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SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

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Title - Sujet	
E3NA Solution	

Solicitation No. - N° de l'invitation	**Amendment No. - N° modif.**
K1A12-149071/A	001

Client Reference No. - N° de référence du client	**Date**
K1A12-149071	2015-12-18

GETS Reference No. - N° de référence de SEAG
PW-$$EL-615-29626

File No. - N° de dossier	**CCC No./N° CCC - FMS No./N° VME**
615el.K1A12-149071	

Solicitation Closes - L'invitation prend fin		**Time Zone** **Fuseau horaire**
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This Solicitation amendment is raised to answer questions received from Bidders and to modify the Solicitation.

A.   QUESTIONS AND CORRESPONDENT ANSWERS:

QUESTION 1

In Table 1 of Annex A's Statement of Work, mandatory requirements 52, 53, 55, 56, and 57 cover ENERGY 2020-specific tasks. Would you please confirm that these tasks should be addressed as part of the response to this RFP for an E3NA Solution.

The tasks include: Mandatory 52 - reconciling and calibrating ENERGY 2020 process and device investments to the macroeconomic models; Mandatory 53 - adjusting ENERGY 2020 to execute the Canada-specific parts of the model in Canadian dollars while the U.S.-specific parts of the model in U.S. dollars; Mandatory 55 - Reducing execution time related to interactions with the macroeconomic models; Mandatory 56 – Reducing execution time of integrated runs related to electric generating capacity routines; and Mandatory 57 – reducing execution time of integrated runs related to cap-and-trade routines.

ANSWER 1

Mandatory requirements 52, 53, 55, 56, and 57 cover ENERGY 2020-specific tasks in Table 1 of Annex A – Statement of Work of the RFP and no longer part of this requirement. Therefore, any reference to those mandatory requirements will be removed from this solicitation. See RFP amendments below.

The numbering of all modified sections of the RFP will not be affected by any deleted criteria. Please keep the numbering the same when submitting a bid.

QUESTION 2

In Table 1 of Attachment 3.4's Financial Bid, Item #4 refers to "ENERGY2020 (Canada) Modifications and Enhancements". This item further is described as covering Mandatory 2 to Mandatory 41 of Table 1 of the statement of work. Would you please clarify and confirm that the coverage includes only Mandatory 2 through 41 or whether it is in reference to the ENERGY2020-specific Mandatory Requirements (52, 53, 55, 56, and 57) mentioned in question #1 above.

ANSWER 2

Item 4 of Table 1 of Attachment 3.4 – Financial Bid was deleted from this solicitation. Bidders are, to refer to the answer of Question 1.
See RFP amendments below.

QUESTION 3

Security Clearance: In section 3.2, the RFP notes that we should submit our Security Clearance information. However, the last 3 pages or so of the RFP completed by the client note that this entire project is UNCLASSIFIED and has no security restrictions, no release restrictions, etc. In light of this, is a Security Clearance still required?

ANSWER 3

Bidders are to refer to article 6.1 – Security Requirement of Part 6 of the RFP and Article 7.4 – Security Requirement of Part 7 of the RFP.

QUESTION 4

Procurement Business Number: I believe we have filed for one and received BN# 811790575. Is there a way to check on this and see if it is indeed active and will meet your requirements for submission? If not, any direction you can provide on how to rectify this situation will be greatly appreciated.

ANSWER 4

The Procurement Business Number (PBN) is an important feature in the Supplier Registration Information (SRI). It is based on a supplier Canada Revenue Agency (CRA) business number and uniquely identifies your business in our procurement and payment systems.

Bidders are to refer to the following link to make sure they have an active PBN.

https://buyandsell.gc.ca/for-businesses/selling-to-the-government-of-canada/register-as-a-supplier

B.   RFP AMENDMENTS:

1.   <u>At Table 1 – Mandatory Requirement of article 6 – Technical Environment of Annex A of the RFP:</u>

DELETE: Table 1 – Mandatory Requirement; and

INSERT: Table 1 – Mandatory Requirement, as follows:

TABLE 1	
MANDATORY REQUIREMENT	

CANADIAN MODELING SOLUTION (E3MC)

E3MC must, in a dynamic and interactive manner, respond to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection related to any change in either energy-related or economic-related variables. These variables are fed in from the Canadian macroeconomic model and ENERGY2020 (Canada).

E3MC must consist of a Canadian Energy, Emission and Economic Modeling Solution that links **ENERGY2020 (Canada)** to a customized **Canadian macroeconomic model** that delivers, allows and supports the users of E3MC with:

1. **Functionality** such that it enables EC to deliver its Programs in accordance to its Priorities outlined in Section 5 of this document.
2. **Completeness** such that it provides EC with the necessary and functional tools to implement the Plan(s) that will ensure its Priorities are met.
3. **Compliancy** such that the Solution, including software, tools and utilities provided will help support EC in meeting its Programs, Plans and Priorities.
4. **Innovation** such that it will provide EC with the flexibility and technology to respond in a timely and innovative manner to future Programs, Plan and Priorities.
5. **Conformity to Government of Canada's Operating Environment** such that the Solution operates on
   a) Microsoft Windows XP or higher, and
   b) Windows Excel 2007, 2010 or 2013, and
   c) Office 2010 and higher.
6. **Data sharing flexibility** such that the solutions provides EC with the flexibility to transfer data to and from the solution using files with extensions xls, xlsx, cvs, txt, accdb and dbf.

Mandatory 1	At **contract awarding**, the Contractor must provide a licence to their current off-the-shelf **CANADIAN MACROECONOMIC MODEL** that is: 1. A **10-province and 3-territory** Canadian dynamic macroeconomic model with foreign and regional linkages. 2. Aligned with Statistics Canada's Canadian National System of Accounts (2012). 3. And which will be **customized** to include the future required functionalities (M2 to M41) to be delivered **within 30 months of contract awarding.**

Mandatory 2	**Macroeconomic Projections** ENERGY2020 (Canada) requires macroeconomic projection mechanisms and reporting variables at the provincial level as well as a select set of nationally measured variables. These projections must be sensitive to the analysis of energy, environment, and environment-related proposals and candidate initiatives of the Government of Canada.
Mandatory 3	**Dynamic Integration** To facilitate a wide spectrum of policy measures and programmes, the macroeconomic model must operate with ENERGY2020 (Canada) on a stand-alone **and** on a dynamic integrated basis. In order to dynamically integrate the Canada macroeconomic model and ENERGY2020 (Canada), an **INTERFACE MODULE** must be developed. This interface must iterate variables between the Canadian macroeconomic model and ENERGY2020 (Canada) until both models reach convergence. This ensures that both models respond, in a dynamic and interactive manner, to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection. **Note**: ENERGY2020 (Canada) is the `command program', and is written in Promula programming language, while the existing interface is written in Visual Basic. The interface provides the ability to project ENERGY2020 (Canada) variables using executable code originating from the macroeconomic model.
Mandatory 4	**Stand-Alone Model** Include options to run a stand-alone provincial or regional economic model.
Mandatory 5	**Bottom-Up Approach** The model must follow a bottom-up approach to accounting for each province and territory separately with Canada being the sum of regions. Canada will still evaluate a top-down approach whereby the Canada results are 'attributed' or 'shared' to each province based on their relative economic strengths and weaknesses
Mandatory 6	**Logically Presented** The model must be illustrated by way of diagrams that clearly show the concepts, flows and linkages of information within the model. The model's equations and blocks must be contained, described and easily accessible within the modeling solution software or programs.
Mandatory 7	**Provincial and Territorial Dimension** The model must solve uniquely for each province and territory using distinct Input-Output tables. The Contractor must clearly demonstrate how they will integrate the Input-Output relationships into the model. **Note**: Final demand feeds into a demand-for-energy converter matrix plus a technology matrix. The output of this feeds into the Input-Output estimate of gross output; gross output feeds into a value-added share matrix to

	produce gross domestic product at basic prices. The provincial and territorial models are required to sum-up to Canada.
Mandatory 8	**Trade Flows** The provincial and territorial sub-models must capture all inter-provincial and international trade flows. **Note**: Consideration will be given to using a national model based on the most recently available Input-Output tables and then share-weighted to the provinces and territories based on their respective Input-Output tables. If this share-weighted approach is used, the macroeconomic model must ensure that when policy touches only one sector in a specific province (for example petroleum refining in Nova Scotia), the direct effect is focused only on that province.
Mandatory 9	**Multiplier Effects** The model must capture the indirect, induced and multiplier effects that affect other sectors and provinces. In the case of share-weighting, the sum of the provincial macroeconomic parameters, including the province with the impact, must equal the national macroeconomic parameters.
Mandatory 10	**Industrial Sector Dimension** The industrial detail in the macroeconomic model must reflect the industrial detail in ENERGY2020 (Canada). At a minimum, it must represent NAICS industries or sectors listed in Appendix 2. In order to meet EC and NRCan analytical requirements, it will be necessary to disaggregate selective industries or sectors to a finer NAICS-digit level. The industries requiring this finer level of detail (to aid in pinpointing direct impacts from policy initiatives) will be determined based on data availability. **Note**: EC's current macroeconomic model contains more than 150 sector categories covering agricultural and forest activities, energy resource extraction, manufacturing, business services, government and others. Given most recent changes to Statistics Canada National System of Accounts, EC acknowledges that the current level of sector dimension is more limited in scope. EC is prepared to discuss a more restricted set of regions and sectors that contains the functionality required to provide the prerequisite analysis. The national, provincial and territorial models must have at least the sectors listed in Appendix 2 and these sectors must be aligned to Statistics Canada's new System of National Accounts.
Mandatory 11	**Address Policies** The model must have the capacity and flexibility to address regulatory and incentive policies at the required level of sectoral definition at the provincial and national level. Statistics Canada's CANSIM Table 379-0030 provides the level of sector detail at the provincial level.
Mandatory 12	**Energy Sectors Dimension** The macroeconomic model must capture energy sub-sector disaggregation directly or indirectly. The current system of national accounts provides information for key energy sectors at various NAICS levels. For example: 1. Oil and gas extraction [211]

	2. Conventional oil and gas extraction [211113]
	3. Non-conventional oil extraction [211114]
	4. Coal mining [2121]
	5. Electric power generation, transmission and distribution [2211]
	As part of its impact assessment, EC requires a disaggregated representation of the key energy sectors such as separate tracking of oil and gas extraction as well as separate tracking within oil extraction (i.e. light and heavy). The macroeconomic model must capture this sub-sector disaggregation either directly or indirectly.
Mandatory 13	**Standard Features** The model must include, but not be limited to:
	1. Base year = $2007 or $2010
	2. Millions of Canadian Dollars
	3. Energy demand (by type and by energy-using sector)
	4. Alignment with Statistics Canada's new System of National Accounts (the International 2008 System of National Accounts)
	5. NAICS 2007
	6. Forecast or simulation period (from most current historical year to 2050 or 2075)
Mandatory 14	**Major Blocks** The model must capture, but not be limited to:
	1. Demography
	2. Foreign Linkages
	3. Government Savings and Finance Sector
	4. Stocks of Wealth
	5. Labour Force
	6. Disposable Incomes
	7. Final Demand
	8. Final Demand Prices
	9. Major Aggregates
	10. Industry Prices and Wages
	11. Industry Output, Employment and Capital Stock
	12. Government Revenue, Expenditure, Redistribution
	13. Earned Income
Mandatory 15	**Major Concepts** The following concepts must be included in the model:
	1. **Household Expenditures** Variables are to be disaggregated at the most detailed level and must include real, nominal and relative prices for personal consumption.
	2. **Investment** By asset type, sector, industry:
	a) Business: structures and machinery and equipment; structures by buildings and engineering type; machinery and equipment by type

	of equipment available; intellectual property products; Investment by asset type and industry.
	    b) Residential: new construction, renovations, ownership transfer costs, housing starts, housing stock and sales of new and existing dwellings.
	3. **Inventory change** By farm and non-farm, sector, industry:
	    a) Manufacturing: inventory cases must be at the same level of disaggregation as GDP, gross output and investment
	    b) Wholesale
	    c) Retail
	4. **Non-profit Institutions** Serving households' consumption expenditure.
	5. **Exports and Imports** By goods and services, by direction with the US and the rest of the world, at the level of detail available in the System of National Accounts.
	6. **Current and Capital Accounts** By province and territory (where available), for households, non-profit institutions serving households, corporations (including undistributed corporate profits), general government and non-residents.
	7. **Government Revenue, Expenditure and Budgetary Balances** By province and territory.
	    Note: This information is available from the System of National Accounts on the CANSIM (Table 384-0040, Current accounts, households, provincial and territorial, annual) plus from the provincial and territorial governments.
	8. **Detailed Government Revenues and Expenditures** By province and type of government entity
	    Note: Available in Government Financial Statistics; detailed taxation data can be acquired from provincial and territorial governments.
	9. **Other Government Expenditures** Net current expenditure on goods and services and sales of goods and services by level of government (including health expenditure) as per the detail in the provincial economic accounts.

Mandatory 16	**Indicators** The following indicators, at a minimum, must be provided by the macroeconomic model: 1. GDP Price Index 2. Long-term Bond Rate 3. Consumer Price Index 4. Exchange Rates 5. Interprovincial Migration

	6. International Migration
	7. Population
	8. GDP By sector and by province
	Note: GDP by industry and province must be produced as listed in Appendix 1. Where the data is supressed or confidential, the Contractor must clearly illustrate the methodology that will be used to produce reasonable estimates for those supressed data series. In addition, the national, provincial and territorial models must have at least the sectors listed in Appendix 2 and these sectors must be aligned to Statistics Canada's new System of National Accounts.
	9. Gross Output by NAICS sector by province.
	10. Employment by NAICS sector by province.
	11. Wage Indicators by NAICS sector by province.
	12. Major Purchased Inputs by Sector.
	13. Taxes Corporate, personal and indirect (HST, GST and PST) and transfer payments
	14. Household Expenditures
	15. Real Disposable Income
	16. Investment by asset type and industry
	17. Investment Prices by asset type and industry
	18. Housing Stock by type, by value and by physical units
	19. Housing Starts by type, by value and by physical units
	20. Commercial Building Starts by type by value and by physical units
	21. Commercial Building Stock by type by value and by physical units
	22. Vehicle Sales by type
Mandatory 17	**Templates** The macroeconomic model must have the capacity to generate pre-defined or user-defined reports or tables (templates from which to read data series) on key data.
Mandatory 18	**Forecast Calibration** The macroeconomic reference forecast must be calibrated: 1. **Short-Term** Align the short-term simulation with the projections outlined in Finance Canada's most recently available Budget or Fiscal and Economic Update projections. 2. **Long-Term** Align the long-term Canadian forecast to Finance Canada's long-term forecast.
Mandatory 19	**Forecast Tuning** The detailed industry and demand variables must be fine-tuned for near-term expectations. This forecast will be used to send initial parameters to ENERGY2020 Canada. Note: ENERGY2020 Canada contains detailed energy-related information. When it is linked to the macroeconomic model and the two models iterate,

	a new integrated equilibrium solution will be reached. This new equilibrium will result in integrated projections value for energy, emissions and the macro-economy.
Mandatory 20	**Reference Case Forecast** When the Canadian macroeconomic model is calibrated (aligned with Finance Canada's forecast) and used as input to the ENERGY2020 (Canada) model, the new macroeconomic reference case forecast will be used for the following main functions: 1. **Policy Analysis** Regulatory analyses for oil, gas and emissions intensive trade exposed industries (EITE), and oil, gas and electricity. 2. **Policy Scenario-Building** Scenarios are built and tested by adjusting parameters such as device and process efficiency, capital costs, market shares, device lifetimes, non-price factors, emission coefficients, taxes, etc. Scenarios with multiple policies are run simultaneously and the model keeps track of interaction effects, rebound effects, etc. 3. **Emission Trends Update** For the residential, commercial, manufacturing, oil and gas, transportation and electricity sectors as well as process emissions, prices and air pollutants.
Mandatory 21	**Linkages** ENERGY2020 (Canada) uses macroeconomic data to drive energy demands in the residential, commercial, industrial, and transportation sectors. Linkages between ENERGY2020 (Canada) and the macroeconomic model must allow for simulation of the real-time impact of energy and environmental concerns on the economy and vice versa. Appendix 3 outlines the current sector structure of E3MC.
Mandatory 22	**Identify Variables to be Transferred** Transferring data from ENERGY2020 (Canada) to the macroeconomic model requires files that are read by both models. These files will contain the changes caused by a specific energy or emissions policy to a set of model variables as calculated by ENERGY2020 (Canada). The files will then be imported into the macroeconomic model, and the macroeconomic model will be executed to obtain a revised macroeconomic forecast given these new assumptions. The specific variables that are sent from ENERGY2020 (Canada) to the macroeconomic model will vary based on the policy being analyzed. The Contractor must identify which variables will be operational to allow for the dynamic general equilibrium solution
Mandatory 23	**Identify How Data will be Transferred** Variables in ENERGY2020 (Canada) will need to be aggregated into the macroeconomic model regions and mapped to the macroeconomic model economic categories before sending them as input. The Contractor has the option to exchange information as changes from the base case or from levels relative to the base case.
Mandatory 24	**Direct, Indirect and Induced Effects** As part of its impact assessment exercises, EC requires separate reporting of direct, indirect and induced

	macroeconomic effects of policy changes. For example GDP, employment, investment and gross output multipliers will need to be reported.
Mandatory 25	**Demonstrate Data-Transfer Capabilities** The Contractor must illustrate the level of effort for building data-transfer capabilities between ENERGY2020 (Canada) and macroeconomic model. The Contractor must demonstrate in detail how the interface between the two models will ensure a dynamic and seamless integration.
Mandatory 26	**Interactive Data Transfer** Output from the macroeconomic model must be interactively transferred to ENERGY2020 (Canada). An integrating program will need to be written to parse the output from the macroeconomic model output files and read the economic variables into a Promula database (ENERGY2020 (Canada) programming language). The code for the data transfers must be incorporated into the interface between ENERGY2020 (Canada) and macroeconomic model.
Mandatory 27	**Identify Macroeconomic Variables to be Transferred** The initial list of macroeconomic variables to be passed from the macroeconomic model to ENERGY2020 (Canada) must include, but not be limited to: 1. Economic Output 2. GDP by Economic Category 3. Total Personal Income 4. Real Disposable Personal Income 5. Consumer Price Index 6. GDP Deflator 7. Exchange Rates 8. Government Compensation
Mandatory 28	**Identify ENERGY 2020 (Canada) Variables to be Transferred** The initial list of variables that will be passed from ENERGY2020 (Canada) to the macroeconomic model must include, but not be limited to: 1. **Energy Production** For each energy sector (electricity, oil, gas, coal, etc.). 2. **Energy Expenditures** By economic category (fuel and capital). 3. **Energy Use Per $ of Economic Output** By economic category and fuel. 4. **Emissions Permit Costs** By economic category and fuel. 5. **Investments** Related to energy production or to meet environmental or energy related policies (by structure, equipment, process for each economic category). 6. **Exchange Rate Information** Used for energy-related trade flows in ENERGY2020 (Canada).
Mandatory 29	**Extraction of Detailed Data** The Contractor must illustrate in detail how data from the macroeconomic model will be extracted and transferred to ENERGY2020 (Canada). This includes, but is not limited to:

	1. The generation of output tables (or custom reports), which must be created during each execution of the macroeconomic model.
	2. A post-process that illustrates how data from the macroeconomic model (in its industrial structure) is mapped to data in ENERGY2020 (Canada)'s industrial structure.
Mandatory 30	**Collaborate on Developing Automated Linking Interface** The Contractor must collaborate to create an automated linking interface between ENERGY2020 (Canada) and the macroeconomic model. ENERGY2020 (Canada) will be the "command" program, controlling the execution of ENERGY2020 (Canada) and the macroeconomic model. The macroeconomic model "base case" will be created as an initial reference case that has not yet been integrated with ENERGY2020 (Canada). As the modeling solution solves, each iteration of the framework must include, but is not limited to: 1. Extracting the data from the macroeconomic model. 2. Transferring the data to ENERGY2020 (Canada). 3. Executing ENERGY2020 (Canada). 4. Extracting data from ENERGY2020 (Canada). 5. Transferring the data to the macroeconomic model. 6. Executing the macroeconomic model. 7. This single "iteration" can be repeated as many times as needed.

Mandatory 31	**Successful Integration Process** To ensure a successful integration process, the following must be achieved:
	1. **Testing** Create a test case of output data generated by modifying the macroeconomic input data.
	2. **Inserting and Extracting Data** Determine the location within the macroeconomic model (or database) for inserting and extracting the data for ENERGY2020 (Canada).
	3. **Coding:**
	  a) Write code to insert data, extract data, and execute the macroeconomic model. Debug and test this code to ensure the results match the test case.
	  b) Write code to extract data from the output of the model 'run(s)' such that it can be called directly into the transfer routine.
	  c) Generate code for ENERGY2020 (Canada) to insert data into the macroeconomic model directly via the selected transfer routine and language.

	d) Combine the code which inserts data, extracts data, and executes the macroeconomic model with the code which inserts data, extracts data, and executes ENERGY2020 (Canada) to create an integrated solution 4. **Convergence Criteria** Convergence rules may be required to limit the number of iterations needed to create a solution.
Mandatory 32	**Endogenous Interaction** ENERGY2020 (Canada) and the macroeconomic model must interact endogenously through changes in energy variables such as production, prices, energy intensities, investments in energy industries, as well as macroeconomic variables. For each iteration period, energy supply and demand results from ENERGY2020 (Canada) will be automatically transferred to the macroeconomic model via the interface module. Note: ENERGY2020 (Canada) produces annual projections as such the macroeconomic model must produce annual projections.
Mandatory 33	**Achieve an Integrated Solution** The macroeconomic model will incorporate these energy results into a new macroeconomic projection for that period. The new macroeconomic data is returned to ENERGY2020 (Canada) to create a new energy projection for the next iteration period. The process of using output from one iteration as input to the next iteration is undertaken to achieve an integrated annual equilibrium solution in all energy markets and the economy.
Mandatory 34	**Direct, Indirect (Induced) Impacts** The integrated modeling solution must capture both direct and indirect (induced) impacts on Canadian industries and consumers of the Canadian and the US climate change and clean air policy initiatives. A key technical objective is to ensure accounting and behavioural consistency between the 'micro' representation of energy markets in ENERGY2020 (Canada) and the 'macro' (plus industrial organization) detail of the macroeconomic model at each single regional level.
Mandatory 35	**Perform Regional Analysis** Analyze the regional, provincial and aggregate macroeconomic impacts (for example gross domestic product, industry gross output, employment, personal disposable income, tax interaction, government revenues/expenditures, and sector-specified competitiveness effects) of a range of energy and environment policy initiatives.
Mandatory 36	**Scenario Development** Develop alternative long-term energy and emissions scenarios for each representative region as well as for the nation.
Mandatory 37	**Analyze Spillover Effects** Analyze the spillover effects in Canada of environmental and energy policy initiatives taken in the US.
Mandatory 38	**Analyze Joint Initiatives** Analyze joint Canada-US environment and energy policy initiatives.

Mandatory 39	**Analyze Alternative Proposals** Analyze alternative provincial and industry proposals for achieving environmental goals.
Mandatory 40	**Collaboration** The Contractor must collaborate on developing the interface module. The Contractor must ensure the E3MC interface module is created in such a way that the two models are dynamically linked and produce integrated results.
Mandatory 41	**EM3C Testing** Once the interconnections are established between the macroeconomic model and ENERGY2020 (Canada), E3MC must undergo extensive testing to ensure that the new structure can assess the impact of multiple policy options. Stress-testing must ensure that: 1. **Response Signals** Each model is responding to signals being sent from the other model. 2. **Integration Failure** There will not be failure during the integration procedure between the two models. 3. **EC Staff** EC staff will be involved at all stages of stress-testing to ensure that the modeling framework meets expectations. This will include design of the test and review of output from both ENERGY2020 (Canada) and the macroeconomic model.

US MODELING SOLUTION (E3US)

E3US must, in a dynamic and interactive manner, respond to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection related to any change in either energy-related or economic-related variables. These variables are fed in from the US macroeconomic model and ENERGY2020 (US).

E3US must consist of a US Energy, Emission and Economic Modeling Solution that links **ENERGY2020 (US)** to a **US macroeconomic model** that delivers, allows and supports the users of E3US with:
1. **Functionality** such that it enables EC to deliver its Programs in accordance to its Priorities outlined in Section 5 of this document;
2. **Completeness** such that it provides EC with the necessary and functional tools to implement the Plan(s) that will ensure its Priorities are met.
3. **Compliancy** such that the Solution, including software, tools and utilities provided will help support EC in meeting its Programs, Plans and Priorities.
4. **Innovation** such that it will provide EC with the flexibility/technology to respond in a timely and innovative manner to future Programs, Plan and Priorities.
5. **Conformity to Government of Canada's Operating Environment** such that the Solution operates on
    a) Microsoft Windows XP or higher, and
    b) Windows Excel 2007, 2010 or 2013, and

c) Office 2010 and higher.

6. **Data sharing flexibility** such that the solutions provides EC with the flexibility to transfer data to and from the solution using files with extensions xls, xlsx, cvs, txt, accdb and dbf.

7. **Timing of Deliverables** The Contractor must provide EC with:

   a) A licence to their current off-the-shelf US macroeconomic model (Mandatory 42) at **contract awarding**.

   b) All future required functionalities listed (Mandatory 43 to Mandatory 57) **within 30 months of contract awarding.**

Mandatory 42	At **contract awarding**, the Contractor must provide a licence to their current off-the-shelf **US MACROECONOMIC MODEL** that is: 1. An open-economy dynamic macroeconomic model with a level of regional disaggregation that can be integrated with the ENERGY2020 (US) model. 2. And which will be **customized** to include the future required functionalities (M43 to M57) to be delivered **within 30 months of contract awarding**.
Mandatory 43	**Regional and Sector Breakdown** The US macroeconomic model will simulate 9 regions (US Census Divisions) and 160-Sectors. Appendix 4 provides an example of the regional and sector breakdown for the US macroeconomic model. EC is prepared to discuss a more restricted set of regions and sectors that will still provide the functionality required to provide the prerequisite analysis. **Note**: ENERY2020 (US) is a state-by-state model than can be aggregated to create multiple regional dimensions suitable for specific policy purposes. The contractor must ensure that the US macroeconomic model reflects the regional dimensions created by ENERGY2020 (US). Examples of regional dimensions or aggregations include those defined by the US Federal Energy Regulatory Commission (FERC) or the Western Climate Initiative (WCI).
Mandatory 44	**Industrial Detail** The industrial detail in the US macroeconomic model must be commensurate with the industrial detail in ENERGY2020 (US). At the minimum, it must represent NAICS industries or sectors listed in Appendix 4 to Annex A. In each macroeconomic model it will be desirable to distinguish a finer level of detail to aid in pinpointing direct impacts from policy initiatives.
Mandatory 45	**Generate Reports** The US macroeconomic model must have the ability to generate pre-defined or user-defined reports (i.e. templates from which to read data series) on key data.
Mandatory 46	E3US must provide a US macroeconomic model **REFERENCE FORECAST** that is calibrated to official US energy forecasts. This forecast must be calibrated in two ways:

	1. **Alignment to EIA** Align the short-term simulation with the projections from most recently available US Energy Information Administration's (EIA) official short-term energy forecast. 2. **Calibration to EIA** Calibrate the long-term US forecast to the most recently available US EIA official energy forecast. This forecast is appropriate for the overall macroeconomic activity. The detailed industry and demand variables must be fine-tuned for near-term expectations.
Mandatory 47	E3US must **SECURLY TRANSFER DATA** from E2020 (US) to the US macroeconomic model. ENERGY2020 (US) uses macroeconomic data to drive energy demands in the residential, commercial, industrial, and transportation sectors. The linkages between ENERGY2020 (US) and the US macroeconomic model will allow for simulation of the real-time impact of energy and environmental concerns on the economy and vice versa. As such, the following will need to be achieved: 1. **Readable Files** Transferring data from ENERGY2020 (US) to the US macroeconomic model requires files that are readable by both models. These files will contain the changes caused by a specific energy or emissions policy to a set of model variables as calculated by ENERGY2020 (US). The files will be imported into the US macroeconomic model, and the macroeconomic model will then be executed to obtain a revised macroeconomic forecast given these new assumptions. The specific variables that are sent from ENERGY2020 (US) to the US macroeconomic model will vary based on the policy being analyzed. 2. **Aggregation of Variables** The variables in ENERGY2020 (US) will need to be aggregated to reflect the regions in the US macroeconomic model and then mapped to the economic categories in the same model (before sending them back to ENERGY2020 (US) as input). 3. **Information Exchange** The Contractor must exchange information as levels relative to the base case. It must be clearly articulated how this information exchange will be performed.
Mandatory 48	E3US must **SECURLY TRANSFER DATA** from the US macroeconomic model to E2020 (US). Output from the US macroeconomic model must be interactively transferred to ENERGY2020 (US), hence the following will need to be achieved: 1. **Write Code to Transfer Data to ENERGY2020 (US)** A routine is required to parse the output from the US macroeconomic model output files and

	read the economic variables into a Promula database (the programming language used by ENERGY2020 (US)).
	2. **Incorporate Code into the Interface** Code for data transfers must be incorporated into the interface between ENERGY2020 (US) and the US macroeconomic model.
	3. **Identify Variables to be Transferred** The macroeconomic variables that must be passed from the US macroeconomic model to ENERGY2020 (US) will include, but not be limited to:
	a) Inflation Rate (Index)
	b) Private Nonfarm Employment
	c) Government Non-civilian Employment
	d) Gross Regional Product
	e) Total capital output
	f) Government Compensation
	g) Population
	h) Total Personal Income
	i) Real Disposable Personal Income
Mandatory 49	It must be illustrated in detail how data from the US macroeconomic model will be extracted and transferred to ENERGY2020 (US). This includes, but is not limited to:
	1. **Generation of Tables** The generation of output tables (or custom reports) must be created during each execution of the macroeconomic model.
	2. **Data Comparability** A post-process must be created that illustrates how data from the macroeconomic model (in its industrial structure) is mapped to data in ENERGY2020 (US) (in its industrial structure).
Mandatory 50	An **INTERFACE MODULE** must be developed that dynamically integrates the results of the US macroeconomic model and ENERGY2020 (US). This interface module must iterate variables between the US macroeconomic model and ENERGY2020 (US) until both models reach convergence. This ensures that both models respond, in a dynamic and interactive manner, to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection.
	Formal integration of the US macroeconomic model with ENERGY2020 (US), where ENERGY2020 (US) provides the "command program", requires software development. Currently, ENERGY2020 (US) is written in Promula. An interface module must be developed that takes into consideration:

	1. **Stand-alone or Integrated Operation** The Contractor must ensure that each model operates on a stand-alone and integrated basis in order to facilitate a wide spectrum of policy measures and programmes. 2. **Operation in Distinct Software** ENERGY2020 (US) and the US macroeconomic model may operate in distinct software systems.
Mandatory 51	E3US must be **TESTED** to ensure the successful interconnection of the US macroeconomic model to ENERGY2020 (US). Once the interconnections are established between the US macroeconomic model and ENERGY2020 (US), the integrated modeling solution (E3US) must undergo extensive testing to ensure that the new structure correctly assesses the impact of multiple policy options. This must include: 1. **Stress-Testing of Modeling Solution** Testing must ensure that each model is responding reasonably to signals being sent from the other model. This stress-testing must ensure that there will not be failures during the interaction between the two models. 2. **Collaboration with EC** it is necessary that EC officials be involved at all stages of testing to ensure that the model meets expectations. This includes design of the test and review of output from ENERGY2020 (US) and the US macroeconomic model.
Mandatory 52	~~The following must be met to ensure successful operation between the Canadian macroeconomic model and ENERGY2020 (Canada) and the US macroeconomic model and ENERGY2020 (US):~~ ~~1. **Process and Device Investment** Historical and forecast values for process and device (or equipment) investments (in ENERGY20202) must be reconciled with the outputs of the Canadian and US macroeconomic models to ensure consistency between the two modeling solutions. Note: Process and device capital costs in ENERGY2020 (Canada) and ENERGY2020 (US) need to be adjusted. The Canadian and US macroeconomic models must support these changes as ENERGY2020 (Canada) and ENERGY2020 (US) contain more detail on end-use and technology level compared to the macroeconomic models.~~ ~~2. **Develop Calibration Process** A calibration procedure must be developed such that it enables the direct transfer of process and device (or equipment) investments to each macroeconomic model.~~ [Intentionally deleted as per this solicitation amendment 001]
Mandatory 53	~~ENERGY2020 (Canada) executes with all prices in US dollars. ENERGY2020 (Canada) needs to be adjusted to execute the Canada-specific parts of the model in Canadian dollars while the US-specific parts will remain executable~~

	with US dollars. Hence, the exchange rate will be needed only for energy-related trade flows between the two countries (electricity, natural gas, oil, and coal imports and exports). [Intentionally deleted as per this solicitation amendment 001]
Mandatory 54	**Consistency between the two modeling solutions** is necessary. As such, the Contractor must ensure the thorough review of and adjustments to inputs and outputs, including: 1. Financial input variables 2. Financial output files 3. Electricity and natural gas dispatch routines 4. Commodity trading inflow/outflow including CO2 permit trading
Mandatory 55	~~Reduce Execution Time E3MC and E3US must iterate to find a consistent solution between ENERGY2020 (Canada), ENERGY2020 (US) and the two macroeconomic models. As such, options to reduce the execution time must be explored.~~ ~~Note: This must achieved by identifying procedures which only need to be executed during the first iteration of each model(s) and by passing emission allowance permit information between iterations.~~ [Intentionally deleted as per this solicitation amendment 001]
Mandatory 56	~~Electric Generating Capacity The procedure which constructs new electric generating capacity (in ENERGY 2020 (Canada)) requires a significant amount of execution time yet only needs to be executed once per iteration. This is due to the fact that changes to the current year macroeconomic variables do not have a significant impact on that procedure. That specific procedure (and any other procedures identified) must be isolated so that it is executed only during the first iteration.~~ [Intentionally deleted as per this solicitation amendment 001]
Mandatory 57	~~Cap and Trade Runs When ENERGY2020 (Canada) is linked to a macroeconomic model, the longest runs are the emission cap and trade runs. A range of options must be explored and tested that will be aimed at reducing the ENERGY2020 (Canada) iterations. This may include an automated process to provide the model with an emissions permit price which is close to the solution in the previous iteration.~~ ~~**Note**: During such a run, the model must first iterate to find the emission permit prices and then must iterate with the macroeconomic model. In the past, the macroeconomic model required 5 iterations while the GHG cap and trade runs required up to 12 iterations of ENERGY2020 (Canada). This resulted in 60 iterations to complete one run.~~ [Intentionally deleted as per this solicitation amendment 001]

	NORTH AMERICAN MODELING SOLUTION (E3NA)

E3NA must, in a dynamic and interactive manner, respond to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection related to any change in either energy-related or economic-related variables fed in **E3MC** and **E3US**.

E3NA must consist of a North American Energy, Emission and Economic Modeling Solution that links **E3MC** and **E3US** to deliver, allow and support the users of E3NA with:

1. **Functionality** such that it enables EC to deliver its Programs in accordance to its Priorities outlined in Section 5 of this document.
2. **Completeness** such that it provides EC with the necessary and functional tools to implement the Plan(s) that will ensure its Priorities are met.
3. **Compliancy** such that the Solution, including software, tools and utilities provided will help support EC in meeting its Programs, Plans and Priorities.
4. **Innovation** such that it will provide EC with the flexibility and technology to respond in a timely and innovative manner to future Programs, Plan and Priorities.
5. **Conformity** to Government of Canada's Operating Environment such that the Solution operates on
   a) Microsoft Windows XP or higher, and
   b) Windows Excel 2007, 2010 or 2013, and
   c) Office 2010 and higher.
6. **Data sharing flexibility** such that the solutions provides EC with the flexibility to transfer data to and from the solution using files with extensions xls, xlsx, cvs, txt, accdb and dbf.
7. **Timing of Deliverables** The Contractor must provide EC with all future required functionalities listed (Mandatory 58 to Mandatory 64) **within 30 months of contract awarding**.

Mandatory 58	**North American INTERFACE MODULE** In order to integrate the Canada and US macroeconomic models, an interface module must be developed that iterates variables between the Canadian and US macroeconomic models until both models reach convergence. This ensures that **E3MC** and **E3US** respond, in a dynamic and interactive manner, to changes introduced through energy and macroeconomic variables and produce a unique integrated energy, emissions and economic projection. See Figure 2.
Mandatory 59	**Integrated North American forecasts** must capture the Canada-US trading relationship, as well as other key Canada-US macroeconomic relationships in the following manner: 1. **Compatibility of Variables** Review of the Canadian and US model structures to map variables across the two models.

	2. **Key Macroeconomic Indicators** Establish the responsiveness of Canada-US exchange rates, export/import dynamics and other key macroeconomic relationships. 3. **Enable Transfer Capability** Modify each model structure as necessary to enable transfer of data and input across the models. 4. **Write Code** Write code to transfer data from the US to the Canadian macroeconomic model.
Mandatory 60	**Test Responses** The modelling solution must provide the capacity to develop policy test case(s) for varying values into the Canadian and US macroeconomic models. Tests must be carried out to determine if the Canadian macroeconomic model responds as expected to changes transferred from the US macroeconomic model. The goal is to ensure that EC is in a position to anticipate the details of environmental and energy policy analysis. This includes but is not limited to: 1. Anticipating changes in global and continental energy prices. 2. Anticipating changes to fiscal and monetary policy. 3. Anticipating exchange rate changes with major trading partners (specifically the US). 4. Anticipating major shocks to the costs of production in energy-intensive industries. These shocks can occur on a US-only, Canada-only and/or joint basis.
Mandatory 61	E3NA must be **tested** to ensure **successful interconnections**. Testing must be an iterative process and is deemed successful when "tested" simulations: 1. Do not fail due to technical glitches. 2. Produce reasonable a priori results. 3. Convergence must be minimal during this testing. Issues of non-convergence must be solved as necessary.
Mandatory 62	E3NA must be **tested** to ensure the **successful integration** of the integrated modeling solutions E3MC and E3US. E3MC and E3US must interact simultaneously to create a integrated North American modeling solution, E3NA. The objective is to test the entire modeling solution so that all information flows operate simultaneously. There are several dimensions to this: 1. **Compatibility** The data framework and structure of behaviour in the two models must be compatible if not necessarily the same. 2. **Capital Stocks and Flows** The dimensions and levels of the capital stocks and flows must be comparable in both ENERGY2020 (Canada) and the macroeconomic model.

	Note: The historical level of investment in equipment, buildings and production processes must be comparable, and that the future capital flows and investments must be identical to allow for robust policy analysis. **Data Exchange** Data measures and executable code must be exchanged between the two models. Note: The program used to execute ENERGY2020 (Canada) and ENERGY2020 (US) will be the "command" program. The macroeconomic model need not be written in the same language as ENERGY2020 (Canada) and ENERGY2020 (US). 3. **Policy Initiatives** Introduction of policy initiatives (for example regulatory, market based, fiscal, etc.) has direct impacts on any model within each modeling solution and will take forms that are unique for each of the two models. It is necessary to ensure that the initiatives are the same and that direct impacts are equivalently introduced into each models.
Mandatory 63	**Minimize Simulation Failure** Testing E3NA must be designed to minimize the chances of simulation failure when the system is being used operationally by EC. This testing jointly requires inputs from the Canadian macroeconomic modeling and ENERGY2020 teams (in EC). Testing follows the same process as the individual model testing in that the system will be "stress-tested". Testing will be an iterative process and deemed complete when "tested" simulations: 1. Do not fail due to technical glitches. 2. Produce robust a priori results.
Mandatory 64	**Regional Simulation** Testing will result in the creation of an integrated energy, emissions and economy modeling solution that has the capacity to be run at various regional levels (as a North American model, as a Canada or US model, as a stand-alone provincial or territorial, or a US regional or state model).
<td colspan="2" align="center">**OTHER REQUIRED SERVICES**</td>	
Mandatory 65	**Documentation** The Contractor must provide a 'User's Guide' of E3MC, E3US and E3NA. This must include, but not be limited to: 1. **Base Case Set-Up** Instructions on setting up a base case or policy runs. 2. **Detail on Inputs and Outputs** Detail the inputs and outputs to each model, the primary uses of this data in each model, and the execution process including the order the models are called and the flow of data between the models.

	3. **Operating Instructions** Provide step-by-step instructions on the operation of each model individually and the operation of the integrated modeling solutions. 4. **Impact on Alternative Variables** In the case of policy development, alternative variables may need to be sent over to the macroeconomic models. Documentation must provide a description of how to incorporate new policies using the macroeconomic models including instructions for determining which macroeconomic model variables will be impacted by a new policy.
Mandatory 66	**On-Demand and As-Required Support** This requirement may range from intensive support (up to 500 hours per year) to less intensive (up to 200 hours per year). Main items for this requirement will be undertaken during the options associated with the request.
Mandatory 67	**Macroeconomic Base Case Development** This requirement is designed to support the development of an initial macroeconomic base case and will serve as the economic driver to the EC's Energy and Emissions Outlook. Note: For this initial base case, the Contractor will use a predefined consensus macroeconomic forecast. Starting from this macroeconomic forecast, revisions to key assumptions must be made. These revisions will ensure that the macroeconomic base case reflects advice provided to the Government of Canada by its stakeholders. This requirement includes, but is not limited to: 1. **Liaising with Stakeholders** Participation in discussions with selected industry associations and companies. Review and modify the short-term and long-term view of economic growth, including modification of economic parameters, based on industry consultations. 2. **Develop and Test Macroeconomic Assumptions** Development and testing of the macroeconomic assumption files to ensure that they are correctly reflecting the advice provided by the industry association and that they are properly interacting with ENERGY2020 (Canada) and ENERGY2020 (US).
Mandatory 68	**On-line Support** This requirement is designed to access the Contractor's staff on an 'as-needed or as–required' basis. On-line support must be provided to EC's Analysis and Modeling Division, as well as to the modeling teams at the NEB and NRCan. This requirement includes, but is not limited to: 1. Responding in a time-dependent manner to requests for support. 2. Making recommendations and suggestions on how best to implement specific changes to macroeconomic variables and policy assumptions. 3. Providing advice on the interpretation of specific results.

	4. Making "selected" modifications to model code to ensure that the policy impacts are being correctly modeled and interpreted.
Mandatory 69	**Alternative Macroeconomic Scenario Development** Upon request, provide technical support and advice on issues related to development of alternative baselines and on the running of the model. EC staff will provide direction to the Contractor's staff.
Mandatory 70	**Analytic Approach Development** Upon request, provide technical support and advice on the development of a methodology for translating $ value gross output into physical values (such as tonnes of steel or cement). EC will provide direction to the Contractor's staff.
Mandatory 71	**In-house Training** Upon request, provide in-house training to staff within EC's Analysis and Modeling Division, as well as modeling teams at the NEB and NRCan.
Mandatory 72	**Advise on Modeling Infrastructure** Upon request, advise and consult on the strategic development of modeling infrastructure required by the EC staff. For example, the Analysis and Modeling Division has developed an economic analysis strategy to guide its modeling activities. As this strategy is implemented, EC staff may require the assistance of outside modeling experts.
Mandatory 73	The E3NA solution must have the capacity to provide **semi-annual macroeconomic reference cases** aligned with the most recent macroeconomic consensus projection: 1. **Reflect Finance Canada Assumptions** Canadian reference cases must reflect the most recent Finance Canada Budget or Fiscal and Economic Update parameters. 2. **Reflect US Consensus and EIA Forecasts** US reference cases must reflect the most recent US consensus forecast or the case used in the most up-to-date EIA Annual Energy Outlook or Early Release.

2.   <u>At Attachment 3.1 – Bid Evaluation Criteria – Technical Compliance of Part 3 of the RFP:</u>

DELETE: Attachment 3.1; and

INSERT: Attachment 3.1, as follows:

ATTACHMENT 3.1

BID EVALUATION CRITERIA – TECHNICAL COMPLIANCE

(See next page)

	BIDDER'S RESPONSE
TECHNICAL REQUIREMENT	**DEMONSTRATED EXPERIENCE** **(BIDDER TO INSERT DATA OR INSERT PAGE WERE THE DEMONSTRATION CAN BE FOUND WITHIN THEIR BID)**
CANADIAN MODELING SOLUTION (E3MC)	
MANDATORY REQUIREMENT	
Technical Component The proposal must include a description of **future required functionalities** (Mandatory 2 to Mandatory 41) by providing items 1 to 4. Note: Items 1 to 4 may illustrate Mandatory 2 to Mandatory 41 **globally, individually** or as a **combination** thereof. 1. **A statement of understanding** of the work to be undertaken and why it has been requested. 2. **A methodology** that will be used to respond to EC's requirement for an integrated and dynamic energy, emissions and economy modeling solution. The methodology must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating the Bidder's proposed approach to delivering the future required functionalities (Mandatory 2 to Mandatory 41). 3. **A work plan** that describes in detail how the Bidder proposes to carry out the Mandatories to achieve the project objectives. The work plan must include visuals such as diagrams, tables, graphics or screenshots, etc.	

4. **A high-level estimate of the timeline** such as the number of weeks or months required to deliver the future required functionalities (Mandatory 2 to Mandatory 41) listed above in **7. Timing of Deliverables**. **Company Expertise Component** The proposal must identify: 1. **The professional staff** to be assigned to the project and their expected contribution to the project. 2. **Staff experience** directly relevant to the work. 3. **Relevant company experience** directly related to the work (for prime and sub-Bidder).	
Mandatory 1 At **contract awarding**, the Bidder must provide a licence to their current off-the-shelf **CANADIAN MACROECONOMIC MODEL** that is: 1. A **10-province and 3-territory** Canadian dynamic macroeconomic model with foreign and regional linkages. 2. Aligned with Statistics Canada's Canadian National System of Accounts (2012). 3. And which will be **customized** to include the future required functionalities (M2 to	

	M41) to be delivered **within 30 months of contract awarding.**	
Mandatory 2	**Macroeconomic Projections** ENERGY2020 (Canada) requires macroeconomic projection mechanisms and reporting variables at the provincial level as well as a select set of nationally measured variables. These projections must be sensitive to the analysis of energy, environment, and environment-related proposals and candidate initiatives of the Government of Canada.	
Mandatory 3	**Dynamic Integration** To facilitate a wide spectrum of policy measures and programmes, the macroeconomic model must operate with ENERGY2020 (Canada) on a stand-alone **and** on a dynamic integrated basis. In order to dynamically integrate the Canada macroeconomic model and ENERGY2020 (Canada), an **INTERFACE MODULE** must be developed. This interface must iterate variables between the Canadian macroeconomic model and ENERGY2020 (Canada) until both models reach	

	convergence. This ensures that both models respond, in a dynamic and interactive manner, to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection. **Note**: ENERGY2020 (Canada) is the `command program', and is written in Promula programming language, while the existing interface is written in Visual Basic. The interface provides the ability to project ENERGY2020 (Canada) variables using executable code originating from the macroeconomic model.	
Mandatory 4	**Stand-Alone Model** Include options to run a stand-alone provincial or regional economic model.	
Mandatory 5	**Bottom-Up Approach** The model must follow a bottom-up approach to accounting for each province and territory separately with Canada being the sum of regions. Canada will still evaluate a top-down approach whereby the Canada results are 'attributed' or 'shared' to each province based on their relative economic strengths and weaknesses	

Mandatory 6	**Logically Presented** The model must be illustrated by way of diagrams that clearly show the concepts, flows and linkages of information within the model. The model's equations and blocks must be contained, described and easily accessible within the modeling solution software or programs.	
Mandatory 7	**Provincial and Territorial Dimension** The model must solve uniquely for each province and territory using distinct Input-Output tables. The Bidder must clearly demonstrate how they will integrate the Input-Output relationships into the model. **Note**: Final demand feeds into a demand-for-energy converter matrix plus a technology matrix. The output of this feeds into the Input-Output estimate of gross output; gross output feeds into a value-added share matrix to produce gross domestic product at basic prices. The provincial and territorial models are required to sum-up to Canada.	
Mandatory 8	**Trade Flows** The provincial and territorial sub-models must capture all inter-provincial and international trade flows.	

	Note: Consideration will be given to using a national model based on the most recently available Input-Output tables and then share-weighted to the provinces and territories based on their respective Input-Output tables. If this share-weighted approach is used, the macroeconomic model must ensure that when policy touches only one sector in a specific province (for example petroleum refining in Nova Scotia), the direct effect is focused only on that province.	
Mandatory 9	**Multiplier Effects** The model must capture the indirect, induced and multiplier effects that affect other sectors and provinces. In the case of share-weighting, the sum of the provincial macroeconomic parameters, including the province with the impact, must equal the national macroeconomic parameters.	
Mandatory 10	**Industrial Sector Dimension** The industrial detail in the macroeconomic model must reflect the industrial detail in ENERGY2020 (Canada). At a minimum, it must represent NAICS industries or sectors listed	

in Appendix 2. In order to meet EC and NRCan analytical requirements, it will be necessary to disaggregate selective industries or sectors to a finer NAICS-digit level. The industries requiring this finer level of detail (to aid in pinpointing direct impacts from policy initiatives) will be determined based on data availability. **Note**: EC's current macroeconomic model contains more than 150 sector categories covering agricultural and forest activities, energy resource extraction, manufacturing, business services, government and others. Given most recent changes to Statistics Canada National System of Accounts, EC acknowledges that the current level of sector dimension is more limited in scope. EC is prepared to discuss a more restricted set of regions and sectors that contains the functionality required to provide the prerequisite analysis. The national, provincial and territorial models must have at least the sectors listed in Appendix 2 and these sectors must be aligned to Statistics Canada's new	

	System of National Accounts.	
Mandatory 11	**Address Policies** The model must have the capacity and flexibility to address regulatory and incentive policies at the required level of sectoral definition at the provincial and national level. Statistics Canada's CANSIM Table 379-0030 provides the level of sector detail at the provincial level.	
Mandatory 12	**Energy Sectors Dimension** The macroeconomic model must capture energy sub-sector disaggregation directly or indirectly. The current system of national accounts provides information for key energy sectors at various NAICS levels. For example: a. Oil and gas extraction [211] b. Conventional oil and gas extraction [211113] c. Non-conventional oil extraction [211114] d. Coal mining [2121] e. Electric power generation, transmission and distribution [2211] **f.** As part of its impact assessment, EC	

	requires a disaggregated representation of the key energy sectors such as separate tracking of oil and gas extraction as well as separate tracking within oil extraction (i.e. light and heavy). The macroeconomic model must capture this sub-sector disaggregation either directly or indirectly.	
Mandatory 13	**Standard Features** The model must include, but not be limited to: a. Base year = $2007 or $2010 b. Millions of Canadian Dollars c. Energy demand (by type and by energy-using sector) d. Alignment with Statistics Canada's new System of National Accounts (the International 2008 System of National Accounts) e. NAICS 2007 f. Forecast or simulation period (from most	

	current historical year to 2050 or 2075)	
Mandatory 14	**Major Blocks** The model must capture, but not be limited to: a. Demography b. Foreign Linkages c. Government Savings and Finance Sector d. Stocks of Wealth e. Labour Force f. Disposable Incomes g. Final Demand h. Final Demand Prices i. Major Aggregates j. Industry Prices and Wages k. Industry Output, Employment and Capital Stock l. Government Revenue, Expenditure, Redistribution m. Earned Income	
Mandatory 15	**Major Concepts** The following concepts must be included in the model: 1. **Household Expenditures** Variables are to be disaggregated at the most detailed level and must include real, nominal and relative prices for personal consumption. 2. **Investment** By asset type, sector, industry:	

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	a. Business: structures and machinery and equipment; structures by buildings and engineering type; machinery and equipment by type of equipment available; intellectual property products; Investment by asset type and industry. b. Residential: new construction, renovations, ownership transfer costs, housing starts, housing stock and sales of new and existing dwellings. 3. **Inventory change** By farm and non-farm, sector, industry: d) Manufacturing: inventory cases must be at the same level of disaggregation as GDP, gross output and investment e) Wholesale f) Retail	

	4. **Non-profit Institutions** Serving households' consumption expenditure.	
	5. **Exports and Imports** By goods and services, by direction with the US and the rest of the world, at the level of detail available in the System of National Accounts.	
	6. **Current and Capital Accounts** By province and territory (where available), for households, non-profit institutions serving households, corporations (including undistributed corporate profits), general government and non-residents.	
	7. **Government Revenue, Expenditure and Budgetary Balances** By province and territory. **Note:** This information is available from the System of National Accounts on the CANSIM (Table 384-0040, Current accounts, households, provincial and territorial, annual) plus from the provincial	

	and territorial governments. 8. **Detailed Government Revenues and Expenditures** By province and type of government entity **Note:** Available in Government Financial Statistics; detailed taxation data can be acquired from provincial and territorial governments. 9. **Other Government Expenditures** Net current expenditure on goods and services and sales of goods and services by level of government (including health expenditure) as per the detail in the provincial economic accounts.	
Mandatory 16	**Indicators** The following indicators, at a minimum, must be provided by the macroeconomic model: 1. GDP Price Index 2. Long-term Bond Rate 3. Consumer Price Index 4. Exchange Rates 5. Interprovincial Migration 6. International Migration 7. Population	

8. GDP By sector and by province 9. **Note**: GDP by industry and province must be produced as listed in Appendix 1. Where the data is supressed or confidential, the Bidder must clearly illustrate the methodology that will be used to produce reasonable estimates for those supressed data series. In addition, the national, provincial and territorial models must have at least the sectors listed in Appendix 2 and these sectors must be aligned to Statistics Canada's new System of National Accounts. 10. Gross Output by NAICS sector by province. 11. Employment by NAICS sector by province. 12. Wage Indicators by NAICS sector by province. 13. Major Purchased Inputs by Sector. 14. Taxes Corporate, personal and indirect (HST, GST and PST) and transfer payments 15. Household Expenditures	

	16. Real Disposable Income 17. Investment by asset type and industry 18. Investment Prices by asset type and industry 19. Housing Stock by type, by value and by physical units 20. Housing Starts by type, by value and by physical units 21. Commercial Building Starts by type by value and by physical units 22. Commercial Building Stock by type by value and by physical units 23. Vehicle Sales by type	
Mandatory 17	**Templates** The macroeconomic model must have the capacity to generate pre-defined or user-defined reports or tables (templates from which to read data series) on key data.	
Mandatory 18	**Forecast Calibration** The macroeconomic reference forecast must be calibrated: 1. **Short-Term** Align the short-term simulation with the projections outlined in Finance Canada's most recently available Budget or Fiscal and	

	Economic Update projections. 2. **Long-Term** Align the long-term Canadian forecast to Finance Canada's long-term forecast.	
Mandatory 19	**Forecast Tuning** The detailed industry and demand variables must be fine-tuned for near-term expectations. This forecast will be used to send initial parameters to ENERGY2020 Canada. Note: ENERGY2020 Canada contains detailed energy-related information. When it is linked to the macroeconomic model and the two models iterate, a new integrated equilibrium solution will be reached. This new equilibrium will result in integrated projections value for energy, emissions and the macro-economy.	
Mandatory 20	**Reference Case Forecast** When the Canadian macroeconomic model is calibrated (aligned with Finance Canada's forecast) and used as input to the ENERGY2020 (Canada) model, the new macroeconomic reference case forecast will be used for the following main functions:	

	1. **Policy Analysis** Regulatory analyses for oil, gas and emissions intensive trade exposed industries (EITE), and oil, gas and electricity.	
	2. **Policy Scenario-Building** Scenarios are built and tested by adjusting parameters such as device and process efficiency, capital costs, market shares, device lifetimes, non-price factors, emission coefficients, taxes, etc. Scenarios with multiple policies are run simultaneously and the model keeps track of interaction effects, rebound effects, etc.	
	3. **Emission Trends Update** For the residential, commercial, manufacturing, oil and gas, transportation and electricity sectors as well as process emissions, prices and air pollutants.	
Mandatory 21	**Linkages** ENERGY2020 (Canada) uses macroeconomic data to	

	drive energy demands in the residential, commercial, industrial, and transportation sectors. Linkages between ENERGY2020 (Canada) and the macroeconomic model must allow for simulation of the real-time impact of energy and environmental concerns on the economy and vice versa. Appendix 3 outlines the current sector structure of E3MC.	
Mandatory 22	**Identify Variables to be Transferred** Transferring data from ENERGY2020 (Canada) to the macroeconomic model requires files that are read by both models. These files will contain the changes caused by a specific energy or emissions policy to a set of model variables as calculated by ENERGY2020 (Canada). The files will then be imported into the macroeconomic model, and the macroeconomic model will be executed to obtain a revised macroeconomic forecast given these new assumptions. The specific variables that are sent from ENERGY2020 (Canada) to the macroeconomic model will vary based on the policy being analyzed. The	

	Bidder must identify which variables will be operational to allow for the dynamic general equilibrium solution	
Mandatory 23	**Identify How Data will be Transferred** Variables in ENERGY2020 (Canada) will need to be aggregated into the macroeconomic model regions and mapped to the macroeconomic model economic categories before sending them as input. The Bidder has the option to exchange information as changes from the base case or from levels relative to the base case. In either case, the proposal must clearly illustrate how this information exchange from will be performed.	
Mandatory 24	**Direct, Indirect and Induced Effects** As part of its impact assessment exercises, EC requires separate reporting of direct, indirect and induced macroeconomic effects of policy changes. For example GDP, employment, investment and gross output multipliers will need to be reported.	
Mandatory 25	**Demonstrate Data-Transfer Capabilities** The Bidder must illustrate the level of effort for building data-transfer capabilities between ENERGY2020	

	(Canada) and macroeconomic model. The Bidder must demonstrate in detail how the interface between the two models will ensure a dynamic and seamless integration.	
Mandatory 26	**Interactive Data Transfer** Output from the macroeconomic model must be interactively transferred to ENERGY2020 (Canada). An integrating program will need to be written to parse the output from the macroeconomic model output files and read the economic variables into a Promula database (ENERGY2020 (Canada) programming language). The code for the data transfers must be incorporated into the interface between ENERGY2020 (Canada) and macroeconomic model.	
Mandatory 27	**Identify Macroeconomic Variables to be Transferred** The initial list of macroeconomic variables to be passed from the macroeconomic model to ENERGY2020 (Canada) must include, but not be limited to: 1. Economic Output 2. GDP by Economic Category 3. Total Personal Income	

	4. Real Disposable Personal Income 5. Consumer Price Index 6. GDP Deflator 7. Exchange Rates 8. Government Compensation	
Mandatory 28	**Identify ENERGY 2020 (Canada) Variables to be Transferred** The initial list of variables that will be passed from ENERGY2020 (Canada) to the macroeconomic model must include, but not be limited to: 1. **Energy Production** For each energy sector (electricity, oil, gas, coal, etc.). 2. **Energy Expenditures** By economic category (fuel and capital). 3. **Energy Use Per $ of Economic Output** By economic category and fuel. 4. **Emissions Permit Costs** By economic category and fuel. 5. **Investments** Related to energy production or to meet environmental or energy related policies (by structure, equipment, process for each economic category).	

	6. **Exchange Rate Information** Used for energy-related trade flows in ENERGY2020 (Canada).	
Mandatory 29	**Extraction of Detailed Data** The Bidder must illustrate in detail how data from the macroeconomic model will be extracted and transferred to ENERGY2020 (Canada). This includes, but is not limited to: 1. The generation of output tables (or custom reports), which must be created during each execution of the macroeconomic model. 2. A post-process that illustrates how data from the macroeconomic model (in its industrial structure) is mapped to data in ENERGY2020 (Canada)'s industrial structure.	
Mandatory 30	**Collaborate on Developing Automated Linking Interface** The Bidder must collaborate to create an automated linking interface between ENERGY2020 (Canada) and the macroeconomic	

	model. ENERGY2020 (Canada) will be the "command" program, controlling the execution of ENERGY2020 (Canada) and the macroeconomic model. The macroeconomic model "base case" will be created as an initial reference case that has not yet been integrated with ENERGY2020 (Canada). As the modeling solution solves, each iteration of the framework must include, but is not limited to: 1. Extracting the data from the macroeconomic model. 2. Transferring the data to ENERGY2020 (Canada). 3. Executing ENERGY2020 (Canada). 4. Extracting data from ENERGY2020 (Canada). 5. Transferring the data to the macroeconomic model. 6. Executing the macroeconomic model.	

	7. This single "iteration" can be repeated as many times as needed.	

Mandatory 31	**Successful Integration Process** To ensure a successful integration process, the following must be achieved:
	1. **Testing** Create a test case of output data generated by modifying the macroeconomic input data.
	2. **Inserting and Extracting Data** Determine the location within the macroeconomic model (or database) for inserting and extracting the data for ENERGY2020 (Canada).
	3. **Coding:**
	    a. Write code to insert data, extract data, and execute the macroeconomic model. Debug and test this code to ensure the results match the test case.
	    b. Write code to extract data from the output of the model 'run(s)' such	

	that it can be called directly into the transfer routine. c. Generate code for ENERGY2020 (Canada) to insert data into the macroeconomic model directly via the selected transfer routine and language. d. Combine the code which inserts data, extracts data, and executes the macroeconomic model with the code which inserts data, extracts data, and executes ENERGY2020 (Canada) to create an integrated solution 4. **Convergence Criteria** Convergence rules may be required to limit the number of iterations needed to create a solution.	
Mandatory 32	**Endogenous Interaction** ENERGY2020 (Canada) and the macroeconomic model must interact endogenously through changes in energy variables such as	

	production, prices, energy intensities, investments in energy industries, as well as macroeconomic variables. For each iteration period, energy supply and demand results from ENERGY2020 (Canada) will be automatically transferred to the macroeconomic model via the interface module. Note: ENERGY2020 (Canada) produces annual projections as such the macroeconomic model must produce annual projections.	
Mandatory 33	**Achieve an Integrated Solution** The macroeconomic model will incorporate these energy results into a new macroeconomic projection for that period. The new macroeconomic data is returned to ENERGY2020 (Canada) to create a new energy projection for the next iteration period. The process of using output from one iteration as input to the next iteration is undertaken to achieve an integrated annual equilibrium solution in all energy markets and the economy.	
Mandatory 34	**Direct, Indirect (Induced) Impacts** The integrated modeling solution must capture both direct and	

	indirect (induced) impacts on Canadian industries and consumers of the Canadian and the US climate change and clean air policy initiatives. A key technical objective is to ensure accounting and behavioural consistency between the 'micro' representation of energy markets in ENERGY2020 (Canada) and the 'macro' (plus industrial organization) detail of the macroeconomic model at each single regional level.	
Mandatory 35	**Perform Regional Analysis** Analyze the regional, provincial and aggregate macroeconomic impacts (for example gross domestic product, industry gross output, employment, personal disposable income, tax interaction, government revenues/expenditures, and sector-specified competitiveness effects) of a range of energy and environment policy initiatives.	
Mandatory 36	**Scenario Development** Develop alternative long-term energy and emissions scenarios for each representative region as well as for the nation.	
Mandatory 37	**Analyze Spillover Effects** Analyze the spillover effects in Canada of environmental and energy	

	policy initiatives taken in the US.	
Mandatory 38	**Analyze Joint Initiatives** Analyze joint Canada-US environment and energy policy initiatives.	
Mandatory 39	**Analyze Alternative Proposals** Analyze alternative provincial and industry proposals for achieving environmental goals.	
Mandatory 40	**Collaboration** The Bidder must collaborate on developing the interface module. The Bidder must ensure the E3MC interface module is created in such a way that the two models are dynamically linked and produce integrated results.	
Mandatory 41	**EM3C Testing** Once the interconnections are established between the macroeconomic model and ENERGY2020 (Canada), E3MC must undergo extensive testing to ensure that the new structure can assess the impact of multiple policy options. Stress-testing must ensure that: 1. **Response Signals** Each model is responding to signals being sent from the other model. 2. **Integration Failure** There will not be failure during the integration procedure	

	between the two models. 3. **EC Staff** EC staff will be involved at all stages of stress-testing to ensure that the modeling framework meets expectations. This will include design of the test and review of output from both ENERGY2020 (Canada) and the macroeconomic model.		

Rated Requirement				
	Description	**Evaluation Criteria**	**Points**	**(BIDDER TO INSERT DATA OR INSERT PAGE WERE THE DEMONSTRATION CAN BE FOUND WITHIN THEIR BID)**
Rated 1	The Bidders should demonstrate its understanding of Mandatories 3, 31, 32, 33 and 34 by producing a global methodology and approach. This methodology and approach must address Evaluation Criteria 1 to 5. This methodology and approach must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating the Bidder's proposed approach to	1. The methodology and approach provide an explanation of how variables are exchanged between ENERGY2020 (Canada) and the Canadian macroeconomic model in a dynamic*** and integrated manner. *****Dynamic** in this instance is defined as the 'real-time' or	The Bidder has addressed all 5 items. = 25 points The Bidder has addressed 4 of the 5 items. = 20 points	

	delivering those Mandatories.	instantaneous process by which model one uses (solved) output from model two as input into its own simulation to produce a general equilibrium solution.	The Bidder has addressed 3 of the 5 items. = 14 points	
		2. The methodology and approach provide an explanation of how changes introduced through energy and macroeconomic variables interact to produce a unique integrated energy, emissions and economic projection in a dynamic and integrated manner.	The Bidder has addressed 2 of the 5 items. = 10 points	
			The Bidder has addressed 1 of the 5 items. = 5 points	
		3. The methodology and approach provide an explanation of how the integrated model (E3MC) will be executed to produce a unique integrated energy, emissions and economic projection in a dynamic and integrated manner.	The Bidder has addressed 0 of the 5 items. = 0 points	
		4. The methodology and approach provide an explanation of		

		how E3MC solves the model for a given year allowing for between-model simultaneous solution.		
		5. The methodology and approach provide an explanation of: a. Convergence and; b. Convergence testing of a set of variables or other conditions that constitute a "stopping rule".		
	MAX. TECHNICAL POINTS	25		
	MIN. POINTS REQUIRED	14		
	TOTAL TECHNICAL SCORE ACHIEVED			
US MODELING SOLUTION (E3US)			
Mandatory Requirement			

Technical Component
The proposal must include a description of **future required functionalities** (Mandatories M43 to M57) by providing items 1 to 4.
Note: items 1 to 4 can present M43 to M57 **globally, individually** or a **combination** thereof.

1. **A statement of understanding** of the work to be undertaken and why it has been requested.
2. **A methodology** that will be used to respond to EC's requirement for an integrated and dynamic energy, emissions and economy

modeling solution. The methodology must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating the Bidder's proposed approach to delivering the future Mandatories (M43 to M57) listed below. 3. **A work plan** that describes in detail how the Bidder proposes to carry out the requirements to achieve the project objectives. The work plan must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating how the Bidder will achieve the project objective. 4. **A high-level estimate of the timeline** such as the number of weeks or months required to deliver the future required functionalities (M43 to M57) within the timeframe listed above in **7. Timing of Deliverables**. **Company Expertise Component** The proposal must identify: 1. **The professional staff** to be assigned to the project and their expected contribution to the project. 2. **Staff experience** directly relevant to the work. 3. **Relevant company experience** directly related to the work (for prime and sub- Bidders).	

Mandatory 42	At **contract awarding**, the Bidder must provide a licence to their current off-the-shelf **US MACROECONOMIC MODEL** that is: 1. An open-economy dynamic macroeconomic model with a level of regional disaggregation that can be integrated with the ENERGY2020 (US) model. 2. And which will be **customized** to include the future required functionalities (M43 to M57) to be delivered **within 30 months of contract awarding**.	
Mandatory 43	**Regional and Sector Breakdown** The US macroeconomic model will simulate 9 regions (US Census Divisions) and 160-Sectors. Appendix 4 provides an example of the regional and sector breakdown for the US macroeconomic model. EC is prepared to discuss a more restricted set of regions and sectors that will still provide the functionality required to provide the prerequisite analysis.	

	Note: ENERY2020 (US) is a state-by-state model than can be aggregated to create multiple regional dimensions suitable for specific policy purposes. The Bidder must ensure that the US macroeconomic model reflects the regional dimensions created by ENERGY2020 (US). Examples of regional dimensions or aggregations include those defined by the US Federal Energy Regulatory Commission (FERC) or the Western Climate Initiative (WCI).	
Mandatory 44	**Industrial Detail** The industrial detail in the US macroeconomic model must be commensurate with the industrial detail in ENERGY2020 (US). At the minimum, it must represent NAICS industries or sectors listed in Appendix 4 of Annex A. In each macroeconomic model it will be desirable to distinguish a finer level of detail to aid in pinpointing direct impacts from policy initiatives.	
Mandatory 45	**Generate Reports** The US macroeconomic model must have the ability to generate pre-defined or user-defined reports (i.e. templates from which to read data series) on key data.	

Mandatory 46	E3US must provide a US macroeconomic model **REFERENCE FORECAST** that is calibrated to official US energy forecasts. This forecast must be calibrated in two ways: 1. **Alignment to EIA** Align the short-term simulation with the projections from most recently available US Energy Information Administration's (EIA) official short-term energy forecast. 2. **Calibration to EIA** Calibrate the long-term US forecast to the most recently available US EIA official energy forecast. This forecast is appropriate for the overall macroeconomic activity. The detailed industry and demand variables must be fine-tuned for near-term expectations.	
Mandatory 47	E3US must **SECURLY TRANSFER DATA** from E2020 (US) to the US macroeconomic model. ENERGY2020 (US) uses macroeconomic data to drive energy demands in the residential, commercial, industrial,	

	and transportation sectors. The linkages between ENERGY2020 (US) and the US macroeconomic model will allow for simulation of the real-time impact of energy and environmental concerns on the economy and vice versa. As such, the following will need to be achieved: 1. **Readable Files** Transferring data from ENERGY2020 (US) to the US macroeconomic model requires files that are readable by both models. These files will contain the changes caused by a specific energy or emissions policy to a set of model variables as calculated by ENERGY2020 (US). The files will be imported into the US macroeconomic model, and the macroeconomic model will then be executed to obtain a revised macroeconomic forecast given these new assumptions. The specific variables that are sent from	

	ENERGY2020 (US) to the US macroeconomic model will vary based on the policy being analyzed. 2. **Aggregation of Variables** The variables in ENERGY2020 (US) will need to be aggregated to reflect the regions in the US macroeconomic model and then mapped to the economic categories in the same model (before sending them back to ENERGY2020 (US) as input). 3. **Information Exchange** the Bidder must exchange information as levels relative to the base case. It must be clearly articulated how this information exchange will be performed.	
Mandatory 48	E3US must **SECURLY TRANSFER DATA** from the US macroeconomic model to E2020 (US). Output from the US macroeconomic model must be interactively transferred to ENERGY2020 (US), hence	

	the following will need to be achieved: 1. **Write Code to Transfer Data to ENERGY2020 (US)** a routine is required to parse the output from the US macroeconomic model output files and read the economic variables into a Promula database (the programming language used by ENERGY2020 (US)). 2. **Incorporate Code into the Interface** Code for data transfers must be incorporated into the interface between ENERGY2020 (US) and the US macroeconomic model. 3. **Identify Variables to be Transferred** The macroeconomic variables that must be passed from the US macroeconomic model to ENERGY2020 (US) will include, but not be limited to: a. Inflation Rate (Index) b. Private Nonfarm Employment	

	c. Government Non-civilian Employment	
	d. Gross Regional Product	
	e. Total capital output	
	f. Government Compensation	
	g. Population	
	h. Total Personal Income	
	i. Real Disposable Personal Income	
Mandatory 49	It must be illustrated in detail how data from the US macroeconomic model will be extracted and transferred to ENERGY2020 (US). This includes, but is not limited to: 1. **Generation of Tables** The generation of output tables (or custom reports) must be created during each execution of the macroeconomic model. 2. **Data Comparability** A post-process must be created that illustrates how data from the macroeconomic model (in its industrial structure) is mapped to data in ENERGY2020 (US) (in its industrial structure).	

Mandatory 50	An **INTERFACE MODULE** must be developed that dynamically integrates the results of the US macroeconomic model and ENERGY2020 (US). This interface module must iterate variables between the US macroeconomic model and ENERGY2020 (US) until both models reach convergence. This ensures that both models respond, in a dynamic and interactive manner, to changes introduced through energy and macroeconomic variables to produce a unique integrated energy, emissions and economic projection. Formal integration of the US macroeconomic model with ENERGY2020 (US), where ENERGY2020 (US) provides the "command program", requires software development. Currently, ENERGY2020 (US) is written in Promula. An interface module must be developed that takes into consideration: 1. **Stand-alone or Integrated Operation** The Bidder must ensure that each model operates on a stand-alone and integrated basis in	

	order to facilitate a wide spectrum of policy measures and programmes. 2. **Operation in Distinct Software** ENERGY2020 (US) and the US macroeconomic model may operate in distinct software systems.	
Mandatory 51	E3US must be **TESTED** to ensure the successful interconnection of the US macroeconomic model to ENERGY2020 (US). Once the interconnections are established between the US macroeconomic model and ENERGY2020 (US), the integrated modeling solution (E3US) must undergo extensive testing to ensure that the new structure correctly assesses the impact of multiple policy options. This must include: 1. **Stress-Testing of Modeling Solution** Testing must ensure that each model is responding reasonably to signals being sent from the other model. This stress-testing must ensure that there will not be failures during the	

	interaction between the two models. 2. **Collaboration with EC** it is necessary that EC officials be involved at all stages of testing to ensure that the model meets expectations. This includes design of the test and review of output from ENERGY2020 (US) and the US macroeconomic model.	
Mandatory 52	~~The following must be met to ensure successful operation between the Canadian macroeconomic model and ENERGY2020 (Canada) and the US macroeconomic model and ENERGY2020 (US):~~ 1. ~~**Process and Device Investment** Historical and forecast values for process and device (or equipment) investments (in ENERGY20202) must be reconciled with the outputs of the Canadian and US macroeconomic models to ensure consistency between the two modeling solutions.~~	

	2. ~~Note: Process and device capital costs in ENERGY2020 (Canada) and ENERGY2020 (US) need to be adjusted. The Canadian and US macroeconomic models must support these changes as ENERGY2020 (Canada) and ENERGY2020 (US) contain more detail on end-use and technology level compared to the macroeconomic models.~~ 3. ~~**Develop Calibration Process** A calibration procedure must be developed such that it enables the direct transfer of process and device (or equipment) investments to each macroeconomic model.~~ [Intentionally deleted as per this solicitation amendment 001]	
Mandatory 53	~~ENERGY2020 (Canada) executes with all prices in US dollars. ENERGY2020 (Canada) needs to be adjusted to execute the Canada-specific parts of the model in Canadian dollars while the US-specific parts will remain~~	

	executable with US dollars. Hence, the exchange rate will be needed only for energy-related trade flows between the two countries (electricity, natural gas, oil, and coal imports and exports). [Intentionally deleted as per this solicitation amendment 001]	
Mandatory 54	**Consistency between the two modeling solutions** is necessary. As such, the Bidder must ensure the thorough review of and adjustments to inputs and outputs, including: 1. Financial input variables 2. Financial output files 3. Electricity and natural gas dispatch routines 4. Commodity trading inflow/outflow including CO2 permit trading	
Mandatory 55	**Reduce Execution Time** E3MC and E3US must iterate to find a consistent solution between ENERGY2020 (Canada), ENERGY2020 (US) and the two macroeconomic models. As such, options to reduce the execution time must be explored. Note: This must achieved by identifying procedures which only need to be	

	executed during the first iteration of each model(s) and by passing emission allowance permit information between iterations. [Intentionally deleted as per this solicitation amendment 001]	
Mandatory 56	Electric Generating Capacity The procedure which constructs new electric generating capacity (in ENERGY 2020 (Canada)) requires a significant amount of execution time yet only needs to be executed once per iteration. This is due to the fact that changes to the current year macroeconomic variables do not have a significant impact on that procedure. That specific procedure (and any other procedures identified) must be isolated so that it is executed only during the first iteration. [Intentionally deleted as per this solicitation amendment 001]	
Mandatory 57	Cap and Trade Runs When ENERGY2020 (Canada) is linked to a macroeconomic model, the longest runs are the emission cap and trade runs. A range of options must be explored and tested that will be aimed	

	at reducing the ~~ENERGY2020 (Canada) iterations. This may include an automated process to provide the model with an emissions permit price which is close to the solution in the previous iteration.~~ ~~**Note**: During such a run, the model must first iterate to find the emission permit prices and then must iterate with the macroeconomic model. In the past, the macroeconomic model required 5 iterations while the GHG cap and trade runs required up to 12 iterations of ENERGY2020 (Canada). This resulted in 60 iterations to complete one run.~~ [Intentionally deleted as per this solicitation amendment 001]		
Rated Criteria			
	Description	**Evaluation Criteria**	**Points**	**(BIDDER TO INSERT DATA OR INSERT PAGE WERE THE DEMONSTRATION CAN BE FOUND WITHIN THEIR BID)**
	The Bidders should demonstrate its understanding of Mandatories 50 and 51 by producing a global methodology and approach.	1. The methodology and approach provide an explanation of how variables are exchanged between ENERGY2020 (US)	The Bidder has addressed all 5 items. = 25 points	

Rated 2	This methodology and approach must address Evaluation Criteria 1 to 5. This methodology and approach must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating the Bidder's proposed approach to delivering those Mandatories.	and the US macroeconomic model in a dynamic and integrated manner. 2. The methodology and approach provide an explanation of how changes introduced through energy and macroeconomic variables interact to produce a unique integrated energy, emissions and economic projection in a dynamic and integrated manner. 3. The methodology and approach provide an explanation of how the integrated model (E3US) will be executed to produce a unique integrated energy, emissions and economic projection in a dynamic and integrated manner. 4. The methodology and approach provide an explanation of how E3US solves the model for a	The Bidder has addressed 4 of the 5 items. = 20 points The Bidder has addressed 3 of the 5 items. = 14 points The Bidder has addressed 2 of the 5 items. = 10 points The Bidder has addressed 1 of the 5 items. = 5 points The Bidder has addressed 0 of the 5 items. = 0 points

		given year allowing for between-model simultaneous solution. 5. The methodology and approach provide an explanation of a) Convergence; and b) Convergence testing of a set of variables or other conditions that constitute a "stopping rule".		
MAX. TECHNICAL POINTS		25		
MIN POINTS REQUIRED		14		
TOTAL TECHNICAL SCORE ACHIEVED				
NORTH AMERICAN MODELING SOLUTION (E3NA)				
Mandatory Requirement				
Technical Component The proposal must include a description of **future required functionalities** (Mandatories M58 to M64) by providing items 1 to 4. Note: items 1 to 4 can present M58 to M64 **globally, individually** or a **combination** thereof. 1. **A statement of understanding** of the work to be undertaken and why it has been requested. 2. **A methodology** that will be used to respond to EC's requirement for an integrated and dynamic energy, emissions and economy modeling solution. The				

	methodology must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating the Bidder's proposed approach to delivering the future Mandatories (M58 to M64) listed below. 3. **A work plan** that describes in detail how the Bidder proposes to carry out the requirements to achieve the project objectives. The work plan must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating how the Bidder will achieve the project objective. 4. **A high-level estimate of the timeline** such as the number of weeks or months required to deliver the future required functionalities (M58 to M64) within the timeframe listed above in **7. Timing of Deliverables**. **Company Expertise Component** The proposal must identify: 1. **The professional staff** to be assigned to the project and their expected contribution to the project. 2. **Staff experience** directly relevant to the work. 3. **Relevant company experience** directly related to the work (for prime and sub-Bidders).	
Mandatory 58	**North American INTERFACE MODULE** In	

	order to integrate the Canada and US macroeconomic models, an interface module must be developed that iterates variables between the Canadian and US macroeconomic models until both models reach convergence. This ensures that **E3MC** and **E3US** respond, in a dynamic and interactive manner, to changes introduced through energy and macroeconomic variables and produce a unique integrated energy, emissions and economic projection. See Figure 2.	
Mandatory 59	**Integrated North American forecasts** must capture the Canada-US trading relationship, as well as other key Canada-US macroeconomic relationships in the following manner: 1. **Compatibility of Variables** Review of the Canadian and US model structures to map variables across the two models. 2. **Key Macroeconomic Indicators** Establish the responsiveness of Canada-US exchange rates, export/import dynamics and other key macroeconomic relationships.	

	3. **Enable Transfer Capability** Modify each model structure as necessary to enable transfer of data and input across the models. 4. **Write Code** Write code to transfer data from the US to the Canadian macroeconomic model.	
Mandatory 60	**Test Responses** The modelling solution must provide the capacity to develop policy test case(s) for varying values into the Canadian and US macroeconomic models. Tests must be carried out to determine if the Canadian macroeconomic model responds as expected to changes transferred from the US macroeconomic model. The goal is to ensure that EC is in a position to anticipate the details of environmental and energy policy analysis. This includes but is not limited to: 1. Anticipating changes in global and continental energy prices. 2. Anticipating changes to fiscal and monetary policy.	

	3. Anticipating exchange rate changes with major trading partners (specifically the US). 4. Anticipating major shocks to the costs of production in energy-intensive industries. These shocks can occur on a US-only, Canada-only and/or joint basis.	
Mandatory 61	E3NA must be **tested** to ensure **successful interconnections**. Testing must be an iterative process and is deemed successful when "tested" simulations: 1. Do not fail due to technical glitches. 2. Produce reasonable a priori results. 3. Convergence must be minimal during this testing. Issues of non-convergence must be solved as necessary.	
Mandatory 62	E3NA must be **tested** to ensure the **successful integration** of the integrated modeling solutions E3MC and E3US. E3MC and E3US must interact simultaneously to create a integrated North American modeling solution, E3NA. The objective is to test the entire modeling solution	

| | so that all information flows operate simultaneously. There are several dimensions to this:

1. **Compatibility** The data framework and structure of behaviour in the two models must be compatible if not necessarily the same.

2. **Capital Stocks and Flows** The dimensions and levels of the capital stocks and flows must be comparable in both ENERGY2020 (Canada) and the macroeconomic model.

3. Note: The historical level of investment in equipment, buildings and production processes must be comparable, and that the future capital flows and investments must be identical to allow for robust policy analysis. **Data Exchange** Data measures and executable code must be exchanged between the two models.

4. Note: The program used to execute ENERGY2020 (Canada) | |

	and ENERGY2020 (US) will be the "command" program. The macroeconomic model need not be written in the same language as ENERGY2020 (Canada) and ENERGY2020 (US). 5. **Policy Initiatives** Introduction of policy initiatives (for example regulatory, market based, fiscal, etc.) has direct impacts on any model within each modeling solution and will take forms that are unique for each of the two models. It is necessary to ensure that the initiatives are the same and that direct impacts are equivalently introduced into each models.	
Mandatory 63	**Minimize Simulation Failure** Testing E3NA must be designed to minimize the chances of simulation failure when the system is being used operationally by EC. This testing jointly requires inputs from the Canadian macroeconomic modeling and ENERGY2020 teams (in EC).	

	Testing follows the same process as the individual model testing in that the system will be "stress-tested". Testing will be an iterative process and deemed complete when "tested" simulations: 1. Do not fail due to technical glitches. 2. Produce robust a priori results.			
Mandatory 64	**Regional Simulation** Testing will result in the creation of an integrated energy, emissions and economy modeling solution that has the capacity to be run at various regional levels (as a North American model, as a Canada or US model, as a stand-alone provincial or territorial, or a US regional or state model).			
Rated Criteria				
	Description	**Evaluation Criteria**	**Points**	**(BIDDER TO INSERT DATA OR INSERT PAGE WERE THE DEMONSTRATION CAN BE FOUND WITHIN THEIR BID)**
	The Bidders should demonstrate its understanding of Mandatories 58 and 62 by producing a global methodology and approach.	1. The methodology and approach provide an explanation of how variables are exchanged between E3MC and E3US in a dynamic and integrated manner.	The Bidder has addressed all 5 items. = 25 points	

Rated 3	This methodology and approach must address Evaluation Criteria 1 to 5. This methodology and approach must include visuals such as diagrams, tables, graphics or screenshots, etc., as a way of illustrating the Bidder's proposed approach to delivering those Mandatories.	2. The methodology and approach provide an explanation of how changes introduced through energy and macroeconomic variables interact to produce a unique integrated energy, emissions and economic projection in a dynamic and integrated manner. 3. The methodology and approach provide an explanation of how the integrated model (E3NA) will be executed to produce a unique integrated energy, emissions and economic projection in a dynamic and integrated manner. 4. The methodology and approach provide an explanation of how E3NA solves the model for a given year allowing for between-model simultaneous solution.	The Bidder has addressed 4 of the 5 items. = 20 points The Bidder has addressed 3 of the 5 items. = 14 points The Bidder has addressed 2 of the 5 items. = 10 points The Bidder has addressed 1 of the 5 items. = 5 points The Bidder has addressed 0 of the 5 items. = 0 points	

		5. The methodology and approach provide an explanation of: a) Convergence; and b) Convergence testing of a set of variables or other conditions that constitute a "stopping rule".		
MAX. TECHNICAL POINTS		**25**		
MIN POINTS REQUIRED		**14**		
TOTAL TECHNICAL SCORE ACHIEVED				
OTHER REQUIRED SERVICES				
Mandatory 65	**Documentation** The Bidder must provide a 'User's Guide' of E3MC, E3US and E3NA. This must include, but not be limited to: 1. **Base Case Set-Up** Instructions on setting up a base case or policy runs. 2. **Detail on Inputs and Outputs** Detail the inputs and outputs to each model, the primary uses of this data in each model, and the execution process including the order the models are called and the flow of			

	data between the models.	
	3. **Operating Instructions** Provide step-by-step instructions on the operation of each model individually and the operation of the integrated modeling solutions.	
	4. **Impact on Alternative Variables** In the case of policy development, alternative variables may need to be sent over to the macroeconomic models. Documentation must provide a description of how to incorporate new policies using the macroeconomic models including instructions for determining which macroeconomic model variables will be impacted by a new policy.	
Mandatory 66	**On-Demand and As-Required Support** This requirement may range from intensive support (up to 500 hours per year) to less intensive (up to 200 hours per year). Main items for this requirement will be undertaken during	

	the options associated with the request.	
Mandatory 67	**Macroeconomic Base Case Development** This requirement is designed to support the development of an initial macroeconomic base case and will serve as the economic driver to the EC's Energy and Emissions Outlook. Note: For this initial base case, the Bidder will use a predefined consensus macroeconomic forecast. Starting from this macroeconomic forecast, revisions to key assumptions must be made. These revisions will ensure that the macroeconomic base case reflects advice provided to the Government of Canada by its stakeholders. This requirement includes, but is not limited to: 1. **Liaising with Stakeholders** Participation in discussions with selected industry associations and companies. Review and modify the short-term and long-term view of economic growth, including modification of economic parameters,	

	based on industry consultations.
	2. **Develop and Test Macroeconomic Assumptions** Development and testing of the macroeconomic assumption files to ensure that they are correctly reflecting the advice provided by the industry association and that they are properly interacting with ENERGY2020 (Canada) and ENERGY2020 (US).	
Mandatory 68	**On-line Support** This requirement is designed to access the Bidder's staff on an 'as-needed or as–required' basis. On-line support must be provided to EC's Analysis and Modeling Division, as well as to the modeling teams at the NEB and NRCan. This requirement includes, but is not limited to: 1. Responding in a time-dependent manner to requests for support. 2. Making recommendations and suggestions on how best to implement specific changes to macroeconomic	

	variables and policy assumptions. 3. Providing advice on the interpretation of specific results. 4. Making "selected" modifications to model code to ensure that the policy impacts are being correctly modeled and interpreted.	
Mandatory 69	**Alternative Macroeconomic Scenario Development** Upon request, provide technical support and advice on issues related to development of alternative baselines and on the running of the model. EC staff will provide direction to the Bidder's staff.	
Mandatory 70	**Analytic Approach Development** Upon request, provide technical support and advice on the development of a methodology for translating $ value gross output into physical values (such as tonnes of steel or cement). EC will provide direction to the Bidder's staff.	
Mandatory 71	**In-house Training** Upon request, provide in-house training to staff within EC's Analysis and Modeling Division, as well	

	as modeling teams at the NEB and NRCan.	
Mandatory 72	**Advise on Modeling Infrastructure** Upon request, advice and consult on the strategic development of modeling infrastructure required by the EC staff. For example, the Analysis and Modeling Division has developed an economic analysis strategy to guide its modeling activities. As this strategy is implemented, EC staff may require the assistance of outside modeling experts.	
Mandatory 73	The E3NA solution must have the capacity to provide **semi-annual macroeconomic reference cases** aligned with the most recent macroeconomic consensus projection: 1. **Reflect Finance Canada Assumptions** Canadian reference cases must reflect the most recent Finance Canada Budget or Fiscal and Economic Update parameters. 2. **Reflect US Consensus and EIA Forecasts** US reference cases must reflect the most recent US consensus forecast or the case used in the most up-to-date EIA	

	Annual Energy Outlook or Early Release.	

3. <u>At Attachment 3.4 – Financial Bid of Part 3 of the RFP:</u>

DELETE: Attachment 3.4; and

INSERT: Attachment 3.4, as follows:

ATTACHMENT 3.4

FINANCIAL BID

BIDDERS MUST INCLUDE THE FOLLOWING PRICING INFORMATION FOR ALL DELIVERABLES IN CANADIAN CURRENCY.

The Bidder must not make any assumptions, which have not been validated by the Contracting Authority prior to the Bid closing date. The Bidder must refer to Part 3 – Bid Preparation Instructions.

	TABLE 1 CANADIAN MODELING SOLUTION (E3MC), US MODELING SOLUTION (E3US), and NORTH AMERICAN MODELING SOLUTION (E3NA) MAXIMUM ALL-INCLUSIVE LOT PRICE (Can $)	
Item #	Item Description	Firm all-inclusive lot price in Can $
1	Licenses for 10 users of commercial off-the-shelf Canadian Provincial and Territorial Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirement of Mandatory 1 of Table 1 of the statement of work.	$_____
2	Licenses for 10 users of commercial off-the-shelf US Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirement of Mandatory 42 of Table 1 of the statement of work.	$_____
3	Modified Canadian Provincial and Territorial Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.	$_____
4	~~ENERGY2020 (Canada) Modifications and Enhancement.~~	~~$_____~~ N/A

	~~This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.~~ [Intentionally deleted as per this solicitation amendment 001]	
5	ENERGY2020 (Canada) and Canadian macroeconomic model Interface Module. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.	$_____
6	Modified US Regional or State Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 43 to Mandatory 57 of Table 1 of the statement of work.	$_____
7	ENERGY2020 (US) and US macroeconomic model Interface Module. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 43 to Mandatory 57 of Table 1 of the statement of work.	$_____
8	Linking of the Canadian and US integrated model to create a simultaneous integrated energy, emissions and economy model of North America. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 58 to Mandatory 64 of Table 1 of the statement of work.	$_____
9	Documentation of E3MC, E3US, E3NA. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 65 of Table 1 of the statement of work.	$_____
10	Maintenance, support and training. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 66 to Mandatory 73 of Table 1 of the statement of work.	$_____
11	Total of Items 1 to 10	$_____

TABLE 2	
ADDITIONAL LICENSES (beyond the 10 initial licenses)	
MAXIMUM ALL-INCLUSIVE LOT PRICE (Can $)	

Item #	Item Description	Firm all-inclusive lot price for 1 user in Can $ (A)
1	Canadian Modeling Solution (E3MC)	$_____
2	US Modeling Solution (E3US)	$_____
3	North American Modeling Solution (E3NA)	$_____

TABLE 3	
ANNUAL MAINTENANCE AND SUPPORT SERVICES FOR THE ADDITIONAL LICENSES	
MAXIMUM ALL-INCLUSIVE LOT PRICE (Can $)	

Item #	Item Description	Firm all-inclusive lot price for 1 user in Can $
1	Maintenance and support services for the Canadian Modeling Solution (E3MC)	$_____
2	Maintenance and support services for US Modeling Solution (E3US)	$_____
3	Maintenance and support services for North American Modeling Solution (E3NA)	$_____

TABLE 4	
PROFESSIONAL AND TRAINING SERVICES	
FIRM ALL-INCLUSIVE PER DIEM RATES (Can $)	

ITEM NO.	DESCRIPTION RESOURCE CATEGORIES	FIRM ALL-INCLUSIVE RATE During Contract Period
1	Senior Economist	$ _____ (A)
2	Economist	$ _____ (B)
3	Project Manager	$ _____ (C)
4	Software Programmer	$ _____ (D)

4.   At article c – Method of Payment for Firm Price – Milestone Payments of Article 7.8 of Part 7 of the RFP:

   DELETE: article c – Method of Payment for Firm Price – Milestone Payments; and

   INSERT: article c – Method of Payment for Firm Price – Milestone Payments, as follows:

(c) Method of Payment for Firm Price - Milestone Payments

   (i) Canada will make milestone payments in accordance with the Schedule of Milestones detailed in the Contract and the payment provisions of the Contract if:

      A. an accurate and complete claim for milestone payment using form PWGSC-TPSGC 1111 http://www.tpsgc-pwgsc.gc.ca/app-acq/forms/1111-eng.html and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract.

      B. all the certificates appearing on form PWGSC-TPSGC 1111 have been signed by the respective authorized representatives; and

      C. all work associated with the milestone and any deliverable required have been completed, delivered, and accepted by Canada.

   (ii) The schedule of milestones for which payments will be made in accordance with the Contract is as follows:

Milestone No.	Description	Firm Amount Percentage of item 11 of Table 1 of Annex B – Basis of Payment	Due Date
1	Licenses for 10 users of commercial off-the-shelf Canadian Provincial and Territorial Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirement of Mandatory 1 of Table 1 of the statement of work.	10%	
2	Licenses for 10 users of commercial off-the-shelf US Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirement of Mandatory 42 of Table 1 of the statement of work.	10%	
3	Modified Canadian Provincial and Territorial Macroeconomic Model.	20%	

			After completion and approval by the Technical Authority
	This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.		
4	~~ENERGY2020 (Canada) Modifications and Enhancement.~~ ~~This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.~~ [Intentionally deleted as per this solicitation amendment 001]	~~5%~~ N/A	
5	ENERGY2020 (Canada) and Canadian macroeconomic model Interface Module. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.	10%*	
6	Modified US Regional or State Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 43 to Mandatory 57 of Table 1 of the statement of work.	7%	
7	ENERGY2020 (US) and US macroeconomic model Interface Module. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 43 to Mandatory 57 of Table 1 of the statement of work.	6%	
8	Linking of the Canadian and US integrated model to create a simultaneous integrated energy, emissions and economy model of North America. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 58 to Mandatory 64 of Table 1 of the statement of work.	9%	
9	Documentation of E3MC, E3US, E3NA. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 65 of Table 1 of the statement of work.	2%	
10	Maintenance, support and training. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 66 to Mandatory 73 of Table 1 of the statement of work.	26%	

*   Intentionally modified as per this solicitation amendment 001 from 5% to 10%

5.   At Annex B – Basis of Payment of Part 7 of the solicitation:

        DELETE: Annex B – Basis of Payment; and

        INSERT: Annex B – Basis of Payment, as follows:

ANNEX B

BASIS OF PAYMENT

The Contractor will be paid in accordance with the following Basis of Payment for work performed pursuant to the resulting Contract, GST/HST (if applicable) extra.

TABLE 1 CANADIAN MODELING SOLUTION (E3MC), US MODELING SOLUTION (E3US), and NORTH AMERICAN MODELING SOLUTION (E3NA) MAXIMUM ALL-INCLUSIVE LOT PRICE (Can $)		
Item #	Item Description	Firm all-inclusive lot price in Can $
1	Licenses for 10 users of commercial off-the-shelf Canadian Provincial and Territorial Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirement of Mandatory 1 of Table 1 of the statement of work.	$_____
2	Licenses for 10 users of commercial off-the-shelf US Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirement of Mandatory 42 of Table 1 of the statement of work.	$_____
3	Modified Canadian Provincial and Territorial Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.	$_____
4	~~ENERGY2020 (Canada) Modifications and Enhancement.~~ ~~This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.~~ [Intentionally deleted as per this solicitation amendment 001]	~~$_____~~ N/A
5	ENERGY2020 (Canada) and Canadian macroeconomic model Interface Module.	$_____

	This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 2 to Mandatory 41 of Table 1 of the statement of work.	
6	Modified US Regional or State Macroeconomic Model. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 43 to Mandatory 57 of Table 1 of the statement of work.	$_____
7	ENERGY2020 (US) and US macroeconomic model Interface Module. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of all applicable Mandatory 43 to Mandatory 57 of Table 1 of the statement of work.	$_____
8	Linking of the Canadian and US integrated model to create a simultaneous integrated energy, emissions and economy model of North America. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 58 to Mandatory 64 of Table 1 of the statement of work.	$_____
9	Documentation of E3MC, E3US, E3NA. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 65 of Table 1 of the statement of work.	$_____
10	Maintenance, support and training. This item must cover all costs, activities and level of effort incurred by the Contractor to deliver the requirements of Mandatory 66 to Mandatory 73 of Table 1 of the statement of work.	$_____
11	Total of Items 1 to 10	$_____

TABLE 2		
ADDITIONAL LICENSES (beyond the 10 initial licenses)		
MAXIMUM ALL-INCLUSIVE LOT PRICE (Can $)		
Item #	Item Description	Firm all-inclusive lot price for 1 user in Can $ (A)
1	Canadian Modeling Solution (E3MC)	$_____
2	US Modeling Solution (E3US)	$_____
3	North American Modeling Solution (E3NA)	$_____

TABLE 3		
ANNUAL MAINTENANCE AND SUPPORT SERVICES FOR THE ADDITIONAL LICENSES		
MAXIMUM ALL-INCLUSIVE LOT PRICE (Can $)		
Item #	Item Description	Firm all-inclusive lot price for 1 user in Can $
1	Maintenance and support services for the Canadian Modeling Solution (E3MC)	$_____
2	Maintenance and support services for US Modeling Solution (E3US)	$_____
3	Maintenance and support services for North American Modeling Solution (E3NA)	$_____

TABLE 4		
PROFESSIONAL AND TRAINING SERVICES		
FIRM ALL-INCLUSIVE PER DIEM RATES (Can $)		
ITEM NO.	DESCRIPTION RESOURCE CATEGORIES	FIRM ALL-INCLUSIVE RATE During Contract Period
1	Senior Economist	$ _____ (A)
2	Economist	$ _____ (B)
3	Project Manager	$ _____ (C)
4	Software Programmer	$ _____ (D)

C.   RFP OTHER AMENDMENTS:

6.   <u>At article 7.6 (a) – Contracting Authority of Part 7 of the RFP:</u>

DELETE: article 7.6 (a) – Contracting Authority; and

INSERT: article 7.6 (a) – Contracting Authority, as follows:

(a)   **Contracting Authority**

The Contracting Authority for the Contract is:

Name: Nabil Ghaddab

Title: Supply Specialist
Public Works and Government Services Canada
Acquisitions Branch
Directorate: Informatics and Telecommunications Systems
                           Procurement Directorate
Address: 11 Laurier St., Gatineau, Québec
Telephone: 819-956-5419
E-mail address: nabil.ghaddab@tpsgc-pwgsc.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

7.   At any reference to Environment and Climate Change Canada (EC):

    DELETE: any reference to Environment and Climate Change Canada (EC); and

    INSERT: Environment and Climate Change Canada (ECCC).

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED