ENERGY TRANSITION ENABLERS IN LATIN AMERICAN COUNTRIES

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Overview

Global energy use accounts for aproximatelly two-thirds of all greenhouse gas (GHG) emissions worldwide (IEA, 2015). Latin America and the Caribbean (LAC) countries have a lower energy consumption per capita compared to other major regions (over a half of world energy consumption per capita), although energy emissions from fuel combustion has increased over 90% from 1990 to 2013.

The so-called energy transition implies a radical transformation of the energy sector towards low carbon energy systems. Energy efficiency, renewable energy including biofuels and carbon capture and storage (CCS) would play an important role in reducing carbon emissions. According to EIA (2015b), energy efficiency will be the most significant driver in reducing emissions from energy use by 2030 (accounting for 49% of GHG emisisons reduction), followed by other policy measures, such as renewable energy investments (17%), upstream methane reductions (15%), fossil fuel subsidy reforms (10%) and reducing inefficient coal (9%).

According to Smil (2010), there is no precise or widely accepted meaning of the term "energy transition". However, it is often used to describe changes in the composition (structure) of primary energy supply. This change takes place gradually from an established energy system to a new one. It is thus a process that can be analyzed in different scopes, for example, from local to global perspective.

The World Energy Council (2014) uses the term as a structural change in the energy sector of a country, more specifically, with a growth trend of the share of renewables combined with the promotion of energy efficiency to reduce consumption of fossil fuels. Such modern definition of transition gives a clear objective of reducing GHG emissions to mitigate climate change. However, commonly, this definition is misinterpreted, reducing the conceptual scope of the term by emphasizing one type of goal, namely a supply shift from fossil fuels to renewable technologies by promoting energy generating capacity additions. There is not one single energy transition but rather various local experiences.

Path dependence, domestic energy endownments and policy decisions seems to shape past energy transitions in LAC, imposing different pathways and process pace (RUBIO & FOLCHI, 2012). "Leapfrogging" may help developing countries at their supply energy side, introducing new clean technologies at increasingly lower costs. However, they may not "leapfrog" at the consumption energy side due to weak policies, financial and human capital constraints (BENTHEM, A. 2014), offseting benefits at the supply side in lowering GHG emissions by increasing energy consumption and losses. According to Fouquet (2016), the speed of new technologies penetration is critically influenced by demand for energy services when income elasticities of energy demand are high. Countries which have fast energy demand growth present higher potential for energy transitions. It might be the case of LAC.

To move towards a low-carbon energy mix, countries in the region have set plans to foster energy transition, by turning production and consumption more efficient, specially at the electric power sector. Several LAC countries have decades of experience with generating electricity from low carbon sources[1] and some of the largest potentials and targets for renewables in the world (IFC, 2016; REN21, 2016). Besides investing in renewables, some other initiatives would help to tap the full energy potential towards a sustainable energy transition. Those alternatives are herein called "enablers", as they are not necessarily the "low-hanging fruits" but they might stimulate more conventional transition options according to local specificities.

Methodology

This paper aims to analize the status of LAC countries regarding their energy transition policies and initiatives. Thus, it uses an empirical evaluation of three typified country case studies (namely Brazil, Chile and Domenican Republic) which illustrate very different contexts (a continental size and a medium size countries and an island)

[1]The region possesses the highest rate of clean energy penetration in the world, due mainly to hydropower (45% of LAC's electricity demand). Meanwhile biomass, wind, small hydro, solar and geothermal sources represent 11 % of the total installed capacity (352 GW). Therefore, over half (56%) of LAC's energy mix is composed by non-carbon dioxide (CO_2) emitting sources (IFC, 2016).

and their potential enabling options to promote energy transition. Therefore it presents a comprehensive review of national energy policies and market design, as well as their electricity sector generating mix and network infrastructures. A literature review provides all conventional aspects of the global debate about energy transition, which is contrasted with aspects analyzed from these case studies. National data will be retrieved from sources such as: ECLAC/UN, IEA/OECD, IDB, IFC, IRENA and national energy regulators and ministries.

Expected Results

The analysis of energy policy in LAC countries is very diverse and complex. The case studies provides evidence of different energy transition enablers.

The Brazilian case is remarkable. Enjoying its continental size and natural endownments, Brazil has a variety of options and potential to deploy many types of renewable energy sources. With around 70% of hydro installed capacity, the country has already a natural cost competitive energy storage to accommodate large shares of intermittent renewables (namely wind and solar) (IEA, 2014). However, as energy demand grows, it looses its pluriannual storage capabilities for just months of energy stored. Energy dispatch prioritize renewables due shorter term prices and operating conditions, thus large hydro power are considered baseload units. Thermal units (powered by fossil fuels and biomass) may be considered baseload rather than back up units in order to increase hydro value of flexibility to the system.

Chile has a dynamic and emerging renewable energy market, specially regarding the deployment of solar projects, that would clean up its power system. By 2050, Chile intends to have at least 70% of its power consumption from renewables. However, due to its narrow shaped territory, the country lacks enough transmission capacity, resulting in relevant transmission congestions, thus losing benefits from generating units' complementarities within the country and with its neighbors.

Dominican Republic has passed a detailed and ambitious renewable energy law (which includes tax incentives, priority of dispatch) defining the country's renewable energy target of 25% by 2025 (IRENA, 2016). However, its electricity sector is characterized by operational and financial problems due to high levels of technical and commercial losses (CNE-REP. DOMINICANA, 2008). Part of the population do not have reliable electricity services, showing the crucial need of infrastructure investments on its distribution network.

Conclusions

Several LAC countries have defined plans, policies and laws aiming a cleaner energy mix and they differ among them. Although some still lack institutional capacity or political environment to move towards a low carbon energy mix, there are enabling options in place that could speed up the energy transition.

The proposed case studies showed that besides the conventional wisdom regarding investments on renewable energy, energy transition must be seem in a broader sense, respecting national specific caracteristics. Network investments, either in transmission lines (Chilean case) or distribution grid (Domenican Republic case) could unveil large benefits, both at the supply and demand side. Moreover, a balanced energy dispatch would increase system's performance and allow higher penetration of intermittent renewables (Brazilian case).

In sum, energy transition goes beyond investing in renewable capacity. Due to economic and demographic growth, additional renewable energy resources coupled with growing energy demand in LAC countries may raise substantial physical and operational constraints that should be overcomed by consistent energy planning and policies.

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