newfoundland labrador hydro
a nalcor energy company

Hydro Place. 500 Columbus Drive.
P.O. Box 12400. St. John's. NL
Canada A1B 4K7
t. 709.737.1400 f. 709.737.1800
www.nlh.nl.ca

June 22, 2018

The Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL
A1A 5B2 Canada

Attention: Ms. Cheryl Blundon
Director Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro – 2017 GRA Settlement Agreement – Business Systems Transformation Program

The enclosed is in response to the 2017 GRA Settlement Agreement, Item 11, which states:

> *All costs and expenses related to the Business Systems Transformation Project described in the Application, which are forecast to be $2.54 million in 2018 and $3.04 million in 2019 shall be removed from the Revenue Requirements in the Test Years and set aside in a deferral account. The reasonableness and prudence of these costs will be reviewed with the recovery of any of these costs to be determined by an Order of the Board. Hydro shall provide a report by June 22, 2018 that (i) explains the costs with supporting detail on the reasonableness and prudence of such costs and (ii) sets out a proposal on the timing for the review of the costs and a proposed definition of the deferral accounts to be created.*

The agreement to remove costs from the 2017 GRA Test Year Revenue Requirements recognizes the need to provide a process for Board review of the benefits and costs associated with the Program without impeding the efficiency of the 2017 GRA process. The enclosed report outlines project costs and details to support the reasonableness and prudence of such costs.

Hydro is proposing the creation of a separate account, beginning in January 2018, into which business system fees and information system costs associated with the Business Systems and Transformation Project will be deferred. Recovery and disposition of any amounts charged to this account shall be subject to a future order of the Board and dealt with through a separate proceeding after the conclusion of the 2017 GRA.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Geoffrey P. Young,
Corporate Secretary & General Counsel
GPY/skc

Encl.

cc: Gerard Hayes - Newfoundland Power
Paul Coxworthy - Stewart McKelvey
Denis J. Fleming - Cox & Palmer
Dennis Browne, Q.C. – Brown Fitzgerald Morgan & Avis
Dean Porter - Poole Althouse

ecc: Van Alexopoulos - Iron Ore Company
Senwung Luk - Olthuis Kleer Townshend LLP
Benoît Pepin - Rio Tinto

Corporate Business Systems Transformation Program Justification

June 22, 2018

A Report to the Board of Commissioners of Public Utilities

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Appendices

1.0 Background

Newfoundland and Labrador Hydro (Hydro) relies heavily on several key software programs and processes to enable it to fulfil its mandate of providing safe, reliable, least-cost service to its customers.[1] In particular, its Enterprise Resource Planning (ERP), budgeting and forecasting, and information management programs are critical to its ability to effectively and efficiently conduct its business. In 2015, the replacement of the ERP and budgeting and forecasting systems, and development of a new information management program was launched.

1.1 Enterprise Resource Planning

ERP systems integrate the management of core business processes by collecting, storing, managing, and interpreting data to drive operational processes and facilitate decision-making.

In 2015, it was decided that Hydro's ERP system, JD Edwards World, needed to be evaluated as its existing functionality did not facilitate automation to enhance productivity, improve reliability, and customer service; and achieve long-term reductions in operating and administrative costs. The ERP system also lacked data standardization and integration, which impacted the availability of quality, reliable data required to inform decision-making and necessary equipment maintenance activities. Essential business improvements in the existing system could primarily be achieved through the use of third-party add-ons, which resulted in ongoing maintenance and data integration challenges, data duplication, and increased reconciliation efforts and support costs. In addition, JD Edwards World was no longer promoted by the vendor and software specialists available for training were limited as the system used an outdated programming language which is no longer taught locally at the college level. Limited access to technical resources would have made it increasingly difficult to support the system.

Hydro required greater visibility into plant and equipment data and functionality to allow for effective asset management to support system reliability. Without a fully integrated system, information was often stored in spreadsheets and stand-alone databases that varied in format

[1] Hydro's mandate is defined in the *Hydro Corporation Act, 2007,* s. 5(1).

and data content across the company. Consequently, there were challenges in extracting and reconciling information from multiple systems and locations that often resulted in delays in the provision of information and inconsistencies in data. Effective data management is critical to the planning and maintenance activities required for the provision of reliable service.

Many business processes were completed manually and queries used third-party software, resulting in inefficiencies and increasing the risk of errors and inconsistencies. Additionally, JD Edwards World did not allow for access from mobile technology, such as smartphones and tablets, which has come into common use in the utility industry and is necessary in a geographically dispersed workforce. Recommendation 5.2 of the Liberty Review on Supply Issues and Power Outages highlights this gap and indicates that investing in electronic connectivity to support field operations has generally proven cost effective.[2]

JD Edwards World was implemented almost 20 years ago with primarily like-for-like upgrades since that time. Although Hydro's mandate has not changed, the business and the environment in which it operates have evolved substantially since that time. Changes in technology and regulatory landscape have required Hydro to adapt how it does business, which its dated ERP system made challenging.

1.2 Budgeting & Forecasting

As part of the business information system enhancements, the need for a single and fully integrated solution to support capital, operating and labour budgeting was identified. Hydro's prior process for planning and budgeting required the use of multiple Microsoft Excel files and software applications. The use of multiple budgeting tools prevented the integration of capital and operating budgeting and forecasting processes, leading to significant manual processes which lacked interconnectivity, thus increasing the risk of unreliable data flowing into capital

[2] Please refer to page 98 of the *Review of Supply Issues and Power Outages – Island Interconnected System,* The Liberty Consulting Group, December 17, 2014.

expenditure programs and informing decision making. Ultimately, it was determined that a more robust system was required.

The systems identified for replacement were the Capital Asset Projection Module (CAPM) and Clarity software. CAPM was used for depreciation budgeting and future projections and provided necessary asset information for Hydro's Cost of Service model. Clarity was used for operating, budgeting, and forecasting purposes. CAPM is highly customized software which was implemented in 2000 and did not evolve with the changing needs of the business. CAPM did not provide flexibility to make changes to budgets or forecasts or to perform scenario analysis, thus limiting ability to efficiently evaluate projects and infrastructure investments. Data entry was labour intensive resulting in inefficiencies.

1.3 Information Management

Information management is the management of information throughout the information lifecycle, from creation to disposal. As a public body, Hydro is legislatively required, under the *Management of Information Act, 2005*, to develop, implement, and maintain a record management system for the creation, classification, retention, storage, maintenance, retrieval, preservation, protection, disposal, and transfer of information.[3] This requires Hydro to have an information management system which provides for consistent information management practices, procedures, expertise, and a strategic approach to managing and protecting its information to ensure legislative compliance. Furthermore, Hydro is subject to the *Access to Information and Protection of Privacy Act, 2015*, which, among other things, gives the public the right to access records in Hydro's custody or control.

In 2015, an Information Management Capacity Assessment (IMCAT) was completed and identified the need for increased information management resources, toolsets, policies, guidelines to provide enhanced management, security of its information, and the requirement for increased diligence in meeting its legislative requirements. Without investing in a well-

[3] *Management of Information Act, 2005,* s. 6(1).

managed, functional, and centralized information management program, Hydro was at risk of not complying with its legislative requirements.

2.0 Program Overview

Hydro is participating in the Corporate Business System Transformation (BST) Program as part of a shared services offering led by its parent company, Nalcor Energy (Nalcor). The BST Program was established to address technical and functional concerns with current processes and systems not meeting the evolving needs of each of Nalcor's subsidiary companies, including Hydro.

While the BST Program is being managed and executed by Nalcor, Hydro has been, and continues to be, actively involved in all phases of the BST Program[4] including: program development; the Request for Proposal (RFP) process; the design, build, and implementation of systems; and the participation of many members of Hydro's executive and senior management team on the Business System Transformation Program Steering Committee.[5]

The BST Program consists of three projects:

i) upgrading the current ERP system from JD Edwards World to JD Edwards EnterpriseOne (EnterpriseOne);
ii) implementing the Planning, Budgeting, and Forecasting solution Cognos TM1; and
iii) implementing a corporate Information Management Program.

Benefits from enhanced functionality and processes include improved data analysis and reporting capabilities; reduction in manual processes (and corresponding reduction in risk of

[4] Refer to Hydro's response to NP-NLH-184 for a detailed description of the input Hydro management had in the development of the BST Program.
[5] As filed in Hydro's response to NP-NLH-182, Hydro's representatives on the Business System Transformation Program Committee include Hydro's: President; Vice President, Corporate Services and Regulatory Affairs; Vice President, Production; Vice President, Financial Services; Vice President, Engineering Services; Manager, Asset Management & Reliability; General Manager, Thermal Production; and Manager, Information and Operating Technology.

errors and rework associated with errors) and interfaces; electronic workflows; integration of budgets and forecasts; and a modern and efficient user interface. In addition, Hydro will be able to expand its information management tools, policies, and guidelines; manage and secure its information assets; and increase its legislative and regulatory compliance.

The implementation process for the BST Program is a phased approach which is expected to be fully implemented in 2020. Initial implementation of all modules of the new ERP system, EnterpriseOne, took place in May 2018 and is planned to continue as demonstrated in Appendix A, Chart 1.

Implementation of Cognos TM1 is scheduled for release in July 2018 and will continue through the second quarter of 2019, as shown in Appendix A, Chart 2.

Finally, the information management program is under development and the implementation of the foundational framework will continue over the next two to three years. As information management is a continually evolving business function, the program is shown to span a 5-10 year horizon in Appendix A, Chart 3. Work on development of the fundamentals of the information management process (governance model, policy framework, legal and regulatory framework, etc.) has begun; however, the implementation has been delayed as a result of the allocation of information management resources to the Muskrat Falls Inquiry.

3.0 Evaluation of Options

To arrive at the selection of the various solutions outlined, a dedicated project team was formed in 2015 to further understand business processes, assess current IT systems, and identify functional and technical requirements. This assessment was undertaken and funded by Nalcor on behalf of its subsidiaries. The project team, which included personnel from Hydro, reviewed all areas of the business, including capital assets, budgeting and forecasting, customer service, human resources, payroll, health and safety, finance, corporate resource planning, risk

management, intercompany transacting, FTE reporting and tracking, asset management, materials management, information management, treasury, and oil and gas.[6]

3.1 Enterprise Resource Planning System

Hydro considered four software options for its ERP system based on industry leading research undertaken by two consulting firms as follows:[7]

i) JD Edwards World: upgrade from existing JD Edwards World A9.3 to A9.4 and integrate with select external software;
ii) EnterpriseOne: Migrate from JD Edwards World A9.3 to JD Edwards EnterpriseOne;
iii) SAP Business Suite: Implement SAP Business Suite; and
iv) IFS Applications: Implement IFS Applications.[8]

The project team worked with vendors to arrange and attend on-site demonstrations of systems against key requirements, as well as to gather costing information for purchase and implementation of each option. Appendix B provides a summary of each of the alternatives against the evaluation criteria.

In addition, discussions were held with other utility and energy companies[9] to understand their processes and systems and lessons learned from IT system implementations. It was determined that most companies upgraded or migrated to later versions of their ERPs, and favoured systems that enabled the use of standard software versus solutions that required customization.

[6] This review was undertaken prior to the Province's announcement regarding its plans to remove oil and gas operations from Nalcor and create a separate crown entity. However, as there was no specific increase in scope of the BST Program due to the inclusion of Oil & Gas in the evaluation, it did not impact the selection of the preferred solution.
[7] Gartner and Nucleus Research.
[8] This option was eliminated early in the process due to a significant gap between the functionality offered by its software and the business requirements identified by the organization.
[9] The project team interviewed: Hydro Ottawa, Saint John Energy, and JD Irving, which use EnterpriseOne; BC Hydro, NB Power, Manitoba Hydro, and Fortis Alberta, which use SAP; and Nova Scotia Power, which uses Oracle Financials. The project team also reviewed documentation and regulatory submissions related to Hydro One and Hydro Quebec.

The evaluation process determined that continuing with JD Edwards World was not a viable option. The existing system was making it increasingly challenging to work in an effective manner with limited functionality and manual, arduous processes. Further exploration into JD Edwards World indicated that options to expand functionality common throughout the utility industry were limited due to lack of available training and fewer future investments being made in the technology by the vendor.

It was determined that while SAP had some desirable features, it did not meet all of the evaluation criteria and implementation required significantly more effort as it was an entirely new system. In addition, selecting and implementing upgrades were challenging with SAP, often requiring an upgrade to the entire release, which implies a higher long-term cost of ownership.

The evaluation criteria were best addressed by EnterpriseOne. In addition, companies that had implemented EnterpriseOne were able to leverage the core functionality within the various modules. The user interface was found to be intuitive and well-received by the user community. The architecture of the software also provides the option of upgrading components as required rather than implementing upgrades to the entire system.

At the conclusion of its evaluation process, the project team recommended to the Project Steering Committee that Nalcor purchase and implement EnterpriseOne software for its ERP system. In addition to achieving the business objectives previously identified, EnterpriseOne also offered an available pre-defined migration path from JD Edwards World to EnterpriseOne. This facilitates the transfer of data from one system to another, thus reducing the risk of data loss or corruption. The EnterpriseOne system also provided familiarity in application architecture, data naming standards, and technical components; making the transition between JD Edwards World and EnterpriseOne easier for end-users. This reduced training requirements upon implementation and facilitated a less disruptive transition than would be experienced with a non-JD Edwards system. Overall, EnterpriseOne offered time and cost savings compared

to moving to a non-JD Edwards system. This recommendation was accepted by the Project Steering Committee.

In November 2015, an RFP for an implementation partner was issued. The contract was awarded to Denovo Ventures Inc. to complete a multi-year project starting in May 2016.

3.2 Budgeting and Forecasting Solution

In addition to the ERP upgrade to EnterpriseOne, in December 2015, an RFP was issued for a Planning, Budgeting, and Forecasting solution and an implementation partner. Hydro considered three software options (Oracle Hyperion, IBM Cognos, and PowerPlan) for its Budgeting and Forecasting system based on industry research. Demonstrations were held with vendors to evaluate solutions against key business requirements.

In addition, discussions were held with other utility and energy companies[10] to understand their processes and systems and lessons learned from their respective system implementations.

Following evaluation, the recommendation from the Project Team was to implement Cognos TM1, which the Project Steering Committee accepted. The contract was awarded to Newcomp Analytics to complete a multi-year implementation of Cognos TM1. This solution provides the benefit of integration with EnterpriseOne resulting in the standardization of data and reporting structures across systems.

3.3 Information Management Program

In 2015-2016, an assessment of Hydro's information management capacity was undertaken which identified several areas in which Hydro was at risk of not complying with its legislative requirements. This assessment was the basis on which the framework for an information

[10] The project team interviewed: Toronto Hydro, Tuscon Power, MassPort, Government of Newfoundland and Labrador, and American Red Cross, which use Oracle Hyperion; JD Irving, Progressive Waste, Horizon Utilities, Irving Oil, Royal Bank of Canada, and Revera, which use IBM Cognos; and TCO Energy, Duke Energy, EQT, and AltaGas, which use PowerPlan.

management program was built. In June 2017, a roadmap for information management was presented to the Executive Steering Committee.[11] This included a governance model and high-level roadmap for the next ten years and detailed activities for the next year.

4.0 Program Cost

Acquisition and implementation costs related to the BST Program are borne by Nalcor, with costs recovered through inter-company administration fees which are recorded by Hydro as operating costs. The total cost for the BST Program is projected to be approximately $44.1 million, including approximately $2.6 million related to preliminary assessment costs which have been absorbed by Nalcor and will not be included in the administration fee. [12] As outlined in Table 1, Hydro's projected share of the BST Program is approximately $23.2 million (52.6% of the total BST Program cost) to be recovered over a 15-year period (2016-2030).

Table 1: Annual Business Systems Fee ($000)

Year	Amount
2016	252.4
2017	339.0
2018	1,690.3
2019	1,677.4
2020	2,088.0
2021	2,187.3
2022	2,187.3
2023	2,186.0
2024	2,172.2
2025	2,172.2
2026	2,158.4
2027	2,155.7
2028	1,318.3
2029	521.5
2030	110.6
Total	**23,216.6**

[11] Please refer to Hydro's response to NP-NLH-182 from the 2017 General Rate Application (GRA) for Committee members.

[12] Assessment costs included interviews, requirements gathering and analysis, development of business cases, presentations and RFPs.

4.1 Test Year Costs

Hydro's 2017 General Rate Application (GRA) included costs related to the BST Program in both the 2018 and 2019 Test Year ($2.542 million and $3.042 million,[13] respectively). The revised Test Year costs outlined in Table 2 show a variance from Test Year costs included in Hydro's original 2017 GRA filing due to timing differences in implementation of the program. The cost variance is allocated out to future years and does not reflect a savings in overall program costs.

Table 2: Hydro's Allocated Administration Fees Related to the BST Program ($000)

	2018 Test Year			2019 Test Year		
	As Filed	**Revised**	**Difference**	**As Filed**	**Revised**	**Difference**
Business Systems Fee	2,542	1,690	(852)	1,894	1,678	(216)
Information Systems Fee (Nalcor Admin Fee)	-	-	-	1,148	678	(470)
Total	**2,542**	**1,690**	**(852)**	**3,042**	**2,356**	**(686)**

In 2018, the Business Systems Fee captures Hydro's share of the BST Program's depreciation and amortization of upfront operating costs, as well as software support and program management costs related to the BST Program. In 2019, costs associated with Hydro's share of Nalcor software support and program management costs related to the BST Program were transitioned to the Information Systems Fee. As such, there were no Information System Fees related to the BST Program included in the 2018 Test Year.

In accordance with the GRA Settlement Agreement filed with the Board on April 16, 2018, Hydro is proposing to remove these costs from the 2018 and 2019 Test Year revenue requirements and to include costs associated with the BST Program in the Business System Revenue Requirement Deferral Account, which is provided in Appendix C.

[13] $3.042 million included in the 2019 Test Year revenue requirement includes $1.894 million in the Business Systems Fee (related to Hydro's share of the BST Program depreciation costs) and $1.148 million in the Nalcor Admin Fee (related to Hydro's share of Nalcor software support and maintenance costs and Program Management costs related to the business system).

4.2 Cost Allocation

4.2.1 Business System Fee

Hydro provided a detailed calculation of the Business System Fee in NP-NLH-031, Attachment 1. Appendix D includes an updated calculation based on the revised 2018 and 2019 Test Year fees.

Capital Costs

BST Program costs meeting capitalization criteria, including internal labour, professional services, and hardware and software costs are recorded in separately identifiable capital project accounts in Nalcor's financial records. Under the BST Program, Nalcor will incur all costs for the capital projects associated with the Program while projects are in progress. When implementation is complete, Nalcor will create new asset accounts and transfer the program costs to these assets. With the assets in service, the full cost of each asset will be depreciated over the course of its useful life. On a monthly basis, a fee will be charged to Hydro for its share of the depreciation costs related to the assets on a pro rata basis through the inter-company admin fee.

The Business System Fee charged to Hydro each year represents the average of two ratios: Hydro's share of overall JD Edwards users and Hydro's share of overall FTEs and contractors in relation to Nalcor and its subsidiaries.

The only exception to the pro rata process is when a capital cost is incurred for the benefit of a specific line of business. In these instances, 100% of the depreciation charge is allocated to the specific line of business. For example, the implementation of the customer service module, Utiligy360, as part of the EnterpriseOne project is for Hydro's use only and is therefore charged solely to Hydro.

This cost recovery method permits Hydro to pay for the usage of the system over its life while it receives the benefit. As a result, Hydro is not required to raise capital for upfront investment and Hydro does not earn a return on the BST Program assets.

Non-Capital Costs

Project costs ineligible for capitalization but not related to ongoing operations (i.e. project training), software support and maintenance, etc. are all allocated to Hydro based on the same methodology as that used for the allocation of capital costs.

Program Management Costs

Costs related to the overall management, oversight and administration of the BST Program are recovered from the lines of business in the year in which they are incurred, using the following methodology:

- Approximately 50% of these costs are related to specific systems and will be charged to Hydro and the other lines of business utilizing the same methodology as the capital and non-capital costs discussed above.
- The remaining 50% of the costs are not directly related to specific systems and are charged evenly across all of Nalcor's lines of business. In addition to its core lines of business, Nalcor has legal entities such as holding companies and limited partnerships that are each charged a nominal fee of $10,000 annually. This represents approximately $50,000 annually. This nominal fee represents costs incurred for maintenance of general ledgers and limited charts of accounts on behalf of these entities. The formula for allocation of these fees is:

$$\frac{\text{(Total Program Management Costs x 50\%) - \$50,000}}{\text{10 companies}}$$

4.2.2 Information Systems Fee

Charges to Hydro are based on average system users and are reviewed quarterly. During Hydro's 2013 GRA, the allocation methods were reviewed by the Board's experts, Brad Rolph, Deloitte, and Grant Thornton, who all found the methods reasonable. The methodology for allocation of the Information Systems Fee has not changed since the 2013 GRA.

4.3 Information Management Costs

Of the total projected BST Program cost of $44.1 million, information management accounts for $2.6 million; Hydro's share of this cost is projected to be $1.2 million. Hydro's proposed revised Business System Fees of $1,690,300 related to the 2018 Test Year and $1,677,400 related to the 2019 Test Year include $309,000 and $47,000, respectively, related to information management.

To advance in this area, dedicated resources have been assigned. Four information management positions were created and are currently charged as a component of the BST Program which will be charged as a component of the information systems fee starting in January 2019.

Ultimately, Hydro has legislated obligations related to management of information which requires a robust information management system. As such, even in the absence of the BST Program, Hydro would have had to advance with an information management program and would have had to incur 100% of the associated costs itself. Hydro believes its participation in a corporate information management program is prudent in terms of its regulatory and legislative obligations.

4.4 Cost-Benefit Analysis

The BST Program was driven and justified originally to address technical concerns and significant functional limitations of the existing systems. For this reason, and because full implementation is not yet complete, many of the anticipated cost savings have not yet been identified. This is consistent with large projects of this nature, as resource and cost reduction is expected to take place over the medium to long term rather than during the initial implementation stages.[14]

[14] *Lessons Learned from Transformation of Pay*, Goss Gilroy Inc., Section 3.6.

However, despite the BST Program being in its early stages, Hydro has already identified quantifiable annual efficiency gains associated with the BST Program of $415,000 in the areas of customer service, finance, and supply chain management.

Following full implementation of the BST Program, there will be a period of integration and change management related to the process and technology changes. Hydro intends to evaluate the implementation closely with a view to finding efficiencies from the changes to the fullest extent possible.[15]

To determine the cost-benefit of the BST Program at this point in time, Hydro considered the life cycle cost associated with two scenarios:

- Status Quo - continuing with JD Edwards World;[16] and
- the chosen business systems – EnterpriseOne and Cognos TM1.[17]

Hydro's cost-benefit analysis (a summary of which is provided in Appendix E) is based on the costs associated with the two scenarios. Hydro notes that the status quo scenario was developed for comparison purposes only and reflects a solution that lacks functionality and the minimum business requirements to continue to operate to 2030.

Each of the scenarios reflects inputs noted as Benefit 1 (Reduced Opex) and Benefit 2 (Avoided Return). Benefit 1 (Reduced Opex) reflects the approximately 0.6% reduced operating expenses required to make the two options cost neutral, commencing in 2020.[18]

Benefit 2 (Avoided Return) reflects the avoided return on rate base, as well as Hydro's portion of the avoided up-front project assessment costs ($2.6 million). The avoided return on rate base

[15] As per Hydro's response to NP-NLH-037 from the 2017 General Rate Application (GRA).
[16] Analysis based on historic costs, projected into the future.
[17] The information management program costs were not included in the cost-benefit analysis as the implementation of this program is required for Hydro to meet legislative requirements.
[18] Similarly, a reduction of approximately 0.5% of capital would be required to make the two options economically equivalent, commencing in 2020.

stems from Nalcor completing this project and not charging Hydro a return. An additional benefit not included in this model but which will be realized by Hydro's customer is the avoidance of interest during construction, as Nalcor is not recovering those costs from Hydro.

To achieve cost neutrality between the two scenarios, Hydro requires an additional[19] annual efficiency savings from the BST Program (or, alternatively, would have to had incurred additional annual operating costs from continuing with JD Edwards World) of approximately $565,000.[20]

Hydro is confident that the efficiency gains and reduced compliance risks resulting from the benefits outlined in Section 5.0 of this report will produce efficiency savings which will be more than enough to exceed cost neutrality, thus delivering on Hydro's least-cost mandate.

5.0 Program Benefits

In Board Order No. P.U. 6(1991), the Board stated *"Where a project is not evaluated alongside other acceptable alternatives and/or if the project does not produce a positive NPV, sufficient appropriate evidence must be provided to justify implementation."* The information contained within this section provides justification based on the enhanced functionality and robust programs and processes that will be realized as a result of the BST Program.

The BST Program supports Hydro's ongoing efforts to:

i) improve analysis and reporting;
ii) reduce manual processes, thus reducing risk of data errors and associated rework;
iii) decrease use of third-party software outside of core systems, thus reducing interface cost related to Nalcor developed interfaces and associated maintenance;
iv) facilitate electronic workflows and approvals where possible, thus speeding process time and reducing risk associated with human error;

[19] The analysis reflects the $415,000 efficiency savings already identified.
[20] Escalating at the projected GDP Implicit Price Deflator.

v) increase data integration and reliability;
vi) implement in-field technology; and
vii) enhance customer service.

These initiatives support the provision of safe, reliable, least-cost energy to customers, and ensure that Hydro can capitalize on efficiencies to meet its legislative requirements.

5.1 ERP System Benefits

The foundation of the BST Program is the upgrade of the organization's ERP system, which provides increased functionality in the areas of project management, supply chain management, capital asset management, customer service, human resources, and finance.

All modules within EnterpriseOne provide benefits that were not available in JD Edwards World. For example, remote/mobile access to data provides access to real-time information, workflows, approvals, etc. Further, EnterpriseOne provides enhanced reporting options, including an embedded query tool and the ability to export data to other formats (e.g. Excel). Appendix F provides further detail, by module, on the functionality enhancements that Hydro will achieve as a result of migration to EnterpriseOne.

5.1.1 Project Management

Benefits of this module relate to job costing and fixed assets. The fixed asset function will track the full asset accounting lifecycle, automate mass asset disposal, provide fixed asset creation with approval routing, and integrate with the equipment plant maintenance module as part of capital asset management and reduce reliance on manual processes. The job costing module includes integration with accounts payable, accounts receivable, contract billing, and fixed assets, provide job status inquiry for general project health information, dashboard functionality to drill back on all project transactions, and standardize operating projects.

Existing systems have been integrated into the new system, reducing reliance on interfaces with third-party systems. The implications of not proceeding with the upgrade are that Nalcor would have to purchase and or write and maintain interface programs for data flow between systems resulting in databases being out of sync, multiple databases for different modules, and likely increase risk of issues with data integrity. These may result in errors and rework, and thus further decrease efficiency, potentially increasing overall system cost.

5.1.2 Supply Chain Management

Supply Chain will realize benefits resulting from this implementation such as Online Requisitions, Purchase Order Improvements, Inventory Management, and functionality that provides automated processes to replace efforts that are currently completed manually. This will result in the reduction of potential errors and, over time, reduce labour costs.

The program will improve data availability and provide information to allow enhanced reporting capability. This will allow more timely and accurate data analysis which can impact savings in contract management, vendor quality and pricing and inventory management.

The use of this module for capital projects will increase visibility of inventory in the system. This will provide the ability to automatically search for inventory items in multiple locations in order to determine if there is enough stock on hand to meet an inventory request. This will assist Hydro in ensuring it maintains an appropriate level of inventory and reducing the likelihood of holding items in inventory which have become obsolete.

5.1.3 Capital Asset Management

EnterpriseOne enables standardization of asset management practices and data management across the organization and provides integration with other key business processes, translating into a more complete view of the organization’s assets from deployment through operations and maintenance to retirement.

With an aging asset base, an increased emphasis has been placed on maintenance, refurbishment and replacement of assets. Critical to this focus are: (i) the ability to obtain real-time asset-based data readings; (ii) timely scheduling and monitoring of asset maintenance activities; (iii) analysis of asset performance and maintenance history across the system; and (iv) reporting on complete asset cost. EnterpriseOne allows for the utilization of multiple asset-based data readings, such as temperature or vibration, into its predictive or condition based maintenance program. Through the use of these readings, the system can identify where predefined tolerances have been exceeded and generate a work order for a technician to investigate. Through this automated, proactive approach to asset maintenance, equipment downtime and maintenance costs can be reduced, and can result in improved reliability through intervention of an asset needing maintenance prior to failure.

EnterpriseOne enables processes that will standardize maintenance activities. These processes allow for a consistent approach to planning, scheduling and recording maintenance costs. With standardization and the Equipment Cost Analysis functionality within EnterpriseOne, equipment that consumes excessive amounts of maintenance resources can easily be identified. With this information, proactive and informed decisions can be made to improve maintenance planning. The improved recording of maintenance data allows for the comparison of maintenance costs on similar equipment throughout Hydro. Asset retirement schedules can be more effective from a cost and reliability perspective due to the improvement with which the economics of equipment maintenance can be factored into asset planning.

EnterpriseOne enables the use of mobile technology with the ability to provide, obtain, and update information in the field. This assists Hydro in addressing recommendation 5.2 of Liberty's 2014 Report, where Liberty stated: *"Investigating hardware, mobile applications, and electronic connectivity (among field personnel, supervision, and the control center) has generally proven cost effective in our experience."* [21]

[21] Please refer to page 98 of the *Review of Supply Issues and Power Outages – Island Interconnected System,* The Liberty Consulting Group, December 17, 2014.

EnterpriseOne also provides dashboards to provide access to real-time information, personalized for assets under an individual's management. It will transition the organization from being heavily-reliant on manual processes to automated, standardized, electronic workflow processes with enhanced reporting and approval capabilities. These improvements will improve process efficiency, improve reporting accuracy, and provide access to enhanced data for more informed decision-making.

5.1.4 Customer Service

In 2015, Ernst & Young was engaged to provide a Target Operating Model Assessment[22] for a number of areas of Hydro's customer service function.[23] At the end of its assessment, Ernst & Young provided recommendations which would yield high, sustainable benefits. The customer service information system, Utiligy360, which has vendor-provided integration capabilities with EnterpriseOne, addresses the following recommendations:[24]

- Purchase and install a robust Customer Relationship Management (CRM) to capture call details, history, etc.;
- Automate collections process; and
- Investigate ways to target certain customers on bill messages.

Utiligy360 supports Hydro's Customer Service Strategy, which outlines goals for improved customer service. The module allows for the electronic recording of all customer interactions, to build a thorough customer case history, and data trending capability that will assist in the identification of common issues. Utility360 will be integrated with the accounts receivable, work order management, asset management and general ledger system components providing for a more robust billing system. Utiligy360 supports accurate customer billing through data

[22] A copy of the assessment was provided to the Board in Hydro's response to PUB-NLH-081, Attachment 1 from the 2017 General Rate Application (GRA).
[23] Contact centre strategy, quality assurance, Key Performance Indicator reporting, billing, web self-service, mobile app and SMS, training, knowledge management, customer experience insight, field operations, IVR/telephony, and outage management.
[24] Please refer to Hydro's response to NP-NLH-252 from the 2017 General Rate Application (GRA) for further information on Ernst & Young's recommendations, and the actions Hydro has taken to address the recommendations.

integrity and creates efficiencies for the processing of adjustments. The software provides greater visibility into overdue accounts enabling more timely collection of accounts receivable. Utiligy360 records customer interactions, permitting the elimination of the existing manual paper-based process resulting in a more efficient customer information management system used by call center personnel.

5.1.5 Human Resources

EnterpriseOne will reduce the current effort required to compile data for human resource related decision-making. EnterpriseOne will enhance functionality in the areas of wage and salary administration, payroll and time performance management, and can be used for other areas including recruitment. The human resources module will provide self-service activities allowing for timely information updates. The module will contribute to the management of organizational risk through the protection of sensitive human resources information and compliance with privacy regulations through a role-based security model and field level security. EnterpriseOne's automated calculation of retroactive pay and improved step progress functionality will result in more efficient payroll processes.

5.1.6 Finance

The finance module of EnterpriseOne provides benefits related to accounts payable workflow and an expense management module. The accounts payable workflow will electronically circulate and obtain approval for invoice processing which should significantly decrease the time for the organization to process and follow up on the status of accounts payable invoices. It will also automate the manual processing required to process credit card transactions and provide for three-way matching between receipts, invoices and purchase orders.
The new system will provide functionality that will allow staff to review their transactions online reducing need for paper statement distribution, attachment of receipts and provide adjusted coding in the system.

The new system will provide automation that will reduce overtime typically worked when there is high volume such as year-end and quarter-ends.

5.2 Planning, Budgeting and Forecasting System Benefits

Cognos TM1, to be integrated with EnterpriseOne, will enable all planning, budgeting, and forecasting activities for capital projects, operating revenues and expenditures, and salary and full-time equivalents to take place within one system. It will eliminate many standalone Microsoft Excel-based templates, which currently result in manual rekeying of data; support enhanced reporting and analytics; and use a role based security model. Cognos TM1 will be a fully integrated solution for all aspects of planning, budgeting and forecasting within Nalcor. The solution will enable a more accurate and efficient budgeting process with a full corporate budget where the dependencies, such as labour transfer between capital and operating, are automated. The integration of both operating and capital budgets within a single solution enables visibility into constraints, such as human resource capacity, providing a more realistic work plan and more accurate budgets for contract resources.

Cognos TM1 will be integrated with EnterpriseOne which allows both systems to share a standardized chart of accounts and corporate structures. The standardization and integration between the two systems will also reduce manual processes and enable an increased level of data integrity.

Cognos TM1 will have the flexibility to accommodate various budgeting and forecasting methodologies including rolling forecasts, zero-based budgeting, escalation and/or a hybrid approach. By automating and standardizing escalation rates, there will be control and audit capabilities around budget and forecast escalation processes. The solution will also have the capability to generate what-if scenarios for modeling and analysis.

The system will also provide the ability to calculate depreciation costs under more than one scenario. This offers the long-term benefit of being able to isolate the customer impacts of

changes in depreciation within proposals submitted to the regulator. This system will be a key input to Hydro's Cost of Service Study, determination of revenue requirements for regulatory submissions and overall capital and budget planning activities.

Appendix G provides further detail on the functionality enhancements that Hydro will achieve as a result of migration to Cognos TM1.

5.3 Information Management Program Benefits

Prior to the formation of the Information Management Program, information management practices were inconsistent across each of Nalcor's lines of businesses and centralized information management guidance at the corporate level was minimal. Daily tasks were complicated by the lack of information management expertise and tools available to employees. The absence of qualified in-house information management professionals limited the organization's ability to expand information management knowledge, strengthen information management maturity and reduce information risk. The goal of the information management program is to establish a centralized information management program to close each of the previously identified gaps.

The implementation of a corporate-wide information management program will ensure Hydro meets its legislative requirements as a public body with respect to information management, access to information, and protection of privacy. The information management framework will support legal and regulatory compliance, and ultimately reduce financial implications of potential non-compliance.

6.0 Deferral Account

Hydro is proposing to set aside the actual costs associated with the BST Program for testing in a separate proceeding before the Board. Appendix C provides Hydro's proposed Business System Deferral Account definition.

7.0 Conclusion

The primary focus in implementing the BST Program is to achieve an integrated business information system, a critical factor to the ongoing daily operation of the organization in the long-term. Hydro's operations are complex and require the support of robust information systems. The existing systems could not provide the long-term functionality required and lacked efficiency, creating barriers to implementing modern and efficient solutions. While the life cycle of the existing systems may have been able to be extended by a few years, the reality was the systems were due for replacement. Rather than invest additional dollars in aging systems, the decision was made to invest in a program which provides long-term benefit.

Hydro's participation in a Nalcor BST Program as a shared-services offering enables it to benefit from economies of scale, as the additional work required by Nalcor to capture Hydro in its assessments, evaluation of options, and deployment of the chosen programs cost less than it would have had Hydro undertaken all of those activities on its own. For example, Hydro did not incur any portion of the $2.6 million associated with initial assessments, as those were absorbed by Nalcor. Further, Hydro's customers will not incur costs associated with interest during construction or return on rate base.

Upgrading from an existing system (versus an entirely different platform) reduced risk of problems associated with transferring historic data. In addition, it capitalized on the familiarity of system users with the JD Edwards platform and existing vendor relationships, facilitating a smoother transition and reduced training than would be required from a different platform.

Hydro is confident that the choice of programs are consistent with its mandate to provide least cost service to its customers. Hydro believes the enhancements provided by EnterpriseOne, Cognos TM1, and its information management program will support its focus on reliability and customer service, and move Hydro toward greater compliance with its management of information requirements as a public body.

Appendix A: Business Systems Transformation Program Roadmap

	Release 1.1	Release 1.2	Release 1.3	Release 2.1
Releases	May 2018	July 2019	December 2019	2020
Project Management	Job Costs and Fixed Assets Foundation, Data Cleanse and Improvements			
Supply Chain Management	Procurement and Inventory Foundation, Data Cleanse and Improvements	Bulk Fuel Management		Supplier Portal
Capital Asset Management	CAM Foundation, Data Cleanse and Improvements	Expand Corrective & Preventive Maintenance Footprint	Predictive Maintenance w/Cost Analysis & Metrics	Empower Maintenance Crew w/ iPad and Mobile Technology
Customer Service	Customer Service Foundation , Data Cleanse and Improvements (through Utlligy360 & E1)	Case Management (JDE E1)		
Human Capital Management	Human Capital Management and Foundation, Data Cleanse Improvements	Employee Self Services	Time and Labour	Replace Lotus Notes Applications for core functionality
Finance	Finance Foundation, Data Cleanse and Improvements	Implement Bank Reconciliation Three Way Match Process	Full Automation Bank Reconciliation Automate approval process for Invoices	AP Automation and Expense Management

Chart 1: JD Edwards EnterpriseOne Schedule and Functionality Overview

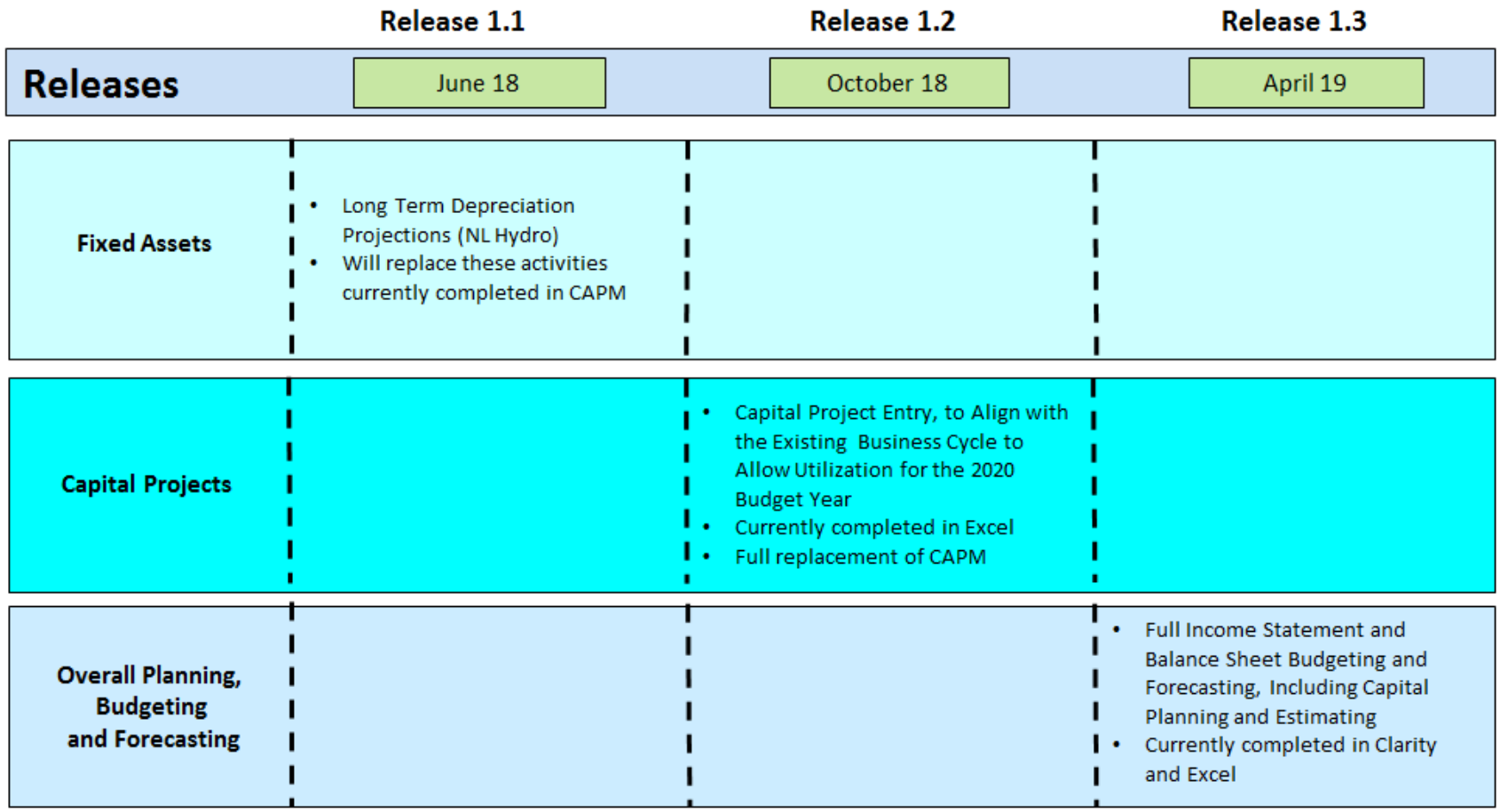

Chart 2: Planning, Budgeting, and Forecasting Release Schedule and Functionality Review

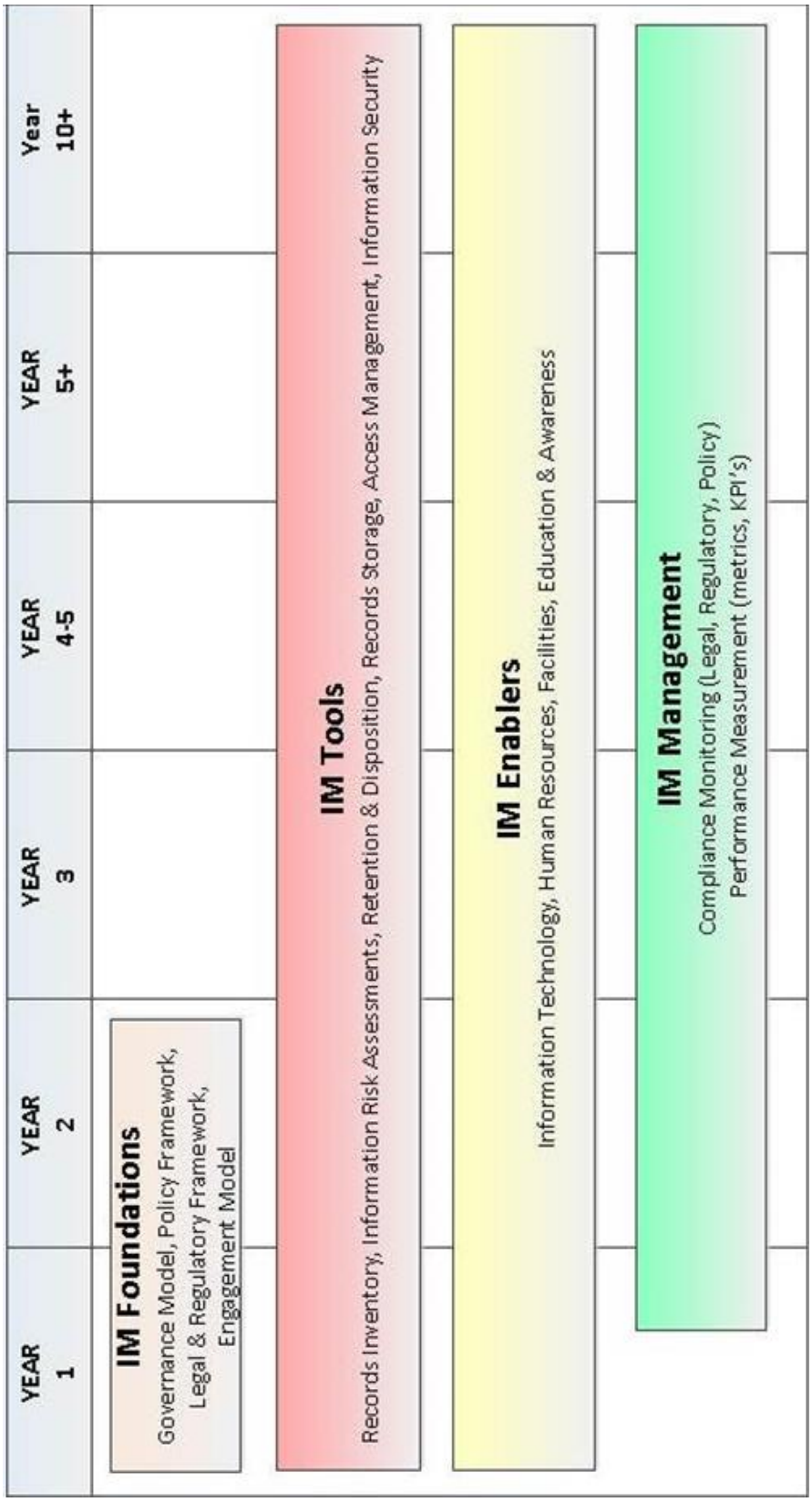

Chart 3: Information Management Roadmap

Appendix B: Evaluation of Software Alternatives for Enterprise Resource Planning Software

Criteria	World	E1	SAP	Commentary
Industry Validation				• JDE E1 and SAP are ranked in the top three vendors identified in the Gartner's Magic Quadrant and a leader in the Nucleus Research ERP Value Matrix and ranks highest in usability.
Functional Requirements				• Both SAP and JDE E1 meet key business requirements; still functional gaps in JDE World alternative. • Integration available for E1 and SAP for a broader range of software applications than World. Integration for E1 and SAP includes Primavera, currently used by Project Execution and Technical Services. • To provide required functionality, JDE World would need to integrate with a number of other software programs requiring maintenance of interfaces, reconciliation of data, additional maintenance, and support costs.
Continuing Development				• Research and development related to JDE is now focused on E1 with fewer enhancement upgrades for JDE World compared to E1 (80%-90% of JDE customer base using or migrating to E1 versus World). New JDE customers are purchasing JDE E1 and not JDE World.
Mobility Applications				• Mobility applications, which improve access to ERP from locations outside of the office are not available for JDE World unless they are custom developed. • JDE E1 allows data entry in the field and access to information from all locations for required processes, increasing timeliness and usefulness of reporting and access to real time data– over 80 mobile applications. • SAP provides approximately 400 mobile applications through Fiori product.
Internet of Things/Monitoring				• JDE World does not allow the interconnection via the Internet of computing devices embedded in everyday objects and equipment, enabling them to send and receive data. • JDE E1 and SAP allows collection and analysis of real time data from equipment allowing for a more effective and efficient asset management program.

Criteria	World	E1	SAP	Commentary
Reporting / Data Analytics				• JDE World has no built reporting functionality and would require an external reporting solution. • OneView Reporting under JDE E1 allows for customizable reports easily generated using real time data without Information Systems intervention and personalized dashboards. JDE E1 also provides advanced query technology. • JDE E1 uses Hyperion Essbase (which Nalcor currently owns) to perform data analytics. • SAP has a built in platform (called HANA) for built in data mining.
Automated Workflow				• Both E1 and SAP have automated workflow which allows predefined automated approval and escalation routes to be established for such items as purchase requisitions, journal entries, etc. World has limited workflow functionality.
Security				• Role based security model (used by majority of companies that defines access to the system based on the user's role) available in all three options. • While role based security is available in World, currently not utilized. • Field level security available in both E1 and SAP but not JDE World.
Solution Architecture				• JDE E1 and SAP have larger number of supported platforms and use modern programming language. • World uses programming language no longer taught in local universities and colleges.
Usability				• JDE E1 is a leader in usability over its competitors (including SAP), simplified screens, and data displays are easy to use. • JDE World is based on green screen technology and has a cumbersome user interface. • Usability, accessibility, connectivity, and personalization are all high value to the new generation. • E1 Pages, Cafe One, Carousel, Breadcrumbs, Tasklists provide a graphical, web based navigational interface that reduces navigation time by ~20-30% and can lead to significant productivity gains.

Criteria	World	E1	SAP	Commentary
Integration (Within ERP)				• Utilities using SAP also encountered difficulties in integrating the various modules within SAP to achieve the desired outcomes.
Training				• For JDE World, fewer options available for external training courses than E1 (would have to be custom developed). Training primarily focused around E1 consistent with the Oracle customer base. • User Productivity Kit (already owned by Nalcor) can be used to internally develop training material for both JDE World and E1. Comparable product offered by SAP called SAP Knowledge Acceleration. • All three options will require significant training for process changes. • E1 architecture is based on World with which Nalcor users are familiar (naming conventions, database structure, terminology, chart of accounts structure, etc.). As entirely new product, SAP is new to the user base and would require additional training and result in a steeper learning curve.
Ease of Change Management				• All three options will require extensive business process change requiring active management. • For JDE World and JDE E1, core functionality of the ERP will be familiar to users. • JDE World option will require technology change (external systems) to meet functionality gaps. • For JDE E1, functionality gaps will be primarily met within ERP. • SAP option will require a completely different solution for core business processes resulting in a higher level of change across business. • Industry scan indicated companies rarely migrated from existing ERP product line.

Criteria	World	E1	SAP	Commentary
Cost to Implement				• Total implementation costs for JDE E1 are significantly lower than that of SAP (estimated difference of $22.2M). • Pre-defined migration path from World to E1 reduces cost and time to migrate. • Nalcor already owns licenses for E1 as part of current license structure; additional licenses will be required however for new modules (extended functionality). • Total implementation costs for JDE E1 option exceed the cost of the World alternative by $5.6M. • While JDE E1 costs exceed the JDE World option, there are significant quantitative and qualitative benefits associated with JDE E1 which outweigh the additional costs primarily from productivity gains; allowing focus on value added activities.
Cost to Maintain				• Annual JDE E1 maintenance and support costs are significantly lower than for World with supporting systems and SAP
Risk				• Risk associated with any ERP implementation is high and will be continuously monitored and managed. • Risk is increased with SAP implementation due to a significant change in technology in addition to business process change. There is also a lack of familiarity with software vendor and implementers and higher risk associated with user adoption due to usability challenges and lack of experience with the system. • The risk associated with World implementation would be higher than E1 due to the number of required interfaces and new external solutions to meet functionality requirements. Level of current user satisfaction is low with World and users are hungry for change

Appendix C: Business Systems Revenue Requirement Deferral Account

Newfoundland and Labrador Hydro
Business Systems Revenue Requirement Deferral Account

Newfoundland and Labrador Hydro will create a separate account, beginning in January 2018, into which business system fees and information system costs associated with the Business Systems and Transformation Project will be deferred.

Disposition of any Balance in this Account

Recovery and disposition of any amounts charged to this account shall be subject to a future order of the Board.

Appendix D: Costs Related to the Business Systems Transformation Program

Costs Related to the Business System Transformation Program
as previously filed and updated June 2018

	Cost Type Description	Actual 2017	Test Year 2018	Revised 2018	Test Year 2019	Revised 2019
	Program Management Costs ($000s)					
	Salaries & Fringe Benefits	$ 771	$ 943	$ 759	$ -	$ -
	System Equipment Maintenance	-	5	2	-	-
	Office Supplies & Expenses	7	10	8	-	-
	Professional Services	26	100	-	-	-
	Equipment Rentals	-	1	1	-	-
	Travel	-	10	-	-	-
	Miscellaneous Expenses	30	58	43	-	-
A	**Subtotal**	$ 833	$ 1,127	$ 813	$ -	$ -
	Project Costs					
	Depreciation	$ 102	$ 2,841	$ 1,266	$ 3,210	$ 2,446
	Project cost amortization		$ 210	$ 44	$ 318	$ 116
	Software Support & Maintenance	64	1,023	970	-	-
B	**Subtotal**	$ 167	$ 4,074	$ 2,280	$ 3,528	$ 2,562
C	**Total Costs to be allocated (A+B)**	**$ 1,000**	**$ 5,201**	**$ 3,093**	**$ 3,528**	**$ 2,562**
	Cost Allocations					
	Average User Basis					
D	Program Management costs (A * 50%)	$ 417	$ 564	$ 407	$ -	$ -
B	Project Costs	167	4,074	2,280	3,528	2,562
E	**Total (D+B)**	$ 583	$ 4,638	$ 2,687	$ 3,528	$ 2,562
F	**Total average users**	1,611.8	1,647.2	1,570.0	1,647.2	1,497.2
G	Cost per average user (E /F)	$ 362	$ 2,815	$ 1,711	$ 2,142	$ 1,711
H	Hydro Regulated average users	820.4	837.5	805.0	837.5	805.0
I	Other lines of business average users	791.4	809.7	765.0	809.7	692.2
F	**Total average users (H+I)**	1,611.8	1,647.2	1,570.0	1,647.2	1,497.2
J	Hydro Regulated (G * H)	$ 297	$ 2,358	$ 1,378	$ 1,794	$ 1,378
K	Other lines of business (G * I)	286	2,280	1,309	1,734	1,185
	Total (J+K)	$ 583	$ 4,638	$ 2,687	$ 3,528	$ 2,563
	Fixed fee basis					
L	Program Management costs (A X 50%)	$ 417	$ 564	$ 407	$ -	$ -
M	Corporate allocation (inactive companies)	(50)	(50)	(50)	-	-
N	Net costs to be allocated (L-M)	$ 367	$ 514	$ 357	$ -	$ -
O	Number of companies sharing costs	10	10	10	-	-
P	Fixed fee per company (N/O)	$ 37	$ 51	$ 36	$ -	$ -
	Allocated Costs					
	Hydro					
J	Hydro - per Average User costs	$ 297	$ 2,358	$ 1,378	$ 1,794	$ 1,378
P	Fixed fee	37	51	36	-	-
	Hydro Specific Charges					
	Depreciation		100	189	100	300
	Software Support & Maintenance	5	33	88	-	
Q	**Total charges - Hydro**	$ 339	$ 2,542	$ 1,691	$ 1,894	$ 1,678
R	**Total Other Lines of Business (Average User Costs plus Fixed fee)**	667	$ 2,792	$ 1,680	$ 1,734	$ 1,184
	Total Business System Fees (Q + R)	**$ 1,006**	**$ 5,334**	**$ 3,371**	**$ 3,628**	**$ 2,862**

Appendix E: Cost Benefit Analysis

Cost Benefit Analysis
Scenario 1: Enterprise One and Cognos

PROJECT COST / BENEFIT ANALYSIS TEMPLATE
BST Analysis

Enterprise One and Cognos

Note: Costs are shown as positive values; Benefits as negative values

A	B	C	D	E	F	G	H	I	J	K	L
Year		Annual O&M Cost $	Annual Fuel Price (if applicable)	Annual Fuel Cost $	Other Cost $	Total Costs $	Benefit 1 Reduced OPEX $	Benefit 2 Avoided Return $	NET $	P.W. January 2018	Cumulative Present Worth
0	2018	66,737		-	1,837,058	1,903,795	-	(1,423,253)	480,542	453,770	453,770
1	2019	700,965		-	1,630,829	2,331,794	(70,231)	(766,532)	1,495,030	1,333,086	1,786,855
2	2020	607,758		-	2,021,626	2,629,384	(986,789)	(882,092)	760,503	640,344	2,427,199
3	2021	322,583		-	2,176,478	2,499,061	(1,302,576)	(826,212)	370,274	294,401	2,721,600
4	2022	330,564		-	2,309,705	2,640,268	(1,176,019)	(733,484)	730,765	548,653	3,270,253
5	2023	338,741		-	2,441,890	2,780,632	(1,170,662)	(636,260)	973,710	690,325	3,960,578
6	2024	255,672		-	2,519,801	2,775,473	(1,197,737)	(534,545)	1,043,192	698,381	4,658,959
7	2025	261,997		-	2,529,918	2,791,915	(1,230,168)	(423,176)	1,138,572	719,768	5,378,727
8	2026	268,479		-	2,533,185	2,801,664	(1,258,643)	(307,197)	1,235,824	737,723	6,116,450
9	2027	275,121		-	2,551,712	2,826,833	(1,264,902)	(201,064)	1,360,868	767,108	6,883,558
10	2028	281,927		-	1,732,630	2,014,557	(1,299,229)	(119,991)	595,337	316,889	7,200,447
11	2029	288,902		-	989,553	1,278,455	(1,329,404)	(72,790)	(123,739)	(62,195)	7,138,252
12	2030	296,049		-	622,846	918,895	(1,354,918)	(56,954)	(492,977)	(233,980)	6,904,271

Cost Benefit Analysis
Scenario 2: Status Quo – World with limited functionality

PROJECT COST / BENEFIT ANALYSIS TEMPLATE

BST Analysis

Status Quo - World with limited functionality

Note: Costs are shown as positive values; Benefits as negative values

A	B	C	D	E	F	G	H	I	J	K	L
Year		Annual O&M Cost $	Annual Fuel Price (if applicable)	Annual Fuel Cost $	Other Cost $	Total Costs $	Benefit 1 (specify) $	Benefit 2 Avoided Return $	NET $	P.W. January 2018	Cumulative Present Worth
0	2018	154,387		-	-	154,387	-	-	154,387	145,786	145,786
1	2019	507,277		-	69,259	576,537	-	(13,262)	563,275	502,260	648,045
2	2020	381,627		-	209,389	591,016	-	(32,892)	558,125	469,941	1,117,986
3	2021	391,074		-	329,273	720,348	-	(38,221)	682,127	542,352	1,660,338
4	2022	458,807		-	381,946	840,753	-	(34,252)	806,501	605,515	2,265,854
5	2023	561,779		-	391,580	953,359	-	(33,371)	919,988	652,238	2,918,092
6	2024	575,677		-	405,417	981,094	-	(41,586)	939,508	628,969	3,547,061
7	2025	589,919		-	417,245	1,007,164	-	(44,480)	962,684	608,578	4,155,638
8	2026	604,513		-	427,687	1,032,199	-	(43,341)	988,858	590,297	4,745,935
9	2027	619,468		-	438,655	1,058,123	-	(42,733)	1,015,390	572,365	5,318,300
10	2028	634,793		-	447,447	1,082,240	-	(36,593)	1,045,647	556,582	5,874,883
11	2029	650,497		-	463,047	1,113,544	-	(45,505)	1,068,039	536,829	6,411,711
12	2030	666,590		-	416,717	1,083,307	-	(45,524)	1,037,783	492,560	6,904,271

Appendix F: Functionality Enhancements from JDE Migration Project

Business Systems Transformation

Functionality Enhancements from JD Edwards Migration Project

<table>
<tr><th colspan="2">System Wide Functional Improvements</th></tr>
<tr><td>• Enhanced search capability, web based interface
• Personalized user screen by job role
• Direct export of data to other formats (Excel/PDF)
• Role based security
• Enhanced data access through new embedded query tool
• Reporting offered in Enterprise One provides out of the box and customizable reports that can be generated using real time system data
• Linking/on screen access to other applications/web pages</td><td>• Automated notifications based upon predefined criteria
• Automated workflows for review and approval
• Mobile system access and approvals
• Reduced reliance on other systems/tools (Lotus Notes)
• Use of process-based E1 pages and favorites, creating a user based customized view of the ERP
• Real-time reporting through dashboards and watch lists
• Ability to attach or link documents to transactions for viewing and access
• Drill through capability from reporting (including dashboards) to underlying transactions</td></tr>
<tr><th colspan="2">Capital Asset Management</th></tr>
<tr><td>• Standardized asset and data management. Larger volumes of data in a standardized format will allow for more analysis
• Real-time asset-based data readings to allow for Predictive maintenance
• Cost of maintaining assets</td><td>• Schedule and monitor maintenance activities, including predictive, preventive and corrective maintenance
• Enhanced tracking of repair history for assets</td></tr>
<tr><th colspan="2">Project Management (Fixed Assets and Job Cost)</th></tr>
<tr><td>Fixed Assets
• Define an appropriate asset structure for tracking asset costs
• Track the full asset accounting lifecycle
• Provide configurable journal entry screen with copy and paste functionality
• Automated mass disposal
• Fixed Asset creation with approval routing
• Integration with equipment plant maintenance module as part of capital asset management
• Support calculation of multiple depreciation methods including Equal Life Group, Straight Line and Capital Cost Allowance
• Field level security</td><td>Job Cost
• Integrated with AP, AR, Contract Billing and Fixed Assets
• Job status inquiry for general project health information
• Dashboard functionality to drill back on all project transactions
• Time schedules enables the scheduling of subtasks
• Standardized operating projects</td></tr>
<tr><th colspan="2">Human Capital Management</th></tr>
<tr><td>• Comprehensive views of employee history
• Automatic creation of organization charts
• Wage and salary administration with the ability to select and process a group of employees for processing of pay grade salary changes, enhancement of automated calculations currently performed manually
Lotus Notes application replacements</td><td>• Self service functionality e.g. the updating of personal information
• Role based security and auditing to secure sensitive employee data
• Time entry enhancements
Health and Safety integrated module in JDE E1</td></tr>
</table>

<table>
<tr><th colspan="2">Finance</th></tr>
<tr><td>Accounts Payable
Automated three way matching of invoices, purchase orders, and receipts
Setup of a single vendor with multiple sites
Electronic attachment of receipts
Expense Management module for purchase card transactions as well as expense claims
Reoccurring and multi vouchers to reduce data entry
Electronic Funds Transfer for US currency
Automated approval process for Invoices
General Ledger
Automated account description pop-up
Automated journal entry description field from prior description fields
Ability to add attachments/link documents to journal entries
Allocation feature allows for auto generation of some entries
Revision of Chart of Accounts to permit natural roll up of costs
Clean up and partial restructure
Align account structure and ensure consistent roll up
Automated Bank Reconciliation
Consolidations performed within the ERP</td><td>Accounts Receivable
Automated e-mail of statements and invoices
Automated account description pop-up
Automated generation of invoice description field
Ability to add attachments or link documents to invoice records
Delinquency account processing
Centralized area to track customer data and interactions
Automated system notifications</td></tr>
<tr><th colspan="2">Supply Chain Management (Procurement and Inventory)</th></tr>
<tr><td>Automatically search for inventory items in multiple locations
Support process improvements around receipting and issuance of inventory
Request item additions electronically and route for approval
Automated and centralized fuel management</td><td>Online purchase requisitions and electronic workflow for automated approval of requisitions
Generate a bill of materials which can be used on subsequent work orders</td></tr>
<tr><th colspan="2">Customer Service (Utiligy 360 and Case Management in E1)</th></tr>
<tr><td>Supports the Customer Service department’s three year strategic plan
Ability to electronically record all interactions with customers
Step-by-step service wizard to create new customers
Utility Collection Manager allows for reporting on all customer collections history</td><td>Automated meter reading for data upload from hand held devices
Data trending capability
Rate management to ensure data integrity</td></tr>
</table>

Functionality that will be available in the Cognos TM1 software across all releases includes

Fixed Assets	
• Long-term depreciation projections of current and projected assets, including projected retirements o 50+ years, by month, as required • Integration with JD Edwards EnterpriseOne for extraction of current Fixed Asset data into Cognos TM1: o Base Asset data – description, location, system, class, function, customer, location, etc. o Depreciation data - asset cost, service life, depreciation method, etc.	• Reporting and data extraction to facilitate long term planning and Regulatory requirements: o Investment Evaluation o Cost of Service o Regulatory Reporting • Two straight line depreciation methodologies: o Average Service Life Equal Life Group
Capital Projects	
• Ability of Project Estimators to prepare capital project estimates and related build up for all Nalcor Lines of Business in an integrated system, including: o Internal labour, by craft and home business unit o Equipment o Materials o Contract labour • Integration with JD Edwards for data, such as: o Master Data: Account and Corporate (Business Unit) structures	• Ability to generate capital project proposals including detailed project cash flows, by account, by month, with supporting account buildup
Income Statement	
• Will result in the replacement of the current Clarity software tool used for budgeting and forecasting • Ability to utilize zero-based or escalated budgeting methodologies or a hybrid approach, by account or line of business • Income statement for each LOB at the account level, with supporting build up • Driver based budgeting and forecasting for select accounts • Control of and standardized utilization of Budget Assumptions o Salary and O&M Escalators o Foreign Exchange Rates o Oil Pricing	• Ad-hoc and published report generation • Integration with JD Edwards, for extraction of data into Cognos TM1, including: o Master Data: Account and Corporate (Business Unit) structures o Transactional Data: Actual account balances, by month • Integration with JD Edwards for update with data generated in Cognos TM1, such as: o Transactional Data: Budget and Forecast account balances, by month • Integration with the capital budgeting and forecasting processes for automated entries for labour credits
Capital and Operating Projects	
• Replacement of the current custom built Capital Asset Projection Module (CAPM) tool and elimination of multiple Excel based templates • Ability to generate new projects (Business Units) both Capital and Operating for automated creation in JD Edwards • Ability to generate project specific Work Breakdown Structures (WBS) for automated creation in JD Edwards • Budgeting and Forecasting by project at the account level, with supporting build up • Driver based budgeting and forecasting for select accounts • Integration with the operating budgeting and forecasting processes for automated entries for labour credits • Integration with JD Edwards for extraction of data into Cognos TM1, such as Craft bill rates	• Integration with FTE budgeting and forecasting for selection of resources from the resource complement, facilitating budgeting of internal labour and contract labour • What-if analysis, including for budget changes or project deferrals • Ad-hoc and published report generation • Integration with JD Edwards for update with data generated in Cognos TM1, such as: o Master Data: Project Work Breakdown Structures (WBS) and Business Units (project numbers) o Transactional Data: Budget and Forecast account balances, by month

<table>
<tr><th colspan="2">Salary and Full Time Equivalency (FTE)</th></tr>
<tr><td>

Budgeting and forecasting of the Salary range for each LOB at the account level, by month, with supporting build up
Restricted security access to salary and related data by business unit
Decomposition of the salary amount into:

Cost of Living
Merit
Progression
Front Line Supervisory (FLS) amount

Budgeting and forecasting of FTEs, hours by month, associated with positions defined in the salary build up
Vacancy tracking and reporting
Driver based budgeting and forecasting for select accounts
Ad-hoc and published report generation

</td><td>

Control of and standardized utilization of Budget Assumptions

Salary, cost of living, merit, etc. escalators and percentages

Integration with projects budgeting and forecasting for selection of the available resource complement
Integration with JD Edwards, for extraction of data into Cognos TM1, such as:

Master Data: Employee, FTE, position and job data
Transactional Data: Actual account balances, by month

Integration with JD Edwards for update with data generated in Cognos TM1, such as:

Master Data and Position Master - approved budgeted positions

</td></tr>
<tr><th colspan="2">Balance Sheet</th></tr>
<tr><td>

Ability to budget and forecast a full Balance Sheet for each LOB, with update capability by each of the respective business unit owners
Cash Flow for each LOB
Data elements outside the income statement will be a manual input, with upload capability, such as from Excel
Income statement data will flow into the balance sheet
Integration with JD Edwards for update with data generated in Cognos TM1, such as:

Transactional Data – Budget and Forecast account balances, by month

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Ad-hoc and published report generation
Elimination entries with ability to generate a consolidated Balance Sheet
Integration with JD Edwards, for extraction of data into Cognos TM1, such as:

Master Data – Account and Corporate (Business Unit) structures
Transactional Data – Actual account balances, by month

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</table>