



Management and Energy Consulting

Since 1968 Gamma Ingenieros has been providing first-class quality services, by viewing things from its clients' perspective and conveying know-how and experience with a view to creating value

Energy

Gamma Ingenieros has consulted on the development of Energy Projects, on Energy Markets, Energy Efficiency, Co-generation, and Regulatory Framework Research, on Emissions, Renewable Energy, the Design and Optimization of Thermal Equipment and on the Design of both liquefied and gaseous Fuel Distribution Networks.



Corporate Management

Strategic Planning, Management and Cost Control, Organizational Optimization, Process Re-engineering, Market Research and Project Development.

Other Expertise

Gamma Ingenieros specializes in project development and supervision including technical inspections and startups. We have supported companies in other areas of engineering, such as technical inspections at construction sites and other applications.

WHO WE ARE

Experience

Gamma Ingenieros started its business activities in 1968 as a Partnership of Professionals.

Since its initiation, Gamma Ingenieros has specialized in Engineering Consulting pursuant to the policies of the Chilean Association of Consulting Engineering Services (AIC - Asociación Chilena de Ingeniería de Consulta) and the Latin American Federation of Consulting Associations, (FELAC- Federación Latinoamericana de Asociaciones de Consultores) maintaining its independence from suppliers and service businesses.

Our Style

When an advisory service or consultancy need arises, and upon being made aware of the client's specific needs, we submit a Work Plan. This document specifies the project goals, scope and methodology, the proposed team as well as the estimated consultancy costs and timings.

The job is managed jointly by Gamma's professional team and the client's counterpart, with a view to delivering a high standard service end-product consistent with the client's requirements and based on our knowhow and far-reaching experienced.

Our style has evolved across more than 45 years of experience as an engineering Company, and we are proud to have been able to convey this to our entire team.

Management

One of the things that set Gamma Ingenieros apart from the rest of the market and that guarantees quality in each consultancy, project or research study is that each job is steered by a highly experienced engineer who acts as the Consultant in Chief, guiding all aspects of the job at hand and evaluating progress continually.

Quality Policy

Gamma Ingenieros believes it is vital that its professionals provide the highest quality service, striving to view things from the client's viewpoint and delivering their utmost know-how and expertise with a view to consolidating an added value experience in each of the companies Gamma advises.

Development of Skills

Our teams receive ongoing training on the areas we focus on, reviewing tendencies and current regulations in addition to development. We subscribe to numerous publications, we are in close contact with Universities in Chile and abroad and we also attend and run Refresher Lectures and Seminars.

Teamwork

One of the values we most prize in our organization is the comprehensive preparation of our professionals particularly with regards to teamwork. Through this exercise we share the experiences gained from different projects and part of Gamma's substance is that our highly experienced team of professionals continuously supervise the younger members.

We also have an outstanding network of contacts in other specialty areas, with whom we create multidisciplinary teams according to our client's needs.

SERVICES

BUSINESS MANAGEMENT



Process Optimization

Analysis of operations and of the productive, administrative or logistical processes and proposals for partial to total improvements (re-engineering). Establishing the requirements for the implementation of information and support systems as well as personnel training is also included.



Economic Evaluation

Development of the techno-economic feasibility of investment projects, including estimates of demand, revenues, costs and investments, cash flows and economic indicators. Use of accounting methods such as asset valuation as well as economic methods aimed at calculating business value.



Management Control

The definition of the key variables for each business and how they are measured and monitored, through the design of executive management control reports.



Organization

Full review of the organizational structure at a higher or department level, with the corresponding job descriptions and profiles, as well as defining the tasks involved. Additionally we participate in the selection and recruitment of executives.



Strategic Planning

Strategic Planning Involves business operating diagnostics, the organization of applied workshops, assessment in developing and implementing planning and strategic management methods.



Market Research

Aimed at appraising the probable demand for products or services and their projection in terms of price, quality, marketing system, and relevant business variables overall.

To this end, we have developed expertise in various areas, such as amongst others, fuels, financial services, industrial products, mass consumer products and consumables for mining and industry in general.

ENERGY

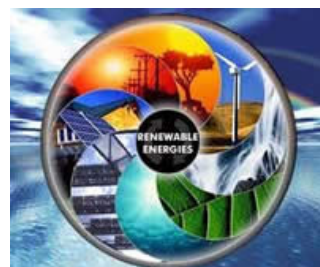
Energy Efficiency

Diagnostics Studies, identification of concrete actions for energy savings, their technical and economic audit, implementation planning as well as financing, personnel training and providing implementation support until the appropriate savings have been achieved. The company is certified by the Chilean Agency for Energy Efficiency (ACHEE- Agencia Chilena de Eficiencia Energetica), having completed over 60 Energy Efficiency projects.



Renewable Energy

Research and project implementation in electric and thermal energy generation using state-of-the-art technology, particularly in solar, thermal, biomass, biogas and minor hydraulic projects. Experience in administering projects for major solar, thermal and biogas plants. Moreover, research on government policies regarding the production and use of biogas is also conducted.



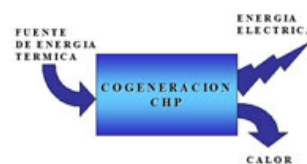
Energy Market

Extensive knowledge regarding the gaseous, liquid and solid fuels markets. Studies on Fuel Demand and Supply. Market Research on fuels usage and application. Advice on negotiating contract conditions and the design of rate structures. Implementation of lower cost alternative fuels.



Co-generation (CHP)

Technical Assessment - Electrical Co-generation Economics. Pre-feasibility studies, Feasibility and Implementation of CHP technologies. Economic assessment, selection and purchase of equipment. Heat recovery projects. Supervision of Plant Installation and Start-up.



Fuel Network Design

Fuel network engineering based on clients' needs, both in terms of internal networks and power matrixes. Research on Conceptual, Basic and Detailed Engineering on Gas lines and Oil lines.



Rules and Regulations Reviews

Research, assessment and audits on the use of domestic and foreign safety regulations applicable to power and fuel facilities and networks. Audits and reviews of power rates for regulated and non-regulated customers.



Natural Gas (LNG) Satellite Regasification Plant. (SRP)

Development of Detailed Engineering for the installation of SRP plants in industries, having engineered more than 12 plants across Chile. The topography, the soil surveys, the foundation calculations and civil works, the mechanical, electrical and service projects and are all included.



Energy Management System ISO 50001

Assessment on Energy Management System implementation consistent with ISO 50,001 certification. Support for Gap Analysis and the implementation of handbooks, procedures, energy efficiency plans, internal audit and indicators. Gamma employs a top professional auditor in this standard, plus another professional with implementation know-how.



Design and Optimization of Thermal Equipment

Review of the current operation and specific needed requirements, solution proposals using technological innovations, enhanced performance and automatization aimed at improving equipment usage.



OTHER EXPERTISE

Project Engineering

Gamma Ingenieros are specialists in conceptual, basic and detailed engineering, the design of oil and gas lines as well as gas networks and the design and review of plants, equipment and facilities.

Environmental Engineering

Gamma Ingenieros conducts research in the field of environmental emissions, and the quantification and review of the more affordable solutions consistent with current regulations

Technical Site Inspection

Gamma specializes in installation projects and the modification of liquid and gaseous fuel networks, as well as industrial scale construction jobs.

Quality Management

This item includes service quality assessment through surveys and the measurement of customer care quality. We apply complementary methods such as conducting and analyzing “Focus Groups”, as well as interviewing representatives of the market being reviewed, as well as opinion leaders.

CLIENTS

ENERGY



SONACOL S.A.



METROGAS S.A.



ABASTIBLE S.A.



GASSUR S.A.



GASCO GLP S.A.



ENAP REFINERIAS S.A.



LIPIGAS S.A.



COPEC S.A.



ENERGIA LLAIMA Spa.



AGENCIA ALEMANA DE
COOPERACIÓN TÉCNICA (GIZ)



AGN
ASOCIACION DE
DISTRIBUIDORES
DE GAS NATURAL
ASOCIACION DE
DISTRIBUIDORES DE GAS
NATURAL (AGN)

SERVICES



FERROCARRIL
ANTOFAGASTA BOLIVIA -
FCAB



AGUAS DE ANTOFAGASTA -
ADASA



TRAIN LTDA.



ISAPRE CONSALUD



CODITEC S.A.



TUSAN - CGE

STATE AGENCIES



MINISTERIO DE ENERGIA



COMISION NACIONAL DE ENERGIA



SUPERINTENDENCIA DE ELECTRICIDAD Y COMBUSTIBLES - SEC

OTHERS



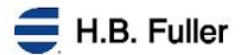
EMPRESAS ARIZTIA S.A.



EMPRESAS CCU



VITAL JUGOS S.A.



H.B. FULLER S.A.



COLUN LTDA.



COCA COLA DE CHILE S.A.

EXECUTIVE TEAM

CEO

Francisco Negroni Ellena

fnegroni@gamma.cl

A Civil Industrial Engineering graduate from Pontificia Universidad Católica de Chile (1958), Francisco holds a PhD in Mechanical Engineering from the University of Berkeley, California, USA (1968), and post-graduate studies in Industrial Engineering. His experience includes being Head of Planning and Control at FENSA and a Research Engineer at COPEC; Consultant in Engineering and Industrial Projects; a Professor and Researcher at the Pontificia Universidad Católica de Chile. He has been CEO of Gamma Ingenieros since 1968 and has widespread experience in industrial projects, in corporate management, optimization and reengineering processes, and in strategic planning. He is a specialist in the efficient use of conventional and renewable energies.



Project Manager

Fernando San Martín Sepúlveda

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Fernando holds a degree in Civil Industrial Engineering from Universidad Católica de Chile (1968) and a post-graduate degree in Economic Engineering from the Universidad de Chile. During the course of his career he has been a Researcher and Professor of the Mechanical Engineering major at the Pontificia Universidad Católica de Chile; the Production Manager at Industrias Eléctricas Omicrón SA.; an Engineer at CADE Consultants and CADE IDEP and the Manager of Constructora “Socoanto Ltda”. He specializes in process optimization, feasibility studies and market and cost research and in strategic planning advisory as well as business management in general.



Project Manager

Iván Muñoz Bravo

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Iván holds a degree in Civil Industrial Engineering from Universidad Católica de Chile majoring in Mechanical Engineering (1975). He holds a Postgraduate Degree in Administration (DPA) from the Universidad Adolfo Ibáñez de Chile (1987). He was a university professor from 1976-1979.

His business career includes the following: Elecmetal Projects Engineer (1975-1988); Independent Consultant (1989-1991); CEO of Fundición Indesa, a member of the Elecmetal Group (1992-1998); CEO of Fábrica de Bolas de Molienda Proacer, a jointly owned Belgian/South African grinding ball manufacturer (1998-2008); South American Regional Manager for Productos Scaw Metals Sud Africa (2008-2010). He has far-reaching experience in the development of industrial projects, in business management, in optimization and re-engineering processes as well as in strategic planning. He is experienced in developing work teams focused on profitability, leadership, growth, safety, quality of life and corporate social



responsibility. He has been a Project Manager and Partner of Gamma Ingenieros since 2011.

Chief Project Manager

Raúl Díaz-Valdés Rowlands

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Raúl is an Aeronautical Engineer from the Military Technical Academy (Academia Politécnica Militar). He was the former Head of the Fuels Division at the Superintendencia de Electricidad y Combustibles (SEC-Superintendencia de Electricidad y Combustibles). His business career also includes: Industrial Projects Engineer, Projects Engineer and Consultant at Gamma Ingenieros since 1996. He has ample experience in the design of electrical and fuel installations and is skilled in Chilean and foreign regulations regarding fuels and electric power. He holds wide-ranging experience in materials certification, in projects, in the implementation and technical inspection of work sites, as well as in determining the risk matrixes for oil pipelines, and gas pipelines, the integrity of fuel networks. He was a Professor of Building Installations in the Energy Area of the School of Architecture at the Universidad de Chile (2009) and a



Professor of the Masters in Energy Economics, MEE, at UTFSM.

EXPERIENCE

ENERGY

• Energy Efficiency

- Measurement and Verification of Energy Efficiency Project Implementation- AChEE/Vital Jugos S.A.
- Energy Efficiency Study - AChEE/Productos Fernandez (PF)
- Energy Diagnostics in Hospitals in Lota, Coquimbo, and in the Instituto Psiquiátrico Dr. José Horwitz Barak. - AChEE/PRIEN
- Energy Efficiency Study - AChEE/Agrícola Chorombo
- Audits and Descriptions of the Bird and Pig Sectors. Diagnostic and Sectoral Line Results. APA/ASPROCER. 2012..
- Energy Diagnostics Review of the Retail sector. The Technical Secretariat's EE Desk on the Retail sector. National Energy Commission.
- Handbook on Fuel Savings and Environmental Regulations Compliance. COPEC.
- Energy Audit. Salesianos Impresores S.A.
- Energy Audit. Elaplas S.A.

• Renewable Energy

- Pre-feasibility Study on the Consumption and Sale of Electric Power in Photovoltaic Panels at Adhesivos Fuller S.A. - GIZ
- Energy Consumption Review of the Chilean Mining Industry and Application Options for Solar Power CSP, CST and PV. Ministry of Energy/GIZ
- Design and Sizing of the Electro-winning Electrolyte Thermal Solar System at Minera El Tesoro -- Energía LLaima S.A.
- Design and Sizing of the Electro-winning Electrolyte Thermal Solar System at Minera Gaby
- Appraisal and Administration of the Thermal Solar System at Minera Gaby including the Start-Up phase - Energía LLaima S.A.

• Energy Markets

- Natural Gas Industrial Market Estimate for the Maule to Los Lagos Regions- GasSur
- Current Potential Natural Gas Market Study in business sectors of the Metropolitan Region.
- Natural Gas Supplier Tender for the new grinding ball plant in Coquimbo. SK Sabo Chile
- Energy Market Study in Cities. LIPIGAS
- Potential LNG Market Study among Major Regional Consumers - Metrogas S.A.
- Potential Industrial Market Study in the 8th Region- Metrogas.
- Fuel (LNG) Consumption Study among Major Consumers in the 2nd Region. Metrogas S.A.
- Natural Gas Potential Market Study in the Area between the 7th and the 14th Regions of Chile - Maule to Los Lagos. Ministry of Energy.
- Review of the Industrial Diesel Oil Market in the Metropolitan Region replaceable by Liquefied Gas. GASCO S.A.

• Rules and Regulations Reviews

- Review of the Installation Requirements (Regulations) for Boiler Rooms - Natural Gas Association AG /AGN.
- Analysis of the Options for Liquid Fuel security reserves. Ministry of Energy.
- Report and Project for the review of Standard NCh 2264 Of. 1999 Natural Gas- Specifications. GNL CHILE.
- Study of the Framework of Standards and Procedures to be met by the Production Channel- Consumption of Biofuels, for initiating and developing Activities within the Republic of Chile. Barros Errázuriz Abogados for CNE.
- Establishing the Basic Safety Requirements for the Transmission and Distribution of Natural Gas and Developing the corresponding Standards - NATIONAL ENERGY COMMISSION
- Formulating the Final Safety Standards text for the Storage, Transport and Sale of Liquefied Gas - NATIONAL ENERGY COMMISSION.

• Cogeneration

- Co-generation Pre-feasibility Study - Industrial Ochagavia / AChEE.
- Bidding Specifications and Supplier Selection for Cogeneration Implementation of 1.4 MWe- Agroindustrial El Paico S.A.
- Consulting on Cogeneration Projects in Hospitals in Magallanes, Coyhaique and the Central Emergency Service in Santiago - GIZ y Minsal.
- Feasibility Study on the Installation of an ORC system in Soprocál, Melipilla.
- Cogeneration Feasibility Study - Agroindustrial El Paico S.A.
- Cogeneration Feasibility Study - Cervecería CCU Chile Ltda.
- Cogeneration Feasibility Study - Embotelladoras Chilenas Unidas S.A.- ECUSA.

- Cogeneration Feasibility Study - Vital Jugos S.A.
- Investment Project Proposal for Energy Efficiency using CHP in Industry. Consorcio Industrial de Alimentos S.A. - CIAL.
- Investment Project Proposal for Energy Efficiency using CHP in Industry. Good Year de Chile S.A.
- **Liquid and Gaseous Fuel Network Design**
 - 16" Oil line By-Pass Extension and Operational Connection Project in the Santa Mónica Sector- SONACOL.
 - Project Proposal, Basic and Detailed Engineering for the new 10" pipeline Project for the Arturo Mario Benites Airport- SONACOL.
 - Biogas pipeline from La Farfana to the Gasworks.
 - Design and supervision of the 35 bar pressure ring installation for Natural Gas distribution in Santiago for METROGAS.
 - Sonacol's 6" AMB Pipeline Modification Project on the new Road Junction sector designed by the AMB Road Access Concessionaire - Design specification and Modification Project. SONACOL S.A.
 - Technical Report - Shut down provisions for the 8" Fuel Oil and the 8" Clean Products lines located in the Las Salinas-Concón stretch. SONACOL S.A.
 - Natural Gas Distribution Network Project for the City of Antofagasta - Backbone Network Design- GAS ANTOFAGASTA S.A.
 - Natural Gas Secondary and Tertiary Distribution Network Projects - METROGAS S.A.
 - Natural Gas Primary Distribution Network for the city of Santiago - Design and Detailed engineering including the extensions to Buin, Paine and Talagante - METROGAS S.A.
- **Regasification Satellite Plants (RSP) for Liquefied Natural Gas (LNG)**
 - Design of LNG regasification facilities for 8 plants in the Metropolitan Region, 3 in the Lakes Region and one in the Biobío Region. METROGAS S.A.
- **Design and Optimization of Thermal Equipment**
 - Steam Network Audit at the COLUN La Union Plant
 - Preliminary Design of the Steam and Condensate Network - Coca-Cola Chile S.A. - San Bernardo Condensates Plant.
 - Investment Estimate and Project Proposal for the Installation of a precalciner on the 2" Lime Kiln - CODELCO DIV. CHUQUICAMATA.
 - Heat Interchangers and Filters replacement Study, Crushing Plant, Concentration Superintendent. - CODELCO DIV. CHUQUICAMATA.
 - Heat Recovery Study in the N°2 Refinery boilers. - CODELCO DIV. CHUQUICAMATA.
 - Study on Heat Generating Options for the Drying Kilns at the Molded Packaging plant.-CHIMOLSA.

BUSINESS MANAGEMENT

- **Process Optimization and Reengineering**
 - Operational Efficiency and Costs Diagnostics Update - Aguas Antofagasta S.A.
 - Redesign of Processes between Banco Santander and the legal services firm ROMERO y Asociados.
 - Analysis of Administrative Processes and development of Improvements Proposals - CrediChile Area - BANCHILE Insurance Brokers.
 - Optimization of Operational Processes - Le Grand Chic.
 - Consultancy in Process Optimization. Preliminary diagnosis and development of Work Plan. BANCHILE INSURANCE BROKERS.
 - Development Review of the Management Report for the Board of Directors. BANCHILE INSURANCE BROKERS.
 - Processes Redesign for the addition of Customers to the Credichile Insurance sector. BANCHILE INSURANCE BROKERS
- **Business, Project and Asset Valuation**
 - Certification of GAS SUR's Revenue, Costs and Replacement Cost Value (RCV) Reports to the National Energy Commission (CNE)
 - Analysis of the economic impact of the Government's Energy Program on the Natural Gas Market. IFM Investor - Australia.
 - Valuation of Operational Assets of Sociedad Nacional de Oleoductos (SONACOL).
 - Formulation of GAS SUR's Revenue, Costs and Replacement Cost Value (RCV) Reports for the National Energy Commission (CNE)
 - Economic Assessment of the Arica - La Paz Railroad - FCAB.
 - Valuation of CODITEC S.A.
 - Valuation of Inversiones San José S.A. (investment firm)
 - Valuation of PROTECO S.A.
- **Business Management**
 - Management Indicators, Railway Operations Management. F.C.A.B.

- Defining Management System for Industrial Consumers - METROGAS S.A.
- Design and Implementation of Product Costing System- ECUSA
- Design and Implementation of Product Costing System - AGROMAULE
- Costs Review - PRINCIPAL SEGUROS
- Design and Programming of a Collective Bargaining Simulation Model - CIA. MINERA MICHILLA.
- **Organization**
 - Creation, Organization and Management of Industrial Market Area for METROGAS S.A.
 - Review of the Organization and Staff Decisions - TRAMACA S.A.
 - Re-organizational Consultancy - CORFO.
 - Administrative organization of Management Areas - CIA. MINERA MICHILLA.
 - Organizational Handbook - GASCO S.A.
 - Conceptual Bases for the Analysis of the Industrial Organization of the Gas Sector. - NATIONAL ENERGY COMMISSION.
- **Strategic Planning**
 - TRANSFORMADORES TUSAN - CGE.
 - ABN AMRO BANK.
 - OXIQUM S.A.
 - BANCO TORNQUIST (Argentina).
 - EMPRESAS LUCCHETTI S.A.
 - ISAPRE CONSALUD.
 - ENTEL CHILE
- **Quality Management**
 - Quality Development: Implementation Stage - SME Comprehensive Management System under Standard NCh 2909. RED INTERNACIONAL DEL LIBRO LTDA.
 - Contingency Plan applied to the 10" Pipeline Construction Site for Liquefied Gas Concón-Maipú, SONACOL S.A.
 - Measuring Customer Care Quality by way of Mystery Shoppers - ISAPRE CONSALUD. (Health Provision Entity)
 - Members' Opinion Survey on Customer Care Quality and other Topics - ISAPRE CONSALUD.
 - Development of Management Handbooks and Process Documentation for ISO 9000 Certification - BANCO SANTIAGO.
- **Logistics**
 - Rational use of available space and operational recommendations for the Maipú Plant warehouse. SONACOL S.A.
 - SQM- Diagnostics and Proposed Improvements to the Liquid Fuels Storage System. SOQUIMICH.
 - Optimization of Haulage System - COCA COLA EMBONOR.
 - Railway Transportation of Forestry Project Evaluation - FCAB (Railway between Antofagasta and Bolivia).
 - Supply Line Evaluation - BATA CHILE.
 - Evaluation of the Project for Railway Transportation of Cellulose to the 8th Region- FCAB.
 - Fuel Freight Study - NATIONAL ENERGY COMMISSION.

OTHER EXPERTISE

- **Environmental Engineering**
 - Sustainability indicators and indices for the Chilean Energy sector. Ministry of Energy.
 - Design of a Fugitive Emissions Collection System from the Arc Furnace. PROACER.
 - Environmental Advisory, Compliance of Nitrogen Oxides (NOx) Emissions Regulations. Malterías Unidas -Talagante Plant.
 - Design and Appraisal of the New Measures for Exact Sources contained in the Environmental Prevention and Decontamination Plan (PPDA) that included Global Technologies and Costs in order to comply with the Reduction goals of Major NOx Emitters.
 - Support for the Implementation of the Emissions Standard for Thermoelectric Power Plants. CNE
 - Development of Technical Background for the Emissions Standard for Power Generators. Sector Characterizations and Proposed Regulations. CONAMA.
- **Technical Site Inspection**
 - Several projects for strengthening, and inserting by-passes and shunts in pipelines- SONACOL
 - Technical Site Inspection of the new Concón Connection Plant Project. Lipigas S.A.
 - Design of Concón Santiago Liquefied Gas pipeline for SONACOL including site inspection.
 - Design and supervision of the 35 bar pressure ring installation for Natural Gas distribution in Santiago for METROGAS.
 - Inspection of materials used in gas networks - METROGAS