

*English (version française ci-dessous)*

**Position: Internship on coupling of economy-scale models**

**About ESMIA**

ESMIA Consultants offers cutting-edge expertise in 3E (energy-economy-environment) integrated system modelling since 2013. Our foundation is a rigorous scientific approach, guided by sophisticated mathematical models, to support decision-making for complex energy issues. More precisely, we:

- Develop custom energy system models from scratch for high-profile organizations worldwide.
- Provide trainings and support to clients wishing to develop their own energy system model.
- Offer advisory services on challenging problems using our proprietary models, including energy transition pathways with their impacts on electricity grids, energy tariffs, labor markets and GDP.

We carry out mandates for prestigious organizations on an urban, provincial/state, national, and global scale in North America and internationally. We continuously innovate to meet the evolving needs of decision-makers. Our modelling work has high impact and used for drafting climate action plans, preparing technological roadmaps, publishing energy outlooks and identifying energy security risks. More: [esmia.ca](http://esmia.ca).

**About the position**

We are looking for an internship who will contribute to the improvement of coupling between ESMIA proprietary models, NATEM (North American TIMES Energy Model) and NAGEM (North American General Equilibrium Model), in collaboration with modellers from different divisions.

NATEM is used to identify the least cost energy transition strategy and NAGEM projects the impacts of this energy transition on different socio-economic factors (such as GDP and unemployment). To establish the coupling between NATEM and NAGEM, it is necessary to create a correspondence (i.e., a mapping) between the different sectors of the two models. NATEM relies on energy availability and flow balances for both primary and secondary energy. The consumption data in these balances are organized by type of use, for example, consumptions in the agricultural sector, buildings, and transportation. This implies that similar types of economic assets are often classified into the same categories. On the other hand, NAGEM relies on resource and usage tables, where consumption and production factors are reported by economic sectors. Each economic sector consists of tangible assets (e.g., land, buildings, equipment, vehicles) and intangible assets (e.g., intellectual property, brands). The focus of this coupling is on tangible assets that consume energy to produce goods and services to meet demands (e.g., demand for heating in buildings or steel production). The coupling between NATEM and NAGEM involves creating a mapping between the databases of the two models to align the energy consumption from NATEM (in TJ) with the energy consumption from NAGEM (in volumes or dollars).

**Key responsibilities**

- Review and understand databases used in both models
- Develop the mapping methodology to connect sectors in NATEM and NAGEM
- Implement mapping methodology in code (Python)
- With support of NATEM and NAGEM modeller test and adjust the developed methodology
- Develop the support documentation

## Qualification

- Master's degree in engineering, science, mathematics or other quantitative disciplines
- Great motivation for data collection, treatment and analysis
- Excellent knowledge of Python
- Autonomy for problem solving and self-organization of work flows
- Excellent knowledge of French and / or English, both oral and written
- Knowledge of economy-wide energy system modelling approaches will be an advantage

## Conditions

- Secured internship fund from ESMIA, IVADO and Mitacs
- Academic partner GERAD.
- Internship duration 4 months full-time (between March 1<sup>st</sup> and August 31<sup>st</sup>)
- Based in Montreal with hybrid office/home formula

The chance to work in a fast-growing industry with a team of dedicated and beyond smart professionals developing sophisticated modelling products.

## How to apply:

Please send your CV and a short letter to:

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*ESMIA is committed to actively creating an inclusive workspace. We strive to attract diverse staff, to welcome you and to support your growth. Our goal is to respect your unique identity and experiences, while valuing the perspectives you offer.*

We accept applications until **February 28**.