

# ECONOMIC CONSULTING ASSOCIATES

Solutions for infrastructure

**ECA's electricity and gas practice**

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**ECA**

ECA provides economic consulting advice in infrastructure services for utilities, investors, governments, regulators and financial institutions worldwide

# Introducing ECA

*ECA has undertaken around 300 assignments in over 40 countries since 1997. A small selection of these are shown here*

**Network Pricing Review, UK**  
*ECA supported EdF Energy Networks in the development of its responses to the regulator's proposals for changes to the distribution network charging structures*

**Gas storage market assessment**  
*ECA provided a market report for the commercial lenders to a new gas storage in Central Europe*

**South East European Gas**  
*In a landmark World Bank study ECA advised on what has become the blueprint for the development of the gas market in SE Europe*

ECA was formed in 1997 to provide economic and regulatory consulting services to industry and government. Since then, we have undertaken around 300 assignments in over 40 countries, covering large and small developed and emerging markets on all continents.

Our core team of 15 professionals is based in offices in London and Bangkok. All permanent staff members hold qualifications in economics, engineering or both, supplemented by many years practical experience. They are supported by an established network of associates with legal, technical and financial expertise.

## ECA's global experience



■ countries where we have worked

Our approach is focused on providing structured solutions supported by rigorous quantitative analysis drawing in particular on the conceptual insights offered by economics.

ECA's experience has traditionally been strongest in the energy sector but the firm has recently strengthened its expertise in water and urban services with new senior team members. We also have highly relevant experience in multi-sector work including telecoms and transport.

Our wide range of services can be grouped into five main areas:

- Policy and strategy advice
- Markets and regulation
- Pricing and cost analysis
- Investment planning and financing
- Restructuring and institutions

## ECA and PSR

The strategic partnership between ECA and PSR enables us to offer an enhanced service in energy market simulation tools and experience. PSR from Brazil is a world leader in electricity market modelling tools with specialist hydro thermal modelling capability.

Market analysis and forecasting packages developed by PSR include SDDP, MAXREV and NCP, while a suite of planning and investment packages includes OPGEN, NETPLAN and OPTFOLIO.

# Our services

## **Marginal Costing of Electricity**

For the Greek energy regulator, we calculated the long-run marginal costs of electricity supply at different voltage levels in order to assess this against current tariffs. The work included the construction of customised charging models, subsequently provided to the regulator.

## **Sustainable Energy Financing**

*ECA is leading a multi-national project for EBRD, identifying RES and energy efficiency investment opportunities across the Western Balkans and advising institutional reforms required to support these*

## **Ukraine Wholesale Electricity Market Design and Rules**

*Working with the electricity regulator, we detailed the design for the new wholesale market and subsequently are supporting its implementation*

## **East Asia's Energy Security**

*World Bank flagship study with 20-year projections of energy supply security and environmental outcomes for key East Asian emerging economies under alternative policies*

## **Strategy and policy advice**

We provide strategy advice to companies and policy advice to governments, working at various levels. Recent examples include the role of the infrastructure sector in alleviating the impacts of the global economic downturn on Botswana, the optimal future fuel mix for Thailand and actions for emerging East Asian economies to improve environmental sustainability and energy supply security.

## **Markets and regulation**

Our market and regulation services are concentrated in the energy sector. We have advised companies with independent generation plants on the commercial implications for them of a particular market design. Our advice and support to governments and regulators includes conceptual design, impact analysis, drafting rules and operational assessments for energy markets, network access conditions and connections. In Turkey, for example, we worked with the regulator to develop the initial electricity market design manual. Over five years later, we continue to support the evolving market, most recently on the design of a capacity support mechanism.

## **Pricing and cost analysis**

Pricing and cost analysis is at the heart of much of our work for both private companies and public sector clients — estimating the costs of service and designing tariff structures to recover these in an economically efficient manner.

With the increasing spread of liberalised markets, our expertise has extended beyond such traditional pricing studies to include analysis of the impacts of pricing systems on market competition, customer behaviour and the environmental outcomes. We also advise on addressing affordability concerns including support to low-income households and linking subsidies to the delivery of outputs.

## **Investment planning and financing**

Our investment expertise is grounded in detailed economic and financial analysis of markets. Recent example analyses include a bankable market study of gas storage in Central Europe and the assessment of the benefits of a Black Sea electricity 'ring'. This expertise is supplemented by our experience in designing public and private financing structures.

## **Restructuring and institutions**

We advise on both broader institutional design and the structuring of individual agencies and programmes. In countries including Cyprus, Malawi and Tanzania we have analysed the benefits of unbundling integrated energy companies. For governments in Cambodia, Indonesia and Macedonia, we have designed institutional arrangements to deliver local infrastructure services. In Bulgaria, Egypt and Kenya we have helped regulatory agencies in defining their organisation, strategies, budgets and staffing needs.

# Electricity

Our corporate and bank clients for electricity sector advice include:

AES Corporation

EDF Energy Networks

Egyptian Electricity Holding Co

Electricity Authority of Cyprus

Electricity of Vietnam

Elektroprivreda Srbije

Energiaki Thessalonikis S.A.

EnerjiSA

National Transmission and Dispatch Company (Pakistan)

Shell

State Power Corporation

ZESA

Asian Development Bank

EBRD

European Commission

Global Environment Facility

IFC

Infracore / Eleqtra

JBIC

Marguerite Fund

OPIC

Socgen

UniCredit

WestLB

World Bank Group

## Range of services

The electricity industry is one of our central areas of expertise. We cover our full range of services, with particular focus on electricity markets, network and retail pricing, and commercial advice .

## Commercial advice

Our experience in project appraisal and support in the electricity industry ranges from initial market assessments through to support in designing transactions. We offer support in economic and financial analysis as well as on understanding regulatory and market frameworks and their impacts on investment.

## Advisory services to an IPP, Greece

ECA provided a comprehensive range of advice to Energiaki Thessalonikis (ENTHE) and Hellenic Petroleum, a new (IPP) in Greece, advising on market rules and regulations, prices, demand and supply forecasting, supply business establishment, the contracts and risk management, gas contract negotiation, transmission and connection, IT strategy, market modelling, RFP documentation and evaluation of the O&M contract tendering.

## Due diligence market advice

ECA due diligence work including price forecasting, regulatory and market risk analyses and market studies for IPP investments including:

- CCGT investments in Turkey
- Portfolio investor in Turkey
- Turkey lignite plant
- Bulgaria solar PV
- Romania wind farm

## Network pricing and retail tariffs

Our experience includes costing studies, charging methodologies, tariff structuring, affordability analysis and subsidy design.

## Network Pricing Methodologies Review, UK

ECA supported EDF Energy Networks develop its responses to the regulator's proposals for changes in distribution network charging structures, including a critical appraisal of the benefits of moving to more locational pricing of networks relative to the increased complexity and transactions costs of such an approach.

## Electricity markets

Unlike many consultancies, we have no one 'model' for the electricity market: we always tailor our recommendations to the individual objectives and constraints of the market and industry. Our experience extends from initial conceptual designs through to reviewing the performance of operating markets and advising on optimal strategies for participants.

## Wholesale Electricity Market, Ukraine

Supporting an inter-agency committee, ECA analysed proposals for transforming Ukraine's existing power pool into a multilateral contracting market, with particular focus on the impacts on prices and investment. Subsequently, ECA drafted key aspects of the new market rules and codes.

## Other electricity market design work

Bosnia, Cyprus, Croatia, Kosovo, Serbia, Slovenia, Tanzania, Turkey, Zimbabwe

# Selected projects in electricity markets

**Wind power due diligence, Romania** Market study and price forecasting of energy and green certificate markets for large wind farm proposed to be installed in Romania (private client, 2012)

**Solar power due diligence, Bulgaria** Conducted a market study of a proposed solar power plant in Bulgaria, assessing the main regulatory and financial risks of solar power plants in Bulgaria (private client, 2012)

**Review of power market reform, Romania** Major study to review and provide advice to the government on improvements in the approach to power and gas sector reform (World Bank 2011)

**Market due diligence study for generation projects, Turkey** Market study of the electricity and gas markets. The study covered the current and future regulatory framework in electricity and gas, long term scenarios for the electricity market including plant dispatch and market prices. (2010-2011)

**Power Market Study for Maritza East 1, Bulgaria** Study to determine whether a new plant at Maritza East 1 is needed to meet demand growth and maintain an acceptable level of electricity supply reliability (base case analysis), and whether alternative sources of power from imports or from electricity generated from imported gas in a CCGT plant would be more economic than Maritza East 1. (2000)

**Advisory Services to Assist in Privatization of the Electricity Distribution Company in Kosovo.** USAID project supporting the transmission company (KOSTT) in development of the market design and market rules to facilitate privatisation of generation and distribution/supply and to development of new generation capacity (USAID and KOSTT, 2011-12)

**Sustainable energy direct financing facility – Bosnia:** Regulatory and economic advice and analysis on the impact on transmission investment and operation with different levels of wind farm penetration and changes to market rules to accommodate renewables dispatch and trading (EBRD and the Independent System Operator, 2010)

**Feed in tariff design, Albania** Proposed a methodology and appropriate level of feed-in-tariffs which provides the necessary returns to investors with an acceptable impact on energy users while achieving the Government's targets for RES. This included a review of the guarantees of origin and other renewable energy certificate schemes (EBRD, 2010)

**Energy pricing study, Saudi Arabia.** Advice on domestic pricing policies, covering gas, oil and petrochemicals and taking account of production costs, exports and domestic market development (2007-2008)

**Sustainable energy market demand assessment, Egypt:** supporting EBRD to develop an entry strategy in Egypt by identifying potential renewable energy and energy efficiency investment projects. Tasks include a review of energy market structures, prices and dynamics and assessing existing funding mechanisms and regulatory frameworks. (EBRD, 2011-ongoing)

**Power Masterplan, Georgia:** Part of a team assessing the potential for Georgia to export power to Turkey. Tasks included reviewing Turkey's power demand and supply forecasts and Azerbaijan's future gas market developments and their impact on Turkish power prices (World Bank, 2010)

**Advice on capacity mechanisms for the Philippines.** World Bank project advising government, regulator and other stakeholders in the Philippines on capacity mechanism options to improve capacity adequacy and reserve against increased renewables penetration in the Philippine Luzon and Visayas locational gross pool market systems. (World Bank and Govt of Philippines, 2011)

**Market Study for CCGT plant, Turkey:** Advice on market mechanisms within which the planned CCGT power plant would be selling power and purchasing gas. Also provided gas and power price forecast (2009)

# Gas

Our corporate and multilateral bank clients for gas sector advice include:

*British Gas Storage*

*BG Transco, UK*

*GDF SUEZ*

*MMBF, Hungary*

*Mytilineos S.A*

*Shell*

*TXU Eastern Power and Energy Trading*

*Asian Development Bank*

*EBRD*

*European Commission*

*Global Environment Facility*

*Infraco*

*KfW*

*World Bank Group*

## Range of services

Our gas work involves the full range of our services, but with a particular focus on:

- Gas markets
- Gas economics from well-head to customer
- Security of supply issues
- Project appraisals and support

## Commercial advice

Samples selected from our projects include:

### **Gas Storage: Central and Eastern Europe**

ECA advised GDF SUEZ on the prospects for gas storage development in Turkey, Greece and Hungary, identifying the key issues in each market, reviewing the regulatory and commercial environment, using annual gas supply-demand modulation models with daily resolution to quantify the need for storage, and mapping this to project opportunities identified.

### **Economic advice on a tax case**

ECA is providing economic advice to the Australian Government in a Federal Court case on gas tax.

### **Central Europe: Gas Storage Analysis**

ECA provided a market analysis for the investor to provide to lenders in support of a major underground gas storage project. The full market analysis supported by modelling covered both strategic and commercial storage, prices and economic value, risk analysis and drivers of competitiveness.

## Policy advice

ECA has advised governments, development banks and regulators extensively on gas sector policy, planning and market issues, including gas security of supply, particularly in Europe.

### **South-East Europe Gasification Study**

In this landmark study for the World Bank (publication forthcoming by ESMAP and PPIAF), ECA advised on what has become the blueprint for the development of the gas market in South-East Europe. The study covered demand potential, supply options, and the engineering and economic aspects of transmission, storage and distribution as well as institutional and regulatory considerations.

### **Egypt: Economic Cost of Yet-to-Find Gas**

For the World Bank, ECA advised the Ministry of Petroleum and EGAS on the economic cost of gas. Becoming a key LNG exporter has linked Egypt to world market prices. ECA developed a Monte Carlo model based on geological meta-data and an expert review of the proven, possible and probable gas reserves in Egypt to estimate the economic cost of Yet-to-Find gas at the well head. ECA developed and delivered to the client a documented gas pricing model of the economic costs along the domestic value chain to offtake points on the transmission network and distribution network. Our presentation to the Prime Minister and four ministers, advised on the price signals needed for private investment in Egypt's gas sector.

# Regulators

## Our regulatory clients include:

*Agency for the Regulation of Natural Monopolies (Kazakhstan)*

*Electricity Authority of Cambodia*

*Electricity Regulatory Authority of Vietnam*

*Energy Market Regulatory Authority (Turkey)*

*Energy Policy and Planning Office (Thailand)*

*Energy Regulatory Authority (Mongolia)*

*Energy Regulatory Office (Kosovo)*

*Ethiopian Electric Agency*

*Gas and Electricity markets Authority (Ofgem, UK)*

*Lesotho Electricity and Water Regulatory Authority*

*National Electricity Regulatory Commission (Ukraine)*

*Natural Gas Authority, Israel*

*Northern Ireland Utility Regulator*

*Regulatory Authority for Energy (Greece)*

*State Energy and Water Regulatory Commission (Bulgaria)*

## Range of services

ECA has a very strong track record advising electricity, gas and multi-utility regulators, advising on policies to encourage private sector investment across all of the infrastructure sectors, particularly in developing country and emerging market environments. ECA also has experience advising corporate clients on issues of regulatory economics. The advice to EdF Network Energy in the UK (see the electricity section in this document) is one example of this. Others are included below.

## *Marginal Costing of Electricity in Greece*

For the Greek energy regulator, RAE, ECA calculated the long-run marginal costs of electricity supply at different voltage levels in order to assess this against current tariffs. This included construction of customised charging models, subsequently provided to RAE.

## *Regulatory Advice in a Developing Gas Market*

Under several contracts, ECA helped the Natural Gas Authority on regulate and develop the natural gas network in Israel. Advice concerned commercial, financial and regulatory matters related to transmission and distribution contracts, pricing, charges and tariffs. ECA advised the Natural Gas Authority on gas purchase in Israel as part of possible restructuring of the gas transmission and distribution markets and on the process of new entry distribution licenses.

## *Security of Supply, Turkey*

There has been recent concern that generation investment in the Turkish electricity market is not meeting demand growth. We reviewed the current demand-supply situation and market design and recommended on the introduction of a system of capacity obligations backed by long-term capacity contracts. We also identified short-term actions to address immediate supply shortfalls.

## *Competitive Generation Market, Vietnam*

We have been supporting the regulatory agency throughout the development of Vietnam's competitive generation market. This support extends from the initial conceptual design as a cost-based power pool through to drafting of rules, codes and contracts and up to the implementation of the new market.

## **Various projects on Public-Private Partnerships**

ECA has advised a number of government agencies responsible for regulating PPPs or to create the conditions that will encourage private investors to enter markets for the first time to invest in infrastructure, while protecting the public interest. Examples include:

- PPP Policy and Toolkits - Tamil Nadu, India
- Power and water regulatory models – Lesotho
- Improved governance – Cambodia
- Communal services - Macedonia

# Banks and international agencies

## Our bank clients include:

*African Development Bank*

*Asian Development Bank*

*EBRD*

*European Commission*

*Global Environment Facility*

*IFC*

*Infraco / Eleqtra*

*JBIC*

*Marguerite Fund*

*OPIC*

*Socgen*

*UniCredit*

*WestLB*

*World Bank Group*

## Range of services

ECA has a well-established track record providing technical assistance and policy advice supported by the major multilateral banks and donor agencies, including The World Bank and its sister organisation the International Finance Corporation, the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank and the Japan Bank for International Cooperation. Examples of this work follows.

### **Potential of Regional Power Sector Integration**

This major study for ESMAP involved 12 case studies of regional power schemes from around the world and a review of the literature on regional power. These materials were then used to compile a guide on the planning and financing of regional schemes, the link between integration and market reform, the harmonisation of regulations, regional institutions and environmental considerations.

### **Black Sea Transmission Ring**

ECA prepared an assessment of the cost savings and increased supply security that greater interconnection between countries bordering the Black Sea could be expected to deliver, under various scenarios for demand and capacity growth. The results have been used as inputs to appraisals of various regional transmission projects.

### **Gas storage economic assessment, Turkey**

For BOTAS and the World Bank ECA assessed the economic and financial viability of a large gas storage project in Turkey to provide seasonal and short term storage capability for BOTAS, the national transmission and import company.

### **Yemen Gas-to-Power Project**

ECA developed the economic and financial case for use of gas reserves in a new CCGT and the design of an accompanying transaction structure suitable for competitive tendering.

### **Assessment of Energy Security and Sustainability in East Asia and the Pacific**

This assignment for the World Bank covered electricity, oil, natural gas and coal in the EAP region: Cambodia, China, Indonesia, Laos, Malaysia, Mongolia, Papua New Guinea, Philippines, Thailand, Timor Leste, Vietnam, and the Pacific Island countries. ECA established an evaluation framework and developed a policy assessment model.

### **Western Balkans Sustainable Energy Financing Facility**

ECA provided institutional support to this EBRD-sponsored facility for RES projects. Services included assessment of legal, technical and regulatory constraints and analysis of project impacts on the operation and costs of electricity systems in target countries.

# Clients

## Selected clients/example projects

### **United Kingdom Department of Trade and Industry: Social Tariffs**

*We reviewed the costs and benefits of mandatory social tariffs for energy customers and how these might be implemented without undermining the competitive energy market*

### **Egyptian Electricity Holding Company: Time of Use Pricing**

*We prepared new time-of-use prices for electricity customers accompanied by contracts designed to create incentives for demand-shifting by major energy consumers*

### **Global Partnership for Output Based Aid (GPOBA): Yemen Urban Water Affordability**

*We have developed an output-based aid mechanism to deliver subsidies for private sector investment in water supply services in un-served and under-served areas near major cities.*

## **Companies and enterprises**

AES Corporation (United Kingdom)  
BG Storage and BG Transco (United Kingdom)  
EdF Energy Networks (United Kingdom)  
Egyptian Electricity Holding Company  
Electricity Authority of Cyprus  
Electricity of Vietnam  
Elektroprivreda Srbije (Serbia)  
EnTec Inc (United Kingdom)  
Energiaki Thessalonikis S.A. (Greece)  
GDF SUEZ ; Georgian International Oil Corporation  
HE&D (Greece) ; Kenya Power & Light Company  
Logica (United Kingdom); Mytilineos S.A. (Greece)  
Nigerian National Petroleum Corporation  
National Transmission and Dispatch Company (Pakistan)  
PetroBangla; PetroVietnam  
Saudi Aramco;  
Shell / SPDC (Nigeria)  
SNC-Lavalin (Canada)  
State Power Corporation (China)  
TXU Eastern Power and Energy Trading Ltd (UK)  
Zimbabwe Electricity Supply Authority

## **International financing institutions and agencies**

African Development Bank  
Agence Française de Développement  
Asian Development Bank  
Department for International Development (UK)  
European Agency for Reconstruction  
European Bank for Reconstruction and Development (EBRD)  
European Commission  
Global Environment Facility  
Global Gas Flaring Reduction  
Global Partnership for Output-Based Aid  
GTZ (Germany)

Infrastructure Consortium for Africa  
Japanese Bank for International Co-operation  
KfW (Germany)  
Know How Fund (United Kingdom)  
Public-Private Infrastructure Advisory Facility  
World Bank Group

## **Regulators**

Agency for the Regulation of Natural Monopolies (Kazakhstan)  
Commission for Energy Regulation (Ireland)  
Croatian Energy Regulatory Agency  
Egyptian Water Regulatory Authority  
Electricity Authority of Cambodia  
Electricity Regulatory Authority of Vietnam  
Energy Market Regulatory Authority (Turkey)  
Energy Policy and Planning Office (Thailand)  
Energy Regulatory Authority (Mongolia)  
Energy Regulatory Commission (Armenia)  
Energy Regulatory Office (Kosovo)  
Ethiopian Electric Agency  
Israel Natural Gas Authority  
Lesotho Electricity and Water Regulatory Authority  
National Electricity Regulatory Commission (Ukraine)  
Northern Ireland Utility Regulator (UK)  
Gas and Electricity Markets Authority (Ofgem, UK)  
Oil and Gas Regulatory Authority (Pakistan)  
Public Utilities Commission of Sri Lanka  
Regulatory Authority for Energy (Greece)  
State Energy and Water Regulatory Commission (Bulgaria)

## **Governments**

Baltic Council of Ministers  
Economic Community of West African States  
Governments of Australia, Bangladesh, Botswana, Bulgaria, Cambodia, China, Indonesia, Kazakhstan, Lithuania, Malawi, Mozambique, Tamil Nadu (India), Tanzania, Thailand, Turkey, Ukraine, United Kingdom, Zambia and Zimbabwe

# Our senior experts

## **Ray Tomkins** Managing Director

Ray established ECA in 1997. His professional career spans 35 years and includes founding the Energy Policy Research Group at Imperial College, University of London and the energy and environment practice at ERM and London Economics. He leads much of ECA's PPP work including in Angola, Bulgaria, Cambodia and India.

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## **Paul Lewington** Director

Paul has over 25 years experience as an energy economist. He is an expert on pricing and cost analysis, recently leading projects on the development of long-run marginal cost estimates for the Greek energy regulator, time-of-use prices for electricity in Egypt and gas pricing strategy in Saudi Arabia.

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## **Ian Rowson** Director

Ian has over 25 years professional experience as regulatory economist and Chartered Accountant. He is an expert on incentive-based regulation and price control, including valuation and the cost of capital. He has worked with regulators extensively in the UK, Ireland and elsewhere.

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## **Dr Peter Robinson** Director for Africa

Peter has close to 30 years experience as a consultant in energy, water and telecoms. Based in Zimbabwe for many years, Peter recently moved to London but maintains a strong focus on Africa. He has worked with senior officials in many countries and has advised several regional institutions on the delivery of energy, water and urban services.

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## **William Derbyshire** Director for Asia

William has 15 years experience in consulting on utility regulation and energy markets. He has been a long-term advisor to the electricity regulatory agencies in Kosovo and Vietnam as they introduce new power markets. William is based in our Bangkok office.

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## **Robert Barnett** Senior economist

Robert has 16 years experience in energy economics in both electricity and gas, specialising in regulation, market design and price forecasting. He has been working extensively on renewables issues in the Balkans as well as on due diligence support for a number of IPP projects in both the renewable and conventional investment fields in Turkey, Bulgaria and Romania.

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