



Regional Chapter

Boosting the Use of Natural Gas In the SICA Region

This chapter is part of a set of documents.



1. Regional Chapter

1.1 Objective

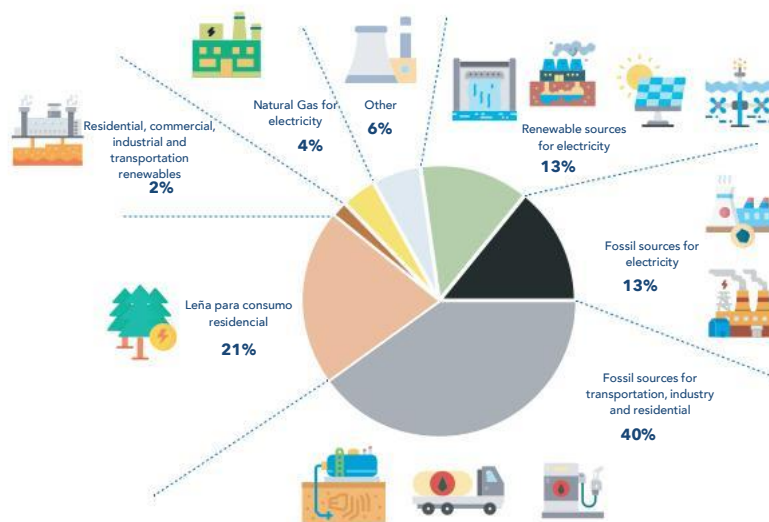
This study has been developed with the objective of proposing an action plan to improve the business environment and thus increase the participation of natural gas in the Central American region, as a transition fuel in the context of the climate goals set by the countries.

1.2 The situation and expected results

Accelerating the introduction of natural gas is intended to reduce emissions, improve competitiveness and help facilitate a better transition between currently used energy sources and an all-electric (decarbonized) economy based on renewable sources.

In terms of energy use, Central American countries¹ continue to use highly polluting fossil fuels as the main source of primary energy to meet their needs.

Gráfico 1 - Energy matrix by primary sources (TBTU2 - 2019)



Source: OLADE

Fossil-based polluting energies accounted for 54% of consumption. On the other hand, the combustion of renewable energies accounted for 23% (firewood and bagasse in residential, industrial and agricultural consumption), making this biomass also a source of greenhouse gas emissions. Together they account for 77% of the Central American energy matrix. In turn, 40% of energy is used in the residential, transportation and industrial sectors.

To reduce emissions and progressively decarbonize the economy, it is necessary to migrate to an economy driven by renewable energy sources, especially in electricity generation.

¹Includes Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua y Panamá.

²Trillion British Thermal Units.

Some renewable energies bring with them an increase in variability and for which electricity systems must plan ahead. Gas has been revealed as a cost-effective alternative that would allow adding flexibility to the system to contribute to the management of such variability, while developing clean mechanisms to mitigate variability (batteries and hydrogen) at competitive prices. On the other hand, gas would allow displacing technologies that run on more polluting fuels.³

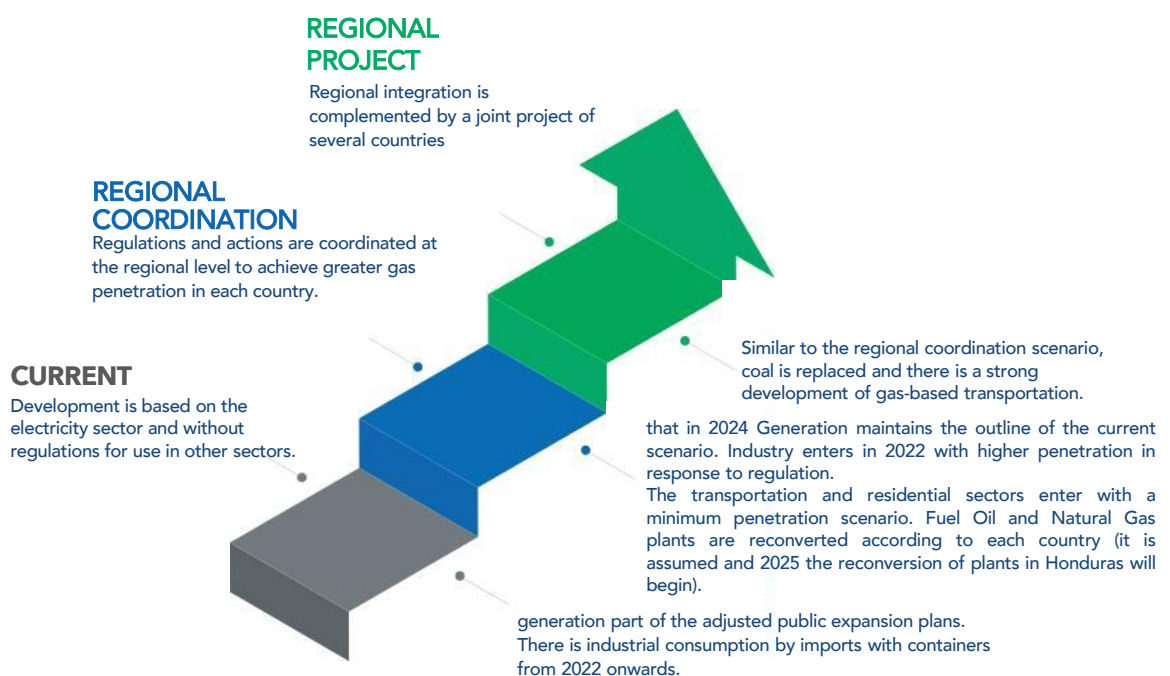
Likewise, natural gas in the industrial segment will make it possible to reduce emissions in those industries for which, with current technologies, it is not feasible to use electricity in their processes. The transportation sector could also benefit from the availability of gas and the development of programs to incorporate its use..

Gráfico 2 - Sectores con alto potencial en la región



To evaluate the potential, three penetration scenarios were simulated, including:

Table 1 - Criteria for projecting demand in each scenario



Source: Own elaboration.

³ Depending on the type of coal being used, gas reduces greenhouse gases measured in CO₂ alone by 45% to 55%. For diesel and fuel oil, around 30% and 50% depending on whether for production or mobility respectively.

The result of these scenarios is shown in the graph on expected demand. In the current scenario, the expected growth is 12% cumulative per annum (p.a.) between 2021 and 2030, in the regional coordination scenario, it reaches 15% p.a. and 17% p.a. with regional integration.

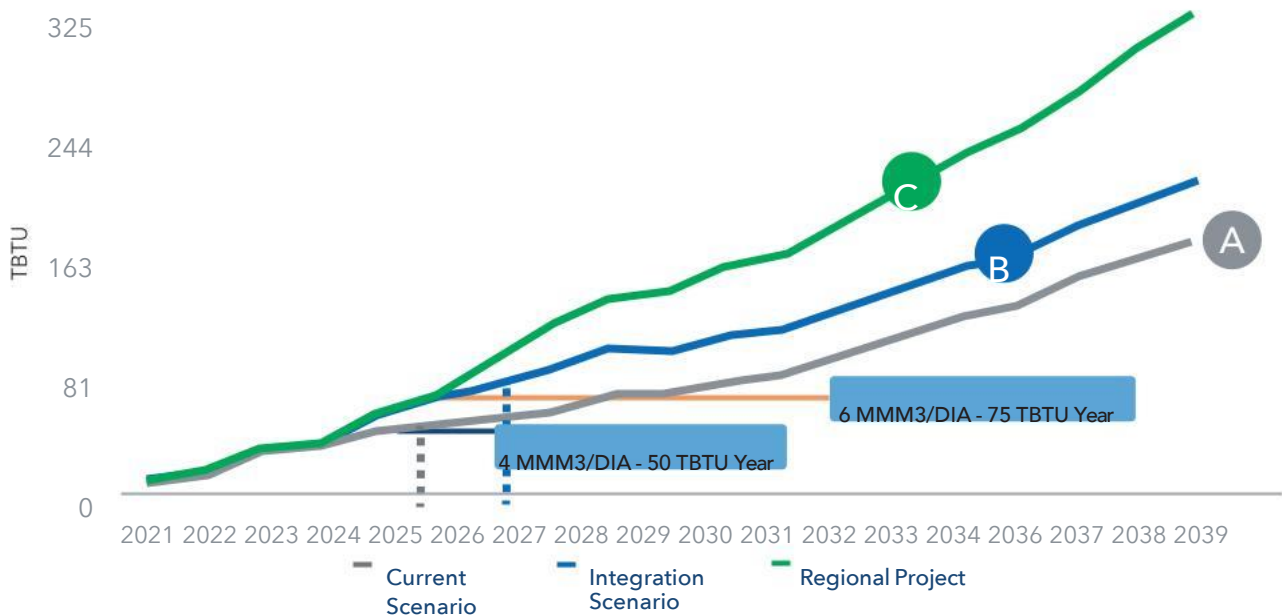
Table 2 - Expected Demand (TBTU) - Scenarios

Country	2020	2025	2030	2035	2040
Current Scenario	76,0	163,0	215,0	314,0	410,0
Integration Scenario	76,0	177,5	258,4	370,4	477,7
Regional Projection Scenario	76,0	184,6	310,6	463,6	612,0

Source: Own elaboration.

Para evaluar el potencial se simularon tres escenarios de penetración, que incluyen:

Figure 3 – Expected Demand (TBTU) – Scenarios

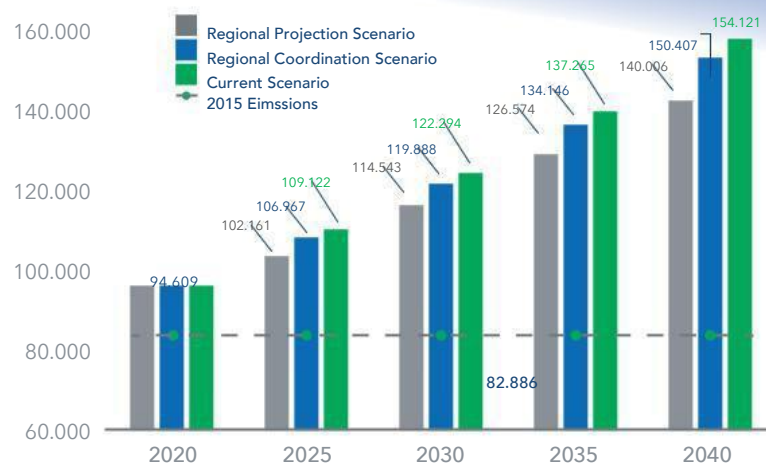


Source: Own elaboration.

Regional coordination would allow, in the short term, to improve the exchange conditions for natural gas and in the second half of this decade to analyze and possibly make joint projects feasible, such as a gas pipeline from Central America to Mexico. The gas pipeline would allow a substantial drop in the price of gas, accelerating the replacement of more polluting fuels and substantially reducing emissions, this joint project would be reflected in the scenario with a regional project

Figure 4 shows the evolution of emissions in each of the proposed scenarios. The projections made for this analysis are trend-based and do not consider non-trend variables such as electric mobility. Should a rapid penetration process of electric mobility occur, the increase in electricity consumption would be higher and total emissions would be lower.

Figure 4 - Emissions from final energy consumption demand (kTN de CO₂eq)⁴



The results of accelerating the penetration of natural gas in the region's energy matrix will depend on optimizing regional coordination. In a scenario where countries promote integration, savings in the consolidated trade balance of up to US\$580 million per year, greenhouse gas reductions of 2% per year, and an increase in GDP of at least 0.20% per year can be achieved. By consolidating the regional partnership (Regional Project scenario), trade balance savings could reach US\$760 million per year, greenhouse gas reductions of 9% per year, and GDP growth of up to 0.25% per year in the 2030s.

Table 3 - Price Estimates by Technology in the Region

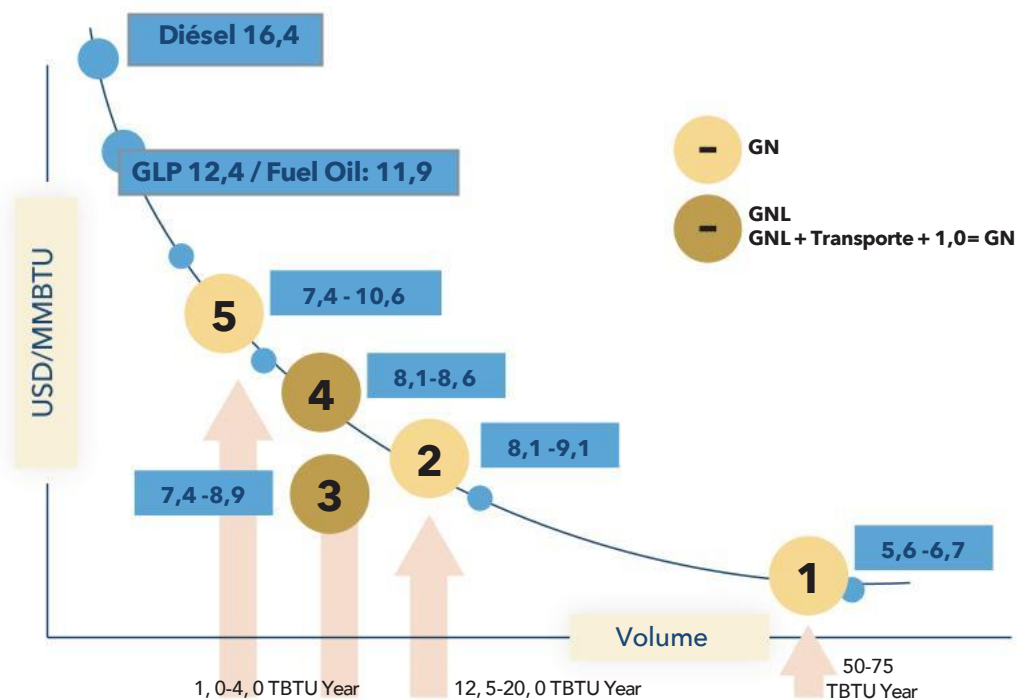
Description	Value Chain	Price by Country (USD/MMBTU)							
		Belize	Costa Rica (Atlantic)	El Salvador	Guatemala (Pacific)	Honduras	Nicaragua	Panamá (Colón)	Rep. Dominicana (Pacific)
Natural Gas									
Gas pipelines Alt1 (*)	Logístico N° 1	-	-	6,0	5,6	6,3	6,1	-	-
Gas pipelines Alt2 (*)	Logístico N° 1	-	-	6,4	-	6,0	6,6	-	-
Regasification terminal (#) The price reflects the gas in gaseous state.	Logístico N° 2	7,4	7,5	8,8	8,9	7,4	8,7	7,6	7,5
GNL									
Regasification terminal The price reflects the gas in a liquid state.	Logístico N° 2	5,9	6,1	7,3	7,4	5,9	7,2	6,1	6,0
GNL Iso-containers	Logístico N° 3	7,2	7,3	8,6	8,7	7,2	8,5	7,4	-
Terminal and transfer to ISO-LNG containers	Logístico N° 4	8,1	8,0	8,3	8,4	8,1	8,3	7,9	7,4
GNC									
CNG Iso-containers	Logístico N° 5	8,3	8,8	10,4	10,6	8,3	10,2	8,9	8,7
Iso-containers "tube skid" de GNC	Logístico N° 5	11,3	12,9	20,0	20,2	11,9	19,7	13,0	12,3

Source: Own elaboration. Note (#): The cost of regasification is estimated at 1.58 USD/MMBtu. This cost reflects the potential demands of each country in the analysis period. In the case of achieving higher volumes at 2 MMm³/day (70 PCD) this cost will be reduced. As a reference example, Argentina's regasification plants are not regulated, but their implicit cost on regasified gas has varied between 0.22 USD/MMBtu and 0.30 USD/MMBtu, between 2014 and 2019. With which a regional level regasification terminal could compete with the prices that would be obtained if a gas pipeline were built. Note (*) The cost of the pipeline assumes that there is support from the States for the pipeline route to have rights of way over the roads between Mexico and Guatemala, or over the roads in the case of the Mexico-Honduras pipeline.

⁴The scenarios do not assume the effects of the penetration of electric mobility on transport emissions, which will also imply an increase in the need for electricity generation. an increase in the need for power generation.

Central America can import gas under four different value chains, pipeline (4), Compressed Natural Gas (CNG) (5), Liquefied Natural Gas (LNG) in containers (2), and LNG in large ships (1). CNG is recommended mainly for short distances. LNG in both modes (3) is advancing in the region, with specific projects in countries such as the Dominican Republic, Panama, El Salvador and Nicaragua. Value chains can also be mixed, reflected in the value chain example - logistics 3 in the table detailed above, for example taking the gas in bulk to some port in Central America and distributed by ship or truck intraregionally.

Figure 5 - Price Comparison USD/MMBTU



Source: Consultant's elaboration. **Nota.** The price of value chains 5, 4 and 3 was estimated with a volume of 1 TBTU, value chain 2 with 12.5 TBTU and value chain 1 with 50 TBTU. The prices of Diesel, LPG and Fuel Oil, not reflecting their scale, have been placed with respect to their substitution price.

Price estimates by technology in the region are from wholesalers at different gas temperature and pressure levels (Natural Gas, CNG and LNG). They are calculated delivered at the ports of entry to each country when the gas arrives by ship and at the delivery points or "city gate" in the case of gas pipelines. The comparison of prices within each country varies substantially, depending on whether the gas is delivered by pipeline, CNG containers or LNG containers.⁵

The prices shown in Figure 5 show the logistics analyzed and described in the price estimates by technology in the region; logistics 4 and 5 are developed independently in the "current scenario" for countries that do not have scale. On the other hand, logistics 1 is the scenario where maximum regional coordination is achieved (Regional Project), allowing access to lower prices and greater benefits.

⁵For example: transporting LNG in containers by truck costs between 25% and 50% of the cost of transporting CNG in containers.

Logistics 2 and 3 occur in countries that have the scale and institutional capacity to promote the projects, they are part of the "current scenario" while in the other countries they will only be developed when they make progress in improving their business environment to meet the necessary demand. It is important to note that regional coordination towards similar business environments will allow for faster development by creating a more attractive market for large investors.

It is worth noting that logistics 2, given the scale required, around 12 TBTU of natural gas, and the sizes of the energy markets of the Central American countries, can be developed in all countries independently, except Belize⁶. However, in countries with smaller markets, a 300 MW natural gas plant has dis-economies of scale, which means that the price of electricity is not strongly affected, since the savings generated by natural gas are used to cover the costs of the plants' lack of scale.

1.3 The Proposal

To achieve maximum effectiveness, regional actions need to be complemented by actions in each country. CABEI's proposed action seeks to ensure that policies aimed at increasing gas penetration are coordinated at the regional level.

1.3.1. Regional Actual

It is proposed for discussion within the Central American Integration System (SICA) and the Regional Electricity Market (MER for its Spanish acronym):

1. Based on the precepts of the Tegucigalpa Protocol, promote with the competent entities in the context of SICA the development of a regional technical regulation that allows the homologation of rules and standards for all the countries, regarding the construction, operation, and maintenance of infrastructures, standardizations on the caloric content of the natural gas commercialized and rules on intra-regional trade among the countries.

The objective of this initiative is to allow the development of regional projects (two or more countries) and the trade of natural gas and LNG between countries. This homologation would allow investments to be scaled up, which, complemented with good regulations, would allow access to more competitive prices as a result of the possibility to trade regionally.

2. To achieve the necessary scale and make the construction of a gas pipeline from Mexico to Central America viable, it is necessary to promote sub-regional agreements to establish joint rules for the development of local projects.

The objective of this collaboration is to prepare local rules for the interaction of a regional gas pipeline and if possible to structure protocols on the mechanisms of gas acquisition and import from Mexico, gas commercialization rules between countries (nomination, minimum volumes, "take or pay"⁷ responsibilities, open access regulation, pipeline expansion regulation, expansion rules, etc.), tariff regulations and their adjustment mechanisms, governance of the concession contract for transporters in each country, force majeure rules, etc. These rules will help reduce project risk and attract public and private investment.

⁶Given current technologies
⁷Take or pay rules

Figure 6 – Potential layouts



Source: Consultant's elaboration. **Note:** The route through Mexico runs parallel to the Mexico-Guatemala Railroad. The layouts are approximations of the routes that these pipelines could take.

These agreements should be complemented with the clarification of the rights of use over the SIEPAC lines, allowing the execution of long-term gas supply contracts as a source of energy for electricity generation, which can make generation infrastructure/reconversions and the gas pipeline viable.

3. . In order to optimize the use of investments, the creation of a regional surplus gas market should be promoted, which would allow private investors to develop infrastructure projects with lower levels of risk. This market will be slow to develop, and the costs required for the development of platforms and regulations should ideally be leveraged by existing organizations, so it can be considered that the MER complements its activities by seeking to develop a surplus gas market for the region. At the start of operations, this market will be strongly related to the electricity market, as electricity generation is the main anchor demand to make gas projects in the region viable.

1.3.2. Actions at the National Level

Increasing the use of natural gas in the Central American region will require the active participation of the private sector. The ability to attract private and commercial financing for natural gas investments will depend on how robust the institutional, governance and regulatory frameworks are.

From this perspective, actions are proposed at both the public and private levels to improve the conditions for attracting such investments in the countries. These have been detailed in the specific documents for each country, and are conceptualized here in a general way to understand their regional linkage:

1. Development of sectoral policies in member countries.
2. Strengthen sector and environmental regulations and standards for the extraction, separation, transportation, distribution, and commercialization of natural gas.
3. Strengthen or create specialized agencies to manage the sector in the short and long term.
4. Promote the reconversion of generation plants, allowing the displacement of more polluting technologies such as coal, fuel oil (Bunker), and diesel.
5. Promote the development of studies for the reconversion of the industrial sectors, being able to consider for this, the support from the government to the companies, especially in the MSME segments.
6. Promote infrastructure projects to be developed with private or mixed capital

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