

OUTSTANDING PROJECTS

Celebrating
35 Remarkable Years

ENERGY
EXPERTISE
EFFICIENCY



ECONOLER

www.econoler.com

OUTSTANDING PROJECTS

Celebrating 35 Remarkable Years



ECONOLER

www.econoler.com



© ECONOLER
160, rue St-Paul, bureau 200
Québec (Québec) G1K 3W1
CANADA

Téléphone : 418 692-2592
Télécopieur : 418 692-4899
www.econoler.com

Table of Contents

Introduction – A Word from the President	9
35 Years of Collaboration	11
OUTSTANDING PROJECTS CELEBRATING 35 REMARKABLE YEARS	14
Energy Efficiency Program Management, Canada (1992-1995)	14
Demand-Side Management Program Design, Mali (1996-1997)	16
Energy Service Company Startup, China (1997-1998) ..	18
Demand-Side Management Program Development and Implementation, Bahrein (1999-2001)	20
Energy Efficiency Building Code Design and Implementation, Sri Lanka (1999-2001).....	22
Energy Service Company Operation, Tunisia (1999-2005)	24
Energy Efficiency Improvement and Greenhouse Gas Emission Reduction Program Designs, Egypt (1999-2007).....	26
Minimum Energy Performance Standard Designs, Vietnam (2000-2003)	28
Energy Efficiency Sector Institutional Review, Peru (2002-2003)	30

Demand-Side Management Program Design and Implementation, India (2002-2005)	32
Energy Service Company Technical Assistance, Croatia (2004-2009)	34
National Energy Efficiency Fund Management, Bulgaria (2005 to ongoing)	36
Energy Efficiency Program Designs, Brazil (2006-2007)	38
Certified Measurement and Verification Professional (CMVP) Program Deployment, Canada and International (2006 to ongoing)	40
Energy Service Company Startup Support, Spain (2007-2008)	42
Municipal Building Energy Efficiency Improvements Using Energy Performance Contracting, Russia (2008-2009)	44
Daylight Saving Time and the Reduction of Work Time Impacts on Electricity Demand, Saudi Arabia (2008-2009)	46
Water Treatment Plant Energy Efficiency Program Design and Implementation, Caribbean and Central America (2009-2010)	48
National Energy Efficiency Program Design and Demonstration Project Implementation, Pacific Islands (2009-2011)	50
Energy Efficiency and Renewable Energy Credit Line Implementation Support, China (2009-2012)	52

Energy Conservation Law Design and Adoption, Uganda (2010-2011).....	54
National Public Building Energy Efficiency Program Technical Assistance, Canada (2010 to ongoing)	56
Municipal Incinerator Heat Recovery Initiative Design, Canada (2011-2015)	58
Utility Energy Efficiency Program Process and Impact Evaluations, Nova Scotia (2011 to ongoing)	60
Bioenergy Market Assessment, Canada (2012-2013)....	62
Regional Energy Efficiency Building Code and Energy Label Project for Lighting Product and Appliance Program Designs, Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo (2013-2017)	64
Energy Efficiency Program Process and Impact Evaluations, Canada (2014-2016).....	66
Residential Efficient Lighting and Appliance Project Impact Assessment, Mexico (2015)	68
National Energy Efficiency Action Plan Design, Armenia (2015)	70
National Energy Service Company Training Program Design and Delivery, Vietnam (2015-2016) ...	72
Energy Sector Monitoring and Evaluation System Design and Implementation Support, Guinea (2015-2016).....	74

Energy Efficiency Microfinance Program Design and Delivery, Paraguay (2015-2017).....	76
National Electricity Utilities Climate Change Adaptation and Mitigation Program Designs, Barbados, Belize, Dominica, Saint-Kitts and Nevis (2016)	78
Road Vehicle Fleet Energy Management Intervention Plan Design, Canada (2016-2017)	80
Morocco Public Lighting Transformation Program, Morocco (2016 to ongoing).....	82
Glossary of Acronyms	85



Introduction – A Word from the President

Dear Readers,

It is my great honour to introduce this publication marking Econoler's 35th Anniversary. In it we present 35 landmark projects carried out by Econoler over the years in Canada and around the world. Each project illustrates the breadth and depth of our firm's expertise in the energy efficiency and demand-side management sectors, projects that have greatly contributed to the fight against climate change since the early 1980s.

More than mere content for a glossy corporate brochure, these projects demonstrate the steady development of Econoler's expertise over more than three decades. We have grown from being known primarily as world class specialists in the use of Energy Performance Contracting to being recognized as one of the top consulting firms in all aspects of the energy efficiency and demand-side management sectors.

The projects presented in this publication further highlight how, from our early work in Canada, Econoler has undertaken a journey that has involved expanding our activities both in our national market as well as throughout the world. Econoler has carried out assignments in over 150 countries, covering all energy sources in all market sectors (residential, commercial, industrial, institutional, transport, utilities). We are humbled to have served so many markets and to have developed a comprehensive view of our sector through such rich experience.

This publication is meant as an expression of gratitude toward our clients, recognizing the trust they have placed in us. These clients range from energy users to governments and institutions, to multilateral and bilateral financing

organizations. They have allowed us to contribute to a broad range of initiatives over the years. Without them, we would not be what we are today.

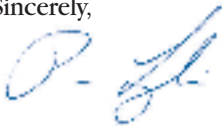
This publication is also our way of paying tribute to the exceptional staff of Econoler - former and current - who, more than anyone, have been responsible for our success. We are proud to have had the opportunity to collaborate with such remarkable people who have not only made significant contributions to our goals, but have enriched all our lives.

Econoler's activities over the last 35 years have allowed us to gain a stellar reputation as a consulting firm in the energy efficiency and demand-side management sectors. The firm takes pride in bringing its know-how and expertise to Canada, other OECD countries, as well as emerging and developing economies. We are proud of our past, even as we embrace and prepare to adapt to the future.

I hope you enjoy reading these pages knowing that Econoler is hard at work preparing for the next 35 years while remaining true to its core values:

EXCELLENCE – RESPECT – INNOVATION

Sincerely,



Pierre Langlois
President

35 Years of Collaboration

The Hôtel-Dieu de Québec, Centre hospitalier universitaire de Québec (CHUQ), Canada (1982-2017)

In 1982, Econoler signed its first agreement under the Energy Performance Contract (EPC) approach with one of the most important hospitals in Canada: the Hôtel-Dieu de Québec, the oldest hospital in Canada with many historic buildings. The project involved evaluating the hospital's energy efficiency improvement potential, as well as designing, financing and implementing a series of energy saving measures while guaranteeing that the savings generated would entirely pay back the investment within a maximum of five years. Since the remuneration of Econoler depended on generated savings and these had to be demonstrated on a monthly basis, Econoler elaborated a measurement and verification methodology, a first for this type of project in Canada, which generated more than 30% in energy savings before the end of the five-year deadline.

This project was so successful that the hospital maintained relations with Econoler for another 15 years, throughout which three additional phases were carried out consisting mainly of implementing additional energy saving measures, as well as developing both an intensive training program for operating personnel and an awareness-building program for hospital staff. Econoler acted as manager for all projects and as technical expert for other measures. It also conceived and developed management software for internal management purposes. Throughout the project, 20 energy efficiency measures affecting all electromechanical systems of the various hospital buildings were implemented. The hospital was thereby able to save more than \$10,000,000 in energy costs, which rendered the project one of the most profitable ever for the hospital.

In 1994, this project was granted the highest distinction award in energy efficiency bestowed by the Ministry of Energy, Mines and Resources of Canada. The project also received the award of merit from various contests in the province and from the Ministry of Health of Quebec.

Since 2010, the Hôtel-Dieu de Québec, known as the Centre hospitalier universitaire de Québec (CHUQ), entrusted Econoler with another technical assistance mandate involving the launch of a new energy service company (ESCO). The mandate included the creation and preparation of all required contractual documents (request for expressions of interest, call for tenders, contract), support in analyzing proposals, monitoring project implementation mostly for the purpose of verifying the measurement and verification plans of and reports on generated savings.

The long-term collaboration between the Hôtel-Dieu de Québec (CHUQ - public organization) and Econoler is a remarkable example of projects that generate significant savings through the implementation of energy efficiency measures and greenhouse gas emission reduction initiatives.

Outstanding Projects Celebrating 35 Remarkable Years

Energy Efficiency Program Management

Hydro-Québec, Canada (1992-1995)

In the early 1990s, Hydro-Québec launched a significant demand-side management initiative whose objective was implementing different energy efficiency programs in various market segments. This initiative led to the establishment of a vast subsidy program for the installation or modification of dual-energy heating systems (electricity and heat sources combined) for the residential sector of the Province of Quebec. This program essentially offered guarantees on installed units, subsidies to reduce acquisition costs, and a discount tariff to participants.

Hydro-Québec established the objective of reducing the electricity consumption of Quebec residences by installing more efficient systems and reducing demand spikes in its network by both turning off electric heating systems during periods of extreme cold and replacing systems that use other energy sources. The program led to 60,000 residential installations over three years with a total budget of CAD 150 million.

Hydro-Québec mandated Econoler, under a consortium of three Quebec enterprises including the firm's parent company at that time (ADS), to manage the largest subsidy program ever launched by the utility. Econoler immediately implemented a structure that offered very high-quality services to residential consumers and provided the highest reliability and performance standards of dual-energy systems compared to the required technical characteristics. This structure included, among others:

- A customer service approach that covered all program aspects;
- A marketing and public relations program;
- Training and certification of business owners and their employees on dual-energy systems;
- An adapted structure to manage subsidy requests;
- A quality assurance program of installations.

Less than two years after program launch, the objective of 60,000 installations was greatly surpassed. By the end of Econoler's mandate, more than 64,000 installations had been carried out, which enabled Hydro-Québec to generate significant peak demand savings.

Demand-Side Management Program Design

Énergie du Mali (EDM), Mali (1996-1997)

EDM, the national electricity utility of Mali, received support from the World Bank to improve efficiency of operations. One of the more ambitious components of this initiative aimed to evaluate the possibilities for demand-side management and energy efficiency throughout the country. The World Bank mandated Econoler to conduct a full study of electric energy consumption in Mali.

Econoler thus developed a strategy to gather reliable information from which quality conclusions could be drawn in a structured manner. This strategy included, among others:

- Audits on the transportation and electricity distribution networks, as well as the 15 largest and most energy-consuming EDM clients;
- Inspection of information in the EDM billing databases;
- Analysis of information gathered during an exhaustive survey of residential consumers;
- Examination of reports from visited commercial and institutional establishments.

These activities helped to precisely establish the quantity of required electric energy for various uses and building categories. Thereafter, Econoler revised the forecasted estimation of national energy demand and conducted a prospective study of large energy-intensive customers.

The data permitted Econoler to identify possible areas for intervention to control increases in energy demand, as well as foster the adoption of more energy-efficient products and habits that reduce energy consumption. Econoler recommendations concerned:

- Controlling technical losses in the transportation and distribution networks;

- Reducing non-technical losses and modifications to tariff grids;
- Implementing demand-side management programs as well as institutional and legal frameworks.

This was one of the first programs in Sub-Saharan Africa that targeted the development of a demand-side management approach and the evaluation of energy savings potential. By using the results obtained by Econoler, EDM established and launched initiatives that improved its efficiency and that of its clients.

Energy Service Company Startup

The World Bank, China (1997-1998)

In the early 1990s, China faced major increases in energy demand necessary to economic development. This situation caused significant problems in terms of both energy infrastructure and the environment. In collaboration with the China Policy Research Institute and the Beijing Energy Research Institute, the World Bank launched a project providing technical assistance to the public electricity utility of Henan province. The purpose of the project was to start up a subsidiary of the Henan utility that specialized in innovative financing and the implementation of energy efficiency projects, namely the Henan First Energy Service Company (HFESCO). HFESCO was the first Energy Service Company (ESCO) in China.

The World Bank mandated Econoler to provide the required support to carry out the project. Econoler analyzed the following:

- The regulatory and legal framework in effect;
- The public utility's management and administrative procedures, as well as project management methods;
- The possible financing mechanisms for end-user project implementation;
- The technical capacity to conduct energy audits and implement energy efficiency projects.

Econoler also carried out the following tasks:

- Conducted a market study to validate energy consumer interest in an added-value offer such as Energy Performance Contracting (EPC);
- Assessed the energy that could be generated through energy efficiency projects;
- Designed and implemented a training and support program for HFESCO senior personnel and management

to introduce them to the concepts of EPC and ESCO operations. The training also covered the process of financial planning and budgeting operations, as well as energy efficiency techniques and skills required to achieve and maintain desired outputs;

- Provided technical support to HFESCO in managing international requests for proposals to purchase cutting edge energy-efficiency equipment for project delivery;
- Established a three-year business development plan for the new ESCO in line with objectives and deadlines in terms of hiring, securing financing and acquiring the skills necessary to support the expansion and diversification of operations.

The work accomplished by Econoler opened up the market for developing ESCOs in China, a concept which underwent a major boom in subsequent years.

Demand-Side Management Program Development and Implementation

Ministère de l'Électricité et de l'Eau, Bahrein (1999-2001)

During the 1990s, the Kingdom of Bahrein experienced rapid growth in energy needs due to an active period of economic development. This growth placed significant pressure on electric networks which risked not meeting the energy demand of consumers.

Thus, the Ministère de l'Électricité et de l'Eau du Bahrein (Ministry of Electricity and Water of Bahrein) mandated Econoler to conduct an exhaustive study of the energy situation in the country and formulate recommendations on the eventual role of a demand-side management initiative to alleviate the situation.

Econoler therefore evaluated the energy demand and consumption profile for each type of usage and clientele. Energy audits were conducted in 25 model establishments across the country to gain proper understanding of the energy profile of different consumers. Combined with existing studies, the data helped establish precise consumption and power demand profiles for each electric equipment category.

Based on this data, Econoler also designed a significant number of demand-side and energy consumption reduction programs to achieve the objectives of minimizing both the load curve modulation of the country's electric utility and reducing annual electricity needs. The programs developed by Econoler involved:

- Introducing legislation allowing for the implementation of various proposed initiatives;
- Creating new standards to enforce the production, import and sale of efficient equipment;
- Introducing labelling programs to foster the purchase of energy-efficient equipment;

- Reducing technical losses in the network;
- Modifying pricing to transmit a more adequate price signal to clientele and render energy efficiency projects more appealing;
- Raising awareness among the population and disseminating information on efficient technologies;
- Carrying out demonstrations on the implementation of efficient technologies;
- Conducting large-scale awareness campaigns that promote the purchase of efficient equipment.

Technologies selected for the programs included efficient lighting, motors, variable-frequency drives, and cooling systems with an off-peak mode. In 2000, the first implementation phase of those measures offering the best technical performance was completed, which resulted in impressive savings.

Interestingly, the World Bank again called upon the services of Econoler in 2016 to design a new energy management program. The request enabled the firm to leverage its experience in the country throughout the course of the mandate.

Energy Efficiency Building Code Design and Implementation

Ceylon Electricity Board (CEB), Sri Lanka (1999-2001)

At the end of the 1990s, Sri Lanka experienced major increases in energy demand, which threatened the energy security of the country. To resolve this issue, the World Bank established an important initiative whose components included designing an energy efficiency building code.

The World Bank mandated Econoler to assist the CEB and the Ministry of Urban Development elaborate and implement the code. Firstly, Econoler recommended establishing both technical and training committees comprising members of the scientific community, construction industry, and engineering sector of Sri Lanka to involve them at the design stage of the code. These committees provided counsel and recommendations to the National Steering Committee on how to best implement the code to foster acceptance and adoption within the community.

Econoler then carried out the following tasks, which led to the development of a first draft building code adapted to the needs of Sri Lanka:

- Conducted a regional study to identify codes that could serve as reference. The Malaysian code was retained as the basis for the new code;
- Reviewed and compared the Malaysian code to the most recent version of the ASHRAE 90.1 building code, which was the worldwide reference for energy efficiency in buildings;
- Recommended changes in the Malaysian code to be able to use it as a foundation document for the subsequent code adapted to the needs of Sri Lanka;
- Determined the performance level to be included for each section of the code based on the socio-economic

context of Sri Lanka. A standard building in Colombo was modelled to serve as reference during the technical-economic evaluation of various improvements made to the different parts of the building. In parallel, historical meteorological data of the region were obtained from national data to finalize the code.

Thereafter, an initial version of the adapted code underwent a public consultation process. Econoler provided training and technical assistance to reinforce the institutional capacity of government bodies to enable them to eventually manage improvements to the code. Finally, an awareness campaign and a competition of the best building designs were launched to generate interest among the public, architects and engineers about the content and application of the code.

Econoler participated in one of the first large-scale initiatives to reduce energy demand in Sri Lanka. This initiative was very successful and has since permitted the country to significantly reduce energy consumption.

Energy Service Company Operation

The Tunisian Company of Electricity and Gas (STEG), Tunisia (1999-2005)

At the end of the 1990s, Econoler was the international diversification division of Hydro-Québec International (HQI) in the energy efficiency sector. Given the collaboration agreements between HQI and numerous electricity utilities throughout the world, the demand for energy efficiency services was increasing. In Tunisia, HQI, STEG and Econoler signed a partnership agreement in 1998 to thereby found and operate the very first Energy Service Company (ESCO) named STGE (the Tunisian Company of Energy Management). The ESCO was duly constituted under Tunisian law, of which Econoler owned 51% of shares while Tunisian banks owned the remaining 49%.

From 1999 to 2005, Econoler operated the ESCO whose activities were based on the Energy Performance Contract (EPC) approach that relied on shared or guaranteed savings mechanisms to test and determine which is the most adapted to the Tunisian context. As ESCO manager, Econoler was in charge of:

- Working with Tunisian institutional intervenors to resolve judicial and regulatory issues that limited or acted as barriers to the EPC approach;
- Designing and adapting not only an EPC model to the various markets, but also a measurement and verification protocol to demonstrate savings generated by projects;
- Promoting the EPC approach to potential beneficiaries;
- Hiring and training engineers and other experts to develop their skills in designing and implementing EPC projects;

- Working with financial institutions by presenting the EPC approach and elaborating adapted financing mechanisms to be used for various project types.

During the six years that it operated the ESCO, Econoler designed and implemented more than 40 projects in all Tunisian sectors. This achievement contributed to the introduction of the EPC approach, which became a recognized mechanism for implementing energy efficiency projects in the country, and opened up the ESCO market in Tunisia. Thereafter, Econoler progressively withdrew from STGE operations to allow local partners to take over.



Energy Efficiency Improvement and Greenhouse Gas Emission Reduction Program Designs

The United Nations Department of Economic and Social Affairs (UNDESA), Egypt (1999-2007)

During the 1980s and 1990s, Egypt experienced significant economic development which led to increased use of energy intensive devices and equipment in all economic sectors. With the financial support of the Global Environment Facility (GEF) and the United Nations Development Program (UNDP), the Egyptian Ministry of Electricity and Energy established an Energy Efficiency Improvement and Greenhouse Gas Reduction project (EEIGGR). UNDESA was placed in charge of managing the project.

Econoler was selected by UNDESA as one of the main technical assistance providers for the implementation of most initiatives undertaken through the EEIGGR project. Between 1999 and 2007, Econoler supported the development and implementation of a great many initiatives, such as:

- Introducing the EPC approach;
- Implementing an energy efficiency and energy consumption database;
- Establishing cogeneration tariffs;
- Designing energy efficiency equipment standards;
- Conducting a feasibility study on technology transfer for efficient lighting;
- Designing a partial-loan guarantee mechanism to finance energy efficiency projects of SMEs;
- Creating an energy conservation program for electric motors;
- Designing a measurement and verification protocol for energy efficiency projects under the EPC approach;

- Drawing up energy supply contracts with interruptible power option;
- Implementing a pilot project: Energy benchmarking for commercial and industrial operations.

The EEIGGR project was hugely successful and largely contributed to the demand-side management of energy in Egypt during the 2000s. Considered today as one of the greatest successes for this type of initiative, the establishment of a partial-loan guarantee fund to finance energy efficiency projects generated investments of USD 7.8 million, thus leveraging 20 times more than the total investment in the mechanism throughout the implementation period.

Minimum Energy Performance Standard Designs

Ministry of Industry and Commerce, Vietnam (2000-2003)

Significant economic growth and the weak penetration of energy-efficient equipment during the 1990s incited the World Bank to launch a vast load management program for the Ministry of Industry and Commerce (MOIT). A major component aimed to introduce Minimum Energy Performance Standards (MEPS) on the market. The program therefore initially targeted more efficient lighting systems and motors to establish the first two standards.

The MOIT mandated Econoler to design the MEPS to improve energy efficiency. Econoler thus carried out the following tasks:

- Designed and provided training on MEPS development procedures for energy-intensive equipment;
- Prepared job descriptions for each intervenor in the MEPS development process and an implementation schedule for both standards;
- Established a methodology and conducted a market study to determine the usage rate of target equipment types, their efficiency levels and current market penetration rates;
- Carried out technico-economic studies to determine the required efficiency rates for each type of equipment and acquisition surcharges thereof, as well as maintain an equilibrium to progressively introduce the new products in the country;
- Designed the standards and presented them to intervenors;
- Devised a plan to introduce the standards on the market. The plan included the participation of laboratories to validate equipment efficiency, training intervenors and a national communications plan to foster knowledge about the new standards.

Introducing these two new MEPS in Vietnam enabled the assessment of all the benefits the country could avail itself of thereto. Over the years, this initiative served as a precursor to many other initiatives, in which Econoler also participated, that reinforced existing MEPS and helped develop new standards for other products.



Energy Efficiency Sector Institutional Review

Ministry of Energy and Mines (MEM), Peru (2002-2003)

Throughout the 1990s, the Peruvian energy sector greatly developed and expanded without regard for either demand-side management, or the capacity of infrastructure to meet increased energy demand. This situation greatly pressured the government and the electricity utility.

Therefore, the Ministry of Energy and Mines (MEM) decided to assist the country in optimizing the use of the electricity network, controlling increases in energy demand and satisfying the energy needs of the population. The MEM mandated Econoler to conduct a study whose findings would serve to propose a plan for implementing policy and prescriptive measures and provide a framework for the development of the energy efficiency sector. Implementing these measures would not only encourage the expansion of an energy-efficient and sustainable market, but also consolidate the institutional framework and regulatory capacity to enable the efficient use of energy. The mandate consisted of the following activities:

- Carrying out an assessment of the energy context of Peru;
- Verifying results obtained in previous years through the implementation of energy efficiency measures in the electricity sector;
- Assessing energy efficiency improvement potential in the various electricity production and usage sectors.

To attain objectives, Econoler devised and carried out the following tasks:

- Proposed a legal framework for cogeneration operations (steam and electricity);
- Proposed regulations for a law promoting the use of energy efficiency;

- Proposed a structure to establish an energy services market, including ESCOs, for the commercial, industrial and institutional sectors;
- Elaborated a financing strategy for energy efficiency projects in accordance with the national financial system;
- Proposed modifications to or complementary legislation relative to:
 - Reduction of selective taxes on fuel for cogenerators and autogenerators;
 - Participation of electricity producers in the electricity market.

The results obtained allowed MEM to implement the first energy policy on the elaboration of measures to foster efficient electricity use and production, as well as the development of cogeneration projects. MEM was also able to adopt a structure that fostered the growth of the energy efficiency market.



Demand-Side Management Program Design and Implementation

Canadian International Development Agency (CIDA), India (2002-2005)

Under the auspices of Canada's commitments to the Kyoto Protocol, the Canadian Climate Change Initiative was established to encourage Canadian firms to submit proposals for initiatives aimed at reducing greenhouse gas (GHG) emissions in developing countries.

Econoler therefore proposed to CIDA that significant energy savings be generated by implementing a demand-side management (DSM) program in energy-intensive sectors whose energy prices were highly subsidized in the India economy. This approach involved working with electricity utilities to reinforce their capacity and involvement in developing and implementing energy efficiency measures. An agreement was signed with the Madhya Pradesh Electricity Board (MPSEB) to launch the program on its territory. Another agreement was signed with the India Renewable Energy Development Agency (IREDA) to finance the implementation of the measures.

Econoler selected agricultural pumping stations and public lighting in which to implement the developed measures, reduce energy consumption and generate savings. The main beneficiary of this project was the Government of Madhya Pradesh which would thereby reduce subsidies to electricity utilities that compensated for losses stemming from the sale of subsidized electricity. Awareness activities mobilized 12 Indian intermediaries to create permanent operations. A carbon financing mechanism was also created to improve the profitability of implemented projects.

This Econoler initiative led to the following results:

- Creation of a capacity building program on designing the DSM program and the carbon financing mechanism;
- Establishment of three DSM units within MPSEB;
- Capacity reinforcement of intermediaries in the energy efficiency field;
- Reduction of 39% in energy consumption, with a 27-month payback period for installed urban lighting modules. Municipalities benefitted from 20% of the savings during the payback period, and 100% thereafter;
- Efficiency improvements of 25% to 49% for projects in the agriculture sector (replacing electric pumps). Farmers reimbursed 35% of the cost over 24 payments using the savings generated thanks to a new invoicing mechanism;
- Creation of a sustainable energy efficiency fund.

This project was among the first in India that addressed the energy inefficiency problems in the agriculture and public lighting sectors. It also opened up the market to scaling up these types of initiatives in ensuing decades based on the approaches developed.

Energy Service Company Technical Assistance

HEP ESCO, Croatia (2004-2009)

In collaboration with the national electricity utility HEP, the World Bank launched an initiative whose aim was to reduce energy consumption in Croatia and establish an economically and ecologically sustainable market for the implementation of energy efficiency projects. Thus, a first Energy Service Company (ESCO) was founded and constituted as a subsidiary wholly owned by HEP. The ESCO was mandated to promote, develop and finance energy efficiency projects using a turnkey EPC approach. Clients could thereby benefit from improvements to their installations without having to invest directly, but rather reimburse the costs using the guaranteed savings generated by the ESCO. HEP ESCO mandated Econoler to support its start-up and implementation efforts for a period of four years.

During the first year, Econoler carried out the following tasks:

- Developed an initial business plan and trained the first ESCO staffers;
- Prepared work methods and necessary tools to ensure proper operations;
- Reviewed the organizational structure and roles of departments, as well as recommended changes necessary to enable ESCO growth;
- Elaborated a partner program for preferred ESCOs;
- Developed a demand-side management program to support the new HEP ESCO.

During the second year, Econoler supported HEP ESCO by carrying out the following tasks:

- Supported and guided the team in sales, marketing, contract negotiation, engineering and project management activities;

- Implemented a measurement and verification of savings protocol;
- Developed a project financing mechanism and reviewed ESCO profitability;
- Recruited personnel and developed partnerships with local businesses;
- Revised project management strategies and trained employees;
- Provided strategic advice and support for ESCO growth.

HEP ESCO had already implemented more than 20 projects upon commencing its third year of operation and held a well-stocked sales backlog for the years to come.

In part thanks to Econoler support, HEP ESCO won the prestigious Best Energy Service Provider Award in 2007 bestowed by the European Energy Service Award (an initiative that offers a promotional platform for European energy services). Over the years, HEP ESCO has distinguished itself through its exceptional developmental achievements and successes in providing energy services in support of energy efficiency in Croatia.

National Energy Efficiency Fund Management

Ministry of Energy of Bulgaria (2005 to ongoing)

With support from the World Bank, the Government of Bulgaria established the Bulgarian Energy Efficiency Fund (BgEEF) in 2004. Seed capital included a USD 10 million subsidy from the Global Environment Facility (GEF), EUR 1.5 million from the Government of Austria and USD 170,000 from private donors. The main objective of BgEEF was to facilitate energy efficiency (EE) investments and foster the development of the EE market in Bulgaria by eliminating financing barriers.

A consortium led by Econoler and constituted by two Bulgarian enterprises was selected to manage BgEEF under the auspices of a private-public partnership. In the six months pursuant to start-up, BgEEF was fully operational and launched its first financial products. One year later, the first project pipeline was successfully financed and the Fund thus established a solid portfolio of projects. In 2006, BgEEF signed many financing partnership agreements with local banks and thus financed projects for a total worth of USD 1.5 million. That same year, the Bulgarian Energy Efficiency Agency granted BgEEF the title of the Number 1 Specialized Financial Institution for Energy Efficiency Financing.

In 2007, BgEEF became the premier financial backer for EE projects in the Bulgarian public sector. In that same year, the World Bank awarded it the distinction of Highly Satisfactory Activity (or Best Practice) whose Design and Implementation Should be Disseminated Internationally. After a highly successful start-up and deep market penetration of its direct loan products, the BgEEF launched a new innovative product for energy efficiency partial credit guarantees.

In 2008, the World Bank named BgEEF a Highly Satisfactory Activity for the second time. The Fund also launched a guarantee on the first five percent in losses in the EE portfolio

aimed at guaranteeing the debts of Bulgarian ESCOs. This product proved opportune, very effective and well adapted to the target market.

From 2005 to 2016, BgEEF granted EE loans to 160 projects for a total investment of more than USD 45 million. Moreover, the Fund approved partial credit guarantees and portfolio guarantees to 32 projects for a total investment of USD 15.5 million. With only USD 15 million as seed capital, BgEEF has so far generated more than USD 60 million in EE investments in Bulgaria. As of 30 June 2013, investments and guarantees provided by BgEEF have contributed to annual savings of 92,372 MWh/year (USD 9.6 million/year) and 74,000 kt/year of CO₂ equivalent.

Energy Efficiency Program Designs

United Nations Development Program (UNDP), Brazil (2006-2007)

Through the UNDP, the Government of Brazil requested that the Global Environment Facility (GEF) and the Montreal Protocol combine efforts to launch a program aimed at eliminating barriers to the implementation of energy efficiency (EE) investments for buildings in the public and private sectors. These barriers were encountered at the decision-making level and when financing EE investments. The objective of this program was to facilitate project implementation in the country while maintaining the application of the Montreal Protocol. It also served to ease the replacement of centrifugal chillers containing chlorofluorocarbons (CFCs) by new efficient units that do not use CFCs.

The UNDP therefore mandated Econoler to lead the development of an innovative approach to help eliminate barriers linked to developing EE in the Brazilian commercial sector. To attain objectives, a team of Econoler experts conducted field missions in the country to identify the barriers to the market and develop a program to overcome said barriers.

This project included many activities carried out thanks to both national and GEF funds. Activities included:

- A technical assistance program for the development, identification, structure, implementation and management of EE projects in the buildings sector;
- An initiative for public buildings to foster and support the use of energy service companies (ESCO) in Brazilian buildings;
- A fund specialized in co-financing, on a demonstrable basis, the replacement of existing chillers by more efficient units for all types of buildings;

- The development of a technical performance partial guarantee mechanism to offer banks and end users a guarantee on the performance of ESCO projects.

In conclusion, the Econoler mandate included the design of a detailed program which was used by the UNDP to negotiate with the country and obtain approval of projects from the various financial backers.

The project was intended to secure both technical approval from the UNDP and financing from the GIF and Montreal Protocol to enable program implementation.



Certified Measurement and Verification Professional (CMVP) Program Deployment

Efficiency Valuation Organization (EVO), Canada and International (2006 to ongoing)

EV O, in collaboration with the Association of Energy Engineers (AEE), founded a CMVP certification based on the International Performance Measurement and Verification Protocol (IPMVP). The CMVP program aims to train and recognize the most qualified professionals in the field of measurement and verification of energy savings and increase the level of professional skill in this vital sector to the development of energy efficiency markets. Until the mid-2000s, the CMVP was mostly offered in North America. Through its subsidiary, the International Institute of Energy Training (IJET), Econoler entered into a partnership with EVO to expand the certification to the international market.

Econoler and IJET delivered the first training in Europe (France) in 2006. The initiative was an immediate success with more than 125 experts from various European countries attending the training and applying for certification. On the basis of this success, IJET launched a broad initiative to promote the certification program, which permitted EVO to establish itself in the following countries:

- Europe: Austria, Belgium, Cyprus, Croatia, Spain, France, Italy, Ireland, the Netherlands, Portugal, Russia, and Switzerland;
- Latin America: Brazil, Chile, Mexico, and Uruguay;
- Asia: India, Malaysia, the Philippines, Singapore, Thailand, and Turkey;
- Middle East: United Arab Emirates.

By sitting on EVO committees, Econoler contributed to elaborating the revised program, improving both the training material and adaptation procedures of IPMVP methods to render the CMVP program more appealing to all. More

than 1,500 experts were trained under the program in the ensuing ten years. Pursuant to establishing numerous strategic partnerships in many countries thanks to the support of IJET, EVO disseminated this impressive training and certification program worldwide, thereby enabling the CMVP certification to achieve significant international recognition.



Energy Service Company Startup Support

Union Fenosa, Spain (2007-2008)

In 2007, Union Fenosa was one of the largest electric utilities in Spain. To diversify operations and offer value-added services, the utility founded an Energy Service Company (ESCO) with the intention of building it up as the largest business of its kind in Spain.

Union Fenosa mandated Econoler to start up the ESCO and support its operations in developing and implementing projects in the commercial, municipal, industrial and hospitality sectors in Spain. These projects aimed at helping clients remain competitive while generating profits thanks to realized energy savings. Econoler appointed a full-time expert for two years to reinforce the ESCO team capacity to identify, design and implement energy efficiency projects under the EPC approach. Econoler thus provided support on technical, financial and operational aspects of the business. More specifically, Econoler carried out the following tasks:

- Devised an ESCO business development plan;
- Designed projects and respective implementation plans;
- Established a marketing plan;
- Reinforced capacity for the EPC approach;
- Prepared various types of agreements adapted to client needs;
- Assessed and defined project risk mitigation strategies;
- Elaborated measurement and verification plans for savings generated by projects;
- Conducted sensitivity and financial viability tests of projects according to the specific characteristics of target organizations.

With the support of Econoler, the new ESCO rapidly filled a sales backlog comprised of 33 hotels that served as

pilot projects. For these, Econoler carried out the following activities:

- Design of measures to be implemented;
- Turnkey implementation of energy-efficient systems;
- Development and implementation of adapted financing;
- Maintenance of installed systems;
- Continuous monitoring of project performance;
- Measurement and verification of generated savings.

At the end of the mandate, the ESCO attained its objective of becoming the most active ESCO in Spain. More than 30 projects were carried out in less than two years and a significant sales backlog ensured good growth in ensuing years.



Municipal Building Energy Efficiency Improvements Using Energy Performance Contracting

European Bank for Reconstruction and Development (EBRD), Russia (2008-2009)

Energy efficiency improvements in municipal buildings in Russia are an important area of support for developing the country and reducing greenhouse gas (GHG) emissions. However, many barriers were identified to implementing such projects. Thus, EBRD launched an initiative aiming to support the creation of an approach based on Energy Performance Contracting (EPC) in the Russian municipal sector.

The EBRD retained the services of Econoler to develop an approach which called for private sector financing to implement projects in municipal buildings. Econoler carried out many activities in support of the local team of experts to identify solutions and the best means for applying this concept to all Russian cities. Therefore, Econoler worked on a pilot project for the city of Surgut where the following tasks were carried out:

- Determined the range and possibilities of ESCO services to meet the needs of the municipal sector;
- Assessed the energy efficiency improvement potential in the municipal sector;
- Evaluated the existing commercial, financial and legal frameworks for the implementation of EPC projects: existing laws and regulations; types of agreements; financing methods;
- Examined public procurement practices and procedures, the manner in which these procurement laws and their application foster public-private partnerships at the municipal and regional levels, as well as advantages and disadvantages of said practices;

- Reviewed municipal and local authority regulations on budget allocations;
- Analyzed the Surgut technical services sector and its capacity to manage the EPC approach;
- Identified functional financing mechanisms for the implementation of EPC projects, particularly for a pilot project in Surgut;
- Designed contractual templates for EPC projects that respect not only the requirements of legal frameworks and budgets, but also existing technical and financing capacity, as well as ascertained the most adapted to EPC implementation in Russian municipalities.

At the end of the mandate, Econoler provided the EBRD a contractual template adapted to the Russian context to implement energy efficiency projects in municipalities.



Daylight Saving Time and the Reduction of Work Time Impacts on Electricity Demand

Ministry of Water and Electricity of Saudi Arabia, Saudi Arabia (2008-2009)

Saudi Arabia faced significant increases in energy demand. Rapid population and economic growth were the main causes of increased electric energy demand in Saudi Arabia. According to estimates by the Ministry of Water and Electricity, the national need for energy production capacity could reach 66,400 MW by 2023 in an uncontrolled context, although capacity was 32,240 MW in 2008. The commercial and institutional sectors represented 25% of energy consumption and 60% of air conditioning needs, which had a profound impact on peak demand.

The ministry mandated Econoler to assess the impact of two measures that could be rapidly implemented in the industrial sector to abate increases in energy demand, namely: (1) applying Daylight Saving Time; and (2) reducing work time during summer. To carry out this mandate, Econoler designed and implemented a structured approach which included the following tasks:

- Assessed production, transmission and distribution costs of electricity in summer;
- Analyzed demand during the peak period segmented by activity sector;
- Evaluated the feasibility of the two measures and the receptiveness of intervenors thereof;
- Evaluated the main advantages of Daylight Saving Time and the required adjustments to permit the implementation of recommendations;
- Assessed the economic impacts of both measures and optimized their application;

- Recommended how to implement the two measures and coordinated the activities thereto.

The work of Econoler demonstrated that potential energy savings resulting from the implementation of both measures represented between 0.3% and 1.5% of total national consumption, depending on the implementation environment, mode of application and reduction in number of hours worked during peak demand periods. Such reductions could be accomplished at low cost, thereby ensuring a good return on investment for the Saudi Government.

Water Treatment Plant Energy Efficiency Program Design and Implementation

Inter-American Development Bank (IDB), the Caribbean and Central America (2009-2010)

Most Caribbean countries are major net energy importers and largely dependent on fuel imports. They have limited primary energy resources (hydrocarbon and hydroelectricity) and their energy consumption is characterized by complex physical energy procurement due to the geographic dispersion of islands and weak economies. At the end of the 2000s, the base energy cost and demand for water sanitation services increased significantly. Much of the infrastructure was dilapidated, which led to losses and a weak level of energy efficiency in their power grids.

IDB identified a need to assist these countries in evaluating the energy efficiency potential of water treatment plants and implementing projects. Econoler was thus mandated to conduct a study for the development of an energy efficiency action plan that would benefit water treatment plants in the following countries: The Bahamas, Barbados, Costa Rica, Guyana, Haiti, Honduras, Panama, Suriname, Jamaica, and Trinidad and Tobago. The mandate consisted of carrying out the following tasks:

- Reviewed all existing energy efficiency studies in the water treatment sector;
- Identified potential energy efficiency improvements in each facility;
- Designed an adapted program aimed at tapping into the full energy efficiency potential of water treatment plants, notably by:
 - Reinforcing capacity;
 - Implementing energy management programs;

- Implementing energy efficiency measures;
- Establishing a preventive maintenance program.
- Elaborated a methodology to help businesses self-evaluate efficiency in their facilities and determine which energy efficient technologies and practices to adopt and use;
- Organized a regional workshop to disseminate the results of the technical collaboration and facilitated exchanges among water treatment plants about their respective experiences in the energy efficiency sector.

This project was very successful with water treatment plants. It helped them identify areas to quickly realize savings without investing and permitted them to implement profitable investment programs. Thereafter, a few countries also benefitted from loans and financial support to implement Econoler recommendations.



National Energy Efficiency Program Design and Demonstration Project Implementation

Asian Development Bank (ADB), Pacific Islands (2009-2011)

The Pacific Islands region is greatly dependent on oil imports to meet energy needs and very vulnerable to fluctuations in the market price of oil. At the end of the 2000s, high carbon and electricity costs severely strained the economy of the region. ADB therefore decided to help five countries in the Pacific Islands (Cook, Papua New Guinea, Samoa, Tonga, and Vanuatu) reduce their excessive energy consumption in various economic sectors by promoting energy efficiency. ADB aimed to promote energy efficiency as the main means to reducing costs, as well as the economic and environmental risks linked to excessive energy consumption. The purpose was to increase energy security and develop effective energy efficiency policies and project implementation models.

ADB mandated Econoler to offer the necessary technical assistance which included four main tasks:

- Assessed energy efficiency potential;
- Developed and implemented energy efficiency policies and regulations;
- Designed energy efficiency projects;
- Implemented structuring projects in target countries.

Firstly, Econoler experts identified and proposed modifications to national energy efficiency policies, strategies, programs and initiatives in progress. These changes aimed to eliminate fiscal, financial, regulatory, commercial, technical barriers, as well as obstacles to information dissemination. Thereafter, the Econoler team reinforced the capacity of target

countries such that they could overcome barriers by adopting proposed recommendations.

More specifically, Econoler carried out the following tasks in target countries:

- Devised a portfolio of projects aimed at generating energy savings that could be financed or co-financed by ADB, or other sources;
- Supported the implementation of identified priority projects throughout the mandate.

To maximize impacts of the technical assistance provided, Econoler set up an office in Fiji and assigned a project director for a period of two years. At the end of the mandate, ADB obtained co-financing of USD 5.2 million from GEF and USD 5.5 million from local partners. The financing permitted participating countries to significantly invest in the implementation of energy efficiency projects and benefit greatly from their respective savings, on top of reducing GHG emissions and protecting the environment.

Energy Efficiency and Renewable Energy Credit Line Implementation Support

KfW/EximBank of China, China (2009-2012)

The German Development Bank, KfW, launched a broad initiative to implement energy efficiency and renewable energy projects in China and reduce its dependence on carbon and oil, as well as reduce the significant GHG emissions thereof. KfW wanted to establish a co-financing program for clean energy projects through a line of credit totalling EUR 75 million. These funds, provided by the Ministry of Finance of China, were entrusted to the EximBank of China which acted as the program implementation agency. An amount of EUR 800,000 was allocated for technical assistance to reinforce the capacity of the bank and its existing or potential clients, as well as to support activities to implement the credit line as originally structured by KfW.

Econoler was selected to deliver the technical assistance over a period of two years. The firm therefore assigned two experts to Beijing to carry out the following tasks:

- Designed additional credit products for the implementation of energy efficiency and renewable energy projects;
- Developed financing request and project assessment instruments for effective review of financing options;
- Designed a monitoring and evaluation mechanism for financed projects;
- Preselected loan requests according to admissibility criteria;
- Evaluated the technical and financial feasibility of investment proposals;
- Reinforced the capacity of bank personnel to assess projects through training workshops adapted to their needs;

- Assisted borrowers in analyzing their projects, choosing GHG reduction measures and attaining objectives by guiding them in not only developing projects and proposals for final approval by the EximBank of China, but also carrying out preliminary or detailed audits;
- Created and applied a measurement and verification savings plan for each project;
- Developed an operations manual for fund managers.

Moreover, Econoler established a team of 14 local energy efficiency and renewable energy experts to help clients of the bank structure projects. The Bank and the initiative were very effective at leveraging KfW funds. Loans were financed using only five percent of funds from the credit lines, while 95% of the funds came from the Bank. For each project, clients had to provide 30% of capital. This leverage effect was made possible thanks to the determination of the Bank to fully benefit from the support provided by Econoler.

Econoler successfully supported the EximBank of China in selecting, evaluating and financing projects for a total of USD 1.8 billion, thus surpassing KfW expectations.

Energy Conservation Law Design and Adoption

*Ministry of Energy and Mineral Development (MEMD),
Uganda (2010-2011)*

To reduce the disparity between energy supply and demand in the electricity sector and offer efficient energy saving solutions to consumers, the Government of Uganda proposed the implementation of energy efficiency and demand-side management programs. The government received a donation from the World Bank to enlist the services of a firm specialized in the energy efficiency sector to carry out the mandate of developing the first stage of the process, namely designing an energy conservation law that would be adopted.

To help draft the legislative and institutional frameworks, MEMD mandated Econoler to provide the technical assistance necessary to adopt the first energy conservation law of the country. Econoler thus carried out the following tasks:

- Studied a comprehensive report on the legal principles to be included in the law and analyzed Ugandan law as well as that of neighbouring countries;
- Reviewed in detail the existing Ugandan energy efficiency strategy;
- Carried out initial consultations with various key intervenors to collect relevant information to identify barriers and solutions for developing appropriate legislative measures in the energy conservation sector;
- Prepared draft legislation of the energy conservation law;
- Organized a consultative workshop for the main intervenors to present the draft legislation and obtain comments to improve the bill;

- Prepared the improved draft legislation with explanatory notes outlining identified problems and proposed methodologies to resolve issues in the corresponding regulations;
- Prepared the final bill to be submitted to Parliament for approval;
- Provided support during the bill adoption process.

With the support of Econoler, the Government of Uganda approved its first energy efficiency law and thus achieved the first milestone in developing this sector in the country. Econoler also contributed to reinforcing the capacity of various government intervenors in the field of energy conservation and raising awareness among different stakeholders as to the importance of this new law which laid out the next steps of this broad initiative aimed at reducing energy consumption in the country.

National Public Building Energy Efficiency Program Technical Assistance

*Natural Resources Canada (NRCan), Canada
(2010 to ongoing)*

The Federal Buildings Initiative (FBI) of the Government of Canada is a voluntary program that facilitates the implementation of energy efficiency projects under the Energy Performance Contract (EPC) approach in government buildings. It helps federal organizations reduce their water and energy consumption, as well as greenhouse gas (GHG) emissions.

Created and administered by the NRCan Office of Energy Efficiency, the FBI enables federal organizations to implement projects under EPCs concluded with specialized firms without using their own capital funds. It offers adapted support to technical staff through a comprehensive program that provides technical, organizational and contractual support to implement energy efficiency projects based on a turnkey approach. Since its launch in 1995, the initiative has improved the energy performance of thousands of federal buildings by enhancing work environments, reducing GHG emissions and generating millions of dollars in savings.

Since 2010, Econoler has been providing technical assistance services to NRCan for a great number of projects, including the following:

- Support to five Health Canada establishments in producing requests for proposals intended for ESCOs, selecting winning bids and negotiating agreements (2010-2011);
- Evaluation of the potential of ESCO projects for sites managed by Environment Canada (2012-2013);

- Support services to the Royal Canadian Mounted Police in assembling requests for proposals intended for ESCOs, selecting a firm and negotiating agreements (2013-2104).

Econoler thus enabled the Government of Canada to implement a great number of energy efficiency projects under the FBI and generate significant energy and monetary savings.



Municipal Incinerator Heat Recovery Initiative Design

City of Quebec, Canada (2011-2015)

For more than 20 years, the City of Quebec had been operating a municipal incinerator whose vapour residue was sold to a local pulp and paper business. Pursuant to a drop in production, the business' vapour needs decreased significantly, resulting in a vast untapped sales potential for the City. In April 2011, the City of Quebec selected Econoler, at the head of a consortium, to conduct an opportunity study and a detailed feasibility study to efficiently exploit the theretofore incinerator energy losses.

The first stage consisted of conducting the opportunity study which involved:

- Collecting, analyzing and revising previous pertinent studies;
- Establishing preferred contextual scenarios in evaluating the various options;
- Proposing technical, economic, social and environmental solutions;
- Recommending the best solution.

The City retained the option of installing a district heating network and the ensuing detailed feasibility study concerned the following:

- Identifying potential clients;
- Estimating construction and operating costs;
- Examining the applicable regulatory framework and identifying potential barriers to implementation;
- Selecting a business model that would maximize economic impacts;
- Preparing an agreement for the sale of excess vapour;
- Assessing project profitability by establishing a methodology that factors in the context, business model

and objectives of the City's clients, determining the fee structure to be applied and quantifying the potential risks and savings for each;

- Determining the potential GHG emission and water consumption reductions, as well as evaluating the risk of the project being rejected;
- Formulating recommendations to help the City choose the optimal solution.

In 2015, the City of Quebec once again mandated Econoler to update the feasibility study to factor in the following: the residual waste management plan of the Communauté métropolitaine de Québec — Rive-Nord; the Regulation Respecting the Recovery and Reclamation of Products; the commercial, residential and institutional projects announced for the district heating network; and finally the resumption of incinerator operations by the City. The reviewed project included a vapour network, a hot water network and cogeneration units.

Thanks to the results of these studies, the City of Quebec obtained an overview of the stakes and was able to make an informed decision on the recovery of vapour produced by the incinerator.



Utility Energy Efficiency Program Process and Impact Evaluations

Efficiency Nova Scotia (ENS), Nova Scotia (2011 to ongoing)

ENS demand-side management (DSM) programs provide a wide array of incentives for the implementation of diverse energy efficiency measures in the residential, commercial and industrial sectors. These include purchase incentives, instant and mail-in rebates, free residential energy audits, household consumption analysis reports, free appliance replacement and disposal, fuel substitution, conducting feasibility studies and adopting a personalized approach for main industrial and commercial consumers. Since 2008, Nova Scotia energy efficiency programs have been evaluated annually by an independent consultant.

Econoler was mandated to conduct independent annual evaluations of the processes and impacts of 15 ENS DSM programs for the 2011-2018 period. The main objectives of the mandate were as follows: evaluate the effectiveness of program design and implementation (determine whether programs were carried out in accordance with established deadlines for installing and activating appliances); as well as calculate gross/net energy and demand savings.

Throughout the mandate, Econoler carried out a great number of tasks, including the following:

- Reviewed the logical models of each program;
- Conducted surveys with participants, builders, and participating retailers on the instant rebates program;
- Carried out on-site visits to verify equipment installation and operating conditions;
- Thoroughly analyzed the database of each program and researched secondary data to estimate the size of the energy-efficient products markets;

- Reviewed unitary savings for all admissible energy efficient products;
- Analyzed billing to verify the heating consumption of participants;
- Analyzed interactive effects;
- Developed algorithms to measure net-to-gross ratios (free-ridership, etc.);
- Calculated gross and net savings for each program;
- Prepared separate reports outlining the nonelectric savings for seven programs;
- Assessed the impacts of codes and standards adopted in Nova Scotia that target reducing energy consumption.

As a result of these evaluations, Econoler demonstrated that ENS programs generated net annual energy savings of approximately 140 GWh, while program components financed by the Province of Nova Scotia generated net annual non-electric energy savings of approximately 240 GJ. These results convinced provincial authorities of the legitimacy of the programs.



Bioenergy Market Assessment

The Ministry of Natural Resources of the Province of Quebec (MRN), Canada (2012-2013)

In 2006, the Quebec government adopted an energy strategy for the 2006-2015 period aimed at ensuring, among other things, the province's energy independence. As part of its energy strategy, Quebec emphasized the development of the energy efficiency and renewable energy sectors. To help reduce greenhouse gas (GHG) emissions by replacing fossil fuels with bioenergy, the Ministère des Ressources naturelles (MRN) started to assess the technico-economic potential of various bioenergy sectors in the Province of Quebec. The MRN thus hired Econoler to conduct this study.

To fulfill this assignment, Econoler carried out the following activities:

- Identified the reliable sources of information to collect the data required to carry out this project;
- Identified all bioenergy production and conversion technologies and determined their respective stages of development;
- Determined the short and medium-term market opportunities for each bioenergy sector;
- Analyzed the market potential of each sector;
- Assessed the potential environmental impacts of the studied bioenergy sectors;
- Estimated the required investments and the annual operating costs, as well as the potential revenues to be generated in the studied sectors to determine profitability and payback periods;
- Quantified the potential GHG reductions and costs of the studied sectors;

- Conducted a comparative analysis of Quebec's bioenergy sectors and existing bioenergy sectors outside the province to characterize the competitive environment in which they evolve;
- Provided recommendations based on three scenarios (short, medium and long term) for deploying bioenergy solutions to replace fossil fuels in Quebec's various economic sectors;
- Provided recommendations for all studied bioenergy sectors on actions to be taken to facilitate their emergence or establishment.

Econoler presented the results of this study to the Ministère des Ressources naturelles through reports and an oral presentation. These reports were submitted to the ministry to help develop and implement major initiatives involving emerging renewable energy sources in Quebec.

Regional Energy Efficiency Building Code and Energy Label Project for Lighting Product and Appliance Program Designs

REEEP, OIF and WAEMU, Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo (2013-2017)

Given its many activities in West Africa and the experience gained thereof, Econoler launched a broad initiative to implement two projects:

- Regional energy labelling project for lighting products and appliances;
- Design and implementation of a regional building code.

Econoler presented both projects to many intervenors, namely the West African Economic and Monetary Union (WAEMU), the Renewable Energy and Energy Efficiency Partnership (REEEP), and the Institut de la Francophonie pour le développement durable (IFDD), to secure their support. All three intervenors approved the initiative and concluded an agreement with Econoler to carry out the initiative. Over a period of four years, Econoler implemented two projects by conducting activities in eight WAEMU member states, which included the following tasks:

- Buildings Code:
 - Analyzed barriers and possible improvements to energy efficiency in buildings;
 - Evaluated existing institutional frameworks;
 - Established optimal design criteria of buildings and evaluated the economic viability thereof;
 - Elaborated a model regional energy efficiency code for new buildings;
 - Structured and delivered regional training workshops for project leaders, public agencies and other players in the construction sector;

- Supported the launch of an awareness campaign on the use and potential benefits of the code.
- Energy Label:
 - Established regional standards and drafted national texts for an appliance energy label;
 - Created a national network of experts and decision-makers capable of converting the dispositions of the regional directive into national legislation;
 - Conducted market studies on appliances and quantified social, economic and environmental impacts;
 - Conducted national studies on the implementation of monitoring, verification and application programs, as well as on the complementary national policies and mechanisms for supply and demand incentives;
 - Developed a training program for commercial inspectors, customs officers, importers and appliance distributors.

Once adopted and implemented, the model regional energy efficiency code and labelling program would result in sustainable reductions in energy consumption and GHG emissions in WAEMU countries.

Energy Efficiency Program Process and Impact Evaluations

Independent Electricity System Operator (IESO), Canada (2014-2016)

Approximately 200 companies account for over 50% of the total electricity consumption in Ontario's industrial sector. They are all considered large electricity consumers. Approximately one quarter of these large electricity consumers are connected to Ontario's high-voltage transmission system, while the remaining large consumers are connected to local power distributors. To help industrial enterprises that wish to reduce their energy consumption, the Independent Electricity System Operator (IESO) launched the Industrial Accelerator Program (IAP), the Process and Systems Upgrades (PSU) program, the Energy Managers program and the Monitoring and Targeting (M&T) program.

Econoler was mandated to evaluate these for the 2013 to 2015 program years. The evaluation of pilot programs was thereafter added to the 2015 evaluation assignment. Econoler evaluated both the process and impacts of said programs. To complete this assignment, Econoler carried out the following tasks:

- Conducted interviews with the staff in charge of IESO programs;
- Designed survey questionnaires, interview guides and sampling plans for conducting surveys and in-depth interviews;
- Collected data among participants, nonparticipants, partial participants, trade allies, technical reviewers and local power distributors;
- Analyzed the data collected to evaluate program designs and identify opportunities to improve program processes;

- Performed benchmarking against similar programs run by other provinces or American states to corroborate the findings of this process evaluation;
- Calculated the gross and net savings as part of the impact evaluation, as well as the additional savings generated through participation in enabling activities; and
- Estimated the total resource cost (TRC) and the program administrator cost (PAC).

This evaluation project also helped determine other benefits and effects associated with the IAP and PSU, including direct employment effects and other socio-economic benefits. Furthermore, Econoler assessed the possibility for the IESO to align its industrial-sector energy efficiency programs with the requirements of the ISO 50001 standard.

As a result of this evaluation, Econoler provided the IESO with not only an account of the effects of its programs, including precise estimates of energy and demand savings, but also the capacity to continuously improve its programs to ensure program effectiveness.

Residential Efficient Lighting and Appliance Project Impact Assessment

SENER, Mexico (2015)

The World Bank supported numerous activities aimed at both encouraging innovation and installing new energy-efficient technologies in the residential sector. Therefore, the Government of Mexico established a broad program whose objective was improved energy efficiency, the Efficient Lighting and Appliance Project (PEE by its Spanish acronym), which is part of the Clean Technology Fund investment plan of Mexico. From May 2011 to September 2012, Component 1 of the PEE financed, among others, the distribution of 40 million self-ballasted compact fluorescent lamps in the residential sector. From April 2009 to January 2013, Component 2 offered a refrigerator and air-conditioner replacement program through subsidies and financing.

SENER selected Econoler to conduct a detailed assessment of the benefits achieved by implementing PEE. Thus, Econoler designed an evaluation methodology adapted to the particular context of projects implemented at that time and applied it with the help of intervenors who participated in the program. The main findings of the assessment for each PEE component were as follows:

- Environmental impacts were approximately 13.6 million tonnes of reduced CO₂ for Component 1 and 1.6 million tonnes for Component 2 throughout the useful life of installed lamps and appliances respectively;
- The PEE had numerous other impacts: direct job creation; generated savings for the Mexican economy; electricity bill reduction for end users; and decreased government subsidies in the energy sector.

Econoler formulated recommendations to improve results of this type of program in Mexico. These recommendations essentially concerned program design and procedures, evaluation practices to be planned at the program design stage (namely preparing databases), managing the disposal of retired appliances after replacement, and improving stakeholder training prior to project implementation.



National Energy Efficiency Action Plan Design

Armenia Renewable Resources and Energy Efficiency Fund (R2E2 Fund), Armenia (2015)

The Government of Armenia has long prioritized the implementation of economically viable energy efficiency measures to increase power supply stability and achieve energy security. To establish the required institutional framework to foster energy efficiency improvements, the government created the R2E2 Fund in 2006 and adopted its first National Energy Efficiency Action Plan (NEEAP) in 2010. Thereafter, the Ministry of Energy and Natural Resources secured support from the World Bank to elaborate the second NEEAP, a key document to outlining objectives and energy savings measures to be implemented.

Econoler was mandated by the R2E2 Fund to develop the second NEEAP for the 2015-2017 period in collaboration with various national intervenors. Econoler carried out a number of tasks, including:

- Analyzed the energy efficiency legal and institutional frameworks of Armenia, as well as comprehensive evaluation reports, to facilitate the implementation of programs and regulations under the auspices of the NEEAP;
- Identified the shortcomings of existing policies;
- Evaluated the current market sectors that would benefit from financing to implement energy efficiency projects and identified barriers to investment;
- Assessed results of the first NEEAP to overcome barriers to achieving established energy savings objectives;
- Prepared a draft of the second NEEAP:
 - Established a detailed list of energy efficiency measures and programs that generated primary and final energy savings, and then shortlisted the most concrete measures;

- Established energy savings targets for each measure or group of measures;
- Outlined the institutional framework, implementation strategy, and the means of promoting and marketing by defining the authority and responsibilities of public institutions.

The second NEEAP prepared by Econoler was very well received by the various intervenors in the country and the World Bank, who described it as one of the best documents of its kind produced in recent years. The plan was used thereafter as a guidance document for conducting government activities.



National Energy Service Company Training Program Design and Delivery

*Ministry of Industry and Trade (MOIT), Vietnam
(2015-2016)*

Under the Global Environment Facility Clean Production and Energy Efficiency Project, the MOIT recommended launching a broad advanced training program for existing and aspiring energy service companies (ESCOs), government organizations, financial institutions and other stakeholders interested in Energy Performance Contracts (EPCs). The program would include:

- Training on founding an ESCO;
- Conducting energy audits suited to evaluating and implementing projects;
- Developing and using adapted agreements;
- Conducting measurement and verification of savings generated by energy efficiency projects;
- Defining risk mitigation strategies;
- Assessing project financing;
- Preparing business plans;
- Implementing related policies.

Econoler was mandated to create the advanced training program to reinforce and certify the capacity of regional ESCOs, while improving the capacity of government and financial institutions as well as other stakeholders in supporting the national development of this initiative. Therefore, Econoler carried out the following main tasks:

- Prepared an outline of the training program;
- Developed the training material;
- Elaborated a six-month plan for the delivery of training;

- Delivered training:
 - Three 15-day training sessions to ESCOs and other energy service providers;
 - One three-day training session to financial institution representatives;
 - One two-day training session to civil servants;
 - One five-day train-the-trainer session to enable Vietnamese experts to deliver the training.

Econoler offered and adapted its training and certification program entitled Certified Professional in EPC to the Vietnam context and developed didactic material in line with the expectations of the MOIT. In collaboration with numerous experts from different backgrounds, Econoler produced very high-quality didactic material. Econoler thus trained more than 70 professionals now capable of working as experts for ESCOs, as well as dozens of experts from other fields. A subsidiary of Econoler, the International Institute for Energy Training (IIET) delivered certifications to those participants who successfully completed the course to help generate the recognition necessary to the program.

Energy Sector Monitoring and Evaluation System Design and Implementation Support

The World Bank, Guinea (2015-2016)

The Government of Guinea recognized that energy is a primary driver of socio-economic development and expressed its commitment to developing this sector. Thanks to financial support from the World Bank and the Agence Française de Développement, the government led a comprehensive study of the energy sector which served to determine the priority measures to be implemented to improve overall productivity, notably for public electric utilities. The results of this study led to the elaboration of a stimulus plan for the electric energy sector to be implemented in upcoming years. In 2014, the SE4All project was launched to prepare an investment prospectus that would orient the implementation of projects in the sector. In this context, the Government of Guinea planned to design and implement a monitoring and evaluation (M&E) system for both all energy sector projects and the activities of access to electrification programs.

In February 2015, the World Bank mandated Econoler to design a centralized M&E system aimed at accelerating the implementation of access to electrification programs, notably the government's stimulus plan. This system was intended for government intervenors to constantly monitor the progress of projects and programs in the energy sector.

More precisely, the Econoler team carried out the following tasks:

- Established key quantitative and qualitative indicators and parameters to monitor and evaluate the progress of the energy sector stimulus plan;

- Conducted a national comprehensive study of residential energy consumption in nearly 4,000 households to develop a detailed baseline energy profile, namely the creation of a database and a map in a geographic information system;
- Designed an efficient and profitable online M&E system to be used by various government intervenors to collect data and monitor the input/output indicators, as well as the results and impacts of numerous projects;
- Implemented the M&E system in government services, ministries and rural electrification agencies;
- Organized training sessions for personnel from various government organizations on how to use and upgrade the M&E system.

Thanks to this reliable and powerful Econoler system, the government intervenors of Guinea can now effectively monitor and evaluate the implementation of projects under both the electricity sector stimulus plan and electrification access programs.

Energy Efficiency Microfinance Program Design and Delivery

*Multilateral Investment Fund (MIF)
of the Inter-American Development Bank (IDB),
Paraguay (2015-2017)*

EcoMicro is a technical cooperation program co-financed by the Multilateral Investment Fund (MIF) and the Nordic Development Fund (NDF), with a budget of USD 7 million. The program's objective is to implement green finance projects through microfinance institutions (MFIs) in Latin America and the Caribbean. Econoler was selected to assist a microfinance institution in implementing green finance projects.

Econoler supported the Fundación Paraguaya (FP), one of the MFIs admitted into the program by the MIF, to: (1) provide assistance in the development and introduction of a credit product to finance the purchase of high-efficiency cooking stoves and possibly other energy-efficient appliances; (2) establish a diagnosis that accounts for the lack of energy efficiency at FP and implement internal policies to ensure environmental sustainability through the adoption of energy efficiency measures in FP's daily operations; and (3) assess the vulnerability of FP's portfolio to climate change and develop a tool to manage potential risks.

To carry out the first task component, Econoler assisted FP by: (1) developing and implementing an internal environmental and energy policy; (2) implementing an awareness-raising campaign about the new policy among FP staff; (3) establishing a baseline to determine FP's energy consumption and carbon footprint; and (4) identifying and implementing energy savings measures in FP installations.

To carry out the second task component, the consortium collaborated with FP to: (1) assess the vulnerability of FP's portfolio to climate change; and (2) develop a methodology to manage any potential vulnerability-related risks.

To carry out the third task component, the most important for this assignment, Econoler assisted FP in: (1) conducting a market research study to identify the most appropriate EE technologies to be financed at FP client installations; (2) designing a tailored EE finance product and operations manual; (3) training FP staff on EE and the new EE finance product (marketing, rationale, etc.); and (4) training FP clients on EE, high-efficiency stoves and the new EE finance product. This task also included assistance for the launch of a pilot project for the new EE finance product as well as the design of a rollout strategy, including adjustments to the product as necessary.

Finally, Econoler prepared a case study of the project and presented it to various stakeholders at the end of the project.



National Electricity Utilities Climate Change Adaptation and Mitigation Program Designs

Caribbean Electric Utility Services Corporation (CARILEC), Barbados, Belize, Dominica, Saint-Kitts and Nevis (2016)

Electric utilities in the Caribbean region depend heavily on imported fossil fuels, causing high electricity prices for end users and leaving local economies vulnerably exposed to international oil price fluctuations. This region is mainly composed of small island developing states (SIDS) which are vulnerable to the adverse effects of climate change. CARILEC is an association of electric utilities, suppliers, manufactures and other stakeholders operating in the electricity industry in the Caribbean and is much involved in promoting sustainable energy initiatives in the region.

CARILEC, with financing from the Inter-American Development Bank (IDB), commissioned Econoler to support five electric utilities (in Barbados, Belize, Dominica, Saint-Kitts and Nevis) in developing a climate-change adaptation strategy, as well as a sustainable energy program.

Econoler was tasked with developing strategies for supply-side and demand-side energy management for each electric utility. Econoler joined forces with CARIBSAVE to focus on the following climate change mitigation and adaptation components:

- For the supply-side component, Econoler experts first performed detailed energy assessments for each country at selected CARILEC member utility companies. Based on the collected data, two documents were prepared: (1) a supply-side management plan; and (2) a strategy for deploying smart-grid technologies.

- For the demand-side component, data-collection activities were carried out onsite at the target main consumers, notably at a water treatment plant, public lighting system, the hotel industry sector and the public building sector. The project team developed a strategy for demand-side management that included the following outputs: (1) a mechanism for establishing energy service companies (ESCOs) among CARILEC member utilities; (2) a model Energy Performance Contract (EPC), including a scheme for repayment on the electricity bill; and (3) an examination of regulatory and financing strategies for recovering investments in energy efficiency programs.

This project was an important step to ensuring further commitment from electric utilities in implementing tangible sustainable energy projects in the Caribbean.

Road Vehicle Fleet Energy Management Intervention Plan Design

Ministère de l'Énergie et des Ressources naturelles du Québec (MERN), Canada (2016-2017)

Between 1992 and 2011, the transportation sector experienced its largest increase in energy consumption (37%) in Quebec. Energy efficiency or GHG emission reduction measures allow road vehicle fleet managers and owners to reduce dependence on fossil fuels. To improve energy management in the sector, MERN designed a program aimed at implementing these types of measures.

MERN mandated Econoler to define the content of an energy management program for heavy vehicle fleets (trucks and buses). This program was meant for both fleet managers and specialists who support the former in optimizing energy consumption. Econoler therefore carried out the following tasks in the transportation sector:

- Conducted a market assessment to obtain an overview of the current energy efficiency situation, more specifically in each of the following areas:
 - Management practices
 - Vehicle technologies
 - How vehicles were driven
 - Vehicle maintenance
 - Logistics
- Compared the current to the ideal situation to identify potential reductions in energy consumption and GHG emissions;
- Devised an intervention approach for support specialists to optimize energy management among fleets;
- Tested the intervention approach in three fleets to obtain the information required to prepare energy analysis reports and feasibility studies for each;

- Developed documentation tools to serve as guides for techno-economic analyses in each of the aforementioned five areas;
- Designed a training program for support specialists;
- Trained support specialists on how to implement the intervention approach and use the documentary tools.

Econoler thereby provided MERN with all the data necessary for implementing a comprehensive energy management program for road vehicle fleets in Quebec.

Morocco Public Lighting Transformation Program

The World Bank, Morocco (2016 to ongoing)

The World Bank assists Morocco in improving its energy efficiency, as reflected in the 2014-2017 World Bank Country Partnership Strategy (CPS). The CPS identifies enhancing energy efficiency in Morocco as a strategic objective to ensure that scarce resources are invested more sustainably in the energy sector. This objective is in line with both reducing poverty and boosting shared prosperity.

The Morocco City Energy Efficiency Technical Assistance assists cities in building local capacity for developing and implementing transformative energy efficiency investments.

The Morocco Public Lighting Transformation Program (the Program) is aimed at encouraging the application of energy efficient practices to public lighting in Morocco, thereby contributing to the shift toward inclusive green growth.

The main objectives of the assignment are to assist the Government of Morocco in designing a sustainable Morocco Public Lighting Transformation Program using a public-private partnership (PPP) approach such as the ESCO business model. The main tasks of the assignment are the following:

- Review the current public-lighting sector. Econoler is reviewing, analyzing and assessing the national public lighting market size, energy demand, the framework conditions for public lighting projects and implementation models thereof.
- Design the Morocco Efficient Public Lighting Program. As part of this task, Econoler will develop a comprehensive operational package covering the institutional, legal, financial and technical aspects of the Program; this package will be used to implement the Program at both the national and local levels.

- Develop a results-oriented funding scheme for IFI funding. Econoler will provide to the World Bank a complete project concept package containing comprehensive economic and financial analyses, as well as a business plan for the results-oriented financing of the Program.
- Implement outreach activities. As part of this task, Econoler will work with the Government of Morocco to disseminate global, regional and national best practices and lessons learned by holding several workshops with the relevant stakeholders at different stages of the project to provide relevant knowledge and capacity-building.

Upon completion of this assignment, Econoler will have designed a project implementation model in support of the energy efficiency transformation of the Morocco public lighting sector based on Morocco's current context and international best practices.



Glossary of Acronyms

ADB:	Asian Development Bank
AEE:	Association of Energy Engineers
ASHRAE:	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BgEEF:	Bulgarian Energy Efficiency Fund
CEB:	Ceylon Electricity Board
CFC:	Chlorofluorocarbon
CIDA:	Canadian International Development Agency
CMVP:	Certified Measurement and Verification Professional
DSM:	Demand-side Management
EBRD:	European Bank for Reconstruction and Development
ECM:	Energy Conservation Measure
EIIGR:	Energy Efficiency Improvement and Greenhouse Gas Reduction project
ENS:	Efficiency Nova Scotia
EPC:	Energy Performance Contract/Contracting
ESCO:	Energy Service Company
ESLGM:	Egypt Sustainable Loan Guarantee Mechanism
EVN:	Electricity Vietnam
EVO:	Efficiency Valuation Organization
FBI:	Federal Buildings Initiative
GEF:	Global Environment Fund
GHG:	Greenhouse Gas
HC:	Health Canada

HFESCO:	Henan First Energy Service Company (first ESCO in Henan)
IDB:	Inter-American Development Bank
IFDD:	Institut de la Francophonie pour le développement durable
IJET:	International Institute of Energy Training
IPMVP:	International Performance Measurement and Verification Protocol
IREDA:	India Renewable Energy Development Agency
M&E:	Measurement and Evaluation
M&V:	Measurement and Verification
MEM:	Ministry of Energy and Mines
MEMD:	Ministry of Energy and Mineral Development
MERN:	Ministry of Energy and Natural Resources of Quebec
MOIT:	Ministry of Industry and Trade of Vietnam
MPSEB:	Madhya Pradesh Electricity Board
NEEAP:	National Energy Efficiency Action Plan of Armenia
NRCan:	Natural Resources Canada
OIF:	International Organisation of the Francophonie
R2E2 Fund:	Armenia Renewable Resources and Energy Efficiency Fund
RCMP:	Royal Canadian Mounted Police
REEEP:	Renewable Energy and Energy Efficiency Partnership
SME:	Small and Medium Enterprise
STEG:	The Tunisian Company of Electricity and Gas

- STGE:** Tunisian Company of Energy Management
- SYNERGIE:** Specialized software developed by Econoler
- UNDESA:** United Nations Department of Economic and Social Affairs
- UNDP:** United Nations Development Program
- WAEMU:** West African Economic and Monetary Union

© ECONOLER
160, rue St-Paul, Office 200
Québec (Québec) G1K 3W1
CANADA

Telephone: 1 (418) 692-2592
Fax: 1 (418) 692-4899
www.econoler.com