



Ecuador

Promoting Induction Cooking in Ecuador

Activity	Implementation of a Nationally Appropriate Mitigation Action (NAMA) in the residential sector promoting the introduction of induction cooktops as a way of improving energy efficiency.
Country	Ecuador
Sector(s) involved	Energy, Industry
Time frame	2014-2023

Case summary

Since 2007, Ecuador has been working on strategies to improve energy efficiency, mainly in the residential sector. In 2014, Ecuador started implementing the Liquefied Petroleum Gas (LPG) Substitution Programme (PEC)¹ that contains, as a central component, the introduction of induction cookers across the country.

The PEC is closely aligned with Ecuador's development plans and objectives, aiming at reducing its dependence on imported and subsidised fuels, and increasing the share of renewable energy in the matrix. As such, it forms part of a comprehensive and coherent package of fiscal, development and energy policies that combine long-term planning for hydropower with a strategy to phase out LPG subsidies, and the elaboration of market based mechanisms to promote private investment. The GHG mitigation potential of the programme has led Ecuador to consider it as a NAMA.

Main features of the PEC include high level political commitment that supports the initiative in a holistic and integrated manner as well as strong involvement of key ministries across all sectors. The elaboration of a sound, multi-criteria socio-economic analysis and an effective communications strategy were also central factors for the success of this programme.



Woman selling pots on a Thursday market – Saquisilí, Ecuador ©iStock.com/marcelina1982

¹ Full name: Programme for Energy Efficiency in Induction Cooking and Water Heating with Electricity in Substitution of LPG in the Residential Sector (Programa de Eficiencia Energética para Cocción por Inducción y Calentamiento de Agua con Electricidad en Sustitución del Gas Licuado de Petróleo en el Sector Residencial - PEC).

Ecuador

Promoting Induction Cooking in Ecuador

Background

The residential sector is responsible for 92% of the LPG consumption in Ecuador, followed by the industrial sector with 5% and other economic sectors with 3%. Despite its importance, the consumption of LPG represents a high cost to the economy considering that: (1) 80% of the LPG consumed is imported, generating an important outflow of currency and (2) it is heavily subsidized to keep the final price for the consumer extremely low. It is estimated that public spending for these subsidies is almost US\$700 million a year (Ministry of Electricity and Renewable Energy 2014).

In 2010, a pilot project for the introduction of induction cooktops was carried out in two cantons (Tulcan and Huaca) in the province of Carchi, with the objective of determining the social, technological and economic impacts of substituting LPG with electricity for home cooking. With the implementation of the named pilot project, 3,433 cook stoves were replaced by induction cookers. The beneficiary families reported satisfaction with the technology, highlighting easy use, speed of cooking, increased security, and reduced energy consumption.

In 2012, the Energy Consumption Equipment Renovation Programme (RENOVA) was launched, aiming to improve energy efficiency in the residential sector. The programme focused on replacing inefficient refrigerators. In the first two years of implementation, more than 300,000 refrigerators were replaced.

The National Development Plan for Good Living 2013-2017 (built on two previous development plans for 2007-2010 and 2010-2013) establishes a roadmap for Ecuador's development, and creates a framework for the implementation of sectoral programmes. Importantly, it includes objectives for the promotion of energy efficiency and for greater participation of sustainable renewable energy sources in the energy matrix of Ecuador. Linked to these objectives, the Electrification Master Plan 2013-2022 outlines plans for up to 25 hydroelectric plants and other renewable projects to be developed over the next years. It must be mentioned that already 8 emblematic hydroelectric plants will start their energy production in 2016, transforming completely the energy mix of the country.

Taking into account the experience gained with these previous national energy efficiency projects, and having the transformation of the energy matrix of the country towards cleaner and independent sources as a national interest, the Ministry of Electricity and Renewable Energy developed the so-called LPG Substitution Programme (PEC) for the residential sector. The main goal of the PEC is to reduce fossil fuel consumption through (1) the gradual reduction of LPG consumption in the residential sector, and (2) the broad introduction of induction cookers that rely predominantly on renewable energy sources.

With the support of the Ministry of Environment, the PEC (specifically the component comprising the substitution of LPG cook stoves with induction cookers) was recognised as an ongoing mitigation action and proposed as a NAMA for Ecuador.

The introduction of induction cookers is in line with the country's objective to increase the share of renewable energies, mainly hydroelectric plants, in its power generation. It promotes the expansion and reinforcement of the electric grid, and stimulates the participation of the national industry in creating a domestic supply of induction cookers.

Public financial resources will be invested in the necessary infrastructure but also serve as loans to support consumers to purchase the cookers and installation kits. The public investment is complemented by increased private finance: incentives will create the appropriate conditions for families to be able to purchase and adopt a new technology

Ecuador

Promoting Induction Cooking in Ecuador

Activities

- » **Strategic energy sector assessment.** The Ministry of Electricity and Renewable Energy undertook a top-down analysis, evaluating national energy supply and demand. It identified LPG consumption in the residential sector as an important public expenditure, as it is subsidised by approximately 80%. It also identified barriers and opportunities for implementing the PEC and for gradually decarbonising the electricity matrix (Salgado 2015).
- » **Establishment of the target.** The target of the induction cooking programme was set to replace three million LPG cook stoves with induction cookers, which represents approximately the total number of households in the country.
- » **Negotiations with companies.** In different meetings with local companies the National Government evaluated the most suitable options for the production of induction cookers. In case the national production was insufficient to meet demand, Chinese companies were approached to negotiate the import of additional induction cookers.
- » **Creation of economic incentives.** After evaluating different financial schemes for the implementation of the PEC, economic incentives were created to promote the purchase of induction cookers by households:
 - » Long-term and low interest loans for users for the purchase of electric stoves and kits installation, payable in up to six years through monthly energy bills with an interest of 7% as fixed rate;
 - » 80 free kilowatt hours monthly until 2018 provided by the government, after which the charge will be \$0.4 per kilowatthour (or \$4 per 100 kilowatts), 55% less than the regular price;
 - » Higher importation tax for LPG stoves to set a price signal that encourages the switch to induction cooking in the residential sector;
 - » Once the installation kit (internal circuit) has been acquired, the installation of the system is free of charge;
 - » Preferential energy rates for households with pre-existing induction or electric system.
- » **National investment and repayment.** Public investment (national budget) is expected to range from \$150 million to \$180 million, depending on the stoves' final specifications and price. Yet, the PEC is likely to be profitable for the government due to (1) huge savings through the phase-out of LPG subsidies that will reduce government spending over the next years, (2) a decline in the marginal price for electric cook stoves once the market is well-established, and (3) re-payments by households serving their low interest loans.
- » **Easy access to benefits.** Beneficiaries can purchase the stoves in any department store and pay it off as part of their electricity bills. In order to have access to all benefits of the PEC, beneficiaries have to register online on the programme's website (www.ecuadorcambia.com/). To date,² 223,000 cooktops have been sold.
- » **Improvement of the energy distribution network and domestic connections.** In order to support the PEC's scope, complementary activities to improve the energy distribution network are being contemplated, aiming at supporting the expected increase in demand, improving stability and reducing losses.

² As of December 2015

Ecuador

Promoting Induction Cooking in Ecuador

Institutions involved

- » Ministry of Electricity and Renewable Energy, promoting and leading the PEC.
- » Ministry of Industry and Productivity, for the activities related to the production and commercialisation of locally-produced induction stoves.
- » Ministry of Environment, for the technical component of the PEC in terms of GHG mitigation and climate change.
- » Ministry of Hydrocarbons for issues related to LPG consumption.

Cooperation with

- » Public utilities to support the reinforcement of the distribution networks and consumer-level connections.
- » The Latin American Development Bank (CAF) and the Inter-American Development Bank (IDB) provided credits for some components of the PEC (including a range of activities, from technical studies and strengthening capacities to enhancement of the distribution system).
- » Low Emission Capacity Building (LECB) Programme implemented by the United Nations Development Programme (UNDP) on behalf of the European Commission, the German Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), the Australian Department of Climate Change and Energy Efficiency and AusAID (including NAMA and MRV design, ongoing).

Finance

Investments in the electric sector: According to the Master Plan of Electricity, the total investment needed in the electric sector until 2023 is approximately \$ 11,619 million, of which 91% will come from the public budget and 9% from private capital. 61% of the total amount is planned to be spent on generation, 10% on transmission and the remaining 29% on distribution and marketing (Muñoz, 2013).

- » **NAMA financing:** Regarding the NAMA, it is estimated that the government will provide US\$ 2,2 billion, complemented by US\$ 97 million from other sources as shown in Table 1 (Parra, 2015). This will correspond to a combination of:
 - » Governmental investment
 - » Low interest loans from multilateral banking
 - » Climate funds (Green Climate Fund or other climate initiatives)
 - » Public-private associations

Table 1: Financial assessment of NAMA

Government financing	
Distribution and transmission networks	1,134,670,000
Preliminary studies for the introduction of new technology	336,000
Technology fund and other facilities	1,075,695,520
Technology development and dissemination	13,080,000
Administrative expenditure	2,077,000
Total	US\$ 2,225,858,520
Additional external financing required	
Electric power service for households without access to electricity	70,983,460
Workforce reinsertion plan	25,000,000
Mid-term and impact studies	930,000
Design of a consistent MRV System	400,000
Total	US\$ 97,313,460

Ecuador

Promoting Induction Cooking in Ecuador

Impact of activities

- » **Development of renewable energy sources:** Right now, only 15% of Ecuador's national renewable energy potential is being exploited. The change of the energy matrix targets the development of hydroelectric power from eight new hydroelectric plants that are expected to double the current generation, thus shifting the national energy matrix towards a more sustainable and climate-friendly energy production. Against this background, the substitution of LPG cookers through the use of induction stoves contributes to the transformational aspect as renewable energy is mainly used for electricity generation.
- » **Mitigation benefits.** The programme is expected to reduce 2.58 million tCO₂e of emissions yearly until 2025. Complementary programmes for hydropower development, power optimisation and energy efficiency are expected to lead to an additional reduction of 14.63 million tCO₂e and 1.83 million tCO₂e, respectively, also by 2025 (Ministry of Environment 2015).
- » **Reducing energy vulnerability.** The programme is expected to promote the modernisation of the electricity infrastructure and enhance the operative efficiency as well as a reduction of LPG dependency.
- » **Generation of energy savings.** Efficiency also means energy savings, as energy demand is reduced at the household level. Induction cooking is a more efficient process to heat food as it uses magnetism, avoiding unnecessary energy loss.
- » **Generation of budget savings.** The implementation of both the induction cooking programme and the transformation of the energy matrix towards renewable energies could represent annual savings for the public purse between US \$ 1,167.2 million and US \$1,401.2 million (Muñoz 2013).
- » **Capacity building.** The PEC has allowed different stakeholders to become familiar with issues such as climate change and other socio-economic impacts.
- » **Local industry promotion and job creation.** This new technology will enable to create jobs as the national companies are being encouraged to promote this industry through institutional arrangements.

Why is it good practice

The NAMA of induction cooking in Ecuador is considered good practice because it has the following features:

- » **Contribution to sustainable development.** In terms of social development, the PEC aims to benefit more than three million families. In addition, GHG emissions are expected to decline due to new investments into hydro energy, a gradual LPG phase-out and increased energy efficiency. Regarding economic development, the PEC is expected to generate substantial budget savings by phasing out LPG subsidies and reducing fossil fuel imports.
- » **Alignment with Ecuador's National Development Plan "Good Living 2013-2017."** This plan provides a legal framework for the PEC and ensures its compatibility with other development goals.
- » **Combination of public policy with financial, technical and economic instruments.** A thorough analysis of the barriers and opportunities associated with the PEC as well as careful economic impact assessments allowed for the design of specific financing and implementation schemes. The combination of public investment into energy infrastructure, fiscal policies to phase out LPG subsidies and market-based mechanisms to leverage private investment provide a fully fleshed-out set-up for the successful implementation of the PEC.
- » **Broad scope.** The programme is cross-sectoral and expected to benefit more than three million households (almost the total number of households in the country).
- » **High-level political ownership.** The National Government gives the PEC high priority as it is a strategy to reach energy sovereignty. This is evidenced, amongst others, through the use of large public financial resources and high-level endorsement by different ministries, as well as through direct presidential support.

Ecuador

Promoting Induction Cooking in Ecuador

- » **Stimulation of private investment.** The different proposed financial schemes aim to reach out to all actors involved in the PEC, from importers to distributors to households.

Key Elements Induction Cooktop Programme

Use of the great hydropower potential of Ecuador

Hydroelectricity usage instead of LPG (cooking and water heating)

Reduce LPG subsidies (700 M USD)

Reduce GHG emissions by diminishing LPG burning

Local industry activation

Source: Ministry of Environment Ecuador (2014): Induction Cooktop NAMA

Success factors

- » **Government leadership.** The government is promoting the process, mainly by the Ministry of Electricity and Renewable Energy. The President publicly supports the initiative, and has invited citizens and other stakeholders to be part of it. This increases the ability to call and gather multiple stakeholders and secure ownership.
- » **Strong energy planning.** Ecuador has developed a solid energy strategy during the last years. The PEC is a result of the analysis of lessons learned from previous actions and assessments in the energy field. The modernisation of the energy and productive sectors has been recognised early on as a priority target at the national level with the long-term objective of decarbonising the energy matrix and achieving energy sovereignty.
- » **Build on national strengths.** The PEC recognises the high potential of the available national renewable energy resources and takes the opportunity to develop Ecuador's hydroelectric potential, setting an example for other countries in the region.
- » **Participation of multiple stakeholders.** Even though energy sector led the process, the involvement of the industry sector and private players was key for the design and the sustainability of the PEC. On the one hand, the industrial sector is helping to make the programme attractive for the beneficiaries by organising workshops all over the country, showing them how induction cooking works and what the benefits are. On the other hand, the private sector will be part of the production and commercialisation of the cook stoves.
- » **Strong communications strategy.** Training through demonstration campaigns and outreach activities using different media channels are key to overcoming knowledge and cultural barriers towards new technologies and changing habits.

Ecuador

Promoting Induction Cooking in Ecuador

Overcoming barriers/ challenges

Financial

What were the main barriers/challenges to delivery?
How were these barriers/challenges overcome?

The total costs of the PEC are relatively high and its implementation requires large public investment. The PEC is expected to be profitable overall due to 1) huge savings through the phase-out of LPG subsidies that will reduce government spending over the next years, 2) a decline in the marginal price for electric cook stoves once the market is well-established, and 3) re-payments through households serving their low interest loans.

Not all beneficiaries can afford to purchase the stoves.

Beneficiaries can purchase the stoves in any department store and pay it as part of their electricity bills.

Socio-cultural

Difficult to convince the beneficiaries of the advantages of the new technology (both using electricity and induction cooking)

Strong communications strategy transmits positive messages about the PEC. Communication campaign through different media such as radio, television and forums reaches out to the target group.

Industry

The change from LPG to induction system may have an impact on stakeholders who depend on the LPG market.

Programme developers are still assessing schemes that will allow for the participation of the affected stakeholders in other components of this same initiative.

Lessons learned

- » **Promote an integrated, cross-sectoral approach.** The PEC is based on a comprehensive and coherent package of fiscal, development and energy policies that combine long-term planning for hydropower with a strategy to phase out LPG subsidies and the elaboration of market based mechanisms to support the introduction of electrical cook stoves.
- » **Include climate change benefits into energy project design.** Climate change benefits (in particular GHG emissions reductions) should be considered a basic component of energy projects from the beginning of their design. This can help to identify new mitigation opportunities aligned with existing energy development projects.
- » **Communicate the programme.** Based on the pilot programme conducted by the Ministry of Electricity and Renewable Energy, the main lines of action regarding the consumers are: advertising the induction technology and strengthening beneficiaries' capacities, logistics, availability of suppliers, strategic partnerships with electricity companies and other industry stakeholders and the monitoring, control and maintenance of the PEC.
- » **Ensure high level ownership.** Visible ownership of the programme at the highest political level helps to bring stakeholders on board, allocate resources and promote sustainable action.

How to replicate this practice

- » **Analyse national needs and circumstances.** Various elements of the PEC can be considered for replication in other countries, based on their respective needs and circumstances. For example, the market based instruments to support the broad introduction of induction cookers could be replicated to other mitigation actions or other sectors in different countries.
- » **Align mitigation with national targets.** Design the mitigation action in line with the objectives of the National Development Plan and previous mitigation targets. This promotes a strong political commitment, allows for relevant stakeholder involvement and ensures ownership.
- » **Take advantage of national opportunities.** Consider the national characteristics that inform the scope and design of the project, such as renewable energy sources, experiences gained from previous mitigation initiatives or pilot projects, and capacities and interests of key stakeholders.
- » **Be innovative.** Develop new financial schemes that incentivise the actions promoted. In addition, it is essential to elaborate socio-economic impacts and benefits that support these new schemes.

Ecuador

Promoting Induction Cooking in Ecuador

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