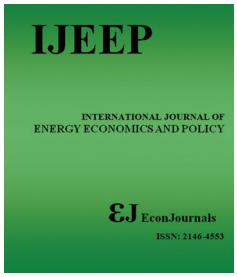

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Policy Learning for Generating Green Electricity

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ABSTRACT

An important challenge for any developing country is to achieve their green energy targets for clean electricity generation. In this respect, Iran is no exception. This paper sets out a reference point for Iran as a less developed country by learning the green electricity production policies from developed countries; Germany and Denmark. We used a mixed research approach. The most significant lessons learnt includes the relevance of the financial and regulatory tools and policies that have been successfully applied in Denmark and Germany. Our findings show the structure of fuel allocation to energy generation plants needs reforming. The result shows a considerable difference between Iran and the two other developed countries regarding the level of utilizing fossil fuels and renewable energies. We identified a wide range of beneficial measures to facilitate the transition to green energy production. These included: reforms to electricity pricing, phasing out nuclear energy production; the setting of a green tax package, subsidising renewable energy development for new and old systems, dedicating soft-interest loans, implementing informative programmes about local ownership, facilitating the process of participation, and performing obligatory plans to purchase green electricity for governmental sectors.

Keywords: Policy Instruments, Financial Incentives, Regulatory Incentives, Green Electricity, Renewable Resources
JEL Classifications: Q28, Q48, K32

1. BACKGROUND

This study attempts to offer an optimal reference for policymakers to boost greener electricity production in Iran. The main research questions driving our research were: what are the financial and regulatory policies or incentives to generate green electricity? And, what are the most important drivers for successful implementation?

To answer these questions, we studied the past and current status of electricity generation in two countries with successful green energy interventions and transitions: Germany and Denmark. These practices were compared with those in Iran.

Achieving clean energy targets represents a complex challenge for developing countries. This is particularly so given the principal role energy plays in enabling socio-economic development and poverty alleviation (Oyedepo, 2012). Intergenerational justice and environmental observations make clean energy important when developing policies that entail the least environmental impact (Meyer, 2007). Electricity, as the highest profile energy feature in our lives, can be generated cleanly by various renewable resources that replace electricity generated by fossil fuels that are a major source of CO_2 emissions. However, governmental interventions to facilitate a transition to clean energy vary with levels of local awareness and the intensity of environmental impacts (Lipp, 2007).

In Denmark, generating green energy, especially electricity, has received considerable governmental support (Lund, 2007). It was also beneficial that they chose to encourage less ownership and the establishment of NGOs (including those opposed to nuclear energy and in support of renewable energy). National energy programmes were evolved with a clear approach to renewable

energy development (Meyer, 2007), governmental support through investment (Van der Vleuten and Raven, 2006), the creation of competitive conditions (Midttun and Gautesen, 2006), promotion of energy self-sufficiency, improved productivity measures (Lipp, 2007) and expanded local ownership (Lehtonen and Nye, 2009). All these measures were clearly favourable interventions to facilitate the energy transition.

Many factors influenced the development of electricity production based on renewable energies in Germany. For example, it was fundamental that there was a strong central government with an open political culture for governmental interventions who formulated and prioritised policies for green energy, the creation of interest groups in the anti-nuclear movement (Wüstenhagen and Bilharz, 2006). In addition, other factors that were remarkably effective included: the distribution of costs among all the consumers (International Energy Agency, 2013), the minimising of investment risk by guaranteeing long-term prices, the signing of long-run contracts and the private-public pattern of ownership in the electricity industry (Arentsen and Künneke, 1996). Other intiatives that were perceived as being supportive included: changes to environmental taxes, the introduction of a tax on electricity consumption (Lauber and Mez, 2006) and having access to numerous natural resources (Deloitte Conseil, 2015).

Iran seems somewhat similar to Germany given its monopoly governmental structure (Wüstenhagen and Bilharz, 2006); (Khalatbari, 2014). Various noticeable positive steps have been taken to reform electricity production. For example, guaranteed purchasing laws and long-term rules (Amini et al., 2015) have been formulated, the energy portfolio has been diversified (Peimanbank et al., 2010), and a distributed electricity production method has been subsidised (Ministry of Energy of the Islamic Republic of Iran, 2016). Determined tolls on electricity bills for renewable development have also been implemented (Islamic Parliament Research Center of Iran, 2017). Power generation plants that were once fueled by crude oil have been switched across to natural gas and the number of combined heat and power (CHP) plants increased (Ministry of Energy of the Islamic Republic of Iran, 2016).

These measures all align with the Iranian commitment to reduce emissions by 12% by 2030, as this was stipulated in the paris agreement (Dodwell et al., 2015).

Despite these positive steps, there are no noticeable outcomes in terms of fossil fuel use reduction. This is for various reasons, measures and factors in Iran that undermine the transition towards green energy development. These include: The authorities having no macro perspective toward energy issues (Power Ministry of the Islamic Republic of Iran, 2018), inaccurate pricing policy for electricity, neglect of the efficiency of the power plant, allocating fuels free of charge to power plants and no application of coal, despite large stockpiles (Peimanbank et al., 2010). Other deterrent factors include: the reduction of public budget to the power sector, delays in approving projects and issuing environmental permissions (Darvish, 2016), the limited application of renewable resources (Amini et al., 2015) and the development of nuclear power plants (The Fifth Five-Year Plan for the Development of the Islamic Republic of Iran, 2011- 2015); (the group of Strategic Planning of Power Ministry of the Energy of the Islamic Republic of Iran, 2011).

Failures in policy making and their implementation in Iran have encouraged high energy consumption, increased fossil fuels usage and neglected the development of renewable energy. The practices employed in Germany and Denmark illustrate how development can be achieved to foster renewable energy. By 2013, 56% and 29% of German electricity production was based on fossil fuels and renewable energies respectively (Craig, 2018). In Denmark, these figures were 7% and 60% in 2016 (Energinet Report, 2018). Meanwhile, in Iran, more than 90% of electricity continues to be generated from fossil fuels (Power Ministry of the Islamic Republic of Iran, 2018).

However, Iran is rich in both renewable and non-renewable resources and the state is the main actor controlling the electricity production sector and seemingly encourage fossil fuel consumption – as the development of the South Pars Gas field in the Persian Gulf clearly exemplifies. Although there are notable plans and programmes for developing renewable energies, Iran seems still some considerable distance from deploying policies and measures recognised as current best practice.

2. METHODOLOGY

We designed and applied a mixed method approach to answer the research questions that involved four main steps as follows:

1. Review of literature and documentation: We searched scientific databases (Elsevier, Science Direct, Google Scholar, and the International Energy Agency (IEA) Website) using relevant keywords: e.g. economic and financial instruments/ incentives/policies, green electricity, renewable energy, and sustainable development.
2. Two pioneer countries - Germany and Denmark - were chosen for a comparative study against Iran and the main differences and similarities identified. The main focus was on relevant policies, rules and regulations, national and international reports and also scientific articles to find the green development path. The IEA was the main reference used for knowledge on interventions. The comparative study results were analysed by the theme analysis[1] method (Braun et al., 2019). We used the IEA policy categories to name the themes and sub-themes.
3. Then a draft questionnaire was designed and its reliability and validity tested by Delphi methodology.
4. The questionnaire was answered by 15 from a total of 25 members of a panel of experts chosen from relevant and related practitioners and academics. Their responses were analysed by statistical methods.

3. RESULTS

The results are presented according to each step above as follows:

1. Literature review. The searches through scientific databases

1 A method for capturing patterns "themes" across qualitative datasets.

found more than 90 articles relating to the successful implementation of policies in different countries which claimed to be in the "green path" involving voluntary green electricity schemes (Energinet Report, 2018), Tradable Green Certificates (TGC) (Gan et al., 2007), and Feed-in-Tariffs (Schaeffer et al., 1999). These are the most practiced policies in Europe.

43 of the 90 articles focused on German and Danish green energy cases, such as: Learning from wind energy policy - Denmark, Sweden and Spain (Meyer, 2007); Lessons for effective renewable electricity policy - Denmark, Germany and the United Kingdom (Lipp, 2007); electricity policy-making and regulation - Denmark (Couture et al., 2010); amongst many other examples. These search results established the criterion upon which to select Denmark and Germany for our comparative study.

2. Comparative study. The comparison starts by illustrating certain basic characteristics for the three countries, e.g. the main emission factors, particularly for CO_2 emissions: alongside population growth, economic growth, primary energy supply and electricity generation (Lockwood, 2015). This data was compiled by the authors using Wikipedia and IEA CO_2 emission fuel combustion reports (International Energy Agency, 2017) The data are shown in Table 1 for the three selected countries.

Table 1 shows that GDP and electricity production per capita in Iran are significantly lower than for the other two countries. Nuclear energy is not utilised in Denmark (Midttun and Gautesen, 2006) and will be stopped in Germany [30], while Iran is trying to further develop it (The Fifth Five-Year Plan for the Development of the Islamic Republic of Iran, 2011-2015).

The review of relevant articles identified various reasons of success, the similarities and differences of policies, measures and incentives as shown in Table 2. This reveals the similarities and useful measures taken by Germany and Denmark by comparison with Iran where different ploys have slowed down green electricity development.

Multiple categories emerged from the review of adopted rules, policies, implemented plans and also measurements in the comparative study phase. For the theme analysis, IEA's renewable policies categorisation set a common worldwide language. We identified and coded three main themes (A-financial, B-regulatory, and C-financial-regulatory incentives) with 14 sub-themes. The sub-themes of the A, B, and C themes are coded as $A_{1,2,3,4,5}$, $B_{1,2,3,4}$, $C_{1,2,3,4,}$ and their statements as $A_{1s,}$ $A_{2q,}$ $A_{3x,}$ $A_{4y,}$ $A_{5z,}$ B_{1s}, B_{2q}, B_{3x}, B_{4y}, and C_{1s}, C_{2q}, C_{3x}, and C_{4y} respectively. All the results with their references are illustrated in Table 6 in Appendix 1.

3. Questionnaire. The draft questionnaire was prepared and its validity was tested by applying Delphi methodology and consultations with an expert panel of 25 experts chosen by a purposive sampling method. The sample was chosen from related professions and academics; experts of the research Centre of the Parliament of Iran, the Ministry of Energy, renewable energy and energy efficiency organisation, Iran chamber of commerce; industries; mines and agriculture, Plan and Budget Organisation of Iran, the Mapna[2] group and professors of well-known universities. Three rounds were completed to obtain an acceptable level of consensus; Kendal's Coefficient of Concordance was applied to show the level of consensus among the panel members. Table 3 presents its result:

The expert consultation led to some irrelevant and inappropriate statements being deleted. We used a Likert scale to give answers to finalise the questionnaire. Then, we asked two main questions on each statement: (i) what is the importance of each statement for supporting green energy development from 1 to 5? And, in accordance with green energy statues in Iran, (ii) what is the priority of each statement in the questionnaire categories used from the respondents' perspective?

4. Analysis of results. In this phase, the final questionnaire was answered by the experts. We applied confirmatory factor analysis (CFA) to analyse the answers and present the final

2 MAPNA Group is a group of Iranian companies involved in development and execution of thermal and renewable power plants, oil & gas, railway transportation and other industrial projects as well as manufacturing main equipment including gas and steam turbines, electrical generator, turbine blade and vane, HRSG and conventional boilers, electric and control systems, gas compressor, locomotive and other pertinent equipment.

Table 1: Country basic characteristics

Country	Population (million)	GDP per capita ($)	Gross production in 2015 (GWh)			Electricity production per capita (GWh) in 2015	CO_2 emission of total primary energy generation in 2015 (Tonne)	CO_2 emission per capita of electricity generation in 2015 (kg)
Iran	80.8	5027	Fossil fuels 93.60%	289181 Renewable 6.30%	Nuclear[1] 0.10%	3579	55.8, and -5.4% reduction compared to 1990	1955
Germany	82	44674	Fossil fuels 56%	597000 Renewable 29%	Nuclear 17%	7281	56.6, and -11.4% reduction compared to 1990	3925
Denmark	5.5	56601	Fossil fuels 39.70%	27704 Renewable 60.30%	Nuclear 0%	5037	47.4, and -32.2% reduction compared to 1990	1855

[1] Iran AEOI (2018) Performance report on electricity production of Bushehr nuclear power plant in 2017 (in Persian), Office of planning and developing of the management of economical and budgetary affairs of AEOI, Iran, ibid

Table 2: Comparison between Iran, Germany, and Denmark

Contradictory measures and incidences in Iran	Useful measurements and actions in Germany and Denmark
• Ignoring plant productivity and pollutant emission and allocating free fossil fuels to them • Lack of a macro approach to the energy sector • Noting economic, social and political issues for energy pricing, instead of considering all production costs • Not paying attention to the potential resources and varying the energy portfolio • Not applying coal with its huge capacity (Peimanbank et al., 2010) • Delay in approving plans and environmental permits (Amini et al., 2015) • Incorrect use of subsidy modification law in the energy sector (Mohajeri et al., 2014) • Emphasising nuclear energy utilisation and development (The Sixth Five-Year Plan for the Development of the Islamic Republic of Iran, 2016- 2020) • Not being serious for implementing long-term contracts and guaranteed prices rules • Not allocating electricity duties for renewable development (Islamic parliament Research Center of Iran, 2017)	• Movements against nuclear energy • Mandatory purchase of local facilities, a minimum price guarantee, and the national price adjustment system to balance regional differences • Supporting the renewable energy sector by low-interest/soft loan (Wüstenhagen and Bilharz, 2006); (Meyer, 2007). • Priority policies for green energy production (Midttun and Gautesen, 2006); (Wüstenhagen and Bilharz, 2006) • Clear tariff in electricity market (Arentsen and Künneke, 1996) • Transferring the responsibilities from the Ministry of Economic Affairs (Democrats) to the Ministry of the Environment (Green Party) (Lauber and Mez, 2006) • Increasing taxes and duties to finance renewable energy subsidies (Energinet.dk, n.d.); (Deloitte Conseil, 2015). • Tax exemption (Wüstenhagen and Bilharz, 2006); (Midttun and Gautesen, 2006). • Developing electricity market and creating a competitive environment (Midttun and Gautesen, 2006); (Deloitte Conseil, 2015) • Let growing the coalition and interest groups (Wüstenhagen and Bilharz, 2006); (Lauber and Mez, 2006) • Distributing the costs between dispersed groups; • National plans to reduce oil dependency (Meyer, 2007); (Wüstenhagen and Bilharz, 2006). • Increasing electricity prices based on fossil fuels • Following public-private, local and municipal ownership pattern (Meyer, 2007); (Arentsen and Künneke, 1996) • Supporting the distributed generation and utilising renewable energy (Lauber and Mez, 2006);(Lehtonen and Nye, 2009) • R & D (Midttun and Gautesen, 2006); (Gan et al., 2007) • Setting ambitious goals (Lehtonen and Nye, 2009); (Gan et al., 2007) • Technological sustainability (Van der Vleuten and Raven, 2006)

Table 3: Kendal's coefficient (W)

Theme	W_1	W_2	Total differences
A (financial incentives)	0.490	0.572	+0.08
B (regulatory incentives)	0.512	0.546	+0.03
C (financial-regulatory incentives)	0.509	0.553	+0.04

model. The statistically significance at 95% was the criteria for acceptance of each statements, which encompassed the T-test and factor loading of <0.3 and also the explained variance of <0.19. In this regard, A_{12}, A_{13}, A_{25}, A_{32}, A_{48}, A_{413} from financial theme, and C13 and C22 from financial-regulatory theme were omitted from the proposed model. The remaining questions have a significant correlation between the dependent variables and each of the related questions. The t-values for all the rest items were more than 1.96. So, it can be argued that these terms affected the dependent variables.

Furthermore, for fit indexes, we figured out the ratio of chi-square and degrees of freedom (df) were 1.13, 1.06 and 0.99 for the financial, regulatory and financial-regulatory themes respectively, and the root mean square error of approximation (RMSEA) was 0.055, 0.070 and zero respectively, which should be <0.08. Therefore, the CFA of these three themes showed the best fit with the data.

In the final phase, we tested the effectiveness of all the themes and sub-themes on the reference model and, according to Figure 1, except B_1, all the other sub-themes have an influence in the main model. So, only B1 should be omitted from the list of influencers:

The status of all the effective factors in the main model is presented in Table 4:

After indicating the effective factors, we use the Friedman test to analyse the answer to prioritise statements. The results are shown in Table 5:

For the obtained significance level <0.05, there is a significant difference among the factors. So, the priority of each category was recognised as mentioned above.

4. DISCUSSION AND CONCLUSION

This study aimed to learn from successful experiences on green electricity production to suggest a reference point that could help energy policy making in Iran in particular and even other less developed countries.

A similar study carried out in the USA (Couture et al., 2010) highlighted the feed-in tariff (FIT) as one of the most successful policies implemented in Europe for developing renewable energies via a tax incentive. The FIT has facilitated the expansion of approximately 75% of photovoltaic and 45% of wind energy implementation around the world. The substantive features of FIT are the long-term contracts offered through which to sell green electricity, ensuring access to the network, and enabling the classification of payments based on the type of technology, size of the project, quality of resources and location of the projects.

Figure 1: The main model with significance number

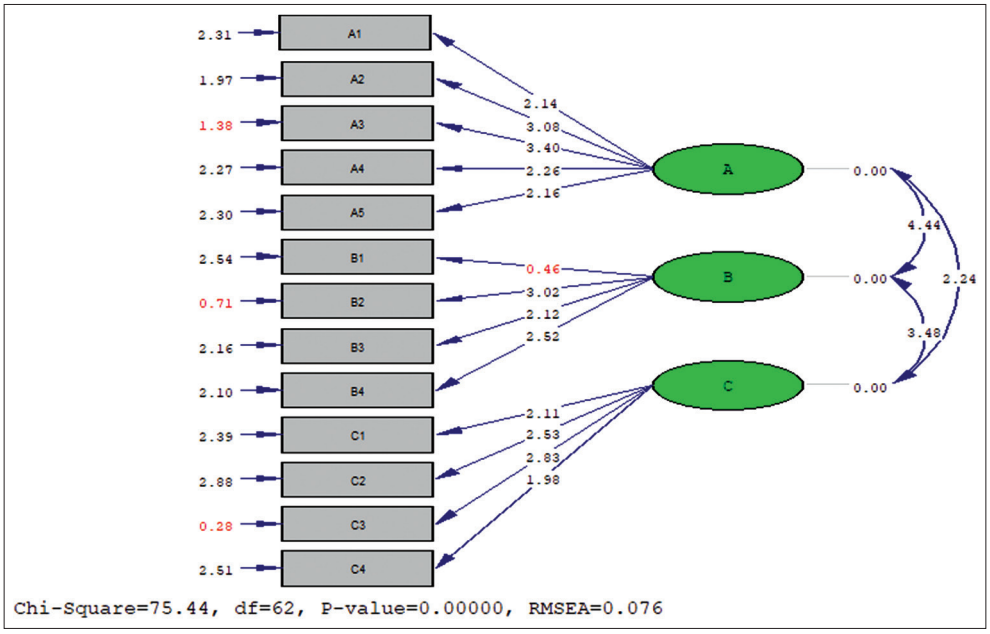

Table 4: Status of all the effective factors

Latent variation	Factors	Abbreviation	Standardised coefficient	Status effect	t-value	result
Green energy supportive policies	Financial tools	A	0.56	Acceptable	2.15	Approved
	Regulatory tools	B	0.98	Very desirable	3.58	Approved
	Financial-regulatory tools	C	0.86	Very desirable	3.13	Approved

Table 5: Results of friedman test

Theme	Friedman test	Mean	Priority result
Financial	A1	2.71	4
	A2	3.57	1
	A3	3.14	2
	A4	2.86	3
	A5	2.71	5
X^2: 1.410	df: 4	Sig: 0.000	n: 15
Regulatory	B1	2.36	4
	B2	2.43	2
	B3	2.82	1
	B4	2.39	3
X^2: 1.410	df: 3	Sig: 0.033	n: 15
Financial-regulatory	C1	2.21	4
	C2	2.86	1
	C3	2.39	3
	C4	2.54	2
X^2: 2.071	Sig: 0.000	df: 3	n: 15

Another study examined the tradable green certificate (TGC). This mechanism allows a member of the electricity supply chain (consumer, supplier or generator) to submit a minimum number of certificates, as determined annually by the authorities. A committed entity may itself produce this certificate or purchase it from the market and also transfer its costs to the consumer (Fouquet and Johansson, 2008).

Other policies in support of renewable energy development include the renewable portfolio standards (RPS). This, also, has been implemented in USA. This is more market-oriented than the other policies described and requires a minimum level of production of renewable resources in a portfolio (Berry and Jaccard, 2001). FIT and RPS are both market-based models. Their difference is that the FIT prices are regulated politically and their number is specified by the market, while the RPS prices are set by the market and the number is determined politically (Lipp, 2007).

The results of our survey differ from other studies as they are based on expert opinions, derived from successful experiences, whilst combining the lessons from international examples with local knowledge about the situation in Iran. The survey tried to cover the entire scope of practical aspects of the possible tools, as well as those suggested and prioritised by experts' opinions, which might enable policy makers to benefit from long-term policymaking suggestions.

The professional and academic perspectives gathered in this research, in order to ratify financial policy, recommended sequential measures to: design green tax package; use different tax models; subsidise for participation; shift pricing; and subsidise to help scrapping old systems. They highlighted applying different financial instruments, such as:

- Imposing tax on CO_2 and SO_2 emissions
- Reducing the tax rates for committed companies
- Gradual phase-in of the taxes
- Transferring back a part of the revenues of green tax package to enterprises through reduced taxation on employing labour, the remainder being redirected to the industry and service sectors
- Exemption of biofuels from oil taxes
- Distinctive taxes for light and heavy industrial processes, as

well as domestic or industrial consumers; subsidising based on working years, ownership of power plants and their capacity
- Specific and limited time to granting
- Providing low-interest loans to the collective buildings, such as schools, to renovate heating system based on renewable energies
- Offering governmental grants, such as reducing household taxes for the installation of heat pumps or solar heating collectors
- Developing a certification scheme for inefficiency or disability of a system based on a minimum level for detecting non-operating systems from the efficient one
- Increasing fossil fuels prices; and
- Defining different fees for plants with different sources.

To improve regulatory policy, they suggested measures to: mprove citizen awareness and establish forums; setting long-term goals; and facilitate participation for producers and suppliers respectively. Different regulatory instruments could be utilised to reach these goals. For example, to:
- Create associations for a variety of renewable resources
- Target to produce a specific amount of renewable energy and eradicating CO_2 emission in a specified period
- Ratify guidelines to issue required permits for installing renewable energy plants; and
- Define mandatory contributions, such as adding a certain amount of biofuels to the fuel resources of the power plants to promote the usage of resources, rather than applying tax exemption or subsidy allocation methods.

The sequential measures suggested for applying financial-regulatory policy included to: regulate to select different sources at various prices in the market; support financially the pilot plans; regulate to purchase green electricity; and rationing. Various financial-regulatory instruments could be utilised and, for further research, the implementation of these suggestions is recommended. For instance, to:
- Legalise the sale of electricity from renewable sources at high market prices
- Set a plan to support pilot systems and helping researchers to find their test results in a real situation;
- Oblige the supplier who uses the public electricity grid to purchase an equal share of green electricity at a price equivalent to the average payments
- Determine a tradable limited share for CO_2 emissions; and
- Guarantee the demand for green certificates by creating stocks for the purchase of renewable electricity, in which all consumers of electricity should implement it.

Consequently, it should be noted that, by comparing the history of energy management policies in these three countries, it was observed that success was not accidental, but rather the result of several components, among them: proper planning; the commitment to making an accurate policy and its implementation and; scrupulous policy assessment. All of them have contributed to the forefront position apparent in Germany, and even more so in Denmark.

5. AVAILABILITY OF DATA AND MATERIALS

The data of international renewable energy policies that support the findings of this study are available from https://www.iea.org/.

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APPENDIX 1

Table 6a: Categorizing the results: A- financial /policies/incentives/tools

Sub-Themes	Statements	References in Denmark	References in Germany
A_1- Pricing	A_{11}- Increasing fossil fuels prices to compete with the renewable technologies in electricity, heat, and transport A_{12}- Transferring high prices of renewable to the consumers A_{13}- Moving gradually toward market-based prices A_{14}- Forcing the utilities to pay more for the green electricity and transferring the imposed costs to the electricity suppliers and customers A_{15}- Reducing payments from a specific time, on an annual basis, to encourage producers to reduce the production costs. A_{16}- Defining different fees for plants with different sources	Legislation on electricity favorable to renewable (electricity reform agreement) New Rules for Payment of Green Electricity - Adaptation of the Electricity Act Reforms	Electricity feed-in law of 1991 Eco-Tax reform renewable energy sources act 2009 Amendment of the Renewable Energy Sources Act (EEG 2009)
A_2- Designing green tax package	A_{21}- Tax on CO_2 and SO_2 A_{22}- provisions a significantly reduced tax rate in the case of specific energy-intensive activities, conditional upon a business committing itself to reduce energy consumption through an agreement negotiated between the company and the authorities A_{23}- Reducing the tax rates for committed companies A_{24}- Gradual phase-in of the taxes. A_{25}- Transferring back a part of the revenues of green tax package to enterprises through reduced taxation on employing labor, and the rest should be redirected to the industry and service sectors to provide investment grants for energy efficiency measures A_{25}- The tax revenues can be used for energy efficiency measures and renewable energy development A_{26}- Exemption of biofuels from oil taxes	Green Tax Package 1995, Carbon Tax/Green Tax System	Law to Amend the Mineral Oil Tax Law and Renewable Energy Law
A_3- Use different tax models to encourage participation	A_{31}- Distinction between different purposes for energy use for assessing the tax: light and heavy industrial processes A_{32}- Returning the tax as a subsidy to implement to carry out energy efficiency measures and renewable development A_{33}- Impose different tax incentives to encourage consumers to consume green electricity. These incentives can be different depending on the amount of consumption, as well as the domestic or industrial nature of the consumer A_{34}- Tax exemptions for a share of production, and in case of further production, the taxes should be paid less than the usual tax rate A_{35}- Tax exemptions for all renewable electricity producers, provided that: all installations are connected to the network, the installation of the electricity generation system should be at the place of consumption, and the consumer of electricity must own the system. In this regard, a maximum amount of electricity should be provided for renewable electricity, for example, only producers of <6 KWh are allowed to participate in this project	Wind energy co-operative tax incentive	Combined heat and power law
A_4- subsidies participation in renewable energy development	A_{41}- The subsidy allocation to renewable energy plants should be based on the working years A_{42}- considering the time of renewable plants connection to the grid for subsidies allocation A_{43}- Considering the ownership for subsidies allocation A_{44}- Allocating subsidies for a specified period of time, for example, 20 years from the date of connection to the grid. Changing the amount of subsidy based on the hurry or delay in connecting A_{45}- Controlling renewable usage by the subsidies allocation amount A_{46}- excluding household systems from subsidizing which are for personal use A_{47}- Determining the annual use of renewable energies; for example between 10% and 94% of the total amount of fuel consumed A_{48}- Subsidizing for developing green production in the industrial sector as developing CHP plants in industry and greenhouses A_{49}- More subsidizing to less favorable renewable energies A_{410}- Subsidize generated electricity per kWh for a determined maximum and for a specified size of facilities A_{411}- Offering low-interest loan (less than the market rate) for private and public-private enterprises who have taken appropriate measures to save energy, or those who have already planned to use renewable energy	Subsidies for wind turbines Subsidies for Renewable Electricity Generation Feed-in premium tariffs for renewable power (Promotion of Renewable Energy Act) Danish Energy Agreement for 2012-2020	250 MW Wind Programme: 1989 ERP-Environment and Energy Saving Programme: 1990 Full Cost Rates Home Eco Grant Ordinance on the Fee Schedule for Architects and Engineers 100 Million Programme 100 000 Roofs Solar Power Programme Combined Heat and Power (CHP) Extra Law Combined Heat and Power Law

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Table 6a: ***(Continued)***

Sub-Themes	Statements	References in Denmark	References in Germany
	A_{412}- Providing low-interest loans in the first phase for the renovation of private buildings and the use of renewable energy for heating systems, as well as the modernization of buildings, subsequently offering these loans to the collective buildings, such as schools A_{413}- Aiming to install specific capacity (determining the share of each renewable energy), within a specified period and also funding for that A_{414}- Contributing to the development of CHP plants to reduce CO_2 emissions and increase the efficiency of power plants, for example; for the electricity generated by CHP technology, offer a fixed price, at a level above the market rate and for a long period of; for instance 10 years A_{415}- Offering governmental grants for the installation of heat pumps or solar heating collectors. These grants can be in the form of household taxes reduction A_{416}- Developing guidelines and incentives for architects and engineers to develop renewable energy in new constructions A_{417}- Designing fixed premium systems (for all renewable) and flexible system (for some renewable)		KfW-Programme Producing Solar Power Climate Legislation Package Enacted under the Integrated Climate Change and Energy Programme Energy Concept 2012 Amendment of the Renewable Energy Sources Act (EEG 2012) 2017 Amendment of the Renewable Energy Sources Act (EEG 2017)
A_5- Considering subsidy for replacement of old and inappropriate situated systems (Scrapping scheme)	A_{51}- Funding some plans to scrap old and inappropriate situated systems A_{52}- Considering the time interval for allocating subsidies to encourage operators. Subsidies are paid per kWh to a maximum level of production or in a specific period for those who upgrade the systems, because the capacity of new systems can be multiplied A_{53}- Developing a certification scheme for inefficiency or disability of a system based on a minimum level for detecting non-operating systems of the efficient one (such as issuing scrapping certificates for a wind turbine with installed power of 450 KW or less) A_{54}- Allocating more subsidies or extending the repayment time, if the owners of the facilities or turbines are more quickly switch the system within a certain period. A_{55}- Providing supportive regulations for the replacement plan for example: new turbines should be installed in the same region, turbines must be at least 10 years old for swaps, new turbines should have a capacity of twice or even more than 5 times than the prior ones, and also, they will receive tariffs per KWh	Replacement of wind turbines Replacement Scheme for Wind turbines on land (scrapping certificates) Promotion of Renewable Energy Act	- Preferential Loan Programmes offered by the Reconstruction Loan Corporation (KfW) 2009 Amendment of the Renewable Energy Sources Act (EEG 2009)

Table 6b: Categorizing the results: B- regulatory /policies/incentives/tools

Sub-themes	Statements	References in denmark	References in germany
B_1- Regulating a market	B_{11}- Developing an agreed framework (target) for a specific amount of renewable electricity production over a specified time frame B_{12}- applying operators for measuring renewable electricity production B_{13}- Offering certificates to indicate suggested KWH in the market	Legislation on Electricity Favourable to Renewables (Electricity Reform Agreement)	-
B_2- Setting goals	B_{21}- Targeting for producing a specific amount of renewable energy in a certain period B_{22}- Targeting to reduce the percentage of CO_2 in a specified time and in accordance with international agreements B_{23}- Supporting to remove the oil boilers in buildings by Prohibiting the installation of oil and gas boilers in new buildings from a specified time B_{24}- Banning the installation of new oil boilers in existing buildings in areas which is accessible to other sources including natural gas B_{25}- Financially committing at certain intervals to convert oil and gas boilers to renewable energy in the new buildings B_{26}- Developing multi-year and successive programs to support R&D and applying Renewable Technologies	Danish Energy Agreement for 2012-2020	Fourth Energy Research Programmme Investing in the Future Programme Fifth Energy Research Programme
B_3- Training for citizen awareness and establishment forums and unions	B_{31}- Selecting local citizens to buy shares of renewable systems in each region B_{32}- Implementing educational initiatives such as Green Plan to increase local knowledge B_{33}- Creating associations for a variety of renewable resources, such as the Association of Local Owners of Wind Turbines B_{34}- Providing special offers to the people who have more than a certain level of ownership of renewable energy systems. For example; it is suggested to sell wind turbines to inhabitants within 4.5 Km or less of the nearest turbine	Promotion of Renewable Energy Act	-

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Table 6b: *(Continued)*

Sub-themes	Statements	References in denmark	References in germany
	B_{35}- Presenting or not providing specific offers to shareholders who own these systems for personal use		
B_4- Facilitate participation of producers and suppliers	B_{41}- Obliging network operators to provide required infrastructures for connecting renewable resources to the grid and transferring electricity at their own expense B_{42}- Ratifying guidelines to issue required permits for installing wind, hydro, biomass and even nuclear power plants on the city border B_{43}- Defining specific mandatory contributions and a percentage of biofuels to be added to the fuel resources of the power plants to promote the usage of resources rather than applying tax exemption or subsidy allocation methods	-	Federal Building Codes for Renewable Energy Production Eco-Tax Reform, Biofuels Quota Act

Table 6c: Categorizing the results: C- financial-regulatory/policies/incentives/tools

Sub-Themes	Sub-Themes	Sub-Themes	Sub-Themes
C_1- Rationing	C_{11}- Determining a tradable limited share for CO_2 emissions C_{12}- Guaranteeing the demand for green certificates by creating stocks for the purchase of renewable electricity, in which all consumers of electricity should implement it C_{13}- Holding public auctions for a specified amount and type of renewable resource in a certain period	Legislation on Electricity Favourable to Renewables	2017 Amendment of the Renewable Energy Sources Act (EEG 2017)
C_2- Regulating for selection of different sources at different prices in the market	C_{21}- Legalizing the sale of electricity from renewable sources at high market prices C_{22}- Public utilities and electricity suppliers give their customers the right to choose between tariffs. This choice to buy green electricity may differ even between different sources of renewable energy	-	Green power
C_3- Regulating for purchasing green electricity	C_{31}- Approving law to oblige governmental sectors to buy green electricity C_{32}- Obliging the supplier who uses the public electricity grid to purchase an equal share of green electricity at a price equivalent to the average payments. This system equalizes benefits as well as the costs	-	Green Power, Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz EEG)
C_4- Financial support for pilot plans	C_{41}- Setting a plan to support pilot systems and helping researchers to find their test results in a real situation C_{42}- Public auctions for pilot implementation of a type of renewable energy with a determined capacity and experience the implementation of other renewable energies C_{43}- Public auctions for specific capacities. Projects must be priced at an auction price	-	Solarthermie 2000Plus Ground-mounted PV Auction Ordinance