Forget the Government: Promoting Renewables with Voluntary Action

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See footnotes at end of text.

Introduction

Climate change mitigation and the support for renewables have been part of the scientific and political discussion for decades already. The scientific warnings about climate change go back to the1950s with the work of Roger Revelle and as early as 1975 (Broecker, 1975) ponders whether we are "on the brink of a pronounced global warming." The United Nations (UN) established the Intergovernmental Panel on Climate Change (IPCC) in 1988 and since then, the issue has been a central theme in many international meetings, discussions and media articles and programs.

Nevertheless, the actual reduction of greenhouse gases (GHG) emissions has been frustrating. UN was able to secure relatively widespread support for the Kyoto Protocol and the Paris Agreement, but the general sentiment is that governments are not doing enough to curb emissions. It is useful to review the reasons for such a fact. First, the benefits of GHG emissions are local, but the costs, dispersed by the globe in a very heterogenous manner. In addition, they will affect more profoundly future generations than the current one. Inside each country, the economic burden of reducing emissions would fall on concentrated sectors, for whom emissions are associated to profitable activities. Therefore, the immediate interest of relevant polluters leads them to oppose environmentalists' efforts. Being a balance of competing political forces, the actions of government tend to be erratic. Sometimes and in some places, there are advances, which are later - or somewhere else - followed by opposite movements. The result is the slow and indecisive progress that we alluded to.

Of course, economic or catastrophic events may tip the balance of forces one way or another, but waiting for such occurrences does not seem wise. These considerations should persuade concerned people to look for approaches beyond the so far explored advocacy for government intervention. Diverting at least some of the efforts from this strategy is not easy, however. The problem is that state's power is too strong an attraction. After all, legal enforcement could obtain fast and important change if it could be unequivocally implemented. Additionally, it is not so clear what can be done without the government. While little can be done to solve the first difficulty, it is possible to tackle the second.

This article sheds light on possible paths of action that do not require the government and are under explored. We focus particularly on the promotion of renewables and its integration to the electric system. The reason for this choice is the notion that renewables penetration is one of the best routes to a cleaner energy matrix and less GHG emissions. Electricity generation practically ties with transportation as the biggest source of emissions, with around 28%.[1] With the tendency towards electrification of cars and everything else, being able to reduce emissions in the electricity sector seems an obvious priority.

From this observation, the next section discusses the economic and technical characteristics of renewables. Since renewables have zero (or at least very low) marginal costs, I argue that the main task is to build capacity. The natural market forces will then make sure they displace other conventional sources. I argue against incentives that distort the effective marginal cost perceived by producers. Instead, all support should be focused on funding the investment (capex). I also discuss the need for integration with other sources and the fact that renewables may be able to survive even if extra payments (or products) are defined for conventional sources. The folloing major section describes a strategy for supporting renewables penetration with voluntary platforms. I also discuss how such markets could be organized as private organizations in many different places. The last section acknowledges that the idea of voluntary platforms is not entirely new and mentions some organizations working along these lines. But it is highlighted that the article's main contribution is the call for private action, departing from the usual and almost exclusive dependence on governmental action.

It should be emphasized that the approach this article advocates is not construed to be an *optimal* strategy in any sense, but only a strategy with potentially higher payoff than the explored up to now. It is offered as an alternative, under the perspective that more government intervention is not forthcoming or has become difficult to achieve.

Economics of renewables and its integration to the electricity system

This section reviews some basic economic characteristics of renewables and its relationship to the electricity markets in which they operate. I begin by discussing its costs structure, common incentives and business models. The main observation from this discussion is the need to avoid giving incentives that create inefficiencies. The next section turns attention to some technical characteristics of renewables and its integration with other sources. All these observations are useful to inform and motivate the plan that is

subsequently presented.

Costs and incentives

Renewables are known to have relatively large fixed costs (capex) and small marginal or variable costs (opex). They have low marginal cost because they do not need to pay for fuel since renewable sources (sunlight, wind, flowing water, etc.) are free. This characteristic implies two things. First, the main difficult for increasing renewables penetration is funding the initial investment. Second, once capacity is built, selling electricity in the corresponding market should give adequate incentives to keep the production in almost all moments where it is available. That is, as long as the electricity price is above the small marginal cost, a renewable producer would be interested in producing. These observations will be useful below.

This cost structure has implications over the optimal way of financing and supporting the penetration of renewables. The first observation suggests that the main task is to provide funds or low interest for initial investments. In the case of solar panels in rooftops, this is precisely what many governments are doing. Indeed, this widespread form of distributed generation is usually supported by tax credits and lines of credit with reduced interest.

Notice, however, that the incentives for centralized (as opposed to distributed) generation with renewable sources usually are of a different kind. Perhaps the most common schemes are feed-in-tariffs, production tax credits, and tradable certificates.[2] The usual form of those incentives changes the perceived marginal cost of the producers, leading to inefficiencies in the dispatch. To understand this, recall that those incentives stipulate a value that is to be paid to the producer per each unit of energy produced. For example, let us say that the tax credit is $12/MWh, the capacity of a qualifying renewable producer is 100 MW and the marginal cost is zero.[3] This implies that even if the current electricity price at its location is - $5/MWh (negative) during, it is still profitable for this producer to keep sending electricity into the grid. The negative price intends to signal to producers that they should not inject energy into the system at that moment. The PTC allows the producer to ignore this signal, thus creating inefficiencies in the dispatch of the whole electricity system. In particular, the 100 MWh produced in one hour has to pay $500. While the firm is pocketing $700, tax payers are paying $1200, thus wasting $500. Everyone would be better off if the firm stops producing electricity and just receives $700 from taxpayers.[4]

Another way to understand the alluded problem is to observe that the PTC changes the supply curve of the market, making a producer of zero marginal cost appear as one of –$12/MWh, since the producer will keep producing as long as the price is above that level. Obviously, this change in the supply curve leads to a new and inefficient equilibrium. This is undesirable and should be avoided. It is not in the interest of society to devise incentives that lead to such inefficiencies

Technical characteristics and integration with electric systems

Perhaps the most important technical characteristic of renewables is their intermittency, that is, their lack of dispatchability. The power to control and vary the production of a supplier is valuable to the system operator, who has the obligation to maintain the balance between production and consumption. Another way of saying this is the following: the system operator needs other types of generators in order to meet the electricity demand, especially when renewables production unexpectedly vary.[5] In short, there is some complementarity between renewables and conventional sources.

This leads to an important observation: when we consider the social (environmental) costs associated to GHG emissions of different sources, it is important to observe their combined effect: after all, although renewables do not emit by themselves, they might require the operation of conventional sources in a way that emits more than their usual pattern of operation would do. Thus, it is possible that the introduction of renewables actually increases GHG emissions. This complementarity makes the concept of social cost of emissions difficult to apply.

It should be noted that a high penetration of renewables would tend to make the average price in markets low, since their marginal cost is close to zero. Low average prices may be detrimental to the existence of conventional sources. Since, as argued above, conventional sources are needed, their active permanence in electricity markets would require extra payments, in exchange for the services they provide and renewables cannot.

In any case, once we recognize that conventional sources are needed and require a proper remuneration for their services, we can accept that, sooner or later, payments for controllable and renewables sources will need to be different even if they produce the same amount of energy. Most likely, this difference will come into being through some market for dispatchability. But it is not our task to define or speculate the forms that such product will take. Suffice it to say that conventional producers will eventually have access to extra payments that would not be paid to renewables. And this is desirable, because it gives the proper incentives to balance the electric system. Once renewables producers recognize the need of such payments, we will make easier progress towards a better integration of all sources.

To be sure, the above point begs the question whether this lower payment for its energy would not hurt renewables. Remember that their marginal cost is close to zero. This means that most likely, they would be able to profitably produce even if the price of energy is very low. What about their return on equity? As we said before, this is related to ways to fund their initial investment in a convenient way. The production

itself, incentivized by the price of electricity can take its course in an efficient manner.

How to organize voluntary platforms to foster renewables

This section details a way of organizing voluntary markets for renewables. As discussed above, it is our view that the problem is funding the initial investments. The support for renewables would have to come in transfers that do not depend on quantity produced, thus not affecting the perceived marginal costs.

In order to adequately supply those investment funds, an organization should be created to perform two main tasks: obtain resources and select the projects that will be funded. In fact, many such organizations can and should be created. Their area of influence or activity may be restricted to a state or country, but could also cover many nations. Each of these organizations will act as a platform, connecting environmentally concerned individuals and firms, who are willing to fund renewables, to entrepreneurs, eager to advance their projects. We will next discuss the two main tasks that a platform would need to perform.

Obtaining funding money

One side of the platform would consist of environmentally concerned individuals and firms, who become convinced about the main point of this article – that is, we should stop concentrating all our hopes in the government – and decide to act directly on the support of renewables. One important task of the platform would be to find and connect those people and firms and present them the opportunity to transcend the unique strategy of government intervention in the climate change mitigation effort.

The platform would receive "investments" or contributions from these individuals and firms, in exchange for certificates of renewables capacity that their money helped fund. The platform would maintain a record of the electricity production of the funded investments or, rather, the amount of GHG emissions avoided by those projects. Additionally, it could estimate the CO_2 footprint of the individual or the firm and urge them to buy enough certificates to offset such footprint. A reputational value could be created for individuals and firms that contribute. A marketing strategy that allow such contributions to be shared through social media could spark interest. For this, perhaps a standard for certificates may be developed by the different platforms involved in this effort.

Two types of contributions could be considered: a gift or donation, in which the individual simply gives money to fund projects, without requesting anything in return; and low or even negative interest "investments". In this later case, the individual would put money to fund projects and would receive back an annuity, corresponding to a low or even negative interest, to be negotiated (or chosen) by the donor. The annuity would be paid back by entrepreneurs receiving funds for their projects, as we discuss next.

Selecting and managing projects

After amassing enough funds, the platform would organize periodic competitions or tenders for the selection of projects, prioritizing those with lower funding requirements. In this way, the platform maximizes the amount of renewables capacity that it supports. The competition makes sense for centralized generation. For distributed generation, a fixed scheme could be made available for interested households.

The funds may be provided without a repayment requirement or be organized as a more or less usual financing scheme, but with low interest rates. Obviously, the platform would have to balance all obligations it contracts to keep financially viable.

The participation in the tender should involve low costs for the entrepreneurs, in order to attract an abundance of projects. However, after their projects are awarded, a contract between the entrepreneur and the platform should be firmed, which specifies the schedule of payments between the parts (payments from the platform to the producer and repayments, if that is the case). The contract should also specify minimum conditions and indicators that the renewable producer should maintain. In particular, the supplier should be able to produce a minimal level, and suffer penalties if those targets are not satisfied. However, as we emphasized above, payments depending on quantity should be kept to a minimum, if not completely avoided. Further details are left for the agents involved.

Remarks

The idea presented in this article is not entirely new. In fact, it has been pursued by a number of organizations in one way or another. Most of those are private foundations that invest in climate change mitigation. But there are also governmental and intergovernmental organizations that serve a similar role. For instance, the International Renewable Energy Agency (IRENA) "is an intergovernmental organization that (...) serves as the principal platform for international cooperation."[6] Another attempt worth mentioning is the Chicago Climate Exchange, which tried to create a voluntary exchange for emissions reductions; see (Sandor, 2012). Most of these attempts, however, seem to presuppose or count on some kind of government intervention.

On contrast, the main contribution of this article is perhaps the call to shift the emphasis from governmental intervention to direct action by private citizens and organizations. Given the deadlock in which politicians have put themselves and the governments they run, it is better to stop waiting for their leadership. Although not easy, private and voluntary action is possible and may make a difference.

I hope this paper inspires actions beyond the appeal to central authority, towards the development

of voluntary platforms, whose creation and growth depend solely on the prowess of environmentally concerned agents.

Footnotes

[1] See https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions/, consulted on Aug 23, 2018.

[2] We do not explicitly discuss other forms of incentives, such as tendering, net metering, voluntary green power programmes, public funded research and portfolio standards. However, one could say that our main idea is an adaptation of the first.

[3] This is actually the Renewable Electricity Production Tax Credit paid in US for some eligible technologies. See http://www.energy.gov/savings/renewable-electricty-production-tax-credit-ptc/, accessed on Aug 23, 2018.

[4] One could argue that the social cost of GHG emissions, which are not present for renewables, could account as a benefit of these sources. However, such cost/benefits are subject to strong uncertainty and are of difficulty calculation. Moreover, as observed below, there are some complementarities between sources that make the whole concept of marginal social cost difficult to apply. For this reason, we think it is better to leave this out of the short run dispatch problem.

[5] It is possible to conceive a setting with only renewables generation and no conventional source, even without significant presence of storage capacity (batteries): if renewables are so widespread that even their minimal possible production is larger than the peaks of demand. In this case, it would be sufficient to curtail production in the many circumstances that production would be above demand. In such a world, the electricity prices would be consistently zero. However, this would require a huge installed capacity of renewables. With storage capability, this scale is reduced, but this setting does not seem realistic in the foreseeable future.

[6] See http://www.irena.org/aboutirena, accessed on Aug 23, 2018.

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Sandor, R. (2012). *Good Derivatives. A Story of Financial and Environmental Innovation*. *John Wiley & Sons*. https://doi.org/10.1080/20430779.2012.759952

Salameh: *OPEC Is an Important Energy Policy Tool to Keep Oil Markets Stable.* Continued from page 19

Footnotes

[1] BP Statistical Review of World Energy, June 2018.

[2] OPEC: General Information & Chronology, 1989, pp. 7-9.

[3] Mamdouh G Salameh, "What Is Behind the Steep Decline in Crude Oil Prices: Geopolitics or Glut" (A book published by the Arab Centre for Research & Policy Studies, June 2015, Qatar).

[4] Ibid.,

[5] Tim Daiss, "Anti-OPEC Bill Could Be a Game-Changer for Oil Markets", Oil-price.com, July 23, 2018, accessed on1 November, 2018.

[6] Ibid.,

[7] Keith Johnson, "Proposed Law Would Allow US to Sue OPEC for Manipulating Oil Market" FP, July 18, 2018.

[8] Ibid.,

[9] Wikipedia, the free encyclopedia

[10] Raymond J. Learsy, "NOPEC (No Oil Production & Exporting Cartels Act": A Presidential Issue & a Test of Political Integrity", Huffington Post, 10 September 2012..

During a side-meeting at the EPRG Winter Seminar in Cambridge, 3 IAEE executives exchanged views on new projects for energy economists. (l to r) David Newbery, Christophe Bonnery and Michael Pollitt