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Environmental Impact Assessment Regulations and Renewable Energy Development in OECD Member Countries: Comparative Analysis of Procedural Frameworks in Japan, New Zealand, the European Union and the United States

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Kim Deepak Guy SCHUMACHER
キム ディーパック ギー シューマッハー

Preface: Abstract

Anthropogenic climate change is among the most complex and urgent global issues and requires a radical change in how we address globally connected systems and socio-environmental interactions. The main contributing factor to anthropogenic climate change are greenhouse gas (GHG) emissions, most notably the massive output of carbon dioxide in the atmosphere, which saw increases for the past 200 years. Energy generation, either for transportation, heat or electricity, have always been constituting the largest share in overall GHG emissions. Finding comprehensive solutions on how to mitigate energy related GHG emissions represents one of the most crucial ongoing challenges in the fights against anthropogenic climate change and global warming.

Due to the rapidly amplifying risk of uncontrollable global temperature rises, in combination with the world's population expected to surpass nine billion people mid-century and hence an increasing pressure on our natural resources, the benefits of renewable energy (RE) for the climate, clean air, clean water as well as local economies; and the subsequent expansion thereof, are garnering increasing political support. Many governments have thus started to promote RE deployment more actively and incentivize developers to invest in large-scale projects, aimed at cutting GHG emissions and enhancing energy independence. However a more accentuated RE development can put strains on local ecosystems and civil society stakeholders.

In order to investigate how to balance the interests and concerns of the various involved stakeholder groups, this research focuses on legal, socio-environmental and comparative data to identify the determinants to RE development in OECD member countries. By looking at the environmental impact assessment (EIA) frameworks, we can progressively identify the complex multi-levelized structures of environmental review and approval procedures with regards to RE project development. These represent one of the major natural resource management tools to enable controversial RE installations, especially large-scale, to coexist with the natural environment and in proximity to communities in the least intrusive manner possible. Given the at times strong resistance among local community stakeholders, understanding what role EIA frameworks have in either stifling or promoting RE will be crucial in order to increase public acceptance and minimize environmental impacts while simultaneously satisfying basic economic viability requirements for RE installations.

Investigating the political ecology of EIA and participatory governance frameworks, this research first tries to identify the mandatory procedures in order to obtain development consents. The conceptualized comparative national EIA framework analysis will reveal the individual strengths and weaknesses of each territory's environmental regulatory procedures that affect RE growth. In order to understand how societal perceptions as well as regulatory and legal requirements influence overall rates of RE deployment besides overall market penetration, this research is divided into five subsections, incorporating large portions based of previously published or submitted academic papers covering the various national EIA review and development permitting systems from different angles.

After an initial brief introductory chapter, the second chapter will outline a comparative analysis of the EIA procedures of Japan and New Zealand, which revealed that in terms of overall efficiency, Japan's environmental review rules are among the more extensive and stringent one among OECD member states, whereas New Zealand engaged in a profound administrative reform in 2009 in order to facilitate environmental approval procedures for projects of national significance. The particular targets of this reform were large-scale renewable energy (LS-RE) facilities, given their role in mitigating greenhouse gases and securing energy independence. Replacing the system previously in place, which was considered as too cumbersome, lengthy and relatively expensive, offering only little planning security to prospective developers, was subsequently streamlined to reduce the approval duration from formerly several years to only nine months in total. The few projects that went through this process afterwards, obtained consent much faster with less regulatory delays or civil society obstruction.

These intriguing results then lead to the research question of whether or not regulatory and procedural reforms could stimulate RE growth and how countries that instituted reforms similar to New Zealand did approach these streamlining efforts. The third chapter thus looks at some recent EIA reform efforts in Japan the European Union (EU) and if these bear the potential to facilitate RE project development. One of the most frequent criticisms directed at EIA rules is that they allow members of civil society to obstruct RE projects under what is called nuisance law or the "Not-in-my-Backyard" (NIMBY) effect. Local stakeholders living in proximity of proposed sites or non-profit organizations that have programmatic interests in any of the development activities' externalities, most notably environmental degradation or species protection, cite numerous environmental and socio-economic concerns substantiate

their RE project opposition. Therefore, EIA reforms can be a way to take into account the subjective nature of these claims and the well-founded negative externalities of LS-RE development. This chapter concludes that the reform measures in Japan and the EU necessitate further reform; as they are not able yet to strike measured balance public concerns and economic development or GHG mitigation efforts. However, procedural streamlining remains stagnant due to organizational barriers within the structural hierarchies of most national administrations in the EU and Japan.

The next chapter then permits us to assess more precisely how various degrees of environmental regulation influence RE development and growth figures and to what extent reducing regulatory requirements can stimulate RE growth. The United States (US) empirical case study attempts to analyze how several demographic, regulatory, geospatial, environmental and administrative factors impact wind energy share and wind energy share growth in all of the 50 states. The US governance system being divided into federal and state levels enables a detailed look at how state-level policies and procedural variances in the environmental review and regulatory frameworks could serve as blueprints for future EIA reforms in the aforementioned OECD member states. Investigating the determinants of wind energy share and growth showed that environmental provisions and rigid permitting and siting procedures do impact growth rates only to limited degrees, whereas overall wind energy potential and financial incentives show much stronger correlations with high share and growth rates. We found also that states with designated agencies in charge of wind permitting did show higher wind energy share rates, thus reinforcing the significance of one-stop-shop regulatory processes and coordinated procedural review approaches.

Thereafter, chapter five presents a comprehensive comparison of the EIA legal frameworks in each of the aforementioned territories by illustrating and highlighting their respective strengths and weaknesses, thus revealing what aspects or elements could contribute to the creation of a more balanced and efficient EIA law, not only in Japan, but among OECD member states in general.

In the final discussion and conclusion chapter, it is determined that environmental regulation can act both as a barrier and a driver to RE development in that it does prolong the overall approval process for development consent applications, but on the other hand, it can act as mediating tool between local stakeholders and project developers, increasing public

acceptance and reducing the risk of legal obstruction. EIA is represents one of the most efficient ways to address stakeholder concerns and reinforce communication and joint fact-finding in RE planning and environmental disputes. Therefore, future research should determine if the conceptual approaches of these reforms lead to increased RE growth and stakeholder satisfaction, given the small lead-up time for these reforms to show any noticeable impacts.

Table of Contents

List of Figures **7**
List of Tables **7**
List of Abbreviations **7**

CHAPTER I: Introduction **9**

CHAPTER II: Comparative Analysis of the Environmental Impact Assessment Procedures of Japan and New Zealand **11**
2.1. Introduction **11**
2.2. Current Renewable Energy Market Structures in Japan **14**
2.2.1. Current Market Development of Renewables **14**
2.2.2. Regulatory Framework and RE Market Structure **16**
2.3. Current Renewable Energy Market Structures in New Zealand **18**
2.3.1. Current Market Development of Renewables **18**
2.3.2. Regulatory Framework and RE Market Structure **19**
2.4. Renewable Energy-relevant Environmental Legislation **20**
2.4.1. Environmental Impact Assessment in Japan **20**
2.4.2. Environmental Impact Assessment in New Zealand **22**
2.5. Results: Common Elements and Differences of the Environmental Approval Processes **25**
2.6. Conclusions and Policy Implications **27**

CHAPTER III: Large-scale Renewable Energy Project Barriers: Environmental Impact Assessment Streamlining Efforts in Japan and the EU **29**
3.2. Methodology **32**
3.3. EIA Frameworks: Japanese Legal Context **34**
3.3.1. National Environmental Legal Framework **34**
3.3.2. EIA-related Barriers to Large-Scale RE Development **36**
3.3.3. Environmental Approval Procedural Reform Efforts **38**
3.4. EIA Frameworks: EU Legal Context **41**
3.4.1. National Environmental Legal Framework **41**
3.4.2. EIA-related Barriers to LS-RE Development **43**
3.4.3. Environmental Approval Procedural Reform Efforts **46**
3.5. Results **48**
3.6. Discussion and Conclusion **51**

CHAPTER IV: The Determinants of Wind Energy Share in the United States: Drivers and Barriers to Development **54**
4.1. Introduction **54**
4.2. In-state Energy and Environmental Regulations **57**
4.3. Research Methodology and Data **60**
4.3.1. Wind Share Indices **61**
4.3.2. Determinants to Wind Energy Growth **62**
4.3.3. Econometric Model **65**
4.4. Results **66**
4.5. Discussion **71**
4.6. Conclusion and Policy Implications **73**

CHAPTER V: Comparison and Evaluation of National EIA Frameworks in Japan, New Zealand, the EU and the US **74**
5.1. Comparative Analysis **74**
5.2. Proposed National Streamlined EIA Framework for Japan **80**
5.3. Methodological Limitations and Future Research Considerations **81**
5.3.1. Japan **82**
5.3.2. New Zealand **83**
5.3.3. European Union **83**
5.3.4. United States **84**
5.4. Concluding Remarks **84**

Bibliography **85**
Acknowledgments **100**

List of Figures

Fig. 1. Electricity and RE Generation in Japan from 1990-2014 (p.12)
Fig. 2. Electricity and RE Generation in New Zealand from 1990-2014 (p.13)
Fig. 3. Installed Wind Power Capacities in Japan from 2009 to 2015 (p.16)
Fig. 4. Installed Wind Power Capacities in New Zealand from 2009 to 2015 (p.18)
Fig. 5. LS-RE Project Subject to Preferential NZEPA Procedure (p.24)
Fig. 6. New Zealand Board of Inquiry Process (p.24)
Fig. 7. Major Japanese Environmental Laws affecting LS-RE (p. 34)
Fig. 8. Classification categories for National EIA Screening (p.36)
Fig. 9. Basic EIA procedural steps for LS-RE projects (p.37)
Fig. 10. Japanese Proposal for the Shortening of the EIA Review Process (p.39)
Fig. 11. EU Environmental Directives affecting LS-RE (p.41)
Fig. 12. Classification categories for EIA Screening (p.43)
Fig. 13. Basic EIA procedural steps for LS-RE projects (p.45)
Fig. 14. TEN-E Procedure for "PCI" Projects (p.47)
Fig. 15. Wind Power EIA Application from 2012 to 2015 (ongoing) (p.49)
Fig. 16. Screening Procedure for Projects potentially subject to the NEPA EIA Procedure (p.58)
Fig. 17. Annual Average Wind Speed at 80m (p.61)
Fig. 18. Correlation between Federal PTC and Wind Capacity Addition from 1998 to 2014 (p.70)
Fig. 19. Evolution of Density of Proposed Wind Turbines (per km^2) in Northeast and Midwest Region between 1999 and 2014 (p.71)
Fig. 20. Streamlined Japanese EIA Framework Proposal (p.80)

List of Tables

Table 1 Evaluation Criteria of the Japanese and EU EIA Frameworks (p.33)
Table 2 Semi-structured JP and EU Expert Interviews (p.34)
Table 3 Results of Procedural Framework Comparison for LS-RE projects (p.48)
Table 4 Variables, measurement units, sources of data and expected dependent variable (WES/WEG) relationship for the explanatory variables (p.63)
Table 5 Data figures for 50 U.S. States (p.64)
Table 6 Correlation Matrix (p.66)
Table 7 Regression Coefficients for WES (p.67)
Table 8 Summary of Main Legal Acts Covering the Environmental Approval Process (p.77)
Table 9 List of Strengths of Individual EIA Frameworks (p.78)
Table 10 List of Weaknesses of Individual EIA Frameworks (p.79)

List of Abbreviations

AEE	Assessment of Environmental Effects
BEL	Basic Environmental Law
BGEPA	Bald and Golden Eagle Protection Act
BLEPC	Basic Law for Environmental Pollution Control
BLM	Bureau of Land Management (United States)
CCS	Carbon Capture and Storage
DOD	Department of Defense (United States)
EBA	Electricity Business Act
EC	European Commission

ECNZ	Electricity Corporation of New Zealand
EIA	Environmental Impact Assessment
EIAL	Environmental Impact Assessment Law
EIS	Environmental Impact Statement
EP	European Parliament
EPAA	Environmental Protection Authority Act
EPACT	Energy Policy Act
ESA	Endangered Species Act
EU	European Union
FiT	Feed-in-Tariff
GHG	Greenhouse Gases
IEA	International Energy Agency
IMR	Impact Mitigation Reporting
L-NEPA	Little-National Environmental Protection Act
LS-RE	Large-Scale Renewable Energy
MAFF	Ministry of Agriculture, Forest and Fisheries (Japan)
MBTA	Migratory Bird Treaty Act
METI	Ministry of Economy, Trade and Industry (Japan)
MOEJ	Ministry of Environment (Japan)
Mtoe	Million Tons of Oil Equivalent
MW	Megawatt
NCL	Nature Conservation Law
NEPA	National Environmental Protection Act
NFS	National Forest Service (United States)
NPO	Non-Profit Organization
NPS	National Park Service (United States)
NZ-EC	New Zealand Electricity Commission (New Zealand)
NZEPA	Environmental Protection Authority (New Zealand)
NZMOE	Ministry for the Environment (New Zealand)
OCCTO	Organization for Cross-regional Coordination of Transmission Operators
OECD	Organization of Economic Cooperation and Development
OLS	Ordinary Least Squares
PCI	Projects of Common Interest
PEIC	Primary Environmental Impact Consideration
PNS	Proposals of National Significance
RC	Resource Consent
RCNS	Resource Consent of National Significance
RE	Renewable Energy
RMA	Resource Management Act
SEA	Strategic Environmental Assessment
SEPA	State Environmental Protection Act
TPES	Total Primary Energy Supply
UN	United Nations
US	United States
US-FWS	Fish and Wildlife Service (United States)
VIF	Variance Inflation Factors
WDI	Wind Development Indices
WEG	Wind Energy Share Growth
WES	Wind Energy Share
WLS	Weighted Least Squares

CHAPTER I: Introduction

Considering the cataclysmic effects that intensifying anthropogenic climate change and global warming have on the world's ecosystems and given the fact that fossil-fuel related greenhouse gases (GHG) represent the main drivers, finding ways how to reduce said negative externalities has become one of the major challenges for mankind. OECD member states still constitute the main per capita generators of GHG emissions, therefore looking at the internal RE policies and how the structure their regulatory frameworks to accommodate higher RE capacities is crucial to any comprehensive global GHG mitigation strategy.

Renewable energy (RE) development is considered as one of the most efficient methods to address climate change and mitigate anthropogenic GHG emissions. However expanding RE has faced numerous obstacles caused either by stakeholder resistance, financial constraints or administrative as well as regulatory barriers. Environmental Impact Assessment (EIA) review procedures, mandatory for many large-scale energy projects bears significant stifling potential therefore this research investigates the energy-environmental-society nexus established by EIA procedures. In order to analyze the regional variances between EIA frameworks, this research focuses on various aspects of environmental approval regulations to investigate the influence of EIA and environmental rules on renewable energy. The political ecology of participatory governance in addition to the determinants of wind energy growth provides an integrated and comprehensive image of the role EIA in national RE and climate change policies.

Four OECD territories were selected for this comparative analysis research, Japan, New Zealand, the European Union (EU) and the United States. The initial motivation for this research started with a general analysis of post-Fukushima Japan's electricity market and the surprising discovery that RE played only a very marginal role in the country's energy mix, despite possessing substantial underdeveloped domestic RE potential, mainly in the forms of wind and geothermal power. Having introduced a general Feed-in Tariff with high rates, RE sources should have seen significant increases with the temporary loss of nuclear power. And for solar PV this was mostly the case, however neither for wind nor for geothermal. Having subsequently learned that solar was not subject to the country's EIA law, whereas wind projects became subject to the latter in 2011, the main thesis thereafter being that EIAs can act as a barrier to RE development. This research thus investigates what elements constitute

barriers and how these regulations could be altered to mitigate their stifling effects.

The second chapter will first look at the EIA system in Japan, given that despite large RE potential, many projects, especially with regards to wind power and geothermal resources, are abandoned during the EIA review stages, due to stringent survey requirements, resource management components and local stakeholder opposition. By comparing the Japanese system with the New Zealand resource management frameworks, it becomes apparent that New Zealand, a country with similar natural resources and RE potential, created a more potent regulatory environment for future RE growth, rendered possible through regulatory streamlining.

Afterwards, building upon the observations in Japan and New Zealand, the third chapter focuses on EIA reform efforts in the EU and Japan, the latter having a complex and cumbersome EIA process for large-scale RE projects, looking at how the EU and Japan do attempt to streamline their own procedural frameworks might reveal the administrative elements that do constitute the strongest barriers to RE development.

The fourth chapter looks at what impact environmental regulations do have on RE development, especially large-scale or generally contentious installations. A study incorporating data from the 50 U.S. states, this empirical analysis investigates how exogenous factors such as population dynamics, socio-environmental and geospatial configurations influence RE development to a larger degree, and if those states with low and weak environmental review, permitting and siting procedures do benefit form increased RE growth figures.

The fifth and final chapter will then, discussing the data presented in the previous chapters, compare the strengths as well as the weakness of each EIA framework of the aforementioned four territories, Japan, New Zealand, the European Union and the United States. Based on those elements, an improved procedural framework for Japan will be proposed, which could potentially render the Japanese EIA more efficient, hence promote RE development, while at the same time respecting the concerns and public participation demands of local members of civil society or other interested stakeholders. This chapter does also address some of the shortcomings of the present research and indicate certain approaches that could be applied in future research projects before providing some final concluding remarks.

CHAPTER II: Comparative Analysis of the Environmental Impact Assessment Procedures of Japan and New Zealand

Chapter Abstract:

The 2011 Fukushima Daiichi-I accident and the subsequent shutdown of the entire nuclear reactor park has left Japan in a situation in which it has to reform its energy market in order to accommodate more electricity from renewable forms of energy generation such as wind- or geothermal power; with special focus on large-scale installations that are most likely to increase renewable energy (RE) generation significantly in the short-term. New Zealand is a country with a similar energy potential as Japan and is already capable of producing more than two-thirds of its electricity through renewables. By comparing the legal and policy aspects of both countries' energy market environments, it will be examined how certain laws, policies and regulations can be designed to create a market- and business environment in which it is easier to promote RE development. Relying on in-depth analysis of the respective national environmental law frameworks and the specific provisions therein, it will be attempted to investigate whether or not administrative hurdles, more precisely the complicated EIA regulations, constitute one of the major factors in the Japanese system that stifle potential RE investment the most, and if indeed so, how these should be further reorganized and reformed in order to enhance the appeal and lower the cost of the entire approval process. In 2009, New Zealand introduced certain streamlining measures such a dedicated government agency and the creation of priority areas, which combined did reduce the cost and time of the EIA process notably for the few eligible LS-RE power station projects. In conclusion, New Zealand environmental law offers an example of how Japan can modify certain laws to improve administrative efficiency.

2.1. Introduction

On November 7, 2014, the Kagoshima local prefectural government granted permission to reactivate the first nuclear reactor after the 2011 Fukushima Daiichi incident after some initial reservations and opposition (Nagata, 2014; Iwata, 2014). This move along with recent reaffirmed political support for nuclear power, has taken some of the momentum from RE proponents, who in the wake of the nuclear disaster saw an opportunity to increase the share of RE in significant ways, given the marginal role renewables played in pre-Fukushima Japan (Yoshida, 2014). The government is still looking to diversify the country's fossil fuel-centered

energy mix by supporting domestic RE generation, as can be seen in Fig.1., RE currently represents only about 5% of Total Primary Energy Supply (TPES). To achieve this goal, the government needs to identify the barriers that hinder RE investment the most and as such prevent a larger RE share.

Fig. 1. Electricity and RE Generation in Japan from 1990-2014 (Source: IEA)

In New Zealand, the share of renewables currently accounts for slightly more than 70% of total electricity output and almost 40% for TPES, displayed in Fig. 2. However, given the much lower population and population density of New Zealand, such a share is certainly unattainable for Japan in the near future (IEA, 2011). This significant demographic disparity notwithstanding, New Zealand possesses a domestic wind- and geothermal power potential that is very similar to Japan's, due to the commonalities in area size, climate, natural environment and topography; and henceforth permits a comparison of both RE markets. (Leaver, 2014; JWPA, 2014; Watanabe, 2014; Nagano, 2012; NZMOE, 2007; NZGA, 2014).

Fig. 2. Electricity and RE Generation in New Zealand from 1990-2014 (Source: IEA)

This comparative analysis will primarily focus on the environmental approval process policies and the governing legal provisions to investigate their influence on the planning and construction stages of large-scale wind power and geothermal projects in Japan and New Zealand. This will be achieved through a juxtaposition of both countries' framework, New Zealand being a country with similar RE potential, yet a more accessible RE investment environment (JWPA, 2014; NZGA, 2014). Large-scale refers to projects with a minimum electricity output capacity of 10MW, which in both countries are always subject to EIA laws (MOEJ, 2012b; NZEPA, 2013).

Therefore, after a brief outline of the general national RE market characteristics, including electricity market regulatory frameworks and RE potential figures, the main focus will lie on how both countries designed their EIA laws and approval procedures to permit a precise determination of their RE promotion and development potential. With most research and existing literature focusing solely on the electricity market reform and regulation, and how a liberalization can improve market access for new power producing entities (hereafter "new entrants"), this research will at first put the emphasis on the Japanese environmental law provisions that can act as barriers to RE development and investment.

This will be followed by a comprehensive policy outline and basic assessments of the

fundamentals of both countries' RE markets such as current regulations as well as future RE potential. The application of environmental law principles, more specifically a detailed legal comparison of the EIA provisions and their impact on RE investments, will enable us to identify the flaws in the Japanese renewable power plant project permitting process.

This legal comparison will provide the basis for the conception of policy reform proposals based on the New Zealand EIA framework, that could implemented into a future reformed Japanese EIA law in order to promote and facilitate prospective RE investments and thereby render a faster diversification of its energy import-reliant energy mix more balanced and attainable.

2.2. Current Renewable Energy Market Structures in Japan

2.2.1. Current Market Development of Renewables

In the wake of the 2011 Fukushima Daiichi-I accident in Japan's Tohoku region, the entire nuclear reactor park has been either partially or entirely shut down in its aftermath. This was mainly because of security concerns and for inspection reasons. However this has left Japan in a vulnerable state, since it currently has to rely almost exclusively on energy imports to satisfy its domestic energy demand. It is a country that has very little domestic fossil fuel resources that could be exploited in a cost-effective manner. This is the reason why the loss of nuclear power, which was providing roughly 27% of the electricity before the accident, has been offset in large parts by increasing the share of thermal energy generation, which poses not only environmental but national security issues as well, given the aforementioned high level of dependency on energy imports (US-EIA, 2013). The fact that the country satisfies virtually all of its energy demand through imports has also a negative impact on Japan's trade deficits, which are only increasing with the inflationary "Abenomics" policies of the current administration (Inagaki, 2014).

Although as aforementioned, the current Japanese government is in the process of actively pursuing the reactivation of a large number of Japan's temporarily inactivated nuclear reactors in order to guarantee network stability, low energy costs and reduce CO_2 emissions, this move still continues to remain unpopular with the majority of the general population despite the recent electoral wins of prime minister Shinzo Abe, a proponent of nuclear power (KYODO,

2014). Assuming that in the future the nuclear sector will represent only a reduced share in the energy mix, a stable energy supply can only be maintained by either continued reliance on thermal energy generation or by extension of the energy supply share of RE technologies. Since Japan depends on fossil fuel imports, domestic RE generation offers an opportunity to reduce foreign commodity dependency as well as reduce greenhouse-gas emissions.

In this theoretically favorable energy market environment, it is somewhat surprising to discover that despite the large potential for renewables, in particular wind and geothermal, the market share of renewables in the total energy mix accounts for only roughly 5%, one of the smallest figures among all OECD nations. Most of Japan's RE stems from hydropower generation, which was developed mostly by the main national energy provider Denpatsu, and following the establishment of the Electric Business Act (EBA) in 1964, and subsequently by the private electric utilities as well (Okamoto, 2005). In recent years, several small-scale government incentives have increased the shares of solar PV and biomass. However, wind and geothermal power generation output figures remain marginal (IEA, 2013).

In the early 1970's, after the two oil shocks of 1973 and 1979, the Japanese government initiated several projects and passed a series of laws that were aimed at increasing the share of RE and diversifying the domestic energy mix in a climate that was caught between the rapidly expanding domestic economy and the growing caution towards nuclear power, primarily caused by incidents such as "Three Mile Island" in 1979 in Pennsylvania, U.S.A. or Chernobyl in 1986 the former Soviet Union (Okamoto, 2005).

Driven by these social resistances, Japan chose solar PV as the preferred renewable energy as the potential was seen as robust and social acceptance fairly broad due to the perception of having less negative impacts on the environment and landscapes (Chen, 2014) This can be explained in parts by the ambitions of the Japanese government to foster domestic solar PV champions, including Sharp or Sanyo among others, that could export this technology into the world (Vivoda, 2014). This preferential political treatment dates back to the 1970's "Sunshine Project", established in the wake of the first oil shock (Chen, 2014). On the other hand wind faced a historically tough stance in Japan due to several factors such as complex land use legislation, several environment-related laws including EIA, and the remoteness of the most promising areas in terms of wind energy potential. This situation is continuing to this day and is one of the reasons why wind power still represents only a small percentage of RE in Japan

despite the significant domestic potential, although as can be seen in Fig.3., the situation has been improving in recent as will be discussed in the next chapter (Mizuno, 2014).

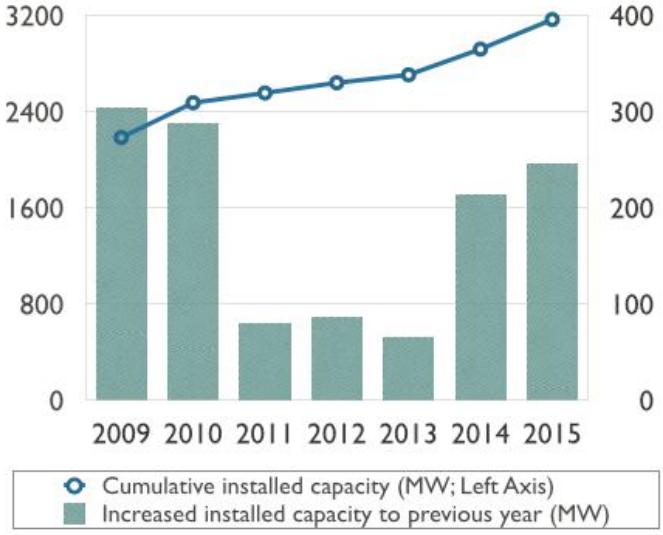

Fig. 3. Installed Wind Power Capacities in Japan from 2009 to 2015 (Source: METI)

Besides the difficult market access for new entrants, many legal barriers obstructing the construction of new power generation facilities have also been hindering further RE energy expansion of wind and geothermal power projects (Steffensen, 2013).

However, the post-Fukushima energy market situation and the recent election wins of the LDP and the Abe government have opened a window of opportunity potentially rendering it possible to create an investment environment that would allow a much higher amount of renewables than the low percentage that they momentarily occupy in the total energy mix. Given the fact that the government wants to increase RE output threefold by 2030 from the 2010 base level, the only solution are substantial modifications in the existing legal framework in order to facilitate RE investment and reduce legal inconsistencies (Institute for Global Strategies (IGES), 2012).

2.2.2. Regulatory Framework and RE Market Structure

Companies in Japan, particularly electric utilities, currently shy away from large investments given the unstable post-crisis economical environment. The government, also left with little financial leeway, has included these suggestions in its latest policy strategies (Ministry of

Economy, Trade and Industry of Japan (METI), 2014a). Furthermore, electric utilities have been mostly independent and have interpreted the latest RE laws at their discretion and in their favor, for example those laws regarding the Feed-in-tariffs (FiT) (Ministry of Economy, Trade and Industry of Japan (METI), 2013). Energy regulation, especially regarding the electricity market, is influenced in large parts by the ten largest electric utilities, which enjoy quasi-monopolies in their service areas (Steffensen, 2013).

These utilities exercise considerable political influence on the government and the respective ministries in charge of electricity market regulation and utility oversight. This is one of the causes for reduced competition in the energy markets, both residential and commercial, and produces little incentive to invest in renewables; not for the existing utilities, which rely on their current power generation facilities to maintain their profit margins; nor for any new entrants, which seldom possess the necessary capital resources or transmission grid access to expand their activities, since generation and transmission are not yet separated and still controlled by the main utilities (Steffensen, 2013). The government passed new legislation that will amend crucial portions of the relevant EBA. To set the legal foundations for this reform, the government plans on passing three amendment bills to the EBA. Two laws have already been passed in 2013 and 2014 and the final one is projected to be passed at beginning of 2015 (METI, 2014b).

The first of the three major liberalization steps, supposed to come into effect in 2015, is the establishment of the “Organization for Cross-regional Coordination of Transmission Operators” (OCCTO). The second step would follow in 2016 and would encompass the introduction of full retail competition, which comprises currently only 60% of the commercial electricity market and excludes the residential one entirely. Step 2 will be followed by a transitional period in which retail tariffs will be arranged in accordance with the progressive development of the electricity market. The third and final step, the complete abolishment of retail tariffs and the legal unbundling of transmission/distribution activities, is planned for 2018-2020 depending on the market situation and the impacts of the two previous steps (METI, 2014a). Until then, it will be hard for new entrants, many of which have been attracted by the new FiT scheme for renewables, to gain significant market shares.

2.3. Current Renewable Energy Market Structures in New Zealand

2.3.1. Current Market Development of Renewables

New Zealand was able to supply 77% respectively 73%, in 2011 and 2012, of its domestic electricity demand through RE generation, and is seeking to attain a level of 90% by 2025. These represent both one of the highest contemporary shares as well as one of the most ambitious RE targets among OECD nations (IEA, 2013).

This can be explained by historical developments pre-dating the current climate and security debates, as New Zealand's governments relied mostly on large hydropower projects in the past to satisfy domestic demand (Kelly, 2011). Hydropower represents the largest share of RE in the general electricity generation mix. Nonetheless, in New Zealand, wind and geothermal power are far more developed and integrated than in Japan, as can been seen in Fig. 4. which is representing the comparatively higher share of wind power. One of the explanations for this development is among others an easier investment environment for new RE projects (Bibee, 2011).

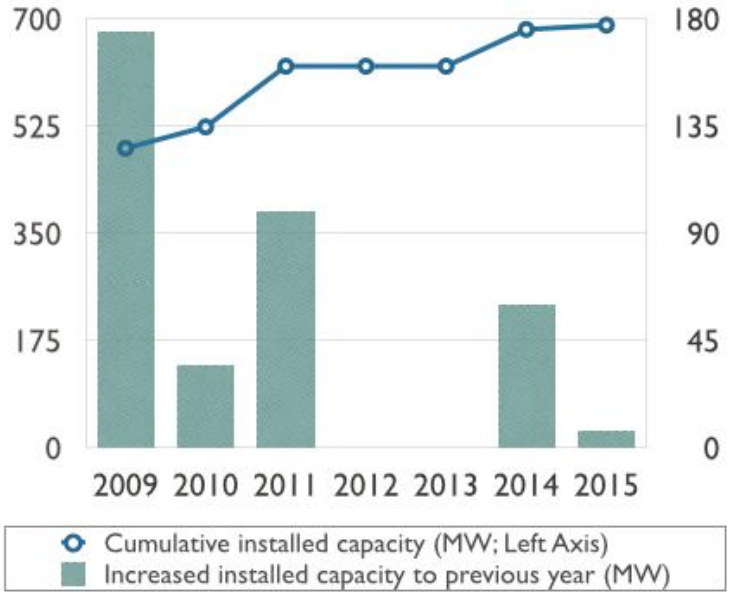

Fig. 4. Installed Wind Power Capacities in New Zealand from 2009 to 2015 (Source: NZWEA)

Electricity market reform in New Zealand began in 1987 with the creation of the Electricity Corporation of New Zealand (ECNZ). In 1988, a national grid operator, Transpower, was established as a subsidiary of the latter, and later in 1993 converted into an independent

government-owned company. This was partially due to a cataclysmic drought in 1992 that had exposed the flaws of the country's electricity generation. Due to a lack of rainfall, water storage capacities and electricity generation at the majority of large hydropower plants dropped to levels that ruptured the stable countrywide electricity supply temporarily (Krumdieck, 2009). Subsequently, the market was further liberalized with the progressive dismantling of the ECNZ and Transpower into several independent private subunits, which was intended to increase competition and spur investment while simultaneously lowering market rates. The current market structure was finalized in 2003 with the creation of the Electricity Commission (NZ-EC) that assumed the main regulatory and controlling functions (Krumdieck, 2009).

2.3.2. Regulatory Framework and RE Market Structure

The electricity market structure that emerged from these transformations is one of the reasons why New Zealand's market is fairly competitive, despite the existence of regional utilities that display minor dominances in their service areas (Bibee, 2011). The NZ-EC is a more active electricity and energy utility regulator, which is more independent and less exposed to industry influence than regulatory authorities in Japan. The New Zealand government is actively promoting competition and the electricity market regulator can assume its functions free from political interference. In addition, transmission and distribution are unbundled and thus make market access easier for new entrants, although, as a result of ongoing market consolidation tendencies, five companies do control 80% of the electricity generation market (IEA, 2013).

Besides a direct energy market regulation approach instigated by the "Electricity Industry Act 2010" (IEA, 2013), another explanation for New Zealand's higher wind and geothermal power shares in the total energy mix lies within the specific reformed or newly created New Zealand EIA provisions related to the construction of new power plants and energy generating facilities. In 2009, New Zealand made profound amendments to its EIA process and simplified the procedural steps for large-scale wind power and geothermal projects, which sped up the approval process from sometimes several years to less than 12 months in most cases (NZMOE, 2013b).

Many investors in Japan being dissuaded by the uncertain market environments and high

initial capital costs, have been refraining from pursuing RE-related projects altogether, or did abandon them altogether during the project accreditation process (Watanabe, 2013). Apart from some EIA law reform considerations, the Japanese government has currently neither concrete plans nor ideas when or how to update the current EIA law (Ito, 2012). Hence, making the whole EIA more accessible and faster would improve RE investment environment significantly and could thus make wind or geothermal power projects more attractive and consequently more competitive in the long run in Japan.

2.4. Renewable Energy-relevant Environmental Legislation

2.4.1. Environmental Impact Assessment in Japan

In Japan, legislation that covers environmental impacts on a general scale has been existing for almost 50 years in the form of two major environmental laws, the 1967 “Basic Law for Environmental Pollution Control” (BLEPC) and the 1972 “Nature Conservation Law” (NCL). These laws were drafted to combat serious industrial pollution and to preserve the natural environment. Under the BLEPC, secondary laws, dealing with respectively air, water, or other forms of pollution, were drafted. The 1957 National Parks Law has been understood as a secondary law of the NCL (Milhaupt et al., 2012; MOEJ, 2016). A general, comprehensive and integrated environmental law, covering a large range of environmental subjects, was then passed in 1993 as the “Basic Environmental Law” (BEL), succeeding the BLEPC and complementing it with additional stipulations to account for changes in the socio-environmental and economic transformations in Japan over the past decades (MOEJ, 2012b). Under the BEL, the NCL currently works as well for the natural-environment preservation.

The initial system for EIA in Japan was a standardized rule of “Implementation of Environmental Impact Assessment “ set up through a Cabinet Decision in 1984. This was developed from 1972 guidelines, for public works, and 1980 guidelines, for port and harbor planning, reclamation activities, power plants, the Shinkansen (high-speed railway trains) and the 1981 EIA bill that failed to pass through theNational Diet in 1983 (MOEJ, 2016).

The “Environmental Impact Assessment Law” (EIAL) of 1997 was enacted based on experiences under the 1984 Cabinet-Decision EIA guidelines, under the promotion of the

BEL. The BEL, which contains a set of rules pertaining to the respect and protection of the environment, explicitly provided state's obligation to make the EIA law in art. 20. Under this provision, the EIAL was enacted and imposed a set of environmental and legal requirements for potential future construction projects (MOEJ, 2012). In 2011, EIAL was amended to take several criticisms, such as the demands for continued monitoring, increased accountability, previously unaddressed environmental factors and more active public participation, into consideration. These changes did enter into force in 2013 (MOE, 2012).

In Fig.9., we see that the management of the Japanese EIA system is divided between several entities, depending on the nature of the application. In principle, each project that requires approval as well as licensing or is funded respectively co-funded by the government, is subject to the EIA law. The national government manages the EIA applications through the MOEJ and various other ministries. Depending on the field into which a project of a proponent falls, the ministry in charge of overseeing the EIA procedure will change. For power plants, the Ministry of Economy, Trade and Industry (METI) is in charge, although each EIA has to be screened eventually by the MOEJ for final approval (MOEJ, 2012b).

A power plant project is subject to the EIAL when the electricity output is larger than the one provided in the EIAL and regulations, as can be seen in Fig. 8. Projects are divided into two categories; Class-1 projects are defined as the ones requiring mandatory EIA due to great potential impact, while Class-2 projects are defined those with less potential impact than Class-1 and for which the government will decide whether or not an EIA will be required on a case-by-case basis after a thorough screening process evaluating socio-environmental, economic and other external factors (MOEJ, 2012b).

The current output thresholds for wind power and geothermal power plants are respectively "10,000kw or over" for Class-1 projects, "7,500kw-10,000kw" for Class-2 projects. This does not mean however that projects with a lower electricity output are exempt from EIAs. Local governments e.g. prefectures, municipalities and ordinance-designated cities can edict their own ordinances, which either impose local EIAs or they can add items not specified by the EIA law to national EIAs, for projects under 7,500kw (MOEJ, 2012b).

2.4.2. Environmental Impact Assessment in New Zealand

Similar to Japan, New Zealand had a number of laws regulating various air, water and soil or other pollutants separately. This also meant that in New Zealand applications for resource consents by investors regarding the construction projects or the exploitation of natural resources had to undergo a "set of procedures for environmental assessment", that was sometimes discouraging investors or slowing down ongoing projects (Montz, 1993).

The "Resource Management Act 1991" (RMA) was a landmark piece of legislation that altered the EIA process in New Zealand radically. First of all, it regrouped all previous environmental laws into one single act, thus making the environmental law framework more coherent and comprehensive. Secondly, it reformed the EIA process to speed up accreditation procedures and facilitate project planning as well as render eventual execution more cost-effective (Montz, 1993).

In New Zealand EIAs are called "Assessment of Environmental Effects" (AEE) but other than the differing denomination; they are essentially the same procedural tool and serve the same function as EIAs in other countries. They are part of the so-called "resource consent" (RC) requirement, which obliges companies or individuals, who wish engage in activities that might adversely or disproportionally affect the environment, to obtain prior consent from government authorities, either on a national or local level (NZMOE, 2009a).

In 2009, 2011 and 2013, the New Zealand government progressively amended the RMA to create a new government agency, the "Environmental Protection Authority" (NZ-EPA), which is charged with overseeing resource consents of "national significance" (RCNS) (IEA, 2011; Kelly, 2011; NZEPA, 2013), which underlie different procedural timeframes and administrative rules than normal AEEs. This new procedure was introduced to streamline the whole AEE process for LS-RE with significant environmental impact potential, like wind parks or geothermal power plants, and shorten the previously often lengthy and cumbersome treatment of these under the normal AEE system (International Energy Agency (IEA), 2011). This system was further incorporated into the New Zealand national legal framework with the passage of the "Environmental Protection Authority Act 2011 (EPAA), which contained some clarification sin terms of competences between the NZMOE, the NZEPA and local authorities, notably regional councils (NZMOE, 2014).

On the one hand, the RCNS system is managed by the New Zealand national government through the NZEPA. The amended RMA establishes an independent application system, evaluation procedure and method to appeal NZEPA decisions (Cheyne, 2013). On the other hand, management of the ordinary AEE system continues to be handled by the respective competent local councils, which are regional political and regulatory sub-divisions comparable to the Japanese prefectures.

Each council produces a resource plan outlining how resources may or may not be used within its jurisdiction. A proponent who wants to construct a power plant in this area is subject to these local rules and the AEE will thus be performed on the basis of the regional council resource plan (New Zealand Ministry for the Environment (NZMOE), 2009b). This plan needs to be in conformity with the RMA provisions, but apart from this requirement, the local plan will set out individual rules whether a RC and AEE will be necessary or not.

The major improvement over the old system is, as illustrated in Fig.5., that RC applicants have the choice to deposit their application either directly with the EPA, or the NZMOE that decides when a matter is of “National Significance”, or finally if the competent regional council refers a matter to the NZEPA (sections 142 and 145 of RMA). Section 142 of the RMA states that a project might qualify if it has “aroused widespread public concern or interest regarding its actual or likely effect on the environment, including the global environment”, “affects or is likely to affect or is relevant to New Zealand's international obligations to the global environment” or “results or is likely to result in or contribute to significant or irreversible changes to the environment, including the global environment” (NZMOE, 2014).

Although this plays only a minor role for RE projects, as large-scale wind power as well a geothermal power installations are under usual circumstances considered to be of “National Significance” at most times given their GHG mitigation roles and thus will normally be notified and henceforth be subject to NZEPA evaluation (NZMOE, 2014).

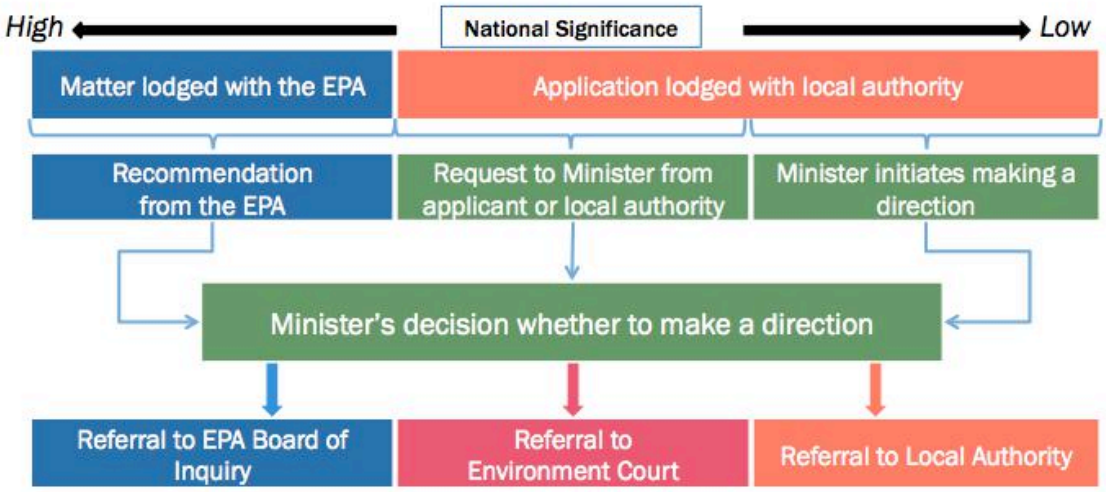

Fig. 5. LS-RE Project Subject to Preferential NZEPA Procedure (Source: NZEPA)

If a project gains RCNS status, it will be subject to a streamlined evaluation by a NZEPA-internal board of inquiry (see Fig.6.) that is independent of the NZMOE or any other government body and is able to disseminate information without prior bias or external influence. The procedure limits public input, containing strict rules in terms of evidence and deadlines (20 days after initial notification). In case of opposition from interested parties or local members of civil society, the board of inquiry will assess every piece of information and eventually take a definitive decision after said public notification period and the subsequent hearings. This decision can only be appealed exclusively on points of law (NZMOE, 2014).

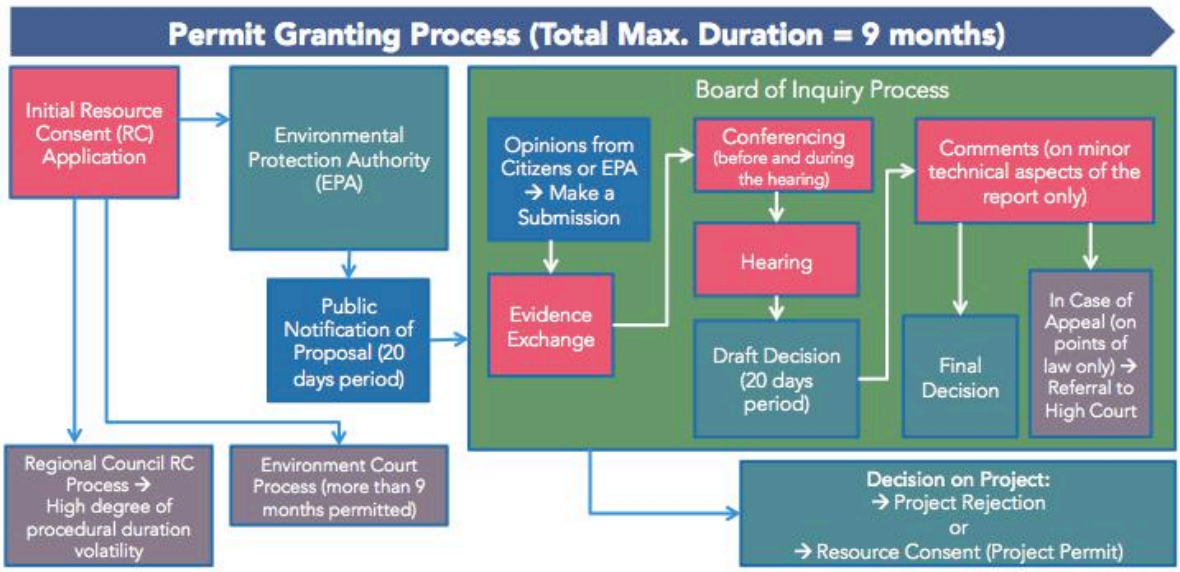

Fig. 6. New Zealand Board of Inquiry Process (Source: NZEPA)

2.5. Results: Common Elements and Differences of the Environmental Approval Processes

EIAs in Japan and AEEs or RCNSs in New Zealand have the same goal. They both impose a multivariate consideration of environmental factors prior to the start of power plant projects. Some of the aspects that need to be taken into account during the EIA and AEE/RCNS regarding wind power or geothermal power plants are among others noise pollution, wastewater management, land, flora and fauna, air pollutants, water pollutants, social and community impact, infrastructure (MOEJ, 2012b; NZMOE, 2009a).

In contrast, there are several differences that render the Japanese EIA system less efficient in terms of creating a system both attractive to investors, while at the same time preventing environmental nuisances. According to numerous RE project developers and certain government ministries, the Japanese EIA system is considered too slow, bureaucratic and cumbersome as it is dissuading a lot of potential RE power plant investors and new entrants, hence creating an uncertain RE business environment (Watanabe, 2013; Valentine, 2011).

Several geothermal projects were abandoned because the whole accreditation and permitting process took more than five years (Jupesta et al., 2013). Regular thermal power generation viewed as being less risky, many new entrants chose to invest in conventional power plants, or those companies that still plan on investing in RE prefer to concentrate their resources on solar PV, which is met with less controversy (Jupesta et al., 2013).

One of the reasons that render the Japanese EIA system complicated is the division of competences between many government ministries and local authorities. Power plant EIAs for example undergo several stages of back and forth between the proponents, public hearings, local authorities, METI and MOEJ. Many possibilities of appeal, delay, additional documents requirements or Environmental Impacts Study (EIS) modifications can even bring small projects to a halt.

Several examples have shown that local communities foster many reservations towards wind or geothermal power plants, mostly for noise, landscape beauty or hot spring degradation concerns (Jupesta et al., 2013; Nishikizawa et al., 2013). Albeit EIAs can also serve as means to increase public acceptance of proposed RE power plants, this system is often considered as

burdensome, bearing significant risk of leaving potential investors, especially new entrants, with too many uncertainties (Azechi, 2012). In addition, the fact that METI, MOEJ or local governments can ultimately reject a project, does render the whole process even more speculative for investors and new entrants. The recent 2011 amendments that came into force in 2013, created even additional obligations such as “Primary Environmental Impact Consideration”(PEIC), which is extending the EIA process to the project planning stage and was modeled after the European Strategic Environmental Assessment (SEA) process that establishes environmental consideration not only at the local project stage, but already at the earliest policy decisional stages (MOEJ, 2012b; ERM, 2013). Moreover, another new requirement is “Impact Mitigation Reporting” (IMR), which is an ongoing environmental assessment once construction is completed (MOEJ, 2012b).

In stark contrast, New Zealand’s AEE and RCNS systems are now heralded as efficient and consequently capable of actively promoting RE power plant developments and investments (International Energy Agency (IEA), 2011). The New Zealand system has the advantage that the AEE/RCNS procedure is integrated into the RMA and not divided into two pieces of legislation as in Japan, where the provisions pertaining to EIA can be found in both the BEL and EIAL. Furthermore the New Zealand government set a stringent 9-month limit for the whole RCNS procedure, during which the whole application will be processed and a decision will have to be taken, bar any extraordinary circumstances. This provides a more dependable timeframe for investors and enables an expedited addition of RE capacities. This nine-month limit has however also faced certain criticism for being to short for opponents or the public to make substantial comments or obtain counter-evidence in case of potential negative externalities (Cheyne, 2013; Doole, 2013).

The local AEE system was considered more burdensome and inadequate for large complex projects, which was one of the reasons for establishing the RCNS system. Since AEE provisions can vary largely from one regional council to another, sometimes projects of similar nature (e.g. wind parks) can be realized in one region but not in another. This makes the RCNS system more attractive for electric utilities, which used this system to build larger power plants to bypass the AEE process (New Zealand Ministry for the Environment (NZMOE), 2011). Only smaller scale RE projects are now approved by regional councils, which can be explained by the ongoing complexity of the approval process notwithstanding

the reforms in the overall EIA procedure (New Zealand Wind Energy Association (NZWEA), 2013).

Thanks to the introduction of the RCNS EIA streamlining framework, a number of high-profile large-scale RE projects could be realized in a relatively short amount of time after initial lodging, despite significant “Not-in-my-Backyard” (NIMBY) opposition from local residents, among them the “Tauhara Geothermal” 250MW project on the North Island lodged in February 2010 and the “Hauauru ma Raki Wind Farm” 500MW project as well on the North Island lodged in September 2010 (NZEPA, 2011; Eccles et al., 2011).

Several recent developments should also be highlighted that might impact future project approval processes. The first one being the 2011 EPAA, which reclassified the NZEPA as a fully independent agency as well as renamed RCNS into “Proposals of National Significance” (PNS) (NZEPA, 2013; NZMOE, 2011, 2013b). Finally, given the drastic changes and streamlining measures implemented by the RMA 2009 and the EPAA 2011, the New Zealand government decided to reform the regular local AEE resource consent process as well, modelling some of the changes after the ones regarding the NZEPA and PNS. The changes introduced by 2013 “ Resource Management Act Amendment” include among others improving the resource consent regime, a streamlined process for Auckland's first unitary plan, a six-month time limit for processing consents for medium-sized projects, easier direct referral to the Environment Court for major regional projects and stronger requirements for councils to base their planning decisions on robust and thorough cost-benefit analysis (NZMOE, 2013a).

2.6. Conclusions and Policy Implications

It can be determined that under the current market environment conditions in Japan, further legal reforms are needed to facilitate investments in as well as a more broad exploitation of RE sources. The transformation of the New Zealand resource consent system rendered the environmental approval process more effective and efficient in enabling the reliable planning and execution of RE projects.

The stifling factors in the Japanese system appear to be mainly the length and costs of the entire process caused by relatively complex and cumbersome project accreditation procedures

for wind power and geothermal power plants. This creates a constant uncertainty for investors, particularly small-scale new entrants who are the most likely to embrace RE generation as traditional utilities continue to rely on conventional forms of power generation such as oil, gas (in the form of LNG) or nuclear power (ISEP, 2016).

Furthermore, this favored the solar PV sector given that the solar PV FiT rates did exceed the ones for wind from 2012 to 2015, for the currently proposed 7GW of wind power, the most cited issues constitute according a 2016 Institute for Sustainable Energy Polices study the ongoing environmental assessments, land-use zoning, gaining local social acceptance or connections to the grid (ISEP, 2016). This study confirms earlier findings by Azechi et al. that described that for six observed planned large-scale wind farms, EIA did little to solve local stakeholder opposition as five of the projects were eventually completely abandoned and one was significantly reduced in size, with some developers thereafter opting for solar PV (Azechi et al., 2012).

The role of local governments in Japan should not be neglected either, given that most EIAs performed in Japan do not happen at the national level but at the local level, where regional factors such as topography, presence of historical sites or competing energy development might play much stronger in the local EIA procedures than the procedural priorities at the national level (JFS, 2014).

Therefore, an approximation of the Japanese RE market model towards the basic streamlined conceptualizations of the one in New Zealand will be difficult to achieve in the short term, given the numerous adverse political, bureaucratic, social, legal and economic factors in Japan. However similarities in RE potential for wind and geothermal power, in combination with a more flexible environmental and land use laws would render significant increases in electricity generated from wind and geothermal power possible in the long-term. And with the current Abe administration possessing comfortable majorities in both houses, the time would be apt for additional environmental law reform. Since the projected electricity industry reforms are laudable, without adequate accompanying environmental legislation, these will remain largely ineffective and will continue to stall domestic LS- RE development.

CHAPTER III: Large-scale Renewable Energy Project Barriers: Environmental Impact Assessment Streamlining Efforts in Japan and the EU

Chapter Abstract

Environmental Impact Assessment (EIA) procedures have been considered to a major barrier to RE development with regards to LS-RE projects, however EIA law has also been neglected by many law- and policymakers, who have been underestimating its impact on RE development and the stifling potential it possesses. As a consequence, apart from acknowledging the shortcomings of the systems currently in place, many governments have momentarily no concrete plans to reform their EIA laws again in the near future. Looking at recent EIA streamlining efforts in two industrialized regions that underwent major transformations in their energy sectors, we try to assess, how such reform efforts can help nations in balancing environmental protection and climate change mitigation with socio-economic challenges. The chpater fills this intellectual void by identifying the strengths and weaknesses of the Japanese EIA laws by contrasting them with the recently revised EIA legal framework of the European Union (EU). This enables the determination of the regulatory provisions that impact RE development the most and how these structured EIA law reforms would affect the domestic RE project development. The main focus lies on the evaluation of the regulatory streamlining efforts in the Japanese and EU contexts and the discussion of how these changes will impact RE development by applying a mixed-methods approach consisting of in-depth literary and legal reviews, followed a comparative analysis and a series of semi-structured interviews. Highlighting the legal inconsistencies in combination with the views of EIA professionals, academics as well as law- and policymakers on the respective EIA reforms, permits a more comprehensive assessment of what streamlining elements of both the reformed EU EIA Directive and the proposed Japanese EIA framework modifications could either promote or stifle further RE deployment.

3.1. Introduction

The announcement of the restart of the Sendai I nuclear reactor near the city of Kagoshima by the Kyushu Electric Power Company (Kyuden) marks a fundamental reversal in Japan’s post-Fukushima energy strategy (Johnston and Yoshida, 2015). This represents the first restart

since the 2011 Fukushima Daiichi nuclear disaster, which led to the complete shutdown of Japan's entire nuclear reactor park. This also left the country in a situation where they had to rely increasingly on conventional thermal power generation in order to compensate the loss of generation capacities, since almost one third of its domestic electricity demand was supplied by nuclear power just before the Fukushima incident (Johnston and Yoshida, 2015).

The current government plans to restart most of the currently offline nuclear power plants and increase the share of nuclear power to 20-22% by 2030 (JFS, 2016a). This evolution stands in stark contrast to the views held by the general population, among which still a large majority opposes nuclear power (Johnston and Yoshida, 2015). According to the government, nuclear power, as a domestic, base-load source is indispensable if Japan wants to reduce reliance on energy imports, maintain output and grid stability besides keeping electricity rates low while simultaneously reducing GHG emissions.

Increased reliance on energy imports in a geo-politically fragile world energy market environment as well as volatile commodity prices and rising greenhouse gas (GHG) emissions, in combination with strong adversity towards nuclear power among the general population, made RE power generation seem like a readily available, socially acceptable domestic solution to the country's energy woes in the immediate aftermath of the 2011 disaster (Haarscher et al., 2014).

In June 2012, with the introduction of a general Feed-in Tariff (FiT) that had some of highest rates for RE producers in the world, the Japanese government wanted to provide the necessary support and financial incentive for RE power generation projects aiming to increase the at that time negligible share of RE in the general energy mix (JFS, 2013).

However, despite significant subsequent growth in RE power generation capacities after the introduction of the general FiT, the overall deployment figures between the various RE sources supported under the FiT scheme diverged largely from one another. The overwhelming majority of eligible investments have been focusing mainly on solar PV, whereas other forms, most notably wind and geothermal, constitute only small fractions of the FiT project approval applications (Kotsubo and Takeuchi, 2013). In stark contrast to the large energy and development potential of wind and geothermal resources in Japan, these forms of RE power generation continue to represent only very small percentages of overall electricity

production (Schumacher, 2015).

The Japanese government announced in April 2015 that Japan wants to increase the share of renewables in the total primary energy supply (TPES) from currently 13% (including large hydroelectricity) to 22-24% in 2030. Taking into consideration the recent progressive levelized lowering of FiT rates, coupled with the fact that all major large hydroelectricity sites have already been developed, the question arises how Japan will be able to achieve the desired energy mix (METI, 2015). Moreover in June 2015, in anticipation and preparation to the United Nations (UN) COP21 climate change summit held in Paris in December 2015, the Japanese government also approved a plan to reduce GHG emissions by 26% by 2030, with 2013 serving as the baseline year (JFS, 2016a).

Given the fact that its national GHG emissions saw a steep increase after the Fukushima disaster, as a result of Japan expanding its thermal power capacities in order to offset the complete shutdown of all its nuclear power facilities, this emission reduction target appears difficult to attain, even with the less ambitious 2013 baseline year and the assumption of nuclear power approaching pre-Fukushima levels (JT, 2015). In light of the aforementioned goals of a 22-24% renewables share of TPES and a 26% GHG emissions cut by 2030, large-scale wind power and geothermal power developments could contribute significant shares to Japan's energy mix, but due to several administrative barriers emanating from the country's environmental laws that appear to partially neutralize the benefits of the FiT, investments and project development have been stagnating in comparison to solar PV, which is largely exempt from these environmental assessment regulations (Azechi et al., 2012; Shibata et al., 2015; Watanabe and Stapczynski, 2016).

Being aware of some of the administrative constraints that have been adversely affecting the environmental approval and permitting stages, the Japanese government has been attempting to deregulate and streamline the stringent national environmental laws, most notably the environmental impact assessment (EIA) law, by modifying and adapting some of the most prohibitive provisions within the various legal frameworks (MOEJ, 2012c; MOEJ, 2013). The majority of these measures proved to be of mostly palliative nature, as their impact has remained relatively limited, and growth rates for wind power and geothermal have been continuing to be comparatively low or at times even decreasing (Azechi et al., 2012; Nishikizawa et al., 2013; Shibata et al., 2015).

In absence of comprehensive, integrated environmental law reform efforts and looking at a OECD member region with similar economic weight and structured RE issues for entire territory, this paper aims at comparing the Japanese measures in juxtaposition to the EIA legal framework of the European Union (EU), which has recently been reformed as well, in order to determine what elements of the EU EIA law could be implemented into the Japanese EIA law in order to strengthen and streamline the environmental approval process as well as reduce the administrative barriers to LS-RE development. Examples and cases from different EU member states (Germany, United Kingdom, Ireland, Belgium and Bulgaria) will be used to illustrate some of the strengths and weaknesses of the EIA process in Europe.

This paper focuses for the most part on the administrative barriers for large-scale geothermal power in Japan and large-scale onshore wind power for Japan and the EU, as these represent the RE sources with the most similar energy potential rates and administrative obstacles (IEA, 2015). Finally, applying comparative analysis expands the scope of the discussion in what ways EIA and environmental laws in general can act as barriers to RE development beyond national or transatlantic considerations.

3.2. Methodology

In order to assess the strengths and weaknesses of each EIA framework, a levelized mixed-methodology approach was applied. The first step consisted of in-depth literary and legal reviews of the current rules in place, followed by the identification of the regulatory elements that acted as development barriers to RE projects. The literary review was concluded by outlining the planned or already enacted reform and streamlining measures in each jurisdiction. The next step consisted of the conception of evaluation criteria presented in Table 1 that allowed for an objective assessment of the fundamental requirements set by EIA procedural steps for developers. These criteria were then integrated into a comparative qualitative data analysis that highlights the likely impact of each procedural component.

Table 1

Evaluation Criteria of the Japanese and EU EIA Frameworks (after Galás et al., 2015)

Issues	Analysis and Evaluation	Evaluation Criteria
A) In the procedural framework	Legal frameworks and reform proposals	• Number of procedural stages • Number of procedural requirements per stage • Public input possibilities • Administrative facilitation • Overall Procedural Duration • Overall Cost
B) In the practical application	Expert opinions and semi-structured interviews	• Consideration of industry concerns in reform efforts • Public input variations • Political willingness to reform • Perceived strong and weak points

The final step consisted of a conceptualized research framework integrating the opinions obtained through semi-structured expert interviews, incorporating established techniques described by Bryman (2008), conducted with individuals both in Japan and the EU between October 2013 and January 2016, and covering various sectors (academia, project development, energy sector, government agency, lawmaker), into the respective conceptualized EIA policy frameworks. The questions addressed issues of EIA framework efficiency, procedural shortcomings and streamlining effort evaluation. The interviewees listed in Table 2 are allocated codes for the Japanese (JP1- JP17) and EU experts (EU1-EU4) to guarantee their anonymity (Bryman, 2008). To offset the small EU sample size, I also cross-checked the EU responses with an official EU questionnaire in which national EIA legislators and administrators were asked to respond to the proposed Directive 2014/52/EU alterations (Clement, 2014; EUFJE, 2014; Philipp and Sangenstedt, 2014; Ciobanu-Dordea, 2014).

Table 2

Semi-structured JP and EU Expert Interviews

EIA Experts classified by sector*	
Sector	Number of interviewees
Academia	6 (5 JP, 1 EU)
Project Development	2 (2 JP)
Energy Sector	2 (2 JP)
Government Agency	6 (5 JP, 1 EU)
Legislator	2 (2 EU)
Think Tank and Consulting	3 (3 JP)
Total	21

3.3. EIA Frameworks: Japanese Legal Context

3.3.1. National Environmental Legal Framework

In Japan, the environmental approval process illustrated in Fig. 7 for wind power and geothermal power plants is currently enshrined mainly in two different pieces of legislation, as shown in Fig. 1. the first being the Basic Environment Law 1993 (hereafter BEL) and the Environmental Impact Assessment Law 1997 (hereafter EIAL) (MOEJ, 2012a).

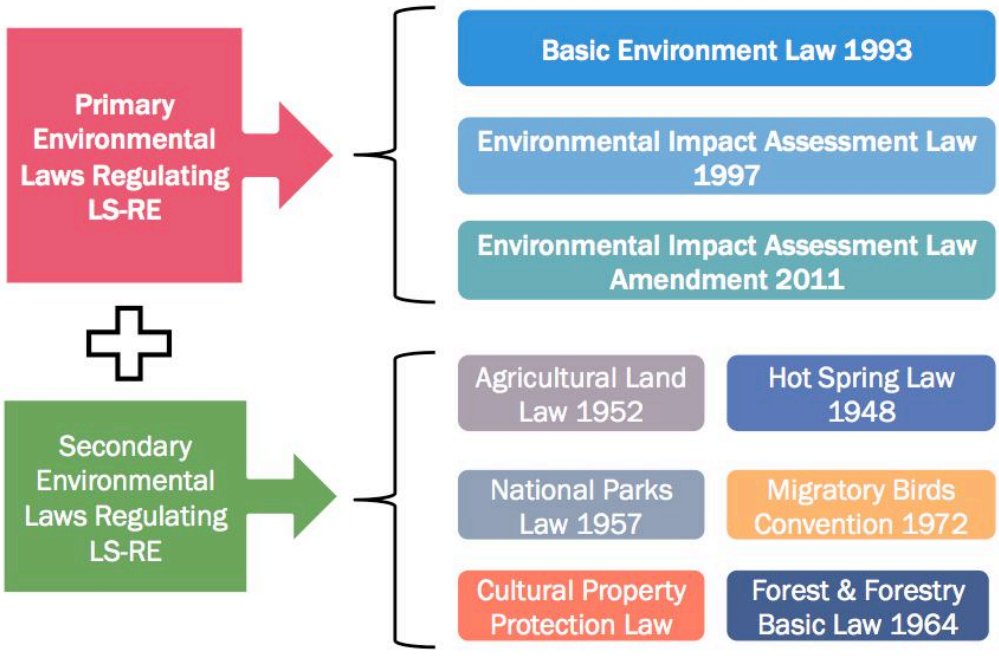

Fig. 7. Major Japanese Environmental Laws affecting LS-RE (Source: MOEJ)

The BEL, which originates from the 1967 “Basic Law for Environmental Pollution Control” and the 1972 “Nature Conservation Law” and combined the provisions therein into one single framework, regulates all major general environmental areas, such as protection of biodiversity and wildlife species, air pollution, water pollution, soil contamination, noise pollution, vibrations, offensive odor or ground subsidence (Nagano, 2012; MOEJ, 2016). The legal details of these areas listed by the BEL are then regulated in specific laws pertaining to each policy area (Schumacher, 2015).

The EIAL then creates an approval procedure for development projects that are likely to have a significant impact on the environment in order to conform these activities with the most common sustainability principles and minimum environmental protection standards. The EIA procedure is started by launching an application with the Ministry of Environment (MOEJ) and will include input by the public, local authorities (prefectures and municipalities), the project proponents and the national government, represented by the MOEJ and, in the case of power plants, by the Ministry of Economy, Trade and Industry (METI). Before final approval is given, MOEJ has to issue a final consultative and non-binding opinion. Afterwards METI will issue the final decision on whether to approve a development license or not (MOEJ, 2012a). Furthermore, local governments such as prefectures and municipalities can create their own supplementary local EIA ordinances for all aspects not explicitly covered by the national EIAL, thus creating a large catalogue of differing EIA rules (MOEJ, 2012a; METI, 2016b).

As aforementioned in Chapter I, in 2011, the EIAL was amended, adding several procedural steps at the beginning and at the end of the EIA process. By integrating PEIC and IMR, which entered into full force in 2013, the government wanted to create additional possibilities for public input and overall planning consideration, in line with more broad SEA principles, without having to create a specific entirely separate SEA law (MOEJ, 2012a).

The large majority of RE power plant projects are subject to the EIAL and the environmental approval procedures stipulated therein. Solar PV is currently a notable exception as projects falling within this category, irrespective of size and production capacity, are not subject to the EIAL (Watanabe and Stapczynski, 2016). Wind power was originally exempt as well, however with the 2011 EIAL amendment it was added to list of projects subject to an EIA, primarily out of environmental concerns, mostly linked to low frequency sounds, noise and

the elevated risk of bird collisions (MOEJ, 2012a).

Fig. 8. Illustrates that EIAs are always mandatory for wind power and geothermal power plants exceeding an electricity production capacity of 10MW. Power plants with a production output capacity situated between 7.5MW - 10MW are subject to a screening procedure in order to determine whether or not they fall within the scope of the EIAL (MOEJ, 2012a).

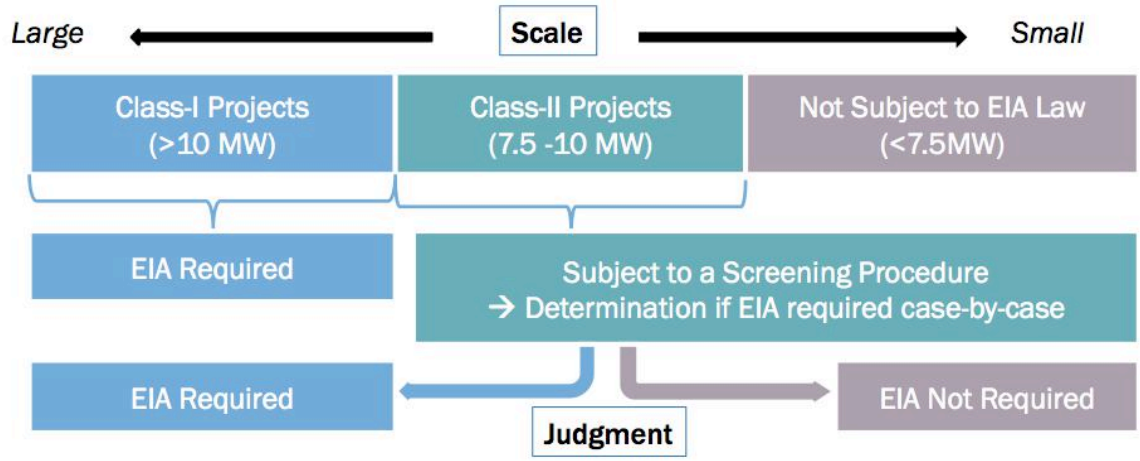

Fig. 8. Classification categories for National EIA Screening (Source: MOEJ)

Besides these two main pieces of environmental legislation, several other laws have to be consulted as well during the various project development stages and the subsequent approval process, such as the “Hot Spring Law 1948” and “Natural Parks Law 1957”, the “Migratory Birds Convention 1972”, the “Noise Regulation Law 1968” or the “Agricultural Land Law 1952”. The approval procedures outlined within these laws are sometimes concurrent or separate from the main EIA process and require separate approval from different authorities (Schumacher, 2015; MOEJ, 2012a; JFS, 2014a; JFS, 2014d; MOEJ, 2015).

3.3.2. EIA-related Barriers to Large-Scale RE Development

The EIAL was introduced with the intent of factoring in potential risk to the environment by future project developments such as the construction of power plants, roads, railways or dams. Despite this being considered an important step in raising environmental awareness and protecting natural resources, some of the structural requirements and procedural steps of the EIAL have been considered to bear the potential of acting as barriers to LS- RE development (Uesako et al, 2013; Ito, 2014; METI, 2016a).

Given the fact that large-scale wind power and geothermal plants require EIAs at all times, some of the aforementioned additional procedural alterations in the permitting process, notably PEIC and IMR, can prolong the overall length of the latter to an extent where the basic economic viability of the whole project might be put in peril. Numerous Japanese wind and geothermal power industry representatives cited the lengthy, cumbersome and costly EIA process as one of the main reasons in cases where projects were abandoned before the issuance of the final ministerial development license or permit decision (Azechi et al., 2012; Nishikizawa et al., 2013; JFS, 2014b). Average duration currently stands at three, with some large-scale wind farms or geothermal power stations having gone or going through EIA longer than five years (Nagano, 2012; Azechi et al. 2012; METI, 2016a).

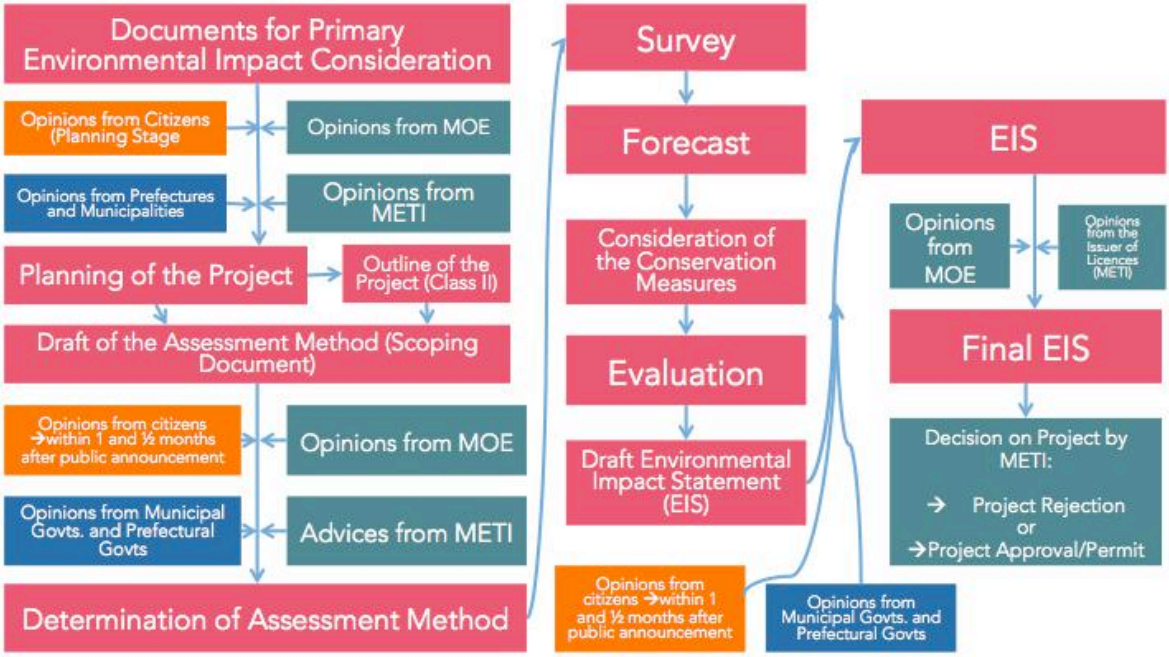

Fig. 9. Basic EIA procedural steps for LS-RE projects (Source: MOEJ)

The major points, with regards to the flaws of the EIAL that are voiced by developers are the numerous procedural steps prescribed by the EIAL (Uesako et al, 2013; Ito, 2014; METI, 2016a). As can be seen in Fig.9., the law contains a multitude of occasions for stakeholders and authorities to participate throughout the whole process, starting with the PEIC, then at both the screening and scoping stages, next after the first draft environmental impact statement (EIS), penultimately before the final EIS and eventually at the impact mitigation report (IMR) post-monitoring stage as well (MOEJ, 2012a). This produces a large number of agencies and stakeholders participating in the process, whose opinions and views all have to

be protocoled, acknowledged and duly considered in the project proponents' EIS (MOEJ, 2012a; METI; 2016a; Uesako, 2013). This can create a complex set of sometimes opposing interests that bear significant conflict potential, which again can prolong the EIA process duration exponentially.

Another administrative barrier is the large number of laws that developers of onshore LS-RE projects have to consider as well, including the aforementioned Hot Spring Law, the Migratory Bird Law, the Natural Park Law or the Agricultural Land Law. Hot spring owners for example can completely and almost indefinitely block geothermal projects on the basis of concerns that the project would deplete the hot water reservoir (JFS, 2014a). In addition, environmental non-profit organizations (NPOs) are able to stall wind power projects due to the stringent bird protection laws as well (Demizu, 2016). Furthermore the government has been limiting and heavily regulating geothermal and wind power development in natural parks, which are subdivided into special protection zones where any type of development is strictly forbidden. Then there are class 1-3 special zones, where development is only allowed with special permits and under very specific conditions (Katori, 2015). Finally, the government regulates the use of agricultural land and has limited almost the entirety of non-agricultural activities, citing the importance of prime agricultural land as the main reason in natural resource-scare and mountainous Japan (JFS, 2014d).

The absence of an integrated permitting process forces developers to seek separate authorizations from different government bodies, which in combination with these rigid land-use provisions and the additional requirements introduced by the 2011 EIA amendment have created a situation that in numerous instances appears to be either too onerous or uncertain for many developers to continue, therefore many choose either to abandon LS-RE projects almost altogether or opt in favor of investing in small-scale installations or solar PV, not subject to the EIAL.

3.3.3. Environmental Approval Procedural Reform Efforts

To address these criticisms, the Japanese government and its ministries recently started several small-scale reforms with the intent of facilitating the development of large-scale on-shore wind farms and geothermal power stations in order to achieve more diversified and broad RE generation capacity growth besides the one that the solar PV sector has been

experiencing since the introcution of the FiT in 2012.

One of the approaches that has been taken is among others a EIAL reform draft that includes plans by MOEJ and METI to cut the average duration of the EIA process from momentarily three years on average to eighteen months (Uesako, 2013; METI, 2016a). As outlined in Fig.10., this will be achieved through various incentives and implementing a number of streamlining measures, mainly by applying a more integrated simultaneous planning process in which all of the relevant EIAL as well as secondary law procedural steps (e.g. Hot Spring Law, Natural Park Law, etc.) will be launched and performed at the same time. Moreover, further streamlining will be achieved by relying more heavily on previous survey and prediction data and conducting the main central government EIA review in coordination with the local government review porcedures as to avoid double examination of nearly identical review elements (Uesako, 2013; METI, 2016a).

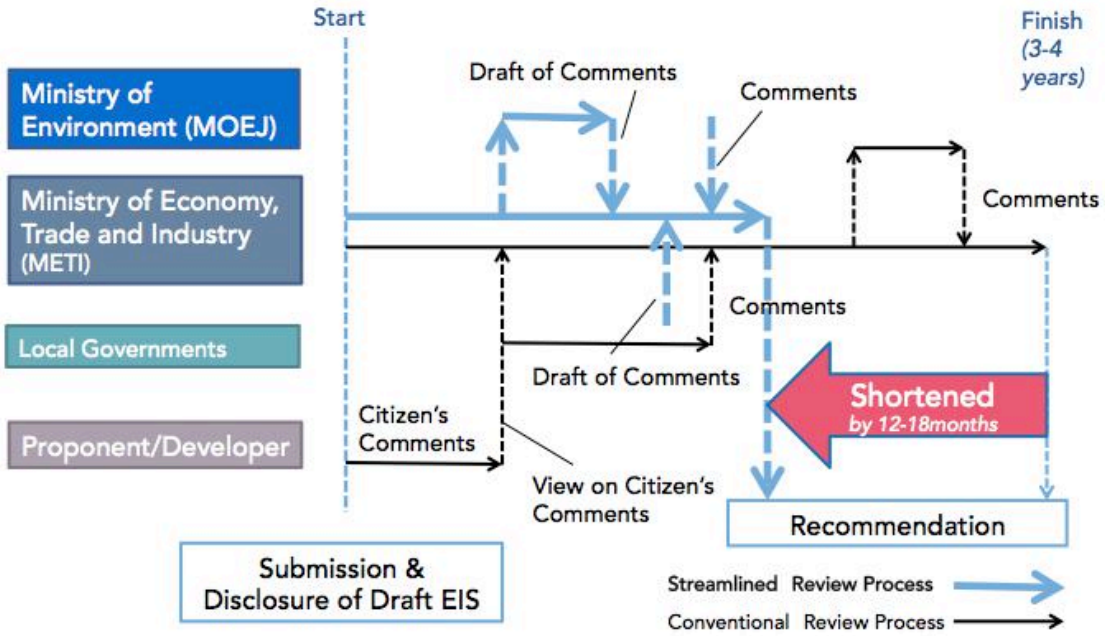

Fig. 10. Japanese Proposal for the Shortening of the EIA Review Process (Uesako, 2013)

In an attempt to facilitate the administrative burden prior to the EIS stage, the MOEJ is also creating a database that will collect survey data, conducted either by MOEJ or private developers, and subsequently render it publicly available in order to reduce cost and administrative backtracking for multiple identical or similar surveys by future project proponents (METI, 2016a). Another idea that is being considered is a system of designated

zones, in which construction of wind power plants would be allowed at all times, whereas in areas outside of these zones, construction would be very limited. This proposal is inspired by the German system of government agencies or ministries designating pre-determined and pre-approved zones that benefit from streamlined administrative procedures in terms of RE development (METI, 2016b). In these zones, all of the relevant studies and required environmental surveys would already have been conducted by the government prior to the start of the project development, thus enabling interested developers to bypass any EIA-related administrative procedural steps and advance to the construction phase in case their project bid is accepted (METI, 2016b).

A measure already in the testing stage is an incentive program administered by METI that will reimburse 50% of the cost for a pre-PEIC survey whose date will subsequently be made available publicly to reduce overall EIA costs and duration (METI, 2016a). The MOEJ and METI also co-published a proposal that would reduce the overall assessment duration, as pre-EIA consultation and data collection procedures can now be completed parallel to the main EIA procedural steps to reduce duration and costs for developers (METI, 2016a).

Regarding the secondary laws, there have been some reform attempts as well, mainly in the form of expanding the land-use scope of the respective legal frameworks. The National Park Law formerly prohibited any development within class 1-3 special zones, yet over the course of two amendments, the government progressively permitted geothermal developments, with more or less strict limitations. Operation of geothermal power plants is currently permitted in the aforementioned special zones to differing degrees and on a case-by-case basis, whereas exploration or operation continues to remain restricted in Special Protection Zones, the highest certification for national parks (Katori, 2015).

Moreover, as previously briefly outlined, any RE developments on agricultural land, the latter being considered of high national value as well as substantial public interest in a mainly resource-scarce and mountainous country like Japan, were previously entirely forbidden. However, recent amendments enacted by the Ministry of Agriculture, Forest and Fisheries (MAFF) rendered RE installations such as wind farms possible, albeit only under certain conditions and on a case-by-case basis (JFS, 2014d).

After having outlined some of the procedural aspects of Japan’s the environmental legal

frameworks and how they might impact or potentially risk stifling RE development, we will look at the recently amended environmental assessment rules in the EU to analyze their weaknesses and strengths, in order to contextualize and evaluate their potential impact on LS-RE project development.

3.4. EIA Frameworks: EU Legal Context

3.4.1. National Environmental Legal Framework

EIA law in the EU first got legally established in the Commission Directive 85/337/EEC in 1985, regulating the environmental approval process for public and private projects complying with the statutory assessment criteria defined in the directive such as project type, size or likely environmental impact (EC, 2009). Over the years, this directive got amended on three occasions: Directive 97/11/EC integrated the "UN ECE Espoo Convention on EIA in a Transboundary Context"; Directive 2003/35/EC aligned the main EIA Directive with the provisions on public participation contained in the "Aarhus Convention on Public Participation in Decision-making and Access to Justice in Environmental Matters"; and finally Directive 2009/31/EC amended the Annex I and II lists that contain the types of projects subject to the EIA Directive, extending the latter to include projects related to transport and carbon capture and storage (CCS). These three amendments were then codified into one single text by Directive 2011/92/EU (EC, 2011).

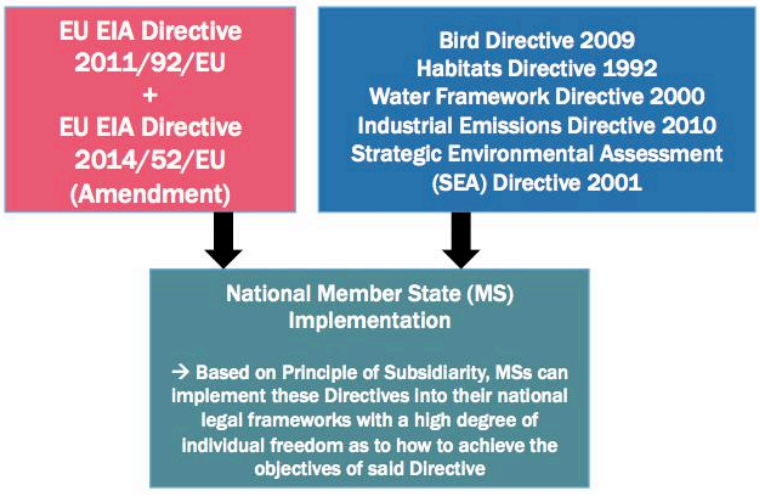

Fig. 11. EU Environmental Directives affecting LS-RE (Source: EC)

Directives apply the EU principle of subsidiarity, presented in Fig.11., which specifies that the member states are in charge of implementing the directions and guidelines contained therein into their national legal frameworks within a prescribed time-frame. Member states do possess more or less considerable leeway as to how they want achieve the minimum policy goals set out by a directive (Van Zeben, 2014).

In 2014, the EU revised the 2011 Directive with the amended Directive 2014/52/EU (hereafter the Directive), which was the result of a five-year consultation process between most major EU institutions (Commission, Parliament and Council), the public, environmental organizations and industry stakeholders (EC, 2012). Its implementation pursued the goal of simplifying the whole EIA process, implementing recent European jurisprudence, aiming at increasing predictability with mandatory time-frames for the national authorities responsible of the EIA review steps, creating more opportunities for public participation and achieving more overall transparency in the diffusion or dissemination of information with regards to the screening or final development consent decisions.

Fig.12. shows that Annex I projects are always subject to an EIA, however the only LS-RE projects currently in this category are large hydroelectricity projects. Annex II of the Directive lists the projects that are not necessarily subject to EIAs, and includes wind power, geothermal power and larges-scale solar PV projects. These projects will be subject to a screening procedure, which can prolong the overall EIA duration and uncertainty for developers considerably (Directive 2014/52/EU). The Directive recommends that competent authorities should take screening decisions within 90 days, however this time-frame is non-binding. In addition the Directive prescribes a mandatory minimum public consultation period of 30 days to address concerns over a lack of accountability and public consideration in the previous versions of the Directive.

Annex III of the Directive provides a catalogue of selection criteria for projects that fall within the scope of the Annex II screening procedure. Things that the national screening authorities need to consider are the characteristics (e.g. size, cumulation, natural resource use, etc.), the location and potential impact of the project in order determine if said project is either subject to or exempt from the EIA requirement (Directive 2014/52/EU).

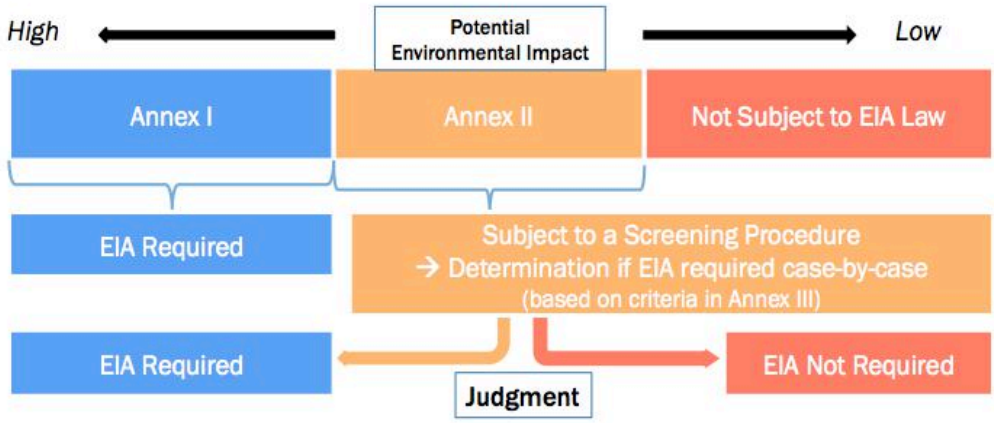

Fig. 12. Classification categories for EIA Screening (Source: adapted from 2014/52/EU)

National member states can also fix their own thresholds or criteria as to when they require an EIA, in Germany for example the German EIA act makes EIA mandatory for wind farms composed of at least 20 wind turbines exceeding 50 meters in height. Wind farms composed of 3 to 19 wind turbines exceeding 50 meter in height are subject to an EIA screening procedure (Geißler et al., 2013). In the UK, large-scale onshore wind power projects exceeding a production output of 50MW or above are always subject to an obligatory EIA, whereas wind power installations composed of more than five turbines or exceeding a production output of 5 MW will be subject to an EIA screening procedure (Jones et al., 2011).

Despite the relatively high degree of flexibility offered by the Directive to the individual member states to adapt and implement the provisions set forth in the Directive into their EIA legal frameworks, the new amendment is also met with criticism from many stakeholders, among them member state officials, industry groups, politicians and environmentalists.

3.4.2. EIA-related Barriers to LS-RE Development

Critics of the Directive mostly voice their dissatisfaction towards the fact that albeit the Directive is an improvement in certain areas over the previous iterations, it does not significantly shorten the whole EIA process illustrated in Fig.13. nor does it eliminate in and of itself the uncertainties created by the complex screening process or the many national legal divergences between member states (Ciobanu-Dordea, 2014; CC, 2014). Henceforth,

additional reforms would be required to enhance the Directive in terms of legal certainty, efficiency and cohesion, elements that were already attempted with the current version.

Moreover, developers remain cautious about the increase of public participation and the more stringent criteria with regards to the quality of the environmental reports and screening opinions. The Directive requires developers and EIA review authorities to make all information accessible online besides the stipulation that competent experts must prepare and review the reports. This leads to concerns over rising overall EIA-associated costs and procedural delays, if either the developers or the competent authorities do not have the means or the personal resources to assure this elevated quality degree for environmental reports or screening opinions (CC, 2014; Lownes, 2016). Moreover, the factors of cost and performance have become especially relevant in light of the Directive's expanded the EIA scope, outlining additional Annex III criteria for consideration including climate change, GHG emissions, biodiversity and risks from natural or man-made disasters, thus increasing the overall complexity and need for expert knowledge and survey study resources.

The requirement for a public consultation period of minimum 30 days is also an element of controversy as it prolongs the process additionally, and regions where the duration was formerly shorter, for example the federal Walloon region in Belgium with a public consultation period of previously 15 days, need to revise this time-frame in their legal frameworks (Stibbe, 2014). Furthermore there remains considerable doubt on whether extended public consideration will even have an impact, given the fact that most people, with regards to large-scale onshore wind power developments, have already made up their minds about wind farms at the beginning of the public consultation stage and seldom change their views afterwards, regardless of the degree of public participation or stakeholder involvement (Smart et al., 2014).

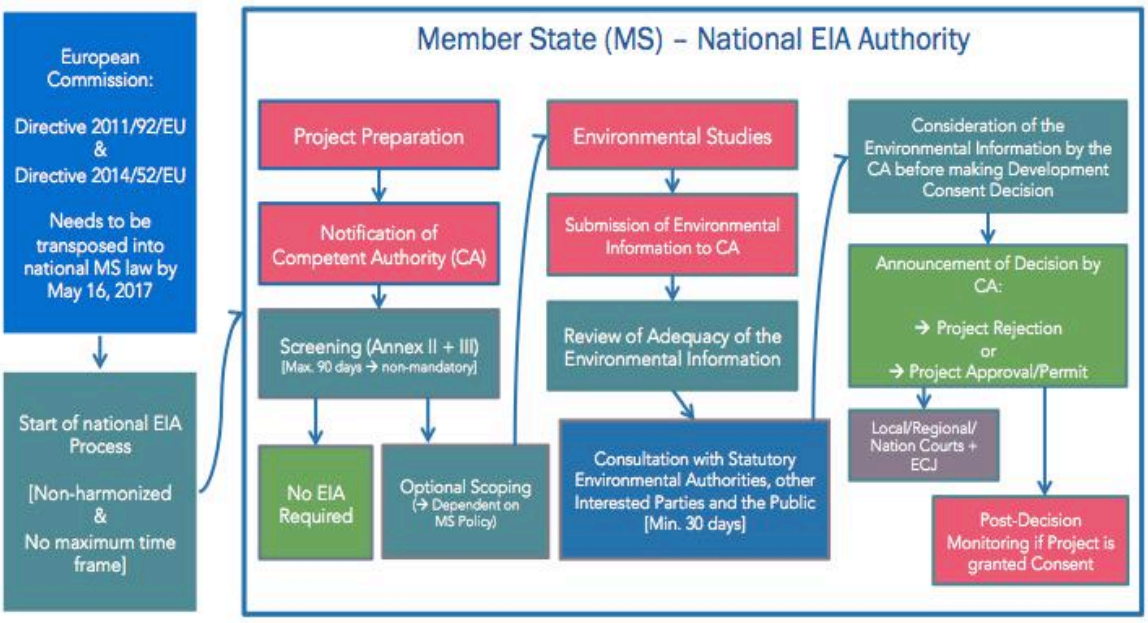

Fig. 13. Basic EIA procedural steps for LS-RE projects (Source: adapted from 2014/52/EU)

Another perceived flaw of the Directive is that it did not create a unified "one-stop-shop" obligation for member states in order to coordinate the EIA procedure with the general permitting process. This leads to a situation where large-scale wind power projects often become subject to several environmental assessments prescribed in separate directives (e.g. "Habitats Directive 1992", "Bird Directive 2009", "Industrial Emissions Directive 2010", "Water Framework Directive 2000" and "SEA Directive 2011") performed by several authorities. This can lead to increased administrative backtracking as well as procedural replications or repetitions, and thus put projects at risk of running into considerable cost and duration overrun throughout the entire permitting process, especially in case of transboundary or interregional projects (Ciobanu-Dordea, 2014; CC, 2014; Lownes, 2016).

In the light of these criticisms acknowledged by the European Commission (EC), the next section will focus on several post-Directive efforts that were implemented in order to mitigate the negative impact of unaddressed procedural shortcomings, inconsistencies and uncertainties. In addition, several pre-Directive EU policy initiatives might also serve as a roadmap to reduce for example the current average overall administrative lead time of 42 months for obtaining a development consent for large-scale wind power projects, as well as minimize the elevated EIA process cost (EU-27 average: €41000) and general duration differences between member states (Cena et al., 2010).

3.4.3. Environmental Approval Procedural Reform Efforts

Even though the Directive was meant as a substantial measure of streamlining the whole EIA process in order to reduce the administrative barriers therein and facilitate the whole procedure for potential developers, the EC outlined some fundamental flaws of the amended EIA legal framework. As detailed by several EC policymakers in charge of the original Directive reform draft, many provisions got progressively diluted over the course of the internal negotiation stages by either the European Parliament (EP) or the European Council (hereafter the Council) (Ciobanu-Dordea, 2014). Most of the opposition emanated from the Council, the EU representative body of the member states, especially towards mandatory scoping, one-stop-shops and binding time-frames. One of the main reasons appears to be the fear of most states that it would burden existing agencies in charge of the EIA process too much, and would not allow for enough flexibility. Furthermore, some states would have had to reform their administrative organizational competence allocations profoundly in order to set up one-stop-shops, which was therefore rejected by several member states with complex bureaucracies (Ciobanu-Dordea, 2014).

Some other significant provisions in the original Directive draft by the EC were not retained in the final version adopted by the EP and the Council, for example obligatory scoping, which now only needs to be provided upon request by the developer. However, the most notable unmet efficiency objective revolved around the specific obligatory time-frames for decision-making, that “the Commission proposed in order to increase legal certainty and accelerate the process of adopting the screening and EIA decisions” (Ciobanu-Dordea, 2014).

Apart from the minimum time-frame of 30 days for public consultation, all other proposed obligatory time-frames, for example 45 days for screening and 60 days for the final decision (after all required documents outlined at the scoping stage had been received), were either extended and rendered non-binding (screening should take max. 90 days) or, in case of a final overall mandatory decision time-frame, not retained altogether (Ciobanu-Dordea, 2014).

To offset these administrative shortcomings, the EC has started to issue certain guidance documents in order to increase the coherence between national member state EIA legal frameworks and promote a more uniform application of EU law. Furthermore, these guidance documents also intend to shorten the whole EIA process without having any legally binding

force and thus possess only consultative character to member states. The first guidance document covers the project categories in Annexes I and II to provide clarity of what attributes and aspects need to be considered when determining whether or not a project belongs to one these categories and will be subject to the EIA procedure (EC, 2015c).

Another guidance document provides details how member states can set up “one-stop-shops” and “coordinated and joint procedures” for the various project assessments contained in the numerous environmental directives (e.g. “Habitats Directive”, “Bird Directive”, “Industrial Emissions Directive”, “Water Framework Directive” and “SEA Directive”) (Guidance 2016/C 273/0). This will lead to a more efficient use of national review authority resources, which in combination with the overall streamlining of environmental assessment procedures, can lead to potentially significant EIA process duration reductions.

These guidance documents draw additional inspiration from EU Regulation No 347/2013, also known as “TEN-E Regulation” (hereafter the Regulation), that was introduced by the EU in 2013, and considering the fact that for regulations the principle of subsidiarity does not apply, this represents a binding legislative act that mandates immediate and obligatory member state implementation (Van Zeben, 2014).

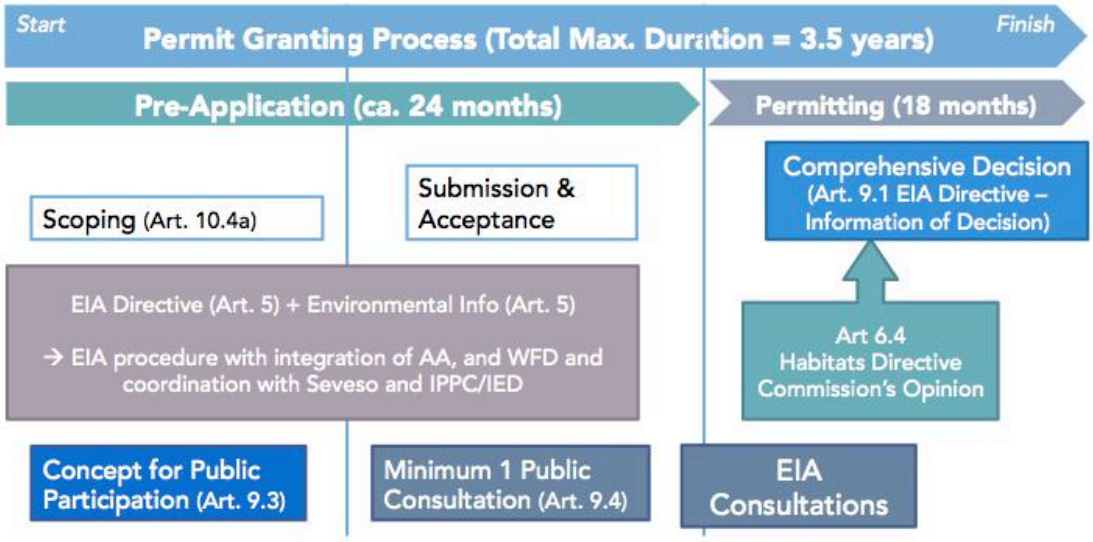

Fig. 14. TEN-E Procedure for “PCI” Projects (Source: adapted from Regulation 347/2013)

The Regulation sets out a comprehensive legal and policy framework to optimize electricity network development within the EU and creates a category of “Projects of Common Interest”

(PCI) that will benefit from a preferential regulatory treatment that contains streamlined permitting procedures and financial incentives.

The regulatory framework under this regulation implements administrative facilitations and streamlining measures that are extremely beneficial for developers, as the latter can benefit from accelerated planning and permit granting procedures including a binding three-and-a-half-years time limit for the granting of a permit as can been seen in Fig. 14., with minor extensions allowed only under special circumstances (Regulation (EU) No 347/2013; EC, 2013). This leads to lower administrative costs for project promoters and authorities resulting from the streamlining of their environmental assessment procedures. And finally, there is a one-stop shop obligation for member sates in that each one of them has to designate or create competent national authority for coordinating or examining all documentation.

However, the largest drawback in terms of RE development is that momentarily only transboundary energy infrastructure projects such as transmission lines or electricity storage facilities are listed among the energy-related PCI categories and henceforth fall within the scope of this preferential framework, energy generation including RE power plants do not qualify for this preferential scheme yet.

3.5. Results

Table 3
Results of Procedural Framework Comparison for LS-RE projects (MOEJ, 2012b; Uesako, 2013; METI, 2016a; Directive 2014/52/EU; Cena et al., 2015)

EIA Procedure	Japan	EU
Pre-EIA	Yes	National Variations
Screening	Yes	Yes
Scoping	Yes	Yes (Non mandatory - National Variations)
Expert-validated Assessment	No (In theory, in practice MOEJ/METI reviews amount to expert assessment)	Yes
Public Participation Mandatory	Yes (45 days + 45 days = 90 days total)	Yes (30 days min.)
Post-Monitoring	Yes	Yes
Overall Average Duration	ca. 36-48 months	ca. 42 months (EU-27)
Average Procedural Steps	28	18 (EU-27)

Looking at the individual procedural components in Table 3 of the Japanese and EU EIA legal frameworks and the respective reform efforts, it becomes apparent, that although EIA is only one of many factors acting as a barrier to large-scale RE development, the environmental approval process certainly contributes the to high costs and overall length of the permitting procedures mandatory for RE project developers. However, streamlining and procedural reforms can trigger notable outcomes. In Japan, a combination of the aforementioned recent EIA procedural modifications, which still remain largely in test stages, shows preliminary results that point to a 667% increase in EIA applications for wind farms as can been observed in Fig.15., a sector that displayed only stagnant growth rates between 2011, when wind power projects became subject to EIA under the amended law, and 2013, when some of the first reform measures were launched (METI, 2015).

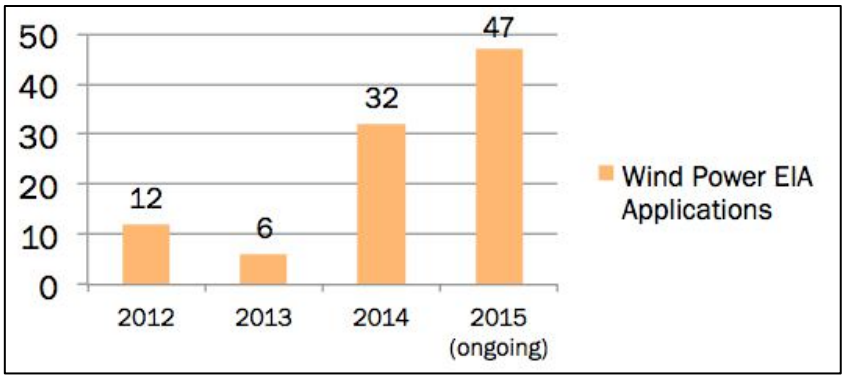

Fig. 15. Wind Power EIA Application from 2012 to 2015 (ongoing) (Source: METI, 2015)

The impact of the new EIA Directive still remains to be seen, as all of the observed member states have not yet fully implemented the Directive's provisions. However looking at early assessments and the results of the semi-structured EIA expert interviews, it seems that the impact will be quite limited as most states have been opting only for soft implementations, meaning that they will use the least integrated and least stringent regulatory thresholds allowed by the Directive (Clement, 2014; EUFJE, 2014; Philipp and Sangenstedt, 2014; Stibbe, 2014). This will do only little to overcome some of the complications of the current framework, thereby underlining the obstructive potential of EIA, cited in the broad and extensive "Wind Barriers" study as the most frequent and serious administrative barrier to LS-RE, especially wind power, in the EU (Cena et al., 2010).

Among the interviewed Japanese experts, a large heterogeneity was observed with regards to

the influence of EIA procedures on LS-RE development. Experts JP14 and JP15 for example pointed out that although Japanese RE industry organizations do identify EIA as a problem that could be solved through streamlining, they consider financial, such as the FiT, and electricity market regulation factors as the more crucial variables influencing RE growth.

Another important point that expert JP2 addressed was the division of competences between the different ministries that complicates numerous EIA applications with regards to LS-RE projects. He sees no possibility for a comprehensive, integrated one-stop-shop option in the near future. As already illustrated in Fig.4., METI and MOEJ both are involved in or administer various stages of the EIA process for energy projects, however the ultimate and final decision-making power resides with METI, thus, energy policy considerations or motivations can override ecological and socio-environmental concerns. Hence, streamlining efforts that would further reduce environmental standards and civil society inlets might not be in the best interest of overall conservation efforts. This contentious aspect is also raised by expert JP3, who feels that given the anti-environment agenda of the current administration, lowering environmental standards to promote LS-RE should not be envisioned since it could put local ecosystems into peril, especially since national EIA reviews for LS-RE projects do constitute only a small fraction of the overall number of environmental assessments, amounting to roughly 20 per year.

Experts JP12 and JP13 consider the current Japanese EIA system fairly balanced and not too much of a burden to developers. After the Fukushima Daiichi nuclear disaster, having additional procedural steps, such the SEA-like PEIC, while enabling developers and locals to communicate on multiple occasions is seen as an advantage in reducing ulterior conflicts, position that is confirmed by experts JP6 and JP7, active in LS-RE project development. They argue that even before the 2011 EIAL amendment, which subjected large-scale wind power projects to mandatory EIAs, many wind power projects were already abandoned due to strong local resistance or preferential development prospects for solar PV or biomass. Therefore the EIAL's influence on project outcomes appears to be limited. They also mention that in the future, mega solar PV plants might also be included in the EIAL due to their large land use footprint. However they do acknowledge, that further improvement of the EIAL could lead to increased LS-RE project developments.

These sentiments were mostly echoed by the European experts EU3 and EU4, who do

confirm that many member states did see the sense in the newly amended Directive 2014/52/EU seen as an improvement, although the Directive's overall significance is downplayed. This can be explained by considering that the number of actually implemented modifications, as opposed to the ones that are merely optional, remains limited, and thus many member states need institute only minor changes to their existing EIA frameworks. Moreover, a high number of member states did not want to reorganize their existing review structures and thus argued in a favor of a Directive that mandates that only few articles require transposition.

The current national transpositions of the previous EIA directives illustrated by Clement, (2014), EUFJE (2014), Philipp and Sangenstedt (2014) as well as Stibbe (2014), do show a heterogeneous situation in terms of transboundary procedural uniformity. Almost all states do divide the EIA review process among several government agencies to varying degrees of coordination, which perform the multitude of various procedures required by several directives such as the Directive 2008/1/EC (IPPC), 92/43/CEE (Habitats) and 2009/147/CE (Birds), at times within an integrated procedural framework, at times disjointed and split up among numerous government bodies and regulations.

Therefore, the three main objectives of the revision of the EIA Directive, strengthening the quality of the assessments, improving the overall coherence and synergies with other EU legislation and simplifying procedures, were only achieved to a limited degree. Experts EU1, EU2, EU3 and EU4, are uniform in their opinion that member states missed a unique opportunity to create a more comprehensive and accessible framework and thus further improvements are required. Looking at the ardent opposition from civil society to certain LS-RE projects, it becomes apparent that the EU EIA review process needs to find the right balance between the EU climate change commitments and localized civil society concerns as legal challenges in Ireland and Bulgaria have shown, that mainly revolved around the omission of or insufficient environmental studies within the context of EIA reviews for large-scale wind farm projects (RTE, 2016; SG, 2016).

3.6. Discussion and Conclusion

Given the ambitious RE generation targets set by Japan (22-24% share of TPES until 2030)

and the EU (27% share of RE consumption until 2030), combined with their planned GHG emission reductions (26% in Japan by 2030, baseline 2013; and 40% in the EU by 2030, baseline 1990), large-scale RE is a domain that requires further development if these targets are to be achieved (Urakami, 2015; EC, 2015a, 2015b). Japan's current reform efforts remain mostly limited to certain policy areas and remedy only specific scenarios without tackling the general structural complexity resulting from numerous administrative barriers, contained in the various environmental laws establishing the permitting processes, in a comprehensive and holistic manner.

However with regards to potential EIA law reform blueprints, the newly amended EU EIA Directive offers only little improvements over the old versions and does not include mandatory one-stop-shops or specific time-frames for decision-making. Henceforth, the most comprehensive source of inspiration for Japan would be less the Directive but rather the "TEN-E" Regulation of 2013, which implements these administrative elements into a sector- and purpose-specific EIA process and makes them binding for energy infrastructure projects categorized as PCI.

Looking at these TEN-E provisions could help reform the Japanese EIA process through the establishment of a one-stop-shop approach in addition to increased coordination regarding the various permitting procedures by both local governments and the national government. In combination with specific maximum time-frames, this could render the whole process more cost-efficient, provide more clarity and legal certainty for developers, authorities and the public, and shorten the overall duration of the whole process. Furthermore, creating a specific Japanese priority category counterpart for LS-RE projects similar to the EU PCIs could earmark the streamline EIA process for only a pre-determined group of projects and reduce administrative burden for a potential future one-stop-shop review authority.

For both the Japanese government and the EU, low electricity prices, grid stability and energy security generally take priority over other considerations such as environmental or climate change concerns. Whereas the EU has made efforts to diversify its energy portfolio in the post-Paris Agreement era, recent developments in Japan are still encumbered by regulatory shortcomings of the electricity market that continues to be dominated by the main ten regional electric utilities that have been enjoying quasi-monopolies in their geographically delimitated service areas.

Recently, these utilities started to limit their input capacities for RE generated electricity, citing grid stability issues, thus leaving many potential RE developers without the possibility to sell their production output.

Therefore further research would entail a closer look at the previous role of the electricity market and how these proposed reform efforts would affect overall RE deployment as well as how grid connection and market access barriers can progressively be reduced, so that the increased RE production capacities resulting from a streamlined EIA procedure can effectively be integrated into the electricity grid.

CHAPTER IV: The Determinants of Wind Energy Share in the United States: Drivers and Barriers to Development

Chapter Abstract

The main focus of this chapter is to analyze the determinants of wind energy share and how procedural and regulatory frameworks do influence the deployment of wind power facilities. An empirical analysis using econometric regression models integrating numerous geospatial, macroeconomic and socio-environmental control variables allows for a more precise assessment of state-to-state variations in the permitting, zoning and siting procedures that wind developers have to clear before being authorized to start construction. Quantifying the number of state-level financial support measures and various permitting process stages, allowed for a more comprehensive assessment of administrative barriers to wind energy development. The results present a picture that partially reverses previous findings that showed that state-level regulatory factors do play an important role with regards to wind capacity additions. Exogenous factors such as land area, ratio of in-state federal lands, degree of urbanization, wind energy potential, the presence of rare protected species and federal statutes and incentives do influence the development potential, growth rates and overall wind energy share to a far higher degree than localized financial incentives or regulatory approval procedures, therefore streamlining nationwide policies might prove to be more powerful measure to increase state-level wind energy shares.

4.1. Introduction

Renewable energy (RE) development has experienced significant growth in recent years in the United States, for the majority of which wind energy accounted with onshore capacity additions amounting to a 24% increase from 60,005MW to 74,472MW between 2012 and 2015 (US-DOE, 2016). Congress has been supporting the transition towards clean and less carbon intensive energy solutions with several federal measures, most notably an industry-wide federal renewable electricity production tax credit (PTC), that has led to a dramatic increase in private-investment driven growth in the wind energy sector (Lu et al., 2011; AWEA, 2015b). These policies were actively supported by the Obama administration in light of increasingly worsening climatic parameters, with 2016 most likely entering history as the

warmest year on record and multiplying signs serving as early indicators for intensifying global climatic upheavals, such as the sharp drop of Artic ice cover in November (WMO, 2016).

Therefore RE development is considered one of the most efficient strategies against anthropogenic climate change, mainly caused by the ongoing elevated output of carbon dioxide and other greenhouse gases (GHG) into the atmosphere, which threatens numerous ecosystems and vulnerable communities (IPCC, 2014). The 5th IPCC Assessment Report, the Sustainable Development Goals as well as the Paris Climate Agreement have further solidified the importance of shifting away from fossil-fuel based carbon-intensive forms of energy generation towards carbon-neutral RE solutions (IPCC, 2014; IEA, 2016).

However the expansion of RE projects has been facing numerous obstacles in many countries, rendering efforts to maintain global temperatures below 2ºC more challenging (OECD, 2015). Federal support schemes such as the PTC being the exception, and with further federal financial or regulatory measures such as the Clean Power Plan (CPP) implementation either being on halt or likely subject to revisions caused by the upcoming political shift under the newly elected Trump administration, the focus on future state-level wind energy barriers and incentives will become progressively more accentuated (Barradale, 2010; Sneed, 2016).

State policies affecting wind energy development do show significant variances regarding energy policy frameworks and permitting procedures. With many determinants influencing overall RE growth, the objective of this paper is to analyze some of those that face the most criticism among developers, for example the number and rigidity of environmental regulations in the permitting and siting procedural frameworks (Dinnell and Russ, 2007; Slattery et al., 2011). Previous studies showed that regulations mandating environmental impact statements or imposing stringent rules with regards to rare species protection, environmental health impact considerations, land use or procedural justice can act as barriers to wind energy development and henceforth bear the potential to stifle both growth and GHG mitigation efforts (Ottinger et al., 2014;, Abbasi et al., 2014).

Analyzing to what extent state-to-state variances in wind energy growth and overall electricity generation share can be attributed to environmental regulations will permit a deeper understanding of the exogenous factors that do impact wind energy development, and more

specifically large-scale installations, the most and whether or not procedural streamlining reforms of environmental provisions could act as a RE support mechanism.

This chapter addresses these questions through econometric analysis taking into consideration the fact that numerous factors do influence wind energy share (WES) and wind energy share growth (WEG) figures. Therefore a comprehensive overall assessment of how specific environmental regulatory requirements in state wind energy permitting and siting processes contribute to the deployment of large-scale facilities in each state will allow us to identify any potential correlations between WES/WEG rates and the presence of environmental regulations. The existing literature deals mostly with the effects of RE policies in general with no specific focus on wind power (Shrimali and Kniefel, 2011; Hitaj, 2013). And most of the existing empirical studies in existence focus in large part on individual policies such as renewable portfolio standards (RPS) (Bird et al., 2005; Yin and Powers, 2010, Carley, 2009, Doris and Gelman, 2010) or electricity market regulation elements such as Mandatory Green Power Options (MGPO) (Delmas and Montes-Sancho, 2011). Hitaj (2013) does cover a large amount of policies, however environmental components or permitting procedural steps are excluded among that study's independent variables, with most of the focus lying on demographic, macroeconomic or electricity market factors.

In order to investigate these potential correlations, cross-sectional data from all 50 states will be incorporated, covering mostly the period between 2007 and 2015, hence allowing for a more comprehensive and holistic empirical investigation, and thus reflecting recent wind energy developments more aptly. It further builds on the previous literature by analyzing the conceptual frameworks that impact RE development and expanding their geographical scope and temporal reach. Among these case studies, Bird et al. (2005), Menz and Vachon (2006), Bohn and Lant (2009), Brown et al. (2012) dealt with wind power only in a fraction of states, ranging from 12 (Bird et al., 2005) to 39 (Menz and Vachon, 2006) states, whereas the data in the aforementioned studies as well as in Hitaj (2013) does date only up to 2008 or earlier, thus not taking into account any of the state-level policy developments thereafter. Fischlein et al. (2014) is one of the few recent wind energy investigations focusing on state-level factors influencing wind deployment, however this study does not include any regression analysis components and is limited to qualitative data analysis and literary review for the most part.

Given the lack of focus on administrative barriers, and more specifically environmental

regulations, in past econometric studies, this research tries to propose a conceptual framework by determining the overall impact of such regulations and procedures on WES and WEG, in order to examine if reforming or streamlining environmental frameworks bears the potential to increase the overall share of RE energy (Menz and Vachon, 2006; Carley, 2009; Yin and Powers, 2010; Doris and Gelman, 2010). This research compiles demographic, geospatial, energy, ecologic, environmental, economic and regulatory data to form a cross-sectional dataset that will then serve as the basis to perform multivariate linear regression analysis and highlight any potential correlations between RE growth and environmental legislation. We theorize that stringent environmental standards and regulations will lower overall WES and WEG rates in states with strong environmental protection components in their permitting procedures. Increasing the planning cost and duration for project developers will incentivize the latter to choose to preferably concentrate most of their development activities in states with little or no regulatory requirements.

4.2. In-state Energy and Environmental Regulations

The US represents an interesting case study in that most data is collected nationwide, however the legal and procedural frameworks do differ sometimes significantly from state to state. This allows us to focus on the individual in-state policies affecting wind energy and investigate if the presence of stringent environmental provisions in state-wide permitting and siting regulations will notably alter WES and WEG rates.

Recent WES and WEG rates do display at times notable state-to-state variances that can only be partially explained by differing regional wind energy resources, macro-economic factors or population dynamics. Environmental impacts on bird and bat populations, low-frequency noise emissions impacts or landscape aesthetics do represent well-documented negative externalities of wind energy installations (Dai et al., 2015). Henceforth, environmental legislation subjecting developers to take these incidentals into account, throughout the permitting and siting stages, bears the risk of adding significant administrative and financial burdens during the pre-construction planning phases, and generally renders overall investments more risky and expensive (Lüthi and Prässler, 2011; Petrova, 2013; Troxler, 2013). In order to assess their impact, we first need to determine which rules do actually affect state-level project development, or if in some states other factors might contribute to a

larger degree to these regional variances.

In 1969, the United States were the first country in the world to create an integrated legal framework whose sole purpose was the protection of the natural environment. The National Environmental Protection Act (NEPA), which entered into force in 1970, mandated that government agencies (see Fig.16.) as well as entities interacting with the government, for example those executing government contracts, would have to consider potential environmental impacts prior to the start of any such activities. They first have to perform an Environmental Impact Assessment (EIA) and produce a comprehensive Environmental Impact Statement (EIS) listing all of the potential socio-environmental hazards created during the project construction and operation phases (Sive and Chertok, 2005; CEQ, 2016).

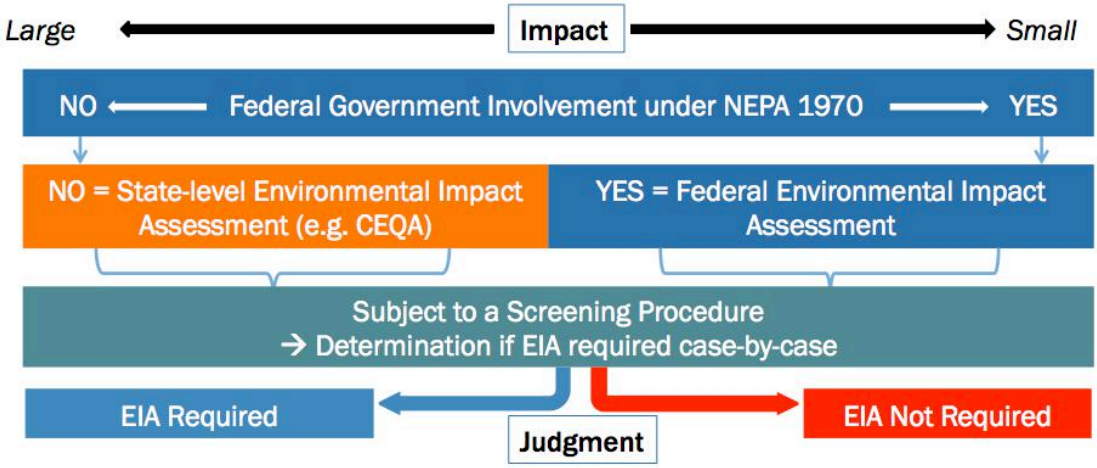

Fig. 16. Screening Procedure for Projects potentially subject to the NEPA EIA Procedure (Source: CEQ, 2016)

These federal government policies do affect state-level wind energy development only to a small degree and mainly through projects planned on federal lands. Government agencies such as the Bureau of Land Management (BLM), National Forest Service (NFS), Fish and Wildlife Service (US-FWS), National Park Service (NPS) and the Department of Defense (DOD) do collectively manage more than 608.9 million acres of land, on which at least 20.6 million acres do qualify for wind power development, mostly in Western Region states such as Nevada, Idaho, Utah or Wyoming (BLM, 2011; Spengler, 2011). As aforementioned, the basic requirements for developers that want to engage in construction activities on these lands is the performance of an EIA followed by the production of an EIS. These projects should influence overall state WES and WEG rates only marginally, for example in 2012 total installed capacity on federal lands amounted to just over 800MW compared to more than

60,000MW on privately-owned lands (AWEA, 2013b). We still anticipate that states with high ratios of federal lands might still be negatively impacted given that obtaining development consent for wind energy installations on these lands is much more cumbersome, thus increasing the pressure on privately owned lands to be developed first, potentially forgoing the most promising wind resources, or increasing potential conflicts on the remaining patches of in-state developable land.

One notable exception of high-impact federal laws are the ones in relation to the protection of certain rare or vulnerable species, in the case of wind power the most critical ones being the Bald and Golden Eagle Protection Act (BGEPA), the Migratory Bird Treaty Act (MBTA) and the Endangered Species Act (ESA) (AFWA and US-FWS, 2007). These statutory provisions apply nationwide, irrespective of activity, property rights or location (Panarella, 2014). Notwithstanding the fact that these are federal rules, and thus indiscriminate towards state regulatory contexts, they still represent a potential indicator of state-level variances on wind energy growth potential. However, as a result of many state-level environmental rules, most notably “State Environmental Protection Acts” (SEPA) also known as “Little-NEPAs” (L-NEPA), emulating and integrating these federal rules into their legal frameworks, the presence of rare and endangered species might still affect wind development to a certain extent (Sive and Chertok, 2005; CEQ, 2016).

Nevertheless state-level regulatory frameworks and procedural approval requirements remain much better indicators of in-state wind energy development potential (Bohn and Lant, 2009; Del Rio and Tarancón, 2012). Many states do not have any procedural requirements or central regulatory authorities at the state level and leave the decision-making to local authorities such as counties or municipalities (Ottinger, 2014; Geißler et al., 2012). On the other hand, as aforementioned, numerous states implemented environmental rules modeled after the NEPA, which are often designated as “Little-NEPAs” or State Environmental Protection Acts (SEPA) (Sive and Chertok, 2005). Numerous states also created their own non-NEPA environmental procedural frameworks applicable to wind energy permitting or siting activities (Geißler et al., 2012).

Several states even created special-purpose regulatory procedures for wind energy projects, including Iowa, Vermont, or West Virginia among others; or for energy projects that surpass certain power generating capacities, for example Oregon for wind generating facilities over

35MW or New York for facilities over 25MW (Geißler et al., 2012; NCSL, 2016; NARUC, 2013). Given that integrated state-level permitting and siting rules usually facilitate the process for large-scale projects, they can speed up the whole approval process for developers. Certain states such as Washington, Hawaii, Colorado or Maine leave the choice up to the developers of large-scale projects whether they prefer local procedures or state procedures, or appeal to the state level if a permit was denied by local authorities (NCSL, 2016; NARUC, 2013).

Numerous developers, industry groups and government agencies cite these environmental provisions as the main regulatory barriers deterring wind energy development, with potential investors sometimes abandoning or avoiding projects altogether, due the lengthy, expensive and cumbersome environmental impact statements and the risk of subsequent nuisance litigation (Petrova, 2013; Brown, 2013). Other points of contention are also the participatory governance components implemented into these regulations that require a mandatory public consultation phase that enables interested members of civil society and local community stakeholders to voice any potential concerns or objections (EPA, 2012). The public participation phases follow certain procedural steps, that if not conducted properly, could lead to potential litigation on procedural grounds, which is also decried as a nuisance by many developers and state representatives (EPA, 2012; Brown, 2013; Petrova, 2013).

Understanding how environmental regulations impact wind energy development will enable decision-makers and developers to re-assess in what ways regulatory streamlining can contribute to promoting the development of RE generation capacities while still maintaining elevated environmental protection standards. We used a mixed-methodology approach to investigate how and to what degree environmental regulations do influence overall wind energy shares and growth or if other factors such as geospatial aspects, financial incentives or population dynamics do play more predominant roles.

4.3. Research Methodology and Data

We applied an integrated statistical analysis framework to establish correlations between the presence of environmental regulations in state-level permitting and siting procedures and WES as well as WEG.

4.3.1. Wind Share Indices

Based of the concept of Wind Development Indices (WDI) proposed in a previous econometric model created by Menz and Vachon (2006), we created Wind Share Indices (WSI), incorporating two independent variables to account for both the absolute wind energy share (WES) in each observed state as well as for growth rates for wind energy share between 2012 and 2015 (WEG). These two metrics would enable us to identify whether and in what ways WES/WEG rates correlate with regulatory project approval environments.

Contrary to Menz and Vachon (2006), Bohn and Land (2009) or Hitaj (2013), we did not exclude any states from our analysis, given that in recent years, numerous states in which wind energy development was considered economically unviable for various reasons - for example for lack of significant wind resources (see Fig.17.) - either added or have seriously been considering adding capacities given the significant technological advances, which allow development in areas with low wind speeds, the increases in local demand or the increased stakeholder acceptance. States in this group include among others Nevada, New Jersey, Delaware, Connecticut, Vermont and Virginia among others (US-DOE, 2016; Iberdrola Renewables, 2015; Wisniewski, 2013).

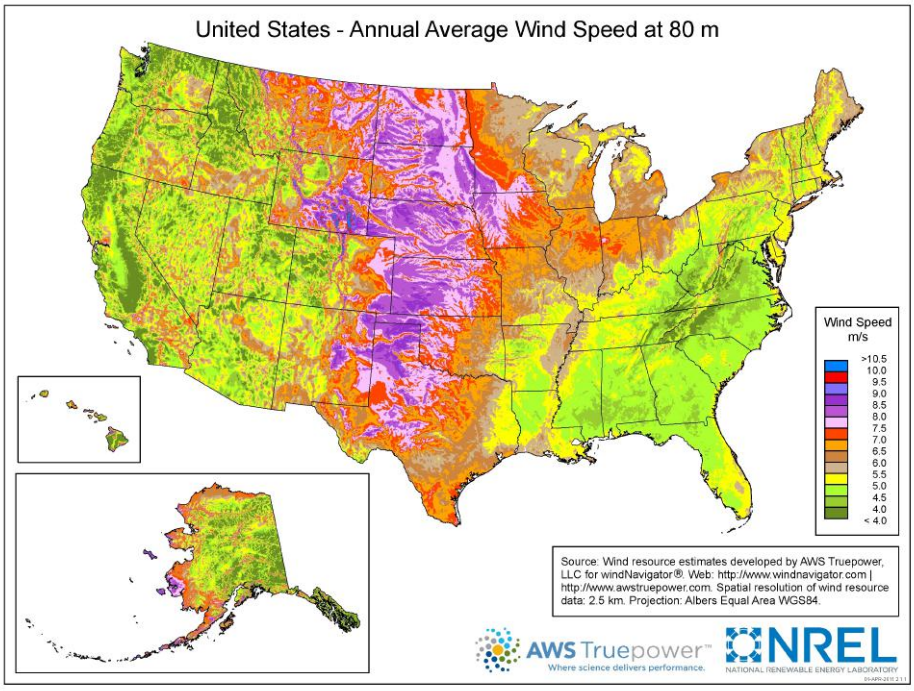

Fig. 17. Annual Average Wind Speed at 80m (NREL and AWS Truepower, 2011)

4.3.2. Determinants to Wind Energy Growth

To account for the numerous factors impacting growth figures in each state, we used a mix of socio-economic, demographic, geospatial, geographic, environmental and regulatory variables to analyze their impact on state-to-state WES/WEG. By including determinants presented in Table 4 such as regulatory bodies or exogenous environmental factors like the presence of protected wildlife, we are able to obtain a more holistic assessment of the actual project conditions for wind development. By focusing on in-state WES and WEG, we decouple our focus from capacity additions; the most frequent independent variable in past studies, towards the overall contributory role of wind energy in each state.

One of the aims was expand the catalogue of determinants significantly beyond the scope of these past studies such as the ones by Bohn and Lant (2009), Carley (2009), Yin and Power (2010), Delmas and Montes-Sancho (2011), or Del Rio and Tarancón (2012), and implement the most recent quantitative cross-sectional data available, especially in terms of state-to-state WES. As presented in Table 5, by integrating more up to date data figures, precise qualitative measures and quantifying the individual elements of the overall permitting and siting processes, we are able to extend the range of the applied econometric regression model in enabling a more detailed assessment of what current the impact of procedural frameworks on wind energy development is.

Table 4
Variables, measurement units, sources of data and expected dependent variable (WES/WEG) relationship for the explanatory variables

Name of Variable	Variable Definition	Source of Data	Expected Relation with Dependent Variable
AER	Average Electricity Rates in 2014 ($cents/KWh)	US-EIA, 2016	(+) Driver
BEAGLE	Bald Eagle Population (Breeding Pairs in 2007)*	US-FWS, 2007	(-) Barrier
CPCN	Certificate of Public Convenience and Necessity (CPCN) (Dummy Variable)	Stanton, 2012	(-) Barrier
DPAW	Designated Permitting Authorities for Wind	Stanton, 2012	(+) Driver
DU	Degree of Urbanization in 2010 (in %)	CB, US-DOC, 2010	(-) Barrier
FIW	Nr. of State-wide Financial Incentives Affecting Wind	US-DOE and NCCETC, 2016a	(+) Driver
LNEPA	Presence of SEPA or "Little-NEPA" regulations (Dummy Variable)	CEQ, 2016	(-) Barrier
RFL	Ratio Federal Land/Total Land in 2013 (in %)	Vincent et al, 2014	(-) Barrier
RPSY	Renewable Portfolio Standard (Years in Existence)**	NCSL, 2016	(+) Driver
RS	Electricity Retail Sales in 2015 (Total, TWh)	US-EIA, 2016	(+) Driver
SERD	State-level Environmental Regulations affecting LS-Wind (Dummy Variable)	Stanton, 2012	(-) Barrier
WLA	Wind Energy Onshore Potential (% of Area with Wind Capacity factor 30%/80m)	NREL and AWS Truepower, 2011	(+) Driver

* More recent data not being available, we relied on the 2006 (WEP), respectively 2007 (BEAGLE) figures
** Only periods with mandatory RPS were considered, not voluntary goals

In terms of dependent selection rationale, spatial and geopolitical determinants WLA and RFL are very closely linked to wind energy development, for example indicating the level of potential (see Fig. 1.) and overall available resources (US-DOE, 2016). In combination with the demographic data component DU, this can point to potential land use conflicts or transmission complications caused by the distance of wind facilities from urban consumption centers (NREL, 2014).

Table 5
Data figures for 50 U.S. States *(see continuation next page)

State	AER	BEAGLE	CPCN	DPAW	DU	FIW	LNEPA	RFL	RPSY	RS	SERD	WLA
Alabama	9.27	77	Yes		59.0%	0		2.6%		88.85		0.02
Alaska	17.46	10000	Yes		66.0%	1		61.2%		6.16		6.57
Arizona	10.18	43			89.8%	7		38.6%	9	77.35		0.74
Arkansas	7.9	42			56.2%	1		9.4%		46.47		1.34
California	15.15	200			95.2%	4	Yes	45.8%	13	261.17	Yes	1.67
Colorado	10.06	42		Yes	86.2%	6		35.9%	11	54.12	Yes	28.73
Connecticut	17.05	10			88.0%	5	Yes	0.3%	17	29.48	Yes	0.04
Delaware	11.22	39	Yes		83.3%	2		2.4%	10	11.50		0.04
Florida	10.77	1133			91.2%	2		13.2%		235.60	Yes	0
Georgia	10.03	82			75.1%	0	Yes	4.0%		135.88		0.02
Hawaii	33.43	0			91.9%	5	Yes	20.0%	14	9.51	Yes	3.91
Idaho	7.93	216			70.6%	3		61.6%		23.06		1.67
Illinois	9.36	100			88.5%	6		1.1%	8	138.62	Yes	34.25
Indiana	9.06	68	Yes		72.4%	2	Yes	1.7%		104.51		31.63
Iowa	8.15	200			64.0%	8		0.3%	32	47.15	Yes	78.32
Kansas	10.16	23			74.2%	1		0.5%	6	39.85		89.38
Kentucky	8.15	35			58.4%	4		4.3%		76.04		0.01
Louisiana	8.09	284			73.2%	0		4.6%		91.68		0.07
Maine	12.65	414			38.7%	2		1.1%	16	11.89	Yes	2.69
Maryland	12.1	400			87.2%	7	Yes	3.1%	11	61.78	Yes	1.18
Massachusetts	15.35	25			92.0%	5	Yes	1.2%	18	54.62	Yes	0.99
Michigan	11.03	482	Yes		74.6%	5		10.0%	7	102.48		7.85
Minnesota	9.52	1312		Yes	73.3%	2	Yes	6.8%	8	66.58	Yes	44.83
Mississippi	9.6	31			49.3%	1		5.1%		48.69		0
Missouri)	9.11	123	Yes		70.4%	2		3.7%	8	81.50		30.39
Montana	8.59	325	Yes		55.9%	8	Yes	29.0%	10	14.21		49.6
Nebraska	8.84	37			73.1%	4		1.1%		29.50	Yes	91.64
Nevada	9.73	3			94.2%	5		84.9%	18	36.02	Yes	0.51
New Hampshire	15.22	12			60.3%	4		13.8%	8	11.00	Yes	1.78
New Jersey	13.95	53			94.7%	3	Yes	3.7%	16	75.49	Yes	0.14
New Mexico	9.65	4			77.4%	6		34.7%	13	23.09	Yes	31.25
New York	16.25	110			87.9%	5	Yes	0.3%	11	148.91	Yes	4.1
North Carolina	9.33	60			66.1%	4	Yes	7.7%	8	133.85	Yes	0.13
North Dakota	8.41	15		Yes	59.9%	4		3.9%		18.13	Yes	84.25
Ohio	9.73	125			77.9%	5		1.2%	7	149.21	Yes	10.28
Oklahoma	8.18	49			66.2%	2		1.6%		61.34		57.1
Oregon	8.68	470		Yes	81.0%	7		52.9%	8	47.26	Yes	2.16
Pennsylvania	10.28	96	Yes		78.7%	10		2.1%	11	146.34		0.56
Rhode Island	15.41	1			90.7%	6		0.8%	11	7.66	Yes	0.35
South Carolina	9.67	208			66.3%	1		4.4%		81.33	Yes	0.05
South Dakota	9.05	41		Yes	56.7%	3	Yes	5.4%		12.10	Yes	88.36
Tennessee	9.4	120	Yes		66.4%	2		4.8%		99.63		0.06
Texas	8.94	156			84.7%	3		1.8%	16	392.34		55.54
Utah	8.35	9			90.6%	8		64.9%		30.19		1.19
Vermont	14.57	1		Yes	38.9%	6		7.8%	1	5.52	Yes	2.39
Virginia	9.17	485			75.5%	5	Yes	9.9%		112.01	Yes	0.35
Washington	7.13	848			84.0%	2	Yes	28.5%	9	90.12	Yes	2.12
West Virginia	7.65	19			48.7%	0		7.4%		32.30		0.6
Wisconsin	10.57	1065			70.2%	3	Yes	5.1%	17	68.70	Yes	14.29
Wyoming	7.76	95			64.8%	0		48.1%		16.92	Yes	43.58

Marco-economic factors AER and RS highlight demand-side variations and if wind capacity additions can be absorbed into the market (Cox et al., 2015). Production-side measures FIW influence price formation and render wind energy competitive with existing capacities and future competing energy technology capacity additions (Cox et al., 2015).

Finally, SERD, CPCN, DPAW, BEAGLE and LNEPA, point to potential environmental administrative or regulatory barriers that could negatively impact wind energy development due to the number or the rigidity of the procedural frameworks as well as the number of steps in the overall approval process, which is composed of planning, permitting and siting stages (Badichek, 2016; Tegen et al., 2016; Cox et al., 2015).

4.3.3. Econometric Model

The econometric study is based on cross-section weighted least squares (WLS) regressions. The general forms of the model are as follows:

$$WES = \beta_0 + \beta_1 RFL + \beta_2 RPSY + \beta_3 DU + \beta_4 AER + \beta_5 SERD + \beta_6 WLA + \beta_7 CPCN + \beta_8 GDP + \beta_9 FIW + \beta_{10} BEAGLE + \beta_{11} LNEPA + \beta_{12} RS + \varepsilon$$

$$WEG = \beta_0 + \beta_1 RFL + \beta_2 RPSY + \beta_3 DU + \beta_4 AER + \beta_5 SERD + \beta_6 WLA + \beta_7 CPCN + \beta_8 GDP + \beta_9 FIW + \beta_{10} BEAGLE + \beta_{11} LNEPA + \beta_{12} RS + \varepsilon$$

In-state WES in 2015 and in-state WEG from 2012 to 2015 were selected as the initial dependent variables. And the variables in Table 4 are the explanatory variables. STATA software was used to estimate this model. Based on the approach previously applied by Del Rio and Tarancón (2009), subsequently a series of tests were run to evaluate the overall quality of the estimates.

The correlation matrix with the explanatory variables is shown in Table 6. The correlations between variables are relatively low. The highest correlation is observed between FIW and RPSY, being 0.4786.

Then VIF (Variance Inflation Factors) are used to test the presence of multicollinearity. Based

on the results of the VIF, insignificant variables were excluded. In the final variable catalogue, VIFs are all below 2 (conservatively recommended threshold is 5) and the possible collinearity between each of the variables is small.

Since cross-sectional data often has heteroscedasticity, the Breusch-Pagan/Cook-Weisberg test is used and it turns out that the null hypothesis of homoscedasticity is rejected. To deal with heteroscedasticity, the application of Weighted Least Squares (WLS) regressions was used as opposed to Ordinary Least Squares (OLS).

Finally, the Ramsey-RESET test on the accuracy of functional forms of the variables was applied, revealing that the null hypothesis of incorrect functional form can only be rejected for WES, however not for WEG. Therefore the results for WEG had to be excluded, given the exclusion of relevant variables. Data limitations did not permit the identification of the missing significant variables, an issue that needs to be addressed in future research.

4.4. Results

Table 6
Correlation Matrix

		1	2	3	4	6	7	8	9	10	11	12	13
1	DU	1.0000											
2	AER	0.2895	1.0000										
3	RPSY	0.3816	0.3065	1.0000									
4	SERD	0.2305	0.2844	0.4012	1.0000								
6	FIW	0.3452	0.1502	0.4786	0.2729	1.0000							
7	BEAGLE	-0.0584	0.1874	-0.1229	-0.1157	-0.1784	1.0000						
8	LNEPA	0.2632	0.3144	0.2358	0.3232	0.0552	-0.0381	1.0000					
9	WLA	-0.1786	-0.2655	0.0276	0.0686	0.0068	-0.0716	-0.0728	1.0000				
10	CPCN	-0.2174	-0.0701	-0.2795	-0.0243	-0.067	0.187	-0.011	-0.1571	1.0000			
11	RFL	0.2455	-0.0133	-0.0192	-0.0025	0.1737	0.3035	-0.1482	-0.1827	0.0676	1.0000		
12	RS	0.3527	-0.1245	0.0832	-0.0769	-0.0395	-0.0877	0.1072	-0.0767	-0.0872	-0.1719	1.0000	
13	DPAW	-0.1937	-0.0794	-0.1225	0.3142	0.1393	-0.0216	0.0106	0.3122	0.1425	0.0622	-0.2107	1.0000

Correlations greater than 0.2795 (absolute value) are significant at 5% and greater than 0.3816 are significant at 1%. (N=50)

Table 7
Regression Coefficients for WES

Dependent Variables	Share WES (2015)
	Coefficient
DU	-0.06747
AER	0.001169
RPSY	0.008044***
SERD	-0.03447*
FIW	-0.01144**
BEAGLE	-5.010E-06
LNEPA	-0.02808
WLA	0.2016***
CPCN	0.03430
RFL	-0.001147
RS	-0.0001972
DPAW	0.1035***
R^2	0.8997
Adjusted R^2	0.8672
F-statistics	27.67 (0.000)
Number of observations	50.00

*p<0.10.
**p<0.05.
***p<0.01.

In Table 7 we present the results of the regression analyses. Many previous studies alluded to the potentially stifling effects of excessive state regulation and stakeholder involvement resulting in burdensome, lengthy and costly planning, permitting and siting processes (Menz and Vachon, 2006; Carley, 2009; Yin and Power, 2010; Doris and Gelman, 2010). In addition to the findings of Bohn and Lant (2009) about the strong correlation between population dynamics and installed wind power capacity, our results do expand on past findings for geospatial and demographic (DU, WLA), macroeconomic (AER), regulatory (RPSY, FIW) and environmental (BEAGLE, LNEPA) factors. The only state-wide procedural variable of any importance is DPAW, thus at least partially debilitating prior findings that allude to a significant impact of rigid or lengthy permitting and siting procedures such as presented by Menz and Vachon (2006), Schmalensee (2009), Bohn and Lant (2009), Hitaj (2013) and

Fischlein et al (2014). Despite Del Rio and Tarancón (2009) pointing out that the literature is inconclusive as to whether there is a significant relationship between WLA and wind capacity additions, the findings point to a shift in the US wind energy landscape throughout the past decade in that states with the best wind resources have added significant capacities and were able to increase their in-state WES, thus more closely reflecting the actual their available wind resources.

The findings for SERD, LNEPA and CPCN show that those states with strict or numerous regulations do not necessarily lose out on progressive wind energy development, especially with regards to covering a large portion of their in-state energy demand through RE, irrespective of localized variation caused by procedural barriers or civic opposition. This is partially contradicted by SERD, however the correlation being less significant than for other variables, environmental regulations seem to have a certain influence on WES, with the overall impact standing in contrast to past studies, which generally did present stronger correlations. Past studies also showed that some of the advantages of leaving permitting and siting processes to local authorities would be offset by the multitude of localized ordinances, whereas centralized permitting eradicates some of these uncertainties through a reduced number of procedural steps, one-stop approaches, more experienced administrators or more extensive resources than local entities (Bohn and Land, 2009). The results for DPAW and SERD do reinforce this understanding given that the states with designated permitting authorities or specific regulations for wind energy projects do indeed enjoy higher WES, therefore it can be assumed that aiming for a “one-stop shop” dedicated administrative process can result in higher numbers of wind deployment.

Moreover, the results show that although there are some correlations between the number of state-level procedural requirements and overall wind energy deployment rates, they remain mostly weak, and thus indicate only a relatively limited impact on state WES. The only notable exceptions are RPSY and FIW, which confirm the significance of renewable energy mandates and state-level financial incentives already illustrated in numerous pervious empirical studies (Menz and Vachon, 2006; Bird et al., 2005; Hitaj, 2013; Doris and Gelman, 2010). This demonstrates that the overwhelming importance of these policy tools by providing developers and utilities with tangible goals, timeframes and financial support structures that not only lead to increased capacity additions but render new RE projects economically viable as existing fossil-fuel based thermal capacities need to be substituted

through cleaner options. Notwithstanding a few notable exceptions of strongly underperforming (e.g. Nebraska, Missouri and Wisconsin) or overperforming (e.g. Vermont, Maine and Idaho) states, our findings lead us to conclude that high WES is for the most part linked to exogenous factors of geospatial, demographic or financial nature, while state-level regulatory frameworks do play an important, yet secondary role.

Henceforth, in concurrence with previous studies, it can be assumed that the impact of specific regulatory components such as environmental or public participation mandates were less influential in states that do cover large areas of land, with low overall populations and population densities, have high wind potential as well as elevated degrees of urbanization. These factors allow for wind to represent more significant percentages of state's electricity share, given that projects do appear to face less stakeholder opposition and smaller general in-state electricity demand, confirmed by the weak correlation with RS. These results stand in contrast with past findings that mention that national or state-level regulatory frameworks and financial incentive mechanisms do play a much more significant role than physical energy potential. Recent developments in the domestic wind energy sector have reversed this trend mostly and especially land-rich states with small populations and high wind energy potential, either distributed or localized, where able to develop these sites and reaching a wind energy share often covering a large portion of in-state energy demand.

Besides geospatial and demographic factors, or results for FIW reinforce the previously established correlations between WES and state as well as federal tax incentives, more notably tax credits, such as consumption tax credits or the federal PTC. The latter was originally adopted in 1992 through the Energy Policy Act (EPACT) and is currently set at $0.023/kWh for wind, geothermal, closed-loop biomass, $0.012/kWh for other eligible technologies, it applies to first ten years of operation (US-DOE, 2016b). Previous studies have outlined in detail the overwhelming influence of this policy tool on wind energy capacity addition rates, basically creating boom-bust cycles that coincided with the respective PTC extensions and expirations as can been seen in Fig.18. (Lu et al., 2011; AWEA, 2015b; UCS, 2015; Hitaj, 2013).

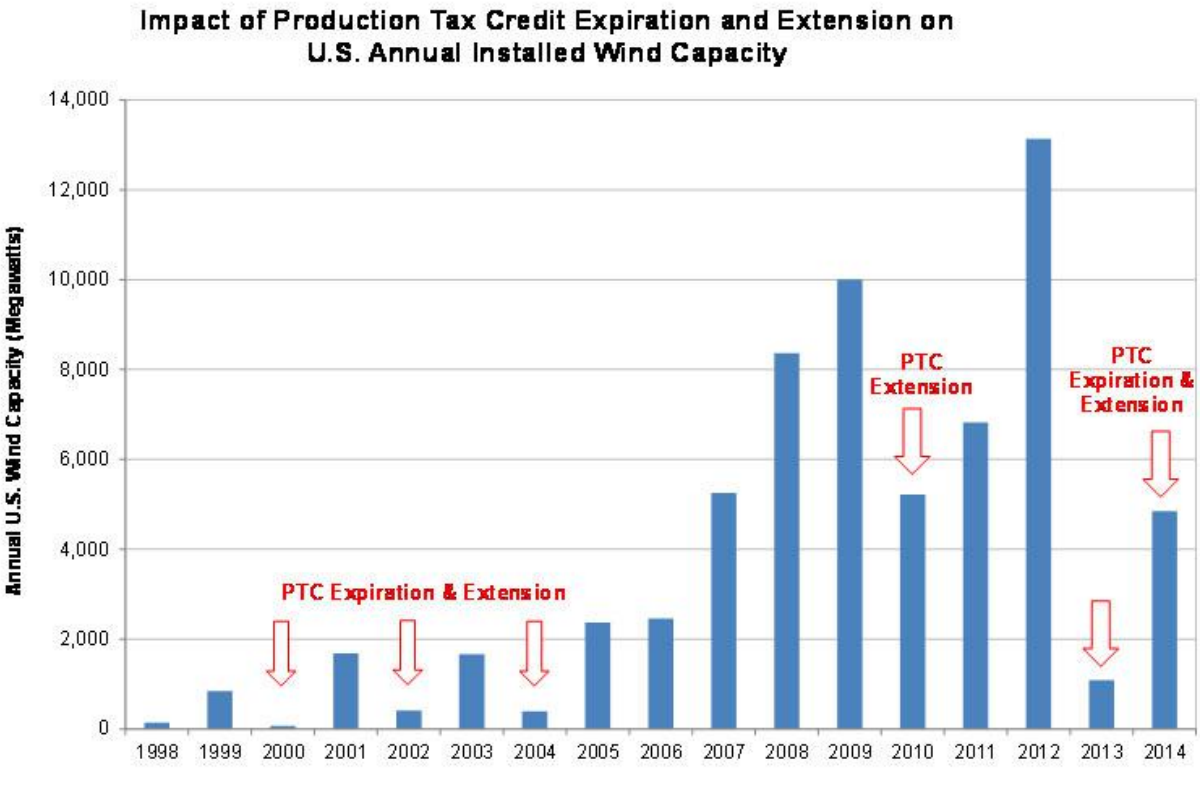

Fig. 18. Correlation between Federal PTC and Wind Capacity Addition from 1998 to 2014 (Source: UCS, 2015)

The results for BEAGLE also empirically confirm the overall small impact of the presence of a rare species and the interplay with the corresponding environmental protection laws, in that states that do show high numbers of nesting bald eagle pairs within their territorial borders do not necessarily display lower numbers of WES (Panarella, 2014; Glen et al., 2013). Although the BGEPA, the MBTA and the ESA are federal laws and thus uniformly applicable in each state, or seconded through L-NEPAs, the results partially mitigate the importance of environmental regulations and the stifling effect they can have. Given that the aforementioned laws include the species most associated with wind related animal casualties and the resulting dissuasive effects they seemed to have on developers, the obtained results partially relativize their influence on project development and show that albeit state-specific regulations can impact growth to a certain degree, they momentarily do not prevent most states from exploiting significant portions of their in-state wind energy potential.

These results overall reinforce the initial assumptions that policy measures and regulatory streamlining efforts will be more efficient at the federal level. The SERD results however do indicate that for LS-RE installations with elevated land footprints, environmental regulations

seem to play an important role. Therefore in the future, localized factors will gain in importance if developable land resources, as illustrated in Fig.19., will become more scarce and zoning issues over siting between local stakeholders and civil society participants will emerge over environmental and aesthetic impacts of wind farms, as can already be anticipated based on current populations and wind energy development trends. Especially if states want to develop previously untapped wind resources, making it progressively harder to avoid avian habitats and migratory routes (Trainor et al., 2016).

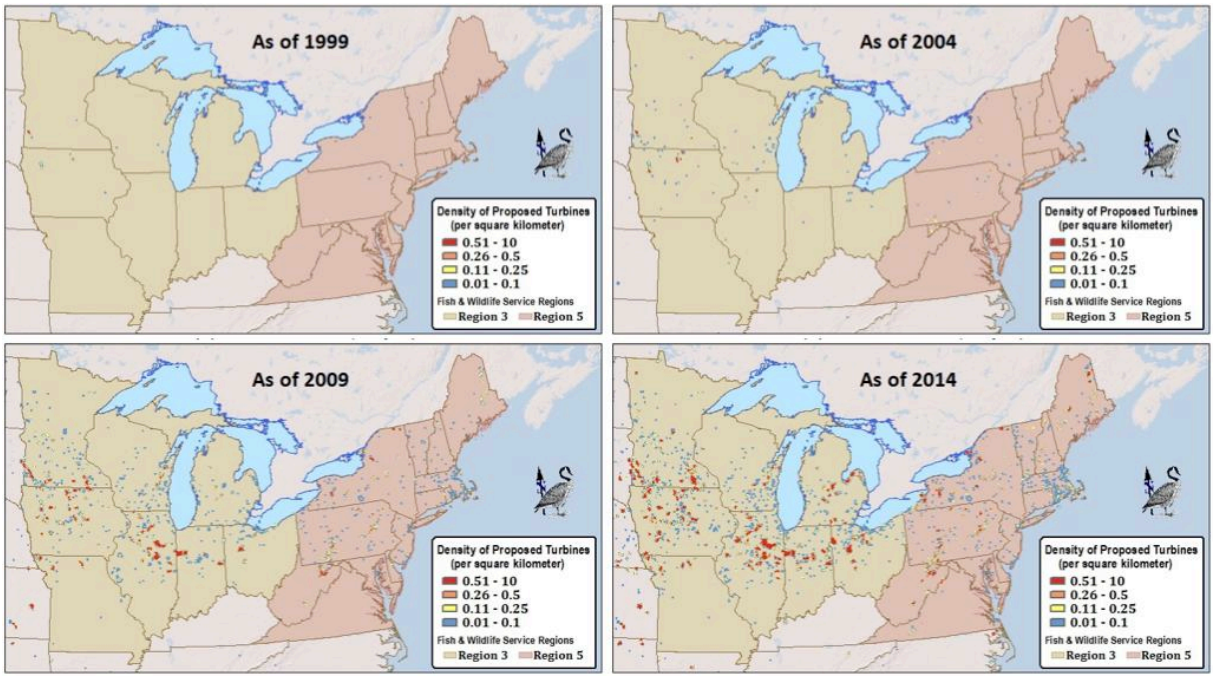

Fig. 19. Evolution of Density of Proposed Wind Turbines (per km^2) in North-East and Midwest Region between 1999 and 2014 (Source: US-FWS)

4.5. Discussion

After looking at the results, the implications for wind developers and further development of RE policies will lead to a stronger short-term emphasis on national measures as state-wide policies do momentarily still impact WES much less than geospatial and demographic factors in combination with federal RE incentives and policies. The observations stand in partial contrast to previous studies and the strictly localized empirical evaluations therein, which assumed that individual project development was, on numerous occasions, stifled by state-level policies and regulations. However nationwide non-environmental regulatory policies such as the federal PTC largely offset these and thus the overall impact on state-to-state WES

rates saw only minor variances.

However, one should note that in the future, due the political stances of the incoming Trump administration and projected decreasing ambitions to develop RE sources on federal lands, the conflict potential between local stakeholders and project developers might amplify due to increased land use and siting conflicts, given that, especially in the Western Region states, the elevated ratio of undeveloped federal sites will drive project developers into areas with elevated risks, including significant environmental impacts or civil society opposition among others.

Overcoming these challenges will be crucial in order to continuously push for a swift transition away from carbon-intense forms of energy generation. Given the limited range of our empirical analysis it is important to emphasize that despite the little general effect on overall WES, localized effects can differ significantly at times depending on multi-levelized geospatial and socio-environmental factors. Therefore complementing this study trough a detailed comparative case study analysis can provide additional evidence on how geospatial and regulatory particularities might impact wind energy developed, especially in states with less distributed wind resources and high population densities, in which potential conflicts might arise due to stringent regulatory frameworks. Ohio is one of the states where large-scale wind energy development came practically to a halt after the state legislature modified zoning rules and implemented setbacks that require a minimum distance of 1,125 feet from the tip of a turbine’s blades to the nearest property line, which in practice means setbacks of about 1,300 feet from each turbine’s base (Kowalski, 2014).

This indicates a trend already observed in other states that are either densely populated or where most resources in rural and less contentious areas have already been developed, including Massachusetts, Indiana, Illinois, Wisconsin, Pennsylvania, New York or New Hampshire among others, in which land use and zoning conflicts have also practically put a halt on many projects (Zaltman, 2013; Treppa, 2016; Brown, 2013; Hoffman, 2011; Mulvaney et al., 2013). This did not affect the overall general national growth trends, mostly driven by the Great Plains and Western Region states where high wind potential coupled with lots of undeveloped land, low population density and high degrees of urbanization basically prevented many of the land use conflicts observed in other parts of the country. Notwithstanding, due to further future demographic migratory flows towards the coastlines

and population concentrations in semi-urban and urban centers, developing any resources outside of the remote wind energy growth corridors will prove extremely challenging without state-level regulatory changes in terms of participatory governance, procedural justice, zoning rules and environmental streamlining (Governing, 2011, 2015).

4.6. Conclusion and Policy Implications

Some of the statistical inconsistencies, partially for WES and especially for WEG, can be explained by the small number of overall observations, although they do not negate the fundamental trends displayed by the variables that do show significant correlations with WES, as previous studies have show similar results between single-year independent variables and multi-year growth rates (Menz and Vachon, 2006; Del Rio and Tarancon, 2012). Therefore in the future, creating a more refined follow-up empirical analysis integrating more complete data sets, such as panel data, WDIs composed of capacity additions besides WES and WEG, including modified dependent variables for the latter, could provide a clearer situational picture. In combination with additional tests, such as an Information Matrix Test, or different methods, such as Beta Regressions, could trigger even more precise and accurate results.

Furthermore, a combination of empirical econometric as well as qualitative case study analyses could reveal ways on how to reform and streamline regulatory and procedural frameworks and increase WES in more densely populated regions and in closer proximity to population centers where more pronounced stakeholder opposition can be expected. This also applies to areas of high ecological significance such as rare species habitats or migratory bird corridors that could trigger additional zoning conflicts if further wind development and RE deployment are pursued, mainly due to the large land use footprint of large-scale wind energy and other RE installations, including solar PV (Ong et al., 2013; Trainor et al., 2016).

Future research should also focus in integrating further variables such as transmission grid capacities for example the CREZ project in Texas that linked production capacities in the sparsely populated Panhandle areas with the more populated regions of North-East and Central Texas (Malewitz, 2013). Given that transmission issues and the lack of connection opportunities prevent the development of some of the most promising wind resources, integrating and quantifying these variables into future empirical studies will further refine the results on what determinants influence state-to-state WES the most (Fischlein et al., 2013).

CHAPTER V: Comparison and Evaluation of National EIA Frameworks in Japan, New Zealand, the EU and the US

Chapter Abstract

In order to streamline EIA frameworks, outlining the strengths as well as the weaknesses of each of the current systems in place is crucial to determine what components should be subject to alterations and how national or regional particularities could function in each respective territory. Throughout the previous chapters, it was revealed that some of the most common factors of a successful EIA system were the reduction of administrative burdens that could increase EIA review-related costs for developers and prolong the entire procedure. These can lead to significant delays in the project planning stages, which might compromise the economic viability of a RE project due to among others evolving market conditions, including reduced subsidy rates, a shift in public perceptions resulting in stronger local stakeholder opposition or lower market demand caused by conventional thermal energy capacity additions. In Japan, the EIA system suffers mainly from administrative fracturing between the local and national levels as well as between various government agencies. In combination with strong reservations from local civil society stakeholders, this revealed some of the flaws of the current system in place, especially with regards to LS-RE projects. The previous results obtained by analyzing the EIA frameworks and reform efforts in Japan, New Zealand, the EU and the US illustrated the overall importance of consolidated and comprehensive frameworks that reduce the amount of uncertainty. Available tools such as mandatory timeframes, scoping, clear screening thresholds and priority assessment categories for RE projects, could serve as elements for a more robust EIA process that creates a unified regulatory procedure for climate change mitigating energy projects, in Japan and elsewhere.

5.1. Comparative Analysis

The following comparative analysis will highlight the elements of each EIA system among those that, in the previous chapters, were identified as factors that can either act as potential drivers or potential barriers to LS-RE and thus will permit the creation of a streamlined EIA framework for Japan, which integrates those aspects that were considered the most efficient in balancing various stakeholder interests, including economic factors, socio-environmental

concerns or participatory governance. Utilizing parts of comparative analysis methods previously applied by Galas et al. (2015), Geißler et al. (2012) and Suwanteep et al. (2016), allows for direct juxtaposition of each frameworks' procedural and structural particularities and thus enables a holistic evaluation of the elements that can stifle the development of RE projects. Qualitative matrixes, comprising each the various strengths (see Table 9) and weaknesses (see Table 10) observed in each territory facilitates the subsequent development of a streamlined procedural framework that can potentially alleviate some of the drawbacks as and inconsistencies in the current system's structures.

In the past, some studies attempted to present streamlining approaches by comparing the Japanese EIA system with other frameworks, however they usually excluded the reform efforts already in place, thus ignoring some of the either positive of negative results of theses streamlining measures, henceforth preventing a comprehensive policy assessment and ulterior creation of efficient proposals. Hayashi (2008) compared the Japanese system with those in England, Canada and South Korea, however he focused almost exclusively on procedural details, almost entirely excluding the larger socio-environmental or context or specific sectorial impacts. Dating from 2008, this study does also exclude all of the post-Fukushima developments such as the 2011 EIAL amendment, energy policy revisions such as the FiT or global RE promotion commitments in the wake of the COP meetings.

The two other studies by Suwanteep et al. (2016) and Chen et al. (2014) do either focus solely on EIA provisions or RE, none of them considers the potential correlation between both and the potential implications that EIAs can have on RE development and vice versa. The most pertinent aspects of this dissertation's research analysis arise out of the so-called "green v. green" conflict that many LS-RE projects see themselves confronted with, in that they usually represent a desirable technology solution in order to mitigate GHG emissions (Slattery et al., 2012). On the other hand, due to the distributed nature and decentralized range patterns, they often enter into conflicts with local stakeholders because of zoning and land-use conflicts, or because of environmental concerns as was observed in all four observed territories (Morris et al., 2014). The fact that RE installations are geographically less flexible than other energy generation technologies due to the geospatially contained nature of available RE resources, they are more likely to enter into a higher number of conflicts with local stakeholders. In many instances these did voice concerns regarding LS-RE projects irrespective of used technology, although solar PV has been less affected than wind or geothermal, given the

absence of active moving parts or substantial geological activities (Hoffman, 2011).

Japan's 2011 EIAL amendment (see Table 8) can be understood as a logical consequence to some of the previously described concerns, and with the country's topography being overwhelmingly mountainous, its seems reasonable to implement certain safeguards or additional procedural requirements such as PEIC or IMR in order to create a more balanced project approval system that offers a high degree of public involvement. However, notwithstanding other relevant factors such as fiscal incentives and market environment, the abundance of procedural steps and input requirements from various stakeholders in the Japanese EIA framework has negatively impacted LS-RE growth for projects involving wind and geothermal, given that these projects do also fall with the scope of other laws such as the Migratory Bird Convention, Agricultural Land Law, Natural Park Law or Hot Spring Law. Solar PV certainly benefitted from some of the aforementioned incentives such as being allocated the highest FiT rates, and several studies and stakeholder interviews did reveal that the fact that solar PV is not subject to the EIAL does facilitate certain measure significantly.

Therefore, one of the most important aspects is to determine when a project is actually subject to an EIA, which will likely prolong the entire planning an eventual construction phases a few years. The most frequent issues in all of the four territories, with regards to screening, were the length of the screening, the vague selection criteria for borderline projects and the resulting uncertainty for developers. The Japanese EIA system is fairly straightforward in this regard in that categorizes energy projects based on production output capacity in MW. Everything ranging below 7.5MW is exempt; everything above 10MW is subject to the EIAL and projects between 7.5MW and 10MW will be screened. However, the screening procedure will involve the opinions from at least four parties, the MOEJ, METI, the project proponent and the prefectural governor, which have to be theoretically delivered within 60days, however this timeframe is often exceeded due to procedural delays (Shibata and Irie, 2013). In New Zealand and the EU, although there are guidelines outlining certain factors to be considered, such as potential environmental impact, the situation is similar to Japan's in that it is not always clear when a project will require an EIA, whereas in the US federal agency involvement is the main criteria for a NEPA-rooted EIA, thus allowing most developers to fall back on state rules, which again are quite fractured and thus offer no uniform screening picture. The results for the US did still show that states with dedicated agencies (DPAW) and comprehensive rules for LS-RE projects (SERD) did enjoy higher wind energy shares.

Table 8
Summary of Main Legal Acts Covering the Environmental Approval Process

Japan	New Zealand	EU	US
• Basic Environment Law 1993	• Resources Management Act 1993	• EIA Directive 2011/92/EU	• National Environmental Protection Act 1970
• Environmental Impact Assessment Law 1997	• Resources Management Amendment Act 2009	• EIA Directive 2014/52/EU	• Clean Air Protection Act 1970
• Environmental Impact Assessment Law Amendment 2011	• Environmental Protection Authority Act 2011	• TEN-E Regulation No. 347/2013	• Bald and Golden Eagle Protection Act 1940
	• Resources Management Amendment Act 2013		• Migratory Bird Treaty Act 1918
			• Endangered Species Act 1973
			• State-level Environmental Protection Action Acts

Japan does also suffer to some degree from a high degree from fracturing at the local level, although this is not the case for non-solar LS-RE projects as they are subject to the national EIA process, which is laudable, as is substantiated by the experiences in New Zealand with the NZEPA Board of Inquiry process, the TEN-E Regulation “Projects of Common Interest” measures and the regression results for the variable DPAW (Designated Permitting Authorities for Wind) in the United States. Centralized, uniform approval procedures performed by one administrative entity reduce the amount of administrative backtracking and therefore render the collection, submission and evaluation of data more easy for both project proponents as well as the reviewers, who do not need to split resources among several agencies. Henceforth, one-stop-shop approaches should be favored to a multi-level, multi-agency system.

The hardest and most contentious part in all territories is the right level of public participation. While Japan opted for increased public input outlets and accountability in the wake of Fukushima and growing concerns of the negative health impacts of large-scale wind turbines, it simultaneously increased the risk of legal obstruction as examples for geothermal projects and wind have illustrated (Nishikizawa et al., 2013, Uechi et 2014), therefore some of the streamlining elements from other territories might prove useful for any future EIA amendments in Japan, if incorporated. New Zealand’s approach with fixed and strictly contained public notification and participation periods, both for regular AEEs and PNSs, does appear the to be the most efficient, especially since most cases can only be challenged in court on procedural grounds. Yet, as critics have pointed out, these periods are insufficient in allowing for a fair and balanced debate over the potential impacts of projects, especially

PNSs. In the EU, member states have to implement a public participation period of minimum 30 days, however given the principle of subsidiarity, this will not necessarily lead to a uniform set of participatory governance rules in each member state. There is an elevated risk of certain member states deliberately setting extremely short periods of time to either promote or dissuade the development of certain technologies, rendering project planning within the EU more complex. The United States system of mostly individualized non-integrated rules within each state does lead to a situation that in some states without any approval process, or where counties are in charge, public participation is reduced to very short periods, if any at all. In the absence of any comprehensive participatory governance provisions, local opponents do need to seek remedies usually through land-use or private property based legal action (Treppa, 2016). The federal NEPA process is certainly more unified and less fractured, however public participation can also stand here in the way of LS-RE development on public lands, and given the government's involvement, opponents can sue at the federal level, thus increasing the risk of prolonged and expensive legal obstruction (Badicheck, 2016).

Table 9
List of Strengths of Individual EIA Frameworks

Japan	New Zealand	EU	US
(+) High degree of public and local involvement	(+) Extremely short processing timeframes between application and final decision under the EPA approval process	(+) Increased public input (minimum public consultation period)	(+) Federal process only for project with federal involvement (most RE projects excluded)
(+) Many stages for revisions and subsequent input	(+) Cost limits and fixed maximum timeframes for PNSs (9 months total) and medium-sized regular AEEs (6 months)	(+) Creation of harmonized guidelines and increased screening process clarifications	(+) Some states without any environmental approval regulations = Short duration and cost
(+) Implementation of restructuring plans for RE installations	(+) Cost support for surveys and pre-EIA steps in certain cases	(+) More clarity through increased public accountability, monitoring and expert involvement	(+) High level of public involvement and mandatory timeframes (under NEPA)
(+) High degree of accountability, pre- and post-monitoring provisions	(+) Integrated one-stop shop approach	(+) Creation of one-stop shop requirement for EIA/Habitats (Natura2000) Directives	
(+) For national EIAs, high degree of shared expertise between MOE and METI	(+) Limited legal obstruction possibilities		

Having highlighted some of the most defining strengths and weaknesses, it becomes apparent that an accessible EIA system benefits most from homogeneity and precise rules including mandatory timeframes, which provide each party involved with the necessary planning safety to act within a stable project development environment that does consider all the various perspectives and opinions of each stakeholder. Providing financial and administrative support for required surveys or studies to developers, which in the case of RE are often composed of new entrants, usually local cooperatives or small utilities that do not rely on established conventional power generation capacities and thus do not necessarily possess the capital reserves to withstand the monetary and regulatory uncertainties created through an overly complex EIA process (JFS, 2014c; JFS, 2015).

Table 10
List of Weaknesses of Individual EIA Frameworks

Japan	New Zealand	EU	US
(-) Vague screening process	(-) Very short duration limits for public involvement or opposition	(-) No mandatory scoping increases uncertainty and might lead to unnecessary procedural confusion	(-) Fractured approval landscape across state lines in absence of a uniform legal body of EIA
(-) Numerous opportunities for litigation and legal obstruction	(-) Limited legal recourse facilities	(-) No mandatory timeframes in the Directive	(-) Screening rules to determine what projects fall under federal jurisdiction are not sufficiently clear = Uncertainty
(-) Solar PV not subject to the EIA Law	(-) Short project assessment timeframes for competent review authority	(-) No one-stop shop obligation	(-) Federal process length at times overly extended with elevated risk of legal opposition
(-) Absence of one-stop approach or dedicated authority	(-) Does not automatically apply to all LS-RE projects, although most of them do qualify	(-) Application of EIA guidelines merely voluntary	(-) Some state processes very lengthy in absence of uniform rules (devolved county competences)
(-) Manifold competence fracturing between ministries, national and local governments		(-) Opting for a Directive instead of a Regulation leads to legal fracturing	(-) Absence of one-stop shop approach in most states and on the federal level
(-) Long procedural timeframes, increasing cost and complexity		(-) TEN-E Regulation not applied to RE generation projects, only to transboundary transmission and storage	
		(-) Risk of increased costs (e.g. experts, monitoring, public distribution)	

With these EIA streamlining fundamentals in mind and drawing inspiration from the previous and ongoing reform efforts in these territories, the following section will present a proposal for Japan that does deviate slightly from the one proposed by the MOEJ (see Fig. 10).

5.2. Proposed National Streamlined EIA Framework for Japan

As illustrated in Fig. 20., this proposal aims at achieving a high degree of efficiency for potential developers without neglecting the concerns of local stakeholders who often do find themselves confronted with serious socio-environmental and economic drawbacks from the expansion of LS-RE projects.

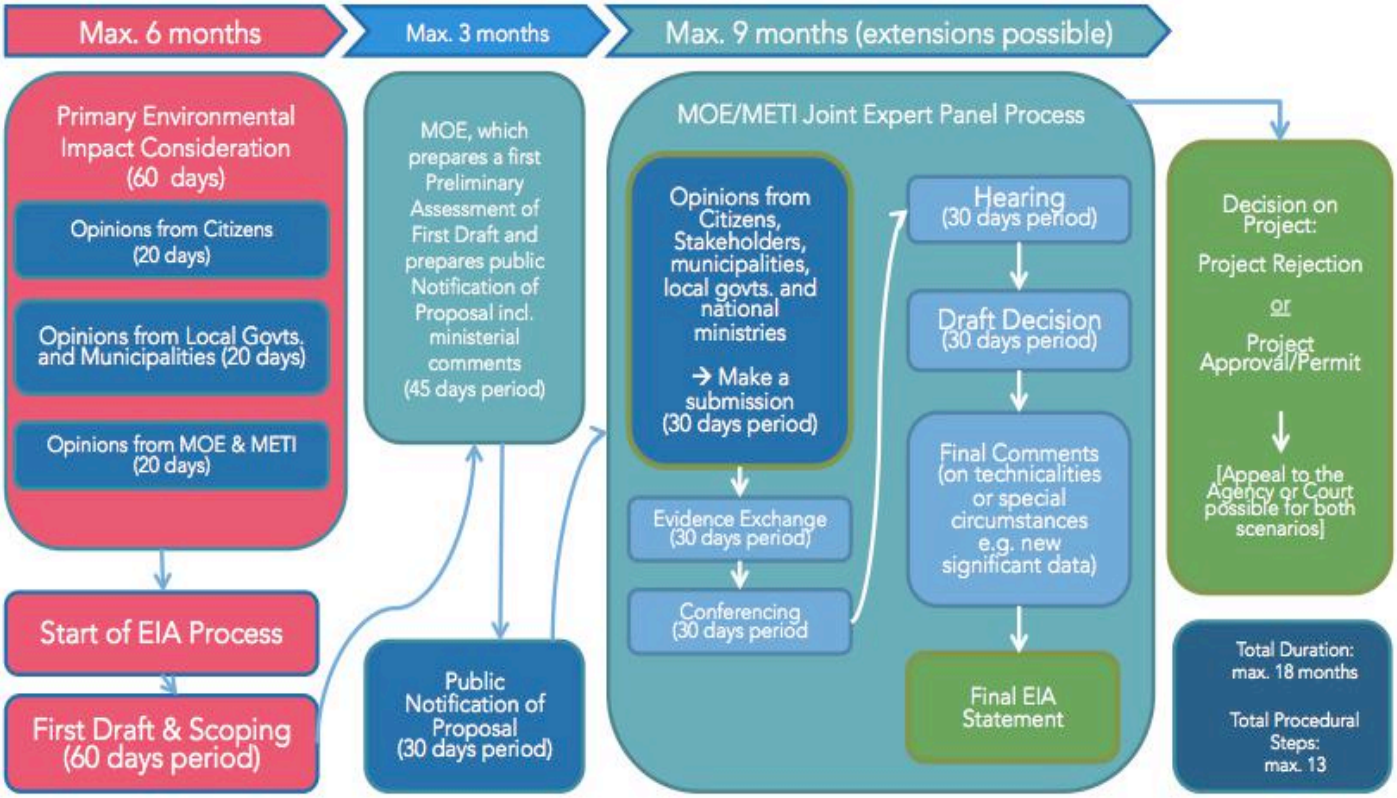

Fig. 20. Streamlined Japanese EIA Framework Proposal

Uncertainty being one of the most dissuasive factors for prospective developers, mandatory timeframes do represent indispensable in providing stability throughout the EIA process for both proponents as well as examiners and civil society members. SEA considerations being useful in outlining prior points of contention, an integrated yet shortened PEIC can already give each involved party sufficient information about the project's likely obstacles. Once the PEIC period of two months has passed, the official EIA process should start, with the first

step being mandatory scoping, a tool that eliminates misunderstandings with regards to the necessary documents, survey data or public inclusion outlets.

One-stop shop approaches with dedicated EIA agencies being the ideal, however unlikely in Japan with strict competence division between several ministries and local authorities, creating a joint process with members from each ministry could facilitate the overall process and reduce administrative backtracking to a minimum. This integrated panel process in combination with several fixed public participation opportunities, could reduce the overall duration by half, similar to the project currently considered by the MOEJ (Uesako, 2013). This proposal does deviate from the MOEJ proposal in that it, albeit offering an identical overall review time reduction, creates an integrated review panel composed of members from all of the potentially involved government ministries such as METI, MAFF and the MOEJ, thus avoiding the obligation for developers to interact with several review bodies. Although not representing perfect one-stop approach, it does reduce the overall interaction requirements with authorities for developers.

In contrast to the NZEPA board of inquiry process open to all projects considered to be of "National Significance", including roads or train lines among others, this streamlined EIA framework would develop its full potential if initially being earmarked for RE projects only, with potential ulterior extensions to environmentally beneficial projects in general, most notably those expressively contributing to the fulfillment of international commitments under the COP21 Climate Change agreement or the UN Sustainable Development Goals (Cronwright et al., 2011a; 2011b). The EU TEN-E Regulation could serve as an inspiration in terms of earmarking, the latter being limited exclusively to transboundary energy transmission and storage projects only, henceforth having created an additional incentive for developers in EU members states to pursue this kind of venture, previously often considered complex and administratively prohibitive and thus unattractive from an investor point of view (EC, 2015d).

Japan already created kind of an outlier with a recent proposal regarding the streamlining of EIAs for power plant replacement activities, albeit this proposal has so far only been intended for conventional thermal power plants in anticipation of future carbon emission reductions from substituting outdated and inefficient power plants with newer thermal power generation technologies (Uesako, 2013). Adapting and extending this novel approach to RE power plants and later on progressively reserving this streamlined EIA process solely for strictly renewable

sources of energy generation would provide a rapidly implementable, since limited to only certain project types, and non-financial incentive, thus avoiding additional pressures on the national or regional budgets (EC, 2013; Lake and Targ, 2013; Uhlmann, 2015).

5.3. Methodological Limitations and Future Research Considerations

The results presented throughout the previous chapters offered insight into some of the aspects and provisions of EIA frameworks that do potentially adversely impact RE development. It still needs to be noted that the used mixed-methodology approach consisting of literary and legal reviews, semi-structured expert interviews, partial quantitative and qualitative data analyses, still does possess numerous limitations, both in terms of methodology and data. In light of these drawbacks, further research will be required in order to sort out some of the inconsistencies and limited scope of the used data sets. This would not only increase the level of contextual accuracy and by extension relevance, it could also expand the overall impact by establishing an even stronger correlation between EIA frameworks and RE development. This could reinvigorate reform efforts with the OECD and beyond and provide a serviceable tool to RE proponents in the fight against global warming without compromising the need for counterbalancing localized social-environmental concerns. Hereafter will be an outline of some of the elements that could or should be included in future research projects involving the four observed territories.

5.3.1. Japan

One of the main limitations for Japan was the generally difficult or restricted access to reliable data for RE project-related EIAs, due fractured development procedures and widespread reluctance of both developers and utilities to provide comprehensive datasets or case study information. Creating new inroads top more complete data sets or the creation of own empirical findings through fieldwork efforts will be crucial in the future. Potential collaborations with Japanese research institutes could partially offset these limitations.

With concrete proposals from the government side being sparse, this represents another area the will could be further assessed in the future, given recent policy changes after COP21

climate change summit and before upcoming full liberalization of the electricity market with the complete unbundling of generation, transmission and distribution operations. The creation of additional empirical analyses integrating the policy and regulatory developments could provide a more complete picture of the proportional influence of EIA in contrast to other factors. Especially the latter is of high interest, given the potential correlation between the liberalization and pre-emptive RE development. This empirical analysis should take into account how local government EIAs differ from region to region and if observed variances in RE development levels can be partially attributed to differences in each regulatory framework.

5.3.2. New Zealand

As data for RE developments in New Zealand is in the public domain and easily accessible, the major limitation for this territory was the absence of any completed project consent applications after the full implementation of the streamlining amendments EPAA 2011 and RMAA 2013. According to the NZ EPA, no conclusive data is currently available since no RE projects are momentarily planned or eligible for expedited NZEPA approval process. Once new applications will be launched in the future, observing how the projects will fare under the new approval procedural framework will provide further data and evidence if these projects do get approved without major opposition or if such profound streamlining approach does compromise environmental protection by threatening or harming local ecosystems in proximity of RE project development sites.

5.3.3. European Union

In case of the EU, large parts of the analysis were confined to a simple investigation on the main provisions contained within the reformed Directive. However, the impact after member state implementation past the May 2017 deadline will be an equally important research topic, given the fact that member states' EIA frameworks will likely diverge significantly from each other, thus an empirical analysis using updated data on RE barriers (latest available: July 2010) and RE capacity additions, similar to the one performed for the United States, could provide a more clear picture of the potential interrelations between both variables. To complement this empirical study and RE project data being fractured between member states, the creation of novel EU project database with comparable indicators could serve as the

foundation a subsequent series of empirical studies.

Next, using a few member states as representative territories for the entire EU EIA reform process will facilitate more efficient and comprehensive qualitative comparison with other non-federal national entities. Finally, a more pronounced expert opinion balance for future semi-structured interviews or additional stakeholder surveys could increase the level of accuracy in terms of reliable stakeholder data for qualitative data analysis purposes.

5.3.4. United States

The relatively small sample size of 50 states did limit the observations to a maximum of 50 for any regression. Therefore, using panel data is preferable to cross-sectional data, in addition to more refined methods such as beta regressions. Limiting any future empirical analysis to only the independent variables of WES and WEG will only reflect WE development to a certain degree, therefore including capacity additions in the future as an independent variable will eliminate statistical bias towards certain functionally limited variables. Finally, not having included some fundamental influencing factors such as transmission network capacities and grid connection procedures for distributed RE generation, there a substantial risk of having obtained an incomplete picture in terms of statistical correlations between environmental regulations and RE development. Given some inconsistencies after having performed various estimate quality assessment tests, the additional test or statistical regression models should be applied to guarantee the functional nature of the dependent variables in future studies.

5.4. Concluding Remarks

In conclusion, it becomes apparent that environmental regulation can act both as a barrier and driver to RE development in that it does prolong the overall approval process for development consent applications, but on the other hand, it can act as mediating tool between local stakeholders and project developers, increasing public acceptance and reducing the risk of legal obstruction. EIA is represents one of the most efficient ways to address stakeholder concerns and reinforce communication and joint fact-finding in RE planning and environmental disputes. Therefore, future research should determine if the conceptual approaches of these reforms lead to increased RE growth and stakeholder satisfaction, given the small lead-up time for these reforms to show any noticeable impacts at the current stage.

Bibliography

Abbasi, T., Premalatha, M., Abbasi, T. and Abbasi, S.A., 2014, Wind energy: Increasing deployment, rising environmental concerns, Renewable and Sustainable Energy Reviews 31, 270–288

AFWA and US-FWS, 2007, Wind Power Siting, Incentives and Wildlife Guidelines in the United States, Association of Fish & Wildlife Agencies, Washington, D.C.; U.S. Fish & Wildlife Service, Washington, D.C.

AWEA, 2013b, Public lands and wind energy, American Wind Energy Association, Washington, D.C, Retrieved from http://www.awea.org/Issues/Content.aspx?ItemNumber=858 (accessed November 13, 2016)

AWEA, 2015b, Wind Energy and the PTC: Sustaining and American Success Story, American Wind Energy Association, Washington, D.C., Retrieved from http://awea.files.cms-plus.com/PTC%20White%20Final%2052115%20PDF.pdf (accessed October 16, 2016)

Azechi, K., Nishikizawa, S. and Harashina, S., 2012, EIA as a Conflict Mitigation Tool for Wind Farm Projects in Japan, Proceedings of the 32nd Annual Conference of IAIA, 27 May-1 June 2012, Porto, Portugal

Azechi, K., Nishikizawa, S., Harashina, S., 2012, EIA as a Conflict Mitigation Tool for Wind Farm Projects in Japan, *Proceedings of the 32nd Annual Conference of IAIA*, May 27-Jun. 1, 2012, Porto, Portugal

BEA, US-DOC, 2015, Broad Growth Across States in 2014: Advance 2014 and Revised 1997–2013 Statistics of GDP by State, , Bureau of Economic Analysis (BEA), U.S. Department of Commerce, Washington, D.C., Retrieved from https://www.bea.gov/newsreleases/regional/gdp_state/2015/pdf/gsp0615.pdf (accessed October 24, 2016)

BLM, 2011, 43 CFR Part 2800: Advance Notice of Proposed Rulemaking Regarding a Competitive Process for Leasing Public Lands for Solar and Wind Energy Development, Federal Register 76(250), Bureau of Land Management, Washington, D.C.

Badichek, G., 2016, Resolving Conflicts Between Endangered Species Conservation and Renewable Energy Siting: Wiggle Room for Renewables?, Environmental Claims Journal 28(2), 163-184

Barradale, M.J., 2010, Impact of public policy uncertainty on renewable energy investment: Wind power and the production tax credit, Energy Policy 38, 7698-7709

Bibbee, A. (2011), Green Growth and Climate Policies in New Zealand, *OECD Economics Department Working Papers* **No.893**, OECD Publishing

Bird, L., Bolinger, M., Gagliano, T., Wiser, R., Brown, M. and Parsons, B., 2005, Policies and

market factors driving wind power development in the United States, Energy Policy 33, 1397-1407

Bohn, C. and Lant, C., 2009, Welcoming the Wind? Determinants of Wind Power Development Among U.S. States, The Professional Geographer 61(1), 87-100

Brown, J.E., 2013, Wind power and nuisance litigation, Defense Counsel Journal 80, 313-321

Brown, J.P., Pender, J., Wiser, R., Lantz, E. and Hoen, B., 2012, Ex post analysis of economic impacts from wind power development in U.S. counties, Energy Economics 34, 1743-1754

Bryman, A., 2008. Social Research Methods. Oxford University Press, New York.

CB, US-DOC, 2010, 2010 Census of Population and Housing, Census Bureau, U.S. Department of Commerce, Washington, D.C., Retrieved from https://www.census.gov/prod/cen2010/cph-2-1.pdf (accessed October 18, 2016)

CB, US-DOC, 2016a, Census of Population and Geography, Census Bureau, U.S. Department of Commerce, Washington, D.C., Retrieved from http://www.census.gov/data.html (accessed October 26, 2016)

CB, US-DOC, 2016b, Population Estimates for 2010 and 2015, Census Bureau, U.S. Department of Commerce, Washington, D.C., Retrieved from http://www.census.gov/popest/data/national/totals/2015/index.html (accessed October 18, 2016)

CC (Clifford Chance), 2014, Briefing note: Watered-Down Revisions to EU Environmental Impact Assessment rules finalised, Retrieved from http://www.cliffordchance.com/content/dam/cliffordchance/PDFs/WateredDownRevisionsEUEIAMay%202014.pdf (accessed June 22, 2016)

CEQ, 2016, States and Local Jurisdictions with NEPA-like Environmental Planning Requirements, Council on Environmental Quality, Washington, D.C., Retrieved from https://ceq.doe.gov/state_information/states.html (accessed October 18, 2016)

Carley, S., 2009, State renewable energy electricity policies: an empirical evaluation of effectiveness, Energy Policy 37, 3071–3081

Chen, W-M., Kim, H., Yamaguchi, H., 2014, Renewable energy in eastern Asia: Renewable energy policy review and comparative SWOPT analysis for promoting renewable energy in Japan, South Korea and Taiwan, *Energy Policy* **74**, 319-329

Cheyne, C., 2013, New Zealand's environmental approvals: best in the world?, Available at (http://theconversation.com/new-zealands-environmental-approvals-best-in-the-world-19434) (accessed October 23, 2016)

Ciobanu-Dordea, A., European Commission (EC), 2014, Revision of EIA Directive, Retrieved from http://www.eufje.org/images/docConf/bud2014/pres11%20bud2014.pdf (accessed August 14, 2016)

Clement, M., EU Forum of Judges for the Environment (EUFJE), 2014, Report on France: Impact Assessments - Preventive Measures against Significant Environmental Impacts in the 21st Century, Retrieved from http://eufje.org/images/docConf/bud2014/FR%20bud2014.pdf (accessed August 24, 2016)

Cox, S., Tegen, S., Baring-Gould, I., Oteri, F.A., Esterly, S., Forsyth, T. and Baranowski, R., 2015, Policies to Support Wind Power Deployment: Key Considerations and Good Practices, Clean Solutions Center, U.S. Department of Energy, Washington, D.C.

Cronwright, S., Linzey, A. and Vince, J., Transport Agency, New Zealand (NZTA) (2011a), The New Consenting Process for Projects of National Significance: A shift in consciousness for planning practice?, Available at (https://www.planning.org.nz/Folder?Action=View%20File&Folder_id=218&File=CRONWRIGHT_LINZEY_VINCE_2011.pdf) (accessed July 24, 2016)

Cronwright, S., Linzey, A. and Vince, J., Transport Agency, New Zealand (NZTA) (2011b), The New Consenting Process for Projects of National Significance: A shift in consciousness for planning practices?, Available at (http://www.planning.org.nz/Folder?Action=View%20File&Folder_id=217&File=CRONWRIGHT_LINZEY_VINCE_2011.pdf) (accessed July 24, 2016)

Del Río, P. and Tarancón, M.-A., 2012, Analysing the determinants of on-shore wind capacity additions in the EU: An econometric study, Applied Energy 95, 12–21

Delmas, M.A. and Montes-Sancho, M.J., 2011, U.S. state policies for renewable energy: Context and effectiveness, Energy Policy 39, 2273-2288

Demizu, S., Standard Examiner, 2016, Japan steps up efforts to protect birds from wind turbines, Retrieved from http://www.standard.net/World/2016/09/18/Japan-steps-up-efforts-to-protect-birds-from-wind-turbines.html (accessed August 7, 2016)

Dinnell, A.M. and Russ, A.J., 2007, Legal Hurdles to Developing Wind Power as an Alternative Energy Source in the United States: Creative and Comparative Solutions, Northwestern Journal of International Law & Business 27(3), 535-590

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

Doole, B., 2013, Fast-track device faces court test, Marlboro Express, Available at (http://www.stuff.co.nz/marlborough-express/opinion/9415929/Fast-track-device-faces-court-test) (accessed November 22, 2016)

Doris, E. and Gelman, R., 2011, State of the States 2010: The Role of Policy in Clean Energy Market Transformation, National Renewable Energy Laboratory, Golden, CO.

EC (European Commission), 2009, Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: On the application and effectiveness of the EIA Directive (Directive 85/337/EEC, as amended by Directives 97/11/EC and 2003/35/EC), Available at

(http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009DC0378&from=EN) (accessed July 6, 2016)

EC, 2011, Permit granting procedures for energy infrastructure projects, European Commission, Brussels, Belgium, Retrieved from, Retrieved from https://ec.europa.eu/energy/sites/ener/files/documents/20110430_infrastructure_summary.pdf (accessed August 24, 2016)

EC, 2012, Proposal for a Directive of the European Parliament and the Council amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects of the environment, Retrieved from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012PC0628&from=EN (accessed July 6, 2016)

EC, 2013, Streamlining environmental assessment procedures for energy infrastructure Projects of Common Interest (PCIs), Retrieved from http://ec.europa.eu/environment/eia/pdf/PCI_guidance.pdf (accessed July 6, 2016)

EC, 2015a, Environment Council approves the EU's intended nationally determined contribution to the new global climate agreement, European Commission, Brussels, Belgium, Retrieved from http://ec.europa.eu/clima/news/articles/news_2015030601_en (accessed August 7, 2016)

EC, 2015b, Europe's renewable energy success on show at COP21, European Commission, Brussels, Belgium, Retrieved from https://ec.europa.eu/energy/en/news/europes-renewable-energy-success-show-cop21 (accessed August 7, 2016)

EC, 2015c, Interpretation of definitions of projects categories of annex I and II of the EIA Directive, Retrieved from http://ec.europa.eu/environment/eia/pdf/cover_2015.pdf (accessed July 6, 2016)

EC, 2015d, Implementing the Projects of Common Interest; Regulation on guidelines for trans-European energy infrastructure & Connecting Europe Facility, Available at (http://www.ecologic.eu/sites/files/event/2014/01_viksne.pdf) (accessed August 23, 2016)

Eccles, G., Gardner, S. and Clafferty, J., Environmental Protection Authority, New Zealand (NZEPA), 2011, The EPA Process – making 9 months work – the Tauhara II experience, Available at (http://www.planning.org.nz/Folder?Action=View%20File&Folder_id=217&File=ECCLES_GARDNER_CLAFFERTY_2011.pdf) (accessed July 24, 2016)

EPA, 2012, Public Participation: Environmental Impact Assessment (EIA) in the United States, Environmental Protection Agency, Washington, D.C., Retrieved from https://www.epa.gov/sites/production/files/2014-05/documents/us-eia-experience.pdf (accessed 6.11.2016)

ERM (Environmental Resources Management), 2013, Introduction to Environmental Impact Assessment (EIA) and Capacity Development in Japan, Retrieved from http://www.aecen.org/sites/default/files/131209introduction_to_eia_rev._maruayma.pdf (accessed 16.04.2016)

EUFJE (EU Forum of Judges for the Environment), 2014, Report on the United Kingdom: Impact Assessments - Preventive Measures against Significant Environmental Impacts in the 21st Century, Retrieved from http://eufje.org/images/docConf/bud2014/UK%20bud2014.pdf (accessed August 24, 2016)

Environmental Protection Authority, New Zealand (NZEPA), 2013, What makes a proposal nationally significant?, Available at (http://www.epa.govt.nz/Publications/EPA_Fact_Sheet_What_makes_a_proposal_nationally_significant.pdf) (last accessed June 15, 2016)

FEPC (The Federation of Electric Power Companies of Japan), 2014, Electricity Review Japan, Available at (http://www.fepc.or.jp/library/pamphlet/pdf/2014ERJ_full.pdf) (accessed August 7, 2016)

Fischlein, M., Feldpaush-Parker, A.M., Peterson, T.R., Stephens J.C. and Wilson, E.J., 2014, Which Way Does the Wind Blow? Analyzing the State Context for Renewable Energy Deployment in the United States, Environmental Policy and Governance 24, 169-187

Fischlein, M., Wilson, E.J, Peterson, T.R. and Stephens, J.C., 2013, States of transmission: Moving towards large-scale wind power, Energy Policy 56, 101–113

Galás, S., Galás, A., Zelenáková, M., Zvijáková, L., Fialová, K. and Kubícková, H., 2015, Environmental Impact Assessment in the Visegrad Group countries, Environmental Impact Assessment Review 55, 11-20

Geißler, G, Köppel, J. and Gunther, P., 2013, Wind energy and environmental assessments: A hard look at two forerunners' approaches: Germany and the United States, Renewable Energy 51, 71-78

Geißler, G., Köppel, J. and Gunther, P., 2013, Wind energy and environmental assessments - A hard look at forerunners' approaches: Germany and the United States, Renewable Energy 51, 71-78

Glen, A. M., Barho, R.D. and Evans, L.M., 2013, How federal wildlife laws impact development of wind energy, Trends 44(4), 14-17

Governing, 2011, State-to-State Population Migration, Retrieved from http://www.governing.com/gov-data/census/2010-census-state-migration-statistics.html (accessed October 18, 2016)

Governing, 2015, State Migration Rates - Net Totals: 2010-2015, Retrieved from http://www.governing.com/gov-data/census/state-migration-rates-annual-net-migration-by-state.html (accessed October 27, 2016)

Guidance 2016/C 273/0 - Commission guidance document on streamlining environmental assessments conducted under Article 2(3) of the Environmental Impact Assessment Directive (Directive 2011/92/EU of the European Parliament and of the Council, as amended by Directive 2014/52/EU)

Haarscher, A., Bruner, M., Doblas, J., Fargere, A., Ashley, S.F. and Nuttall, William, 2014,

The Japanese Electricity System 15 months After March 11th 2011, Cambridge Working Papers in Economics 1443, Retrieved from http://www.econ.cam.ac.uk/research/repec/cam/pdf/CWPE1443.pdf) (accessed July 10, 2016)

Hayashi, K., 2008, How to Improve Japanese EIA legislation by Utilizing International Experience, IAIA'08 Conference Proceedings, 28th Annual Conference of the International Association of Impact assessment, 4-10 May 2008, Perth, Australia

Hitaj, C., 2013, Wind power development in the United States, Journal of Environmental Economics and Management 65, 394-410

Hoffman, N.R., 2011, A Don Quixote tale of modern renewable energy: Counties and municipalities fight to ban commercial wind power across the United States, University of Missouri - Kansas City Law Review 79(3), 717-739

IEA (International Energy Agency), 2015, Renewables Information 2015, OECD/IEA, Paris, France.

IEA, 2011, Energy Policies of IEA Countries: New Zealand 2010 Review, OECD/IEA, Paris

IEA, 2013, Key World Energy Statistics, OECD/IEA, Paris

IEA, 2016, Energy Technology Perspectives: Towards Sustainable Urban Energy Systems, International Energy Agency, Paris, France.

IPCC, 2014, Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, In Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, K., Adler, A., Baum, I., Brunner, S., Eickemeier, P., Kriemann, B., Savolainen, J., Schlömer, S., Von Stechow, C., Zwickel, T. and Minx, J.C. (Eds.), Cambridge University Press, Cambridge, United Kingdom and New York, NY.

Iberdrola Renewables, 2015, Iberdrola Renewables Files Potential Wind Power Agreement with Green Mountain Power, Retrieved from https://s3-us-west-2.amazonaws.com/iberdrola-pdfs/pdf/rel_15.07.02.pdf (accessed October 18, 2016)

Inagaki, K., 2014, Weak yen divisive for Abe ahead of Japanese election, *Financial Times*, Available at (http://www.ft.com/cms/s/0/5163bc30-8115-11e4-896c-00144feabdc0.html#axzz3Q9PsKyvo) (accessed December 4, 2016)

Institute for Global Environmental Strategies (IGES), 2012, Innovative Strategy for Energy and the Environment, Available at (http://www.iges.or.jp/jp/archive/cp/pdf/activity20121018/01_Tsukamoto.pdf) (accessed June 17, 2016)

Institute for Sustainable Energy Policies (ISEP), 2016, Renewables 2016 Japan Status Report, Summary, Retrieved from http://www.isep.or.jp/en/wp/wp-content/uploads/2016/10/JSR2016Summary-EN.pdf (accessed December 4, 2016)

Ito, T., Ministry of Environment, Japan (MOEJ), 2014, Current Situation for EIA in Japan,

Available at (http://www.aecen.org/sites/default/files/5_overview_of_ the_eia_implementation_in_japan_.pdf) (accessed January 4, 2016)

Iwata, M., 2014, Japan Nuclear Reactors Approved For Restart: Prefecture's Approval a Win for Prime Minister Shinzo Abe's Government, *The Wall Street Journal*, Available at (http://www.wsj.com/articles/japan-nuclear-reactors-approved-for-restart-1415356593) (accessed on November 7, 2016)

JFS (Japan for Sustainability), 2016, Japan's Environment Ministry Announces Proposals for Reducing GHG Emissions, Retrieved from http://www.japanfs.org/en/news/archives/news_id035628.html (accessed August 7, 2016)

JFS, 2013, Renewable Energy in Japan – Current Trends Show Promise and Opportunities, Retrieved from http://www.japanfs.org/en/news/archives/news_id034505.html (accessed June 24, 2016)

JFS, 2014a, Hot Springs Power Generation to Start at Disaster Evacuation Facility in Japanese Resort Town, Retrieved from http://www.japanfs.org/en/news/archives/news_id035012.html (accessed June 24, 2016)

JFS, 2014b, Japanese Ministry Decides to Support Three Geothermal Projects, Retrieved from http://www.japanfs.org/en/news/archives/news_id034707.html (accessed June 24, 2016)

JFS, 2014c, Community and Locally-led Renewable Energy Projects Highlighted in Renewables Japan Status Report 2014, Available at (http://www.japanfs.org/en/news/archives/news_id035048.html) (accessed June 24, 2016)

JFS, 2014d, New Renewable Energy Law to Allow Conversion of Farmland in Japan to Wind Farms, Retrieved from http://www.japanfs.org/en/news/archives/news_id034849.html (accessed August 5, 2016)

JFS, 2015, The challenges Facing Full-Scale Renewable Energy Development and Expectations of Electricity System Reform (Part 1), Available at (http://www.japanfs.org/en/news/archives/news_id035315.html) (accessed July 29, 2016)

JT (The Japan Times), 2015, Japan, South Korea stick to coal plant policies despite global climate deal, Retrieved from http://www.japantimes.co.jp/news/2015/12/16/national/science-health/japan-south-korea-stick-coal-plant-policies-despite-global-climate-deal/#.WEI8X5KfPXs (accessed August 24, 2016)

JWPA (Japan Wind Power Association), 2014, Wind Power Energy Resources and Mid/Long Term Target (V4.3), Available at (http://jwpa.jp/pdf/20140729_GRE2014_00995_TargetRoadmapforJapaneseWindpower.pdf) (accessed December 4, 2016)

Johnston, E. and Yoshida, R., The Japan Times, 2015, In major victory for nuclear industry, first reactor goes online under post-Fukushima regime, Retrieved from http://www.japantimes.co.jp/news/2015/08/11/national/kagoshima-reactor-restarted-first-go-online-post-fukushima-regime/#.VcnVzbePJ4t) (accessed August 11, 2016)

Jones, C.R., Orr, B.J. and Eiser, R., 2011, When is enough, enough? Identifying predictors of capacity estimates for onshore wind-power development in a region of the UK, Energy Policy 39, 4563-4577

Jupesta, J., Suwa, A., Govindan P., 2013, Stakeholder Analysis on Geothermal Development: A Case Study in Japan, *Proceedings of the Earth System Governance Tokyo Conference*, Jan. 28-31, 2013, Tokyo, Japan

KYODO, 2014, Abe tightens grip on power as ruling coalition wins 325 seats in Lower House election: Ruling bloc captures two-thirds supermajority, capitalizing on opposition chaos, *The Japan Times*, Available at (http://www.japantimes.co.jp/news/2014/12/15/national/politics-diplomacy/abes-snap-election-pays-big-win/#.VKfxS6bG0ys) (accessed December 5, 2016)

Katori, K., The Asahi Shimbun, 2015, Ministry to allow drilling in national parks to gain geothermal power, Retrieved from http://ajw.asahi.com/article/behind_news/social_affairs/AJ201507310037 (accessed August 11, 2016)

Kelly, G., 2011, History and potential of renewable energy development in New Zealand, *Renewable and Sustainable Energy Reviews* **15**, 2501-2509

Kotsubo, Y. and Takeuchi, K., 2013, Japan's feed-in-tariff system for clean energy mired in regulations, Retrieved from http://ajw.asahi.com/article/sci_tech/environment/AJ201305220009 (accessed July 27, 2016)

Kowalski, K.M., Midwestern Energy News, 2014, Industry: Setback changes will end new wind farms in Ohio, Retrieved from http://midwestenergynews.com/2014/06/19/industry-setback-changes-will-end-new-wind-farms-in-ohio/ (accessed 18.10.2016)

Krumdieck, S. (2009), Editorial: New Zealand energy strategy - Introduction to the energy policy special issue, *Energy Policy* **37**, 3297-3300

Lake, E.A. and Targ, N.W., Holland & Knight LLP, 2013, Federal Efficiency/Streamlining: CEQ Issues New NEPA Guidance Documents, Available at (http://www.hklaw.com/publications/Federal-EfficiencyStreamlining-CEQ-Issues-New-NEPA-Guidance-Documents-03-19-2013/) (accessed August 7, 2016)

Leaver, L., Gerritsen, M., Archer, C. and Archer R., 2009, Wind Energy Resource Assessment and Turbine Optimization in New Zealand, Available at (https://pangea.stanford.edu/ERE/pdf/pereports/MS/Leaver09.pdf) (accessed November 9, 2016)

Lownes, V., Deloitte, 2016, Transposing the amended EIA Directive – preparing for change, Retrieved from http://blogs.deloitte.co.uk/realestate/2016/02/transposing-the-amended-eia-directive.html?utm_source=Mondaq&utm_medium=syndication&utm_campaign=View-Original (accessed August 24, 2016)

Lu, X., Tchou, J., McElroy, M.B. and Nielsen, C.P., 2011, The impact of Production Tax

Credits on the profitable production of electricity from wind in the U.S., Energy Policy 39, 4207-4214

Lüthi, S. and Prässler, T., 2011, Analyzing policy support instruments and regulatory risk factors for wind energy deployment—A developers' perspective, Energy Policy 39, 4876-4892

METI (Ministry of Economy, Trade and Industry, Japan), 2015, Long-term Energy Supply and Demand Outlook Subcommittee Report: Power Generation Cost Evaluation [Translated from Japanese Original], Retrieved from http://www.enecho.meti.go.jp/committee/council/basic_policy_subcommittee/mitoshi/cost_wg/007/pdf/007_05.pdf (accessed August 24, 2016)

METI, 2014a, *Strategic Energy Plan April 2014*, METI, Tokyo, Available at (http://www.enecho.meti.go.jp/en/category/others/basic_plan/pdf/4th_strategic_energy_plan.pdf) (accessed December 5, 2016)

METI, 2014b, Electricity Market Reform in Japan, Available at (http://www.meti.go.jp/english/policy/energy_environment/electricity_system_reform/pdf/201410EMR_in_Japan.pdf) (accessed December 5, 2016)

METI, 2016a, White Paper on Energy 2016: Chapter 3 - Transformation of Energy Policy Based on the Paris Agreement: Section 2 - Energy policy to realize balance between environmental constraints and growth ~ Energy innovation strategy ~ [Translated from Japanese Original], Retrieved from http://www.enecho.meti.go.jp/about/whitepaper/2016html/1-3-2.html (accessed August 29, 2016)

METI, 2016b, The Sites selection Project for Wind Power Plants initiated by regional communities Retrieved from http://www.env.go.jp/policy/assess/7-1asiaeia2016_pdf/asiaeiaconference2016-g7.pdf (accessed August 30, 2016)

MOEJ (Ministry of Environment Japan), 2012a, Environmental Impact Assessment in Japan, Retrieved from http://www.env.go.jp/policy/assess/1-3outline/img/pamph_e.pdf (accessed July 14, 2016)

MOEJ, 2012b, Environmental Impact Assessment in Japan, Available at (http://www.env.go.jp/policy/assess/1-3outline/img/pamph_e.pdf) (accessed September 14, 2016)

MOEJ, 2012c, Towards a Smooth Implementation of Environmental Assessment for Wind Power Generation Projects [Translated from Japanese Original], Retrieved from http://www.env.go.jp/policy/assess/4-7windpower/jigyo.pdf (accessed August 23, 2016)

MOEJ, 2013, Shortening the Assessment Process for Thermal Power Plant Replacements [Translated from Japanese Original], Retrieved from http://www.env.go.jp/policy/assess/5-7expedite/no121130301b.pdf (accessed August 24, 2016)

MOEJ, 2015, National Park Systems: Park Plans, Retrieved from http://www.env.go.jp/en/nature/nps/park/system/keikaku.html (accessed August 11, 2016)

MOEJ, 2016, The Basic Environment Law - Outline, retrieved from https://www.env.go.jp/en/laws/policy/basic/leaflet2.html (accessed October 7, 2016)

Malewitz, J., Texas Tribune, 2013, $7 Billion CREZ Project Nears Finish, Aiding Wind Power, Retrieved from https://www.texastribune.org/2013/10/14/7-billion-crez-project-nears-finish-aiding-wind-po/ (accessed October 18, 2016)

Milhaupt, C.J., Ramseyer, J.M., West, M.D., 2012, "The Japanese Legal System: Cases, Codes and Commentary", Foundation Press, New York, 2nd edition, 2012

Mizuno, E., 2014, Overview of wind energy policy and development in Japan, *Renewable and Sustainable Energy Review* **40**, 999-1018

Montz, B.E., 1993, From Law to Practice: EIA in New Zealand, *Environmental Impact Assessment Review* **13**, 89-108

Morris, A., Owley, J. and Capello, E., 2014, Green Siting for Green Energy, George Washington University Journal of Environmental Law 5, 17-29

Mulvaney, K.K., Woodson, P. and Prokopy, L.S., 2013, A tale of three counties: Understanding wind development in the rural Midwestern United States, Energy Policy 56, 322–330

NRDC, 2014, NRDC Summary of EPA's Clean Power Plan: Carbon Pollution Standards for Existing Power Plants, National Resources Defense Council, New York City, NY.

NREL and AWS Truepower, 2011, Estimates of Windy Land Area and Wind Energy Potential, by State, for areas >=30% Capacity Factor at 80m, National Renewable Energy Laboratory, Boulder, CO., Retrieved from http://apps2.eere.energy.gov/wind/windexchange/pdfs/wind_maps/wind_potential_80m_30percent.pdf (accessed October 22, 2016)

NREL, 2014, Realizing Clean Energy's Potential: Lesson Learned in the U.S. West, National Renewable Energy Laboratory, Golden, CO.

NZEPA, 2013, What makes a proposal nationally significant?, <http://www.epa.govt.nz/Publications/EPA_Fact_Sheet_What_makes_a_proposal_nationally_significant.pdf> (accessed June 4, 2016)

NZGA (New Zealand Geothermal Association), 2014, Geothermal Energy Development Potential, Available at (http://www.nzgeothermal.org.nz/geo_potential.html) (accessed December 2, 2016)

NZMOE (Ministry for the Environment, New Zealand), 2007, *Environment New Zealand 2007: Summary*, Available at (http://mfe.govt.nz/publications/ser/enz07-summary-dec07/enz07-summary-dec-07.pdf) (accessed September 17, 2016)

NZMOE, 2009a, A Guide to Preparing a Basic Assessment of Environmental Effects, Available at (http://www.mfe.govt.nz/publications/rma/aee-guide-aug06/aee-guide-aug06.pdf) (accessed August 20, 2016)

NZMOE, 2009b, Applying for a Resource Consent, Available at (http://www.mfe.govt.nz/publications/rma/everyday/consent-apply/applying-resource-consent.pdf) (accessed October 14, 2016)

NZMOE, 2011, Turitea Wind Farm Proposal: Final Report and Decision, Available at (http://www.mfe.govt.nz/rma/call-in-turitea/final-report/) (accessed July 5, 2016)

NZMOE, 2013a, Changes to the resource consent process - Fact sheet 2, http://www.mfe.govt.nz/sites/default/files/media/RMA/factsheet-2.pdf (accessed June 4, 2016)

NZMOE, 2013b, Proposals of National Significance: Historic Call ins, Available at (http://www.mfe.govt.nz/rma/proposals-national-significance/historic-call-ins) (accessed September 8, 2016)

NZMOE, 2014, About Proposals of National Significance, Available at (http://www.mfe.govt.nz/rma/proposals-national-significance/about-proposals-national-significance) (accessed October 14, 2016)

NZWEA (New Zealand Wind Energy Association), 2013, Submission by the New Zealand Wind Energy Association on: Towards better local regulation, Draft Report, Available at (http://www.productivity.govt.nz/sites/default/files/DR090%20-%20New%20Zealand%20Wind%20Energy%20Association%20-%20Submission.pdf) (accessed November 19, 2016)

Nagano, Y., 2012, Geothermal Power Tests Tradition in Japan, *The New York Times*, Available at (http://www.nytimes.com/2012/10/02/business/energy-environment/geothermal-power-tests-tradition-in-japan.html?pagewanted=all&_r=0) (accessed November 12, 2016)

Nagata, K., Yoshida, R., 2014, Sendai nuclear plant get first restart OK, The Japan Times, Available at (http://www.japantimes.co.jp/news/2014/07/16/national/sendai-reactors-get-regulators-ok-restart-first-since-fukushima/#.U9e9Dkjiohg) (accessed October 16, 2016)

Nishikizawa, S., Mitani, T. and Murayama, T., 2013, Perception and Annoyance Related to Environmental Impacts of Coastal Wind Farms in Japan, Proceedings of the 33rd Annual Conference of IAIA, 13-16 May 2013, Calgary, Canada

OECD, 2015, Overcoming Barriers to International Investment in Clean Energy, Organization for Economic Cooperation and Development, Paris, France

Okamoto, T., 2001, The Reorganization of the Electric Power Industry. In: Nakayama S., Goto, K. and Yoshioka, H. (Eds.), *A Social History of Science and Technology in Contemporary Japan: Volume 1, The Occupation Period 1945-1952*, Trans Pacific Press, Melbourne, 2001, pp. 319-352

Okamoto, T., 2005, The Reconstruction of the Electric Power Industry. In: Nakayama S., Goto, K. and Yoshioka, H. (Eds.), *A Social History of Science and Technology in Contemporary Japan: Volume 2, Road to Self-Reliance 1952-1959*, Trans Pacific Press,

Melbourne, 2005, pp. 414-453

Ong, S., Campbell, C., Denholm, P., Margolis, R. and Heath, G., 2013, Land-Use Requirements for Solar Power Plants in the United States, National Renewable Energy Laboratory, Golden, CO.

Ottinger, G., Hargrave, T.J. and Hopson, E., 2014, Procedural justice in wind facility siting: Recommendations for state-led siting processes, Energy Policy 65, 662–669

Panarella, S.J., 2014, For the birds: Wind energy, dead eagles, and unwelcome surprises, Hastings West & Northwest Journal of Environmental Law and Policy 20(1), 3-50

Petrova, M.A., 2013, NIMBYism revisited: Public acceptance of wind energy in the United States, Wiley Interdisciplinary Reviews Climate Change 4, 575-601

Philipp, R. and Sangenstedt, C., EU Forum of Judges for the Environment (EUFJE), 2014, Report on Germany: Impact Assessments - Preventive Measures against Significant Environmental Impacts in the 21st Century, Retrieved from http://eufje.org/images/docConf/bud2014/DE%20bud2014.pdf (accessed August 24, 2016)

RTE, 2016, Court hears challenge to Tipperary wind farm plan, Retrieved from http://www.rte.ie/news/ireland/2016/0303/772407-tipperary-wind-farm/ (accessed August 24, 2016)

Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 Text with EEA relevance

SG (The Sofia Globe), 2016, European Court of Justice finds against Bulgaria in Kaliakra conservation case, Retrieved from http://sofiaglobe.com/2016/01/14/european-court-of-justice-finds-against-bulgaria-in-kaliakra-conservation-case/ (last accessed August 24, 2016)

Schmalensee, R., 2009, Renewable electricity generation in the US, MIT-CEEPR, Cambridge, MA, Retrieved from http://ceepr.mit.edu/files/papers/2009-017.pdf (accessed October 18, 2016)

Schumacher, K., 2015, Comparative Analysis of the Environmental Impact Assessment Procedures of Japan and New Zealand, The International Journal of Sustainability Policy and Practice 11(2), 11-21

Shibata, Y. and Irie, S., 2013, Actual Conditions of EIA Review Committees in Japan, Proceedings of the 33rd Annual Conference of IAIA, 13-16 May 2013, Calgary, Canada

Shibata, Y., Tsukimura, Y. and Takemae, Y., 2015, SEA approaches for Geothermal Development in Japan and New Zealand: Comparison of Development Process, Proceedings of the 35th Annual Conference of IAIA, 20-23 April 2015, Florence, Italy

Shrimali, G. and Kniefel, J., 2011, Are government policies effective in promoting deployment of renewable electricity resources?, Energy Policy 39, 4726-4741

Sive, D. and Chertok, M.A., 2005, “Little NEPAs” and their Environmental Impact Assessment Procedures, ALI-ABA: Environmental Litigation, Retrieved from www.sprlaw.com/pdf/spr_little_nepa_ali_aba_0605.pdf (accessed October 18, 2016)

Slattery, M.C., Lantz, E. and Johnson, B.L., 2011, State and local economic impacts from wind energy projects: Texas case study, Energy Policy 39, 7930–7940

Slattery, M.C., Johnson, B.L., Swofford, J.A. and Pasqualettu, M.J., 2012, The predominance of economic development in the support for large-scale wind farms in the U.S. Great Plains, Renewable and Sustainable Energy Reviews 16(6), 3690-3701

Smart, D.E., Stojanovic, T.A. and Warren, C.R., 2014, Is EIA part of the wind power planning problem?, Environmental Impact Assessment Review 49, 13-23

Sneed, A., Scientific American, 2016, Trump’s First 100 Days: Climate and Energy, Retrieved from https://www.scientificamerican.com/article/trumps-first-100-days-climate-and-energy/ (accessed November 29, 2016)

Spengler, E.S, 2011, A shift in the wind: The siting of wind power projects on public lands in the Obama era, Indiana Law Journal 86, 1185-1217

Stanton, T., 2012, Put It There! – Wind Energy & Wind-Park Siting and Zoning Best Practices and Guidance for States, National Regulatory Research Institute, Silver Spring, MD; National Association of Regulatory Utility Commissioners, Washington, D.C.

Steffensen, J., 2013, Reforming Japan’s Electricity Sector: Abe’s Push for Deregulation, Available at (http://www.nbr.org/downloads/pdfs/eta/Ito_interview_102313.pdf) (accessed August 24, 2016)

Suwanteep, K., Murayama, T. and Nishikizawa, S., 2016, Environmental impact assessment system in Thailand and its comparison with those in China and Japan, Environmental Impact Assessment Review 58, 12-24

Tegen, S., Lantz, E., Mai, T., Heimiller, D., Hand, M. and Ibanez, E., 2016, An Initial Evaluation of Siting Considerations on Current and Future Wind Deployment, National Renewable Energy Laboratory, Golden, CO.

Trainor, A.M., McDonald, R.I. and Fargione, J., 2016, Energy Sprawl Is the Largest Driver of Land Use Change in United States, PLoS ONE 11(9), e0162269

Treppa, H., 2016, Not a huge fan: Deterring the implementation of wind turbines in the Great Lakes, University of Detroit Mercy Law Review 93, 321-351

Troxler, B., 2013, Stifling the wind: California environmental quality act and local permitting, Columbia Journal of Environmental Law, 38(1), 163-195

UCS, 2015, Production Tax Credit for Renewable Energy, Union of Concerned Scientists,

Cambridge, MA, Retrieved from http://www.ucsusa.org/clean-energy/increase-renewable-energy/production-tax-credit#.WAjJDNyfPXt (October 28, 2016)

US-DOE and NCCETC, 2016a, Database of State Incentives for Renewables & Efficiency, U.S. Department of Energy, Washington, D.C.; NC Clean Energy Technology Center, Durham, NC., Retrieved from http://www.dsireusa.org/ (accessed November 14, 2016)

US-DOE, 2016, WINDExchange: Installed Wind Capacity, U.S. Department of Energy, Washington, D.C., Retrieved from http://apps2.eere.energy.gov/wind/windexchange/wind_installed_capacity.asp (accessed October 18, 2016)

US-DOE, 2016a, Wind Technologies Market Report 2015, U.S. Department of Energy, Washington, D.C.

US-DOE, 2016b, Renewable Electricity Production Tax Credit, U.S. Department of Energy, Washington, D.C., Retrieved from http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc (accessed October 18, 2016)

US-EIA (Energy Information Administration, U.S.A.), 2013, Country Analysis Brief - Japan, Available at (http://www.eia.gov/countries/country-data.cfm?fips=ja) (accessed October 10, 2016)

US-FWS, 2007, Estimated Number of Bald Eagle Breeding Pairs (by State), U.S. Fish & Wildlife Service, Washington, D.C., Retrieved from https://www.fws.gov/home/feature/2007/bald_eagle_pop_map_final.pdf (accessed October 18, 2016)

Uechi, J., Murayama, T. and Nishikizawa, S., 2014, An Analysis of Factors Influencing Community Acceptance on Geothermal Power Development, The 3rd Japan-Korea-China Tripartite EIA & SEA Conference Proceedings, 80-84

Ueasako, D., Kamita, K. and Uesugi, T., 2013, Streamlined EIA Procedures for Power Plant Replacement in Japan, Proceedings of the 33rd Annual Conference of IAIA, 13-16 May 2013, Calgary, Canada

Uesako, D., Ministry of Environment, Japan (MOEJ), 2013, Streamlined EIA Procedures for Power Plant Replacement, Retrieved from https://www.env.go.jp/en/focus/docs/files/20130513-75.pdf (accessed August 24, 2016)

Uhlmann, B., 2015, EU Law and Policy on Energy Security: Streamlining of Environmental Impact Assessments for Cross-border Electricity Infrastructure, Available at (http://skemman.is/en/stream/get/1946/20208/46485/1/LLM_Thesis_Britta_Uhlmann.pdf) (accessed August 7, 2016)

Urakami, A., MOEJ, 2015, Japan's INDC and current climate change policies, Retrieved to http://www.env.go.jp/earth/ondanka/attach_8/2_1_Akiko_s_INDC_and_climate_change_policies_0929_2015_fin.pdf (accessed August 6, 2016)

Valentine, S.V., 2011, Japanese wind energy development policy: Grand plan or group think?, *Energy Policy* **39**, 6842-6854

Van Zeben, J., 2014, Subsidiarity in European Environmental Law: A Competence Allocation Approach, Harvard Environmental Law Review 38(2), 415-464

Vivoda, V., 2014, Energy Security in Japan: Challenges After Fukushima, Ashgate Publishing, Farnham, Surrey

WMO, 2016, Provisional WMO Statement on the Status of the Global Climate in 2016: 2016 is set to break even the temperature records of 2015, World Meteorological Organization (WMO), Geneva, Switzerland, Retrieved from http://public.wmo.int/en/media/press-release/provisional-wmo-statement-status-of-global-climate-2016 (accessed November 14, 2016)

Watanabe, C. and Stapczynski, S., The Japan Times, 2016, Sun no longer shines on Japan's solar boom as subsidies wane, Retrieved from http://www.japantimes.co.jp/news/2016/07/14/national/sun-no-longer-shines-japans-solar-boom-subsidies-wane/#.WEI8bZKfPXs (accessed August 24, 2016)

Watanabe, C., 2013, Marubeni taps geothermal power as nuclear alternative, The Japan Times, Available at (http://www.japantimes.co.jp/news/2013/04/04/business/corporate-business/marubeni-taps-geothermal-power-as-nuclear-alternative/#.U9fGVUjiohh) (accessed on June 26, 2016)

Watanabe, C., 2014, GE Says Japan Has More Potential to Harness Wind Power, *Bloomberg Business*, Available at (http://www.bloomberg.com/news/articles/2014-02-26/ge-says-japan-has-more-potential-to-harness-wind-energy) (accessed December 6, 2016)

Wisniewski, D.J., 2013, The Battle for Wind Farm Siting in Virginia, Virginia Lawyer 63, 12-15 & 41

Yin, A. and Powers, N., 2010, Do state renewable portfolio standards promote in-state renewable generation, Energy Policy 38, 1140–1149

Yoshida, R., 2014, Cabinet Oks new energy policy, kills no-nuclear goal, *The Japan Times*, Available at (http://www.japantimes.co.jp/news/2014/04/11/national/cabinet-oks-new-energy-policy-kills-no-nuclear-goal/#.VJEr2abG2Xg) (accessed September 27, 2016)

Zaltman, A.J., 2013, Obstructions and Opportunities in the Complex World of Massachusetts Onshore Wind Power Development, Journal of High Technology Law 13(1), 215-246

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