

# Renewable Energy in the US and its Incentivization: An Exploration of Public Policy Frameworks

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**Executive Summary:** Renewable energy is a promising source of sustainable energy with many positive environmental externalities. It is generally defined as energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Since renewable energy is replenished, therefore it is sometimes termed as “sustainable energy”. The U.S. Department of Energy (DOE) states that renewable energy accounted for about 10% of total U.S. energy consumption and 13% of electricity generation in 2013 (US EIA, DOE, 2013). By some accounts the U.S. has the potential to generate 80 percent of its electricity from renewable energy by 2050 (NREL, 2012). To realize this potential, and thereby attain a transition towards renewable energy, however, would entail a multipronged strategy that addresses both supply-side and demand-side challenges. This paper mainly analyzes strategies to promote renewable energy in the US through the lens of public policy frameworks. However, discussing technical details of the frameworks is beyond the scope of this paper.

## I. Introduction

Power mix refers to how final energy consumption in a given geographical region breaks down by primary energy source (all energy sources that remain in their natural state such as oil, natural gas and sunlight). It includes fossil fuels (oil, natural gas and coal), nuclear energy, waste and the many types of renewable energy (biomass, wind, geothermal, water and solar). The present power mix (67 % fossil fuels versus 7 % renewables) of US, which maximizes the use of carbon-based energy sources, is fouling the air with greenhouse-gas emissions that are causing serious harm to the global climate and environment. To address this critical problem, experts call for decarbonizing energy supplies (Bashmakov et al., 2014). One remedy is to shift towards low-carbon resources, i.e. renewable energy (wind &

solar). But this shift would face myriad obstacles ranging from poor market acceptance, market distortions (Beck & Martinot, 2004), market uncertainties (Painuly, 2001), economic and financial concerns (Painuly & Reddy, 2003), high capital costs and inadequate infrastructure (Taylor & Bogach, 1997) to lack of social acceptance (Bürer, Wolsink & Wüstenhagen, 2007), and institutional barriers (Wolsink, 2000). Given such impediments, states such as California and Oregon should be commended for instituting reforms (e.g. laws regulating big utilities to eliminate coal imports by 2035 and requirements to meet 50% of consumer demand with renewable energy) that have promoted the use of renewable energy (Carley, 2009).

Considering this background, interesting research questions emerge for investigation

including: How have states overcome various political and policy obstacles to renewable energy? What lessons can be gleaned from state energy policies that have been unsuccessful in effectively promoting renewable energy? According to Schlager and Blomquist (1996, p.653) 'the goal of a political theory of the policy process is to explain how interested political actors interact within political institutions to produce, implement, evaluate, and revise public policies.' Keeping this in mind, this paper discusses policy process frameworks that address these questions; in particular through assessing incentivization of renewable energy sources in the US context, while also more generally appraising the applicability and relevance of these frameworks. Moreover, the paper offers suggestions for further research.

## **II. Literature Review**

1. Setting the Stage: There is a robust stream of academic literature on renewable energy focusing on barriers (e.g., institutional, technical and community). Additional research, with a more optimistic view related to opportunities for renewable energy, focuses on drivers and implementing policies. Those who agree that energy supply should be decarbonized have differing opinions on the way this should be done. Selecting and implementing policies is a complex process. We see this in the field of renewable energy because of the conflicting views and goals of stakeholders (Bazilian & Komor, 2005). When analyzing renewable policy options, researchers compare and contrast the underlying choices. Some like Finon et al. (2003) evaluate policies based on the assumption that market-based solutions are better; others like Arthur (1989) and Arrow (1962) assess policies based on the assumption that government interventions work better. Still others propagate community-oriented energy policies such as incentivizing non-profit domestic and small-scale renewables (Hain et al., 2005). Finally,

researchers like Menz (2004) suggest a mix of government and market-based mechanisms.

2. How to overcome obstacles: It is important to evaluate the obstacles that stand in the way of policy solutions to incentivize renewable energy generation. Martinot and Beck (2004) focus on three main barriers that prevent investment from occurring: 1) cost and pricing (e.g. subsidies for competing fuels, high capital costs and unfavorable power pricing rules), 2) legal and regulatory (e.g. restrictions on siting and construction), and 3) market (lack of access to credit and technical or commercial skills). Similarly, Painuly (2001) classifies multiple barriers to renewable energy technologies including market failure and distortions; economic, institutional and technical obstacles; and social/cultural impediments. Overall, for Martinot and Beck and Painuly, many of the barriers could be placed as market distortions and uncertainties that unfairly discriminate against renewable energy.

One 'so-called' barrier frequently analyzed in renewable energy literature is NIMBY-ism (Not In My Backyard), the idea that people will oppose a renewable energy project if it is to be built near their home or community. However, several studies suggest the opposite – that individuals living closer to renewable energy projects tend to have more positive attitudes towards them, in comparison to those living further away (DTI, Scottish Executive et al., 2003; Brauholtz, 2003). A study by Wolsink (2000), meanwhile, concluded perceived visual impacts and institutional problems, rather than NIMBYism, as main factors explaining public attitudes towards a local wind farm. He calls NIMBYism an "off the shelf", "lazy" explanation impeding actual understanding (Wolsink et al., 2006).

Another important barrier is social acceptance, which could be better explained by applying the triangle model of social acceptance of renewable energy (Bürer et al., 2007). This model highlights three

dimensions needed for a project to be accepted socially 1) socio-political acceptance, 2) community acceptance; and 3) market acceptance. Socio-political acceptance refers to acceptance of policymakers' decisions in the energy arena when addressing, for example, planning issues. Community acceptance refers to acceptance of specific projects of renewable energy at the local level, including potentially affected populations and key local stakeholders. By market acceptance, Bürer means support and demand for the renewable energy shown by consumers and investors.

The literature about incentivization and resistance go hand-in-hand. Without incentivizing the supply-side, the transition to renewable energy would be difficult to achieve. The general thrust of energy policy literature here is to know the way energy policies promote production. One approach would be to examine the effectiveness and efficiency of various policies. Finon et al., (2003), for example, suggest that market-based solutions such as feed-in-tariff (compensating renewable energy producers at a rate determined by the public authorities which is usually equal to the cost of generation) has increasingly proven to be more effective than competitive bidding. However, market uncertainties invite another approach in the form of government interventions like R&D funding, demonstration grants, and other financial strategies, including tax deductions and credits for electricity produced from renewable energy sources, as suggested by Arthur (1989) and Menz (2004). In this regard, Bird et al., (2003) mention the important role that tax credits play in renewable energy development (First enacted in 1992 as part of the Federal Energy Policy Act, tax credits provide financial incentives for electricity produced from new renewable energy facilities). The Federal Public Utilities Regulatory Policies Act, in turn, requires utilities to purchase electricity

from small-scale production facilities. Government mandates like the Renewable Portfolio Standard (RPS) also help foster the development of renewable energy, obligating a particular percentage of energy come from renewable energy sources (Vachon & Menz, 2006). RPS is a regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal. Generally, the studies analyzing the effectiveness of RPS are inconclusive. Langniss and Wiser (2003) applaud the success of RPS policies while a study by Schelly (2013) highlights the unintended consequences of policies associated with RPS implementation in Wisconsin and Colorado. It is important to recognize that previous policy instruments have either energized supply-side initiatives by reducing costs or strengthened demand-side initiatives by incentivizing the use of renewables. In contrast, RPS tries to promote renewable energy without resorting to specific prescriptions as to how generators should meet the required target.

Another way that policymakers seek to incentivize renewable production is to increase the price of substitutes (e.g. fossil fuels), thus making it financially attractive to invest in renewables. There are studies (Menz, 2004) passionately supporting this argument. Yet one study by Levin, et al., (2011) ironically shows that people transitioned to natural gas, not renewables when the carbon tax was imposed in Georgia. The authors posited multiple reasons for this trend, including communal reluctance and suspicion regarding renewable energy. Thus simply regulating the fossil fuel industry may not lead to a simple and automatic spur in renewable energy investment.

Finally to overcome the social barriers, incentivization literature indicates ways to increase the three acceptance levels as identified earlier by triangle theory. Bürer et al. (2007) suggests socio-political acceptance can be achieved through public information

and awareness campaigns, aimed at educating key stakeholders about renewable energy. Secondly, as demonstrated by Hain et al., (2005) in the UK, community acceptance can be fostered by engaging the community in the planning of renewable energy projects. Finally, Martinot and Beck (2004) suggest financial incentives such as grants, tax reliefs, rebates and subsidies, loans, tax credits and production credits would raise market acceptance level. Generally, research into public attitudes towards renewables indicates that people would welcome renewable energy development (Upham and Shackley, 2006 and Upreti, 2004). However, what is important is the greater institutional support, because without it public acceptance would not be widespread (Rogers et al., 2008).

In short, the renewable energy literature contains a wealth of suggestions on how to overcome opposition to renewable energy projects – both through market-based solutions and government regulations. A missing link in the chain of incentivizing renewable energy is the way matters have been perceived and constructed, placed in agendas, propagated to the public and finally dealt with by those at the helm of affairs – in other words, how the policies have been presented to the public and implemented within the overall framework of energy policies. This is where policy process theorists come to examine the policy processes addressing this incentivization of renewable energy in the broader context of energy policy. Next, this paper will bring to light actual applications of policy process frameworks associated mainly with the ways to understand the development and implementation of renewable energy policies.

### **III. Frameworks**

This section draws on the policy process literature on climate, environment and energy, and seeks to apply the insights in this literature to understanding the advancement

– or lack of advancement – of renewable energy. Frameworks such as Punctuated Equilibrium Theory (PET), Multiple Streams Approach (MSA), Advocacy Coalition Framework (ACF), Institutional Analysis and Development (IAD), Internal Determinants and Diffusion (ID & D) are particularly noteworthy. Under each framework, applications of the framework along with their implications are examined within the context of policies designed to incentivize the development of renewable energy. Additionally, the author offers specific comments and concerns further enhancing the analysis.

#### **1. Punctuated Equilibrium Theory**

Pioneered by Baumgartner and Jones (1991, 1993), PET seeks to explain periods of stasis in the policy process, marked by rapid punctuations (Sabatier and Weible, 2014, pp. 59-61). The periods of stasis represent equilibrium in the process, with disequilibrium occurring when issues are “forced onto the macro-political agenda” (Sabatier and Weible, pp. 64). When applied to renewable energy policy, PET with its focus on feedback, shocks, governmental attention, policy images, and institutional venues helps explain the factors that accelerate or impede the passage of renewable energy policy measures.

Colgane, Keohane and Gaaf (2011) applied punctuated equilibrium to trace changes in the international energy regime complex in the post-World War II era. As the authors note, significant institutional changes in the energy regime complex were a function of dissatisfaction. This dissatisfaction, in turn, was a function of shocks such as price spikes and supply shortages. In response to high oil prices and widespread gasoline shortages in the West (e.g., 1973–81; 2003–2010), dissatisfied energy-importing states such as Japan, U.S., and Germany created the International Energy Agency, International Renewable Energy Agency (IRENA) and

International Partnership on Energy Efficiency Cooperation (IPEEC) to mitigate the situation. Conversely, in periods of low oil prices (e.g., 1985–86, 1998) marked by the Asian financial crisis of 1997 and excess global oil production capacity, the dissatisfied energy-exporting states (for example, Saudi Arabia, Iraq, USSR) agreed to tighten oil production and strictly observe their oil quotas. OPEC countries forged agreements with non-OPEC exporters (USSR) which fueled both global oil demand and increased oil prices. Then as oil prices moderated between 1999 and 2002, so did innovation. The authors identified this period as one of relative stasis.

When applied to understanding the incentivization of renewable energy in context of the US, research might address the extant international trends and tendencies towards renewable energy. For example, analyzing the impact of Kyoto Protocol (though the US did not sign it) and its subsequent impact on attitudes in US towards the use of conventional energy versus renewable energy could contribute insight. Moreover, we can get data to understand the outlook of renewable energy when there is a focusing event such as a sharp increase in oil prices or when the economy is unstable.

Analogous studies can offer instructive direction. For instance, applying PET to environmental policies in the US, Baumgartner (2006) found little to no federal expenditures on energy conservation until 1977, at which point they surged considerably. Following this brief spike, expenditures declined sharply. Baumgartner observes that the oil crisis of the 1970s and the changing image of energy conservation amplified attention to this issue, which had previously been barely noticed. However, once the crises subsided and attention diminished, funding dropped significantly. Baum's analysis may help us to understand the role of punctuating events by shedding light on the heightened attention and

investment that renewable energy projects have received on occasion.

In a similar vein, Baumgartner and Jones (2009) applied PET to examine how nuclear policy was undermined in the 1970s. In the post-WWII era, the policy monopoly (congressional committee and federal agencies) created a positive image of nuclear policy by presenting nuclear power as a panacea to a multitude of problems ranging from the need to reduce energy bills, minimize dependence on other countries for oil, and reduce air pollution, to boosting economic activity. In the 1970s, environmental activists challenged the narrative by highlighting the negative image of nuclear hazards and turning to new institutional venues (e.g., courts and committees). As a result the once-positive image of nuclear power turned negative, and the post-war policy for power plant expansion was replaced by increased regulation and costs. However, despite ecological, health, and safety challenges (e.g., Fukushima, Chernobyl and Three Mile Island), current concerns for energy security and growing worries over climate change may make a resurgence of nuclear power possible.

While the earlier mentioned studies don't directly examine renewable energy, they could serve as useful guides for analyses. For example, Baumgartner and Jones' (2009) application of PET to nuclear policy can be used to evaluate renewable energy policy. Specifically, their study could be applied to renewable energy to show how the policy image of the conventional energy could be overturned or at least restructured over time. Generally, the importance of "positive/negative feedback", "policy image", "attention" and "focusing events" is placed front-and-center in the studies mentioned above. When there is heightened attention to an issue, it can rise to a macro-level on the decision agenda, which ultimately plays a critical role in passage or failure of the policy.

By emphasizing policy image and focusing events, PET is, by and large, considered an extension of Multiple Streams Analysis, which is discussed below.

## 2. Multiple Stream Analysis (MSA)

MSA literature focuses the way in which the problem, policy, and politics streams of the policy process 'couple' to open a policy window. It also helps to explain how policy entrepreneurs (they may be elected politicians, leaders of interest groups or merely unofficial spokespeople for particular causes; people with the knowledge, power, tenacity and luck to be able to exploit windows of opportunity; and heightened levels of attention to policy problems to promote their solutions to policymakers) are able to merge these three streams following an opening of a policy window to plead for a particular policy. Karapin (2005) uses the concepts of multiple streams to explain the development of wind power in the US. The convergence of political and problem streams in the 1970s advanced renewable energy in US, especially in California. In the later 1970s and early 1980s, the economic recession and Iranian hostage crisis that allowed Reagan to win the presidency, a subsequent drop in oil prices, and the technical failures of many wind turbines caused the streams to couple in a way unfavorable to renewable energy. However, in the 1990s rising and volatile natural-gas prices, declining wind-power costs, rising climate-change concerns, and the successful promotion of green consumerism by environmentalists 'coupled' in a favorable way to spur renewable energy forward. This shows that for the streams to be coupled and policy window to be opened; only a skilled and influential policy entrepreneur is needed. In Karapin's (2005) study, Jimmy Carter converged political and problem streams in 1970's to advance renewable energy.

Using the concepts of policy entrepreneurship and policy windows in MSA, Maltby (2013) analyzed the energy policy subsystem in Europe. After labelling

the European Commission (EC) as a policy entrepreneur, he explained the towering influence EC acquired in shaping the policy. While placing renewable energy challenges within the broader matrix of cosmopolitan issues, the EC was able to offer robust solutions in the policy stream. While Europe, in general, enjoys mature institutions and robust economy like the US, we can apply the lessons from this study to the US provided that we take into account the differences in geography, resource base and government systems. For example, the idea of making EC as entrepreneur in energy across Europe could be applied to US by considering the Department of Energy as a policy entrepreneur across the states able to troubleshoot problems that states face in promoting renewable energy.

Similarly, drawing on the MSA, Storch and Winkle (2013) analyzed forest policy within the context of climate change in two German federal states, Bavaria and North Rhine Westphalia (NRW). According to the authors, climate change was a problem in the forest-laden Bavaria in 2007 well before it garnered the political and international attention. Based on this high sense of urgency and deep acceptance of the relevance of climate policy, Bavarian agency officials moved quickly and competently to devise new policies. They did so not by jettisoning old policies but instead by studying them intensely to determine what was worth keeping and what wasn't. In essence, they employed the policy stream and incorporated it with politics to implement successful policies.

In contrast, in NRW, growing concerns about climate change in 2007 led to a different political reaction. Being strongly dependent on carbon-based fuels (NRW accounts for more than one-third of Germany's carbon dioxide emissions), emissions reductions would play a critical role in the nation's overall climate policy. However, efforts there proved to be slow-paced. No consensus could be reached on

how to address climate change issues. As a result, reducing carbon emission never emerged as a high priority. In brief, no one was able to open the policy window and NRW did not witness the introduction of any large-scale climate policies. According to Storch and Winkle's study, researchers in the U.S. could address climate change issues and since renewable energy is directly related to climate change, it has always been presented as a way to fight climate change. Therefore, researchers by looking into this study would also know how policy entrepreneurs in renewable energy could develop a sense of urgency, sharpen their analytical skills and appreciate the relevance of renewable energy, and ultimately plead for policies that might increase the share of renewable energy across the states. Similarly, we could analyze the pace of efforts towards renewables in US through an examination of climate change issues.

Extending this analysis, Brunner (2008) used MSA to analyze the radical change in Germany's position on emissions trading from overgenerous grandfathering to tight caps and auctioning in the first half of 2007. Several focusing events (birth of Knut in Berlin Zoo as a symbol of climate change vulnerability) and scientific publications (the Stern Review-2006 and the Al Gore's movie "An inconvenient truth") on climate change, raised awareness about the issue, rendering it as a problem worthy of attention. In the policy stream, policy entrepreneurs ardently pleaded for auctioning. In the politics stream, Germany's EU presidency, the G8 summit in Heiligendamm and the national mood made strict climate regulations possible. The study showed that focusing events could change the direction of policy. Here we see a regulatory framework was designed to deter the excessive emission. I think regulatory laws, e.g., Public Utilities Regulatory Policies Act and RPS, as discussed in section 2, were designed to incentivize renewables in US

correspond to the tight cap and auctioning policy of Germany.

Hence the interplay and 'coupling' of streams, the opportunities afforded by a policy window and the role of policy entrepreneur are all essential in the advancement of renewable energy. Another consideration is whether a policy entrepreneur alone is sharp enough to identify an "open window" when it appears? The role of a policy entrepreneur is usually played by a collection of individuals called 'advocacy coalition', which is discussed in the next framework.

### 3. Advocacy Coalition Framework

In contrast to MSA, which emphasizes the role of streams in policy change, ACF acknowledges the presence of belief-based coalitions and the way they interact to bring policy change. When applied to renewable energy, ACF traces and examines the presence of advocacy coalitions and their underlying prevalent beliefs. Karapin (2005) uses ACF in conjunction with MSA to explain the widespread acceptance of renewable energy in Germany over the past two decades. Karapin asserts that the extremely rapid growth of renewable energy in early 1990s, its defense in the late 1990s, and its strengthening in 2000s was not only the result of convergence of politics and problem streams, but also due to the emergence of a strong advocacy coalition (favoring renewable energy) as opposed to a frail coalition (opposing renewable energy). The strong coalition included the Greens, environmental organizations, research institutes, unions, hydroelectric producers, key elements of the Christian-Democratic and Social-Democratic parties, the Environment Ministry, and the Federal Environmental Agency. The environmental movement contributed crucially to this advocacy coalition. Environmentalists, for example, helped to found green parties, initially at local and regional levels. The movement also

influenced public opinion on nuclear power and climate change (Vasi 2009, 328). In contrast, the competing frail coalition, which included the Federation of German Industry and most large utilities, favored regulating renewable energy and promoting nuclear energy. This analysis could motivate study of coalitions, like the sustainable energy coalition and Mid-Atlantic Renewable Energy Coalition (MAREC) that promoted renewables in the US. On the state level, coalitions such as those that made Oregon a champion in renewable energy could be of interest.

Moving further, Nohrstedt (2010) analyzed the nuclear energy policy subsystem in Sweden to test basic ACF hypotheses regarding coalition stability and policy change. He found that coalitions remained stable over time. He further found that policy core coalitions were also more stable than secondary aspect coalitions. Nohrstedt qualified the role of policy subsystem, saying that the political party scene was more important than the policy subsystem and that narrow interests could surpass core beliefs. The author concluded that ACF was a starting point to understand political conflict and traced the evolution of an issue to the government agenda. Interestingly, Szarka (2010) concurred that interests could supersede core beliefs, while he relied on ACF to explain wind power policies across Europe (Spain, Denmark, U.K, and Germany). *Ceteris paribus*, these results have implications for understanding US renewable energy policy. For example, if we were to remove the social barriers to incentivizing renewables in US, we would not only need to trace coalitions but we also make sure to analyze their core beliefs. If people are extremely conservative and oppose wind farms, the policy subsystem could convince the coalition to change its position by providing heavy incentives such as tax credits, rebates and reliefs.

In terms of Swiss energy policy, Ingold, Markard and Suter (2014) analyzed the forecasted transition (the phasing out nuclear

and implementing “Energiestrategie 2050”) in Swiss energy policy, while engaging the concepts of ACF. They examined how coalitions had changed and whether there were indications for major policy change. They called the shift from nuclear to renewable energy a socio-technical transition, and, according to them, it could not happen without politics and policy change. They viewed coalitions as the unit of analysis for studying the extent of change and contended like other analyses that advocacy coalitions had largely remained stable. It came as a surprise to them that secondary beliefs were pro change and many key actors were in favor of nuclear phase-out and an expansion of renewables through regulation. For them, this was an indication that major policy change might be ahead. Again, accounting for all the geographical, economic and other differences between Sweden and US, this study could be applied to renewable energy in US to realize the importance of coalition and the significance of secondary beliefs when it comes to attain a transition. Secondary beliefs might explain why a single policy like RPS can lead to a transition in some states and not in others. Likewise, secondary beliefs help understand NIMBYism (as discussed in section 2), which might either drive or inhibit the process.

To test ACF hypothesis, Sutter (2011) analyzed Swiss climate policy between 1995 and 2010. In addition to finding stability among coalitions, interestingly, he observed that for some political issues such as energy efficiency or adaptation to climate change, cross-coalition cooperation resulted in a potential revision of otherwise contrasting policy beliefs. However, who make this cooperation possible? Ingold and Varone (2012) in their analysis term the actors who bring cooperation (policy compromise or even policy change) as ‘policy brokers’. The authors demonstrated the importance of ‘policy brokers’ in ACF. Further, they suggested that policy brokers would act



chiefly in their self-interest provided they lacked strong beliefs about a policy.

Both the above studies lend credence to the ACF hypotheses, while Ingold and Varone (2012) point towards policy brokers, Sutter (2011) strengthen the lens of ACF by adding a proposition regarding policy brokers. In the case of US renewable energy policy, policy brokers could reconcile the differences among competing coalitions. Whether a policy broker could become a policy entrepreneur is an open question. Moreover, would a policy broker have the patience and resources to wait for a policy window to lobby for a policy or would they take some other avenue?

In another interesting study, Pollak, Phillips and Vaijhalal (2011) applied ACF to explain the success of energy coalition over climate coalition in the US. The two competing coalitions were defined by whether carbon-based fuel are viewed as the primary source of global energy supplies or the primary source of greenhouse gas (GHG) emission emissions?. The climate coalition was a proponent of Carbon Capture and Storage (CCS) i.e. to *permanently* store carbon to reduce GHG. The energy coalition, in contrast, was a proponent of Geological Storage (GS) i.e. to *temporarily* store carbon to maximize Enhanced Oil Recovery (EOR) According to the authors, the policy regime in US was devoted to the injection of CO<sub>2</sub> into deep geologic formations. This meant that the energy coalition was the beneficiary of the policy regime. The authors found that the energy coalition has had greater success than the climate coalition in shaping state laws to align with its policy preferences i.e. enshrining its view of the purpose of carbon-based fuels in state policies, protecting the EOR status quo.

Pollak, Phillips and Vaijhalal (2011) application of ACF to climate and energy coalitions is interesting, as the dominant energy coalition supports the existing policy

regime. Thus no change in policy is observed. This has implications for renewable energy policy too. When there are no shocks from outside the policy subsystem, to promote renewable energy, coalitions must be aligned with the dominant party.

To recap, the ACF while explaining policy change in climate/energy arena holds that a given policy closely reflects the belief system of the dominant incumbent coalition. Based on real world energy scenarios, the studies above mainly tested the hypotheses of ACF and they were mainly trying to extend the power of ACF. ACF stresses importance on interactions and coordination within and outside coalitions. This is also one of the themes of the IAD to be discussed next.

#### 4. Institutional Analysis and Development (IAD) Framework

Unlike other frameworks that either concentrate on focusing events or examine the interaction of human agency in policy change, IAD focuses on institutional rules. At the heart of Ostrom's IAD is an interest in "how institutions affect the incentives confronting individuals and their resultant behavior" (Ostrom 2007, as cited in Sabatier & Weible p. 21) In her seminal work, *Governing the Commons* (1990), Ostrom underscores community attributes like trust, reciprocity, generosity and collaborative governance as a way to solve social dilemmas. Imperial (1999) applied IAD to the ecosystem-based management program by changing institutional arrangements, improving coordination between the organizations and incorporating environment and development considerations in a way acceptable to society. Conceptually, the use of renewable energy resources is compatible with the philosophy of preserving ecosystem. So IAD could be equally applied to analyzing the development of renewable energy too. By looking into transaction costs associated with implementing renewable energy policies, examining the contextual

conditions (e.g., physical, biological, social, economic, cultural, etc.) that might influence the design and performance of renewable energy institutions, observing the existing rules and detecting the strengths and weaknesses of the institutional arrangements would pave the path for promoting renewable energy. The ideas from this study such as incentivizing coordination, reshuffling institutional arrangement, incorporating environment and development considerations and exploring community attributes cannot be ignored in efforts to promoting renewable energy.

Wang and Liang (2009) applied IAD to study how provincial governments implemented energy conservation targets assigned by the central government in China. Under this framework, they conducted an empirical analysis on the implementation of energy conservation policy from 2006 to 2008. The results showed that the energy conservation policy introduced by the government was robust, and provincial governments responded positively to the policy instructions from the central government. Wang and Liang's study is equally appealing to renewable energy in US too. While looking into the incentivization literature, this study would make us mindful to analyze the outcomes and the influences on decision-making at various levels and not to ignore the authority of central institutions (Federal government, Congress and Department of Energy). We also get from this study that there would be strong motivations for the provincial governments to follow the instructions of the central government and they will compete with one another for better relative performance in the implementation of renewable energy.

The role institutional arrangements/rules might play in promoting renewable energy is evident from the studies. The contextual factors (e.g., political, cultural, demographic, etc.) which IAD emphasizes, reverberate as significant independent variables (among others) in the model discussed below.

#### 5. Internal Determinants and Diffusion (ID & D) Model

With the probability of adoption of policy as its dependent variable, ID & D is a unique model, taking some aspects from each of the models discussed above. Accordingly, ID & D (Berry & Berry, 2014 as referenced in Sabatier & Weible, 2014, p.307-359) suggests that internal state developments like political events, constituent pressure, internal economics and social characteristics are the keys to understanding policy decisions.

Using ID & D, Koontz and Wiener's (2010) case study analysis considered the degree of variance among Oregon, Ohio and Oklahoma with respect to their specific small-scale wind energy policies. The authors found that Oregon had the highest number of wind energy policies including tax incentives, grants, loans, and a Renewable Portfolio Standard (RPS). Likewise, Ohio had every policy in place that Oregon had introduced except for tax incentives. In contrast to Oregon and Ohio, Oklahoma lacked substantial number of wind energy policies. They further explained that in Oregon vigorous state commitment towards environmental protection, moderate economic development and citizen's liberal ideology favored small-scale wind policies. Likewise, in Ohio high economic development potential, moderate state commitment towards environmental protection, and modest interest group strength explained the presence of small-scale wind policies. On the other hand in Oklahoma, moderate state commitment towards environmental protection and broad support for the political strength of fossil fuel industries fostered opposition against small-scale wind policies. This study informs that state commitment to environmental protection, along with other determinants, could be critical components in the adoption and incentivization of small-scale wind power (which is renewable energy).

#### **IV. Moving Forward**

1. There is considerable research on the technical details of renewable energy in US. However, there is a lack of policy process research, most notably in the way that it relates to the incentivization. One explanation for the paucity of research, and thus the lack of attention, could be the relative infancy of the field. The field is new and therefore it is important to recognize that the field is evolving in tandem with technological advances. Therefore, researchers examining policy theories related to renewable energy must abreast themselves with all technological knowhow in the field.

2. One way to advance the application of policy theory in analyzing renewable energy incentivization, is to fill the gaps in prevailing frameworks. For example, Ingold and Varone (2012) identify the shortcoming of ACF (for example, the inability to explain aberrations from core beliefs) and attempt to clarify the framework to include these aberrations. Similarly, Nohrstedt (2010), when finding that narrow interests supersede the coalition beliefs, doesn't abandon the framework; instead he widens the framework to include this proposition too.

3. Moreover, models explaining the adoption of energy policy in general could be applied to a single policy as well. For instance, Koontz and Weiner's (2010) application of ID & D could be focused on one specific policy – for example, why some states may adopt tax credits or RPS and others may not.

4. One good practice would be to use multiple frameworks to explain an issue. This has been demonstrated by Karapin (2005) who used MSA and ACF to explain wind energy policy in US and Germany. Coalitions, along with coupling of streams, led to development of renewable energy in both countries. Looking for ventures is likely to promote the field. For example, the passage of energy policy acts such as in 1992, 2005 and 2007 is an opportunity for policy process theorists to look into. In contrast, American Clean Energy and Security Act of 2009 failed to be passed

by US Congress. PET with MSA could be possible candidates to explain such failures. Moreover, we could turn to Social Construction Framework (SCF) to understand the historic reluctance of policymakers and the public to adopt renewable energy measures. Likewise, what accounts for the ongoing dominance of conventional energy sources? Has this continuous standard been a product of social engineering and political hegemony?

5. While we see the application of frameworks in a particular state/country, we might extend this analysis to other states/countries in a way fit to their historical context, demography and economy. For example, Koontz & Weiner (2010) analysis on wind energy in Oregon, Ohio and Oklahoma could prove valuable in understanding the potential of wind energy in other states as well.

## **V. Conclusion**

Drawing on obstacles such as social acceptance, NIMBY-ism and market distortions on one hand and incentivization strategies including government regulations and market forces on the other hand, the analysis, while employing policy process literature, provides fundamental insights into agenda-setting, decision-making, the political mien and national mood in the context of renewable energy. The applications of frameworks in climate, environment and energy arena and their respective implications for renewable energy incentivization conclude that, comprehensive policies in support of renewable energy resources are made more effective by melding self-interest and public interests back into an analytical framework in the service of effective public policy.

Moreover, the incentivization of renewable energy must reconcile values, interests, coalitions, images, events and norms within the policy arena to ensure energy security and climate protection. Here the tools of

frameworks offered interesting avenues to analyze the incentivization literature. From the example of the European Commission being a policy entrepreneur (Maltby, 2013), this paper suggested the corresponding idea of identifying the US DOE as a policy entrepreneur in promoting renewable energy. This insight would benefit from additional discussion. At first glance, it would seem that the US would have an easier time than the EU in implementing a broad, relatively top-down approach to renewable energy policy. After all, the EU is a collection of independent countries whereas the US is a federated system with a comparatively strong central government. The EU places a premium on consensus, whereas the US values compromise and action. As much as the US debates issues and delays the approval of measures, the EU does that even more. So,

given the different frameworks and principles under which each political entity operates, how is it that the EU has been able to pass and enforce a more vigorous renewable energy policy? This is something to be delved into further. Moreover, what accounts for these varying approaches and outcomes for the two separate entities?

In conclusion, while the policy theory literature lacks research on specific facets of renewable energy incentivization (e.g., RPS, NIMBY-ism, etc.), the renewable energy literature in general discusses many key themes of political salience and practical importance. This article serves as a general linkage of US renewable energy concepts, public policy frameworks, and potential implications. These topics, themes, and related questions are worthy of further research.

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