grid does not involve connection to the CETI, the Direct Route and Far North Route Options also have significant potential for new electricity generation in the vicinity of the proposed route corridors, with the option of building new AC transmission alongside the CETI line.

Specifically, the Direct Route has approximately 1200 MW of hydro generation potential from 10 sites, and the Far North Route has approximately 1469 MW of hydro generation potential from 22 sites. In both these cases the development costs would be less than or equal to the cost of imported hydro. These two routes also have significant wind generation potential, the economic cost of which is higher than the economic cost of imported hydro. Overall, there is slightly more new resource potential associated with the Direct Route option at a marginally lower cost than the Far North Route option, and the Direct Route presents the best opportunity for connection of more off-grid community loads.

It was determined that there are a number of potential new energy generation sites close to off-grid First Nations which could be more economically developed completely separate from the CETI infrastructure. Table 2 shows the number of First Nations and off-grid First Nations within 200 km of the proposed Route Options. These potential new energy generation sites could be developed to service community loads, with lines to existing transmission for excess generation capacity. The development of these separate systems could be planned and designed to connect numerous communities with expansion potential to service future growth, and/or provide revenue for the investors. As a result of this



analysis, it appears that supply options other than connecting to the CETI transmission corridor may be more economically feasible for the remote communities.

**Table 2 - First Nation Communities within 200 km of Route Options**

	Route Option			
	Direct	Thunder Bay	Winnipeg	Far North
Total Off-grid Communities	15	18	2	8
All First Nation Communities	82	95	127	60

Source: SNC Power Ontario Inc.

Regardless of the final decision, the optimal configuration of a CETI connection, and/or a parallel AC line, or an entirely separate system to service community loads and/or generate revenue requires significant further study.

**Question 2** - What effect would the proposed transmission corridor have on First Nation communities?

There are a number of aspects that must be considered when determining the effect that the implementation of one of the CETI Route Options. These include the:

- Impacts to First Nation traditional use of the land;
- Environmental impacts;
- Potential for a reliable energy supply; and,
- Potential for training/economic growth.

This report provides an overview of the results of the initial analysis, conducted at a preliminary screening level of detail, primarily for the purposes of discussion and community consultation.

### **2.3 The Environmentally Preferred Route**

The results of the environmental screening, using published sources, indicate that the Direct and Far North Routes are preferred from an environmental perspective. It was assumed that any negative impacts of transmission development are considered to increase with proximity of the feature to the transmission corridor, while recognizing that these impacts could be offset by positive impacts (such as ease of access to resources).

It should be noted that no Traditional Ecological Knowledge (TEK) was included in the analysis since community consultation was not conducted as part of the report. There is also a significant bias in the data used, which relates to the relative inaccessibility of large portions of the Direct and Far North Route corridors. The majority of the features, which



were examined as part of the analysis, are found in the south and western portion of the study area, particularly along the corridor defined by the Trans-Canada highway from Sudbury to Kenora and the Manitoba border. In particular these relate to wetlands, environmentally sensitive areas, parks, and conservation areas on the environmental side as well as the majority of the economic criteria. Since both the Thunder Bay and Winnipeg routes have significant sections that follow this corridor it was found, as expected, that these route options had significantly more negative environmental impact scores and positive economic scores as shown by the results of the analysis.

As a result, additional studies are required to determine the:

- Presence and extent of recognized traditional areas and uses;
- Presence and extent of recognized environmental features;
- Specific impacts that might be caused;
- Severity and duration of impacts; and
- Potential for mitigation.

A comprehensive assessment of impacts cannot be completed without community consultation and the inclusion of traditional ecological knowledge.

## **2.4 Reliable Energy Supply and Impacts/Benefits to First Nations**

The question of a reliable energy supply relates to the previous question on load servicing. As stated above the most technically and economically attractive method of delivering power from Conawapa to Sudbury is a Direct Current (DC) line on the Direct Route Option with no generation or load connections. This does not necessarily mean that connection to CETI is impossible, just prohibitively expensive, and may not be the best solution to the problem. However, even if a connection is not deemed to be economically feasible, the First Nation requirement for a grid based system to service the remote communities is still a high priority for the First Nations, and in fact, may be part of the cost of achieving their approval for the CETI line to be constructed. Therefore, an assumption can be made that a regional transmission facility will be required whether a direct connection to CETI is made or not.

The direct benefits of construction of CETI could be the development, through education and on the job training, of the remote community members' skills necessary for the construction, and longer term operations and maintenance of a transmission system. These skills could then be used to develop and connect potential generation capacity within the region, interconnect the communities, and build and maintain new line in the communities. The jobs associated with the operations, maintenance and construction of new system(s) could be the basic underpinning of the economy for the remote First Nations.

The implementation of a local energy system, whether through connection to CETI (which is unlikely), or the development of local grid, based on development of local power potential and transmission, would also serve to alleviate current energy constraints within the off-grid



communities, allowing for a number of potential economic ventures to become possible. The most obvious and high value opportunities involving intensive construction and operational requirements are mining, forestry (limited by access), and hydraulic electricity generation for market if connection is made to the existing grid.

Connecting to the existing grid system also provides the opportunity to implement communications technologies which are a critical element in the support of a modern viable economy. The most easily measurable use of these communication technologies are found in the medical, educational fields, and in the retail businesses opportunities it would open up in the communities.

There may be some direct changes to traditional culture expected to result from impacts to traditional pursuits (trapping, hunting, fishing, etc.), but based upon experience in other remote areas, transmission lines do not affect animal behaviours significantly. In addition, some may consider the employment of community members and non-aboriginal peoples during construction, and subsequent potential development to be an impact to traditional culture through the influx of non-aboriginal cultural influences and/or increased access to alcohol and other illicit substances.

The debate about whether access to non-traditional jobs and exposure to outside cultural influences has a positive or negative affect on traditional culture and values, is important, and is being discussed throughout Canada as pressure to develop remote northern areas increases. Whether youth and the community as a whole are better off with resource jobs on traditional lands which might potentially draw them away from traditional pursuits, or whether without jobs in the region, youth may leave the community for southern centres to access larger job markets and training are difficult issues which have no easy or correct/incorrect answer. Communities must debate these issues amongst themselves to determine whether these are important factors to consider or not.

As the current report is preliminary in nature, the ability to measure the actual impacts of CETI and grid connection, either direct or indirect, to these communities can only be done on a opinion based generic basis. In the next stages of study, a more detailed analysis of impacts and benefits will need to be undertaken to substantiate this preliminary assessment. More detailed studies would typically include an inventory of features that could be impacted (typically supported by field reconnaissance); a more specific analysis of the social and economic impacts that could affect individual communities; and inclusion of community input and traditional knowledge.

**Question 3** - How could First Nations participate financially in the proposed transmission corridor?

First Nations' participation in the development of a project on the scale of the CETI will likely take at least two distinct forms, and probably a number of sub-forms. Many of these forms of participation can be seen from two perspectives: a governance perspective and a commercial perspective.



## 2.5 *First Nation Participation Models*

From a First Nation perspective, communities may seek some form of resource benefit sharing for the use of their lands as well as some control over, or assurances with respect to, impacts to the community and its resources. If this were the only approach pursued it would mean that the participation of the First Nation could include payment and participation in permitting process.

Models for this type of approach include:

- Cash compensation or Impact Benefit Agreements;
- Resource benefit sharing; and,
- Other revenue generating positions that are negotiated with Ontario

Looking at proposed developments from a commercial perspective means that the First Nation would attempt to maximize revenue and economic development opportunities for the community. This would typically involve the First Nation seeking to engage in the project as some type of partner or owner, as well as a part of the decision-making structure. Potential profits then would flow back to the First Nation through profits and/or dividends, as opposed to simply entering into a compensation agreement.

First Nations today look at project development from both perspectives, and there are a wide variety of models available for First Nations to economically participate in projects like CETI such as:

- Silent (minority equity) partnerships
- Minority equity partnerships
- Majority equity ownership

## 2.6 *Project Financing*

All of these options require significant funds, in increasing order of magnitude as you move down the list. Most, if not all, of the First Nations within the proposed Routes have a limited ability to invest in a project of this magnitude, but for the project to have the full support of the First Nations affected, a process would need to be developed that would enable real financial participation in the project. To reach the financial goals required for this type of participation, there are a wide variety of project financing models available. These include:

- Traditional Federal/Provincial Funding for infrastructure project - applicable to regional grid only.
- The Avoided Costs Model – diversion of existing Federal funds for current power supply
- Other Federal and Provincial Funding for Infrastructure Projects- includes:
  - Canada Strategic Infrastructure Fund;



- Municipal Rural Infrastructure Fund;
- FedNor; and,
- Other programs.
- Community and National Level Funding – limited, could cover study costs, and even training. Includes:
  - INAC’s Community Economic Development Program (CEDP)
  - Aboriginal Business Canada
- Ordinary bank loans (on-balance sheet financing) – requires secured assets
- Co-development with a financially strong partner - joint venture with a financially strong partner to provide equity capital and secure bank loans
- Limited recourse project financing – future revenues secure the loan, very complex.

Each participation and financing model has advantages and disadvantages, but generally a higher the degree of ownership results in typically a higher the degree of risk. There are three key questions for First Nations in considering potential ownership options. These are:

- Do the First Nations wish to become an “Owner” and assume the risks/liabilities and opportunities of an Owner or part Owner;
- If the First Nations wish to become an Owner -- how do they obtain an equity position without assets/funds or the ability to secure traditional financing; and,
- How much risk is the First Nation prepared to accept?

All participation models (business and non-business) should be discussed among First Nation leaders and community members. It is important that everyone understands the meaning and implications of business “risk” and “benefits” before final decisions are made and negotiations are initiated.

### 3.0 MAIN CONCLUSIONS

Overall, at this level of reporting, from a technical, economic and environmental perspective the Direct route is considered the optimal route for a CETI transmission corridor.

The most technically and economically attractive method of delivering power from Conawapa to Sudbury is a DC line on the Direct Route Option with no intermediate generation or load connections.

Environmental, social and economic impacts and benefits of CETI require further study, including community engagement and TEK. Intensive and ongoing community consultation must begin as soon as possible, even if the viability of the project is not yet proven. There is a danger that the amount of unstructured information in the communities may cause unrealistic expectations resulting in a negative opinion of the project when the facts become known.





There are a number of new energy resource opportunities that may be feasible for development and connection of remote communities which are independent of CETI. A regional transmission system should be investigated more thoroughly, as it could possibly be the key to long term economic viability for the remote communities of Ontario's far north. First Nations have a number of opportunities for business and non-business participation in CETI which must be discussed among First Nation leaders and community members preceding any negotiation with Ontario and/or the Owner. Training for potential construction, operations and maintenance job opportunities related to the transmission system must start early in the process, so that First Nation people can fully benefit from the project.

A number of provincial and federal regulatory approvals are required before CETI can be built.

## 4.0 NEXT STEPS

This section provides an overview of the next steps to occur during the planning and development phases of the power transmission line. Steps are summarized on Figure 5. All future short- and long-term phases of the project are included: planning and decision making, permitting, procurement, construction and operation and maintenance of the power line. These steps could take up to five (5) to ten (10) years to complete, before the transmission line is operational.

The first step is for the government of Ontario to complete the Energy Needs assessment and make a definitive determination on new supply and transmission within the Province. If CETI is pursued as a supply option, and a decision is made to proceed, a Power Purchase Agreement (PPA) will need to be negotiated with the province of Manitoba to supply power. Applications for leave to construct, and requests for proposal to construct the line will be issued at this point. At the same time information will continue to be gathered from various sources, including First Nations, and negotiations with communities potentially affected by the line will commence. These processes could take 2-3 years to complete.

Once a PPA is finalized, the permitting process will begin. This will involve a significant Federal and Provincial Environmental Assessment process, in conjunction with a comprehensive Traditional Ecological Knowledge (TEK) collection program. Throughout this process northern communities will continue to be consulted and any negotiations on business participation and/or Impacts Benefits Agreements will be conducted during this time. Once these processes are completed and the Leave to Construct is issued by the Ontario Energy Board, detailed engineering and design will commence, followed by the letting of contracts for construction. These various activities could take 1 to 3 years to complete.

Following receipt of environmental approvals, detailed design would be completed and construction would begin with a general mobilization of work crews and equipment, followed by the commencement of clearing of the Right-of-Way (R.O.W). Once clearing is well



underway, construction of the transmission line would begin with the building of the transmission structures, setting of the line and construction of the necessary substations. The construction phase could require 2-3 years to complete.

The final steps would involve the establishment of an Operations and Maintenance program to maintain and operate the line. The details of this program would be determined by the owners and regulators during the design and approvals stages.

Community information and consultation activities will be conducted through all stages of the project, being most intensive during the planning, permitting and construction phases.

An electronic copy of this Report can be seen on the Ontario Ministry of Energy Website:  
<http://www.energy.gov.on.ca>

Figure 5

High Voltage Transmission Line Planning and Development Process

Estimated Time	2-5 years	1-3 years	2-3 years	Ongoing
Needs Identification	Planning and Decision Making	Contract Award/Permitting	Construction	Operations and Maintenance
Shortage of Electricity in Ontario				
Ontario Power Authority formed				
Consider Conservation				
Look at New Generation				
Look at Import of power				
MOE and OPA look at New Transmission	<i>Information Gathering</i>			
	i.e. CSC-MOE report on CETI routes			
	Information-paper and people			
	Pre-Feasibility Studies			
	Negotiations leading to a Power Purchase Agreement with Manitoba			
	Decision To Proceed			
	Cabinet Decision to Proceed			
	Negotiations with communities affected by line	<i>Permitting</i>		
		Environmental Assessment (TEK) studies		
		Consultation with Communities		
		Conclusion of negotiations - Impact Benefits Agreement		
	Request for Proposals to construct line	Contract Awarded	<i>Construction</i>	<i>Operations and Maintenance</i>
			1. Mobilization	
			2. Right of way clearing	
	Application for Leave to Construct by Ontario Energy Board	Leave to Construct issued by OEB	3. Transmission line pole/structure setting and stringing of cables	
		Transmission Rates Hearing?	4. Substation construction	
			5. Energization of Line	
		Engineering		
		Design		
		Sub-contracting		
<b>Communication Processes</b>				
General Information	Routing Options and Issue identification	Route Selection		
	Community Information Sharing	FN Community Consultation	FN Community Consultation	On-going community consultation
	FN Leadership engagement	OEB Hearings re transmission rates?		
		Traditional Knowledge studies		
<b>Regulatory Processes</b>				
	Power Purchase Agreement	Environmental Assessment (TEK)		Rate Hearings every 2-5 years
		- federal		
		- provincial		
		Leave to Construct with OEB		
		- approved Rates		
		Construction permits		



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