



Canadian Energy Information Organization

The Case for the Establishment of the CEIO

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¹ CERI acknowledges the contribution to this document from Bruce Lourie of the Ivey Foundation and David Collyer.

INTRODUCTION

This proposal details the recommendation for the establishment of the Canadian Energy Information Organization (CEIO). The proposal is representative of the agreed vision of many stakeholders and includes input and support from various Canadian organizations, governments, regulators, businesses, universities, and other entities. It has considered and is based on numerous publications, including content from the Senate, the Council of the Federation, the Canadian Energy Research Institute for the period of 2012-2017, as well as input received during CEIO consultations which took place in 2015-2017; attracting stakeholders from most parts of the country. The proposal also considers the recommendations of the NEB Modernization Panel. Outlined in this document are proposed organization goals, the value proposition, principles and characteristics, functions and products, operations and governance and a timeline association with the implementation of the CEIO.

The current state of energy information in Canada is characterized by:

- Overlapping data collection
- Gaps in data collection
- Variations in methodologies, definitions, time periods and quality
- Difficulty in accessing and reconciling data sets
- Variation in the credibility of data offering organizations (i.e. lack of trust)

The primary objective of the Canadian Energy Information Organization would be to resolve the above issues.

Drivers for Change

During discussions² over the last several years, we have observed that most energy stakeholders agree that a single window to energy data would eliminate costly duplication of efforts typically found with current systems where many different organizations produce their own statistics for policy, regulatory, royalty, pricing, demand response, and investment purposes. Instead of collecting the same information many times, often under

² Summary of a Workshop to discuss establishing a Canadian Energy Information Organization – A Canadian Energy Research Institute Initiative (http://resources.ceri.ca/PDF/Other/CEIO_Feb_2016_Workshop_Summary.pdf)

Survey on Need for Canadian Energy Information Organization
(http://resources.ceri.ca/PDF/Other/CEIO_Survey_Summary.pdf)

Combined Summaries of Charrettes in Montreal and Calgary, 2017
(http://resources.ceri.ca/PDF/Other/CEIO_Charrette_summary_2017.pdf)

different rubrics, consolidation of information at a single site would save time and money. Harmonization of data would also reduce end-user confusion as variations in definitions and taxonomy would be addressed making the information easier to digest.

It was also noted that some stakeholders believed there is a need for access to coherent and consistent energy information to help raise public awareness about the importance of energy to the health of the economy and their daily lives. The suggestion that the public does not appreciate the trade-offs associated with energy development and that if they were to become more literate, they would be more apt to understand was also made. Although “education” of this nature is a laudable goal, it is secondary to the other objectives noted in this paper. More detail regarding the sourcing of additional energy information in collaboration with the Indigenous Peoples of Canada and the dissemination of a full spectrum of Canadian energy data can be found in ***Appendix B – Informed Canadians Make Better Decisions and in Appendix C – Parallel Ways of Knowing***.

There was consensus that the CEIO should provide unbiased information which governments could use to inform evidence-based policy development and energy companies could use to improve their understanding of market drivers, production, benchmarking and forecasting at the operational level, and public advocacy organizations could use it as a source of “truth” and commonality at the economic and policy levels. Local governments (municipal and Indigenous) could use such information to address their respective needs associated with urban planning and energy efficiency programs. In remote communities, where energy supply can be challenging, the CEIO would provide a vital resource to support evidence-based decision-making.

The CEIO would have a significant impact on public policy. Having the ability to access high-quality demand data could help in the formulation of provinces’ long-term energy plans and guide decisions about infrastructure development. Energy markets are changing rapidly, driving the need for immediate access to quality information.

The Need for Objective, Independent Information

The world of energy is changing rapidly both on the production and demand sides. Canada, as a country experiencing a domestic energy transition and trade based issues, needs to be able to follow, anticipate and manage energy system changes to remain internally prosperous and externally competitive. For this, Canadians need tools to illuminate the complexity of our energy systems. This proposal outlines the establishment of an organization that can help to ensure that Canada can count on the energy data needed to support this effort.

Canada is blessed with an abundance of energy resources. We have, however, reached a point where the development of these resources for economic growth will require

difficult choices regarding the associated environmental and societal impacts. The availability of credible and comprehensive energy information will be essential going forward if citizens, organizations and governments are to have the opportunity to make informed decisions about Canada's energy future. In Canada, there exists only limited access to this information, which has restricted the ability for Canadians to acquire and interpret data regarding energy production and use options.

Data, information and analysis can help to address the need for:

- **Increased consensus** regarding shared jurisdictional responsibilities between the federal government and provinces and territories. Canada's Constitution states that the federal government has responsibility for natural resources whereas provinces have responsibility for energy resources. A centralized organization, such as the CEIO that all governments could reference would no doubt improve collaboration between governments regarding the management of energy resources.
- **Increased consensus** among stakeholders regarding the "true" economic, environmental and social impacts of energy development. Consensus could help to support increased public acceptance for energy developments or consumer focused policy.
- **Increased support for evidence-based policies** for federal, provincial, territorial, and, increasingly important, municipal governments as they develop policies to manage energy production and use, as well as the associated economic, environmental and social impacts, and our climate change goals. These range from the careful management of production activities to the promotion of energy efficiency and conservation, and urban design.
- **Improved efficiency of regulatory reviews or approvals** for municipal, provincial/territorial and federal infrastructure projects. Such efficiency improvements could enhance the investment environment for large-scale projects in Canada.
- **Monitoring and reporting on the effectiveness of policies** at all levels as they relate to energy production and use. Such reports can lend trust to policies and regulations established as governments will be able to demonstrate the value of policy. Of importance is Canada's commitment to the Paris Agreement and the need to report credible information about to energy sector CO2 emissions.
- **Improved efficiency of trade agreements** by providing governments, Indigenous Peoples, industry and interested stakeholders with clear information

regarding trade balances (gross domestic product and jobs) concerning energy exports and imports.

- **Improved confidence** from Canadian Citizens and international trading partners that Canadian energy systems are well managed.

The need for an energy information organization has been identified during various federal/provincial meetings over the last 15 years. Interested stakeholders lament the lack of data, and convenient, transparent access to existing data in Canada.



June 19, 2012 – Jameson Berkow: Finding information about the Canadian energy industry is easy – if you go to the U.S.

The above headline sums up the situation we face in Canada. There currently exists no comprehensive energy data repository for Canada.

In a March 2014 report on renewable energy to Natural Resources Canada, the Canadian Industrial Energy End-use Data and Analysis Centre concluded: “many questions remain about the extent and nature of renewable energy production in Canada.” They attributed this challenge to a lack of data and analysis associated with this evolving sector.

The above references exemplify data and analysis challenges related to the energy sector in Canada. Reliance on information and research from the U.S. Energy Information Administration (EIA) has been the default option for most energy analysts in Canada for many years. Inherently, this limits the ability to effectively understand the issues because EIA’s data collection and research agenda is driven by the requirements of U.S. federal and state governments and other American stakeholders.

A multitude of stakeholders utilize Canadian energy data in Canada and abroad:

- Potentially affected public
- Federal government
- Provincial government
- Political parties
- Regulatory agencies
- Indigenous Peoples
- Media
- Investors
- Energy associations
- Government agencies
- Environmental organizations
- Financial institutions
- International development agencies of Canada
- Consulates abroad
- Academic and research institutions
- International trading partners
- International organizations

Many of these stakeholders are participants in regulatory, investment, consumption, trade, and policy decision-making in various forums and circumstances.

In such an international and Canadian context, it is in Canada's best interest that these stakeholders operate with the same comprehensive, consistent, coherent, quality and timely factual data. The ability to access this data would allow for improved communication, raise trust in collaboration, help to facilitate evidence-based decision-making and allow decision makers to concentrate on the costs, benefits, risks and outcomes of projects, investment decisions and policies rather than debate facts and misinformation.

Specific Outcomes of the CEIO

The benefits of the CEIO are many and are grouped in several categories:

Trust and Policy

- Enhanced stakeholder trust in energy information and government policies
- More focused public dialogue and reduced conflict over energy project developments
- More efficient and effective energy regulatory processes
- Enhanced credibility of provincial and national regulatory organizations
- Greater effectiveness and reporting of energy system performance monitoring

Canadians and communities

- Enhanced understanding of energy policy impacts on consumers
- Expanded capacity for local authorities – municipal and Indigenous – to become smart energy communities and constructive participants in energy policy and project decisions
- Increased energy literacy of Canadians concerning the energy sector, and its impacts on economy and environment
- Enhanced public understanding and acceptance of increased diversification and sophistication of the energy sector

Quality, Gaps, and Timeliness

- Convenient one-stop, one-format resource to gain energy information for all data users
- Reduced cost and time savings across Canada for producers and users of energy information
- Timely, cost-effective and efficient bridging of gaps in energy information due to development of energy data infrastructure
- Better quality data that can be used to achieve better energy management by companies, communities, and individuals across Canada
- More coherent data for use in policy analysis and hence increased confidence in energy policies by governments and key stakeholder groups
- Increased spatial coverage of energy information

Climate Change and the Environment

- Increased stakeholder and political understanding of energy policy impacts on the environmental-economic-societal relationship
- Improved greenhouse gas (GHG) management
- Improved management of land and water use impacts

Markets and Reporting

- Increased energy market and investment opportunities and transparency
- Increased awareness of the transformations taking place in the energy sector
- Reduced market uncertainty and related investment decisions
- Better quality data and reporting on domestic and international policy commitments outlined in the Paris Agreement and other treaties

CEIO REQUIREMENTS

As noted in the discussion of need, the key requirements of the organization would be:

- Independence from key stakeholders – the activities of the organization cannot be controlled by one stakeholder’s perspective
- Broad support – from national, provincial, territorial governments and Indigenous Peoples
- Broad cross section of representation in the governance of the organization
- Stable long-term funding – core government funding must be in place for 3 to 5 years at a time, to allow for a focus on the quality delivery of services. Endowment funding could be established with annual reporting and, after three years, a comprehensive review of services to ensure the organization is meeting expectations and market needs. Funding from other stakeholders would support the organization but would not be a necessity
- Credibility and trust of stakeholders – proactive marketing and communications approach to provide information to stakeholders and solicit feedback on ways to improve
- Collaboration – a means by which the organization could collaborate with data providing organizations to gather existing information and minimize the need to create duplicate data gathering processes
- Accessibility – data and reports would be publicly available
- Transparency of operations and governance – all significant decisions and key discussions are documented and publicly available
- Unbiased – all issues addressed are done so from a neutral perspective with a focus on the data and a minimization of assumptions or values judgements
- Technical expertise – the organization must have credible staff that are recognized within the energy sector as having demonstrated an understanding of energy issues

Constraints

The three key constraints on the establishment of the CEIO are:

- Long-term funding – funding should be available for a 3 to 5-year period, sufficient to fulfill the mandate and free from annual budgetary considerations by governments or other funders
- A legislative mandate – a means by which the organization can be protected from short-term changes in political direction and a means by which the organization can encourage data providing organizations to share information. This mandate should be federal with support from the provinces and territories.
- Security – constraints as to how data is received and accessed must consider the value inherent in this organization and any potential breach by a third party. As such, system security is a priority for the organization and may limit some potential services.

Dependencies

Key dependencies are considered part of the development plan to establish the CEIO. These will take two years to complete and include:

- Collaborative agreements with data gathering organizations across Canada; and
- Support from federal, provincial and territorial government departments, Indigenous Peoples, industry associations and environmental organizations.

SCOPE OF THE CEIO

Scope

Energy-related data and analysis on primary and secondary energy (including but not limited to coal, oil, gas, natural gas liquids, electricity, renewable energy, biomass, products of primary energy) supply, energy transport and delivery and end-use consumption and services. A key aspect of the scope of this work is on air, land and water use impacts including climate change and the transition to a low carbon economy.

Mission

To collect and issue independent, quality data on energy supply and use to support informed discussion and decision-making on public policy concerning energy, efficient markets, energy trade, environmental and social impacts of energy.

To improve the understanding of energy systems and related economic, social and environmental impacts amongst the potentially impacted public.

Customers

Federal, provincial and territorial governments, municipalities and citizens, Indigenous Peoples, the energy industry and other businesses, investors, government, financial markets, banks and the media.

Characteristics

- National scope
- Inclusive of all energy types and economic, environmental, and social impacts
- Dedicated to the public interest in offering unbiased data and information
- Central repository for credible, comprehensive, coherent, quality, timely energy data
- Flexible and exploring new and innovative data sources in a rapidly changing world
- High level of collaboration and integration with provincial and national data collectors displayed with state of the art artificial intelligence and data management tools

Functions, Products and Operations

Three key functions of the CEIO would include Data Management, Analysis and Reports, and Communication.

Artificial Intelligence and Data Management (see Appendix A – Data Management Tools for further information on the data structure)

- Data clearing and quality assurance
- Data reconciliation and harmonization
- Ensuring relevance and timeliness
- Mediation to address data consistency, privacy, confidentiality, and security issues
- Provision of a uniform data-retrieval interface, complete with customization and presentation capabilities
- Data gap analysis and filling in gaps (comprehensiveness)

Analysis and Reports

- Past: Analysis of historical developments, trends, statistical interpretations
- Current: Market monitoring and assessment (quarterly, annually)
- Future: Trend Analysis

Marketing and Communication

- Promotion of CEIO to decision makers
- Ensuring open access to information
- Sharing information with organizations in Canada
- Promoting collaboration and information exchange through state of the art artificial intelligence and data management
- Outreach to energy stakeholders and information consumers

To provide its services, the CEIO will develop and operate databases, website, data-retrieval and processing software and mobile/tablet applications. CEIO products and services will be guided by accessibility standards of the EIA and the IEA.

Collaboration with many organizations will be pivotal to the success of the CEIO. Among them will be governments, regulatory, institutes/programs, agencies, associations, and other organizations that collect data. Partnerships with Statistics Canada regarding data collection and with research institutes for market analytics will also be integral to the CEIO design. These would be bi-lateral agreements to manage expectations and budgetary requirements.

ORGANIZATION

The CEIO would be an independent agency with its own administration policies including those dealing with human resources, marketing and branding and information technologies and communication protocols.

As an organization, it would have the following structural requirements:

1. Senior Leadership – a CEO and management team would direct the day-to-day functions with the CEO reporting to a Board of Directors
2. Data Management – the data management function would consist of a senior leader and cadre of IT and energy sector professionals to manage information submissions from various organizations. This group would also handle data verification and gap analysis. Guidance for this function will be provided by a Technical Advisory Committee.
3. Research and Analysis – a senior leader with staff to assess the data being submitted to develop reports. These reports would evolve but include economic, environmental, and social impacts associated with historical energy statistics. Information reports would be focused on providing relevant information based on the needs of user groups.
4. Relationship Management – this function acts as the business development arm of the organization. It would consist of a senior leader and a small group of business development personnel to develop and manage the organizational relationships between the CEIO and collaborating agencies.
5. Marketing and Communications – a senior leader and small staff with the mission to establish and grow the credibility of the organization. This group would also handle outreach and stakeholder satisfaction management.
6. Finance and Administration – a senior leader with a small staff responsible for finance, human resources, procurement, and facilities management.
7. Technical Advisory Committee – Comprised of energy experts who provide research advice on performance and development of the CEIO, including such areas as data gaps, consistency, and emerging data needs.
8. Data Collection/Quality Assurance – Focus on data collection, integration, quality assurance, reconciliation, coherence, timeliness, and other issues and will work with the IT team on delivery of the data through the website and other means.

9. Quality Assurance and Analytics teams will be partially outsourced to existing organizations.

GOVERNANCE STRUCTURE AND PROCESS

A critical factor for the success of the CEIO, as with any independent agency of government, will be the balance between independence, policy relevance and durability over time. The governance structure and process, therefore, needs to conform to a high standard. Given the data-driven mission of the CEIO, the governance structure must provide confidence and credibility in the accuracy, transparency, and openness of data collection, as well as access, use and dissemination of information.

The key attributes of the CEIO Board of Directors (the Board) therefore include:

- Independent
- Highly qualified
- Balanced and diverse
- Transparent
- Credible

These attributes are consistent with Government of Canada requirements for Governor in Council (GIC) appointments. Even though the CEIO will not likely be a crown corporation, the Board may have a specified number of GIC members. An example is Sustainable Development Technology Canada (SDTC), an arms-length foundation created in 2001 by the Government of Canada to fund new clean technologies. SDTC was given initial funding of \$100 million over five years, with additional funding provided by agreements developed in future years. In return, SDTC is subject to external audits and evaluations of the performance of the organization and how its mandate has been fulfilled. SDTC reports to Parliament through a designated Minister (Natural Resources Canada).

Board Appointment Process

For the initial development of the CEIO Board, a three-person external-to-government panel could be commissioned to prepare a list of potential GIC candidates, in consultation with the designated Minister, following which the Government of Canada would decide on GIC member appointments. Meanwhile, the Member Council would be created and could appoint its chosen Board candidates. This process would ensure a reasonable degree of independence for the initial CEIO Board.

SDTC, for example, is governed by a 15-member Board with overall responsibility for stewardship and strategic direction. Seven Board members are GIC appointments, and

the eight remaining members are appointed by a Member Council composed of individuals representing the interests of the public, private and academic sectors. The process by which the SDTC Board and Member Council were selected could be adapted to achieve the key attributes of the CEIO Board while respecting the Government of Canada's GIC appointment principles of openness, transparency, merit, and diversity.

Board Composition, Role, and Terms

The CEIO Board composition would be expert-based, rather than stakeholder-based, to ensure its independence as well as the recruitment of high-quality individuals who would enhance the credibility of the organization. A small Board of 9 to 11 members would be selected based on their expertise in energy data, data sources, modelling and analysis, and their knowledge of climate policy in energy-related economic sectors and regions of Canada.

All Board members would be expected to have some degree of governance expertise and be appointed with the understanding that the CEIO is an essential element in helping Canada achieve its energy transition and clean growth goals within the context of the Pan-Canadian Framework. In this regard, Board members will need to act as ambassadors connecting the CEIO to relevant sectors and communities. The Board's role will include good governance (e.g. setting and overseeing the implementation of corporate objectives and strategic directions, monitoring of corporate and management performance, and so on), hiring and oversight of the CEO of the organization, and ensuring that the CEIO creates and maintains the highest level of data quality and integrity, while garnering broad support from national, provincial and territorial governments, industry, academia and Indigenous Peoples.

The founding Board should be appointed with two to four-year terms, staggered to allow for Board member renewal. Terms could be renewed once with a maximum period served of eight years for any individual.

Funding model

Independence, credibility, and durability are often linked to the funding mechanism. Consistent with successful organizations elsewhere, such as the California Air Resources Board (CARB), the U.S. Energy Information Administration (EIA), and the U.K. Committee on Climate Change (CCC), the CEIO would need to be assured of sustainable funding through a budget mechanism that protects the resources of the organization over time.

It is recommended that CEIO receive five years of initial federal funding with an expectation that it is a permanent organization receiving five-year tranches of support.

Project funding and commissioned research funding may be in addition to this and provided by provincial and territorial governments, and the private sector.

STAFFING AND BUDGET

Staffing & Compensation

| Function | Senior Level Average total annual compensation (\$200K) | Mid-level Average total annual compensation (\$120K) | Junior Level Average total annual compensation (\$100K) |
|----------------------------------|---|--|--|
| Senior Leadership | 1 * Chief Executive Officer | | 1 * Executive Assistant |
| Data Management | 1 * Vice President | 4 * Manager | 10 * Information Technology Specialist 10 * Energy Analyst 6 * Service Desk Representative |
| Research & Analysis | 1 * Vice President | 4 * Manager | 8 * Analyst |
| Relationship Management | 1 * Vice President | 4 * Manager | 8 * Business Development |
| Marketing & Communication | 1 * Vice President | 4 * Manager | 8 * Coordinator |
| Finance & Administration | 1 * Vice President | 4 * Manager | 3 * Accountant 3 * Human Resource Specialist 4 * Administrative Coordinator |
| Total Staff | 6 | 20 | 61 |
| Total Annual Compensation | \$1.2 K | \$2.4 M | \$6.1 M |

Budget

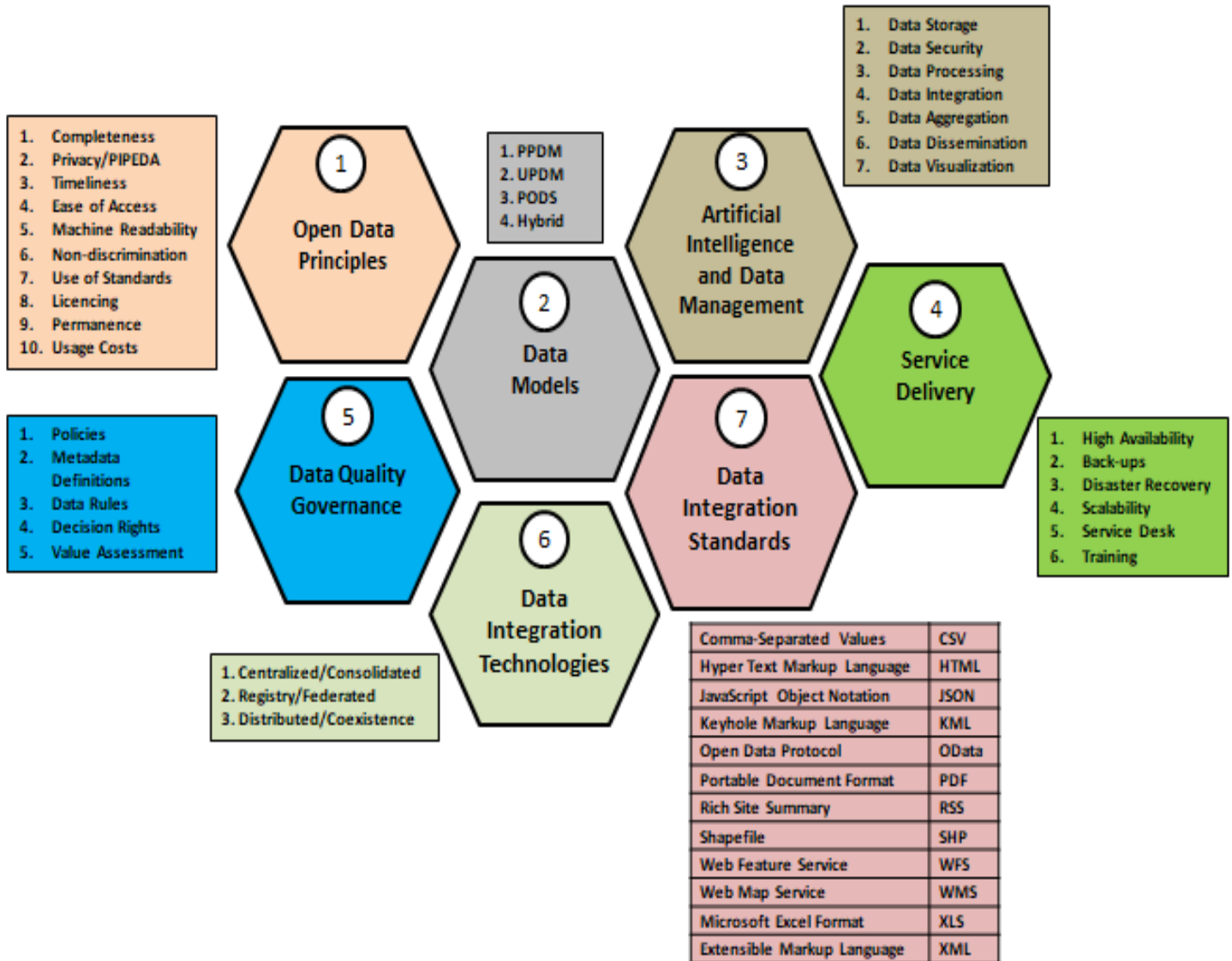
| Expenses | |
|--|----------------------|
| Salaries | \$ 9,700,000 |
| Consultants: General, data analysis | \$ 1,000,000 |
| Consultants: Data gathering, protocols and collection improvements | \$ 3,175,000 |
| Professional Fees | \$ 200,000 |
| Recruitment & Relocation | \$ 200,000 |
| Staff Training & Conf. Reg. | \$ 150,000 |
| Business Development | \$ 50,000 |
| Memberships & Assoc. Dues | \$ 30,000 |
| Books | \$ 50,000 |
| Rent | \$ 350,000 |
| Phone & Fax | \$ 40,000 |
| Courier | \$ 20,000 |
| Printing & Photocopying | \$ 60,000 |
| Supplies | \$ 60,000 |
| Computer Hardware & Software (sustaining) | \$ 600,000 |
| Insurance | \$ 100,000 |
| Bank Charges | \$ 40,000 |
| Marketing and communications | \$ 1,000,000 |
| Meeting Expenses | \$ 400,000 |
| Travel | \$ 400,000 |
| Total expenses | \$ 17,625,000 |
| Capital | |
| Year 1 (system design build data engineering security protocols) | \$ 3,000,000 |
| Year 2 (system build data integration data security) | \$ 3,000,000 |
| Sustaining (system operations data management data security) | \$ 2,000,000 |

Funding

Funding for this organization would be consistent with funding principles for arm's length agencies, such as endowment funding (as described in Funding Model above). This would allow for stable growth and market assurance that the CEIO is part of the energy landscape in Canada and that the organization will stand the test of time. Funding should be sought from federal, provincial, and territorial governments. Federal funding for the initial establishment of the CEIO will accelerate the development process.

APPENDIX A: DATA MANAGEMENT TOOLS

Fundamental to the success of the CEIO is the use of advanced and emerging data management tools. The size and scope of the data to be collected, coordinated, and confirmed is immense. Use of artificial intelligence, data reconciliation automation and smart data analytics will support and enhance the credibility of the organization.



The image above depicts the data management tools which will establish the CEIO as the preferred and trusted source of Canadian energy information.

The Table below details the different data building blocks and why they are important for the effective establishment of the CEIO.

| Building Block | Description | Value Proposition to the CEIO |
|--|---|--|
| 1. Open Data | Open Data is defined as structured data that is machine-readable, freely shared, used and built on without restrictions. | <p>CEIO will be multi-stakeholder and multijurisdictional, the data in CEIO would facilitate:</p> <ul style="list-style-type: none"> • Availability and Access: the data must be available in a convenient and modifiable form. • Re-use and Redistribution: the data must be provided under terms that permit re-use and redistribution • Universal Participation: every stakeholder of CEIO must be able to use, re-use and redistribute the pertinent data. |
| 2. Data Models | CEIO data models help in defining and categorizing data elements, showing how the data elements are connected to each other, and establishing standard definitions and descriptors so that data can be consistently understood, captured, processed, and consumed by relevant stakeholders. | <p>The data models in CEIO will be critical in designing a well-functioning database for two main reasons:</p> <ul style="list-style-type: none"> • Data modelling requires one to understand how the business functions to define the data elements that drive the business processes. • Data models can tell whether one needs a global warehouse, an independent data mart, or a series of interconnected data marts for improved analytics and decision making. |
| 3. Artificial Intelligence (AI) and Data Management (DM) | AI is primarily aimed at automated approaches for predictive analytics. However, predictive analytics is key component of data management (DM), | <p>On Artificial Intelligence (AI) and Data Management (DM), CEIO will facilitate:</p> <ul style="list-style-type: none"> • End-to-end process of data management for appropriate decision making |

| Building Block | Description | Value Proposition to the CEIO |
|----------------------------------|---|---|
| | which includes data capturing, data cleaning, data dissemination, data integration, data visualization, and presentation of insights to stakeholders. | <ul style="list-style-type: none"> • Building new methods that support the process of analyzing pipeline related data. |
| 4. Data Governance | Data governance (DG) refers to the overall management of data in an organization. Without data governance, data sets in CEIO will be inconsistent, unreliable and unrepeatable. | <p>The data sets in CEIO will be typically federated; it will be created by one stakeholder and might be shared by all relevant stakeholders. Essentially DG ensures that:</p> <ul style="list-style-type: none"> • CEIO data is safe, secure, and handled in compliance with laws and regulations • Stakeholders gain value from data and improve their business performance |
| 5. Data Integration Technologies | Data integration is the combination of technical and business processes used to combine data from disparate sources into integrated valuable information. | <ul style="list-style-type: none"> • The data sets in CEIO will be typically created by one stakeholder but might be relevant for many more stakeholders. Hence data sets need to be integrated or synchronized across multiple systems either in a centralized/de-centralized/federated manner so that users have a complete view of CEIO categories, entities, and events. |
| 6. Data Integration Standards | Data integration involves combining data of different formats in a single and unified format | As data integration is a key element in CEIO, stakeholders need different options integration standards based on the use cases. For example, if cloud applications need to be integrated, then XML data format is recommended. For direct data download from the application, CSV/XLS/PDF data format is the preferred solution. |

| Building Block | Description | Value Proposition to the CEIO |
|-----------------------|--|---|
| 7. Service Delivery | It is the consistent delivery of the CEIO enabled service to the CEIO customer | As CEIO will serve numerous stakeholders, the service desk is essential to ensure stakeholder communication and care. |

APPENDIX B: INFORMED CANADIANS MAKE BETTER DECISIONS

There is an urgent need for information about all parts of the Canadian energy sector from oil, natural gas, coal, thermal and hydroelectric power through to nuclear, solar, wind, biomass, and other sources of energy. This need is familiar, and there have been successful organizations established in the past to provide factually, stakeholder reviewed information, statistics, news, market feeds and educational learning resources designed to increase awareness and understanding of energy-related issues.

While the CEIO would provide access to technical data for federal, provincial, municipal, and Indigenous governments which could inform policy and regulatory decisions, there is another far greater audience thirsty for independent, evidence-based, objective information on which they can base their own decisions. This audience is Canadians.

Informed citizens who better understand energy policy and regulatory choices, make better decisions related to energy, choose careers in energy, invest, and are invested in energy and use energy more wisely.

The CEIO not only could provide a central hub of technical energy data, but it can also build upon past efforts to deliver energy information to Canadians. The world has made great strides with information technology, and the establishment of the CEIO is the perfect opportunity to leverage those tools to improve Canada's energy literacy ***and fluency***. The CEIO would be so much more than a hub of information; it would be the portal to conversations about Canada's transition to a low-carbon energy future. Because the provision of information is only a part of the effort needed to shift thinking and behaviour to allow Canada to meet its climate change objectives.

APPENDIX C: PARALLEL WAYS OF KNOWING

Canada has seen unparalleled progress in the last decade regarding its relationship with Indigenous Peoples.

“No relationship is more important to Canada than the relationship with Indigenous Peoples. Our Government is working together with Indigenous Peoples to build a nation-to-nation, Inuit-Crown, government-to-government relationship – one based on respect, partnership, and recognition of rights.”

Ottawa, Ontario – June 21, 2017, National Aboriginal Day - Prime Minister Justin Trudeau

Indigenous Peoples have their robust forms of local and regional government. Often, energy development projects within traditional territories require, not only federal and provincial approvals, but they must also seek local and regional government approval and involve Indigenous People in meaningful ways, including environmental protection measures, employment, training, preferential contracting and financial benefits.

The establishment of the CEIO provides a new opportunity to collaborate with Indigenous People to gather and communicate traditional “ways of knowing” as they related to the development of Canada’s natural resources in an environmentally, socially, and economically responsible manner.

While this case for the establishment of a Canadian Energy Information Organization has provided a comprehensive overview of the technical energy data part, this appendix serves to identify the additional need for and intent to develop another component of the CEIO.

Working in partnership with Indigenous Peoples, both individually and as organizations, the CEIO intends to augment what is commonly known as ‘Western Science’ – that which is typically organized into categories (e.g., biology, chemistry, physics) and is limited to knowledge of the physical world - with what some have termed ‘Aboriginal Science’ or ‘Indigenous Science’ which can be defined as a wide range of tribal processes of perceiving, thinking, acting and coming to know that have evolved in Indigenous human societies for thousands of years.

Indigenous Knowledge includes knowledge of the metaphysical (spiritual) world and reflects a view of nature as interconnected and interdependent. Indigenous Science is rooted in local places and has been sought by many natural resource development proponents in the past as part of what is commonly known as a “traditional land use study.” Indigenous Science is often practiced to meet the need for the long-term survival,

or sustainability, of a people. The establishment of the CEIO would provide the opportunity for Canadians to learn that there are often parallel ways of knowing.