Fapesp BG Brasil
Research Centre for Gas Innovation

Energy Policies and Economics Programme
Coordinator: Prof. Dr. Edmilson Moutinho dos Santos
IEE – University of São Paulo

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Energy Policies and Economics Programme
8 Multidisciplinar Projects
Projects 21 to 28

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Energy Policies and Economics Programme - Project 21:

- Leader: Hirdan Katarina de Medeiros Costa – IEE – USP
- Reseachers: USP's Law School; IBDE
- Project Description and Scope:
  - Setting up the Brazilian and Paulista's Natural Gas Law Service
  - Building USP's Interdisciplinary NG Policy, Legal and Regulatory hub and intelligence service
- Objectives:
  - Organize a Natural Gas Law Service in a comprehensive perspective.
  - Compilation of Federal and local level statutes, regulations, board policies and rules.
  - Provide the experts' commentary of collected docs.
  - Comparative institutional analyses … Initially between São Paulo, Brazil, and Alberta, Canada.
- Business Need/Problem:
  - The NG regulation in Brazil is very complex with rules coming from many and diverse sources.
  - Access to information is difficult and inhibiting of foreign investments.
- Tecnology Information and Deliverables:
  - Updated information hub is the main deliverable of the project.
  - Experts' analytical views of important legal, regulatory and political decisions are expected to become positive references for diverse stakeholders and groups of interest
- Project Risks:
  - Definition of possible and realistic coverage in each stage of the project.
  - The extent of information coverage depends on the involvement of human resources (scholarships).

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Energy Policies and Economics Programme - Project 22:

- Leader: Murilo Tadeu Werneck Fagá – IEE – USP
- Reseachers: COMGAS, ABRINSTAL, UNIDO, Consultants Krona e SINDE
- Project Description and Scope:
  - Producing Benchmark Studies on Natural Gas Efficient Uses in the Industrial Sector
  - Identify industrial policies and strategies that lead to unconventional markets for NG in industrial sectors.
  - Produce reference studies on adopted technologies, as well as policy and regulation tools
- Objectives:
  - Acting as a facilitator in the technological dissemination of unconventional final uses of gas in chosen industrial sectors.
  - How NG with leading technological changes represents the main element to solve classical problems of low competitiveness in the national industry.
  - Energy efficiency issues are however by no means restricted to the efforts of innovation and production of new technologies.
  - Equally critical are difficulties to disseminate and accept new technological standards, as well as promotion of energy-efficiency management initiatives
- Business Need/Problem:
  - The search for efficient uses of energy is a relevant research theme
  - Defining and implementing energy management measures has also and has been driving the international community .
  - Promoting and managing energy efficiency in all production segments still remains a challenge.
  - Finding the use of more appropriate energy resources for each final use represents a great potential strategy to promote higher rationality and energy sustainability.
- Tecnology Information and Deliverables:
  - Ttechnological ddemonstration and issemination of unconventional final uses of gas in chosen industrial sectors.
  - Equally critical are difficulties to disseminate and accept new technological standards, as well as promotion of energy-efficiency management initiatives, which are crucial attributes to competitiveness, sustainability and increasing productivity.
- Project Risks:
  - Dealing with technological changes and integrated managerial system in specific industrial sectors represent the main critical elements of the project
  - The best energy-efficiency management, technologies and practices are still unknown in Brazil, particularly regarding unconventional applications of natural gas in the industry.
  - The project aims to deal with the extremely low level of information and final industrial customers must be mobilized towards energy efficiency promotion and management.

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Energy Policies and Economics Programme – Project 23:

- Leader: Edmilson Moutinho dos Santos – IEE – USP
- Reseachers: Ricardo J. Esparta (EQAO) and others
- Project Description and Scope:
  - ASSESSING THE IMPACTS UPON THE BRAZILIAN GREENHOUSE GAS INVENTORY IN DIFFERENT NG SCENARIOS
- Objectives:
  - Estimate/quantify current and future Greenhouse Gases (GHG) emissions in Brazil as well as SP, taking different scenarios for Natural Gas exploration, transportation and use.
  - Define methodologies to translate positive externalities associated to NG uses into economic credits to benefit investments in the NG industry
- Business Need/Problem:
  - Brazil has international commitments to contribute to GHG emissions reductions
  - NG is part of the solution when associated to different renewables
- Tecnology Information and Deliverables:
  - The project aims to create comparative analyses to balance the greenhouse gas inventory and emission reduction quantification for different scenarios of NG penetration
  - Methodological advances are also expected from the project
- Project Risks:
  - In a country with high share of renewables, NG is not necessarily perceived as a cleaner energy source
  - Assessing future scenarios for NG in Brazil is complex due to the lack of clear NG policies

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Energy Policies and Economics Programme – Project 24:

- Leader: Virginia Parente - IEE – USP
- Reseachers: Economics and Production Engineering
- Project Description and Scope:
  - Estimation of price and income elasticities of NG in Brazil
  - Modelling the demand segments taking into account the industrial sector evolution, the electricity generation and the policies for carbon abatement
- Objectives:
  - The purpose of this research is to undertake econometric estimation of elasticities in the natural gas demand in Brazil.
  - Paying special attention to the industrial segment, which represent more than 60% of the total NG consumption in Brazil
  - But also focusing on the power market as recent changes took place in the electricity sector
- Business Need/Problem:
  - A successful planning and strategy of growth for the natural gas industry depends not only on counting upon an increasing demand, but also on understanding the rhythm, profile and market reactions vis-à-vis the major economic variable (in particular prices and income).
- Tecnology Information and Deliverables:
  - Adequate models to examining how and in which extent the Brazilian natural gas demand responds to changes in energy prices and the country income .
  - Brazil is a special cases in the world where the NG demands fluctuates according to renewables availability
  - Also taking into account the increase in the electricity demand and the pressure for carbon abatement, and how both may affect the NG market
- Project Risks:
  - Regarding the demand of natural gas in Brazil, fundamental challenges still lay ahead for effective consolidation of the gas industry in Brazil
  - The still heavy need of investments in production, transport and distribution infrastructure; turn the econometrics analysis of NG industry in Brazil a very intricate and imprecise exercise

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Energy Policies and Economics Programme – Project 25:

- Leader: Dominique Mouette – Environmental Management - EACH / USP
- Reseachers: COMGAS, ABGNV, IEE-USP
- Project Description and Scope:
  - Integrated Sustainability Analysis of Natural Gas as a Transportation Fuel in Heavy-Duty Vehicles
  - The definition of a Paulista Blue Corridor
- Objectives:
  - The project reviews the modern concepts of sustainable transportation and shows the alignment of these concepts with the promotion and the use of natural gas as fuel in passenger and freight transportation instead of diesel.
  - Case study of the Metropolitan Region of São Paulo, including the capital of the State of São Paulo
- Business Need/Problem:
  - Studying the concept of sustainable transportation is in the centre of interest of all main cities worldwide.
  - Externalities imposed by pollution, noise and traffic congestion are huge and increasing.
  - The project focuses on reviewing the modern concepts of sustainable transportation, and analysis the role of NG as an alternative and more sustainable fuel
- Tecnology Information and Deliverables:
  - Reviewing of concepts of sustainable transportation and demonstration of technical evidences that support public policies to promote NGV as part of the strategic substitution of diesel oil as fuel in the urban transportation.
  - Calculate and propose an initial route for the Paulista Blue Corridor
- Project Risks:
  - Modelling complexity in the reviewing of different international experiences and on verifying how big cities deal with the relationship between “alternative fuels” and “sustainable transportation”.
  - Analysis of the role of NGV in the sustainable transportation models for the city of São Paulo is also marked by special legal difficulties imposed at Municipal level

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Energy Policies and Economics Programme – Project 26:

- Leader: Edmilson Moutinho dos Santos – IEE – USP
- Reseachers: International consultants: Ieda Gomes; Paul Poulallion
- Project Description and Scope:
  - Evaluation of small LNG and CNG supply options for transportation and off-grid locations in southeast Brazil;
  - Planning the expansion and operation of multimodal NG integrated networks.
- Objectives:
  - Reviewing and evaluation of alternatives (compressing or
  - Liquefying) natural gas in small plants, and to transport CNG or LNG via trucks (or other transportation modals such as barges in hydroways, trains or cabotage ships) to serve consumers in remote off-grid areas in the southeast region of Brazil.
  - The research will also develops an integrated and critical analysis of planning methodologies for expansion and operation of multi-modal integrated networks, including reviewing some of the technical and economic parameters used in the government planning
- Business Need/Problem:
  - Capturing more consumption for natural gas in the southeast region in Brazil faces huge challenges associated to the lack of infrastructure (mainly for potential consumers outside the reach of the main gas grid.
  - LNG supplied by small liquefaction units and/or trucked from the existing terminals may be an attractive proposition
  - Adding new technologies toward a multi-modal integrated gas network require new dispatching
  - and operation model for the system, which become more complex and sophisticated, particularly with increasing sources of supply.
- Tecnology Information and Deliverables:
  - The expected result is a modelling tool in Excel allowing for comparison of several alternatives gas transportation and distribution;
  - And also the production of a concept, multi-model integrated gas logistics.
- Project Risks:
  - Difficult access to basic information regarding costs of technologies

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Energy Policies and Economics Programme – Project 27:

- Leader: Suani Teixeira Coelho – IEE/USP
- Reseachers: Domestic (ÚNICA, SAPESP) and international partners
- Project Description and Scope:
  - The perspectives of biomethane (urban and rural) to contribute to increase the NG supply in the State of SP
  - Analyze the environmental contribution of increasing biomethane share in the energy matrix of São Paulo State
  - Setting up standards for injection of biomethane into the NG grids as well as the final uses of biomathene, as in trucks.
- Objectives:
  - The project will focus on biogas/biomethane production from vinasse, rural and urban residues.
  - In the case of rural residues, the project will analyze mainly animal-based residues.
  - In the case of urban residues, it will focus on the organic fraction of MSW.
- Business Need/Problem:
  - In the global context, biogas production becomes an interesting energy option.
  - In Brazil, currently, there are (few) biogas-conversion plants existing in landfills.
  - Especially in the São Paulo State, there are significant difficulties for environmental licensing of new facilities, also due to rejection of local people
- Tecnology Information and Deliverables:
  - The project will analyze whether biomethane has the potential to cost-effectively contribute to Paulista energy mix as well as the state carbon reduction targets.
  - Understanding the real potential and the development conditions of biogas in the state of SP
  - Setting up a CDM Model.
- Project Risks:
  - The costs associated to biomethane
  - Restrictions for pipeline injection as well as final use of biomethane
  - The global economics seem unfavorable for CDM projects

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Energy Policies and Economics Programme – Project 28:

- Leader: Luis Antonio Bittar Venturi – Institute of Geography - USP
- Reseachers: Afonso Henriques (UNIFEI) and others
- Project Description and Scope:
  - GEODIS - GEOGRAPHIC DISPERSED AND INTEGRATED ENERGY PLANNING SYSTEMS
  - AN APPROACH TO INTEGRATED AND SPATIAL URBAN ENERGY SYSTEM PLANNING THE ROLE OF NATURAL GAS
- Objectives:
  - The main objective of this project is to develop a simulation model focused on the INTEGRATED AND SPATIAL URBAN ENERGY SYSTEM PLANNING.
  - The project will develop and test the model to cope with an integrated district cooling/heating network, taking into consideration both the natural gas grid and the electrical power grid, with a real application for São Paulo Metropolitan Area.
  - The modelling process with GEODIS aims to optimize the integrated uses of local resources and infrastructure, looking for getting maximum social satisfaction.
- Business Need/Problem:
  - The new possibilities for gas-fired air conditioning systems in the metropolitan areas fit to the new urban needs, mainly by increasing the energy services reliability.
  - The project will take in account the new technologies such as the dispersed and embedded gas-fired generation, cooling systems and the combination of both (cogeneration), in the private and public use (district cooling).
  - Optimizing urban energy infrastructure uses
- Tecnology Information and Deliverables:
  - The GEODIS will be an INTELLIGENT INTEGRATED APPROACH of “demand side management” model, which accounts for dispersed energy generation and storage. The model will allow an integrated planning of the power and the natural gas grids to supply the energy demanded by the intense air conditioning uses.
  - The project will allow setting up the model basis with a real application for the Metropolitan Area of Sao Paulo.
- Project Risks:
  - The extension of the proposed model is a real challenge and require available human resources.
  - The proposed GEODIS platform is an integration of six modules:
  - • Social Forces; • Environmental Mapping; • Energy Demand Forecasting; • Supply Design; • Engineering; • Integrated Analysis

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