



# Energy consultancy and research centre

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**REF-E srl**

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## EXCELLENCE IN ENERGY MARKETS

REF-E operates in energy markets and provides research and customised consulting services, independent market observatories, training. It supports companies, institutions, government bodies in their decision making processes.

## REF-E: HIGH STANDING, EXPERTISE AND INDEPENDENCE

REF-E high standing, expertise and independence, built up through a long experience in energy markets, are widely recognised today by corporations and institutions.

REF-E furnishes competition and regulatory analysis, price forecast scenarios and support for investment decisions and policy-making to its clients, with its hallmark qualities of independence, professionalism and expertise. It also facilitates dialogue between industry and institutions in Italy and in the world.

## 4 WORDS FOR REF-E

	such as <b>economics</b>	independent analysis, underpinned by solid understanding of the fundamentals
	such as <b>engineering</b>	technical expertise, to handle complex modelling
	such as <b>energy</b>	a sector that is constantly changing for the environment
	such as <b>environment</b>	to meet the challenges of the futures

## REF-E, MORE THAN FIFTEEN YEARS OF EXPERIENCE IN THE ENERGY MARKETS

With its great experience built-up over the years, REF-E is able to advise you with a highly advanced knowledge of energy markets.

By putting each and every customer at the top of its priority list, keeping up-to-date with new legislation and generating new solutions, REF-E offers its clients a broad range of services in all energy sectors for both strategic and operational purposes, which can be tailor-made to suit all requirements.

Sectors	Subject Areas
<ul style="list-style-type: none"><li>• Electricity</li><li>• Natural Gas</li><li>• Renewable Electricity Sources</li><li>• Renewable Energy Thermal Sources</li><li>• Climate and the environment</li><li>• Energy Efficiency</li><li>• Transport</li><li>• Oil and Fossil Fuels</li></ul>	<ul style="list-style-type: none"><li>• Public Policies</li><li>• Network regulation</li><li>• Market Design and Auction Design</li><li>• Forecasting models</li><li>• Antitrust Policies</li><li>• Litigation</li><li>• Corporate Strategies</li><li>• Risk Management</li><li>• Gas distribution tender process</li></ul>

## RESEARCH AND CONSULTING

We provide private companies, institutions and public bodies with medium-term scenarios, research and forecasting tools for individual sectors, evaluations of economic policy impacts and micro-simulation. Our assessment of the positioning and strategies of our clients is based on consolidated experience in research and consulting in many fields of economic analysis.

REF economists work jointly with major universities and our research activity is consequently based on the most advanced analytical tools.

### □ **Basic Research**

The aim of our research is to interpret and predict current transformations in energy markets, focusing on global, regional and sectorial aspects. We have been building our databases for macro and micro variables and constructing interpretative models and original indicators for around 30 years now.

### □ **Real time support**

Researchers and consultants at REF-E are constantly available to clients who require up-to-date information or wish to discuss changes in the economic and regulatory environment as they occur.

### □ **Consultancy**

We employ original methods and carefully targeted analysis to meet the knowledge requirements of our clients. Sector models are employed to track the positioning of individual companies on a series of reference variables and to forecast changes for different possible scenarios. Advice and training on project analysis and development are provided to the management of production units and companies in the public and private sector. The skills of economists, engineers and lawyers are all brought to bear.

## THE OBSERVATORIES

REF runs permanent observatories which monitor change as it occurs and provide members with an independent forum for discussion with policy makers.

Participants in observatories receive the following services: newsletters, consultancy on the interpretation and impact of economic and sector policy measures, access to selected information (data banks, chart-books, legislation international comparisons).

## TRAINING

Seminars are regularly organised for members of observatories and other clients who are interested. Activities in seminars include the presentation, evaluation and discussion of research reports, policy options, scenarios and forecasts.

Training often forms part of research and advisory programmes implemented in companies and management schools. Young graduates entering the research market are offered work experience and training is provided for company staff. Training is performed by inserting trainees in research projects and continuous programmes.

## A WIDE RANGE OF PRODUCTS AND SERVICES FOR ENERGY MARKETS

**Practical experience**, acquired through continuous work in industry and institutions, a **network of international contacts**, developed over the years through high level and independent participation in discussion on current issues, **knowledge of the latest theories** maintained constantly up-to-date through active participation in academic debate: these factors enable **REF-E** to provide its clients with a global strategic vision and expert support in decision-making and relations with institutions.

In-depth understanding of all energy sectors enables **REF-E** researchers to offer a wide range of services and products.

PRODUCTS	PUBLICATIONS	MODELING TOOLS
Energy observatory	Osservatorio Energia Newsletter	ELFO++/ ELFO++ Europe
Multi-client projects	Energy Outlook	CAST
Market Analysis	Energy Report	Step
Business plan	Working Papers	Idem
Indexes		Gipssy
Databases		Gasp
Training		Co2
Monitoring heating & cooling		GreeT
REF-E Scenarios		
Seminars and meetings		
LNG end use Observatory		
Market Strategy Services - Analytics Reports		

Our **Products** to solve operational and strategic problems are customised to meet client requirements.

Our **Publications** to provide full and constantly up-to-date technical knowledge, available to everybody

Our **Modeling Tools**, the result of our advanced modeling skills acquired and employed over the years by REF-E professionals, are released on a standard or tailor-made basis.

### ENERGY OBSERVATORY

Created in 1999, the Energy Observatory is financed by producers, energy product suppliers and investment banks. A broad range of periodicals and publications provides members of the Observatory with fundamental support and constantly up-to-date information, designed to meet different needs for knowledge and in-depth analysis of the energy sector.

#### Periodicals

- **Energy Observatory Newsletter**, a monthly in-depth focus on changes in the energy sector in Italy and Europe. It features in-depth analysis on regulatory changes, on mergers, acquisitions and corporate ownership, on the creation of a regulated market and on tariff and price trends on the main European electricity and gas exchanges. It also provides forecasts of the main market indicators.
- **Electricity Outlook**, a four-monthly forecasting periodical for the electricity and the gas market, based on the Elfo++ model, the leading tool of its kind in Italy, developed in-house by REF-E for its clients. It identifies demand and supply patterns and gives forecasts of production costs, competitive prices (at both national and zonal level) and the potential impacts of the strategies of major companies, in the light of structural and regulatory conditions.

#### Other publications

- **Energy Report**, an annual report which provides in-depth information on trends and outlooks for electricity, natural gas and renewable power generation sectors, through an analysis of the regulatory framework and market structure in Italy and Europe. It contains medium term market scenarios.
- **Weekly Report on Energy Exchanges** constantly updates prices and volumes on Italian and European energy market
- **Working Papers**, in depth studies which address current issues in the Italian energy sector, based on the theoretical literature. The papers analyse policy issues currently subject to debate, methodology and details of market analysis, authorisation and institutional matters and scenario creation.

#### Services

- **Databases** allow advanced access to many complex data gathered in the years and constantly updated.
- **Discussion Seminars** on scenarios and developments on energy markets, allow debating in the context of regulatory changes.
- **Phone consulting** allows easily and continuous contacts with REF-E researchers.

## MULTICLIENT PROJECTS

REF-E employs a multi-client project methodology to address issues which require deeper levels of analysis. With its widely recognized high-standing and impartiality, REF-E is able to promote discussion between institutions and companies on the results of different policy scenarios.

Recent projects include the following:

- LNG end use supply chain
- implementation of the new mechanism of natural gas balancing market in Italy
- evaluation of district heating networks
- dispatching market reform and integration of renewable energies
- capacity payment: available mechanisms and the Italian market
- a new design for the Italian natural gas balancing market
- the reform of green certificate mechanism: cost benefit analysis
- the evolution of natural gas spot market: Italy in the European panorama
- the splitting of the North Zone: cost benefit analysis for the Italian power market

## MARKET ANALYSIS

REF-E advises the Italian Energy Authority and provides quarterly analyses and forecasts based on medium-term consensus scenarios.

REF-E experts develop scenarios for major energy players on a regular basis and produce in-house forecasting models for the energy sector and provide clients with in-depth studies of changes on energy markets with their Energy Observatory.

## ASSESSMENT OF NEW INVESTMENTS AND BUSINESS PLAN

Over the years REF-E has provided support to major national and international companies, such as API, Tirreno Power, ExxonMobil and others, particularly in renewable energy sector, with their investment decisions.

REF-E uses these forecasts to assess investment risks and opportunities in the power and gas sectors and in new technologies for renewable power and heat generation. Forecasts and scenarios are key words on energy markets:

- electricity prices forecasts
- green certificate price forecasts
- forecasts of changes in incentive schemes for renewables
- gas and fuel price forecasts
- forecasts of allowed revenues in regulated businesses.

REF-E develops **scenarios** as follows:

- **market structure and regulatory framework** scenarios as key factors for assessing investment opportunities both in regulated and free market environments
- **short and medium-term scenarios** are designed to support the supply policy decisions of companies, in view of regulatory impacts and short-term trends in fundamentals
- **long-term scenarios** to provide technical and operating assessments of power generation and infrastructure development projects. These consider risks attaching to changes in the sector and provide a fundamental input in the preparation of business plan and investment decisions.

## INDEXES

### □ L-MED

**L-MED index** is the first price reference for spot LNG (DES) cargoes in the Mediterranean basin, designed to reflect the competitiveness between alternative destinations (Asian and main European Hubs) and the interfuel competition.

### □ ITEC/REF-E

**ITEC/REF-E** is an index of the average cost of thermoelectric production using Platts data updated monthly on the basis of changes in fuel prices. ITEC/REF-E is useful as a benchmark for long-term contracts.

### □ ITEC12/REF-E

The new index **ITEC12/REF-E** takes into account the change in the Italian generating mix, in the procurement strategies and in the commodity indexation formulas.

The new index, constructed using Platts data updated monthly, is defined both by a simple formula and includes a spot component in the CCGT supply costs.

**ITEC/REF-E and ITEC12/REF-E** ensures reliability, transparency, simplicity, cost reflectivity and independence; the indexes are constructed using widely traded commodities on the international markets thereby guaranteeing low hedging costs. Final updates along with first and second line forecasts are published through [www.ref-e.com](http://www.ref-e.com), Il Sole 24 ore and Quotidiano energia.

ITEC/REF-E and ITEC12/REF-E indexes are trademarked products and may be used subject to license agreement.

### □ MAGI\* (Indice Month Ahead Gas Italia)

The **MAGI** is an independent, reliable and transparent index of the month ahead Italian gas price at PSV, based 70% on confirmed transactions and 30% on a market-wide survey. **MAGI** will reflect the fundamentals of the Italian gas market as they are understood in the month prior to delivery and will allow all market participants to express their view of the index value through the transactions that they execute and through the bids and offers they make.

This robust index creates the possibility either for consumers to buy gas or for producers to sell gas at a reliable market price and gives market participants the possibility of using financially settled swaps to hedge market exposure in a credit-efficient manner.

**MAGI-Q** is a quarter ahead index aligned with the frequency of the market component of the residential gas tariff.

MAGI and MAGI-Q indexes are published through [www.MAGIndex.org](http://www.MAGIndex.org), GeEO Italian Gas & Power, REF-E Energy Observatory and selected specialist Italian newspapers and trade publications.

\*(MAGI is a trademarked product but may be used subject to license agreement).

## DATABASES

REF-E constantly updates its databases on energy market structure and costs. They include the following:

- **Hydroelectric concessions mapping:** a unique, complete and up-to-dated database, enabling to map and analyse Italian concessions for large water flows diversion for hydroelectric production. The coverage of the database is above 95% of the total installed hydroelectric capacity in Italy, REF-E collected and mapped a rich information set for each concession.
- **Data:** all the information publicly available on the electricity market is gathered in one easy reference tool. Continuous maintenance assures completeness, accuracy, integrity and maximum possible granularity, while customisable interfaces assure maximum usability. The data cover the period from 1 January 2009 until the last day available. They are updated daily and are provided for each market area and each individual hour of trading.
- **Thermal power generation fleet:** list of thermal power plants, identification data, technical data, date of entry into service and of decommissioning or stage reached in authorisation procedures, estimated emissions levels, estimated costs (investment, capex and opex) according to the plant technology
- **Hydro power generation fleet:** list of hydro plants classified on the basis of whether they use dams, are run-of-the-river facilities, or are pumped-storage plants, identification data, topology of the valleys, technical specifications, seasonal variation in rainfall obtained from averages over the past 30 years, both in the Alps and in the Apennines
- **CIP6 power generation fleet:** list of "CIP6" incentivised scheme power plants, identification data, commissioning date, start and end date of CIP6 agreements/incentives, technical specifications, annual output. Forecast of hourly generation profile for CIP6 plants aggregated by zone
- **Renewables:** list of renewable energy powered units (>2MW in size), identification data, technical data, estimate of annual output. Forecast of hourly generation profile for total renewable plants by zone. Forecasts of medium to long-term trends for renewable generation. Wind speed measurements for different locations in Italy. Estimate of typical electricity output profiles for mini-hydro and run-of-the-river plants and for wind farms in different regions of Italy. Estimated investment costs and capex and opex
- **Transmission grid:** limits on interconnections between zones based on the current zonal market structure and estimates of the impacts of future intervention to strengthen the national transmission grid on the zonal structure of the market
- **Demand:** future scenarios of hourly demand at national and zonal level
- **M&A activities in Europe:** list of mergers, acquisitions or joint ventures involving companies, plants or planned plants concluded by or between companies operating in the natural gas or power industry, located in Europe (inclusive of all EU member states, Switzerland, Norway, Eastern Europe and Balkans countries), Turkey or Russia. The database includes information on the following for each transaction: shareholdings, dimensions of the plant acquired, price paid, main operating and capital figures for the company acquired, technical specifications of the plant and any other useful variables.
- **Wholesale gas prices:** main references for the gas prices observed in Italy and in some European countries. The database collects data regarding both spot and forward transactions on over-the-counter and organized markets, as well as oil-indexed price formulas and official surveys on the gas prices at some European borders
- **Gas distribution:** the database covers all Italian municipalities with detailed information regarding the active distribution company, the RAB (regulatory asset base), economic, demographic and geographic variables. Moreover each municipality is associated with the corresponding ATEM

- **Gas import contracts:** the database collects data regarding gas import contracts lasting at least one thermal year. Each contract is identified through the identity of the buyer and the seller, the entry point at the Italian border and the average contracted quantity, according to the information provided on the specialised press.

## TRAINING

REF-E organises training courses on energy market subjects for companies and tailors them to meet the needs of individual clients, adapting them for different requirements. They include training for new recruits and specialist and refresher courses for senior management.

Subjects covered include:

- **energy sector liberalisation:** from the economic theory to actual practice
- **power and gas markets**, what they are and how they work (energy product exchanges, OTC markets, derivatives markets) and how dispatching and congestion are managed
- **renewable energy sources:** how to assess the impact of Italian government policies on costs and prices, renewables and new unbalancing regulation
- CO2 market and EU ETS systems
- **regulation in the liberalisation era** (the roles of national regulatory and antitrust authorities, methods of regulation and price cap mechanisms, tariff setting in Italy)
- methods for modelling and forecasting power supply and demand.

Each course can be arranged in the following editions:

### Company edition

- participants are from the same company
- custom programme
- schedule agreed with the client

### Inter-company edition

- participants are from different companies
- standard programme
- schedule set in line with REF-E's organizational requirements

**Venue:** REF-E office in Milan (can also be held in the clients' premises if requested, option only available for company edition)

**Languages:** Italian (English on request)

## LNG END USE SUPPLY CHAIN

**LNG end use supply chain** is taking its first steps in Italy. Increasing developments are expected with the new Legislative decree and the LNG national framework, adopted in implementation of Directive 2014/94/EU.

The **target sectors** are maritime transport, heavy road transport, and off-grid industrial and civil users, representing about 11% of the country's final consumption, which could be largely covered by natural gas through the direct use of LNG.

However, the spread of LNG end-use requires overcoming the **infrastructural gap** in the first link of the distribution chain, with possible operations at existing terminals and the creation of an intermediate coastal storage network.

**LNG end use Observatory** aims to support players and policy makers promoting dissemination of knowledge, and the analysis

- of the market trends and infrastructure development
- of the impact of legislation and regulatory acts
- of competitiveness in the target sectors and infrastructure projects

## MARKET STRATEGY SERVICES - ANALYTICS REPORTS

### Gas Watch

**New bimonthly Gas report** aimed to provide fundamentals analysis and price analytics, with the specific purpose to support market strategy, portfolio & risk management decisions or trading strategies.

It explains the current trends and the possible market evolution to highlight market opportunities, especially, but not only, on the Italian hub.

### LNG Watch

**New monthly LNG** business intelligence service aimed to provide fundamentals analysis, price analytics and strategic outlooks on worldwide LNG markets, with the specific purpose to support market strategies evaluations, portfolio & risk management decisions or trading strategies.

It is a tool, complemented by our **Gas Watch** service, which helps to follow the current LNG trends, both on production and demand side, mainly to understand and predict possible market evolution and interactions on the European markets.

## MODELING TOOLS

REF-E has employed its **multidisciplinary skills** in economics, econometrics, engineering and statistics to develop in-house **forecasting models** for the energy sector, for both forecasting and risk analysis purposes:

### Elfo++, Electricity Forecast

The leading model for simulation of the power generation market and wholesale price forecasts. Its main features are as follows:

- variable time horizon: week, month, year, several year
- complex electric system that can be extended to the European dimension
- can be adapted for international markets
- modeling for bidding strategies by market players
- interface based on database with advanced functions
- robust algorithms and fast processing times
- tools for post processing of results

### Elfo++ tools

Elfo++ tools offer a wider and even more user-friendly processing of results:

- **Elfo++ Sensitivity** to easily perform price sensitivity analysis with respect to demand, fuel prices and other key drivers.
- **EPTP** to assess the optimal strategies to maximize the profits of a price taker company.
- **Elfo++ Short term** for simulation of the short term market scenario
- **Elfo++ Webapp** is the web application for Elfo++ that offers to new clients an easy and improved access to the scenario analysis tools

### ELFO++ Europe

ELFO++ Europe is the advanced version of ELFO++ designed to simulate the European market coupling on different time horizons (short, medium and long term).

Due to the “interior point” optimization method implemented the new calculation engine of ELFO++ Europe is able to:

- model the European electricity interconnected system with no theoretical limits on the size of the fleet and of the network represented
- model the ramping constraints of single thermal generation units
- nonetheless the complexity of the underlying system, solve the optimization problem with very efficient run times
- The new input database maintains the same structure and format of ELFO++. The perimeter of European markets covered in the currently available version of ELFO++ Europe comprises the Central South area of continental Europe and includes Italy, France, Germany, Austria, Switzerland, Slovenia, Luxembourg, Netherlands and Belgium. The model consists of 19 market zones (11 Italian zones and 8 for each of the other European states considered) connected through 23 equivalent lines, around 700 thermal power plants, 60 equivalent hydro generators and more than 120 equivalent generators for the rest of the energy sources (nuclear, renewable, small thermal and net import from the adjacent areas).

### **CAST (CApacity Strategic Tool)**

Now, with the go-ahead from the European Commission, the capacity market could constitute a turning point, after a long deadlock.

The first auctions are expected to be held by the second quarter of 2017, with delivery taking place as early as the second half of the year.

The objective of the CAST model is to support operators participating in Italian capacity market auctions, when the bid strategies are defined and the opportunities and risks connected with the mechanism are assessed.

The CAST model enables operators to:

- simulate capacity market auctions
  - by simulating the capacity supply and demand curve
  - by estimating the balance at the outcome of the auction
- estimate the potential effects on other market phases
- discuss the expected risks based on appropriate assumptions about key variables.

The advantages of the CAST model are:

- its user-friendliness and immediacy
- the stability guaranteed by the Elfo++ structural model and the REF-E database
- the reliability it offers in preparing the auction bid strategy and assessing the opportunities and risks associated with participation.

### **STEP (Short Term Electricity Price)**

An econometric model for short term forecasts of electricity prices.

### **IDEM (Italian electricity DEMand)**

A forecasting model for national and local electricity demand.

### **GIPSSY (Gas Import Production and Storage System)**

A model for simulating and forecasting the Italian natural gas market.

### **GASP (natural GAS Price)**

An econometric model for forecasting natural gas prices in Italy.

### **CO2 (demand and supply forecast)**

A forecasting model for CO2 prices and supply and demand scenarios.

### **GreeT (Green Tariffs)**

A model for generating green scenarios: growth in supply by source, plant location, returns, compliance with international objectives.

**REF-E** models are used for in-house **research activity and specialist consulting** services or supplied by means of **end user license agreements** to operators who may use them autonomously for support in **trading** and **planning activities**. **REF-E** constantly updates the input database and carries out maintenance to correct and develop the software, to transform **forecasting models** into **efficient and highly customised tools**.

## SUBJECT AREAS

### Public policies

REF-E has been monitoring changes in energy and climate policy in Europe and Italy for over fifteen years. It provides fundamental support to investors who operate in a constantly changing political and regulatory framework through REF-E publications and studies.

REF-E expertise covers issues in the following sectors: electricity, gas, oil, the development of new renewable technologies and energy efficiency.

**REF-E modeling tools** enable it to support clients to **evaluate investments in energy infrastructure** on the basis of current and future energy policies.

REF-E analysis can be used to support **strategic marketing decisions** both in **liberalised wholesale markets** and in **regulated market segments**.

**Multi-client projects** provide in-depth analysis of **market design** and **regulatory impacts** and support for discussions between industry and institutions.

Since 2012 **REF-E** has joined a consortium qualified by the **European Commission - DG Energy**, regarding a framework agreement (Multiple Framework Service MOVE/ENER/SRD.1/409-2012 Lot 2) for the provision of **economic studies** in order to support the preparation of the European Union policies and legislative proposals on the energy markets analysis, supply security, role of conventional and non-conventional fossil sources, sustainable and efficient production, grids and smartgrids.

### Network regulation

In-depth understanding of Italian and international regulatory models, acquired in part through working with the regulators themselves, enables **REF-E** researchers to perform the following:

- assessment of **regulatory impacts** on investment plans and future earnings
- **regulatory due diligence** services for investors and lenders
- support for regulated companies in dealings with **Regulatory Authorities**
- assessment of strategies in **tender procedures** for natural gas **distribution concessions** at local level (**ATEM**)

REF-E's **expertise** and **independence in the provision of expert opinions** on the interpretation of regulations and network codes are widely recognised.

### Market design and auction design

Monitoring market design issues and analysing the impacts on power and gas market structure form part of REF-E's ongoing activities, which include monitoring gas and power markets.

REF-E facilitates discussions and the selection of the most efficient solutions through its multi-client projects at a time of important changes in market regulation and legislation, by providing an objective basis for discussion and an analysis of best international practices.

### Forecasting models

REF-E develops in-house **forecasting models** for the energy sector, for both forecasting and risk analysis purposes.

REF-E models are **used** for in-house **research activity and specialist consulting** services supplied by means of **end user license agreements** to operators who may use them autonomously for support in **trading** and **planning activities**.

### Antitrust policies

REF-E uses its expertise in modelling and economic analysis to provide high quality **support and advice to companies in their relations with antitrust authorities** and has provided **companies and law firms** with expert advice on economics in antitrust proceedings.

### Litigation

Dispute over contracts are settled increasingly more often today through the involvement of independent experts or tribunals.

Thanks to long **experience, its understanding** of the market and its **models for independent analysis**, companies and law firms turn to **REF-E** - both as independent experts and expert witnesses for clients - in many **national and international litigation proceedings** in a wide range of fields:

- gas **prices** and transport capacity
- **interpretation** of contracts
- expected returns on **investments**
- the regulatory framework
- **the development of tailor-made market models.**

### Corporate strategies

REF-E assists its clients in drawing up **corporate strategies for the energy market**. Its **models and database** are used by both new entrants and incumbents to:

- support **investment decisions**
- **analyse the market**
- make **forecasts**
- prepare **business plan**
- provide **in-depth understanding** of market structure.

REF-E follows and interprets the strategies of the main players on European and Italian energy markets by constantly updating its M&A and gas distributors database and by analysing corporate financial statements.

### Risk management

For use in risk measurement and strategic decision-making for producers, investors and consumers **REF-E** provides: specialist consulting services and **forecasting models** of energy demand and prices.

### Gas distribution tender process

REF-E has been supporting DSOs, investors and utility companies throughout tender procedures for awarding of the gas distribution service.

REF-E can support operators by constantly updating its M&A and gas distributors databases, analyzing corporate financial statements, reviewing regulation, developing market scenarios after the tenders based on a set of proxies (level of fragmentation, size, presence of Post Letta municipalities, strategic interest for national players), and exchanging views with stakeholders and institutions. Through all these activities, REF-E is able to :

- carry out regulatory due diligence for industrial and financial investors
- evaluate regulatory risk
- support investment decisions and business plans' elaboration

## A wide range of expertise



- provide expert advice in antitrust proceedings related to M&A operations
- analyze the level of potential competition in each ATEM and elaborate possible market scenarios after the tenders
- support DSOs to communicate tariff data to the AEEGSI and to check the level of RAB
- organize training courses for DSOs covering topics such as tariff regulation, strategic analysis and business plans' elaboration.

## STAFF

### □ **Pia Saraceno (President)**

She obtained her degree in Economics at the Bocconi University and specialised in development economics at Cambridge in the U.K. She joined IRS in 1976 after a period working for Montedison and became a director in 1980 and president between 1998 and 2000. She was chief executive of REF from 2000 to 2011 and now serves as the chairman of REF-E, following its establishment in 2012. She has also carried out research on macroeconomic analysis and sponsored and advised on research into federalism and technical assistance for transition economies. In 1999 Saraceno set up Osservatorio Energia and began to promote further research into the liberalisation of the energy sector and environmental issues, which in recent years have become her major areas of interest.

She has participated in academic life giving courses at a number of different universities.

Since 2011 she has been teaching Economy of Energy and management of environment assets at the Catholic University of Milan. Since March 26 2013, she has been appointed member of the Board of Directors, as independent director.

### □ **Claudia Checchi (CEO)**

Claudia graduated with a PhD in Economics and Management from the Sant'Anna School of Advanced Studies in Pisa in 2003. In REF-E (formerly REF Ricerche per l'Economia e la Finanza srl) she holds the position of Director of the Energy Observatory and is responsible for the research and forecasting relating to the natural gas market. Her core roles in REF-E are: i) heads up the studies and forecasts on the natural gas market; ii) coordinates the development of provisional models on the natural gas market, which are developed by REF-E; iii) coordinates the Observatory Energy publications. She is a specialist in market design and incentive design, regulation and public policies, modelling of agents' behaviour and market strategies. In previous roles within the company, Claudia has managed several projects working in conjunction with institutions, industries and associations. These roles have allowed her to develop an in depth knowledge of the electricity and gas market and its regulations. In July 2013 has been appointed Ceo in REF-E..

### □ **Virginia Canazza (Partner)**

Virginia obtained her degree in Electrical Engineering at University of Pavia in 2000. Between 2001 and 2007 she worked at CESI Spa (Centro Elettrotecnico Sperimentale Italiano) as researcher and advisor in the field of Electricity Trading and Grid Planning. She joined REF-E in June 2007 and now holds the position of Head of REF-E Electricity and Renewable Department. Her core roles in REF-E are: i) head of research and consultancy activities on analysis, forecasting and simulation of the energy markets; ii) coordinator of Elfo++ development, deterministic simulator of Italian and European electricity wholesale market, and its integrated tools which are developed by REF-E; iii) director of the "Previsivo" of the Energy Observatory; iv) senior expert in electricity market design, regulation and system operations. Virginia has supported many operators in the strategic assessment of new investments, business planning, trading optimization, risk management, antitrust procedures and regulatory issues, with a specific focus on the evaluation of the impact of the new reforms concerning ancillary services market, capacity market and renewable integration.

Teacher at University of Pavia - Faculty of Engineering- Master of Science degree course "Power Systems Management, Automation and Information".

### □ **Sergio Ascari (Senior Advisor)**

Senior Consultant, working mainly with REF-E, in the analysis and modelling of the European gas market and its regulation (since 2009). Has taken part in several projects on behalf of the European Commission, regulators and energy companies about the development and implementation of several aspects of European gas market regulation (Demand, congestion management balancing, tariffs and prices, storage, security of supply, market model, new infrastructure, industrial organisation). Part-time Gas Advisor and Instructor of the Florence School of Regulation, in charge of gas training activities (since 2006). Took part in the development of the Gas Target Model for the European Union integrated gas

market (2011). Gas Expert in the Regulatory Section of the Energy Community Secretariat in Vienna (2007-9), focusing on the Western Balkan gas market. Since 2002, he has worked for the promotion and harmonisation of energy regulation and capacity building and training of energy regulators in Czech Republic, Lithuania, Turkey, Portugal, Ukraine, Egypt, Israel and other countries. Head of Gas Tariffs and economic regulation, of the Environmental Unit and of International Co-operation in the Italian Regulatory Authority for Electricity and Gas (1997-2006). Worked extensively in the 1990's on the evaluation of external costs of energy generation and use, including on behalf of the European Commission. Research assistant, research director and lecturer in Energy and Environmental Economics, in the Institute of Energy Economics (IEFE), Bocconi University, Milan (1982-94), and in the University of Pavia (1994-97). Graduated in Economics at the University of Pavia in 1982; M.Sc. (Econ.), University of York, 1985.

□ **Roberta d'Alessandro (Manager)**

Roberta achieved a degree in Aerospace Engineering in 2008 and a Master of Business Administration in Management and the Economics of Energy and the Environment (MEDEA) at Scuola Enrico Mattei - in Eni Corporate, in 2010. She has worked in Gas and Power industry for several years, in Milan and then in Brussels, both for Portfolio Management & Gas Market Strategy and Gas Trading. She has provided internal advisory services to support upstream, midstream and downstream market strategy and investments decisions in the gas business by sharing market insights and identification of new business opportunities. She has coordinated strategic and technical analysis (on Medium/Long Term view) to support Top Management and business lines through: i) Gas & LNG outlooks in Western Europe; ii) Ad-hoc analysis on Gas&LNG Infrastructures and market disruptions; iii) Leading regular meetings with internal stakeholders and senior management within Trading and Portfolio Management; iv) Developing an European Gas&LNG price and fundamentals forecasting models; v) Evaluating the impacts of the regulation on European gas markets; vi) Supporting the renegotiations on Long Term contracts; vii) Being responsible for the development of an IT centralized Market Intelligence System. Thanks to her experience abroad close to the trading desk, Roberta has developed a market-oriented mindset, with strong skills and competences on the main European gas markets, gaining a strong knowledge and competences on both Northern and Southern European Gas & LNG Markets. In REF-E from June 2016 she is responsible for the coordination of EU Natural Gas and Lng advisory services, the development of European Gas & LNG price forecasting models (Short - Medium Term). She is supporting the activities on gas trading strategies and risk management and she is also involved for Osservatorio Energia publications.

□ **Donatella Bobbio (Expert)**

She received her master degree in 2007 in Economics, Institutions, Environment and Territory at Turin University. She worked for the research centres of Unione Industriale of Turin and Unioncamere Piemonte, dealing with regional economy and internationalization; then she attended in Rome the master Safe about energy resources management. At ref. since September 2009, she works for Osservatorio Energia on renewable energy, environmental markets and tariffs.

□ **Luca Cervasio (Senior Advisor)**

In REF-E since 2012 he is senior advisor in information systems, data analysis and grid computation. Expert in distributed software architecture design and web based information systems. He obtained his Master of Science in Informatics Engineering from Politecnico of Milan with major in Artificial Intelligence and Robotics.

□ **Giacomo Ciapponi (Consultant)**

In 2012, he graduated in Mathematics at the University of Milan, from September 2011 to June 2012 he followed the Master in Economics Program at the Collegio Carlo Alberto, based in Moncalieri (TO). He joined REF-E in 2013 and he works within the Energy Observatory and studies forecasting and simulation models of energy markets.

□ **Andrea Coletta (Consultant)**

He joined REF-E in December 2016, where he is involved for Osservatorio Energia publications in the energy market regulation and district heating and he also works on Italian and European gas market watch. He obtained a M.Sc. in 2016 in Economics, Environment and Territory at Turin University, with a dissertation on energy security and the role of renewable energy sources, in collaboration with ENEA.

□ **Federica Davò (Consultant)**

She joined REF-E in January 2017, where she works within forecasting and simulation of energy markets and updating and simulation of the power generation market scenario. Between 2013 and 2016 she worked at RSE – Ricerca Sistema Energetico, as researcher in the fields of energy market models, wind and solar power forecasting and electricity market price forecasting. Between 2014 and 2016 she did a Ph.D. in Analytics for Economics and Business (AEB) at University of Bergamo, with scholarship funded by RSE. She graduated in Mathematics at the University of Milan in 2012.

□ **Tommaso Franci (Senior Advisor)**

At REF-E collaborates in the study for residential heating and cooling market, and policy analysis in the energy sector. He works in the field of regional policies, authorisation regimes, and environmental conflicts in the energy sector. Has worked with Assoelettrica and the GSE. Senior consultant and researcher for policy analysis in the area of energy and environment. Graduate in Industrial economics and policy at the Facoltà di Scienze Politiche “Cesare Alfieri” in Florence (1991).

□ **Ana Georgieva (Expert)**

She obtained her M.Sc. degree in Chemical Engineering in March 2007 at University of Chemical Technology and Metallurgy – Sofia, Bulgaria. From October 2007 to October 2009 she has followed Management, Economics and Industrial Engineering Master Program at University of Politecnico di Milano, Italy. At REF she currently works with the Energy Observatory on simulation and analysis of energy markets.

□ **Matteo Leonardi (Senior Advisor)**

In REF-E is expert on energy policy and energy markets, electricity market and environmental policy. His core competencies are: impact on the electricity sector of CO2 European policies: short term electricity prices and long term investments implication; evaluation of renewable incentive costs. Impact assessment evaluation of different renewable energy policy options; energy efficiency and renewable thermal incentive mechanisms and their impact in the residential sector; implication of CO2 policy in the transport sector.

□ **Pablo Angel Escibano Martin (Consultant)**

In REF-E since March 2017, he works in the emerging market of the LNG analysing the global flows of production and consumption, focusing mainly in the Mediterranean area with the regional market indicator L-MED. Pablo achieved a degree in Chemistry at the University of Valladolid (Spain) in June 2014, doing the final project in collaboration with the lab LACAM of the university UERN (Brazil), about the potentiality of the biodiesel as an alternative energetic resource. After that, he has obtained a Master at the University of Santiago de Compostela (Spain) in renewable energies and energetic sustainability.

□ **Giorgio Perico (Expert)**

In March 2011, he graduated in Statistics and Economics, with specialization in Financial Markets, at the University of Milan-Bicocca. In 2010, he worked at the same university on a research project concerning the forecast of operators' bid functions in electricity market auctions. Since December 2010, he does research at REF-E in the Energy Observatory, with focus on historical analysis and simulation of electricity markets.

□ **Alberto Rivoiro (Senior Advisor)**

In REF-E since 2008, is a consultant, responsible of the implementation and development of the algorithms used by the structural models of the electric sector and of natural gas (among which Elfo++ and GIPSSY). From 2004 to 2011 he has been a TERNA consultant where he contributed to the building and development of the software implementing the daily Dispatching Services Market(MSD). From 2000 to 2007, as the whole Enel research activity was transferred to CESI, he continued the creation, implementation and development of planning models for short/medium term operation (among which PROMED). From 1976 to 2000 he has been working at Enel Electrical Research Center, involved in building of software dedicated to the Italian Electric System Expansion using probabilistic methods (WAT), and to the Annual and Weekly Planning of the System Operation on behalf of CNC (Enel National Control Center), the latter using optimization algorithms advanced and highly performing in terms of calculation speed. He obtained the degree in Electrical Engineering on December 1974 at the Politecnico in Milan, Italy.

□ **Lucia Caiazza**

Administration

□ **Dalia Imperatori**

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