

Arvid E. Kruze

International Development Consultant

- Power Sector Specialist
- Financial and Economic Analyses
- Hydro and other RE Projects
- Electricity Tariffs
- Monitoring & Evaluation
- Team Leader and Project Management Experience



QUALIFICATIONS SUMMARY

Arvid Kruze is a power industry specialist, with expertise in economic, financial, policy and regulatory issues. Among other areas, this includes electricity tariffs and associated costing, financial/ economic analysis, corporate/ strategic planning and monitoring & evaluation (M&E) of energy projects. He combines advanced academic credentials with 34 years' experience, particularly on development projects.

He has served as Team Leader on technical assistance projects in Bosnia-Herzegovina, Kosovo, Nigeria, Azerbaijan, Papua New Guinea, Afghanistan and India. He has also provided specialist input to many development projects throughout the world as an expert consultant, as may be seen in his Professional History below. This includes, among other work, the completion of over 30 electricity tariff related assignments in 15 different countries. Also, having worked extensively in emerging economies, he is well aware of the issues and challenges being faced by developing countries with respect to increasing access to energy and developing clean energy resources. His international experience includes projects in Afghanistan, Armenia, Azerbaijan, Belize, Bosnia-Herzegovina, Botswana, Canada, China, Egypt, Ethiopia, Haiti, India, Kenya, Kosovo, Madagascar, Malawi, Mongolia, Mozambique, Nigeria, Pakistan, Palestine, Papua New Guinea, Philippines, Russia, Saudi Arabia, Seychelles, Tajikistan, Tanzania, Thailand and Tunisia.

EDUCATION

MBA, McGill University, Montreal, 1979.
B. Eng., (Mining) McGill University, 1976.

PROFESSIONAL HISTORY

1996 to date: Independent consultant to a number of electric utilities, consulting firms and international donors active in the electricity supply industry (a client list is provided at the end of this CV). Worked on the following projects, among others:

- International Rural Electrification Specialist on a cluster evaluation of nine previous and ongoing rural electrification projects across Africa. Engaged by the African Development Bank (ongoing since December 2014).
- Power Sector Expert on the Impact Evaluation of the MCC (Millennium Challenge Corporation) Power Sector Revitalization Program in Malawi, undertaken by Social Impact, Washington, DC. Provision of advice on technical, policy, regulatory, economic and financial issues related to the country's power sector, on a multi-year project to develop an effective monitoring and evaluation (M&E) program for MCC's \$350 million investment program (ongoing since April 2014).
- Financial and Economic Specialist, Azerbaijan Power Distribution Investment Project, a \$150 million investment in distribution facilities of the government owned electric utility, Azerenerji. Funded by

PROFESSIONAL HISTORY (continued):

the Asian Development Bank (ADB), the work includes an assessment of Azerenerji financial performance, borrowing capacity and financial management capabilities, as well as economic and financial analyses of the project (2014-15).

- Financial Specialist in the Power Transmission Enhancement Investment Program Tranche 4, Pakistan - a \$230 million investment in power transmission facilities being financed by the ADB. The work, under subcontract to SMEC (Australia), entailed a financial analysis of the project in accordance with ADB guidelines, involving a financial management assessment of the government owned transmission company, financial evaluation of the project, development of financial projections and, analysis of historic and expected future financial performance of the company (2014).
- Senior Technical Expert on a data-gathering mission to Tanzania and Ethiopia in connection with the US Government's Power Africa initiative, funded by USAID and undertaken by Pragma Corporation, Washington, DC. Led a three-person team in collecting information to be used for Power Africa's first Annual Report (2014).
- Tariff Specialist on the ADB financed Regional Power Transmission Project - Sector Operational Performance Improvement, Tajikistan. The work included the assessment of various tariff options and development of tariff methodologies for an unbundled power sector comprising generation, transmission and distribution entities. Conducted through Corporate Solutions, UK (2013).
- Senior Energy Expert and Team Leader, Performance Evaluation of USAID's Regulatory and Energy Assistance Program (REAP) in Bosnia-Herzegovina, undertaken by Social Impact, Washington, DC. Led a three-person team in conducting an evaluation of a project designed to help the country meet the provisions of the Energy Community Treaty of South Eastern Europe (2013).
- Economic and Financial Specialist on a feasibility study for the rehabilitation of the Golovnaya hydropower station, Tajikistan, funded by the ADB and undertaken by Corporate Solutions, UK. Conducted an economic and financial assessment of the project for potential ADB financing (2013).
- Senior Advisor on a study undertaken by Econoler International (Canada) to study the impact of electricity tariffs on poverty and the social situation in Côte d'Ivoire (ongoing since November 2012).
- Lead Evaluation Specialist, evaluation of the USAID Energy Security and Regional Integration project, Armenia. Led a team of two in conducting an evaluation of the results of a three-year project that provided assistance in three priority areas in the development of the Armenian energy sector, including nuclear power, renewables and regional integration. Conducted through Social Impact (2012).
- Team Leader, USAID Programmatic Impact Evaluation of the Energy Sector in Kosovo. With a team of three, undertook an impact evaluation of a variety of USAID financed energy sector projects in the country over the previous five years. Conducted through Mendez, England & Associates (2012).
- Energy Sector Economist, as a part of transaction advisory services provided by CPCS Transcom International to the Government of Nigeria for the privatization of 4,775 MW new generating facilities and associated transmission and distribution investments made in power facilities under the country's National Integrated Power Program. Provided an analysis of current demand projections and the ability of the new generating capacity to meet this demand (2012).
- Economic and financial specialist, in a project to promote the development of renewable energy technologies in Azerbaijan, including wind, solar and biomass. Specific tasks included: i) international cost comparisons, ii) estimates of likely costs in Azerbaijan and iii) development of a

PROFESSIONAL HISTORY (continued):

- methodology for assessing economic and financial viability of selected projects, which included, among other sub-tasks, the derivation of feed-in tariffs. Contracted directly with UNDP (2011).
- Team Leader, Economics and Finance, as a part of transaction advisory services provided by CPCS Transcom International, Canada, for the privatization of successor companies created out of the Power Holding Company of Nigeria. Led a team of professionals in assessing the current state of the industry and providing recommendations in areas of policy, trading arrangements, regulation, finance and tariffs, to facilitate the privatization of 16 generation and distribution companies, as well as carrying out business valuations for each company (2011-12).
 - Economic and financial specialist in the review of a feasibility study for undertaking a \$300 million investment in various power facilities operated by the Electricity Supply Company of Malawi. Conducted for the Millennium Challenge Corporation through Sterling International Group, USA (2010).
 - Senior advisor on an electricity tariff study undertaken for the Ministry of Energy, Botswana. The work comprised a number of studies and analyses, including benchmarking of electricity prices and pricing methodologies worldwide, recommendations for a pricing methodology suitable for Botswana, determination/ forecast of industry revenue requirements, a cost of service study and retail tariff design. Conducted through CRISIL Risk & Infrastructure Solutions, India (2010-11).
 - Economic and financial expert on the development of an Energy Policy for Seychelles. Worked on all economic and financial aspects of elements contained in the proposed policy. Engaged directly by UNDP, Mauritius (2009-10).
 - Team Leader and Distribution Planning Expert on a project preparatory assistance study conducted in Azerbaijan for the purpose of availing of a \$500 million credit facility available from the ADB for investment in new electricity distribution facilities. Primarily responsible for leading a team of technical experts in project definition, cost estimation, economic/ financial analysis and due diligence on environmental and social aspects, as well as Government policy matters. Conducted through VisionRI, India (2009-11).
 - Individual consultant to the ADB for designing a rural electrification project in Papua New Guinea. Analyzed alternatives for grid extensions in given areas of the country, as well as off-grid possibilities in the form of solar-based lighting (2009).
 - Tariffs expert on a feasibility study to introduce interruptible electricity tariffs to Saudi Arabia, under the country's National Energy Efficiency Program. Conducted for the Saudi Electricity Company through Econoler International, Canada (2008).
 - Chief, Financial Analysis, on feasibility studies conducted for the Kohala and Karot hydropower projects, Pakistan, by Snowy Mountain Engineering Company (SMEC), Australia, for the Water and Power Development Authority, Pakistan. Responsible for economic and financial analysis of the projects (2008-10).
 - Economic Specialist on a study to examine the feasibility of introducing Daylight Saving Time in Saudi Arabia, conducted for the Ministry of Water and Electricity, Saudi Arabia, through Econoler International, Canada (2008-10).
 - Team Leader and Power Sector Specialist, on the Power Sector Development Plan Project, Papua New Guinea, funded by the ADB and conducted through VisionRI (India). Main activities on this project included: i) a market forecast, ii) an assessment of power supply options, including hydropower and other renewable energy options such as solar, iii) review of the policy, legal and regulatory environment, iv) preparation of selected pre-feasibility studies, v) drafting a power sector

PROFESSIONAL HISTORY (continued):

- operational program, vi) capacity building and vii) ensuring the support and involvement of all stakeholders and policy makers (2007-09).
- Institutional analysis of the Ministry of Energy, Mozambique, funded by the World Bank. The main purpose of this assignment as an individual consultant was to assess the organizational needs of the Government of Mozambique to accommodate the development of a number of power mega-projects in the country, and to address a few associated issues (2008).
 - Team Leader and Economist, on the Small to Medium Hydropower Development Project, Afghanistan, funded by ADB. The objective of this technical assistance project to the Government of Afghanistan was to ultimately deliver feasibility studies on 5 hydro projects in the 1 MW to 10 MW range, starting with a reconnaissance/ ranking study of 60 identified hydro sites. As Economist, conducted market forecasts in the areas served by the projects, estimated related benefits based on willingness-to-pay, and performed the required cost-benefit analyses. Conducted through Engconsult, Canada (2006 - 2007).
 - Tariffs expert on a project for the European Bank for Reconstruction and Development (EBRD) as part of its due diligence for a loan to the Federal Grid Company (FGC), Russia, conducted through Fichtner (Germany). The project entailed an analysis and critique of the tariff structure of the FGC, examination of certain key performance indicators, and recommendations for changes in the tariff methodology with a view to incorporating incentives for performance improvement (December 2005 - April 2007).
 - Study on Interruptible Power Contracts, Egypt. Retained as an expert by Econoler International (Canada) on a UNDP funded study to develop contractual arrangements between the country's power system operator and large customers for different types of interruptible power (October - December 2006).
 - Tariffs and cost of service specialist on a tariff study conducted in Kenya for the Electricity Regulatory Board, conducted by Fichtner (Germany) with World Bank funding. Responsible for the derivation of the long run marginal cost of supply and advice on tariff and financial issues particular to the project (July-December 2006).
 - Tariffs expert on a project to establish and launch the Palestinian Energy Regulation Commission, carried out by Nexant (USA) and funded by the World Bank. The tariff component of the work included the development of a tariff methodology, including revenue requirements, cost of service and tariff structure, to be implemented by the distribution utilities serving the state of Palestine (2005).
 - Tariffs specialist, Cost of Services Study, funded by the Water and Power Development Authority (WAPDA), Pakistan. Provision of input, as required, to a local partner in conducting cost of service studies and the derivation of cost-based tariffs for all levels of electricity supply, including generation, transmission and distribution. Conducted through Acres, Canada (2004-5).
 - Team Leader, Tariffs, Energy Infrastructure Services Project II, Uttar Pradesh, India, funded by the Canadian International Development Agency (CIDA) and conducted by AMEC and Acres, Canada. Provision of assistance on financial, tariff and other regulatory matters to the Uttar Pradesh Power Company Limited, on a project designed to assist and train the utility's staff in corporate planning and tariff submissions. Led a team of Canadian experts and Indian counterparts (2002-05).
 - Electricity tariffs specialist on a regulatory framework study, conducted for the Ministry of Economic Development, Azerbaijan. Developed tariff principles and an implementation plan for electricity tariffs on this World Bank financed project, undertaken by Nexant, USA (2003-04).

PROFESSIONAL HISTORY (continued):

- Economist and financial specialist in the assessment of the Inginiyagala hydropower rehabilitation project in Sri Lanka, conducted by AMEC (Canada) and funded by CIDA. Home office work included estimating the project's benefits based on avoided costs, an economic analysis of the project from the perspective of the national economy of Sri Lanka, and financial analysis of the project's affordability to the Ceylon Electricity Board (1999 - 2003).
- Economic and financial specialist on a 500 kV interconnection study, conducted for the Sichuan Electric Power Corporation (SEPC), China. Undertaken by Dessau Soprin (Canada) and financed by CIDA, the study analysed the economic and financial feasibility of a 500 kV line built for the purpose of evacuating lower cost power in Sichuan Province to eastern China (2003).
- Financial and tariffs advisor to the SEPC, China, in the development of a strategic plan for the utility. The work, conducted by Dessau Soprin (Canada) and funded by SEPC, included training and advisory services to SEPC planning staff (2000-2004).
- Financial and tariffs specialist, Energy Infrastructure Services Project, Madhya Pradesh, India, funded by CIDA and conducted by SNC-Lavalin (Canada). Provision of assistance on financial, tariff and other regulatory matters to the Madhya Pradesh State Electricity Board (2001-02).
- Tariffs specialist, providing advice and guidance in areas of financial forecasting and development of tariffs, on a study to assist the Palestinian Energy Authority in developing a modern legal and regulatory framework for the power sector of Palestine, conducted by AMEC (Canada) with World Bank funding (2001-02).
- Financial analyst in the creation of a strategic plan for the start-up of a transmission company serving Palestine, conducted by SECOR Conseil Inc. (Canada) and funded by the World Bank (2001).
- Tariffs specialist on the Regional Energo Pilot Project in the Russian Republics of Komi and Samara, conducted by AMEC (Canada) and financed by CIDA. Specific tasks included the development of tariffs for electricity transmission and distribution, the formulation of electricity retail tariffs based on cost of service and the development of tariff design procedures for district heating (1999-2001).
- Task Leader, Tariff Structure Normalization, on the Kamchatka Energy Sector Development and Restructuring Program, Russia, conducted by Acres International, Canada (in association with others) and funded by the World Bank. Specific tasks included cost of service analyses for heat and electricity supply, associated socio-economic issues and the development of a pricing strategy (2000).
- Economic specialist in the evaluation of the Chalillo project, conducted by AGRA Monenco (Canada) for Belize Electricity. The project comprised the construction of a dam upstream of an existing hydro facility on the Macal River, primarily to boost its firm capacity and to better regulate water flows. The analysis entailed estimating the project's benefits based on avoided costs, derivation of optimum dam height and plant capacity, and estimation of net benefits to Belize Electricity (1997-2000).
- Financial specialist in the analysis of the viability of the Kablangan hydro project, Philippines, conducted by AGRA Monenco (Canada) and funded by CIDA. Work included projection of the hydro company's financial statements and derivation of the required long-term sale price of the plant's output in order to achieve financial viability (1998-2000).
- Financial specialist in the evaluation of the Cinera water supply/ hydroelectric project. Conducted by AGRA Monenco (Canada) for the city of Cucuta, Colombia. Home office work included financial analysis of several water supply and hydro generation alternatives at various dam heights and turbine capacities (1999).

PROFESSIONAL HISTORY (continued):

- Financial and tariffs analyst for the North Power Transmission Project, funded by the ADB, as part of an overall review conducted by Teshmont Consultants (Canada), of a \$500 million transmission line project undertaken by the North China Power Grid for possible ADB funding (1998-99).
- Financial specialist in an assessment of the ability of Energy Authority of Mongolia to undertake the Zabkhan hydroelectric project. Work included the projection and analysis of the Authority's proforma financial statements, with and without the project. Undertaken by AGRA Monenco (Canada) for the Kuwait Fund (1998).
- Expert witness, retained by James Maclaren Industries Inc., in its intervention in a public hearing convened by the Régie de l'énergie du Québec, Canada, to address electricity production supply tariffs (mainly hydro) proposed by Hydro Québec (1998).
- Power tariffs and cost of service specialist on a tariff study conducted for Electricité d'Haiti (EDH) by AGRA Monenco (Canada). This World Bank financed project was an update of work performed ten years previously. The project provided recommendations to both EDH and international lending agencies on desirable changes to EDH's out-of-date tariff structure (1997-99).
- Financial specialist on a subtransmission/ distribution planning project in the Visayas and Mindinao areas of the Philippines, conducted by Dessau Inc. (Canada) and financed by the Canadian International Development Agency (CIDA). Work primarily included an assessment of the viability of required investments in subtransmission and distribution facilities within the region (1997).
- Power tariffs consultant in Armenia, as part of a USAID financed project on power sector restructuring, conducted by Hagler Bailly Consulting (USA). The tariff work included a review and critique of the current power tariff situation, estimation of the long run marginal cost of supply and the formulation of a tariff strategy for the Armenian power sector (1996-97).
- Project Manager for Monenco AGRA (Canada) on the valuation of a small hydro plant at Winneway, Quebec, Canada, for an interested purchaser, using the discounted cash flow approach). Coordinated the inputs of a number of engineers to derive the plant's value (1995-97).
- Course designer and instructor for a series of courses in electric power pricing and costing, as well as in engineering economics for selected senior employees drawn from China's electric power bureaus. These courses, financed by CIDA through Monenco AGRA (Canada), were given in a number of locations in both Canada and China (1995-96).

1994 to 1996: Project specialist for Monenco AGRA Inc., Montreal, Canada. Worked on the following project:

- Task Leader, Tariffs on a World Bank financed project for the reform of the power sector in the state of Orissa, India. The work involved the formulation and design of economically efficient electricity tariffs at the generation, transmission and retail levels. Specific responsibilities included cost of service analyses, tariff design and the co-ordination of inputs from a number of specialists into the overall tariff development process.

1990 to 1994: Senior Supervising Consultant, Monenco AGRA Inc., Montreal. Worked on the following major projects, among others:

- Provision of technical assistance to the National Energy Policy Office of Thailand in determining a retail electricity tariff structure for the country. These tariffs were introduced countrywide in 1991.

PROFESSIONAL HISTORY (continued):

Also, developed time-of-day tariffs for large customers and wholesale tariffs for electricity sales between electric utilities (financed by CIDA, 1990-94).

- Economic and financial analysis for feasibility studies conducted for a Distribution Dispatching Centre (SCADA/ DMS) for the Provincial Electric Authority of Thailand (1993-94).
- Project manager for a load research study conducted for Maritime Electric Company, Limited, Prince Edward Island, Canada. The project entailed recording the daily load profiles of a statistically valid sample of the utility's customers, subsequent analyses of data collected and drawing conclusions about group behavioural characteristics with regard to electricity consumption (1991-94).
- General assistance to Maritime Electric Company, Limited, on regulatory matters including, among other items, the development of a policy for the purchase of power from independent producers and provision of advice on matters relating to costing and tariff setting (1989-94).
- Staff consultant, specializing in electricity tariffs, to the ADB on a loan appraisal mission to Thailand (1993).
- Provision of assistance in electric tariff related matters to TransAlta Utilities, Alberta (1992).

1981 to 1990: Supervising Analyst and Senior Analyst, Monenco Consultants Limited, Montreal. Was involved in the following work, among other projects:

- Staff position for a period of 5 months at Maritime Electric Company, Limited, PEI, providing advice and support to the Vice-President Rates and Energy Management in areas of tariffs and load forecasting (1989).
- A 10-month assignment in Madagascar, on a study financed by the World Bank, working with JIRAMA, the local electric utility. Participated in a review of the utility's existing tariff structure, the development of new retail tariffs and in forecasting JIRAMA revenue requirements (1988-89).
- Involved in the creation of a master plan for rural electrification in Haiti, financed by CIDA. Specifically, was responsible for the conception and design of the tariff structure required to finance the plan, as well as the accompanying financial projections. Also, worked on a detailed load forecast for the country broken down province by province (1986-89).
- Conducted assessments of the economic and financial viability of a number of capital intensive projects including, among others, the feasibility of constructing a plant for the treatment of hazardous wastes in Quebec (1982-85), a paper recycling plant in Ivory Coast (1983-86) and hydro electric power developments in Guyana (1981-82).
- A variety of public utility regulatory and financial work, such as cost of service analyses, marginal cost pricing studies, corporate productivity studies, indexed fixed asset valuations, minimum system studies and preparation of evidence for submission at rate hearings. Clients included, among others, Maritime Electric, Newfoundland Light and Power, New Brunswick Power and TransAlta Utilities (1981-1990).

1979 to 1980: Planning Engineer (last position held), Denison Mines Limited, Elliot Lake, Ontario.

- Worked on long-range plans for the mine and feasibility studies of undeveloped properties; involved in the development of a long-range computer planning model; aided in the development of various engineering computer applications; also, involvement in time studies and determination of equipment requirements.

PROFESSIONAL HISTORY (continued):

LANGUAGES: English (native fluency), French (very good)

CITIZENSHIP: Canadian

CLIENT LIST – since 1996:

Acres International, Niagara Falls, Canada
Acres Management Consulting, Toronto, Canada
AMEC (formerly AGRA Monenco), Montreal, Toronto and Calgary, Canada
Corporate Solutions Consulting Ltd, London, UK
CPCS Transcom International, Ottawa, Canada
CRISIL Risk & Infrastructure Solutions, Mumbai, India
Dessau Soprin, Montreal, Canada
Econoler International, Quebec City, Canada
Engconsult, Toronto, Canada
Fichtner, Stuttgart, Germany
Hagler Bailly, Washington DC, USA
James Maclaren Industries, Masson, Quebec, Canada
Mendez, England & Associates, Washington DC, USA
Ministry of Energy, Mozambique
Nexant, Washington DC, USA
Pragma Corporation, Washington DC, USA
SECOR Conseil, Montreal, Canada
SNC-Lavalin, Montreal, Canada
Social Impact, Washington DC, USA
Snowy Mountain Engineering Company, Melbourne, Australia
Sterling International Group, Washington DC, USA
Teshmont Consultants, Winnipeg, Canada
TransAlta Energy, Calgary, Canada
VisionRI, New Delhi, India

Funding agencies (usually indirect clients):

African Development Bank
Asian Development Bank (ADB)
Canadian International Development Agency (CIDA)
European Bank for Reconstruction and Development (EBRD)
Kuwait Fund
Millennium Challenge Corporation (MCC)
United Nations Development Program (UNDP)
USAID
World Bank