Assessment of Policy Impacts on Sustainability in Europe

The policy interactions of offshore wind energy generation and conserving marine ecosystems (Estonia)

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1. Introduction

1.1 Background and problem description

The case study on wind energy generation and conserving marine ecosystems explores the policy interactions between two major policies of European Union: the renewable energy policy and nature conservation policy. Both policies form the backbone of the EU environmental policy, firstly to significantly reduce the GHG emissions and secondly, to halt the loss of biodiversity by 2020. While the biodiversity conservation on land is relatively well in operation, the marine ecosystems have still remained poorly understood and conservation efforts are just in progress. That is the reason why the case study takes a closer look at the offshore wind energy projects that may impose adverse effects on sensitive marine ecosystems and thus create conflicts between renewable energy and nature conservation goals of EU.

The case study addresses particularly the priority objectives of a), b), d) and g) of the nine priority objectives of the proposed EU 7th Environmental Action Programme1: (a) to protect, conserve and enhance the Union's natural capital; (b) to turn the Union into a resource-efficient, green and competitive low-carbon economy; (c) to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing; (d) to maximise the benefits of the Union's environment legislation; (e) to improve the evidence base for environment policy; (f) to secure investment for environment and climate policy and get the prices right; (g) to improve environmental integration and policy coherence; (h) to enhance the sustainability of the Union's cities; (i) to increase the Union's effectiveness in confronting regional and global environmental challenges.

Estonia has been characterised as a unique European Union member state whose energy sector is dominated by one primary source of energy – oil shale, a fossil fuel[2], which contributes to 80% of the GHG emissions of the country.Followed by the EU Renewable Energy Directive (2009), the National Energy Development Plan 2020 has set a target to increase the share of renewables in the final energy consumption to 25% by 2020[3]. Estonia is well in pace with approaching the targets, the supply of renewable energy had increased to 14.6% and final domestic consumption from renewables has exceeded the policy target in 2012 (25.6%). It should be noted that so far wind turbines have been erected on land only, and there are no offshore wind farm projects in the process of permitting procedure in Estonia. However, there are several applications of offshore wind farm projects submitted to the permitting authority but the applications have been put on hold.

Firstly, the case study explores the policy mix and policy instruments of the renewable energy and nature conservation in Estonia, with special reference to wind energy production.

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1 EU 7th Environmental Action Parogramme (COM(2012) 710final)

2 IEA. 2013. Estonia 2013.Executive Summary, Key recommendations, General Energy, Policy Chapter. www.iea.org

3 Energiamajanduse Arengukava 2020 [National Energy Development Plan 2020] http://www.mkm.ee/public/ENMAK.pdf

Then effectiveness and efficiency of policy instruments of both policies are studied and finally the policy interactions based on policy instruments are demonstrated.

The case study aims to answer to the question what policy instruments facilitate or limit the expansion of wind energy production offshore in Estonia and why.

1.2 Methodology

The study follows the the general outline of the APRAISE 3E module 2 methodology.

The case study was conducted in 5 stages:

1. Inventory of documents, including laws and regualtions on energy policy and nature conservation in EU and Estonia;
2. Stakeholder mapping: all actors involved in the wind energy regulation, impact assessment, support scheme, and production, as well as in management of protected areas;
3. Interviews with stakeholders to identify and evalute the significance of the issues of potential conflict between renewable energy and nature conservation policies.
4. Analysis of the effectiveness and efficiency of policy instuments, with special focus on renewable energy support scheme and designated Natura 2000 sites.
5. Conclusions on the factors that facilitate or limit the production of wind energy, especially offshore.

The current report summarises the results of the study.

2. From EU directives to national policy instruments

2.1 EU Directives and corresponding national policy instruments

The EU directives addressing the supply and consumption of renewable energy, including wind energy and protection of the biodiversity are the following:

The **Renewable Energy Directive (RES-Directive)** (2009) directly affects the expansion of offshore wind energy generation. The directive aims to increase the share of electricity generation from renewable energies to 20% by 2020. Wind energy generation, on- or offshore, is one of the key renewable energy sources. RES-Directive is the main driving force of the expansion of the renewable energy and thus forms the core of the case study. The RES-Directive is highlighted red in the table above, as a policy document to be further explored in the next steps of the case study.

The **Habitats Directive (HD)** (1992) and the **Birds Directive (BD)** (1979) are the two key EU nature conservation directives. The Habitats Directive stipulates the development of EU-wide network of Natura 2000 sites, comprising both bird sites and habitat sites. The Article 6 (3) and (4) request to assess the potential of effects on human activities on Natura 2000 sites and to ensure that the favourable conservation status of species and habitats would be maintained. Therefore the impacts arising from planning, construction and maintenance of onshore and offshore wind farms needs to be assessed prior to granting planning and construction permissions. This is the reason why both, BD and HD are marked in red in the table above.

Other EU legislation that regulate the planning and siting of wind energy installations are the **Strategic Environmental Assessment Directive (SEA Directive)** (2001) is applied on plans and programs, whereas the **Environmental Impact Assessment Directive (EIA Directive)** (1985, 2011) is applied on projects likely to have significant environmental effects on the environment prior to the granting planning or construction permit. Both SEA and EIA directives have linkages to Habitats and Birds Directive in cases where plans, programs or projects may have adverse effects on Natura 2000 sites. On-shore and offshore wind farms are likely to have such effects thus SEA and EIA directives are important tools to address these impacts, and thus the directives are highlighted red in the table above.

Safeguarding the marine ecosystems, the **Marine Strategy Framework Directive (MSFD)** (2008) is an important piece of EU legislation, which aims to achieve good environmental status of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The MSFD establishes European Marine Regions on the basis of geographical and environmental criteria. Each Member State - cooperating with other Member States and non-EU countries within a marine region - are required to develop strategies for their marine waters. The marine strategies to be developed by each Member State must contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes. Since MSFD provides the general framework of the protection and use of marine resources, including for generation of wind

energy and protection of marine ecosystems, the directive would be addressed as secondary to the RES directive and BD/HD. That is why the MSFD is highlighted in grey in the table above.

The national policy instruments implementing the listed EU directives is presented in the following table. In addition to specific laws, there are also several strategies and action plans relevant in the study area (renewable energy and nature conservation:

Act on Sustainable Development[4] (*Säästva arengu seadus*, 1995) provides the need to use natural resources sustainably, stipulating *inter alia* that "planning documents, programmes and projects affecting the use of the environment and of natural resources shall be made available to the public", and that "use of natural resources and of natural resources shall be subject to use rates and charges calculated on the basis of the impact upon the environment". The Act also stipulates the need to draw up national plans in economic sectors, including energy, to be finally approved by the Parliament.

National Energy Development Plan 2020[5] (*Energiamajanduse riiklik arengukava aastani 2020* (2009) covers electricity, heat and transport fuels. The Strategic Environmental Assessment report provides 9 alternative scenarios for electricity production and consumption, 3 heat production and consumption and 3 transport fuel scenarios. The SEA report suggests an electricity scenario with the least effect on the environment and human health, where 80% of the oilshale is used for electricity production and 20% for shale oil production, and where the oil shale based electricity shall not exceed 39% of the total electricity production (compared to 80% in 2009) by 2020. The share of wind energy in total electricity production would have been increased to 21,7%. The Plan, however, envisaged to increase the share of wind energy production to 1200MW, forming 40% of the total electricity production by 2020, but at the same time also the investment into two new oil shale power plants with total capacity of 600MW (1,2 billion euro) to replace part of the old power plants to meet the limits of CO_2, SO_2 and NO_x emissions by 2015. The process for drafting of Energy Development Plan 2030 and corresponding Strategic Environmental Assessment was initiated in summer 2013 by Ministry of Economic Affairs and Communications.

National Electricity Development Plan 2018[6] (*Eesti elektrimajanduse arengukava aastani 2018* (2009) favoured the increase of wind energy production from 150MW in 2010 to 400MW by 2018 on land. The offshore wind energy production is designed to start from 200MW in 2016 to be increased to 500MW by 2018. Shale oil fired gas turbines are designed to become the balancing power to offshore wind parks, starting from 2016 with 200MW, increasing to 500MW by 2018.

[4] Act on Sustainable Development http://www.envir.ee/orb.aw/class=file/action=preview/id=1101227/Act+on+SD_2009.pdf

[5] Energimajanduse riiklik arengukava aastani 2020 [National Energy Development Plan 2020] http://www.mkm.ee/public/ENMAK.pdf

[6] Eesti elektrimajanduse arengukava aastani 2018 [National electricity development plan 2018] http://www.eas.ee/images/doc/ettevotjale/innovatsioon/energia/eesti_elektrimajanduse_arengukava.pdf

National Renewable Energy Action Plan 2020[7] (*Eesti taastuvenergia tegevuskava aastani 2020* (2010) sets the target to meet of the EU target of 25% of the final energy consumption from renewable resources by 2020. The national target does not go beyond the mandatory target. The Action Plan envisages that the capacity of onshore wind parks increases to 100MW by 2020 and 500MW of offshore wind parks by 2018. The financing mechanisms of offshore wind parks should be sought out by 2015.

Nature Conservation Development Plan 2020[8] (*Looduskaitse arengukava aastani 2020*) (2012) sets four objectives of nature conservation policy in Estonia. Under the third objective "Sustainability of natural resource is maintained and ecosystem approach is applied upon their use", also the potential conflict of renewable energy production, including wind energy onshore and offshore are addressed. The Plan points out that wind parks affect birds and bats, while the offshore wind parks are usully designed into shallow waters rich in biodiversity. In order to avoid such conflicts marine spatial plan need to be developed, on project level, detailed EIA must be conducted. The Plan admits that only one third of the marine areas are covered by biodiversity inventories, EEZ has not been covered yet. Thus there is little data on marine ecosystems available today. The Plan also sets a target to have management plans of protected areas (also at sea) completed by 2020.

Table 1 illustrates the regulatory framework of wind energy and nature conservation at national level. Wind energy is regulated by the Electricity Market Act and Grid Code. Siting of a wind turbine or a wind park is regulated by a Planning Act, impacts arising from such installations are assessed via EIA and/or SEA regulated by the Environmental Impact Assessment and Environmental Managament Systems Act. Siting of an offshore wind turbine or a wind park needs a water permit that is regulated by the Water Act. Marine protected areas, as any other protected area on land are established and managed according to the Nature Conservation Act.

[7] Eesti taastuvenergia tegevuskava aastani 2020 [National renewable energy action plan 2020] http://www.mkm.ee/public/nreap_EE_final_101126.pdf

[8] Looduskaiste arengukava aastani 2020 [Nature conservation development plan 2020] http://www.envir.ee/orb.aw/class=file/action=preview/id=1186984/LAK_lop.pdf

Table 1:*National policy framework of wind energy and nature conservation*

Environ-mental policy themes	Policy instruments			
	1	2	3	4
Energy	**Electricity Market act** Elektrituru seadus	**Grid Code** Võrgueeskiri	**Planning Act** Planeerimisseadus	**Environmental Assessment and Environmental Management System Act** Keskkonnamõju hindamise ja keskkonnajuhtimissüsteemi seadus
Climate				
Agriculture				
Air				
Waste				
Water	**Water Act** Veeseadus			
Biodiversity	**Nature conservation act** Looduskaitseseadus			

■ ***Renewable Energy Directive (2009/28/EC)***
■ ***Water Framework Directive (2000/60/EC) and Marine Strategy Framework Directive (2008/56/EC)***
■ ***Habitats Directive (92/43/EEC)/Birds Directive (2009/147/EC)***
■ ***EIA Directive (85/337/EEC)/SEA Directive (2001/42/EC)***

The Electricity Market Act regulates the renewable energy support scheme (Policy Instrument 1). Nature Conservation Act regulates the establishment and management of protected aeras, including those at sea (Policy Instrument 2). Environmental Impact Assessment and Environmental Management Systems Act regulates the impact assessment of spatial plans (SEA) and projects (EIA) (Policy Instrument 3). The role of the Grid Code (Policy Instrument 4), Planning Act (Policy Instrument 5) and Water Act (Policy Instrument 6) are described in Table 2.

Table 2: *Design features of relevant national policy instruments*

Overview of relevant national policy instruments						
Parameter to compare	**P1 Renewable energy support (Electricity Market Act)**	**P2 Designated Natura 2000 sites (Nature Conservation Act)**	**P3 Environmental Impact Assessment and Environmental Management Systems Act**	**P4 Grid Code (Electricity Market Act)**	**P5 Planning Act**	**P6 Water Act**
Timeframe	Act was first adopted in 2003; amended 18 times since then. Enforcement of the support scheme: 2007	The current law adopted in 2004 transposing the EU law; amended 21 times since then	The first law enforced in 2001; the current act was adopted in 2005.	Adopted in 2003, amended 5 times since then	First version from 1995, replaced by the current act adopted in 2002, amended over 22 times since then	Adopted in 1994, amended 40 times since then
Policy objectives and targets	Support for implementation of renewable sources of energy, making the energy sector more effective and ensuring the domestic energy security / adequate capacity	Defines the principles of nature conservation, conservation of species and habitats, and management of protected areas, including Natura 2000 sites, and categories of fines for non-compliance. No	The act sets general principles and procedures how to conduct EIA and SEA and Appropriate Assessment. It also identifies the mandatory assessment of impacts of wind	The Regulation prescribes the requirements for the connection of electrical installations to the power network and the rights and obligations of the market participants	The purpose of the Act is to ensure conditions which take into account the needs and interests of the widest possible range of members of society for balanced and sustainable spatial development, spatial planning, land use and building. According to the	The purpose of the Water Act is to guarantee the purity of inland and transboundary water bodies and groundwater, and ecological balance in water bodies. For the construction of wind turbine into the water, a water permit is requested from the developer.

Overview of relevant national policy instruments						
Parameter to compare	**P1 Renewable energy support (Electricity Market Act)**	**P2 Designated Natura 2000 sites (Nature Conservation Act)**	**P3 Environmental Impact Assessment and Environmental Management Systems Act**	**P4 Grid Code (Electricity Market Act)**	**P5 Planning Act**	**P6 Water Act**
		specific regulations for marine sites or species / habitats.	parks.	related to balance responsibility	list approved by Estonian Government, the wind parks which total capacity is more than 7.5 MW and contains more than 5 windmills, is an object of significant spatial impact, for which the preparation of a comprehensive plan is mandatory.	
Type of instrument	Subsidiy	Command and Control	Command and Control	Command and control	Command and Control	Command and control
Activity coverage	Energy	Biodiversity	Energy, land, biodiversity	Energy	Energy, land, biodiversity	Water
Directly targeted stakeholders	Wind energy companies, grid provider	Wind energy companies, grid provider, local authorities, permitting authorities, local communities, experts, environmental NGOs	Wind energy companies, grid provider, local authroties, permitting authorities, local communities, experts	Wind energy companies, grid provider	Wind energy companies, grid provider, local authorities, permitting authorities, local communities, experts	Wind energy companies, grid provider, local authorities, permitting authorities, local communities, experts, fishing companies, defence authorities

2.2 Selection of key national policy instruments

In this case study, the two primary policy instruments (PI) have been selected:

- Renewable energy support (implemented under the Electricity Market Act);
- Designated Natura 2000 sites (implemented under the Nature Conservation Act);

The main policy instrument to promote renewable energy in Estonia is the ***renewable energy support*** scheme applied according to the Electricity Market Act. The renewable energy support scheme came into force in 1.05.2007 and it is targeted at increasing the use of renewable energy sources, making energy sector more effective and to assure the security of energy supply.

A producer of renewable energy is entitled to receive support from the transmission network operator (state company AS Elering):

1) for electricity if the producer has generated it from a renewable energy source. Since 1 July 2010, for electricity if the producer has generated it from a renewable energy source, except from biomass;

2) since 1 July 2010, for electricity if the producer has generated it from biomass in an efficient cogeneration process, except where the electricity has been generated from biomass in a condensation process, in which case the support is not paid.

3) for electricity if the producer has generated it in an efficient cogeneration regime from waste within the meaning of the Waste Act, from peat or from waste gas from oil shale production;

4) for electricity if the producer has generated it in an efficient cogeneration process with a cogeneration installation whose electric capacity does not exceed 10 MW;

5) for the availability of the installed net capacity of an oil shale-based generating installation if the generating installation started operation in the period from 1 January 2013 to 1 January 2018.

A producer who uses wind as the source of energy production may receive support until the total amount of 600 GWh electricity is generated from wind power in a calendar year.

The renewable energy support is financed by consumers according to the calculations made by the transmission network operator based on the annual production amounts of renewable energy and allocated support units.

The primary policy instrument in nature conservation policy is the **Nature Conservation Act,** which defines the principles of nature conservation, conservation of species and habitats, and management of protected areas, including Nature 2000 sites, and categories of fines for non-compliance. The protection of Natura 2000 sites has been effective since 2001, the year when most of the Natura 2000 sites were identified. Currently the marine sites are being studied and designated. Specifically, the policy instrument most relevant for the case study, is the designation of Natura 2000 sites. Conservation objectives are species, habitats and

landscapes of conservation concern. The rules also describe the management needs in different management zones, from no management to implementation of active management measures in order to maintain or achieve favourable conservation status of species and habitats. The Nature Conservation Act also stipulates that management needs have to be provided in special management plans of protected areas or species' action plans.

The policy instruments regulating the siting and impact assessment of offshore wind energy development planning and projects, and transmission of produced electricity are:

- Grid Code, which prescribes the requirements for the connection of electrical installations to the power network.
- Planning Act, which regulates the relations between the state, local governments and other persons in the preparation of spatial plans.
- Environmental Assessment and Environmental Management System Act, which sets general principles and procedures how to conduct EIA and SEA and Appropriate Assessment.
- Water Act, which regulates the use and protection of water, and relations between landowners and water users. For the construction of offshore wind turbines, a developer has to apply a water permit.

Since, the relevance of these four policy instruments is not so strong or is rather indirect than direct, these policy instruments are covered on a more aggregate level under context factors.

The timeline of adoption of relevant policies and policy instruments on energy, including wind energy, and nature conservation are illustrated in Figure 1.

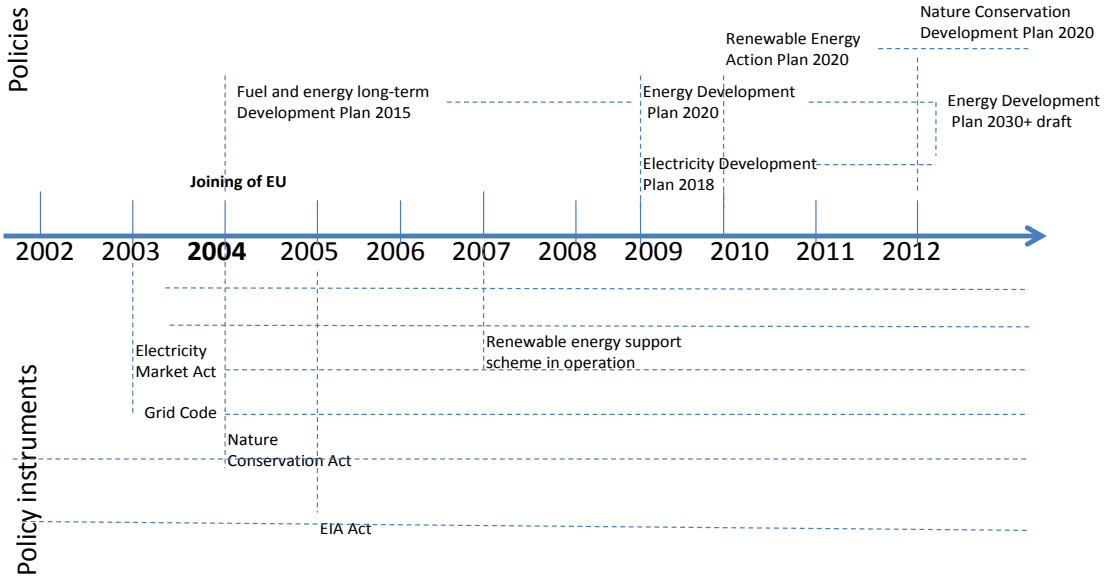

Figure 1: *Timeline of adoption of policies and policy instruments on energy, including wind energy, and nature conservation in Estonia*

2.3 Identification of affected stakeholders

Stakeholder groups involved and affected by the wind energy projects and nature conservation are described in Table 3. The stakeholders have been identified according to their role in the process of planning, impact assessment, permitting and operation of the wind energy projects, both onshore and offshore.

Table 3:*Affected stakeholders*

Relevant stakeholder groups	P1 Renewable energy support (Electricity Market Act)	P2 Designated Natura 2000 sites (Nature Conservation Act)	P3 Environmental Impact Assessment and Environmental Management Systems Act	P4 Grid Code (Electricity Market Act)	P5 Planning Act	P6 Water Act
D35 1.1 Production of electricity	Wind energy companies; Grid provider	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts, Env. NGOs	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts	Wind energy companies; Grid provider	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts	Wind energy companies; Grid provider; local authorities; permitting authorities; local commun-ities; experts; Fishing companies; National defence authorities
D35 1.2 Trans-mission of electricity	Wind energy companies; Grid provider;	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts	Wind energy companies; Grid provider; local authorities; permitting authorities; local communities; experts	Wind energy companies; Grid provider; local authorities; permitting authorities; local commun-ities; experts; Fishing companies; National defence authorities

3. Effectiveness and efficiency of policy instruments

3.1 Effectiveness

According to the Estonian Wind Power Association (EWPA), there were 85 onshore wind turbines with a total capacity of 184MW installed by the end of 2011 in Estonia[9]. By 2013, there were 126 turbines in 21 wind farms onshore, with total production capacity 269.4 MW. The wind turbines produced electricity which was about **5% and 5.5% of the total electricity consumption** in Estonia in 2011 and 2012, respectively. On 8 November 2012 the wind production exceeded 200MW for the first time in history of Estonian wind power generation[10] ranging to total capacity of 269.4 MW. For 2013, the EWPA forecasts the increased capacity of 294.3 MW. The two largest producers of wind energy in Estonia are state energy company Eesti Energia and NeljaEnergia OÜ that share 41% and 51% of total production capacity, respectively. Both companies together with Neugrund OÜ have plans to go offshore, with total capacity of 1490MW.

Renewable energy support

As for the main PI targeted at utilizing renewable energy sources, the objective is set on a very broad level: the target is set for total renewable energy share, and it is not defined separately for different renewable energy sources. Hence, the target is to obtain 25% of energy from renewable energy sources in gross final consumption of energy by 2020 (Estonian Renewable Energy Action Plan up to 2020). The indicative shares for different renewable energy sources are also provided in the named plan, but these cannot be taken as mandatory (Table 4). As it can be seen from the table, offshore wind energy is expected to take into use in 2016. The installed capacity of onshore wind energy in 2012 was slightly lower than expected.

Table 4: *Expected and actual production capacity of wind energy, MW (Estonian REAP and Estonian Wind Energy Association)*

	2010	**2011**	**2012**	**2013**	**2014**	**2015**
Assumed wind energy:	147	178	311	350	400	400
Incl. onshore	*147*	*178*	*311*	*350*	*400*	*400*
Incl. offshore	-	-	-	-	-	-
Actual wind energy (onshore)	148.8	184.1	269.4			
	2016	**2017**	**2018**	**2019**	**2020**	
Wind energy total:	500	550	550	650	650	
Onshore	*400*	*400*	*400*	*400*	*400*	
Offshore	*100*	*150*	*150*	*250*	*250*	

[9] http://www.tuuleenergia.ee/en/windpower-101/statistics-of-estonia/

[10] http://elering.ee/tuulikute-tootmisrekord-uletas-200-megavati-piiri/

As the general RES target for Estonia set for 2020 (25%) has been already met in 2011 (25.9%), the government has no initiative to promote renewable energy use further than that. This is the reason why the offshore wind energy development is also not so much favoured by the government as the system is financed by consumers. It is most likely that the offshore wind energy production capacity predicted for 2016 (100 MW) will not be achieved, as no offshore wind energy park project has been approved yet. Also, the production capacities projected for offshore energy seem to be too low, as offshore wind energy parks need to be usually larger (at least 500MW) than that in order to be economically efficient.

Hence, as a policy instrument, the renewable energy support has reached the objective faster than expected, which raises a question of the support level being set too high (Figure 2). The issues of efficiency are discussed in the next chapter.

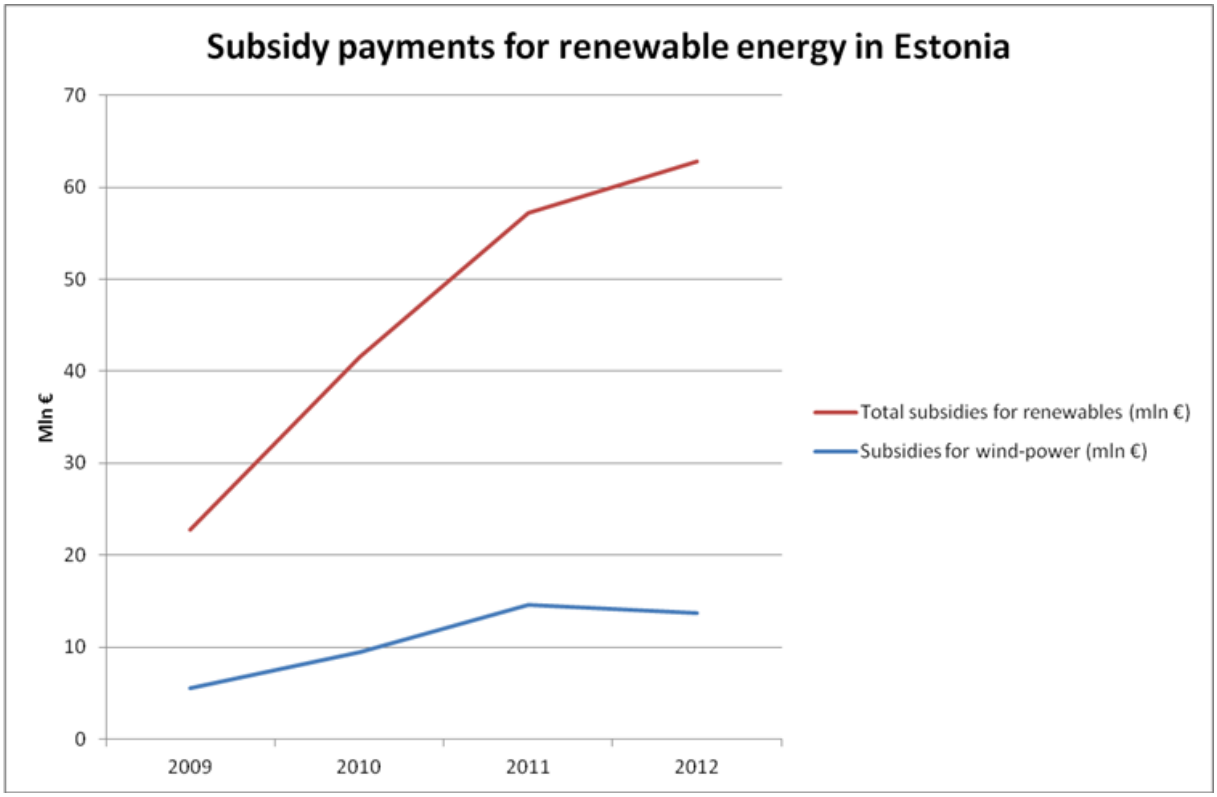

Figure 2: *Renewable energy support payments in 2009-2012 in Estonia (Source: AS Elering)*

It should be noted that although the production of onshore wind energy has been increasing, the support payments do not necessarily increase in the same pace. The reasons for that could be either the non-compliance of the producers with Grid Code, i.e. being unable to meet the technical requirements, or the annual production exceeding the limit of annual support provided by the Government for a total of 600 GWh wind energy produced in the whole country. The con-compliance of the producers with technical requirements is the main reason since the wind energy production has not reached the annual limit yet.

In recent years, the renewable energy tax for consumers has been decreasing, as the actual amount of energy produced from wind has been smaller than expected due to poor wind conditions. Still, wind energy forms 41% among renewable energy support, biomass 31% and other sources (hydro, waste and biogas) 12% and 17% from efficient cogeneration.

Designation of Natura 2000 sites at sea

According to the Estonian Environmental Agency[11], there are 608 Natura 2000 sites in Estonia: 542 SCIs and 66 SPAs in 2013. There are 69 sites (43 SCIs and 26 SPAs) that have sea area, including 4 sites that are entirely located at sea, while other sites have both mainland and sea area. (Figure 3).

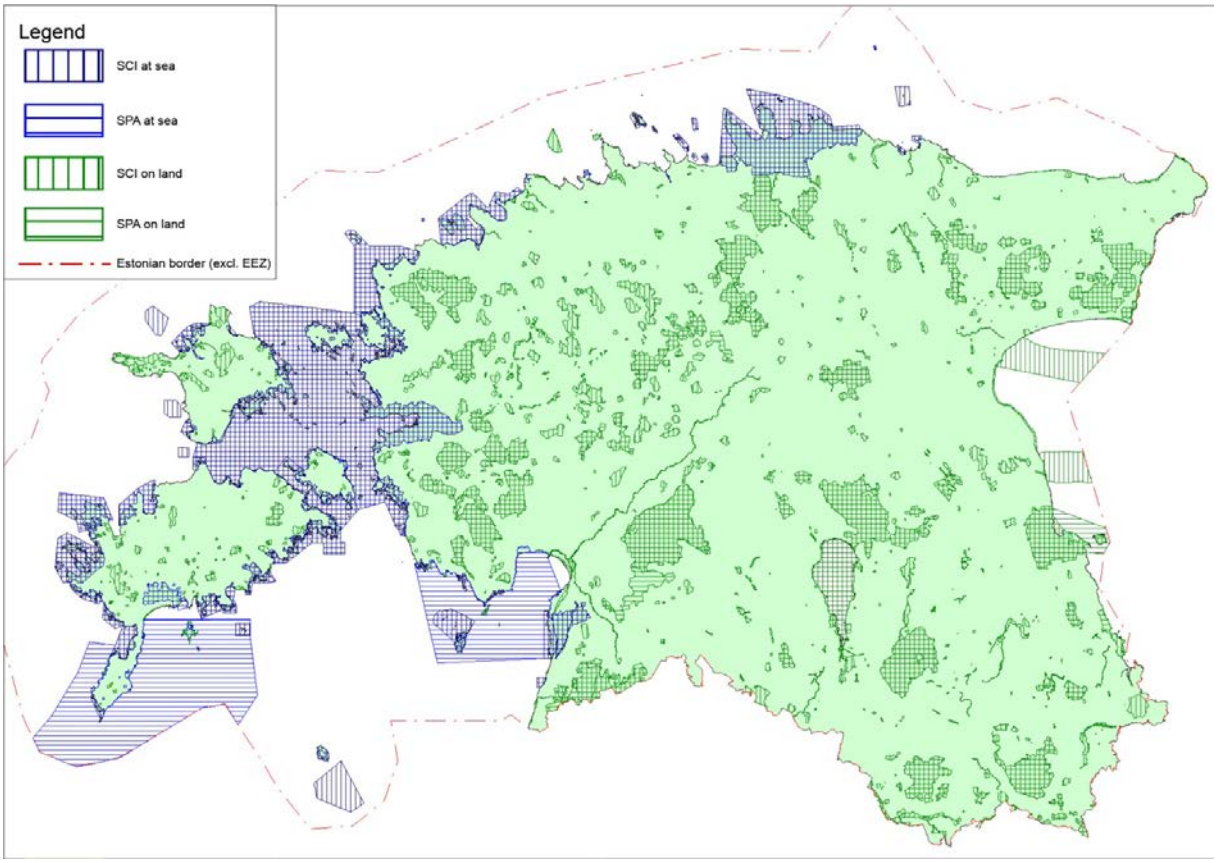

Figure 3: *Natura 2000 sites in Estonia (SPAs designated under Birds Directive and SCIs under the Habitats Directive. Overlaps of SCIs and SPAs in raster. (Source: Estonian Environmental Agency, 2013)*

The inventories of marine ecosystems are just under way. The inventories are taking place in inland sea and territorial waters, the EEZ has not been explored yet. Thus the information on the marine habitats and species is incomplete. Much of the information gathering at sea has been driven by the offshore wind power developers who have commissioned inventories of areas of their interest to develop offshore wind parks (e.g. NW Hiiumaa marine area, Neugrund shallows, Gretagrund shallows, Pärnu Bay etc).

All the SCIs and SPAs have national designations (national park, nature reserve, landscape protected area, limited conservation area, or species protection site), with protection rules adopted by the Government. One SCi or SPA may have more than none national designation with different management zones (Figure 4), which makes it sometimes rather complicated to understand the matching of borders and management restrictions imposed by

[11] Estonian Nature Conservation in 2011. http://www.keskkonnainfo.ee/main/index.php/en/component/content/article/48-uudisedeng/764-new-publication-qestonian-nature-convservation-in-2011q

the protection rules of different designations. The Nature Conservation Act does not make a difference between terrestrial and marine protected areas, the principles of designation are the same, the management zones should comply with the designation and protection rules need to be adopted by the Government and management plan by the Minister of the Environment.

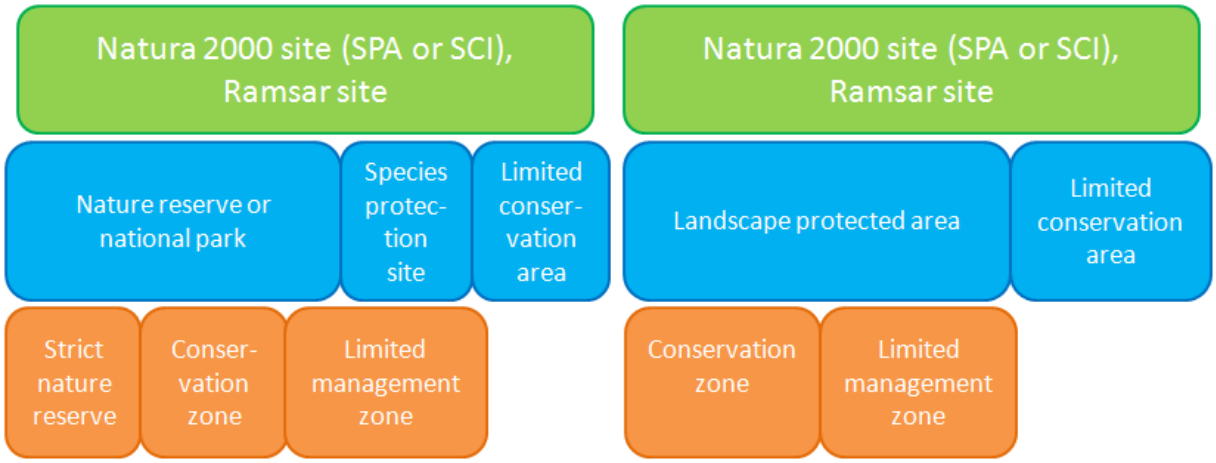

Figure 4: *National and international designations of protected areas, and corresponding management zones. [12](source: Peterson, K. Practice and Quality of Appropriate Assessment, 2010)*

3.2 Efficiency

3.2.1 Cost-benefit assessment

Although the Electricity Market Act regulates the electricity production, transmission and support to renewable energy, there is no offshore wind production yet. § 59 of the Act provides that the producers of renewable energy are entitled to renewable energy support as following:

- 0.0537 €/kWh of electricity from wind, water, solar, biogas or biomass based cogeneration;
- 0.032 €/kWh of electricity in case of efficient cogeneration process based on waste, peat or carbonisation gas obtained as a result of processing of oil shale; or efficient cogeneration process with a cogeneration installation whose electric capacity does not exceed 10 MW

Wind energy producer may receive support until the total amount of 600 GWh electricity is generated from wind power in Estonia in a calendar year.

In 2011 wind energy production received support of 14.4 million euros, representing 23% of the total amount of renewable energy support paid by the consumers.

[12] One Natura 2000 site may have more than one national designation. National park, nature reserve, landscape protected area and species protection site may have one to three management zones, limited conservation area is not divided into management zones. The system applies both to terrestrial and marine protected areas.

The renewable energy support is financed by the consumers, as every electricity consumer has to pay renewable energy fee, which in 2012 was 0.0097 €/kWh, i.e. about 10% of electricity price. In autumn 2012 the Ministry of Economic Affairs and Communications proposed to limit the support for renewable energy, reasoning it with the need to lower the costs for electricity consumers.

In addition to renewable energy support, renewable energy has also been financed by other sources as brought out on Table 5.

Table 5: *Financing of renewable energy in 2004-2012 (State Audit Office 2012)*

Source of financing	Financed amount (millions euros)
Renewable energy support	189.8
Investment support (CO_2 quota sales, EU funds, Environmental Investment Centre)	53.2
European Bank for Reconstruction and Development	23.5
Measures of Rural Development Plan	8.1
EEA and Norway grants	0.4
Agricultural applied research	0.2

Hence, the amount of wind energy eligible for support is limited to 600 GWh, of which 448 GWh is already produced on land. As known from other countries' experience, onshore wind production is cheaper than offshore and the costs depend on the distance from land (table 6). As offshore wind production is more expensive than onshore wind production: the differences estimated by Wallach et al (2011) are presented in table 6, but it should be reminded that in Estonia a cost component of ice needs to be considered as well. As Estonia has reached its general target of renewable energy share, the government is not interested in expanding the renewable energy support scheme.

Table 6: *Operating costs of near shore and far shore wind turbines (Wallach et al. 2011)*

Category	Year 1-10	Year 11-20
Scenario I (near shore, 12 nm)	2.94 ct/kWh	3.04 ct/kWh
Scenario II (far shore, 38 nm)	3.03 ct/kWh	3.68 ct/kWh

3.2.2 Dynamic efficiency

Dynamic efficiency is about learning effects and other opportunities for cost decreases (e.g. economies of scale) accrueing once the environmental technology (i.e. offshore wind) has begun to diffuse. It can improve the cost-to-effectiveness ratio of a (set of) policy instrument(s). As there are not yet any offshore wind power installations (and no such expectations in the near future) in Estonia, dynamic efficiency does not play a role in this case study.

3.2.3 Impacts of Co-Effects on efficiency

The possible economic co-effects of offshore wind energy include positive and negative ones: it has positive effects on investments and employment, specifically in construction phase, but also in utilization phase. It perhaps has wider positive economic effects, as some parts of wind generators (e.g. transformers) are produced in Estonia.

There are also important negative co-effects on biodiversity and local community: for example, the visual effect, noice, effect on fishing, but also the effect on marine ecosystems (species and habitats) as well as migratory birds and bats. As the sea habitats have not inventoried yet in Estonia and the designation of Natura 2000 sites on open sea is postponed, the developers who want to build offshore wind parks are required to carry out additional studies about species and habitats. Hence, the biodiversity concerns are perceived as a reason contradicting and prolonging the development approval, although the real reasons might be something else.

Table 6: *Main intended effects*

Main effects	Description
Environmental friendly energy	The main driver of renewable energy support was the need to achieve the target for renewable energy share set up by the EU
Increased energy security	Diversification and dispersion of energy sources and utilization of renewable energy sources increases energy security

Table 7: *Possible Co-effects*

Co-Effects	Description
Biodiversity	Construction and operation of offshore windfarms may affect marine ecosystems (species and habitats) as well as migratory birds and bats.
Effects on economic indicators	Utilization of offshore wind means investments and positive employment effects (during the construction phase). Also wider positive economic effects, as part of wind generators production is located in Estonia.
Effects on local community	Negative: fishing, visual effect, noise. Positive: temporal employment

4. Expected and observed system context

4.1 Defining the system context and identification of context factors

The context factors that were found to be important in Estonian case, are provided in table 8. The economic factors most relevant are GDP growth, investment climate and price of electricity. GDP growth favours investment activities, and hence also investments in renewable energy. An attractive investment climate has always been a priority of Estonian economic policy to attract foreign investments. Price of electricity is an important factor perceived by consumers: if this is too high, there is big pressure to decrease it and RE is usually seen as an expensive alternative.

The ecological factors most relevant are greenhouse gas emissions and final energy consumption, as if these are increasing, these could favour RE development. Also share of renewable in final energy consumption is important: if the target set is reached, the motivation to invest further into RE might not exist any more. Energy dependence is an important factor for Estonia, which could be seen as supporting the motivation to invest in RES.

As for natural resources, the relevant factor is the number of sites designated under the EU Habitats and Birds Directives, as wind parks development plans often conflict with the designated sites.

Table 8: *System context factors*

Type of factor	Evaluation factors	Sub-factors	Description/measurable markers
System Context Indicators	**Economic**	*Economic development*	Annual GDP growth
			Investment climate
			Price of electricity
	Ecologic	*Climate Change*	Greenhouse gas emissions
		Energy	Final energy consumption
			Share of renewables
			Electricity export
			Energy dependence
		Natural resources	Number of sites designated under the EU Habitats and Birds Directives

Table 9: *System context factors relevant for offshore wind in Estonia - quantified*

Indicator	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Economic	No													
Economic development														
Annual GDP growth	%	10.3	6.7	7.0	8.2	6.7	9.1	10.3	7.7	-4.0	-14.0	3.4	8.3	3.9
Price of electricity (households)	€/kWh								0.078	0.083	0.092	0.099	0.101	0.124
Price of electricity (industry)	€/kWh								0.063	0.069	0.077	0.085	0.088	0.096
Business investment	% of GDP	18.82	18.75	20.28	22.48	21.72	21.46	22.27	22.23	19.47	11.99	11.06	12.91	
Ecologic														
Climate change														
GHG emissions	(1990 = 100)	42.3	43.3	41.8	46.5	47.4	45.8	44.4	52.2	48.5	40.3	49.5	51.8	
Number of Natura 2000 sites (SCI+SPA)[1] on land and at sea	No	NA	NA	NA	NA	509+66	509+66	509+66	531+66	531+66	531+66	542+66	542+66	542+66
Incl. number of designated Natura 2000 sites on land only(SCI+SPA)	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	499+40	499+40
Incl. number of designated Natura 2000 sites at sea (territorial waters and EEZ), partly on coast	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	43+26	43+26
Energy														
Final energy consumption	1000t TOE	2423	2656	2620	2748	2808	2867	2868	3091	3055	2769	2911	2843	
Share of renewables in final energy consumption	%					18.4	17.5	16.1	17.1	18.9	23	24.6	25.9	
Electricity export	GWh	1303	1118	1102	1989	2141	1953	1001	2765	2310	2943	4354	5252	4950
Energy dependence	%		32.14	29.47	26.31	28.43	25.39	28.48	23.77	23.97	21.39	13.11	11.7	

Source: Eurostat database; [1] – Estonian Environment Agency 2012[13]

[13] Conservation of Estonian Nature in 2011. Estonian Environment Agency, 2012 http://www.keskkonnainfo.ee/publications/ELK_2011_eng.pdf

4.2 Impact of expected and observed context factors on effectiveness/efficiency of policy instruments

PI 1: Renewable energy support

Economic

Annual GDP growth percentage

During the policy formation time (in the beginning of 2007) the GDP growth was expected to continue a rapid growth, bringing in and favouring the investments. However, in reality the GDP declined considerably in 2008-2009, leading to drastic savings in public sector and pressure to cut down different subsidies, including renewable energy support.

Price of electricity

The price of electricity has increased at a small rate in 2000s, which was expected to continue, but due to opening of electricity market the price for households has substantially increased. As renewable energy support is financed by renewable energy fee paid by consumers of electricity, this has given rise to public discussions to cut down the part of renewable energy fee. From one side, when price of electricity is high, this makes renewable energy production economically profitable and thus attractive for investors. From the other side, when the living standard of people is low, high electricity price is disputed. Also it is required that consumers know for what they pay, hence renewable energy fee is shown on electricity invoice, but it is questionable whether the price of conventional energy is correct, as it is partly subsidized from state budget.

Business investment

An important criterion for policy decisions in Estonia is about maintaining the favourable investment climate to attract foreign investments. Business investments were expected to increase continually during the formation of the PI. However, due to economic crisis, also the business investments have decreased.

Table 10: *Economic context factors' impacts on effectiveness and efficiency (renewable energy support in the context of offshore wind development)*

System context factor	Expected "impact"	Observed "impact"	Explanation	Impact on effectiveness/ efficiency
Annual GDP growth percentage	+2	-1	GDP decrease instead of expected growth, leading to smaller investments and pressure to cut back RE subsidies	Slightly negative
Price of electricity	0	-2	Was expected to rise at a small rate, but increased considerably in 2012-2013 due to opening of electricity market. As RE support is financed by electricity consumers, the significant price increase has raised public demands to cut down the RE fee	Highly negative

System context factor	Expected "impact"	Observed "impact"	Explanation	Impact on effectiveness/ efficiency
Business investment	+2	-1	Was expected to continue the increase, but has declined in years of crisis	Slightly negative

Energy

GHG emissions

Due to changes in economic production in last decades, Estonia has been in a position not needing to cut back the GHG emissions, as the production level in reference year (1990) was significantly higher than it has reached in the years of independence. Hence, the GHG in 2000 were only 42% of the value of 1990. In 2000s The GHG emissions have been expected to continue slight increase. In times of economic crisis, the GHG emissions decreased slightly, but continued to grow again since 2010.

Final energy consumption

Also for final energy consumption, the expected trend was slightly upward, and the observed one has been in accordance with that, except for the years of crisis, when it decreased a little.

Electricity export

The expected trend was slightly upward, in reality has increased considerably: from about 3000 GWh in 2007 to about 5000 GWh in 2012. If electricity export continues to increase, gives further motivation to search for alternative sources for electricity production, for example offshore wind. However, in reality it has led to higher emissions, because the electricity is produced from conventional sources.

Share of renewable energy

The share of renewable energy in gross final energy consumption was expected to increase at somewhat lower path that actually happened. Estonia has fulfilled the target of renewable energy share of 25% and this has led to government taking reserved position in expanding support for renewable energy projects. Most of the renewable energy comes from biomass; there is no offshore wind energy utilization yet. Hence, the implications on offshore wind energy development from the fulfilment of renewable energy share, is negative.

Energy dependence

Energy dependence, which is measured as a ratio of energy import to gross inland consumption, has always been an important issue for Estonia. It has been stressed also in explanatory letter accompanying the changes into the Electricity Market Act, which also introduced the renewable energy support. The argument is that diversification of energy sources strengthenes the energy security. Hence, energy dependence was expected to decrease when support mechanism for renewable energy was introduced. In reality, energy dependence has really decreased, but the role of renewable energy support in that is questionable.

Table 11: *Energy context factors' impacts on effectiveness and efficiency (renewable energy support in the context of offshore wind development)*

System context factor	Expected "impact"	Observed "impact"	Explanation	Impact on effectiveness/ efficiency
GHG emissions	+1	0	GHG increase has not been significant in last decades (compared to 1990 level), government has not proposed substantial plan to decrease the emissions	No impact
Final energy consumption	+1	0	Was expected to increase slightly, and has done so in reality	No impact
Electricity export	+1	0	Has led to higher emissions, as electricity is produced from conventional sources	No impact
Share of renewable energy	+1	-2	While the general renewable energy target is positive and has been reached, it has adverse impact on wind energy (spec. offshore), as government has reserved position in continuing renewable energy support	Highly negative
Energy dependence	+2	+1	Energy dependence has decreased, but the role of renewable energy support has not played a major role in that	Slightly positive

Crucial context factors for PI1 (renewable energy support): share of renewable energy, price of electricity, final energy consumption, business investment.

P2: Designation of Natura 2000 sites

<u>Economic</u>

GDP

GDP has a negative effect on biodiversity, as with increasing GDP and economic activities, the pressure on land available for nature conservation is increasing.

Number of designated Natura 2000 sites on land

The designation of SPAs has been complete on land, number of SCIs on land has slightly increased from 509 in 2004 to 542 in 2011 (2013).

Number of designated Natura 2000 sites at sea

The designation of SPAs and SCIs at sea has been less successful, because of poorly inventoried marine ecosystems. The designation of sites in EEZ has been lagging behind.

Table 12: *Economic context factors' impacts on effectiveness and efficiency (designated Natura 2000 sites)*

System context factor	Expected "impact"	Observed "impact"	Explanation	Impact on effectiveness/ efficiency
GDP	-1	-1	Increasing GDP and economic activities, the pressure on land available for nature conservation also increases	Slightly negative
No of designated Natura 2000 sites on land	+2	+2	The designation of SPAs has been complete on land, number of SCIs on land has slightly increased from 509 in 2004 to 542 in 2011 (2013).	Highly positive
No of designated Natura 2000 sites at sea (territorial waters and EEZ)	+2	-1	The designation of SPAs and SCIs at sea has been less successful, because of poorly inventoried marine ecosystems. The designation of sites in EEZ has been lagging behind.	Slightly negative

Crucial context factors for PI2 (designated Natura 2000 sites): number of designated Natura 2000 sites at open sea.

5. Expected and observed policy transposition and implementation

5.1 Expected and observed policy transposition and PI implementation

PI 1: Renewable energy support

Political and Social Acceptance

Motivation to invest

Renewable energy support provides from one side motivation to invest in renewables, but as the tariff is the same for onshore and offshore wind energy, and the necessary investment in offshore wind energy is higher than for onshore wind energy, this hampers the investment, or leads to search for close to shore locations to decrease the investment as much as possible. In addition, there is no certainty for investors: they are required to carry out research and finance it, but there is no quarantee that permission of building wind energy park is issued. As there are discussions of reducing the renewable energy support scheme, it further contributes to investor uncertainty.

Familiarity

The specific needs and data necessary for developing offshore energy have not been considered when the renewable energy support was designed. As there is not much knowledge and experience with offshore wind energy and sea habitats have not been studied comperehensively, this hinders the policy implementation.

Equity

Renewable energy support is financed by customers of electricity, raising the equity issue, as costs of electricity seem to be too high. The considerable increase of electricity price was not foreseen (considered) in design phase of the policy.

Adaptability

Renewable energy support has been developed to be a stable policy instrument, but the raising electricity price has led to pressure to cut down the support (financed by electricity customers), and at the same time protests among those who have invested in renewable energy production. Hence there are mixed signals sent to investors hampering the investment interest.

Table 13: *Impact of political and social acceptance on effectiveness and efficiency (renewable energy support)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Motivation to invest	+2	-1	Search for cheaper RE projects, offshore wind seen as too expensive	Slightly negative
Familiarity	0	-1	As there is not enough knowledge about sea habitats, additional research is required from project developers, hindering the development	Slightly negative
Equity	0	-1	Electricity price has risen significantly, leading to discussions about need to cut down renewable energy support (financed by all electricity consumers)	Slightly negative
Adaptability	0	-1	The support was designed as stable policy instruments, the recent changes give mixed signals to investors, hence hampering the development of offshore wind energy	Slightly negative

Policy Consistency

PI consistency with Sustainable Development targets

Renewable energy development is consistent with climate policy objectives, the objectives of biodiversity preservation are not so clearly set on national level, sea habitats and the impact of offshore wind turbines on them has not been profoundly studied.

Table 14: *Impact of policy consistency on effectiveness and efficiency (renewable energy support)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
PI consistency with Sustainable Development targets	+2	+2	Clear consistency with climate policy objectives, but not enough knowledge about biodiversity linkages, thus more studies are required from developers, hampering the investments into wind energy	Highly positive

Policy Coherence

Coordination and Management among institutions

Renewable energy is coordinated by Ministry of Economic Affairs and Communications, while the issues related to biodiversity and Natura habitats are coordinated by Ministry of the Environment. The consideration of biodiversity and other environmental concerns in the development activities is ensured by EIA/SEA procedures.

Table 15: *Impact of policy coherence on effectiveness and efficiency (renewable energy support)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Coordination and Management among institutions	0	+1	Coordination of biodiversity concerns in wind energy development is ensured via EIA/SEA procedure	Slightly positive

Implementability

Administrative setup and feasibility

There is no person in Ministry of the Economic Affairs and Communications dealing only with renewable energy issues, but these tasks are fulfilled together with others, hence no additional administrative burden

Enforceability

There are clear rules for enforcement, but similarly to other activities that need EIA, the foreseen timeline might lengthen due to public interests and discussions.

Existence of suitable infrastructure

There is not enough infrastructure capacity, limiting the location possibilities of wind parks. No plan has been designed to increase or alter the infrastructure for the needs of offshore (& onshore?) wind parks.

Table 16: *Impact of implementability on effectiveness and efficiency (renewable energy support)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Administrative setup and feasibility	0	0	No administrative burden foreseen, also not in reality	No impact

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Enforceability	0	-1	Due to EIA procedures and additional studies required, longer enforcement	Slightly negative
Existence of suitable infrastructure	0	-2	The capacity of infrastructure is too small	Highly negative

Crucial policy instrument context factors for PI1 (renewable energy support): PI consistency with SD objectives, existence of suitable infrastructure, familiarity, equity.

PI 2: Designated Natura 2000 sites

Political and Social Acceptance

Familiarity

There is knowledge of designating protected areas on land, which has been quite successful in Estonia, the knowledge could be used on sea as well, but some peculiarities emerge

Table 17: *Impact of political and social acceptance on effectiveness and efficiency (designated Natura 2000 sites)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Equity	+2	+2	Equity in terms of process: impact assessment process of renewable energy projects and planning applications is public	Highly positive
Familiarity	+1	0	There is knowledge of designating protected areas on land, which has been quite successful in Estonia, the knowledge could be used on sea as well, but some peculiarities emerge	No impact

Policy Consistency

PI consistency with Sustainable Development targets

Renewable energy development is consistent with climate policy objectives, the objectives of biodiversity preservation are not so clearly set on national level, sea habitats and the impact of offshore wind turbines on them has not been profoundly studied.

Table 18: *Impact of policy consistency on effectiveness and efficiency (renewable energy support)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness / efficiency
PI consistency with Sustainable Development targets	+2	+2	Clear consistency with biodiversity policy objectives. Still, marine areas have not been designated yet. Conflicting interests with climate policy (offshore wind energy)	Highly positive

Policy Coherence

Coordination and Management among institutions

Renewable energy is coordinated by Ministry of Economic Affairs and Communications, while the issues related to biodiversity and Natura habitats are coordinated by Ministry of the Environment. The consideration of biodiversity and other environmental concerns in the development activities is ensured by EIA/SEA procedures.

Table 19: *Impact of policy coherence on effectiveness and efficiency (designated Natura 2000 sites)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Coordination and Management among institutions	0	0	Coordination of Natura areas designation is the responsibility of Ministry of Environment. Biodiversity concerns are considered in development activities via EIA/SEA procedure	No impact

Implementability

Administrative setup and feasibility

There is a special department in the Ministry of the Environment dealing with nature protection, no additional administrative burden for designating the Natura areas for the officials.

Enforceability

Estonia has not succeeded to designate marine protected areas, although the designation process on land has been quite successful, because of low government financing of inventory of marine habitats.

Table 20: *Impact of implementability on effectiveness and efficiency (designated Natura 2000 sites)*

Policy context factors	Expected "impact"	Observed "impact"	Impact	Impact on effectiveness/ efficiency
Administrative setup and feasibility	0	0	No administrative burden foreseen, also not in reality	No impact
Enforceability	0	-2	Estonia has not succeeded to designate marine protected areas, because of low government financing of inventory of marine habitats	Highly negative

Crucial policy instruments context factors for PI2 (designated Natura 2000 sites): PI consistency with Sustainable Development targets, enforceability, equity of the planning process.

6. Explore policy instrument interaction including an analysis of stakeholder behaviour within the application system

6.1 The stakeholder system

The stakeholder system comprises key actors, such as wind energy producers, regulators, grid companies, electricity sales companies and consumers (in black-framed boxes in Figure 5). Other facilitating stakeholders are different service providers (in light green-framed boxes). The policy instruments are described in blue-framed ovals (renewable energy subsidy, voluntary agreements, renewable energy tax, excise tax and grid tax as policy instruments to affect the wind energy production, and designation of Natura2000 sites that provide limitations to the wind energy production). The context factors that facilitate the system are EIA/SEA and Appropriate Assessment expertise, academic research data availability but also the administrative capabilities and expertise in governmental and local administrations.

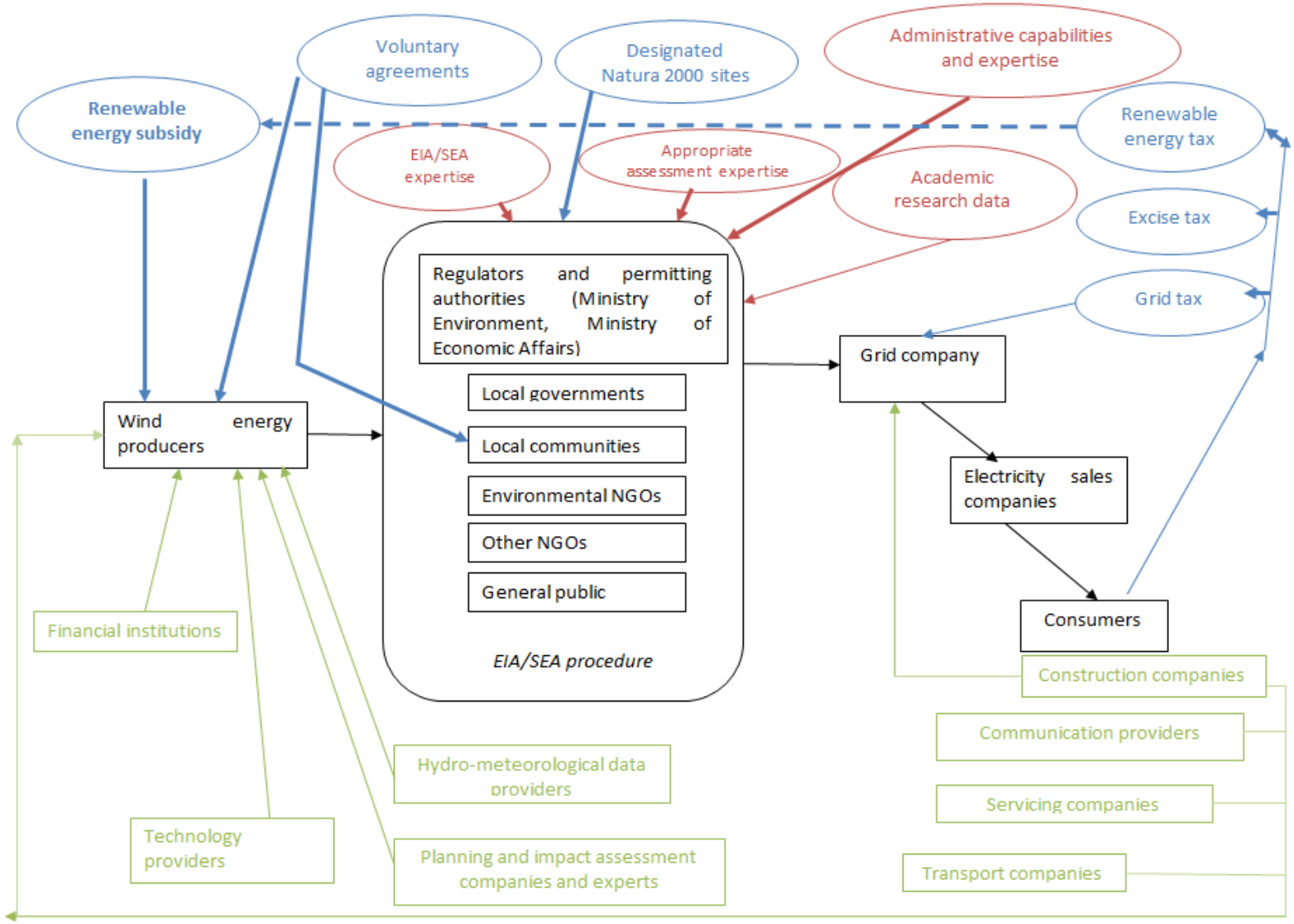

Figure 5: *Stakeholder system of wind energy producers and other stakeholders*

The relationship between the wind energy producers and other actors is further described in Tables 21 and 22.

Table 21: *Relationship of wind energy producers with other stakeholders*

Core business activities	Production and supply of wind energy to the grid
Wind energy producers (companies)	Interested party
	Subject of renewable energy support
Functional relationships with stakeholders	Submitter of planning application; responsible for SEA and EIA, including Appropriate Assessment under the Habitats Directive (nationally under the Planning Act, EIA Act and Nature Conservation Act), Applicant of permits (water permit, grid permit)
Briefly describe nature of stakeholder relations – primary relations	*Environmental Board* (approval of the SEA, EIA and AA reports Other statutory consultees of *public authorities* (participate in the planning, SEA, EIA and AA process), *Ministry of the Environment* (issuance of water permit, building permit), *Technical Supervision Board* under the Ministry of the Economic Affairs and Communications (issuance of the grid permit) *The grid company* AS Elering makes the payments fo renewable energy support to the wind energy companies. Collects renewable energy taxes from consumers via electricity sales companies; manages and upgrades transmission infrastructure, provides access to the grid *Local Governments* (approval and adoption of the spatial plan) *Local communities, Environmental NGOS, other NGOs, and general public* (participate in the planning, SEA, EIA and AA process)
Secondary relations	*Financial institutions* (banks and insurance companies) provide loans and insurance policies to developers *Technology providers* (wind turbines retailers; transporters of turbines; port admistrations) *Hydrometerological data providers* (hydro-meteorological stations; special weather forescasts, etc) *Planning and impact assessment companies* (planning and impact assessment consultaing companies)

Table 22: *Relationship of wind energy producers with other stakeholders (structured by stakeholders)*

Stakeholder name	Wind energy producers (S1)
Core business activities	Production and supply of wind energy to the grid
Targeted by environmental policy instruments (info taken from Task 2.1)	1) Renewable energy support 2) Voluntary agreement with local community 3) EIA procedure 4) Grid code
Describe policy instruments general compliance options (info taken from Task 2.2)	1) Wind energy producers are entitled to renewable energy support 0.0537 €/kWh of electricity (the same tariff applies for water, solar, biogas or biomass based cogeneration). Wind energy producer may receive support until the total amount of 600 GWh electricity is generated from wind power in Estonia in a calendar year. 2) In order to reduce conflicts with local communities, voluntary agreements are made between wind energy producers and local communities to support different activities on local level. 3) Offshore wind energy production has significant environmental impact and hence in order to get a permit, EIA must be conducted. 4) In order to get the renewable energy support, electricity must be generated by means of installation conforming to the requirements of Grid Code
Functional relationships with stakeholders	Regulators (S2) Grid company (S3) Local communities (S4) Environmental NGOs (S5) Consumers (FS1) Financial institutions (FS2) Technology providers (FS3) Hydrometeorological data providers (FS4) Impact assessment consulting companies (FS5)
Briefly describe nature of stakeholder relations – primary relations	S1-S2 Environmental Board approves of the SEA, EIA and AA reports, Ministry of the Environment issues water permit and building permit, Technical Supervision Board under the Ministry of the Economic Affairs and Communications issues the grid permit. As additional research is required from developers, this is seen as one of the reasons prolonging the procedure. S1-S3 The grid company AS Elering makes the payments of renewable energy support to the wind energy companies. Collects renewable energy taxes from consumers via electricity sales companies; manages and upgrades transmission infrastructure, provides access to the grid. Wind energy developers see the technical requirements too strict, hence complicating the support receiving. S1-S4 In order to gain a support from local communities, voluntary agreements with them are made. Local communities participate in SEA and EIA procedures for wind energy production. However, has

Stakeholder name	Wind energy producers (S1)
	not facilitated the utilization of offshore wind energy parks, the problems are elsewhere. S1-S5 Environmental NGOs participate in SEA and EIA procedures of wind energy development and represent the interests of nature conservation. Biodiversity concerns are perceived as one main reason why offshore wind energy has not been utilized yet in Estonia. S1-FS1 Electricity consumers pay finance the renewable energy support and also consume the produced electricity. Increasing electricity price has initiated discussions in media about the need to support renewable energy (perceived as too expensive). S1-FS2 Financial institutions provide loans for wind park developers. S1-FS3 Technology providers supply the necessary technology. S1-FS4 Hydrometerological data providers supply with data. S1-FS5 Planning and impact assessment companies conduct the necessary EIA and SEA procedures.

The key actors in nature conservation, with specific roles in designation and management of Natura 2000 sites, also in regard to offshore wind energy production, are regulators – the Ministry of the Environment and the Environmental Board (depicted in black-framed box in Figure 6). The other related actors are land owners and land managers, but also interest groups, such as NGOs, fishermen, tourism developers (depicted in light green boxes). Policy instruments relevant for the designation of Natura 2000 sites are depicted in blue-framed ovals, and capacities needed for designation and management of Natura 2000 sites.

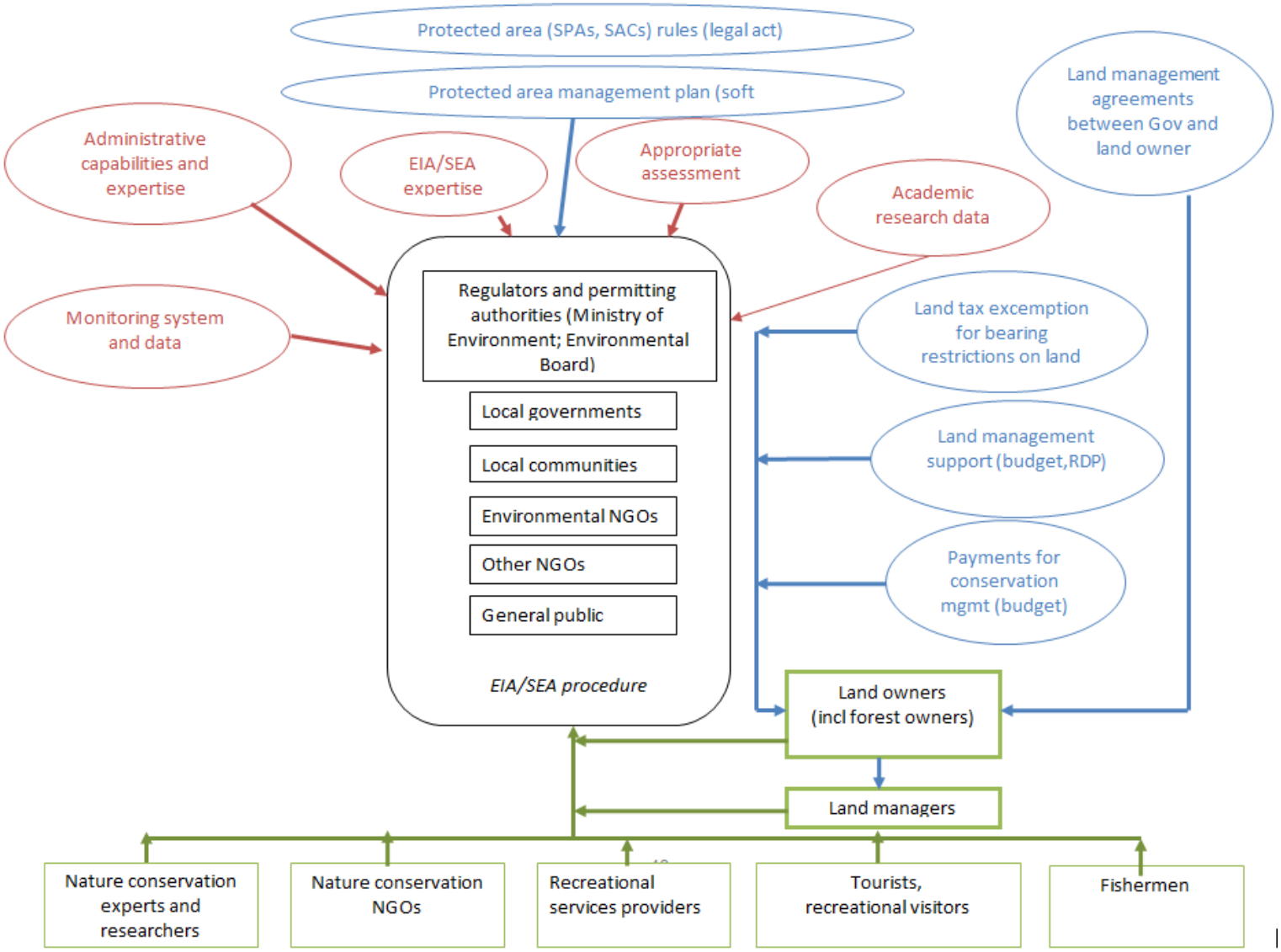

Figure 6: *Stakeholder system of nature conservation and other stakeholders in wind energy production*

The relationship between the nature conservation stakeholders and other related stakeholders is described in Table 23

Table 23: *Relationship of nature conservation stakeholders with other stakeholders in wind energy production*

Core business activities	Environmental permitting authority and manager of protected areas
Protected area managers	Environmental Board (EB) in 6 regions, regulator EB is the manager of all protected areas designated by the Government, this means that EB develops the management plans for the protected areas, organises the monitoring of habitats and species, also some management activities financed by the Ministry of Environment (subsidies for land management, payments for conservation via land management agreements), develops proposals for new designations and drafts the protection rules for the areas. EB also approves of the SEA, EIA and AA reports submitted by the developers
Functional relationships with stakeholders	*Wind energy producers* (applicant of an environmental permit (water permit), key actor in SEA, EIA and AA process, where they perform as developers seeking for approval of SEA, EIA and AA reports) *Ministry of Financial Affairs* (provides tax exemptions to land owners whose land is under nature conservation restrictions; and compensates to the local authorities for the reduced land tax revenues) *Local governments* seek opinion of EB on planning applications and approval of SEA, EIA and AA reports *Nature conservation experts and researchers* (provide input to biodiversity monitoring at national level; to SEA, EIA and AA process with data on habitats and species) *Nature conservation NGOs* (provide input to SEA, EIA and AA process with data on habitats and species) *Recreational services providers* (nature tourism companies, extreme sport companies etc provide input to SEA, EIA and AA process *Tourists, recreational vistors* (protected areas have also visitor management plans) *Fishermen* (EB also isuses fishing licences both in protected areas and outside)

6.2 Identifying possible policy interactions based on impact on stakeholders

Six interviews with the main stakeholder groups were conducted (the list is in the Annex) and their viewpoints of the policy interactions between wind energy production and nature conservation were sought. The results are summarised in the following.

All interviewees acknowledged the importance and timelyness of the topic – although there are no offshore wind park projects in operation yet in Estonia, there is a great business interest to construct such parks. However, there are several unsolved issues that have put the offshore wind park projects on hold for infinite time in the future. The main hurdles to the projects, as perceived by the interviewees, are of political, regulatory and competence-related issues.

A few wind power companies had applied for planning and construction permit for the first offshore wind park already ten years ago. The suitability of the shoals of the NE Hiiumaa Island for offshore wind park was studied, but the approval of the Environmental Impact Assessment report was put on hold, since there was no legal framework for construction in marine areas in place at that time. It took another five years to develop regulations for permitting procedures. Legally the permitting procedures are based on spatial planning documents that follow the hierarchy of such documents: starting from the higher level planning document, such as the national plan and a county plan, which are both reflected further in the lower level plans, such as in detailed plans at municipality level. The latter form the basis for application for construction permit from the local municipality and environmental permits (e.g. water permit) from Ministry of the Environment. Although, construction into the sea and the relevant permitting procedures became regulated within the Water Act, the higher level spatial plans were still missing. The county level marine spatial planning in two counties (Hiiumaa and Pärnumaa) was initiated by the Government in early 2013 only. The interviewees agreed that the legal confusion in marine spatial planning has taken a too long time, and unfortunately has resulted in planning initiatives in two, not all coastally bound counties. Two other western archipelago counties (Saaremaa and Läänemaa) would need similar plans, since developers have indicated their interest towards these areas as well. Interviewees also argued that the marine spatial plans initiated in two counties only would limit the choice of options for selecting the best sites for offshore wind parks, while alternatives need rather be sought in a larger sea area.

Environmental NGOs argued that the Government has been largely deaf to the long-term calls by NGOs to develop a comprehensive marine spatial plan that maps the national interests such as defence, nature conservation, minerals in the whole territorial water of Estonia, on one hand, and provides the business opportunities for e.g. fisheries, tourism and renewable energy producers, on the other hand. The lack of research and appropriate data on marine habitats and species was stressed by the environmental organizations. Such inventories have been patchy and largely driven by projects initiated by wind power companies or NGOs. While the former have financed the inventories by themselves, the NGOs have applied for EU money, specifically the Interreg or EU Life-Nature funding, where the Governm ent has provided up to 15% co-financing (e.g. Gorwind, Estmar, Marmoni). There have been no marine inventory projects initiated and financed entirely by the Government. The environmental experts argued that the knowledge and competence in marine issues is far behind that of similar issues on land. The lack of research and reliable data is regarded as the main obstacle for decision making on the choice of best options for the use of the sea, since the values of the sea are poorly understood.

The interviewees were asked to review and adapt the table on key policy instruments that regulate the offshore wind power planning and generation and nature conservation. Several adaptations were made to the initial table. The interviewee from Estonian Wind Power

Association (EWPA) suggested to add the draft Marine Spatial Planning Directive (MSP) to the list of policy instruments as this piece of forthcoming EU legislation would directly regulate the marine spatial planning, including the planning of offshore wind parks. Interviewees from EWPA and Estonian Ornithological Society (EOS) also suggested to add the EU document " The Wind Energy Developments and Natura 2000" (2010) as the main guidance document for conducting Appropriate Assessment of wind parks in European Union.

SEI Tallinn had developed the initial system map with system actors of energy producers, facilitating actors and policies&enabling environment and presented it to the interviewees for comments and adapation. The main adaptations included the complex system of renewable energy subsidies and taxes.

The interviewee of EWPA did not find the double role of Elering a problem. However, the problem appears, according to to EWPA, the timing of payments of renewable energy subsidies to producers which is regulated, but leaves a wide discression for Elering to make these payments. Thus delays in payments are common. Such delays of payments may cause cash flow problems to the renewable energy companies, argued the EWPA representative. The policy makers from the Ministry of Economics and Communication argued that the Energy Market Act sets a concrete date for such payments (21st day of each month), but payments are only due if the technical requirements are met by the power company in due time. The issue of delayed payments of renewable energy subsidies raised by EWPA took the grid company AS Elering by surprise. Similar to the representatives of the ministry AS Elering representative argued that such delays may only be due to the noncompliance of the energy company with regulations.

Further to the system actors, the interviewees suggested the linkages and dependances between the actors. The initial map was drawn during the interview in EOS and was further elaborated during the interviews with representatives of ELF and EWPA.

The consolidated system maps based on the interviews was developed.

Estonian National Development Plan of Energy 2020 sets the target of 25% renewable energy of final energy consumption by 2020. In 2010, 23% of the final consumption of energy was renewable energy. Since the meeting of the target value (25%) is almost complete far before the indended deadline, the Government has taken a conservative rather than a proactive approach in developing offshore wind parks, argued the interviewees. Policy makers of the Ministry of Economics and Communication confirmed the argument by saying that since the renewable energy target value will be met, the Government would not push costly investments of offshore wind farms but would rather expand the renewable energy production on mainland and from biomass.

The interviewees indicated that the major obstacles to the development and operation of offshore wind parks is the lack of experience with offshore wind parks, both at the administrative level and technical expert level. The administrative capacity to deal with such complex issues is largely missing. Experts and researchers have only started to inventory the sea and the big picture is slowly developing. Environmental organizations suggested to explore and utilize the experience of other countries (e.g. Denmark, The Netherlands, Germany) rather than invent the wheel ourselves. The EWPA representative explained that

the energy companies work closely with foreign companies and the best knowledge and technology transfer is secured. However, it was admitted by the EWPA representative that while the landbased wind parks are developed more or less routinely already, the experience with offshore wind parks is less advanced. The Baltic Sea is relatively shallow, less saline and stormy compared to the North Sea, but freezes in winter. According to the EWPA representative, these conditions provide some business advantanges to the wind energy producers in the Baltic Sea, since the construction and operating costs may be less in the wind parks of the Baltic Sea than in the North Sea.

Regarding the economic incentives, both – whip (tax) and carrot (support) system has been introduced. The Electricity Market Act sets the limit to the unitrenewable energy subsidised by the Government. Based on the already established capacities of renewable energy production and possible new capacities established in the running year, a budget forecast for subsidies is made by AS Elering. If the forecast budget is exceeded (more producers claim subsidies than planned) the adjustments to renewable energy tax would be made on 1 December for the next year and the deficit would be covered in the following year by increased tax. For example, the deficit of renewable energy subsidies' budget was 281,000 Euro in 2012 and thus the renewable energy tax would be increased in 2013 to cover the deficit of the previous year. According to AS Elering, in April 2013, there were 42 hydroenergy producers, 20 wind energy producers, 6 biogas producers and 5 biomass-based energy producers that received renewable energy subsidy. Not all energy producers apply for subsidy, explains AS Elering. According to the Electricity Market Act, wind energy producers that have received investment support from the Government are not eligible for renewable energy subsidy, whereas this restriction does not apply to other renewable energy producers (hydro, biogas, biomass). Also, a renewable energy producer can apply for subsidy for a maximum of 12 years. Thus the first producers that started renewable energy production in 2002-2003 will stop receiving the subsidy in 2014-2015. The budget of subsidies is formed from the renewable energy taxes paid by the energy consumers. As described earlier the state grid company AS Elering collects the taxes and makes payments to the renewable energy producers. All wind energy producers receive a baseline payments that is topped up with the payments that depends on the amount of KWh produced and sold to the grid. In early 2013, the Government has submitted a bill to the Parliament to amend the system of payment of renewable energy subsidies. According to the draft law, the subsidy will be linked to stock exchange rate, and thus the subsidy would depend on the electricity price at NordPool stock exchange. This approach was regarded as an acceptable approach by the representative of EWPA.

The expansion of the wind energy sector is limited by the quality and structure of power networks. The current technical maximum of wind energy production is estimated to 400-600MW, but that also requires balancing power. However, the overall capacity of wind energy production could be increased to 1450MW if major investments to power networks were made, argued the representative of EWPA. Policy makers of the Ministry of Economics and Communication argued that such investments would put too heavy tax burden on consumers, both industrial and households. Thus, wind energy production should rather be expanded on coastal and wasteland areas, not at sea, argued the ministry. The draft national plan on EU structural funds 2014-2020 includes an investment into a 330kV power line between Estonia and Latvia. According to AS Elering it may also facilitate the development of

onshore and offshore wind parks in the Gulf of Riga, but no concrete plans have been made yet.

All interviewees considered the conflict between wind parks and nature conservation a major, yet unsolved issue. The conflict is largely embedded in the 'natural' conflict where shallow waters are suitable for wind turbines (max depth to 20m) but also rich in biodiversity. The environmental organizations argue that erecting wind turbines on marine and coastal Natura habitats, such as habitat 1110, 1140, 1150*, 1160, 1170 and 1620 would destroy the habitat and with that also the feeding habitat of waterfowl and marine mammals (seals, porpoises). Thus, the wind parks should be erected outside the nature values. However, both interviewees from the environmental organizations admitted that coexistence of wind parks and marine nature parks is possible because the nature values and the impact of wind parks on them is very site specific. Thus, the adverse impacts can be avoided or minised by good site selection of the wind park, individual wind turbines and their number and capacity. For example, the turbines should not be placed on protected habitats or flyways of migratory birds and bats, argued the nature conservation experts interviewed. The representative of the wind energy producers argued that there was a limit to such adjustments, since the cost of a development project of an offshore wind park would be much higher than on land, and that there was a minimum capacity of the energy that would enable to produce energy in a profitable way. Thus, reducing the number of turbines has its limits, whereas increasing the power capacity of individual turbines (e.g. from 3MW to 5MW) would increase the area of the wind park, which again may affect the valueable marine habitats.

There is a need for a separate law on the sea, both for development and conservation, argued the environmental organizations. The EWPA representatative also supported the common principles of marine planning, as proposed by the European Commission by the draft directive, but admitted that the experience from other countries (e.g. Germany) have indicated that since the sea is full of conflicting interests everywhere and compromises need to be made anyhow.

The list of interviewees is in the Reference-chapter.

Table 24:*The importance of relationships of wind energy producers with other stakeholders*

Connection	Impact	Strength
S1-S2 (wind energy producers and regulators)	Environmental Board approves of the SEA, EIA and AA reports, Ministry of the Environment issues water permit and building permit, Technical Supervision Board under the Ministry of the Economic Affairs and Communications issues the grid permit. As additional research is required from developers, this is seen as one of the reasons prolonging the procedure.	Medium
S1-S3 (wind energy producers and grid company)	The grid company AS Elering makes the payments of renewable energy support to the wind energy companies. Collects renewable energy taxes from consumers via electricity sales companies; manages and upgrades transmission infrastructure, provides access to the grid. Wind energy developers see the technical requirements too strict, hence complicating the support receiving.	Medium

Connection	Impact	Strength
S1-S4 (wind energy producers and local communities)	In order to gain a support from local communities, voluntary agreements with them are made. Local communities participate in SEA and EIA procedures for wind energy production. However, has not facilitated the utilization of offshore wind energy parks, the problems are elsewhere.	Low
S1-S5 (wind energy producers and environmental NGOs)	Environmental NGOs participate in SEA and EIA procedures of wind energy development and represent the interests of nature conservation. Biodiversity concerns are perceived as one main reason why offshore wind energy has not been utilized yet in Estonia.	Medium
S1-FS1 (wind energy producers and electricity consumers)	Electricity consumers finance the renewable energy support and also consume the produced electricity. Increasing electricity price has initiated discussions in media about the need to support renewable energy (perceived as too expensive).	Strong
S1-FS2 (wind energy producers and financial institutions)	Financial institutions provide loans for wind park developers.	Low
S1-FS3 (wind energy producers and technology providers)	Technology providers supply the necessary technology.	Low
S1-FS4 (wind energy producers and data providers)	Hydrometerological data providers supply with data.	Low
S1-FS5 (wind energy producers and IA consulting companies)	Planning and impact assessment companies conduct the necessary EIA and SEA procedures.	Low

6.3 Conclusion on interaction analysis: Expected impact of stakeholder interaction in a multi-PI environment on the ability to achieve policy objectives

Table 25: *Policy interactions description*

Policy instrument interaction categorisation			
Classification	**Interaction 1**	**Interaction 2**	**Interaction 3**
Policy instrument scope	External: PI1&PI2 (renewable energy support and designated Natura 2000 sites)	External: PI1&PI2&PI3 (renewable energy support, designated Natura 2000 sites, EIA process)	Internal:PI1&PI4 (renewable energy support and Grid Code)
Expected type of policy intercation	*TRADE OFF = Direct interaction:* The policy instruments are in conflict: state is not interested in offshore wind energy as RE target has been reached, but do not claim so directly, but let the offshore wind developers conduct additional research about impacts on species, habitats, etc	SYNERGY – The potential conflict beteen offshore wind energy development and nature conservation is prevented via SEA spatial plans of marine areas and EIAs of concrete projects.	*TRADE OFF = Direct interaction:* Development of offshore wind parks is directly related to the availability of transmission infrastructure and grid capacity, which is not in favour of offshore wind energy production.

Policy Interaction 1

Approval of off-shore wind sites has been postponed for various reasons. One of the more important ones is that information about species and habitats in the sea is still missing and the developers are required to do additional studies. As the government has reached its targets for RES and off-shore wind power is expensive (and would lead to an increase in the consumer price for electricity), is reluctant to expand the system to new installations. However, this has not been said out and offshore wind developers are submitting applications to build installations on sea, and as additional studies are required by the state, the reason for not building offshore wind parks is seen as the conflict between nature and renewable energy.

Policy Interaction 2

Marine spatial planning and corresponding Strategic Environmental Assessment (SEA) provides the stakeholders, including offshore wind energy producers and nature conservation authorities, a platform to discuss the use of the marine areas in a sustainable way in an open and transparent process. Once the SEA of the marine spatial plan is completed and the plan approved, it gives the developers, including wind energy producers a better understanding of the areas where offshore wind could be produced. The impacts of concrete projects would

then be assessed via EIA process. Both SEA and EIA process need to be coupled with Appropriate Assessment where impacts on Natura 2000 sites are considered.

Policy interaction 3

Development of offshore wind parks requires investments into transmission infrastructure and to increasing the grid capacity. It has not been decided at the political or regulatory level yet, who should take the responsibility: the project developer or the transmission system operator, or it should become a shared responsibility between the two.

Table 26: *Impact of interactions on effectiveness and efficiency of key policy instruments*

Policy intercations	Impact	Impact on effectiveness key PIs
Policy Interaction 1 (renewable energy support and designated Natura areas)	State is not interested in offshore wind energy as RE target has been reached, but do not claim so directly, but let the offshore wind developers conduct additional research about impacts on species, habitats, so far no permissions have been granted.	Highly negative
Policy Interaction 2 (renewable energy support, designated Natura areas, EIA process)	The potential conflict beteen offshore wind energy development and nature conservation is prevented via SEA spatial plans of marine areas and EIAs of concete projects	Slightly positive
Policy Interaction 3 (renewable energy support and Grid Code)	Development of offshore wind parks is directly related to the availability of transmission infrastructure and grid capacity, which is not in favour of offshore wind energy production.	Slightly negative

7. Validation by stakeholders

In order to validate the results of the case study, a seminar was held on 22 November 2013. The objective of the seminar was to introduce the main findings of APRAISE Case Study of Estonia about offshore wind generation and conserving marine ecosystems and discuss these with the main stakeholders. The stakeholders that participated represented different regulators (Ministry of Economic Affairs and Communications, Ministry of the Environment), grid company, wind energy producers, environmental NGOs, and a EIA consultancy company.

One of the discussion points was whether the predicted contribution of offshore wind (250MW) for year 2020 as specified in National Renewable Energy Action Plan (NREAP) is realistic to achieve. According to NREAP, the production capacity of offshore wind energy is projected to reach 100 MW by 2016, increasing to 250 MW in 2020. However, as no plan of offshore wind park has been approved yet, it is highly unlikely that these targets will be met. In addition, it was discussed that the predicted production capacities are too small as offshore wind parks need to have higher capacity (at least 500MW) in order to be economically efficient.

Regarding the efficiency of policy instruments, it was discussed that wind energy, especially offshore, is regarded as expensive energy source in Estonia. The reasons are that as renewable energy support has been used mainly to build cogeneration plants, that ensure more stable electricity and heat production than wind energy, the CHP plants are more viable. Also, the environmental effects of wind energy parks are not clear, leading to opposition by local communities, also amplified by low environmental awareness and bad reputation for some businessmen developing wind energy in Estonia. However, participants also debated that the potential for cogeneration plants has been almost exhausted and if further increase in renewables is foreseen, wind energy is the most likely option.

An important discussion point was also the financing system of renewable energy support, which is paid by electricity consumers and brought out as separate line on their monthly bills. In the context of Estonia, where the general living standard is not very high, people are disputing about the need to pay for expensive energy solutions. However, this expensiveness might be biased, as prices are not right and the actual price of conventional energy (from fossil fuel - oil shale) including the associated external costs and subsidies granted are not presented to consumers. The energy price was also a discussion point: from one side, energy price needs to be high, which makes renewable energy production also economically profitable and thus motvatinbg for investors. From another side, as living standard of people is low, low energy price is preferred. Hence, it was proposed that a context factor characterizing the living standard of people should be added to the report.

One important implication of a fact that there is no clear vision from the state, what should be done at sea, is that it gives mixed signals to all the stakeholders. For example, developers are required to carry out additional research at the sea, which is expensive, and there is no guarantee that this will lead to approval of the project, which does not encourage investors to invest here. At the same time, there is also no clear picture in regards of biodiversity, species and habitats at open sea and this causes opposition from nature conservationists to development projects. The inventories of marine ecosystems are expensive and take a long

time. Different parts of the decision are coordinated by different ministries and hence very mixed signals are sent to the public. The mixed signals stem also from the fact that so far the plan for renewable energy after 2020 is missing in the country: the renewable energy target has been reached, how to proceed is not clear so far, but perhaps new necessary targets will evolve with new Energy Economics Development Plan 2030.

The general conclusions of the case that need to be added are: discouragement of investors of offshore wind parks and the lack of consistent plan from the state. The problem of Natura 2000 sites not being designated does not apply to all sea areas, but to the open sea, and EEZ in particular, the knowledge about coastal and near shore ecosystems is better.

8. Synthesis and Conclusions

8.1 Conclusion on effectiveness and efficiency

The renewable energy support was designed to achieve the 25% of the renewable energy share in final energy consumption by 2020, but the target has not been specified by different renewable energy types. The policy instruments that are related to the policy target are the following:

PI1 – renewable energy support

PI2 – designated Natura 2000 network areas

PI3 – Environmental Impact Assessment and Strategic Environmental Assessment

PI4 – Grid Code

PI5 – Planning Act

PI6 – Water Act

Renewable energy target was achieved already in 2012 and hence, it might be concluded that the support tariff has been too high. As ceiling has been set for wind energy (600 GWh per calendar year), of which onshore wind parks generated already 448 GWh in 2012, the options for further development of wind energy under the current scheme are limited.

As the Estonian renewable energy support scheme is not technology-specific, it is believed to be cost-effective, as there should be an interest to apply the most cost-effective technology. Hence, most of the renewable energy produced in Estonia is based on biomass and cogeneration.

8.2 Synthesis on the impacts of contextual factors, implementation factors and interactions

Summary of the assessment of context, implementation and interaction factors of two policy instruments is provided in Table 27.

The most influential context factors for renewable energy support (PI1) are the fact that general target of renewable energy share has been reached, the energy price increase has been considerable in recent years, and increasing electricity consumption (including export) has not favoured the renewable energy production, but instead the conventional one. As for designated Natura 2000 areas, the fact that the inventories of marine habitats have not been done in the open sea, is prolonging the procedures of approval of offshore wind energy parks. In general, the context factors have had negative impact on effectiveness of policy instruments.

Table 27: *The most influential factors for assessed policy instruments*

Effectiveness		**PI1 Renewable energy support**	**PI2 Designated Natura 2000 areas**
Context factors	*Highly negative impact on offshore wind energy production, as renewable energy target has been reached and no interest so far in enlarging the scheme, although it has not said so specifically. Slightly negative impact as government has not done inventory on open sea, hence no clear vision where offshore wind parks could be built, complicating the process for developers.*		
	Share of renewable energy	-2	
	Price of electricity	-2	
	Final energy consumption	0	
	Designated Natura 2000 sites at open sea		-1
	Overall assessment	**-2**	**-1**
Implementation factors	*Slightly negative impact on offshore wind energy production, as renewable energy projects are financed by electricity consumers, leading to discussions about the need to pay for renewable energy (perceived as too expensive). Slightly positive impact from the fact that the contradicting objectives can be resolved via EIA process. However, the fact that open sea inventories have not been done, is complicating the procedure.*		
	PI consistency with SD objectives	+2	+2
	Existence of suitable infrastructure	-2	
	Familiarity with sea habitats	-1	
	Enforceability (low government financing)		-2
	Equity (PI1: support financed by consumers, PI2: equity of planning process)	-1	+2
	Overall assessment	**-1**	**0**
Interaction factors	*Slightly negative impact resulting from the conflict between climate policy and biodiversity policy objectives, although the conflict is relieved by EIA process.*		
	Interaction of renewable energy and biodiversity targets	-2	
	Interaction between renewable energy and biodiversity handled via EIA process	+1	
	Interaction of renewable energy with grid capacity	-1	
	Overall assessment	**-1**	

As for implementation factors, both the renewable energy support and designated Natura 2000 areas are clearly consistent with sustainable development objectives. At the same time, there are factors that are hindering the offshore wind energy development, namely that the infrastructure is not suitable so far and that the inventories of marine habitats in the open sea for Natura 2000 areas have not been carried out yet. As for equity, two different impacts can be distinguished: firstly, as electricity consumers are financing the renewable energy support, this raises the question that renewable energy is too expensive. As for equity of process of getting approval for offshore wind parks, the EIA process is designed so that it takes into account both, the developers' and nature conservationists' concerns. In general, the implementation factors have had negative impact on offshore wind energy production.

In terms of the set objectives, there is a clear conflict between climate policy target and biodiversity policy target appearing in the case of offshore wind energy production. However, the conflict can be resolved through EIA procedure, which gives information about the economic, social and nature values and/or disturbances to the marine ecosystems resulting from the specific development. The technical requirements set by the Grid Code and the insufficient infrastructure are also considered hindering factors for offshore wind energy. In

general, the interaction factors can be assessed as having negative impact on the effectiveness of policy instruments.

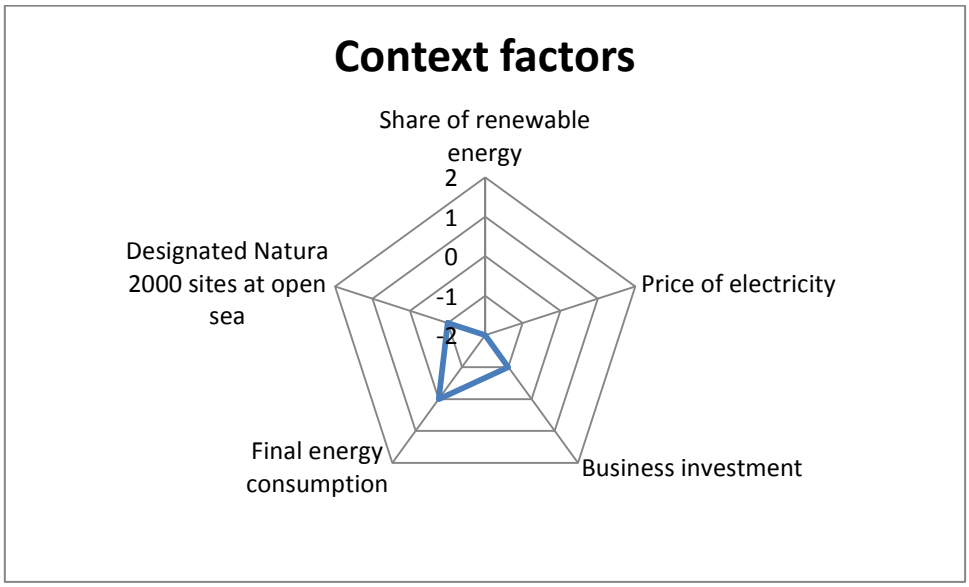

Figure 7: *The most influential context factors for renewable energy support (specifically on offshore wind energy production)*

In Figure 7 it can be seen that the most influential context factors have had negative impact on offshore wind production development in Estonia, only final energy consumption has had no impact. While looking at the deviation between what was envisaged during the design of policy instruments and what has happened in reality, the biggest deviation is related to business investment, share of renewable energy and designation of Natura 2000 sites in the open sea. All three context factors were expected to have positive impact, but in reality the impact has been negative. Business investment is related to economic growth and due to economic crisis investments (including investment interest in renewable energy) have decreased (the expected impact was +2, actual -1). Share of renewable energy as objective set on national level was expected to have positive effect (+1), but in reality as the renewable energy target has been met in shorter time than expected and mostly originating from biomass, the actual impact on wind energy development is negative (-2). As for designation of Natura 2000 sites in the open sea, also this was expected to have positive effect (+2), as the process on land and near shore has been quite successful, but in reality as inventories at open sea have not been carried out and thus additional studies are required from wind energy developers, prolongs the planning process and increasing uncertainty among investors (-1). Quite big deviation is resulting also from the electricity price: it was expected to have no impact, but in reality due to different reasons the price of electricity has increased very rapidly in recent years and as renewable energy is financed by electricity consumers and the sum is presented on monthly invoice, this has led to discussions about cutting down the renewable energy support (hence the actual impact has been -2).

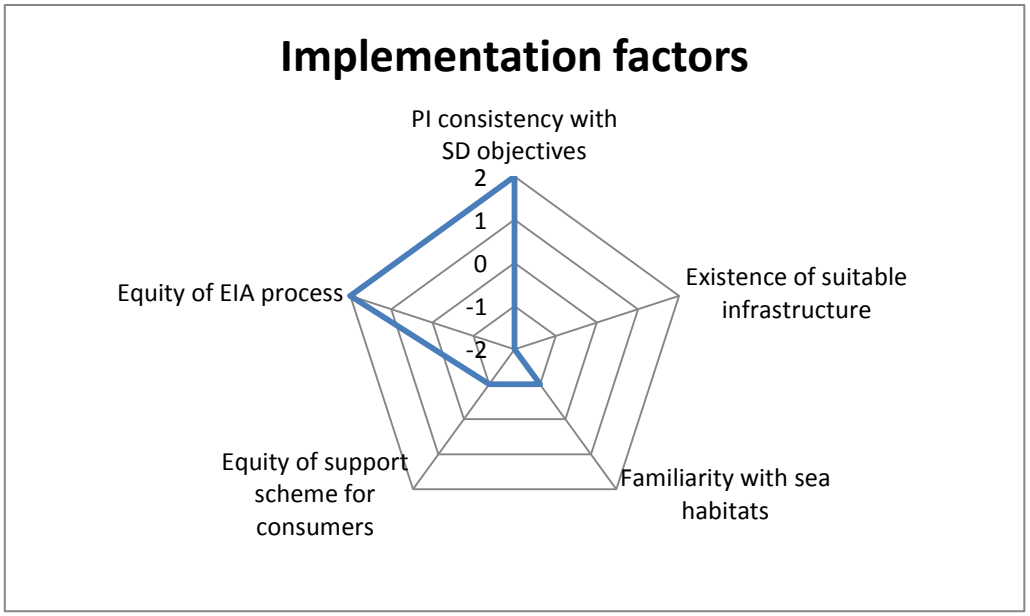

Figure 8: *The most influential implementaion factors for renewable energy support (specifically on offshore wind energy production)*

Figure 8 demonstrates that two of the implementation factors have had highly positive impact (consistency with sustainable development objectives and equity of EIA process), but the rest of the most influential implementation factors have had negative impact (existence of suitable infrastructure, familiarity with sea habitats and equity of support scheme for consumers). Among these five factors the ones with highest deviation between planned and actual is the non-existence of suitable infrastructure: it was expected to have no impact, but according to investors this has had highly negative impact (-2).

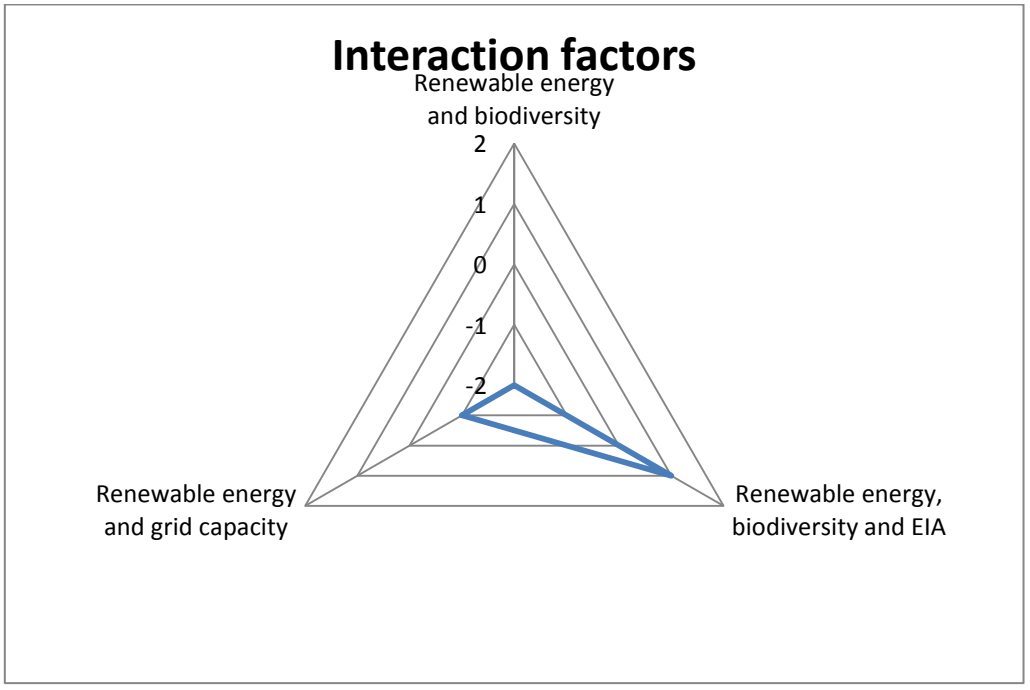

Figure 9: *The most influential interaction factors for renewable energy support (specifically on offshore wind energy production)*

The interaction between renewable energy support, biodiversity (specifically, Natura 2000 sites) and environmental impact assessment is positive, allowing to consider different interests, while the other policy instruments interactions are negative: between renewable energy support and biodiversity as specified by different policy objectives, and interaction between renewable energy support and grid code: there is not enough infrastructure to facilitate the development of offshore wind energy.

9. Conclusions

The renewable energy target (25% of final energy consumption by 2020) has been achieved already, new and perhaps more ambitious targets have not been set yet. Thus, government is not taking active role in enlargening the existing renewable energy support scheme. The current renewable energy system will not be very motivating for offshore wind energy, as support is paid only until 600 GWh of electricity is produced from wind, 448 GWh was already produced in 2012. Thus, new renewable energy target and ceiling is necessary to develop offshore wind energy in Estonia.

Since the costs of renewable energy are incurred by the consumers, it is rather complicated to enlarge the current support system of renewable energy producers, because of the high cost to consumers.

Hence, the most influential context factors affecting the wind energy development in Estonia, have been target of renewable energy share, which has been reached, rapidly increasing electricity price and the system that renewable energy is financed directly by electricity consumers, decreasing business investments and final energy consumption, which has been slightly increasing, but covered mainly by conventional energy sources.

Transmission networks are insufficient to support the introduction of offshore wind energy production.

Designation of Natura 2000 sites in territorial waters is under way; no sites have, however, been designated in the Exclusive Economic Zone. Developers are required to conduct the necessary research when applying for permission to build offshore wind park, which lengthens the procedure and increases uncertainty of investors. The marine spatial plans are being only drafted by the Government; the site identification of offshore wind parks has been driven so far by developers. Although both, Natura 2000 objectives and renewable energy contribute to sustainable development targets, they do so in different policy areas (biodiversity and climate policy) and these areas in principle conflict with each other. The conflict is relieved by environmental impact assessment procedure, which enables to consider different interests.

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