ENERGY TRANSITION ENABLERS: TECHNICAL SOLUTIONS FOR LATIN AMERICAN COUNTRIES

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Overview

The discussions about the future of the planetary climate and its consequences for countries are at the core of the energy transition research agenda (Grubler, 2012). Such agenda has evolved and gained momentum as technology and the political will provide grounds for a coherent socio-technical transformation. Most of the energy transition studies reduce the conceptual and systemic scope of the term by emphasizing the development of renewables generation solely (Andersen, 2014). However, as renewable sources have been developed and the constraints of their penetration became apparent, scholars and, more importantly, policymakers have paid increasing attention at the missing pieces at organizational conditions and infrastructure requirements that might prevent a consistent energy transition (IEA, 2014; IRENA, 2017). Indeed, identifying the most promising set of actions in this space and designing policy incentives have been critical challenges.

To move towards a low-carbon energy mix, Latin American and the Caribbean (LAC) countries have set plans to foster energy transition, by adapting their production and consumption, particularly in the electric power sector (UNFCCC, 2015).

Besides the conventional wisdom on investing in renewables, other initiatives might enable a systemic and holistic transition. This paper provides evidence that recent LAC energy policies try to find specific technical enablers that might speed up the transitioning process. We called "technical enablers" targeted technical improvements on the energy system which provide an efficient use of system resources while respecting local specificities.

Those enablers allow both higher penetration of variable renewable energy (VRE) and more efficient final consumption in a way that carbon emissions would be mitigated.

Methods

This paper analyzes the requirements of LAC countries (Brazil, Chile and the Dominican Republic) regarding their energy transition conditions, technical enabling options and recent policy measures. Thus, through a comparative analysis we undertake an empirical evaluation of specific cases to illustrate very different contexts and how they relate with transitioning targets.

1) The Brazilian Case: a continent-sized country, with a variety of renewable options which must meet a growing energy demand over time.

2) The Chilean Case: a medium-sized country with a challenging geography and ambitious renewable energy targets towards sustainability and lower external energy dependence;

3) The Dominican Republican Case: an island with lower income population and still poor infrastructure conditions to accommodate and incentivize renewable projects development.

The purpose of such comparative analysis is to identify technical enablers which contribute to a systemic low carbon transition well suited for diverse local characteristics.

Results

Countries' experiences provide lessons and raise questions about what would be a feasible trajectory towards a sustained transition. Those questions are the ones that policy makers must ask themselves when promoting national energy transitions complying with ambitious emissions targets. Hence, through comparative analysis, policy makers can explore country specific options and their convergence towards a global and common objectives, even if they mean different trajectories.

The proposed case studies provide evidence that besides the conventional wisdom about energy transition options (renewable capacity additions), a transition must be seen in a broader sense through the lens of their technical enablers and related flexibility resources provided.

Brazil can accommodate an increasing share of VRE with its cost-competitive energy storage from large hydro if it recognizes the value of reservoirs' flexibility. Energy dispatch may change towards baseload thermal units in the medium term enabling a lowering of emission in the long term from a higher penetration of new renewable sources. Sectorial reforms are currently being discussed to address such issue.

In turn, Chile has to deal with similar challenges that Brazil faced while interconnecting its regional systems aiming to better use its widespread natural resources. A new national transmission system is being built and it is expected that it will change dramatically the way in which Chile explores its domestic natural endowments.

The Dominican Republic has to solve its distribution challenges as a precondition for a more efficient energy use and to overcome its fiscal burden. An investment strategy of renewables alone could not solve the energy issue that the country faces. For this matter, reforms are being designed and discussed through its Electricity Pact.

Conclusions

The next energy transition is a process which might be understood in a broader sense. Policymakers should promote a transition firstly by analyzing country-specific and systemic conditions, secondly by searching for potential enabling options for transition and, finally, by adopting measures to implement them. Network investments, both in transmission lines (Chile) or distribution grids (the Dominican Republic), could unveil large benefits at the supply and demand sides. A balanced energy dispatch with thermal units could increase system's performance and allow a higher penetration of VRE (Brazil).

At the same time that renewable energy sources are required for a sustainable future, they impose challenges for systems. Indeed, the enabling options contribute to turning systems more efficient and secure, independently if they are intended to run with zero or positive carbon emitting sources. Nevertheless, if climate related targets are considered as a strategic axis for energy policies, the system operation and planning must be aligned with such targets.

In sum, if the low carbon energy transition is a legitimate goal for energy policies, technical enablers are preconditions for systems robustness.

References

ANDERSEN, A. (2014) No transition without transmission: HVDC electricity infrastructure as an enabler for renewable energy? Environmental Innovation and Societal Transitions 13 (2014) 75–95

GRUBLER, A. (2012) Energy transitions research: Insights and cautionary tales. Energy Policy 50 (2012) p. 8–16

IEA (2014) The Power of Transformation: Wind, Sun and the Economics of Flexible Power Systems. International Energy Agency. IEA/OECD. Paris, 2014

IRENA (2017) REthinking Energy 2017: Accelerating the global energy transformation. International Renewable Energy Agency. Abu Dhabi.

UNFCCC (2015) Intended Nationally Determined Contribution, INDC-DR. United Nations Framework Convention on Climate Change. Available in: < http://newsroom.unfccc.int/unfccc-newsroom/dominican-republic-submits-its-climate-action-plan-ahead-of-2015-paris-agreement/ >