

Birmensdorf 09.2015

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COST Action TU1401 Renewable energy and landscape quality

Final Report

Scientific Report Reference	COST-STSM-ECOST-STSM-TU1401-240815-063934
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Home institution	Warsaw University of Life Sciences
STSM Topic	Indications and tools for planning renewable energy power plants.
Period	from 24.08.2015 to 6.09.2015
Host institution	Swiss Federal Research Institute WSL – PD Dr. Irmi Seidl WSL; Head of Research Unit Economics and Social Sciences Supervisor: Dr. Matthias Buchecker; Swiss Federal Research Institute WSL

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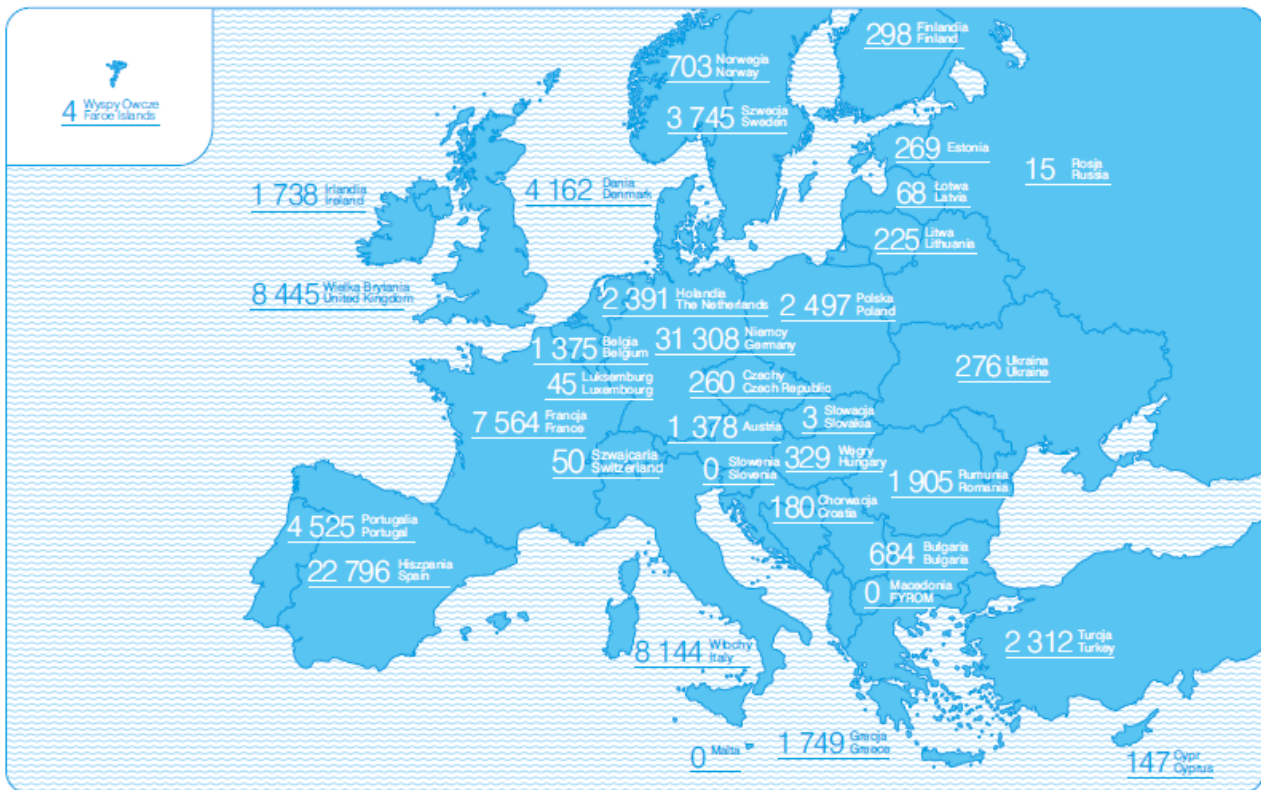
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1. Abstract

Conducted research are an answer for a question how spatial policy is pursued in relation to wind turbines. Study where made mainly for Switzerland which was supposed to be an exceptional example of developed country outside EU who also deals with the topic of renewal energy power plants location. What was interesting also about Switzerland case study it is the new approach to renewable energy. According to Swiss Energy Strategy 2050 in less than in 20 years Switzerland will cut themselves from atomic energy and will replace the gap of energy with mostly renewable energy power plants. That indicates the need to think how conduct procedures of locating renewable energy power plant. In the report also the case study of Poland was included because of long lasting discussions about wind turbines in the landscapes. In the report also basic information about EU regulation for wind turbines location are included. EU have booth high big impact for countries which are included in the Union but also for Switzerland which is used to implement chosen EU regulation, or transform those regulation.

Report includes the main results of literature and documents review. What also is included are extracts of conducted interviews with representatives of different professions (scientists, administration officers and investors) which are included or interested in the topic of landscape quality while wind turbines investments.

Fig. 1 Liczba turbin wiatrowych w krajach europejskich; (źródło: Energetyka wiatrowa w Polsce Wind energy in Poland; Raport 2013; TPA Horvath, BSJP Legal & Tax Advisory, Invest in Poland)



2. Purpose of researches - Relevance to the COST Action TU1401 objectives

According to the New Charter of Athens 2003 we can distinguish 4 main trends in city changes:

- Social and political changes,
- Economic and technological changes,
- Environmental changes,
- Urban changes.

Under each of these groups, the expected influence on cities is considered - both for cities and planners. This is why we need to check how do we protect our landscapes from the changes we put in it also while implementing new „Green” technologies. Spatial planning systems are different also in EU countries. There are EU directions about preventing the landscape but still countries have a lot of free will how to do that. That is why proposed researches are important: to compare different spatial planning systems and do these systems have separate tools to prevent the landscape also while planning and building renewable energy plants.

Single wind turbine or wind parks are objects in the landscape which for sure have a big impact for visual quality of the space. We can distinguish wind turbines because of their high and the size of a propeller. Choosing the right site for your wind turbine is one of the most important decision while the process of wind turbines and wind farms implementation. Location plays a main role in the process of building wind power plants and can have consequences in further functioning of the power plans but also on nearest but also further surrounding. As a surrounding we can both understand visual aspect of wind turbines but also consequences of their functioning as noise pollution and exclusion of turbines surrounding (depending on the law regulations) from other use of the land.

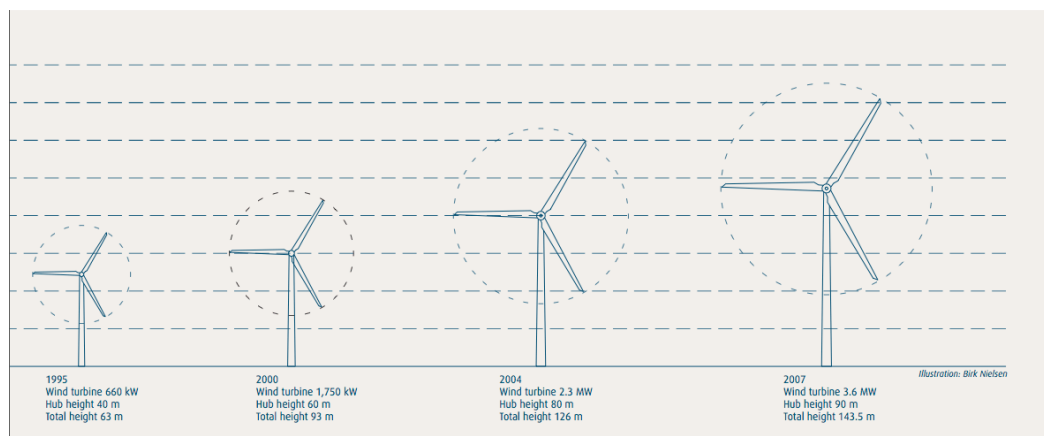


Fig. 2. Wind turbine sizes. (¹Henning Sten Hansen; 2010)

Research focuses on the study of documents and tools which regulates landscape shaping and protection while planning and building renewable energy systems. Spatial planning tools review should be compared also to the similar research conducted in the home country of the researcher.

¹ Hansen H. S.; 2009; Obstacles for Wind Energy Development due to EU Legislation Aalborg University after Danish Energy Agency

Proposed research are combined with the researches which are conducted in purpose of writing an article for European Conference of the Landscape Research Group “Energy Landscapes: Perception, Planning, Participation, Power in Dresden 2015.

3. Description of the work carried out during STMS

3.1 Goal, methods and time table of the research

Goal of the researches:

Proposed research is an attempt to define a set of spatial planning tools used for examining the impact of wind turbines and wind farms on the landscape. Proposed research should lead to the definition of the tools used to protect landscapes while planning renewable energy plants (here wind power plants). While the research comparative data will be collected.

Methods of the researches:

Research are divided in to two parts:

1. Literature review – prepared and conducted before field studies (Polish case study will be analyzed before STMS):
 - Review of methods of landscape evaluation, summary of landscape evaluation methods in order to select the most appropriate method of assessment for the purposes of the assessment landscape
 - overview of the planning tools for determining the place of construction of the alternative energy sources plants (review concerns Switzerland, Poland and general law regulations of EU)
2. Field trips and field studies: chosen with the cooperation of Host Institution Supervisor dr. Matthias Buchecker from Swiss Federal Research Institute WSL.

Scientific questions:

1. Which law acts regulate locating wind turbines processes in Switzerland and European Union?
2. What are the tools of landscape prevention relevant to the wind turbines in Switzerland?
3. What are the tools of landscape prevention relevant to the wind turbines in European Union?
4. What are the differences between the law regulations and tools of landscape protection relevant to the wind turbines implementation in Switzerland and European Union?

Time table of the STMS

Week one

- 24.08. Methodology of the researches, preparing the schedule of the researches,
- 25.08. Preparation of work in the WSL Institute, interviews (work at WSL institute)
- 26.08. Interviews, literature review (work at WSL institute)
- 27.08. Interviews, literature review (work at WSL institute)

28.08. Field trip to Canton Aargau, interview with the Canton Administration representative.

Week two

31.08 Summarizing information after the field trip literature review (work at WSL institute)

01.09 Summarizing information after the field trip literature review (work at WSL institute)

02.09 Workshop, Field trip to Lausanne, meeting with the renewable industry representative

03.09 Preparation of the final report, summarizing the STMS (work at WSL institute)

04.09 Preparation of the final report, summarizing the STMS (work at WSL institute)

Tab. 1 Schedule of the researches

Stage of the researche	Products of the researched stages	Full period of research (divided in to 2weeks)			
		1st week 24-25.08	1st week 26-28.08	2nd week 31.08-2.09	2nd week 03.09-04.09
Stage I – preparations; initial works	Work plan, elaborating a methodology and work plan	V			
Stage II – researches	Interviews, documents and law regulation reviews		V		
Stage III - results	Field trips, interviews,			V	V
Stage IV - Final report	Preparation to Final Report, summarizing of the researches, Interviews after the researches				V

4. Description of main results

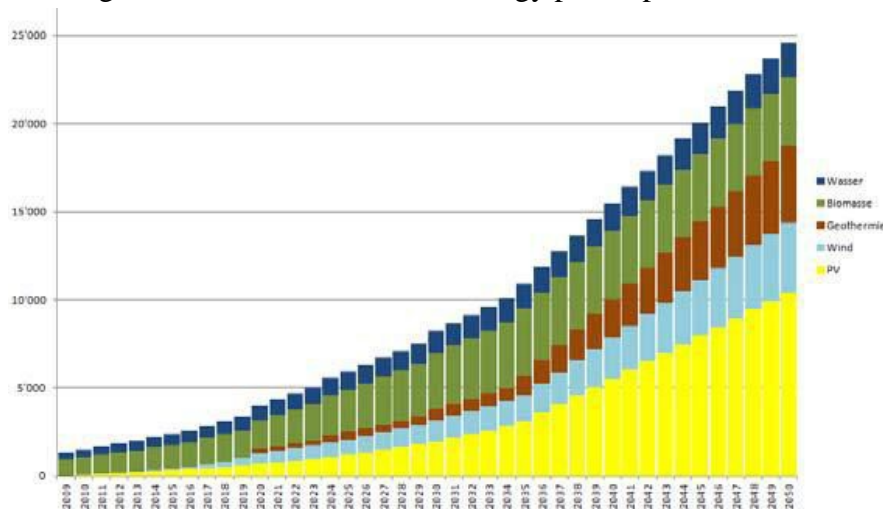
4.1 Swiss regulations for wind turbines location

Federal Level - Wind turbines in the Energy Strategy 250.

Swiss Energy Strategy 2050 has a federal range. Switzerland decided to change its energy system which right now is based on nuclear power plants. Till the end of 2050 Switzerland decided to rearrange its energy system. All general information about that are gathered in Energy Strategy 2050. After the safe operating period expires (estimated at 50 years) nuclear power plants will not be replaced and will be decommissioned (Beznau I; 2019; Beznau II and Mühleberg: 2022; Gösgen: 2029; Leibstadt: 2034). It means that Switzerland will have to deal with a huge gap of energy. Referring to the strategy the gradual loss of production from nuclear power plants has to be compensated for by hydropower, new renewable energies, CG facilities and GCC. As thermal generation using fossil fuels will increase, additional emissions of 1.09 to 11.92 million tonnes of CO² are anticipated by 2050. According to the Strategy (fig. 1.) wind power will be one of the most important source of the energy in Switzerland, nearly at same level as geothermal energy and biomass energy. But source of energy which will play main role in energy industry in Switzerland will be photovoltaic energy. What is sure from the goals of the Strategy, whole industry of energy production in Switzerland will be rearranged. That means that Switzerland will have to change some other sectors, like spatial planning of zones in purposes of energy production, giving permissions for new investments of renewable energy but also probably other very important

aspects like social participation while renewable energy investments. Switzerland will have to convince its citizens that renewable energy industry will increase quality of their life and quality of the natural resources and what is also important will not destroy Swiss landscapes. What is problematic Strategy is a general document on a federal level and do not refers to the land use issues or locating of renewable energy power plants.

Fig.3 Diagram showing increase of use renewable energy power plants in Switzerland till 2050 ²



Other documents on the federal level which refers to renewable energy issue are³:

1. Energy Act of 26 June 1998 (ENG) (Energiegesetz vom 26. Juni 1998 (EnG) - This law is defines diverse, safe, economic reasonable and environmentally compatible energy supply contribute⁴.
2. Energy Ordinance of 7 December 1998 (ENV) (Energieverordnung vom 7. Dezember 1998 (EnV))
3. Ordinance of 24 November 2006 relating to proof of production type and origin of electricity (guarantee of origin regulation) (Verordnung des UVEK vom 24. November 2006 über den Nachweis der Produktionsart und der Herkunft von Elektrizität (Herkunftsnachweis-Verordnung, HKNV)
4. Ordinance of 5 July 2011 on the information on the energy label of new passenger cars (VEE - PW) (Verordnung des UVEK vom 5. Juli 2011 über Angaben auf der Energietikette von neuen Personenwagen (VEE-PW)
5. Ordinance of 15 April 2003 on the energy-related test methods for water heaters , hot water and heat storage (Verordnung vom 15. April 2003 über das energietechnische Prüfverfahren für Wassererwärmer, Warmwasser- und Wärmespeicher)
6. Ordinance of 22 November 2006 on fees and supervision fees in the energy sector (PFR - En) (Verordnung vom 22. November 2006 über Gebühren und Aufsichtsabgaben im

² Büchel D. 2012, *Vizedirektor / Leiter Abteilung Energieeffizienz und erneuerbare Energien BFE; Energisstrategie2050: Die wichtigsten Massnahmen;*

³ Source: <https://www.admin.ch/opc/de/classified-compilation/73.html#73>

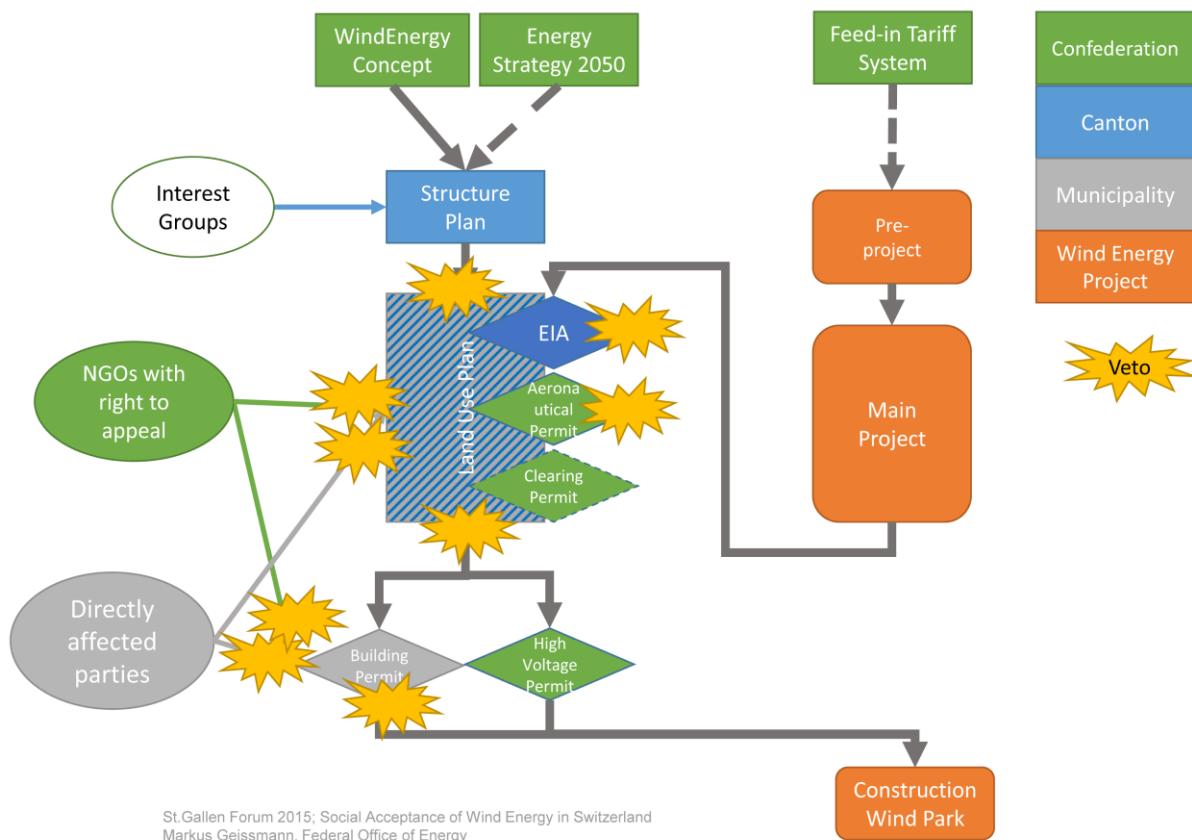
⁴ Translated from the Energy Act of 26 June 1998 (ENG) “Dieses Gesetz soll zu einer ausreichenden, breit gefächerten, sicheren, wirtschaft-lichen und umweltverträglichen Energieversorgung beitragen”.

Energiebereich (GebV-En)

Spatial planning system in Switzerland

Spatial planning system in Switzerland is divided into three levels: Federal level, Canton level, municipality level. Federal level defines only most general information about construction and functioning of Switzerland and Law Acts which defines functioning of most important branches of living. What is very important is that cantons and municipalities have a lot of freedom in defining their own law regulations. But what is also important lower level of administration always have to take into consideration decisions made on a higher level. Switzerland spatial planning system also assume multi-level social participation on every level of planning. All decisions like defining strategies, land use plans, most important investments are consulted with the citizens.

Fig 4. Diagram showing general structure of spatial planning system in Switzerland on a wind turbines investment case study⁵ (Geissmann M. 2015)



⁵ Geissmann M. 2015, *Social Acceptance of Wind Energy in Switzerland Current status and crucial issues*; Federal Office of Energy; St. Gallen Forum

Canton Aargau case study.

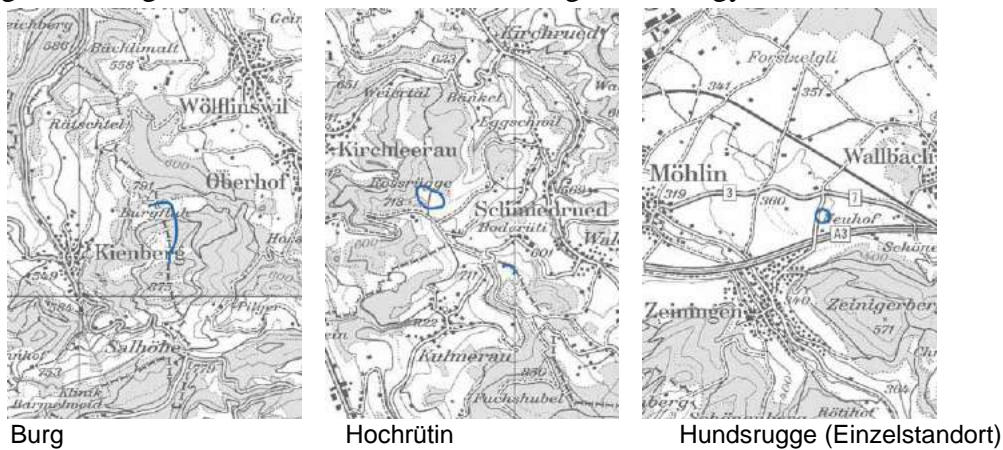
According to the Canton Aargau Strategy Plan, canton already have developed special wind zones. What is specific for the canton, decision about locating wind turbines was made few years before Energy Strategy 2050 was created. According to the Canton Aargau Strategy Plan in canton there are five zones suitable for wind energy investments.

Zones suitable for wind energy where designated after detailed analyzes prepared by canton administration with experts from different fields. Those analyzes contained: wind conditions, environmental conditions, agreement with BLN document for natural resources protection on a federal level (Landschaften und Naturdenkmäler von nationaler Bedeutung), social conditions and preferences.

Wind energy investment needs to be proceeded with a number of spatial planning documents. What starts the whole process of the investment is designation of wind zones by a canton. If canton do not have wind zones already developed investor can report to the canton administration his need will of future investment. Than canton is obliged to proceed with analyzes leading to designation of wind zones. Of course these analyzes can also prove that canton has any suitable zones for renewable energy investments.

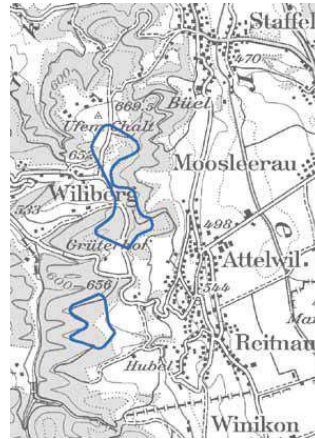
In canton Aargau Strategy Plan 5 places for wind turbines are included. But in which place on canton Aargau area no more than 3 power plants cannot be built. In Burg Municipality area 5 wind turbines wind warm is planned. But only one of those turbines will be located at the area of Canton Aargau. That also is a cause of a need to have constant cooperation between neighbor canton.

Fig. 5. Zoning of wind turbines in Canton Aargau - Strategy Plan for Canton Aargau.





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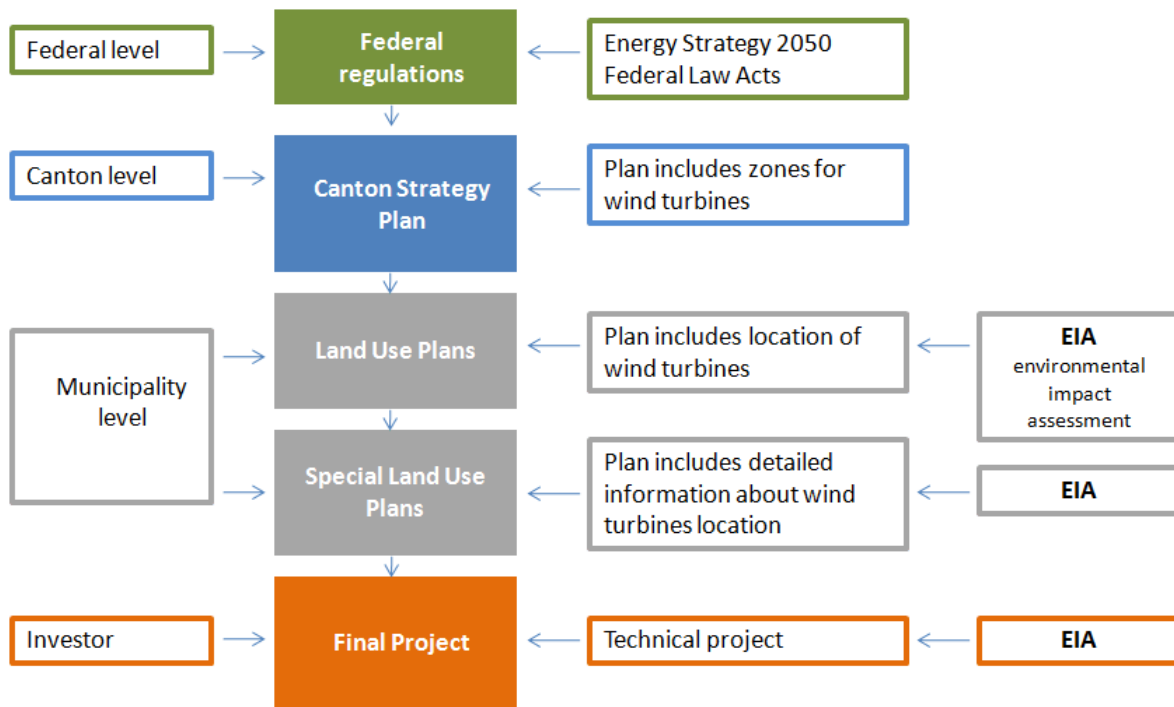
If canton already has designated wind zones than the next step while the whole process are public consultancies in the area of the future investment. People leaving in the area and other groups of interest have to give a permission to the investment. That actually start long process of social participation while the investment.

After receiving permission from municipality agreement of social participants municipality can start a next step: preparation of the local land use plan in the purposes if wind energy. This plan will show exact location of the future investment. This plan also have to be consulted with social participants. Last step which have to be done by the municipality is designation of a Special Land Use Plan which shows detailed plan of wind farm localization, with designation of areas for wind farm maintenance. As other steps of the process this plan also has to be consulted. If whole process of necessary documents preparation investor is able to submit final project of the investment (including technical project) to the municipality. Usually investor prepares all the projects simultaneously while the preparation of land use plans. That is the risk what he usually must take while the whole process.

But not only land use plans are obtained. While the process investor must receive several permissions which will show that he is allowed to start building a wind farm. These permissions are:

- EIA Environmental Impact Assessment (prepared twice while preparation of land use plans but also a separate one more detailed for the project);
- Aeronautical permit;
- Clearing permit (also economic reasons for the investment);
- Building permit.

Fig. 6. Spatial planning documents while wind turbines investments – Canton Aargau case study (Domanowska M. 2015)⁶



According to canton Aargau Strategy Plan following criteria must be obey while wind turbine investment⁷:

- usually at least three similar wind turbines can be created at the area, those wind turbines plans and realization should be at the same time ,
- suitable wind potential 450 kilowatt hours per square meter is required
- location area of wind turbine should not be under conservation of cantonal importance or under environmental protection;
- wind turbines should not be located on: moore according to the federal inventory, dry meadows according to the federal inventory, groundwater protection zones 1 and 2,
- Distance from residential and mixed zones should at least: 300 meters.

Social participation while wind turbines investments

There is a growing problem in the wind farm investment process, attributable to a dispute between two groups: supporters of wind farm development associated with various organizations,, mainly including ecological organizations and actual investors, and developers and opponents united in other ecological organizations and impromptu local opposition movements. Local authorities and their interests as well as state authorities involved in the disputed are trapped in the middle. The

⁶ Graph prepared based on information from the interview with Mr Michael Rothen; Kanton Aargau; Departement Bau, Verkehr und Umwelt.

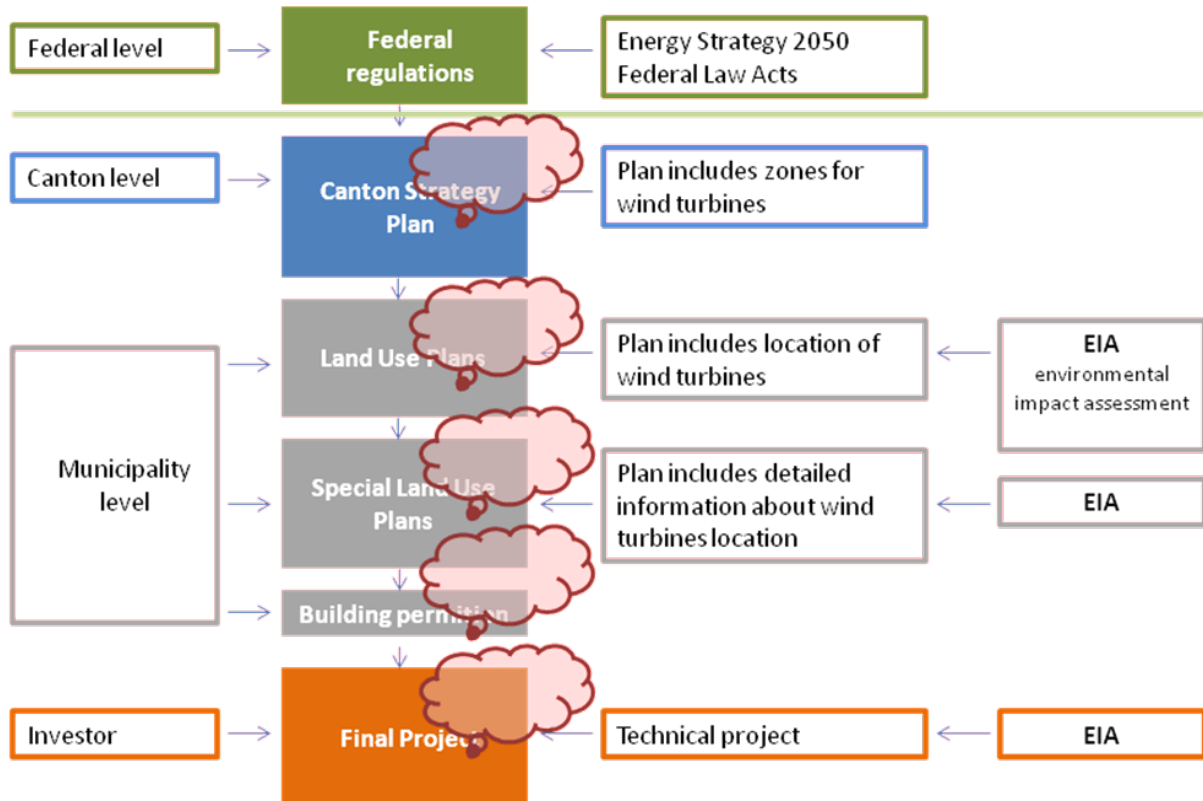
⁷ Richtplan Kanton Aargau/ Strategy Plan for Canton Aargau.

dispute covers nearly every single aspect of wind investments. The primary concern, however, relates to environmental impact of wind farm development. Opponents of wind turbines raise that they destroy

local ecosystems, posing a particular hazard cite known though exaggerated arguments of the alleged hazards to birds and bats. Another issue under discussion is the impact of farms on the health of local residents.

Fig. 7. Spatial planning documents while wind turbines investments – Canton Aargau case study - Social participation while wind turbines investments where market with red clouds.

(Domanowska M. 2015)⁸



Description of conducted interviews

Conducted interviews:

1. **Dr. Astrid Björnsen Gurung**; Swiss Federal Research Institute WSL; Manager Energy Change Impact Research Program· Economics and Social Sciences Research Unit (Wirtschafts- und Sozialwissenschaft Landschaftsdynamik Umwelt- und Ressourcenökonomie Landschaftsökologie)

Topic of the interview:

⁸ Graph prepared based on information from the interview with Mr Michael Rothen; Kanton Aargau; Departement Bau, Verkehr und Umwelt.

- general information about research conducted in the department: building a research program on energy change impact to provide information and scenarios on the anticipated consequences of the energy change;
- problem of filling the gap of energy after decision to stop nuclear power plants in Switzerland, yet hydropower will not fill the future energy gap but still wind power is not popular in Switzerland,
- problems of the wind turbines referring to the Swiss Energy Strategy 2050;
- Polish future plans of renewable resource of energy implementation, political context of the problem,

2. **Dr. Matthias Buchecker;** Swiss Federal Research Institute WSL; Project leader of group "Social Science in Landscape Research" Public participation, perception of natural hazards, societal needs (Wirtschafts- und Sozialwissenschaft Sozialwiss. Landschaftsforschung)

Topic of the interview:

- general information about research conducted in the department
- information about social participation while the investment process in Switzerland

3. **Benjamin Schmid;** Swiss Federal Research Institute WSL, Economics and Social Sciences; Regional Economics and Development

Topic of the interview:

- General information about administrative division of Switzerland, and general information about differences between competences between federal level, cantons level and municipality level,
- Subsidiarity concept in Switzerland (regulation should be on the lowest level of administrations, people involvement is highly recommended)
- Local activism and renewable energy in Switzerland:
 - two main stages of activism relevant for renewable energy: in the first half of the XX century local activists were interested to build renewable energy power plants because they wanted to have electricity; they had a need to be able to use energy and nowadays we can observe that local activists are much into renewable energy in their nearest surrounding (more than 200 local interventions and activists which are/where dedicated to the renewable energy)
 - feed in tariff support for implementing renewable energy installations for local activists.
- Local activism and green areas in Warsaw: case study of Park Krasiński, model example of a conflict and lack of effective communication (participation process) between city holders and citizens.

4. **Christiane Plum;** Swiss Federal Research Institute WSL; Economics and Social Sciences, Social Sciences in Landscape Research

Topic of the interview:

- Most suitable localizations for power turbines in Switzerland,
- Problems of locating wind turbines in mountain areas even if there are the best condition for this kind of investments,
- Need of environmental analyzes before wind turbines implementation, Swiss Landscape Zoning Plan, BEF research about special zones suitable for wind energy,
- Social participation in the wind power plants locating:
 - big involvement of citizens in to the process, question if this involvement is not to big (so it is possible to stop the investment for years),
 - examples of suing the investors for possibilities of harmful impact of the local surrounding or quality of life of the inhabitants in case of realization of the investment,
 - possibilities of increasing the role of the of inhabitants in the investment process (creating new models of participation) but on the other hand there are no possibilities to decrease the social participation (there an regulated minimum of social participation while the investment processes)
- Polish spatial planning system and polish law regulation for wind turbines location.

5. **Georg Muller**; Swiss Federal Research Institute WSL; Landscape Dynamics;
Landscape ecology

Topic of the interview:

General information about spatial planning system in Switzerland:

- Can you tell a short characterization of Swiss spatial planning system?
- As Switzerland management is divided in to three levels (federal, canton and municipality) on which level land use cover plans are prepared? According to materials of Federal Office of Energy (St.GallenForum 2015; Markus Geissmann) in Switzerland there are: structure plans and land use plans (on canton levels) what are the regulations of those documents, what are the main differences?
- And how strong is an obligation to obey the land use plans (are the land use plans and strategic plans can be changed in some legislation processes, if yes when?).
- Are there federal regulations to prepare land use plans and strategic plans (like a general guidelines)? What is the scale of those documents?

Information about wind turbines in a spatial planning process?

- Do Swiss spatial plans shows the areas for the future use in purposes of renewable energy or energy industry in general?
- Are there separate law regulations about locating wind turbines or the regulations are the same for wind turbines as for other constructions? (that it is how it works in Poland, no separate regulations). Dose location of wind turbines (and other renewable energy power plants) are regulated by separate low acts?
- Are there federal/canton/municipality guidelines for wind turbines location? And if yes what dose guidelines regulate?

Visit at the canton Aargau Administration Office: Study trip 28.08.2015;

6. Mr Michael Rothen; Kanton Aargau; Departement Bau, Verkehr und Umwelt.
Canton Aargau, city Aarau,

Topic of the interview:

I. Investment process of a wind turbine.

- When in the spatial planning process investor has to start our efforts to locate the wind turbines? What are the initial works while the investment?
- What kind of permissions we need to receive while the investment process: from the beginning to the end of the investment (I have an information about: aeronautical permit, clearing permit, high voltage permit and EIA)? What kind of authority gives those permissions?
- What kind of environmental analyzes we have to prepare while the investment process? Is there any other than EIA?
- Is there an obligation to prepare the visual analyzes of the impact which will be made by the investment? Is it the part of EIA? If yes are there some standard methods of preparing visual assessment for wind turbines?
- How dose the process of social participation looks like while the investment? Can we change the standard way of public participation? I have some general information but I would like to know some practice information: for example are those an open meetings, how people are informed about meeting etc.?
- Are wind turbines usually controversial investments for citizens? Dose it often happens that social participants do not agree for wind turbines in their surrounding? How big should be a group of people to stop the investment?

Visit at the canton Luzerne: Study trip 02.09.2015;

Interview with Mr. Hürlimann; representative of an investor and developer of wind turbines

Topic of the interview:

- general information about investments done by the investor; Kulmerau case study
- information about social participation while the investment process in Switzerland
- main problem while the investment in to the wind turbines
- social participation and main problem while the process
- main reasons why opponents of wind turbines are stopping the process.

4.2 Polish law regulations for wind turbines location

In Poland so far shaping the landscape was the result of a number of provisions in the laws and regulations. Documents which refers directly to wind turbines or wind farms location:

1. Energy Strategy 2030
2. Energy Strategy 2050 (in preparation, after consultation process),
3. Act of 7 July 1994 Building Law – this law regulates locating all construction types, wind turbines do not create a separate group of specific construction,
4. Act of 27 March 2003 Planning and Spatial Development – determinates spatial planning system, refers to the general decisions about land use,

Documents which refers non directly to wind turbines or wind farms location:

1. Ordinance of 14 June 2007 r. The Permissible Noise Levels In The Environment – designate how much noise pollution can be generated in different surrounding, refers non directly to the wind farms location,
2. Act of 3 October 2008 The Provision of Information About The Environment And its Protection, Public Participation in Environmental Protection and Environmental Impact Assessments- refers non directly to wind farms locating, all energy investments need to have environmental analyzes,
3. Act of 20 February 2015 Renewable Energy Law – refers directly to the renewable energy but not to their location, refers only to the technical aspects of locating power plants,

Producing wind energy on a big scale in Poland is defined as wind farms according to the Ministry of Economy Ordinance of 4th May 2007, About detailed conditions of energy system functioning. Wind Farms are defined as „generating unit or group of these units which uses wind to generate the energy, units have to be connected with the energy network with one attachment”. According to polish law one windmill which producing energy is a building object.

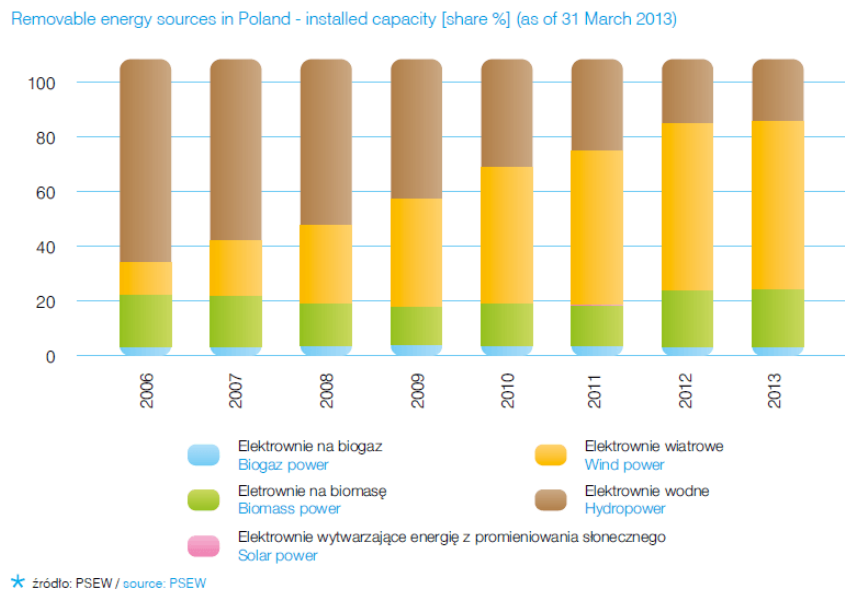
The support system for renewable energy in Poland is regulated by the Energy Law and has not been amended since 1 October 2005. Eligible technologies are those which are granted the status of renewable energy sources. Thus, also biomass firing plants that produce biogas and hydroelectric power plants may benefit from the support system, whereby the amount of support is in principle the same for all sources, regardless of the type of technology or connection capacity.

Wind farms are usually developed based on local land development plans (“LLDP”) that are prepared for the whole area of a municipality or a part of it. An LLDP is a local law act which determines the land use and location of public purpose investments. Before the new LLDP is passed or the existing one is amended, the study of conditions and directions of spatial development of the municipality (“Study”) must be adopted. Study is not a binding act of local law, but rather an internal document that defines the spatial policy of the municipality. In the course of the planning procedure, a comprehensive assessment of wind farm location is performed. Areas in which devices producing energy from renewable energy sources with a capacity exceeding 100 kW and the protection zones associated with development and land use restrictions should be indentified already at the Study level.

In polish law regulations number of issues important for the issue of renewable energy and wind power plants locating are not considered. These issues are:

- a) Issue of functioning and aesthetic of open areas:
- Issue of special treating dominant in the landscape (including wind turbine),
 - Issue of aesthetical aspects of new investments in the aspects (there is an obligation for environmental assessments but they do not have to contain parts about visual aspects or further visual pollution).
- b) Issue of lack of local spatial plans:
- Issue of chaotic development of the suburb areas (urban sprawl), what also affects locating renewable energy power plants,
 - local spatial plans are usually written for developed areas (city areas) not for open areas in which wind power plants can be located.
- c) Issues of implementation of the renewable energy power plants including wind turbines:
- Lack of landscape zoning including lack of landscape zoning in purpose to find most suitable areas and landscapes suitable for different kinds of renewable energy power plants including wind turbines and wind farms,
 - lack of the separate regulations for wind turbines locating (nowadays they are located with the same regulations as other constructions and buildings) it also means that there still is lack of protection against chaotic wind turbines and wind farms localization,
 - low use of methods of analyzing areas in purposes of locating renewable energy power plants including wind turbines and wind farms.

Fig. 8. Process of wind energy rising in Poland since 2006⁹



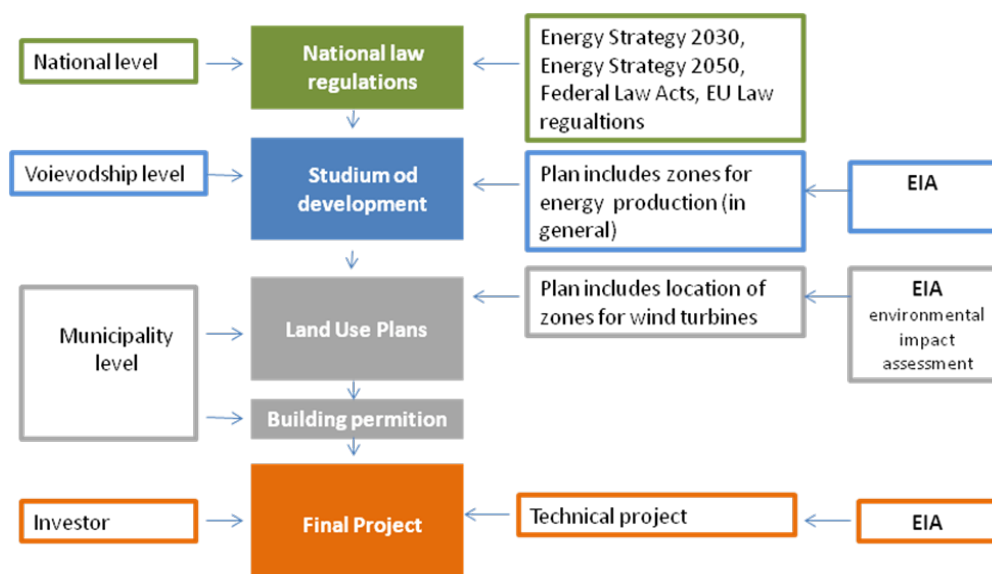
⁹ Source: Energetyka wiatrowa w Polsce. Wind energy in Poland; Raport 2013; TPA Horvath, BSJP Legal & Tax Advisory, Invest in Poland

Fig. 9. Number of wind turbines in Poland. 2013¹⁰

Region	Liczba instalacji/ Number of installations	Moc/Capacity (MW)
zachodniopomorskie	49	836,9
pomorskie	31	312,2
kujawsko-pomorskie	215	296,1
wielkopolskie	114	291,5
łódzkie	162	277,7
warmińsko-mazurskie	23	209,5
mazowieckie	62	142,7
podlaskie	19	120,4
opolskie	5	84,2
podkarpackie	25	82,5
dolnośląskie	7	74,3
lubuskie	7	56,6
śląskie	16	11,6
świętokrzyskie	14	6,1
małopolskie	11	3,0
lubelskie	5	2,2

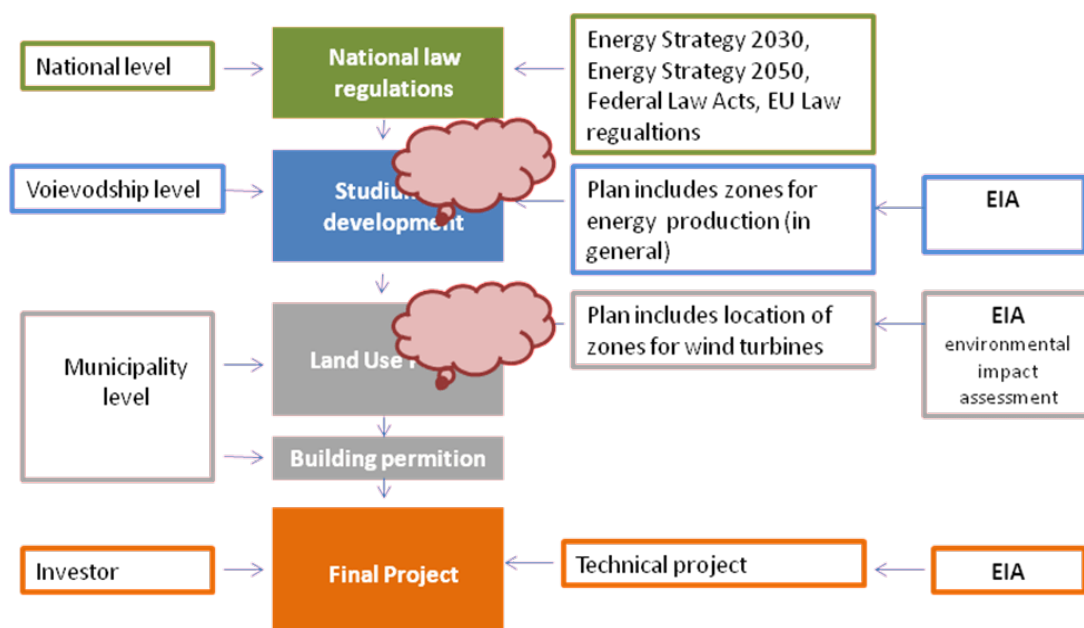
* źródło: Urząd Regulacji Energetyki / source: Energy Regulatory Office

Fig 10. Spatial planning system for wind turbines investment (M.Domanowska)



¹⁰ Source: Energetyka wiatrowa w Polsce. Wind energy in Poland; Raport 2013; TPA Horvath, BSJP Legal & Tax Advisory, Invest in Poland

Fig 11. Social participation (marked with pink clouds) while spatial planning system for wind turbines investment (M.Domanowska)



“Landscape Act” case study

In April 2015, President Bronislaw Komorowski signed an unique (for Polish conditions) draft of a document of so-called "Landscape Act"¹¹. Landscape act amends certain acts In Polish law, these acts have connection with tools of landscape protection. This Act is a document collecting ten amendments to the functioning of laws that govern varying degrees of Polish law spatial or refer to the Polish landscape and natural environment.

In Landscape Act first project, which were changed during the consultation process one of the most important and widely discussed problem where notes about locating so called dominant in the landscape. It was a key problem for all industries connected to the renewable energy production. Why it was so important for wind energy? Wind farms as well as single wind turbines were recognized as dominants in the landscape (no matter what kind of turbines, their high, wilderness or number of produced energy). According to the Landscape Act project dominants in the landscape could be build only if the voivodship governance would give a permission for that. According to the previous law decision of building all kinds of wind turbines were decided by a commune governance.

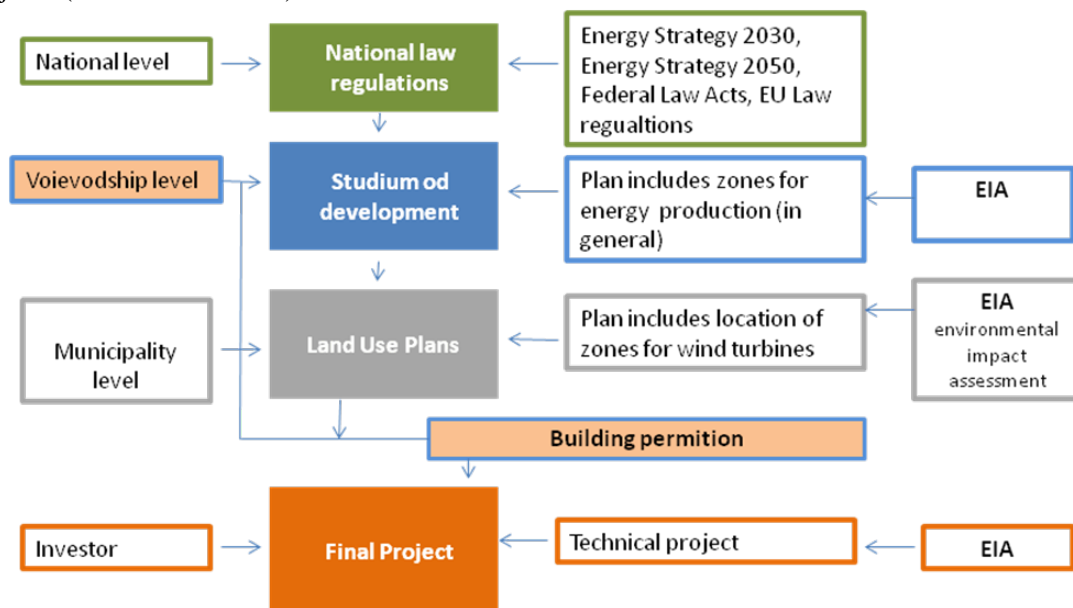
Main notes dedicated to the dominants in the landscape rejected while consultation processes:

¹¹ Ustawa z dnia 24.04.2015o Zmianie niektórych ustaw w związku ze wzmocnieniem narzędzi ochrony krajobrazu

- Definition of a dominant in the landscape;
- Definition of a domination in the landscape (according to the Environmental Protection Act);
- Choosing new organs responsible for determining locations of dominants in the landscape (that includes also wind turbines);
- Order to consult zoning decision for dominants in the landscape with Regional Environmental Management.

All rejected notes where creating new regulation for wind turbines locating. Renewable energy industry. According to the Polish law decision about wind turbines is made by municipality administration. According to rejected project of a Landscape Act decisions about locating wind turbines should belong to the higher, voivodship level of administration. Those changes cause need to apply for building permission not on the municipality level (how it is now) but on a voivodship level. That would also cause a need to invent new ways of procedures for voivodship administration. It would probably had also an impact on whole time of investment process.

Fig 12. Spatial planning system for wind turbines investment – changes proposed by the Landscape Act project (M.Domanowska)



4.3 EU documents and reports for wind turbines location

EU mainly gives only a frameworks for its participant countries. Framework supporting the development of energy from renewable energy sources (“RES”) in the Member States of the European Union have largely defined by the Directive of the European Parliament and of the Council on the promotion of energy from renewable sources (“RES Directive”). One of the main objectives of the RES Directive is to determine targets for the share of renewable energy sources in the total energy mix to be met by the individual Member States of the European Union. In the case

of Poland, the target is to achieve a 15% share of renewable energy in gross final energy consumption by 2020. The RES Directive not only provides for direct support for renewable energy at the national level, but also comprehensively regulates the matters relating to ensuring the priority treatment of renewable energy sources.

Strategic Research Agenda / Market Deployment Strategy (SRA/MDS); EU European Wind Energy Technology Platform; 2014: *“Reaching the ambitious goals set by the European Wind Initiative, to make onshore wind energy the most competitive energy source by 2020 and offshore wind energy by 2030, requires significant investments in R&D. For the 2010-2020 period the European Wind Initiative requires €6 bn. Within this budget, €3.1 bn should come from private investors, €1.86 bn from the EU budget and €1 bn from national programmes.”*¹²

“Adapting policies – wind energy requires stable and long term market and regulatory frameworks. 2030 renewable energy targets are key to providing such frameworks. National frameworks should take account of Member States individual circumstances and wind power potential, establishing targets for each energy technology and maximising regional economic benefits by relying on local sources of energy, as long they are competitive in price/cost terms” Wind Energy Scenarios 2020; A report by the European Wind Energy Association; 2014

Fig. EU wind power installations, actual (end 2013) and new EWEA 2020 low, mid and high scenarios in MW¹³

	2013 actual installations			Low 2020 scenario			Central 2020 scenario			High 2020 scenario		
	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total	Onshore	Offshore	Total
Austria	1,684	-	1,684	3,000	-	3,000	3,400	-	3,400	3,550	-	3,550
Belgium	1,079	572	1,651	2,500	1,250	3,750	3,000	1,500	4,500	3,250	1,800	5,050
Bulgaria	681	-	681	1,250	-	1,250	1,500	-	1,500	1,750	-	1,750
Cyprus	147	-	147	200	-	200	300	-	300	400	-	400
Czech R	269	-	269	500	-	500	1,000	-	1,000	1,200	-	1,200
Denmark	3,501	1,271	4,771	3,600	2,300	5,900	3,700	2,800	6,500	4,000	3,000	7,000
Estonia	280	-	280	550	-	550	700	-	700	1,000	-	1,000
Finland	422	26	448	2,000	26	2,026	2,500	26	2,526	2,700	26	2,726
France	8,254	-	8,254	13,000	1,000	14,000	18,500	1,500	20,000	20,000	1,500	21,500
Germany	33,730	520	34,250	40,000	5,000	45,000	45,000	6,500	51,500	50,000	7,500	57,500
Greece	1,865	-	1,865	3,000	-	3,000	4,500	-	4,500	5,000	-	5,000
Hungary	329	-	329	500	-	500	600	-	600	700	-	700
Ireland	2,011	25	2,037	3,500	25	3,525	4,000	25	4,025	4,500	200	4,700
Italy	8,551	-	8,551	12,000	-	12,000	12,000	-	12,000	15,000	-	15,000
Latvia	62	-	62	150	-	150	200	-	200	300	-	300
Lithuania	279	-	279	500	-	500	600	-	600	800	-	800
Luxembourg	58	-	58	90	-	90	100	-	100	110	-	110
Malta	0	-	-	20	-	20	30	-	30	50	-	50
Netherlands	2,446	247	2,693	3,500	1,200	4,700	4,000	1,400	5,400	5,000	2,000	7,000
Poland	3,390	-	3,390	7,000	-	7,000	10,000	-	10,000	12,000	500	12,500
Portugal	4,722	2	4,724	5,500	25	5,525	5,700	25	5,725	6,000	25	6,025
Romania	2,600	-	2,600	3,000	-	3,000	3,200	-	3,200	3,500	-	3,500
Slovakia	3	-	3	150	-	150	300	-	300	350	-	350
Slovenia	2	-	2	30	-	30	30	-	30	50	-	50
Spain	22,954	5	22,959	24,500	5	24,505	26,000	5	26,005	28,000	5	28,005
Sweden	4,258	212	4,470	5,500	212	5,712	6,000	212	6,212	6,300	212	6,512
UK	6,850	3,681	10,531	10,000	8,500	18,500	11,500	9,500	21,000	13,000	11,000	24,000
Total EU27	110,426	6,560	116,987	145,540	19,543	165,083	165,860	23,493	191,853	188,510	27,768	216,278
Croatia	302	-	302	500	-	500	600	-	600	700	-	700
Total EU28	110,728	6,560	117,288	146,040	19,543	165,583	168,960	23,493	192,453	189,210	27,768	216,978

¹² Strategic Research Agenda / Market Deployment Strategy (SRA/MDS); EU European Wind Energy Technology Platform; 2014

¹³ Wind Energy Scenarios 2020; A report by the European Wind Energy Association; 2014

4. Follow- up

As a most important personal benefit from the coordinated research is that I will try to transcript my work results in to a scientific paper. I think that taking part in STMS is maybe one of the best way to really have a time for research for COST topics. Usually researchers are devoted in to many projects. While STMS they can really work on the topic of COST Action. And that is why I also appreciated that time so much.

6. Personal and mutual benefits for the Home and Host institutions

Personal profits from the STMS are complex. First, participation in the task confirmed me in the need of international cooperation and participation in international tasks. Personal profits from taking part in international Action I can estimate as priceless. What was also important for me was the ability to make contact with the scientific team on the international field in WSL institute. I assume personal profit from this activity will translate into different areas of life. What I have to underline is the Swiss way of work in WSL Institute. It booth gives you freedom of your actions but also puts nice pressure on interaction and cooperation between scientists.

I hope that results of this work can be used by the members of TU 1401 Action. Results of my work will be presented while Dresden meeting of Action TU 1401 members (15-16.09.2015). As a benefit for my home institution I can list that collected research material can be a starting point of new researches and the ability to continue my studies in Poland. For sure I will also transfer results of my work in to the scientific paper.

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