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REVIEW OF THE COST STATUS OF MAJOR TRANSMISSION PROJECTS IN ALBERTA

From The Transmission Facilities Cost Monitoring Committee

JUNE 2011 REPORT
Introduction

Origin and Composition of the Transmission Facilities Cost Monitoring Committee

The Government of Alberta created the Transmission Facilities Cost Monitoring Committee (TFCMC) on July 31, 2010, through a Ministerial Order issued by the Honourable Ronald Liepert, Minister of Energy, in order to make sure Albertans have the benefit of increased transparency on the cost of transmission projects.

According to the Ministerial Order, number 64/2010, the TFCMC can consist of up to 13 individuals as follows:

- the Alberta Association of Municipal Districts and Counties may appoint one member
- the Alberta Chambers of Commerce may appoint one member
- the Alberta Direct Connect Consumers Association may appoint one member
- the Alberta Federation of Rural Electrification Associations may appoint one member
- the Alberta Urban Municipalities Association may appoint one member
- the Consumers’ Coalition of Alberta may appoint one member
- the Canadian Federation of Independent Business may appoint one member
- the Industrial Power Consumers Association of Alberta may appoint one member
- the Independent Power Producers Society of Alberta may appoint one member
- the Minister may also appoint up to two independent members with technical, regulatory, transmission facility development or other experience that, in the opinion of the Minister, will benefit the Committee
- the Independent System Operator (“Alberta Electric System Operator”) shall appoint one member, and
- the Office of the Utilities Consumer Advocate shall appoint one member.

The TFCMC’s Mandate

The TFCMC’s mandate is to review records that relate to the cost, scope, schedule and variances of Alberta transmission facility projects forecasted to cost in excess of $100 million. This may include more than one transmission facility, if it is a part of a contiguous transmission facility project. The Alberta Electric System Operator (AESO), a not-for-profit entity that is responsible for the safe, reliable and economic planning and operation of Alberta’s transmission system (also known as the Alberta Interconnected Electric System) determines which transmission facilities are part of a transmission facility project.

In a letter dated January 12, 2011, the Minister of Energy clarified that the starting point for the TFCMC, when reviewing cost variances, is the estimate in place when a project is approved by an Order in Council for Critical Transmission Infrastructure (CTI) projects, or, the estimate in place when the Needs Identification Document (NID) is approved by the Alberta Utilities Commission (AUC). The TFCMC, therefore, does not review any of the projects from an initial prudence, need, technology choice or staging perspective.

The TFCMC cannot delay or slow the development of transmission facility projects.

Each calendar year, the TFCMC is required to provide at least two reports to the member organizations represented on the committee as well as at least one report to the Ministers of Energy and Service Alberta. The reports will summarize the records it reviews and the status of the transmission facility projects.
About the TFCMC Members

The 11 organizations and two independents named in the Ministerial Order forming the TFCMC represent a cross-section of industry, consumer and business groups with ties or expertise related to Alberta’s electricity sector.

Organizations and independent members are listed alphabetically:

The Alberta Association of Municipal Districts and Counties (AAMDC) advocates on behalf of the province’s 69 municipal districts and counties. The association assists its members in achieving strong, effective local government. The **AAMDC representative on the TFCMC is Dwight Oliver, Director for AAMDC District 2.**

The Alberta Chambers of Commerce (ACC) is a federation of 124 Chambers of Commerce, which in turn represent more than 22,000 businesses. The ACC ensures its members’ business interests are improved through the development and advocacy of policy to the provincial and federal governments. The **ACC representative on the TFCMC is Ken Kobly, ACC President & CEO.**

The Alberta Direct Connect Consumers Association (ADC) represents nine large industrial consumers who have facilities directly connected to the transmission system. The ADC members represent the key sectors of forestry, chemical and cement manufacturing. The aggregate electricity demand of the membership represents about seven percent of the Alberta load. The **ADC representative on the TFCMC is Colette Chekerda, ADC Executive Director.**

The Alberta Electric System Operator (AESO) is a not-for-profit entity, is independent of any industry affiliations, and owns no transmission or market assets. It is responsible for the safe, reliable and economic planning and operation of the Alberta Interconnected Electric System. The **AESO representative on the TFCMC is Jerry Mossing, AESO’s Director of Transmission Support.**

The Alberta Federation of Rural Electrification Associations (AFREA) is a not-for-profit association representing 35 Rural Electrification Associations throughout Alberta. The AFREA is committed to promoting the economic welfare and value of its cooperative members by providing representation to government and industry stakeholders. The **AFREA representative on the TFCMC is Dan Astner, AFREA 2nd Vice President.**

The Alberta Urban Municipalities Association (AUMA) represents Alberta’s 284 urban municipalities including cities, towns, villages, summer villages, and specialized municipalities. The AUMA represents and advocates for the interests of its members to the provincial and federal governments. The **AUMA representative on the TFCMC is Darren Aldous, AUMA President.**

The Canadian Federation of Independent Business (CFIB), an association representing small- and medium-sized businesses across Canada, takes direction from its more than 108,000 members, providing independent businesses a voice at all levels of government. The **CFIB representative on the TFCMC is Richard Truscott, the CFIB’s Director of Provincial Affairs for Alberta.**

The Consumers’ Coalition of Alberta (CCA) is comprised of the Consumers’ Association of Canada (Alberta Division) and the Alberta Council on Aging. The CCA, a coalition of two public interest groups, participates as a collective in public utility hearings to ensure rates, tolls and charges for residential customers are just and reasonable. The **CCA representative on the TFCMC is Azad Merani, CCA Consultant.**

The Independent Power Producers Society of Alberta (IPPSA) represents Alberta’s power producers. IPPSA is a forum for dialogue among Alberta’s power producers and a proponent of competition in Alberta’s electricity market. The **IPPSA representative on the TFCMC is Evan Bahry, IPPSA’s Executive Director.**
The Industrial Power Consumers Association of Alberta (IPCAA) is an organization representing large industrial customers, including such key sectors as oil & gas, forest products, petrochemicals and steel. Its mission is to take a leadership role in achieving a fair, open and efficient marketplace for electricity sales and service in Alberta. The IPCAA representative on the TFCMC is SHELDON FULTON, IPCAA's Executive Director.

The Office of the Utilities Consumer Advocate (UCA) is the voice of small consumers in Alberta’s electricity and gas markets. The UCA advocates on behalf of Alberta’s low-volume or smaller users of electricity and natural gas, those being residential, small business and farm utilities consumers, and helps them to make informed choices. As well, the UCA represents and protects their interests by participating in utility hearings and inquiries. The UCA representative on the TFCMC is WAYNE TAYLOR.

TFCMC Independent Members

ALLEN SNYDER, of Winnipeg, brings a background and a wealth of knowledge in the electricity sector to the TFCMC. He held several key executive positions with Manitoba Hydro including Vice President of Transmission & Distribution, Power Supply and Corporate Services over the past 20 years. He also established the successful Manitoba Hydro International with sales of software and services to more than 60 countries worldwide. Currently, he is Vice President of Energy Services for Wood West & Associates.

HENRY YIP is a senior business executive with more than 30 years of broad business experience in Canada and the USA. He has held senior executive positions in large corporations and entrepreneurial business enterprises, and has advised governments in the area of city planning, strategy development, technology commercialization, international business collaboration and grant application approval. His current business interests include Chair of the Board at Edmonton Economic Development Corporation, Executive Chair at Nirix Technology, and President of C’andcee Development.
Overview of the Operations of the TFCMC

The TFCMC meets monthly, alternating between the cities of Calgary and Edmonton. The primary purpose of the meetings is to review reports provided by AESO on the cost status of transmission projects that are within the Committee’s purview. The first meeting took place in September 2010.

The TFCMC reviews the reasons for cost variances of all these projects. When appropriate, it retains external experts to prepare information requests (IRs) to AESO and the Transmission Facility Operators (TFOs) for further illumination on the reasons for the variances.

The TFCMC strives for consensus in its decision-making process but a simple majority of those present at a meeting is the minimum threshold for agreement.

Independent member Henry Yip chairs the TFCMC. The TFCMC secretary is Laura Severs, engaged by the Office of the Utilities Consumers Advocate (UCA) for the purpose of this role.

The TFCMC will also form ad hoc sub-committees from time to time to facilitate the workings of the Committee. A sub-committee was created to develop proposals on securing expert advice to support the Committee’s work. Evan Bahry initially chaired the sub-committee. The chairmanship was moved to Jeff Nish, (the UCA representative at the time) when the work moved towards the development of contract wording. The TFCMC also has a standing sub-committee to monitor and approve expenditures incurred by the Committee during the course of discharging its mandate. Sheldon Fulton chairs that sub-committee.
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Message from the Chair

Welcome to the inaugural report of the Transmission Facilities Cost Monitoring Committee (TFCMC). The main focus of this report is to share with you, our stakeholders, the information received and reviewed by the TFCMC.

The primary purpose of the TFCMC is to review records that relate to the cost, scope, schedule and variances of Alberta transmission facility projects costing in excess of $100 million. Twelve projects are being monitored by the TFCMC. The current cost estimate of these 12 projects exceeds $10 billion.

To carry out our responsibilities, the TFCMC receives monthly summary reports on the status of these transmission builds. We have also established a schedule to conduct more in-depth reviews of these projects. Section 2 of this report details our views on what we have learned so far and includes some preliminary ideas for improvements. Even though we are only in the early stages of reviewing the 12 projects, it is apparent to Committee members that electricity transmission infrastructure builds are complicated. Factors such as technology choice, capacity, and load optimization must be taken into account, as does the need to deal with social and environmental considerations. In Section 3, the Committee presents its concluding thoughts to date and suggests opportunities for improvement after reflecting on the complexity of the industry.

As stated in the Ministerial Order creating the Committee, the TFCMC shall not delay or slow the development of transmission projects it reviews. But we do believe that our work will be helpful by identifying any process weaknesses in effectively managing electricity infrastructure costs and by offering proposals for improvement. Committee members are concerned about projects that have exceeded initial Needs Identification Document (NID) phase budgets by a significant margin – there is a need to improve cost estimate quality and accountability. We also believe that the information harvested from the work being done by the TFCMC will enable the organizations participating on the Committee to be better informed should they choose to intervene in Alberta Utilities Commission (AUC) hearings.

Finally, I would like to take this opportunity to express my appreciation for the engagement and hard work of the Committee members and their respective organizations. Most of the organizations are committing their own resources to support the work of their respective committee members. The TFCMC also would like to acknowledge the collaborative approach of the AESO in meeting the needs of the Committee and in enhancing the value of the TFCMC’s work.

The TFCMC intends to issue semi-annual reports to its stakeholders. Your comments to improve this report will be most appreciated. Please email your comments to TFCMC@gov.ab.ca.

Original signed by

Henry Yip
Chair, Transmission Facilities Cost Monitoring Committee
1. Transmission Projects Covered Under The TFCMC’s Mandate

The TFCMC has the authority to review records relating to the cost, scope and schedule transmission facility projects that are expected to cost more than $100 million. These projects include all lines and substations, which make up the transmission facilities required to transfer power between generators and loads. The current list of monitored projects, in alphabetical order, is:

1. Alberta Industrial Heartland Bulk Transmission Development (HBTB); Project 629 – Construction of a double-circuit 500 kV transmission line, which will connect the Heartland region (northeast of Fort Saskatchewan) to existing 500 kV transmission facilities in the Edmonton area.
2. Central East Area Transmission Development (CETD); Project 811 – Transmission development in Wainwright, Lloydminster, Provost, Vegreville and Cold Lake.
3. Edmonton Region 240 kV Line Upgrades (ERLU); Project 786 – Upgrading 240 kV lines in the Edmonton area; adding one 240 kV phase shifter at Dover substation.
4. Enmax No. 65 Substation (ESCS); Project 922 – New 240 kV substation in south Calgary and 138 kV development due to overloading in south Calgary.
5. Fort McMurray Area Transmission Bulk System Reinforcement (FMAC); Project 838 – Construction of 500 kV transmission lines from the Edmonton region to the Fort McMurray area.
6. Hanna Region Transmission Development (HATD); Project 812 – Transmission development in Hanna, Sheerness and Battle River.
8. North South Transmission Reinforcement (HVDC); Project 737 – Construction of two 500 kV HVDC transmission lines from the Edmonton area to the Calgary and south regions.
10. Southern Alberta Transmission Development (SATD); Project 416 – Transmission development in Goose Lake-Peigan and North Lethbridge.
11. Southern Alberta Transmission Reinforcement (SATR); Project 787 – To accommodate wind generation in southern Alberta.
12. Yellowhead Area Transmission Development (YATD); Project 671 – Yellowhead area transmission development, including the Alberta Beach area.

2. TFCMC Observations To Date

The TFCMC has undertaken in-depth reviews through case studies or cost summaries provided by AESO, and/or from presentations by the transmission facility operators on five of the 12 projects at the time of this report. From these reviews, the Committee has observed the following concerns and issues:

Alberta Industrial Heartland Bulk Transmission Development (Project 629) also known as “Heartland”

An AESO cost summary on the Heartland project was provided for this project. This summary described the basis for the AESO 2009 Long-Term Transmission System Plan (LTTP) estimates, i.e., a $260-million option and the $360-million option. The summary noted that the 500 kV double-circuit (d/c) line from Ellerslie to Heartland was more closely associated with the $360 million option. In the facility application, Heartland project costs rose to $580 million.
The TFCMC was advised that $77 million was necessary for 22 kilometres of a 240 kV d/c line, to connect the Heartland 500 kV substation to load in the area. AESO approved the change to the project to include the 22 km of the 240 kV d/c line as part of the project's designation as Critical Transmission Infrastructure (CTI).

The TFCMC was also advised that route changes, pipeline mitigation, technical changes (i.e. breaker and bus configurations) and consultation costs (routing and environment) all made significant contributions to the project’s cost increases.

Escalations and Allowance for Funds Used During Construction (AFUDC) contributed to the increases as well, and these were not included in LTTSP estimates, the TFCMC was advised.

TFCMC members expressed concern as to how the original Ellerslie to Heartland project shifted from a 240 kV line to a 500 kV line and then to an alternative choice of the east transportation utility corridor (TUC). AESO advised that the project description is contained in the Electric Utilities Act. But with an imminent Alberta Utilities Commission (AUC) hearing, transmission facility operators (TFOs) and AESO responses to further questions may prejudice their involvement on witness panels.

Edmonton Region 240 kV Line Upgrades
(Project 786)

An AESO cost summary on the Edmonton region project was provided describing the need of connecting the Keephills Number 3 generator, without a new high capacity line into the Keephills/Ellerslie/Genesee (KEG) area.

As transmission and generator outage coordination and technical scope are complex, the TFCMC was advised that these requirements resulted in scope changes and cost increases.

Scope changes in this project included additional protection requirements (the protecting of equipment and the network). When scope changes occur, AESO conducts a reasonability test of the associated cost change but this did not include another overall assessment of the viability of the project.

A reasonability test considered the cost of the technical solution to a technical need, the schedule to be achieved, other alternatives, management review and whether the scope change was consistent with original project objectives.

Members expressed an overall concern with the accuracy and accountability for the Needs Identification Document (NID) estimates.

Southern Alberta Transmission Reinforcement
(Project 787)

An AESO cost summary was provided. This series of projects has recently been undertaken by AltaLink, the TFO, and is scheduled to be constructed in three phases, with completion planned for year-end 2016. The intent of these projects is to upgrade the Southern Alberta electric system. A portion of the system will be upgraded to a 240 kV AC looped system while another portion will have the 138 kV system upgraded. These changes are required as result of increased wind generation connections, increased loads and aging infrastructure. Voltage support will also be added in some substations.

There are 13 components to this overall project and in the 2009 LTTSP it was expected to cost approximately $3.4 billion ISD$ (in-service date dollars). The NID filing date was December 30, 2008, and the NID estimate was approved on September 17, 2009. The TFO has not yet filed estimates (Proposal to Provide Service or PPS) for several components of the project, thus the overall cost is an estimate at this time.

The first component of this project presented is the construction of the Milo Junction switching station at an estimated cost of $29.7 million. This station is scheduled for commissioning in the spring of 2011. However, abnormally wet conditions may result in a delay in the in-service date.
The next component presented is the addition of a phase shifting transformer, 138 kV circuit breakers and a new control building at the new Russell substation near the Castle River substation. This project is expected to cost $17.2 million and includes the burying of 60 km of fibre-optic cable for system protection between Goose Lake, Russell, and Coleman. This segment of the project is expected to be in service by the fall of 2011.

A 240 kV double-circuit transmission line from the East Medicine Hat station (Bowmanton) to Whitla and a new Whitla station including shunt reactors will be built as this portion of the overall project. This line is approximately 110 km in length and the AUC hearing was held in March 2011. The estimated cost of this line and station is $353 million and it is scheduled to be in operation in the fall of 2014.

Another segment of this transmission line, a 240 kV d/c from Bowmanton to Cassils went through the same AUC hearing in March. It is expected to cost $408 million and is scheduled to be in service by spring 2014.

There are a series of 138 kV upgrades to be conducted in the Medicine Hat area as a result of the increase in electricity flows. The facility application is scheduled to be filed in the summer of 2011, with a planned in-service date of the upgrades of 2014. No PPS has been completed to date.

A 240 kV d/c transmission line from Chapel Rock to Fidler, a distance of approximately 48 km, and a new substation at Chapel Rock, which includes a 500/240 kV bank, a reactor and a static VAr compensator are included. PPS estimates for this project will be developed. The proposed facility in-service date is spring of 2014.

Another 240 kV d/c transmission line from Journault to Picture Butte, a distance of approximately 75 km, will be constructed. No PPS estimate for this line has been completed but it is scheduled to be in service in the summer of 2014.

There is a further Goose Lake to Journault 240 kV d/c transmission line to be constructed over 220 km. Again, no PPS estimate has been completed for this line. This is the last segment of the SATR project and it is scheduled to be in service by the end of 2016.

Also planned is a Journault to Whitla 240 kV d/c transmission line, which is approximately 90 km in length. No PPS estimate for this line has been completed and it is scheduled to be in service by the summer of 2014.

Also scheduled is line replacement project 911L. No PPS estimate for this line has been completed and it too is scheduled to be in service by the summer of 2014.

There are a series of upgrades to be made to the 138 kV system in the Blackie area of southern Alberta. No PPS estimate for this work has been completed but this work is expected to be in service by the summer of 2014.

An upgrade to the existing Cypress substation is planned and a static VAr compensator is to be installed to provide voltage support in the area. No PPS has been produced for the project but it is scheduled to be in service by the fall of 2013.

Lastly, the Ware Junction substation will be upgraded and this project has been estimated at $6.1 million and is scheduled to be in service by year-end 2012.

At present, there are many uncertainties in both costs and schedules, which will be more firmly established when the AESO reviews and accepts the remaining PPS. The current $3.4 billion ISD$ estimate in the NID reflects both expected cost escalation and carrying costs (AFUDC) during construction.

TFCMC members questioned whether the full project would have remained viable had a doubling of the costs been known at the outset.
TFCMC members requested that future cost summaries be provided to include escalation and AFUDC in order to provide more meaningful comparisons of estimates at later review dates.

**Southern Alberta Transmission Development**  
*(Project 416)*

An AESO case study was provided and AltaLink did a presentation on this project, which has been virtually completed but has been extended far in excess of the original schedule. The Need Application was filed by the AESO in April 2004 with AUC Need Approval granted in May 2005. The original project approval was estimated at $91 million.

As the project proceeded, it became evident that significantly more wind projects (generation) were being proposed and accepted for the Pincher Creek area, necessitating significant scope upgrades to accommodate more wind connections.

There were also several increases in project costs due to environmental and line alignment issues. For example, rerouting due to a cemetery location and landowner concerns, which necessitated the Stirling substation expansion, added $2.7 million to the project. Rerouting through a flood plain added a further $6.1 million due to enhanced foundation requirements.

New generation in the area added another $4.1 million and further realigned route changes added $2.2 million. Then a major problem developed due to permitting costs across private lands and $19 million was required to satisfy these concerns. The in-service date was delayed until the summer of 2008.

As further new generation proposals were accepted, a second circuit was required between Peigan and Lethbridge, which added an additional $3.7 million. Poor soil conditions and a tight market for contractors were responsible for another $2.1-million increase. Project delays, carrying costs and escalation added a further $14.4 million.

Then in 2009, the project encountered another significant problem with routing through a reserve. Despite agreements with landowners on the proposed route, the project was halted by a community decision to reroute the transmission line. These delays, coupled with escalation, tight market conditions and carrying costs added $95 million to the project. All aspects of the project have been signed off by AESO resulting in a final project cost of $238 million.

TFCMC members were very concerned that the original project increased in cost by 162 per cent since its inception in 2004. The project had been progressing favourably, satisfying the demand for new generation connections until significant routing issues took place. Then late in the project, after considerable monies had been expended, unforeseen problems with route selection occurred that proved to be extremely costly. The additional costs are ultimately borne by the customer. These costs were so significant that the decision to accept the generators’ applications may have been reversed if the additional costs had been foreseen.

The project should be wrapped up in the spring of 2011 but future developments involving landowner agreements on a proposed route selection should be more carefully scrutinized before construction is undertaken.

**Northwest Transmission Development**  
*(Project 535)*

An AESO case study was provided for this project and ATCO Electric did a presentation as well. This project has been virtually completed with only three segments remaining: facility application #5 – a 144 kV transmission line from Ring Creek to the new Arcenciel station and a new capacitor bank; #6 – a new synchronous condenser at Arcenciel, and #7 – a static VAR compensator at Arcenciel.

The need for this project was recognized in March 2006 and the need approval granted in August 2006. The total project scope envisioned was $262 million. However, due to project scope changes, the value has increased to $463 million or an 80 per cent jump.
Although all completed segments of the project have come in below the authorized budget, TFCMC members question why the project scope was not better defined at the outset. Clearly, increased electrical usage in the region can be attributed to increased oil and gas activity. However, the planning for the project would appear to have underestimated the requirements for a well-balanced transmission line network in the area.

The AESO approved each scope change with the exception of facility application #6, which is pending, but it would appear as if this occurred on a piecemeal basis without consideration for the overall needs of the region for a reliable and secure transmission system. Several scope changes were sent back to the regulator for approval.

3. **TFCMC Conclusions and Recommendations**

Since its inception, the TFCMC has been receiving monthly reports from the AESO on the 12 transmission projects. In addition, it has undertaken more in-depth reviews of five projects (to date), again with information provided by AESO and in some cases by the Transmission Facility Operators (TFOs). The TFCMC’s review has focused on cost variances from cost estimates established at the Need Identification Document phase (NID) to the Proposal to Provide Service (PPS) phase.

The TFCMC has noted that three of the five projects we have looked at to date experienced significant cost increases:

- The cost for Project 535 (Northwest) increased from $262M to $463M
- The cost for Project 416 (Southern Alberta) rose from $91M to $239M
- The cost for Project 629 (Heartland) increased from $360M to $569M

The TFCMC has observed that once the AUC approves a NID (the document submitted to AUC identifying the need for transmission expansion or enhancements) and once a project proceeds, cost increases and scope changes occur for a variety of reasons. It is evident that when project costs go beyond the range of the applicable estimate, the process for review and approving scope changes lacks opportunity for stakeholder review and possible intervention, including reviewing the project need. However, the TFCMC recognizes that the consequences of revisiting the alternative solution or cancelling projects already underway are significant, and may financially impact both load and generator customers due to their own financial commitments to connection projects.

The TFCMC also noted that TFOs are reluctant to take ownership of NID estimates, preferring instead to focus on PPS/FA (Facility Application) estimates as a project cost starting point. The TFCMC interprets this reluctance or unwillingness as primarily due to the increased rigour and detail the TFOs would need to apply during the NID class estimates of the project provided to the AESO in advance of any approvals. Comparatively, the NID class estimates that have been provided by the TFOs to AESO are less detailed as project definition is still at a preliminary stage.

However, NID class estimates are the basis upon which to perform option evaluation and selection of a preferred option in preparation for project approval filing. The AESO’s obligation is to evaluate options to serve the need for transmission and recommend an option based on its analysis. Costs, as well as land use, performance requirements, adherence to the reliability standards, impact of losses, elimination of constraints, environmental considerations, routing, and operational flexibility are all considered in option evaluation. The cost estimates provided for each alternative are provided on the same basis, i.e., same level of detail and rigour, and are consistent between options.

Several projects, including the Southwest and Northwest transmission developments extend over longer periods from conception to energization. Among other impacts, the cost increases can be significant with regard to escalation, AFUDC, and scope changes. This presents a challenge in that a long-term plan should by definition include transmission development plans in a 10-year horizon.

Providing accurate costs in a five-to-10 year horizon leads to uncertainties as shown by the cost drivers for the Southwest and Northwest projects completed in the 2006-2010 period. Presentations made to the
TFCMC by ATCO Electric and AltaLink show that extensions to construction schedules and unavoidable changes to execution scope are some of the ways that costs can increase. By extension, a NID may also precede a FA by several years and introduce more cost uncertainty when compared to a combined NID and FA regulatory process. Current Independent System Operator rules do not make any distinction for longer time periods between NID estimates and FAs.

The overall cost environment is:

- 2009 Long-Term Transmission System Plan estimates and NID approvals are consistently lower than the FA estimates.
- NID class estimates are consistently lower than PPS estimates.
- Actual costs are consistently higher than estimates.

While the final costs might be supportable, the above situation brings into question the project approval process, leading to concerns that NID approvals are undertaken using costs that are not likely representative of final costs.

**Recommendations**

In the course of conducting its review of project costs, TFCMC members have made some preliminary recommendations to better manage transmission costs or to improve transparency in cost monitoring. They are:

1. That the AESO improve future NID estimates by including fully loaded costs (AFUDC, escalation, engineering and supervision, and owners’ cost). All AESO and/or TFO estimating assumptions would be included in the NID filing to represent the starting point for tracking the full development cost of a project. In the event that the TFO is anticipating use of CWIP (Construction Work In Progress), then an estimate of AFUDC should be included to provide proper comparisons of the total cost for projects.

2. That the AESO improve the estimates in the AESO Long-Term Transmission Plan by employing third-party cost estimates or cost estimate verification as well as from benchmark data being compiled by AESO.

3. That the AESO develop a transmission cost benchmarking competency and database to further assess the reasonableness of the costs, including at the NID phase. The AESO would then use its benchmarking data to test costs proposed by TFOs in the NID and PPS stages.

4. That the AESO enhance compliance of the material procurement provisions of Rule 9.1; the rule by which the AESO directs TFOs to estimate, design and construct transmission facilities.

5. That for non Critical Transmission Infrastructure (CTI) projects, the Department of Energy consider legislative changes to require a second approval stage by the AUC if cost estimates exceed a pre-determined limit. The TFCMC recognizes the need to avoid unnecessary project delays due to factors outside the control of the TFOs.

6. That the AESO initiate a review process on the current framework for cost accountability. This process should discuss the challenges with implementing transmission project requirements required by legislation. The TFCMC believes that the review would lead to other recommendations for cost monitoring/cost management improvement, such as the creation of post-project variance reports.

**It should be noted that the UCA does not support Recommendation 5. It provided the following rationale:**

The AESO currently has the discretion to seek a further order from the AUC and already does so when circumstances warrant (see for example AUC Orders U2005-184, U2006-94, U2006-205, U2006-265, U2007-261, U2007-348, U2008-318, and U2010-394). Forcing the AESO to seek a further order from the AUC in all circumstances would result in unnecessary additional regulatory costs and could delay completion of urgently required transmission facilities.
Appendix A

The Transmission Projects At A Glance

1. **ALBERTA INDUSTRIAL HEARTLAND BULK TRANSMISSION DEVELOPMENT (HBTB); PROJECT 629** – Construction of a double-circuit 500 kV transmission line, which will connect the Heartland region (northeast of Fort Saskatchewan) to existing 500 kV transmission facilities in the Edmonton area.

**THE PROJECT:** The Alberta Industrial Heartland Bulk Transmission Development calls for the construction of a double-circuit 500 kV transmission line, which will connect the Heartland region (northeast of Fort Saskatchewan) to existing 500 kV transmission facilities either west or south of Edmonton. This upgrade is to respond to the growing power demand for power in this region. The Heartland project will form the foundation of electricity supply into northeast Alberta and will support oilsands development, local demand in the Heartland area and strengthen the entire provincial network.

**THE COMPONENTS:** A 500 kV AC double-circuit transmission line connecting the 500 kV system on the south side of Edmonton to the new Heartland 12S Substation (the 500 kV Line Project); a 240 kV/500 kV Heartland 12S Substation, located approximately 15 km northeast of Edmonton in the Gibbons-Redwater Region (the Heartland 12S Substation Project); and a 240 kV double-circuit transmission line connecting the 240 kV system in the area to the new Heartland 12S Substation (the 240 kV Line Project). The Industrial Heartland region includes parts of Sturgeon, Strathcona and Lamont counties.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
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<td>500 kV 1206L/1212L (Formerly P629)</td>
<td>Sixty-five km of 500 kV double-circuit line from Ellerslie to Heartland substation</td>
<td>March 30, 2013</td>
</tr>
<tr>
<td>Heartland 12S Ellerslie 89S and 1054L/1061L (Formerly P1066)</td>
<td>Heartland 500 kV sub and 22 km of 240 kV lines to tie in the existing system.</td>
<td>March 30, 2013</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):**
AltaLink L.P. and EPCOR Distribution & Transmission Inc.

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberta Industrial Heartland Bulk Transmission Development</td>
<td>$537 Million (2011$ without escalation)</td>
<td>$580 Million (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
Review of the Cost Status of Major Transmission Projects in Alberta

Project 629
Alberta Industrial Heartland Bulk Transmission Development
2. **CENTRAL EAST AREA TRANSMISSION DEVELOPMENT (CETD); PROJECT 811** – Transmission development in Wainwright, Lloydminster, Provost, Vegreville and Cold Lake.

**THE PROJECT:** The Central East project serves the dual purpose of meeting the growing demand for electricity from oilsands development and pipelines, and enables the connection of more than 500 MW of proposed gas-fired generation and wind farms in the eastern region of Central Alberta. Aging infrastructure, overloads and low voltages in the large area east of Edmonton from Cold Lake in the Northeast region to Hardisty make necessary the substantial rebuild of the 138 kV and 144 kV systems, and decommissioning of aging 69 kV and 72 kV lines.

**THE COMPONENTS:**

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATCO Facilities</td>
<td>Substations</td>
<td></td>
</tr>
<tr>
<td>Convert existing stations from 72 kV to 144 kV (Willingdon 711S, St. Paul 707S, Heisler 764S, Kitscoty 705S)</td>
<td>Dec. 31, 2012</td>
<td></td>
</tr>
<tr>
<td>New 144 kV switching station (Bourque 970S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 MVar capacitor bank at Vermillion 710S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission Lines</td>
<td>New 144 kV single-circuit line from 7L92 to Willingdon 711S</td>
<td>Dec. 31, 2012</td>
</tr>
<tr>
<td>New 144 kV single-circuit line from 7L701 to Heisler 764S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New 144 kV single-circuit line from 7L14 to Kitstcoty 705S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New 144 kV double-circuit line from Bourque 970S to Mahihkan 837S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New 240 kV double-circuit line, energized at 144 kV and one side strung, from Bourque 970S to Bonnyville 700S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rebuild existing 144 kV lines for transmission capacity (7L53, 7L74, 7L83, 7L87, 7L749, 7L14, 7L701)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New 138 kV double-circuit line from 749L to Killarney Lake 267S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New 138 kV single circuit Wainwright 51S to Edgerton 899S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New 138 kV double circuit line from 704L to Wainwright 51S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rebuild existing 144 kV lines for transmission capacity (704L, 715L, 748L, 749L)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
THE TRANSMISSION FACILITY OPERATOR(S):
The AESO directed both AltaLink L.P. and ATCO Electric to prepare and file Facility Applications.

PROJECT COST:

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central East Area Transmission Development</td>
<td>$352 Million (2011$ without escalation)</td>
<td>Not Available</td>
</tr>
</tbody>
</table>
Review of the Cost Status of Major Transmission Projects in Alberta

Project 811
Central East Area Transmission Development
3. **EDMONTON REGION 240 KV LINE UPGRADES (ERLU); PROJECT 786** – Upgrading 240 kV lines in Edmonton area; add one 240 kV phase shifter at Dover substation.

**THE PROJECT:** More than 4,000 MW of baseload generation that serves as the main source of electricity for the majority of the province is situated near Wabamun Lake in the Edmonton region. This generation supports central and south Alberta loads, northwest region loads, Edmonton area loads and major industrial loads located in the Fort Saskatchewan area. There are major thermal overloads of transmission facilities throughout the Edmonton region, the 138 kV transmission paths from Wabamun to North Calder, East Edmonton to Nisku, and from East Edmonton to the Fort Saskatchewan area that are weak during peak load conditions and voltage violations occur in those two areas due to weak system support.

**THE COMPONENTS:**

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebuild 240 kV 904L</td>
<td>Rebuild 50 km of 240 kV line 904L, change the Jasper tap point from 904L to 908L.</td>
<td>March 1, 2012</td>
</tr>
<tr>
<td>AML 902L Restriction &amp; 909L Restrination (Formerly P1057)</td>
<td>Restrinate eight km of 902L out of Sundance and Wabamun</td>
<td>March 30, 2012</td>
</tr>
<tr>
<td>AML 908L, 909L Restrination (Formerly P1058)</td>
<td>Restrinate four km of 908L and 909L out of Sundance</td>
<td>Feb. 10, 2011</td>
</tr>
<tr>
<td>Epoch Jasper, Petrolia (Formerly P955)</td>
<td>Upgrade bus work and protection at Jasper, Petrolia</td>
<td>June 30, 2011</td>
</tr>
<tr>
<td>1044EL, 1045EL (Formerly P955)</td>
<td>Restrinate 1044EL and 1045EL</td>
<td>June 30, 2011</td>
</tr>
<tr>
<td>ATCO Phase Shifter (Formerly P957)</td>
<td>Add phase shifting transformer at Livock (previously at Dover)</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>TransAlta 902L, 1043L (Formerly P959)</td>
<td>Rebuild 1043L (904L), and restrine 902L owned by TransAlta</td>
<td>March 30, 2012</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):**
The AESO directed AltaLink L.P., EPCOR Distribution & Transmission Inc. and ATCO Electric to prepare and file Facility Applications.

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edmonton Region 240 kV Line Upgrades</td>
<td>$153 Million (2011$ without escalation)</td>
<td>$150 Million (ISD$)</td>
</tr>
</tbody>
</table>
Project 796
Edmonton Region
240kV Line Upgrades
4. **ENMAX NO. 65 SUBSTATION (ESCS); PROJECT 922** – New 240 kV substation in south Calgary and 138 kV developments due to overloading in south Calgary.

**THE PROJECT:** The AESO has recommended transmission reinforcement in the South Calgary area to serve the significant load growth, including the construction of a new South Health Campus that requires a geographically separate redundant electricity supply and because of increasing population in the south area of the city.

**THE COMPONENTS:** The proposed development includes a new 240/138 kV substation near the intersection of Macleod Trail and Highway 22X and associated 138 kV and 240 kV lines to interconnect into the existing system.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENMAX No. 65 I/C to 911L</td>
<td>Interconnect the Enmax No. 65 substation to the AltaLink 911L (240 kV)</td>
<td>Dec. 14, 2012</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):**
ENMAX

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enmax No. 65 Substation</td>
<td>$37 Million (2011$ without escalation)</td>
<td>$38 Million (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
Facility Application 1

Facility Application 2
Interconnect the Enmax No. 65 Substation to the AltaLink 911L (240 kV)
5. **FORT McMURRAY AREA TRANSMISSION BULK SYSTEM REINFORCEMENT (FMAC); PROJECT 838** – Construction of 500 kV transmission lines from the Edmonton area to the Fort McMurray area.

**THE PROJECT:** The Fort McMurray area transmission project is to serve load from the expected growth of the oilsands industry in the northeastern part of the province. The AESO has recommended a 500 kV AC line from the Genesee generating station to a new 500 kV substation in the Fort McMurray area and a 500 kV AC line from the new Heartland substation to the new Fort McMurray area 500 kV substation.

**THE COMPONENTS:**

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fort McMurray Area Bulk System Development Stage 1-Phase 1 (Formerly P1010)</td>
<td></td>
<td>2015 - 2017</td>
</tr>
<tr>
<td>Fort McMurray Area Bulk System Development Stage 2-Phase 1 (Formerly P1012)</td>
<td></td>
<td>2017 - 2019</td>
</tr>
<tr>
<td>Fort McMurray Area Bulk System Development Stage 3-Phase 1 (Formerly P1014)</td>
<td></td>
<td>To Be Determined</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):** The Fort McMurray transmission system reinforcement project will be competitively procured.

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
</table>
| Fort McMurray Area Transmission Bulk System Reinforcement | **Stages 1 & 2:** $1,649 Billion (2011$ without escalation)  
**Stage 3:** $1,349 Billion (2011$ without escalation) | **Stages 1 & 2:** Not Available  
**Stage 3:** Not Available |
Project 838
Fort McMurray Area Transmission Bulk System Reinforcement

Facility Application 1
Fort McMurray Area Bulk System Development Stage 1-Phase 1 (Formerly P1010)

Facility Application 2
Fort McMurray Area Bulk System Development Stage 2-Phase 1 (Formerly P1012)
6. **HANNA REGION TRANSMISSION DEVELOPMENT (HATD); PROJECT 812 – Transmission Development**
in Hanna, Sheerness and Battle River.

**THE PROJECT:** Transmission reinforcement in the Hanna region (East Central Alberta) will allow for
the connection of up to 700 MW of wind power and serve demand of about 970 MW, largely driven
by industrial development in the area. The AESO’s system studies indicate that the Hanna region
transmission system is near capacity and will not be able to supply additional loads in the region or
interconnect any major wind projects without substantial system improvements.

**THE COMPONENTS:** A new 240/144 kV substation near Hardisty with a 240 kV double-circuit line
connecting the new substation to the 240 kV line between Cordel and Hansman Lake; a 240 kV double-
circuit line form Anderson to Oyen and north to Hansman Lake with a new 240 kV switching station north
of Anderson and two 240/138 kV substations near Oyen and Monitor; a 240 kV double-circuit line west
from Anderson and various local area 138 kV enhancements.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngstown 772S Capacitor bank addition (Formerly P977)</td>
<td>Youngstown 772S - capacitor bank addition, 144 kV breaker and communication tower</td>
<td>Oct. 7, 2011</td>
</tr>
<tr>
<td>Battle River 757S Capacitor Bank addition (Formerly P978)</td>
<td>Battle River 757S - 72 kV capacitor bank addition, 144 kV circuit breaker and substation alterations</td>
<td>Aug. 12, 2011</td>
</tr>
<tr>
<td>New Lanfine 240/144 kV substation (Formerly P979)</td>
<td>Oakland to Lanfine Transmission Project. 9L24, Lanfine Substation 959S, and related alterations</td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Lanfine 959S 200 MVar SVC (Formerly P980)</td>
<td></td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Lanfine-Oyen 144 kV S/C Line 7L132 (Formerly P982)</td>
<td></td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Oakland 946S 240 kV S/S combined with Anderson-Oakland line (Formerly P996)</td>
<td>Anderson to Oakland transmission project 9L70/9L97, Oakland substation and related alterations</td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Oakland-Lanfine 240 kV S/C Line 9L924 (Formerly P998)</td>
<td>Oakland to Lanfine transmission project. 9L24, Lanfine substation 959S, and related alterations</td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Coyote Lake 963S 240 kV S/S combined with Oakland-Coyote line (Formerly P999)</td>
<td></td>
<td>March 31, 2013</td>
</tr>
<tr>
<td>Coyote Lake 963S - Michichi Creek 802S 144 kV SC Line 7L128 (Formerly P1000)</td>
<td></td>
<td>March 31, 2013</td>
</tr>
<tr>
<td>Pemukan 932S 240 kV Substation (Formerly P1001)</td>
<td></td>
<td>Sept. 30, 2012</td>
</tr>
</tbody>
</table>
### FACILITY APPLICATION NAME

<table>
<thead>
<tr>
<th>Facility Application Name</th>
<th>Facility Application Description</th>
<th>Forecast or Actual In-Service Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Lanfine-Pemukan 240 kV S/C Line 9L46 (Formerly P1003)</td>
<td></td>
<td>March 31, 2013</td>
</tr>
<tr>
<td>Hansman Lake - Pemukan 240 kV S/C Line 9L966 (Formerly P1011)</td>
<td></td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Pemukan 932S - Monitor 774S 144 kV S/C Line 7L127 (Formerly P1013)</td>
<td></td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Relocate 7L79 line from Monitor 774S - Pemukan 932S (Formerly P1015)</td>
<td></td>
<td>Sept. 30, 2012</td>
</tr>
<tr>
<td>Heatburg 948S - Three Hills-Nevis 144 kV D/C Line 7L16/7L159 (Formerly P1021)</td>
<td></td>
<td>June 15, 2012</td>
</tr>
<tr>
<td>Rowley 768S - Michichi-Three Hills 144 kV DC Line 7L25 (Formerly P1022)</td>
<td>Expansion and rebuild existing Rowley 768S substation, construction of about 13 km of new double-circuit 144 kV transmission line designated as 7L25 and 7L137.</td>
<td>Dec. 31, 2011</td>
</tr>
<tr>
<td>144 kV Capacitor Bank and Circuit Breaker Additions at Three Hills Substation 770S</td>
<td>Additions to Three Hills substation</td>
<td>Dec. 31, 2011</td>
</tr>
<tr>
<td>Stettler 769S - Nevis 768S 144 kV S/C Line 7L143 (Formerly P1023)</td>
<td></td>
<td>March 31, 2013</td>
</tr>
<tr>
<td>Nilrem 574S combined with D/C 240 kV 953L -1047L and Tucuman 478S combined with D/C 138 kV 679L-680L (Formerly P1024,P1025)</td>
<td></td>
<td>April 30, 2012</td>
</tr>
<tr>
<td>Hardisty 377S Substation Capacitor Bank</td>
<td>138 kV capacitor bank addition at Hardisty 377S substation and other associated work</td>
<td></td>
</tr>
<tr>
<td>New 240 kV line 966L from Pemukan 932S - Hansman Lake 650S (Formerly P1026,P1027)</td>
<td>New 240 kV line 966L from Pemukan 932S - Hansman Lake 650S</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>Hansman Lake 650S Substation Static VAR Compensator Addition (Formerly P1026,P1027)</td>
<td>Hansman Lake 650S SVC</td>
<td>June 30, 2012</td>
</tr>
<tr>
<td>New 240 kV line 1060L from Ware Junction 132S-West Brooks 28S (Formerly P1028)</td>
<td></td>
<td>Dec. 14, 2012</td>
</tr>
</tbody>
</table>
THE TRANSMISSION FACILITY OPERATOR(S):
There are 23 Facility Applications attached to the Hanna project. As of May 2011, AltaLink L.P. has filed four of five and ATCO Electric has filed seven of 18.

PROJECT COST:

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanna Region Transmission Development</td>
<td>$909 Million (2011$ without escalation)</td>
<td>$941 Million (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
7. NORTH FORT MCMURRAY TRANSMISSION DEVELOPMENT (NFMD); PROJECT 791 – Transmission
development north of Fort McMurray.

PROJECT: The North Fort McMurray Transmission Development Project is to relieve transmission
constraints and to serve forecast electrical demand as industrial load (oilsands) continues to grow in the
area north of Fort McMurray.

THE COMPONENTS: The project calls for a double-circuit 240 kV line from Kearl Lake to Salt Creek;
addition of the McLelland 240 kV switching station near Kearl Lake; and a 240 kV switching station at
Black Fly.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
</table>
| North Fort McMurray 240 kV Transmission Development | Provide electric service to oilsands developments | April 1, 2012
|                                          |                                  | March 11, 2013                   |

THE TRANSMISSION FACILITY OPERATOR(S):
ATCO Electric

PROJECT COST:

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Fort McMurray Transmission Development</td>
<td>$197 Million (2011$ without escalation)</td>
<td>$237 Million (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
Project 791
North Fort McMurray Transmission Development

Facility Application 1
McLelland to Black Fly & Salt Creek to Black Fly

Fort McMurray
8. **NORTH SOUTH TRANSMISSION REINFORCEMENT (HVDC); PROJECT 737** – Construction of two 500 kV HVDC transmission lines from the Edmonton area to the Calgary and south regions.

**THE PROJECT:** The North South Transmission Reinforcement is to address increased demand in southern and central Alberta, mitigate issues with reliability, maximize efficiency, accommodate long-term growth and lead generation decisions. The project calls for two high-capacity lines between Edmonton and Calgary to reinforce the backbone of the grid and replace aging 240 kV lines. One line will be located on the west/centre portion of the province, connecting to the existing Wabamun Lake hub west of Edmonton to the Calgary area hub near Langdon. The second line will be located on the east side of the province connecting the Heartland hub northeast of Edmonton to a southern hub in the Brooks area.

**THE COMPONENTS:** The new lines will be 500 kV high-voltage direct current (HVDC) technology and will be built to transfer up to 1000 MW of power. The lines and stations will be upgradable to 2000 MW at a future date. Four HVDC converter stations will be required, one at the source and one at the destination point, to convert AC power to DC and DC to AC.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Application - ATCO (Currently known to TFO as P961)</td>
<td>Application to construct and operate a High Voltage DC line from Heartland to West Brook</td>
<td>Mid 2014</td>
</tr>
<tr>
<td>Facility Application - AltaLink (Currently known to TFO as P962)</td>
<td>Application to construct and operate a High Voltage DC line from Genesee to Langdon</td>
<td>Oct. 14, 2014</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):**
AltaLink L.P. will build the western line and ATCO Electric will build the eastern line.

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>North South Transmission Reinforcement</td>
<td>$2,951 Billion (2011$ without escalation)</td>
<td>$3,058 Billion (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
9. **NORTHWEST TRANSMISSION DEVELOPMENT (NWTD); PROJECT 535** – Transmission development in northwest Alberta.

**THE PROJECT:** The Northwest Transmission Development identifies transmission issues in three areas of the Northwest region. The transmission development includes adding new 240/144 kV transformers, capacitor banks and reactive support devices, a 240 kV line from Brintnell to Wesley Creek, and the addition of four new 144 kV transmission lines.

**THE COMPONENTS:** Most of these enhancements have been completed with only two 144 kV lines – Ring Creek and Rainbow Lake, and Sulphur Point and High Level – to be completed.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>9L15 240 kV Wesley Creek 834S to Brintnell 876S, 2 300MVA Tx P598 (Formerly P598)</td>
<td>240 kV single-circuit line Brintnell to Wesley Creek, 2-300 MVA transformers at Wesley Creek</td>
<td>Energized</td>
</tr>
<tr>
<td>7L131/7L106 144 kV D/C line Wesley Creek to Meikle 905S &amp; CTs P599 (Formerly P599)</td>
<td>144 kV double-circuit line from Wesley Creek to new Meikle substation.</td>
<td>Sept. 29, 2010</td>
</tr>
<tr>
<td>7L133-144 kV S/C line Sulphur Point 828S to High Level 786S P600 (Formerly P600)</td>
<td>144 kV single-circuit line from Sulphur Point to High Level</td>
<td>April 4, 2011</td>
</tr>
<tr>
<td>High Level 786S +/- 30 MVAr SVC (Formerly P601)</td>
<td>High Level +/- 30 MVAr Static VAr Compensator</td>
<td>June 30, 2010</td>
</tr>
<tr>
<td>7L113-144 kV S/C line Ring Creek 853S to New Arcenciel 930S (Formerly P602,P604)</td>
<td>144 kV single-circuit line from Ring Creek to new Arcenciel substation and 1 - 30 MVAr capacitor bank at Arcenciel</td>
<td>Sept. 1, 2011</td>
</tr>
<tr>
<td>Arcenciel 930S -30 +50 MVAr synch conductor (Formerly P603)</td>
<td>Arcenciel 930S -30 +50 MVAr synchronous condenser</td>
<td>Nov. 1, 2012</td>
</tr>
<tr>
<td>Arcenciel 930S +/- 30 MVAr SVC P605 (Formerly P605)</td>
<td>Arcenciel 930S +/- 30 MVAr Static VAr Compensator</td>
<td>Sept. 1, 2011</td>
</tr>
<tr>
<td>Little Smoky 813S-install +/- 100MVAr SVC &amp; 2-144 kV breakers (Formerly P606)</td>
<td>Little Smoky 813S-install +/-100 MVAr Static VAr Compensator &amp; 2-144 kV breakers</td>
<td>Sept. 3, 2009</td>
</tr>
</tbody>
</table>
**THE TRANSMISSION FACILITY OPERATOR(S):**
ATCO Electric

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest Transmission Development</td>
<td>Not estimated in 2011 Long-Term Transmission Plan</td>
<td>$508 Million (ISD$ with escalation, does not include project 603, Arcenciel synchronous condenser)</td>
</tr>
</tbody>
</table>

---

![Map of Northwest Transmission Development projects](image-url)
10. **SOUTHWEST ALBERTA TRANSMISSION DEVELOPMENT (SATD); PROJECT 416** – Transmission development in Goose Lake-Peigan and North Lethbridge.

**THE PROJECT:** The Southwest region is currently home to the majority of Alberta’s wind power generation area. This project is now completed.

**THE COMPONENTS:**

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drywood 415S 138/69 kV Transformer Replacement</td>
<td>Replace transformer</td>
<td>Sept. 20, 2006</td>
</tr>
<tr>
<td>Pincher Creek 396S 138/69 kV Transformer Replacement</td>
<td>Replace transformer</td>
<td>Nov. 1, 2006</td>
</tr>
<tr>
<td>Magrath 225S 138/69 kV Transformer Replacement</td>
<td>Replace transformer</td>
<td>Nov. 23, 2006</td>
</tr>
<tr>
<td>Stirling 67S 138 kV Development and 820L Extension to Stirling 67S</td>
<td>Upgrade – 69 kV to 138 kV</td>
<td>Feb. 12, 2007</td>
</tr>
<tr>
<td>240 kV Lines from Goose Lake to Peigan (Formerly P970)</td>
<td>Build a 240 kV double-circuit line from Goose Lake to Peigan</td>
<td>May 31, 2010</td>
</tr>
<tr>
<td>D/C 240 kV line from Peigan 59S and North Lethbridge 370S (Formerly P971)</td>
<td>Build a 240 kV double-circuit line from Peigan to North Lethbridge</td>
<td>Oct. 29, 2010</td>
</tr>
<tr>
<td>138 kV Tie Line between 170L and 725L (Formerly P972)</td>
<td>138 kV lines re-configuration</td>
<td>Oct. 22, 2010</td>
</tr>
<tr>
<td>Replacing the conductor on two km of 616L (170L) line (Formerly P973)</td>
<td>Increase conductor size of 170L</td>
<td>Nov. 5, 2010</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):**
AltaLink L.P.

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest Alberta Transmission Development</td>
<td>$91 Million</td>
<td>$238 Million (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
Review of the Cost Status of Major Transmission Projects in Alberta

Project 416
Southwest Alberta Transmission Development

Facility Application 1
Drywood 415S 138/69 kV Transformer Replacement

Facility Application 2
Pincher Creek 390S 138/69 kV Transformer Replacement

Facility Application 3
Magrath 225S 138/69 kV Transformer Replacement

Facility Application 4
Staging 675 138 kV Development and 820L Extension

Facility Application 5
240kV Lines from Goose Lake to Pegah

Facility Application 6
15KV/240kV line from Pincher Creek to Lethbridge

Facility Application 7
158kV Tie Line between 170L and 725L

Facility Application 8
Reconstruction 2km of 616L (170L)

Existing Substations
Existing 99 kV Transmission Lines
Existing 138 kV Transmission Lines
Existing 240 kV Transmission Lines
Projected 416 Components
Cities and Towns
11. **SOUTHERN ALBERTA TRANSMISSION REINFORCEMENT (SATR); PROJECT 787** – The purpose of this project is primarily to accommodate wind generation in southern Alberta.

**THE PROJECT:** The existing capacity of the transmission system in southern Alberta is insufficient to provide adequate system access for the interconnection of additional wind-powered generation. Additional substations and upgrades to existing facilities are required. The AESO has outlined the need for a 240 kV AC looped system with three stages of implementation.

**THE COMPONENTS:**

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>911L Line Replacement (Formerly P882)</td>
<td>Build new 240 kV lines</td>
<td>June 2, 2014</td>
</tr>
<tr>
<td>Milo Junction Switching Station (Formerly P883)</td>
<td>Build a switching station at Milo Junction</td>
<td>April 15, 2011</td>
</tr>
<tr>
<td>PST Addition at Russell 632S (Formerly P884)</td>
<td>Phase shifting transformer and new Russell substation</td>
<td>Sept. 30, 2011</td>
</tr>
<tr>
<td>Cassils to East Medicine Hat (Formerly P886)</td>
<td>240 kV lines from Cassils to Bowmanton</td>
<td>March 25, 2014</td>
</tr>
<tr>
<td>East Med Hat to Whita 240 kV Transmission Line (Formerly P887)</td>
<td>240 kV lines from Bowmanton to Whita</td>
<td>May 31, 2014</td>
</tr>
<tr>
<td>Med Hat Area 138 kV Line Development (Formerly P888)</td>
<td>138 kV system upgrades in Medicine Hat area</td>
<td>May 30, 2014</td>
</tr>
<tr>
<td>Chapel Rock Sub and 240 kV line to Fidler (Formerly P1034)</td>
<td>240 kV Line from Fidler to Chapel Rock and new Chapel Rock 500 kV substation</td>
<td>Jan. 31, 2014</td>
</tr>
<tr>
<td>Etzikom Coulee S/S and 240 kV line to MATL S/S (Formerly P1035)</td>
<td>240 kV line from Journault to Picture Butte substation</td>
<td>May 22, 2014</td>
</tr>
<tr>
<td>Goose Lake S/S to Etzikom Coulee S/S 240 kV Line (Formerly P1036)</td>
<td>240 kV line from Goose Lake to Journault substation</td>
<td>Dec. 1, 2016</td>
</tr>
<tr>
<td>Etzikom Coulee S/S to Whita 240 kV Line (Formerly P1037)</td>
<td>240 kV line from Journault to Whita substation</td>
<td>Nov. 28, 2014</td>
</tr>
<tr>
<td>Blackie Area 138 kV Upgrade (Formerly P1038)</td>
<td>138 kV system upgrade in the Blackie area</td>
<td>March 1, 2014</td>
</tr>
<tr>
<td>Cypress Substation SVC (Formerly P1039)</td>
<td>SVC addition at Cypress substation</td>
<td>Sept. 30, 2013</td>
</tr>
<tr>
<td>Ware Junction Substation Upgrade (Formerly P1040)</td>
<td>933L line in/out at Ware Junction</td>
<td>Dec. 14, 2012</td>
</tr>
</tbody>
</table>
THE TRANSMISSION FACILITY OPERATOR(S):
AltaLink L.P.

PROJECT COST:

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Alberta Transmission Reinforcement</td>
<td>$2,287 Billion (2011$ without escalation)</td>
<td>Not Available</td>
</tr>
</tbody>
</table>
12. **YELLOWHEAD AREA TRANSMISSION DEVELOPMENT (YATD); PROJECT 671** – Yellowhead area transmission development.

**THE PROJECT:** The AESO identified the need for a number of transmission system upgrades to replace facilities that have deteriorated with age in Drayton Valley, Edson, Hinton and the Alberta Beach areas, and to meet the growing residential and commercial demand for electricity in the area.

**THE COMPONENTS:** Conversion of the 69 kV systems to 138 kV from Wabamun to Drayton Valley and Wabamun to Barrhead; and re-configuration and enhancements to the 138 kV system in the Edson-Hinton area.

<table>
<thead>
<tr>
<th>FACILITY APPLICATION NAME</th>
<th>FACILITY APPLICATION DESCRIPTION</th>
<th>FORECAST OR ACTUAL IN-SERVICE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinton/Edson Area Transmission (Formerly P909)</td>
<td>Hinton/Edson Area 138 kV transmission upgrades</td>
<td>March 26, 2012</td>
</tr>
<tr>
<td>Cold Creek 602S 138 kV, 27 MVar Capacitor Bank (Formerly P910)</td>
<td>Cold Creek 602S 138 kV, 27 MVar capacitor bank</td>
<td>Dec. 20, 2010</td>
</tr>
<tr>
<td>Cherhill Substation and 240 kV Interconnection (Formerly P911)</td>
<td>Cherhill substation and 240 kV interconnection</td>
<td>Dec. 8, 2011</td>
</tr>
<tr>
<td>Drayton Valley Area 138 kV Transmission (Formerly P912)</td>
<td>Drayton Valley Area 138 kV transmission development and cap bank Installations</td>
<td>Dec. 16, 2011</td>
</tr>
</tbody>
</table>

**THE TRANSMISSION FACILITY OPERATOR(S):**
AltaLink L.P.

**PROJECT COST:**

<table>
<thead>
<tr>
<th>TRANSMISSION PROJECT</th>
<th>AESO 2011 LONG-TERM TRANSMISSION PLAN ESTIMATED COST</th>
<th>PROPOSAL TO PROVIDE SERVICE ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellowhead Area Transmission Development</td>
<td>$123 Million (2011$ without escalation)</td>
<td>$126 Million (ISD$ with escalation)</td>
</tr>
</tbody>
</table>
Review of the Cost Status of Major Transmission Projects in Alberta

Project 671
Yellowhead Area Transmission Development
Appendix B

Reports and Materials Reviewed

The following pages list the reports and related documents that the TFCMC has reviewed at its monthly meetings up until the period covered by this report, September 2010 to April 2011. It should be noted, however, that in various instances portions of the material provided have been excluded from the TFCMC due to confidential, or commercially sensitive concerns, or in instances where the disclosure of future matters relating to a project’s cost, scope, or schedule would have a significant impact on the electricity market or a project’s cost, scope or schedule.

Reviewed September 2010 (First Meeting)

Items:
- AESO Presentation on Projects Falling Under the TFCMC’s Mandate

Reviewed October 2010

Items:
- AESO Discussion Paper on Rules for Transmission Facility Projects
- Governance and Committee Operational Procedures – Straw Model
- Chair selection process and recommendation(s)
- Recommendations for independent members - review and discussion
- AESO Supplied Sample of Monthly Report(s) from Transmission Facility Operators the TFCMC will be Reviewing

Reviewed November 2010

Monthly Reports:

AltaLink L.P.

PROJECT 416 – August 2010 Progress Report for SW Transmission Development; (AESO Reference: RP-05-416; AltaLink Reference: D0024, Version 1)


PROJECT 786 – August 2010 AML Progress Report for Edmonton Region 240 kV Upgrades (AESO Reference: RP-05-786; AltaLink Reference: D.0213, Version 1)


PROJECT 787 – August 2010 Progress Report for Cassils to Bowmanton (AESO Reference: RP-05-886; AltaLink Reference: D.0184.02)


PROJECT 787 – August 2010 Progress Report for Bowmanton to Whita Transmission Line and New Whita Substation (AESO Reference: RP-05-887; AltaLink Reference: D.0184.03)

PROJECT 787 – September 2010 Progress Report for Bowmanton to Whita Transmission Line and New Whita Substation (AESO Reference: RP-05-887; AltaLink Reference: D.0184.03)


ATCO Electric

PROJECT 535 – August 2010 Progress Report for High Level to Sulphur Point 144 kV Line (AESO Reference: RP-05-600 Rev. 0; ATCO Electric Reference: 51060; Date: September 22, 2010)

PROJECT 535 – September 2010 Progress Report for High Level to Sulphur Point 144 kV Line (AESO Reference: RP-05-600 Rev. 0; ATCO Electric Reference: 51060; Date: October 22, 2010)


EPCOR Distribution and Transmission Inc.


Additional Items:
- AltaLink Response to TFCMC Request for Information on Heartland Project
- Update Cost Prudence Chart – Transmission Additions to Utility Rate Base
- AESO Cost Committee Monthly Report Matrix – Chart of Relevant Projects and Their Status

Reviewed December 2010

Monthly Reports:

AltaLink L.P.


PROJECT 671 – October 2010 Progress Report (Revised) for Yellowhead Transmission Development – Cherhill (AESO Reference: RP-05-911; AltaLink Reference: D.0030.03, Version 1)


PROJECT 787 – October 2010 Progress Report for Cassils to Bowmanton (AESO Reference: RP-05-886; AltaLink Reference: D.0184.02)

PROJECT 787 – October 2010 Progress Report for Bowmanton to Whita Transmission Line and New Whitla Substation (AESO Reference: RP-05-887; AltaLink Reference: D.0184.03)


ATCO Electric

PROJECT 535 – October 2010 Progress Report for High Level to Sulphur Point 144 kV Line (AESO Reference: RP-05-600 Rev. 0; ATCO Electric Reference: 51060; Date: November 22, 2010)

PROJECT 535 – October 2010 Progress Report for 144 kV Single-Circuit Line Ring Creek to 853S to New Arcenciel 930S, 30 MVar Capacitor Bank and CT Upgrades to 7L82 (AESO Reference: RP-05-602; ATCO Electric Reference: 51081; Date: November 22, 2010)

PROJECT 535 – October 2010 Progress Report for Arcenciel 930S 144 kV +/- 30 MVar Synchronous Condenser (AESO Reference: RP-05-603; ATCO Electric Reference: 51103; Date: November 22, 2010)


Additional Items:
- Transmission Facilities Cost Monitoring Proposal From Dan Levson of Bema Enterprises Ltd. (including sample information request based on the Heartland Transmission project)
- FTI Consulting Proposal
- TFCMC Terms of Reference Document for Consultants
- Critical Transmission Infrastructure Overview Chart (Draft)
■ AESO Supplied Maps of Transmission Projects Falling Under the TFCMC’s Review
■ AESO Supplied Transmission System Quarterly Report
■ AESO Cost Committee Monthly Report Matrix – Chart of Relevant Projects, Costs and Status

Reviewed January 2011

Monthly Reports:

AltaLink L.P.


ATCO ELECTRIC

PROJECT 535 – November 2010 Progress Report for High Level to Sulphur Point 144 kV Line (AESO Reference: RP-05-600 Rev. 0; ATCO Electric Reference: 51060; Date: December 29, 2010)

PROJECT 535 – November 2010 Progress Report for 144 kV Single-Circuit Line Ring Creek to 853S to New Arcenciel 930S, 30 MVAr Capacitor Bank and CT Upgrades to 7L82 (AESO Reference: RP-05-602; ATCO Electric Reference: 51081; Date: January 10, 2011)

PROJECT 535 – November 2010 Progress Report for Arcenciel 930S 144 kV +/- 30 MVAr Synchronous Condenser (AESO Reference: RP-05-603; ATCO Electric Reference: 51103; Date: December 21, 2010)


EPCOR Distribution and Transmission Inc.


Additional Items:
■ Case Study Template for Projects Falling under the TFCMC’s Review
■ Outline/Suggestions for TFCMC Reports as Required by the Ministerial Order Creating the Committee
■ AESO Cost Committee Monthly Report Matrix – Chart of Relevant Projects, Costs and Status

Reviewed February 2011

Monthly Reports:

AltaLink L.P.

PROJECT 787 – October 2010 Progress Report for Windy Flats/Peigan to Foothills Transmission Line South Foothills Transmission Project (AESO Reference: RP-05-882; AltaLink Reference: D.0184.05)


PROJECT 787 – November 2010 Progress Report for Windy Flats/Peigan Transmission Line South Foothills Transmission Project (AESO Reference: RP-05-882; AltaLink Reference: D.0184.05)


PROJECT 787 – November 2010 Progress Report for Cassils to Bowmanton (AESO Reference: RP-05-886; AltaLink Reference: D.0184.02)

PROJECT 787 – November 2010 Progress Report for Bowmanton to Whittla Transmission Line and New Whittla Substation (AESO Reference: RP-05-887; AltaLink Reference: D.0184.03)


ATCO Electric


PROJECT 535 – December 2010 Progress Report for 144 kV Single-Circuit Line Ring Creek to 853S to New Arcenciel 930S, 30 MVAR Capacitor Bank and CT Upgrades to 7L82 (AESO Reference: RP-05-602; ATCO Electric Reference: 51081; Date: January 24, 2011)

PROJECT 535 – December 2010 Progress Report for Arcenciel 930S 144 kV -30/+50 MVAR Synchronous Condenser (AESO Reference: RP-05-603; ATCO Electric Reference: 51103; Date: January 24, 2011)


EPCOR DISTRIBUTION & TRANSMISSION INC.


Additional Items:
- AESO Cost Committee Monthly Report Matrix – Chart of Relevant Projects, Costs and Status
- AESO Supplied Heartland Project Cost Summary
- AESO Supplied Long-Term Plan (p. 43) Heartland Transmission System Reinforcement Options
- AESO Supplied Southwest Transmission Project Cost Summary Case Study
- AESO Supplied Northwest Transmission Project Cost Summary Case Study
- AltaLink presentation on Project 416, Southwest Alberta Transmission Development
- ATCO Electric presentation on Project 535 Northwest Transmission Development

Submitted Shortly After The February Meeting:

AltaLink – EPCOR


Reviewed March 2011

Monthly Reports:

AltaLink L.P.


AltaLink – EPCOR


ATCO ELECTRIC


EPCOR Distribution and Transmission Inc.


Additional Items:
- AESO Cost Committee Monthly Report Matrix – Chart of Relevant Projects, Costs and Status
- AESO Supplied Edmonton Region 240 kV Line Upgrades Project (the “Debottlenecking Project”) Work Scope and Cost Changes - From NID to PPS; Project 786
- AESO Supplied Southern Alberta Transmission Development AESO Cost Summary
- TFCMC Intro to FOIP

Reviewed April 2011

Monthly Reports:

AltaLink L.P.


PROJECT 787 – February 2011 Progress Report for Windy Flats/Peigan Transmission Line South Foothills Transmission Project (AESO Reference: RP-05-882; AltaLink Reference: D.0184.05)


AltaLink – EPCOR


ATCO Electric

PROJECT 535 – February 2011 Progress Report for High Level to Sulphur Point 144 kV Line (AESO Reference: RP-05-600 Rev. 0; ATCO Electric Reference: 51060; Date: March 21, 2011)


PROJECT 535 – February 2011 Progress Report for Arcenciel 930S 144 kV -30/+50 MVAR Synchronous Condenser (AESO Reference: RP-05-603; ATCO Electric Reference: 51103; Date: March 21, 2011)


EPCOR Distribution and Transmission Inc.


Additional Items:

- AESO Cost Committee Monthly Report Matrix – Chart of Relevant Projects, Costs and Status
- AESO Supplied Southern Alberta Transmission Reinforcement (SATR) Needs Identification Document
- SATR NID Names Compared to PPS Names
- Consultant Overview document
- TFCMC 2011-12 Budget Overview
- Project 786 Information Requests (originating from the TFCMC)
Appendix C

Case Studies and Cost Summaries

To better understand the costs and changes associated with the various transmission projects, the TFCMC has had case studies prepared outlining the respective details. These case studies are below.

**PROJECT 416 SW TRANSMISSION PROJECT COST SUMMARY FOR TFCMC CASE STUDY 4-FEB-11**

<table>
<thead>
<tr>
<th>LINE #</th>
<th>EVENT / COST DRIVER</th>
<th>COST ESTIMATE (MILLIONS $)</th>
<th>EXPLANATION FOR ESTIMATE ADJUSTMENT</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>April 5, 2004 NID Application filed with EUB, cost estimate for Option 1 = $77M and Option 2 = $78M</td>
<td>$77</td>
<td>Project Scope: Option 1 - new double circuit 240 kV line from Pincher Creek 396S to Peigan 59S with both sides strung; and new double circuit 240 kV line from Peigan 59S to North Lethbridge 370S, one side strung Option 2 - new Mud Lake 116S substation; and new double circuit 240 kV line from Pincher Creek 396S to Mud Lake 116S with both sides strung; and new double circuit 240 kV line from Mud Lake 116S to North Lethbridge 370S, one side strung. Common to Option 1 and Option 2 - new single circuit 138 kV line, Stirling 67S to Tempest 403S - salvage substation Tempest 403S and sections of 138 kV line - re-configure existing and add new 138 kV lines to reconnect McBride Lake wind farm - re-conductor a portion of existing line 170L between Pincher Creek 396S and Peigan 59S - substations upgrades at Magrath 225S, Drywood 415S and Pincher Creek 396S</td>
<td>Option 1 involved the land area of the Piikani First Nation, and also involved the land area on the Blood Indian Reserve. Indian and Northern Affairs were involved in the approval process.</td>
</tr>
<tr>
<td>2</td>
<td>Sept. 7, 2004 EUB Decision 2004-075</td>
<td></td>
<td>EUB Decision refers AESO NID application back for additional consideration to review congestion, planning criteria, use of RAS, load forecasts and future generator commitments</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Oct. 14, 2004 EUB Decision 2004-087</td>
<td></td>
<td>EUB Decision is an addendum to prior EUB Decision 2004-075 and determined NID meets need but could exceed requirement at an unnecessarily high price, therefore the EUB requires additional information. EUB asks AESO to prepare alternative proposal or proposals</td>
<td></td>
</tr>
<tr>
<td>LINE #</td>
<td>EVENT / COST DRIVER</td>
<td>COST ESTIMATE (MILLIONS $)</td>
<td>EXPLANATION FOR ESTIMATE ADJUSTMENT</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------</td>
<td>-----------------------------</td>
<td>------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>4</td>
<td>May 17, 2005 EUB Decision 2005-049 AESO adds ‘Part B’ project scope</td>
<td>EUB Decision affirms the scope of the NID. AESO defines existing 240 kV word scope as ‘Part A’ and stringing the second side of the new double circuit 240 kV line, Peigan 59S to North Lethbridge 370S as ‘Part B’. Part B to proceed if AESO receives specific new generator commitments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>May 20, 2005 EUB Need Assessment Approval U2005-184</td>
<td>EUB approves NID and project scope as defined in EUB Decision 2005-049</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nov. 15, 2005 AESO application to amend EUB NID Approval U2005-184</td>
<td>AML had advised the AESO that the proposed development at Pincher Creek 396S and the associated 240 kV line terminations needed to be changed due to siting issues for an adjacent road allowance for Highway #3. A new substation called Goose Lake 103S is proposed to be constructed adjacent to Pincher Creek 396S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Jan. 18, 2006 AESO application to amend EUB NID Approval U2005-184</td>
<td>The AESO received a customer request to clarify the ultimate substation arrangement for the proposed Good lake 103S substation and the confirm the current list of generator commitments in the area, and using its expertise, the probable total wind generation to be connected to the grid. This request is related to the amount of land required for the Goose Lake 103S substation and associated line terminations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Feb. 17, 2006 AESO application to amend EUB NID Approval U2005-184</td>
<td>AESO advised the EUB that sufficient new generation commitments were received to required Part B of the project to proceed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>April 18, 2006 EUB Need Assessment Approval U2006-94</td>
<td>The EUB approved work scope includes new Goose Lake 103S substation and only referenced Option 1 (described above)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Oct. 3, 2006 AESO application to amend EUB NID Approval U2006-94</td>
<td>The AESO requested approval for both Option 1 or Option 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LINE #</td>
<td>EVENT / COST DRIVER</td>
<td>COST ESTIMATE (MILLIONS $)</td>
<td>EXPLANATION FOR ESTIMATE ADJUSTMENT</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------</td>
<td>-----------------------------</td>
<td>-------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>11</td>
<td>Oct. 19, 2006 EUB Need Assessment Approval No. U2006-265</td>
<td></td>
<td>The EUB approved either Option 1 or Option 2; the number of new 138 kV circuit breakers at Goose Lake 103S (rather than Pincher Creek 396S) from 4 to 5; the number of new 240 kV circuit breakers at Peigan 59S (for Option 1) was changed from 5 to 7.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>May 10, 2005 The City of Lethbridge provide a PPS to the AESO with an anticipated ISD of “Fall of 2006”</td>
<td></td>
<td>PPS cost estimate is $25k.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>June 16, 2005 AML provided a PPS to the AESO with a forecasted ISD of Nov., 2006 for the 240 kV portion and Feb., 2007 for the other developments.</td>
<td>$91</td>
<td>The PPS includes the new Goose Lake 103S substation, which was the major project scope change listed above in the section for AESO and EUB Related Changes. The PPS did not include stringing the second side of the new 240 kV line between Peigan 59S and North Lethbridge 370S (See TCA #7 and #12, listed below with a cost of $7.8M)</td>
<td>$7.8M could be added to $91M to include the stringing of the second side of the 240 kV double circuit line between Peigan 59S and North Lethbridge 370S, for a total of $99M</td>
</tr>
<tr>
<td>14</td>
<td>Nov. 7, 2005 AESO accepts PPS from AML</td>
<td></td>
<td>PPS based on AESO Functional Specification Rev. 3.0, dated April 5, 2005. The AESO requested that a number of items be removed from the PPS project scope, which included: circuit breakers, protective relays, air-break disconnect switches, communication towers, radio equipment, multiplexers and a radio station.</td>
<td>See attached sheet “AESO initiated changes” summary which includes mention of the above line item 13.</td>
</tr>
</tbody>
</table>
The PPS submitted to the AESO included all AESO/EUB changes (including the Goose Lake 103S substation) except to string the second side of the new 240 kV double circuit line between Pegan 59S and North Lethbridge 360S. The AESO indicated in the NID that stringing the second side depended on local generator interconnection projects being committed by the customers. The customer commitments were subsequently received by the AESO. See line 8 of the main table.

The AESO requested a number of project scope reductions when reviewing the PPS. The net cost savings of the changes are not known, but includes circuit breakers, protective relays, air-break disconnect switches, communication towers, radio equipment, multiplexers and a radio station. (Approximate cost estimate indicated.)

AESO request to change the RAS Functionality

Notes:
1. The NID does not specifically indicate whether AFUDC or E&S are included. (see page 45 of the NID)
2. The PPS includes AFUDC = $1,364,000 and E&S = $6,075,000
### PROJECT 535 NW TRANSMISSION PROJECT COST SUMMARY FOR TFCMC CASE STUDY

#### 4-FEB-11

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST DRIVER</th>
<th>COST ESTIMATE (MILLIONS $)</th>
<th>EXPLANATION FOR ESTIMATE ADJUSTMENT</th>
<th>RATIONALE AND COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>$263</td>
<td>Reflects the total estimated capital costs (excluding AFUDC and E&amp;S) (2005$) for Part B of the project per the NID filing. Part A, estimated at $32.6 million, has been excluded from this estimate. All Part A work was completed at a final cost of $33.3 million.</td>
<td>See “Part A and Part B facilities” tab for a detailed breakdown of the components. The estimate excludes Part A; details are provided on a separate tab. The AUC approved the scope with Approval U2006-205 on August 17, 2006. Estimates for the NID provided by the TFO.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>$654</td>
<td>Reflects updated capital cost estimates as published in the Long Term Transmission Plan (LTP) (June 2009), expressed in 2008$. See tables 3.0-1 and 8.0-1 of the LTP.</td>
<td>Revised cost estimates were provided by the TFO for the various components of the project. The main reasons for the increased costs were attributed to higher inflation rate and an EPC adder reflecting outsourcing by the TFO of the design, procurement and construction. Scope had not changed. See “Part A and Part B facilities” tab for a breakdown of the components.</td>
</tr>
<tr>
<td>3</td>
<td>Scope change associated with the 144 kV line from Ring Creek to Rainbow and subject of an amendment filing to the AUC on June 10, 2010.</td>
<td>$15</td>
<td>Additional 144 kV line and addition of 8 circuit breakers at the new Arcenceil substation.</td>
<td>The Arcenceil substation location was adjusted due to siting issues requiring an additional 144 kV interconnection to the Rainbow substation and establishment of a breaker and a third substation. Reflected in AUC approval U2010-394; note 2 below.</td>
</tr>
<tr>
<td>4</td>
<td>Scope adjustment that reflects breaker additions for SVCs and SVC rating modifications</td>
<td>$2</td>
<td>Additional 144 kV circuit breakers and rating modifications to SVCs.</td>
<td>Required to improve reliability to ensure switching of the SVCs do not impact 144 kV bus reliability. Reflected in AUC approvals, per note 2 below.</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>$671</td>
<td>AS REPORTED BY THE TFO IN THE FACILITY APPLICATIONS, WITH THE EXCEPTION OF THE ARCENCEIL 50 MVAR SYNCHRONOUS CONDENSOR PROJECT WHICH HAS NOT BEEN FILED WITH THE AUC.</td>
<td>THE SYNCHRONOUS CONDENSOR WAS IN THE ORIGINAL SCOPE AND ESTIMATED AT $21 MILLION AS REPORTED IN THE LTP.</td>
</tr>
</tbody>
</table>

**Notes:**

1. In view of the escalating costs, the AESO carried out an economic analysis to determine whether to stay the course for the project with the current scope. The AESO provided the AUC, via letter dated August 1, 2007, the results of the analysis and confirmed that it was appropriate to stay the course.

2. The AESO filed various NID amendments for the project: These include:
### P535 NW TRANSMISSION DEVELOPMENT PROJECT

**14-JAN-11**

<table>
<thead>
<tr>
<th>PART A</th>
<th>$X1000</th>
<th>$X1000</th>
<th>$X1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NID</td>
<td>FA AND PPS</td>
<td>AESO LONG TERM 2009 PLAN</td>
</tr>
<tr>
<td>1</td>
<td>P577 Cranberry Lake - install one 144 kV 30 MVAR SVC and one breaker</td>
<td>$10,000</td>
<td>$11,897</td>
</tr>
<tr>
<td>2</td>
<td>P570 Lubicon - install 2 - 144 kV 30 MVAR cap banks and 3 breakers</td>
<td>$3,000</td>
<td>$4,083</td>
</tr>
<tr>
<td>3</td>
<td>P571 Friedenstal - install 1 - 144 kV 15 MVAR cap bank and 1 breaker</td>
<td>$2,500</td>
<td>$2,017</td>
</tr>
<tr>
<td>4</td>
<td>P572 Ksituan - install 1 - 15 MVAR cap bank and 1 breaker</td>
<td>$2,500</td>
<td>$2,017</td>
</tr>
<tr>
<td>5</td>
<td>P573 Goodfare - install 2 - 15 MVAR cap banks and 2 breakers</td>
<td>$3,000</td>
<td>$2,785</td>
</tr>
<tr>
<td>6</td>
<td>P574 Big mountain - install 1 - 30 MVAR cap bank and 1 breaker</td>
<td>$1,500</td>
<td>$2,304</td>
</tr>
<tr>
<td>7</td>
<td>P575 Little Smoky - install 3 - 30 mvar cap banks and 5 breakers</td>
<td>$5,500</td>
<td>$5,463</td>
</tr>
<tr>
<td>8</td>
<td>P576 Louise Creek - install on site spare 240/144 kV transformer and 1-240 kV breaker and 2 - 2144 kV breakers</td>
<td>$4,000</td>
<td>$2,699</td>
</tr>
<tr>
<td>9</td>
<td>Misc CT upgrades</td>
<td>$600</td>
<td>$0</td>
</tr>
<tr>
<td><strong>TOTAL PART A</strong></td>
<td><strong>$32,600</strong></td>
<td><strong>$33,265</strong></td>
<td><strong>$33,000</strong></td>
</tr>
</tbody>
</table>

Notes:
1. The comment regarding “no scope change” refers to the time between NID estimate and PPS or FA estimate.
2. A PPS estimate has not been received for this project, and as such a FA has not been filed as of this date. The estimate provided represents a forecast.
# P535 NW TRANSMISSION DEVELOPMENT PROJECT
## 14-JAN-11

<table>
<thead>
<tr>
<th>PART B</th>
<th>$X1000</th>
<th>$X1000</th>
<th>$X1000</th>
<th>$X1000</th>
<th>COMMENTS (SEE NOTE 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NID</td>
<td>PPS AND FA</td>
<td>AESO LONG TERM 2009 PLAN</td>
<td>FORECAST FINAL COST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>P598 - 240 kV single circuit from Brintnell to Wesley Creek. 2 - 300 MVA transformers</td>
<td>$103,000</td>
<td>$208,000</td>
<td>$208,000</td>
<td>$184,900</td>
</tr>
<tr>
<td>2</td>
<td>P599 - double circuit 144 kV line from Wesley Creek to new Hotchkiss (Meikle)</td>
<td>$64,000</td>
<td>$193,000</td>
<td>$193,000</td>
<td>$114,930</td>
</tr>
<tr>
<td>3</td>
<td>P600 - single circuit 144 kV line from Sulphur Point to High Level</td>
<td>$18,000</td>
<td>$78,000</td>
<td>$80,000</td>
<td>$36,600</td>
</tr>
<tr>
<td>4</td>
<td>P601 - High Level - install 144 kV 30 MVAR SVC</td>
<td>$10,000</td>
<td>$12,000</td>
<td>$68,000</td>
<td>$11,061</td>
</tr>
<tr>
<td>5</td>
<td>P602 and P604 - single circuit 144 kV line from Ring Creek to new Rainbow Lake station (Arcenciel) and 30 MVAR cap bank</td>
<td>$25,500</td>
<td>$121,000</td>
<td>$80,000</td>
<td>$106,730</td>
</tr>
<tr>
<td>6</td>
<td>P603 - Arcenciel - install 50 MVAR synchronous condenser</td>
<td>$12,000</td>
<td>$21,000</td>
<td>$21,000</td>
<td>$21,402</td>
</tr>
<tr>
<td>7</td>
<td>P605 - Arcenciel - install 30 MVAR SVC</td>
<td>$13,500</td>
<td>$12,000</td>
<td></td>
<td>$12,050</td>
</tr>
<tr>
<td>8</td>
<td>P606 - Little Smoky - install 100 MVAR SVC</td>
<td>$14,500</td>
<td>$22,000</td>
<td></td>
<td>$20,300</td>
</tr>
<tr>
<td>9</td>
<td>Misc teleprotection upgrades</td>
<td>$2,000</td>
<td>$4,000</td>
<td></td>
<td>$4,000</td>
</tr>
<tr>
<td><strong>TOTAL PART B</strong></td>
<td><strong>$262,500</strong></td>
<td><strong>$671,000</strong></td>
<td><strong>$654,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 | Ring Creek to new Arcencile Substation - NID Amendment U2010-394 |
NID estimate based on new sub being right beside existing Rainbow and a ring bus configuration. Siting issues resulted in the new sub being located about 5 km away. This resulted in the need for 2 - 144 kV lines being built between the 2 stations. Decision was made to build the station in a breaker and one third configuration, install breakers on each of the SVC, Cap Bank and Synch Cond. This resulted in 8 more breakers being installed.
## PROJEKT 629 HEARTLAND FACILITY APPLICATION
### ESTIMATED COSTS VS. AESO LONG-TERM TRANSMISSION PLAN

**4-FEB-11**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST DRIVER</th>
<th>COST ESTIMATE (MILLIONS $)</th>
<th>EXPLANATION FOR ESTIMATE ADJUSTMENT</th>
<th>RATIONALE AND COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Escalation, E&amp;S, and AFUDC</td>
<td>$360</td>
<td>The Long Term Transmission Plan (LTP) (June 2009) estimate. See P.43 of LTP that includes a 500 kV double circuit and Heartland substation. (See Note 2, below.)</td>
<td>The cost estimate does not include the 240 kV Heartland load loop facilities nor the Ellerslie stations modifications required to encompass the full scope of the Heartland CTI Project. The LTP identified the need for the Heartland 240 kV interconnection as part of the 240 kV regional plans and referenced on P. 349 of the LTP.</td>
</tr>
<tr>
<td>2</td>
<td>Establish 240 kV Heartland load loop</td>
<td>$77</td>
<td>Labour and material for 22km of 240kV double circuit line.</td>
<td>Required to enable the interconnection of the Heartland 500/240 kV substation to the area 240 kV transmission system.</td>
</tr>
<tr>
<td>3</td>
<td>Transmission line design</td>
<td>$38</td>
<td>Change in structure mix, foundation mix, etc as a result of final routing for the 500 kV line. Specific tower location, and type, not known prior to full routing consultations. Final route entailed application of more dead-end and angle structures than originally estimated.</td>
<td>Specific transmission line route not established until stakeholder consultation completed by the TFO. A multitude of line routes were evaluated by the TFO in conjunction with the facilities application. The double circuit tower design selected was one originally developed for the cancelled N-S Edmonton-Calgary 500 kV AC line.</td>
</tr>
<tr>
<td>4</td>
<td>Gas Insulated Line (GIL) for line crossing near Ellerslie</td>
<td>$20</td>
<td>500 kV GIL required to enable crossing 4-240kV circuits near Ellerslie. Added to the scope by the TFO following stakeholder consultation.</td>
<td>Required in order to maintain 150 m separation from the new 500 kV double circuit transmission line to the nearest residences.</td>
</tr>
<tr>
<td>5</td>
<td>Pipeline mitigation</td>
<td>$15</td>
<td>Not part of original estimate due to uncertainty of line routing at the time. The preferred route parallels a considerable number of pipelines.</td>
<td>Refer to the TFO’s facility application for more detail.</td>
</tr>
<tr>
<td>6</td>
<td>Ellerslie station modifications</td>
<td>$11</td>
<td>500 kV breakers to terminate the 500 kV lines at Ellerslie.</td>
<td>Required to integrate the 2-500 kV lines into the system at Ellerslie.</td>
</tr>
<tr>
<td>7</td>
<td>Facility application development</td>
<td>$37</td>
<td>Extensive consultation process; 4-options; including an underground option; beyond what was originally contemplated. As noted in the TFO’s facility application this is made up of 1) $14 million (M) - consultation costs, 2) $4 M - hearing costs, 3) $4 M - environmental evaluations, 4) $ 4M - land title searches, 5) $4M-preparation of expert evidence, 6) $ 2M - intervener cost orders, 7) $ 5M siting consultants.</td>
<td>Refer to the TFO’s facility application for more detail. This also includes the AESO’s commissioned work regarding investigation of 500 kV underground.</td>
</tr>
</tbody>
</table>

**TOTAL** | **$580** | **AS REPORTED BY THE TFO IN THE FACILITY APPLICATION** |
<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST DRIVER</th>
<th>COST ESTIMATE (MILLIONS $)</th>
<th>EXPLANATION FOR ESTIMATE ADJUSTMENT</th>
<th>RATIONALE AND COMMENT</th>
</tr>
</thead>
</table>

Notes:
1. The above summary is consistent with the information provided by AltaLink/EPCOR in IR - AUC.AML/EPCOR-051.
2. The cost estimate, as noted in the LTP, reflects a double circuit 500 kV line in a west route around Edmonton, however is utilized as a basis for comparison as it best reflects a project scope that is indicative of the easterly preferred route currently applied for before the AUC.
### PROJECT 786 EDMONTON REGION

#### 240 kV LINE UPGRADING COST SUMMARY FOR TFCMC CASE STUDY

**11-MAR-11**

<table>
<thead>
<tr>
<th>LINE #</th>
<th>EVENT / COST DRIVER</th>
<th>TOTAL COST ESTIMATE ($M)</th>
<th>AML COST ESTIMATE ($M)</th>
<th>EDTI COST ESTIMATE ($M)</th>
<th>ATCO COST ESTIMATE ($M)</th>
<th>EXPLANATION FOR COST ESTIMATE ADJUSTMENT</th>
<th>COMMENT</th>
</tr>
</thead>
</table>
| 1      | August 25, 2008 NID Application filed with AUC Application No. 1584342 2010$'s (as spent dollar as described in the NID, which is tied to the ISD of 2010) | $125 | $77 | $9 | $39 | Note: The estimate of $125 million was slightly higher than the $122 million shown in the 2009 Long-Term Transmission Plan (Reference Table 3.0-1 - Edmonton Region 240 kV Line Upgrades) and can be attributed to some refinement in estimating as part of the NID application. Project Scope:  
- Increase capacity of 908L and 909L (replace first 4 km of line conductor near Sundance 310P)  
- Increase capacity of 902L (replace first 4 km of line conductors near both Wabamun 19S and Sundance 310P)  
- Rebuild 904L (Jasper to Wabamun) with a larger capacity (41 km)  
- Rebuild 904L (Jasper to Petrolia) with a larger line capacity (6 km)  
- Increase capacity of 904L (north-south section south of Jasper) (replace 12 km of line conductor)  
- Construct 12 km of new double circuit line with one side strung (will be part of new line)  
- Re-terminate 904L from Wabamun 19S to Sundance 310P (new line number is 1045L)  
- Re-connect re-built section of 904L, new 12 km line and existing line section near Keephills to create a high capacity line from Petrolia to Keephills (new line number is 1043L)  
- Install Special Protection Systems for three double circuit tower failure events (Criteria Category C5)  
- Install a 240 kV 600 MVA phase shifting transformer (PST) in 9L57 and three associated 240 kV breakers at Livock substation | Initial project scope as filed with the AUC. The main project scope items not included in the NID were:  
- the extent of 240 kv protection upgrades was unknown  
- the location of the PST was unconfirmed and needed to be coordinated with other projects  
- the number of line outages and degree of complexity in the required construction stages was unknown  
Additionally, AltaLink provided cost estimates that included work scope associated with TransAlta transmission facilities. |
| 2 | February 24, 2009 NID Approval No U2009-62 | | | | | The NID Approval included the work scope described above. The NID Approval indicated that the PST would be connected to the existing 240 kV line 9L57 between Brintnell 876S and Dover 888S. Its exact location would be determined in a subsequent facility application | |

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$125$ $77$ $9$ $39$ Note: The estimate of $125 million was slightly higher than the $122 million shown in the 2009 Long-Term Transmission Plan (Reference Table 3.0-1 - Edmonton Region 240 kV Line Upgrades) and can be attributed to some refinement in estimating as part of the NID application. Project Scope:  
- Increase capacity of 908L and 909L (replace first 4 km of line conductor near Sundance 310P)  
- Increase capacity of 902L (replace first 4 km of line conductors near both Wabamun 19S and Sundance 310P)  
- Rebuild 904L (Jasper to Wabamun) with a larger capacity (41 km)  
- Rebuild 904L (Jasper to Petrolia) with a larger line capacity (6 km)  
- Increase capacity of 904L (north-south section south of Jasper) (replace 12 km of line conductor)  
- Construct 12 km of new double circuit line with one side strung (will be part of new line)  
- Re-terminate 904L from Wabamun 19S to Sundance 310P (new line number is 1045L)  
- Re-connect re-built section of 904L, new 12 km line and existing line section near Keephills to create a high capacity line from Petrolia to Keephills (new line number is 1043L)  
- Install Special Protection Systems for three double circuit tower failure events (Criteria Category C5)  
- Install a 240 kV 600 MVA phase shifting transformer (PST) in 9L57 and three associated 240 kV breakers at Livock substation
<table>
<thead>
<tr>
<th>LINE #</th>
<th>EVENT / COST DRIVER</th>
<th>TOTAL COST ESTIMATE (SM)</th>
<th>AML COST ESTIMATE (SM)</th>
<th>EDI COST ESTIMATE (SM)</th>
<th>ATCO COST ESTIMATE (SM)</th>
<th>EXPLANATION FOR COST ESTIMATE ADJUSTMENT</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>April 9, 2009 PPS Rev 1 from ATCO for PST</td>
<td></td>
<td>-$12</td>
<td>Work scope similar to the NID, cost decrease due to better pricing of the phase shifting transformer.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4     | June 30, 2009 PPS from AML | $34 | | | - AML's PPS includes $9,653,299 that is attributable to TransAlta, who is the TFO on First Nations land. This was included in the NID and PPS total cost and attributed only to AML  
- Re-conductor 4 spans of 913L, since common double circuit towers held both 902L and 913L. The new conductors on 902L needed to meet current line clearance standards, so then 913L, which was on the same towers, will be re-strung to also meet the current standard.  
- Temporary 909L by-pass required to minimize outages to double circuit line 908L/909L  
- The temporary re-termination of 909L from Sundance to Keephills, needs to be re-terminated back to Sundance at the end of the project  
- The PPS identified 31 line outages were required to perform the work, which were not included in the NID. Additional field crew costs were anticipated to coordinate the outages with generator maintenance periods, in coordination with the AESO, which was unknown at the time the NID was created.  
- The transmission line changes were highly complex to an extent not known when the NID was created  
- Extensive 240 kV protection upgrades were not included in the PPS from AML and were included in TFO Change Authorizations subsequent to the AESO acceptance of the PPS  
- AML added escalation to the cost estimate as follows: 8% material, 12% construction  
- AML added contingency costs to the cost estimate as follows: 10% internal labour and materials, 15% for construction labour. | Additional work scope not identified in the Need application. |
<table>
<thead>
<tr>
<th>LINE</th>
<th>EVENT / COST DRIVER</th>
<th>TOTAL COST ESTIMATE ($M)</th>
<th>AML COST ESTIMATE ($M)</th>
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<th>EXPLANATION FOR COST ESTIMATE ADJUSTMENT</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (continued)</td>
<td>June 30, 2009 PPS from AML</td>
<td>$34</td>
<td></td>
<td></td>
<td></td>
<td>- Salvage of the North-South section of the old 190L/903L double circuit line, which was originally to be used. See AESO application to the AUC to amend NID (below in this list) - A special high capacity (large conductor) 240 kV single circuit towers was designed for the section being re-built. The foundations for these new towers was more expensive than anticipated</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>January 27, 2010 PPS from EDTI</td>
<td>$4</td>
<td></td>
<td></td>
<td></td>
<td>- Switchgear and associated buswork upgrades at Petrolia and Jasper substation to accommodate the transmission line upgrades - Extensive 240 kV protection upgrades were included the PPS from EDTI Additional work scope not identified in the Need application. Substation equipment.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Feb 5, 2010 AESO application to the AUC to amend NID Approval U2009-62 Application No. 1605880</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The project work scope included the construction of a high capacity 240 kV circuit between Keephills 320P and Petrolia 816S, originally designated at 908L in the NID, and later renamed to 1043L. 1043L will be created by using the rebuilt section of the prior 904L, a new 12 km section of double circuit 240 kV line, a salvaged north-south section of existing double circuit line 190L/903L and the addition of 1.2 km of new double circuit 240 kV line near Keephills 320P. When AML were reviewing the north-south salvaged section of existing double circuit line 190L/903L they advised the AESO of advantages of using a different salvaged section of existing 190L/903L to the north and east of Keephills. The AESO found the change acceptable from a system perspective and the AUC found the change acceptable from their perspective, since the new proposal used a section of existing double circuit transmission line that was to be salvaged as part of the same project where AML already had permit and license.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>February 18, 2010 AUC issues Decision 2010-075 for an Amendment to Need Assessment Approval U2009-62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>As described above, the AUC approved a change in project work scope, as described in the Amendment to Need Assessment, which results in a “re-route of 908L in a more advantageous and efficient manner than was originally proposed, and also would meet the need expressed in the NID”.</td>
<td></td>
</tr>
<tr>
<td>LINE #</td>
<td>EVENT / COST DRIVER</td>
<td>TOTAL COST ESTIMATE (SM)</td>
<td>AML COST ESTIMATE (SM)</td>
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<td>ATCO COST ESTIMATE (SM)</td>
<td>EXPLANATION FOR COST ESTIMATE ADJUSTMENT</td>
<td>COMMENT</td>
</tr>
<tr>
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<td>-------------------------</td>
<td>------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>8</td>
<td>PPS Total Cost Estimate ($2011 dollar, as ISD has been specified as year 2011)</td>
<td>$151</td>
<td>$111</td>
<td>$13</td>
<td>$27</td>
<td>Cost estimates as reported by the TFOs in their facility applications. The AltaLink component includes work scope associated with TransAlta owned transmission facilities.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D

Transmission Facility Owners Responses

Under the TFCMC’s mandate, the Committee shall allow TFOs to review and provide written comments on any report produced that references a TFO or a project a TFO is developing. Responses were received from both AltaLink and ATCO Electric.

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May 20, 2011

Henry Yip, Chair
Transmission Cost Monitoring Committee
Email: hcyip@telus.net

Henry,

Thank you for the opportunity to comment on your first semi-annual Transmission Cost Monitoring Committee Report. It is clear from the document that the committee has taken the time to understand that Alberta transmission infrastructure projects are complex and subject to many risk factors that influence both cost and schedule.

We have reviewed the TFCMC report and the recommendations that the committee has put forth. We agree with the general theme that the NID estimate should include the AESO modeling assumptions for fully loaded costs and the cost impact of schedule duration. We are also supportive in principle, of the AESO benchmarking project costs within the province of Alberta. As your committee work has discovered, our Alberta regulatory framework has significant unique stakeholder requirements that preclude the effective comparison of total project costs with other jurisdictions. We also support the view that the AESO is in the best position to technically assess projects in order to enable effective benchmarking of project costs on an equivalent comparative basis.

Your recommendation to develop incentive mechanisms to encourage cost improvement is well noted. We understand the desire to establish incentive mechanisms regarding cost control. The development of such mechanisms is an industry wide issue that would need to be addressed through consultation with the AESO and all industry parties. Any establishment of an incentive or penalty mechanism on TFOs or other players will result in a change in business risk that would need to be properly evaluated.

We understand the spirit of recommendation #5, the second AUC approval if the project cost exceeds a predetermined limit, but struggle with the practical implementation of such a process. We would suggest addressing this issue through your recommendation for an AESO discussion paper on the cost accountability framework.

There is a couple of information corrections that I would like to draw to your attention. On page 13, paragraph 2 for project 781, you reference that the estimated cost for the Chapel Rock to Fiddler project is $7.3M. The $7.3M is actually the amount under direction for the project. We have not completed a PPS for this project. Likewise, on page 16, your reference to the cost for Project 629 (paragraph 2) is not accurate. The more appropriate comparison is $437M to $569M as this includes the scope for the 240kV loop in both data points.

If you have any questions relative to these comments, please don’t hesitate to call me at 403-267-6133.

Regards,

Original signed by
Johanne Picard-Thompson
SVP Projects, AltaLink
June 6, 2011

Heary Yip  
Chair, Transmission Facilities Cost Monitoring Committee  
1701 TD Tower  
10088 – 102 Avenue  
Edmonton, AB T5J 2Z1  

Dear Sir:  


Thank you for the opportunity to review and comment on the Transmission Facility Cost Monitoring Committee’s (TFCMC) first report dated June 2011. As included in the introduction of the Report, the TFCMC was created in order to make sure Albertans have the benefit of increased transparency on the cost of transmission projects. This is consistent with the mandate included in Ministerial Order 64/2010 which includes the following:  

Committee Mandate  
10. The Committee shall review records that relate to the cost, scope, schedule and variances of Alberta transmission facility projects that are forecast to cost in excess of $100 million.  
11. The Committee shall prepare reports that summarize the records it reviews and the status of the transmission facility projects.  

ATCO Electric (ATCO) remains committed to cooperating with all interested parties and working on a collaborative basis to help the TFCMC achieve its mandated objectives. Specific comments relating to each recommendation contained in Section 3 of the Report - TFCMC Conclusions and Recommendations are included in Attachment 1 to this letter.  

ATCO would also like to reiterate information shared with the TFCMC regarding the Need Information Document (“NID”) estimates and ATCO’s historical performance as compared to those estimates. The NID for the Northwest Project was developed by the AESO in 2005, which pre-dated the existing rules regarding the “4/- 30%” target ranges for those estimates. ATCO does not therefore consider this NID to be a relevant benchmark against which performance can be measured. For the period 2007 – 2010, ATCO has delivered 39 projects under the existing rules governing NID estimates — the total of the final costs associated with these projects is $168 million, which is $16 million lower (9%) than the $184 million that was included in the
Transmission Facility Owners Responses

ATCO Electric

NID estimates. This demonstrates that ATCO is well within the target ranges of NID estimates upon which project decisions are made.

Please contact me directly at 780-420-7434 if you have any questions or require any clarification to the comments included herein.

Yours sincerely,
ATCO ELECTRIC

Original signed by

Dennis A. DeChamplain, C.A.
Vice President, Controller

DAD/day
Attach.
### TFCMC Recommendations and Comments

#### June 2011 Report

<table>
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<tr>
<th>Recommendation</th>
<th>ATCO Electric Comments</th>
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<tr>
<td>1</td>
<td>That AESO improve future NID estimates by including fully loaded costs (AFUDC, escalation, engineering &amp; supervision, and owners’ cost). All AESO and/or TFO estimating assumptions would be included in the NID filing to represent the starting point for tracking the full development cost of a project. In the event that the TFO is anticipating use of CWIP, then an estimate of AFUDC should be included to provide proper comparisons of the total cost for projects.</td>
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| 2  | That AESO improve the estimates in the AESO Long-Term Plan by employing third-party cost estimates or cost estimate verification as well as from benchmark data being compiled by AESO. | ATCO Electric notes that the use of benchmark data may help the AESO and customer groups assess the indicative cost of various projects. In order for benchmark data to be directly relevant and comparable, great care must be taken to normalize the data to give proper impact and consideration to all factors affecting the ultimate cost including the following:  
- types of structures and conductor capacity (i.e. lattice vs. H-frame towers, 240kV vs. 72 kV capacity);  
- weather (impacting productivity rates);  
- economic factors (impacting availability and rates for internal and contractor resources);  
- environmental conditions (i.e. extent of brushing required, geotechnical and sensitive ground conditions);  
- geographic conditions (i.e. distance to major urban centres);  
- length of construction seasons (i.e. one vs. multiple winter seasons) |
| 3  | That AESO develop a transmission cost benchmarking competency and database to further assess the reasonableness of the costs, including at the NID phase. The AESO would then use its benchmarking data to test costs proposed by TFOs in the NID and PPS stages. |  |
## TFCMC Recommendations and Comments
### June 2011 Report

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| 4 | That AESO enhance compliance of the material procurement provisions of Rule 9.1; the rule by which the AESO directs TFOs to estimate, design and construct transmission facilities.  
ATCO notes that under rule 9.1.5.8 - *Compliance Review Right of ISO*, the AESO has the ability to verify compliance with rule 9.1.5 regarding procurement of Project Material. |
| 5 | That for non Critical Transmission Infrastructure (CTI) projects, the Department of Energy consider legislative changes to require a second approval stage by the AUC if cost estimates exceed a predetermined limit. The Committee recognizes the need to avoid unnecessary project delays due to factors outside the control of the TFOs.  
ATCO is already experiencing difficulties in obtaining all regulatory approvals on a timely basis to meet customer needs. By introducing additional approval stages into the existing processes, this recommendation increases the risk of delay to committed in-service dates.  
ATCO notes that the AESO already has all of the information required to compare the NID estimate to forecasted final costs in order to make a timely determination of the economic viability of any existing project. |
| 6 | That AESO initiate a review process on the current framework for cost accountability. This process should discuss the challenges with implementing transmission project requirements required by legislation. The Committee believes that the review would lead to other recommendations for cost monitoring/cost management improvement, such as the creation of post-project variance reports.  
ATCO believes that the current framework allows the Alberta Utilities Commission to effectively determine cost accountability for Transmission Projects. ATCO has, for example, filed Post Completion Reports for certain Projects with the AUC in prior regulatory proceedings. |