



Windpower Basics
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Stamåsen a Statskraft project



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Preface

Wind turbine development in Sweden

- The development and manufacturing of wind turbines is largely something that the Swedish industries are missing as environmental and economical goals.
- The Danish, German and Spanish companies seem to have an impregnable lead.
- Sweden is expected to take the same step in development of renewable energy as the rest of Europe.
- Renewable energy is the least costly.
- By building Stamåsen wind farm alone the emission of carbon dioxide will decrease by 2 million tons.
- With wind power continued production health-hazardous substances is eliminated and the threat of environmental disasters is minimized.

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Chapter 1 – Introduction

Wind power is a heavily questioned economical factor. The biggest problem seems to be the money being invested in it, when to get them back and how to gain a profit from wind power.

I have chosen Stamåsen as an example in this report because of the new technics in construction of the towers and because of low wind demanding's, environmental less affecting turbines and because we can follow the progress a few years forward.

The main goal of the report is to show thru an environmental aspect as well as economical that wind power is soon to be a winner in this energy race if getting the chance to develop and adjust for the Swedish landscape and market.

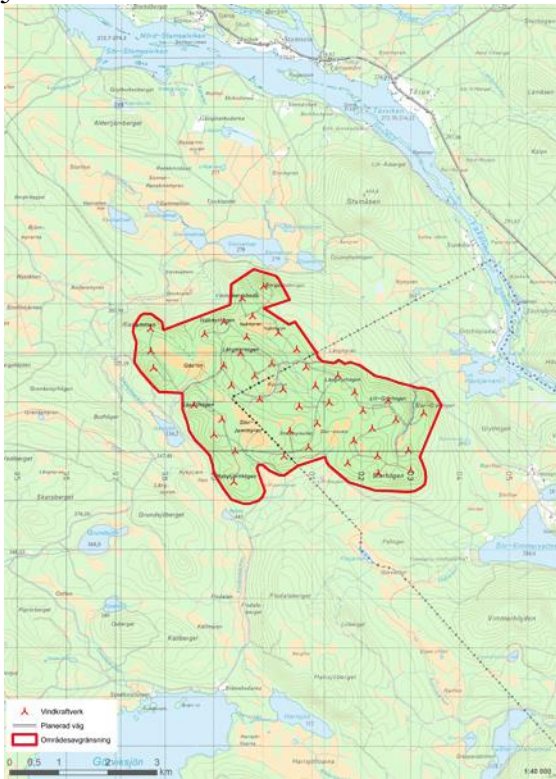


1.1 History

Environmental Advisory Board at the County Board of Västernorrland approved in 2009, 50 wind turbines with a maximum output of 115 MW. The permit applies to a construction start within three years. The project began in 2011 and is expected to be completed by the end of 2012. During the first round, 26 wind turbines will be built with a total power supply of 60MW

1.2 Location

Jämtland



Wind power park Stamåsen

Chapter 2 – Wind turbines

2.1 Product and Technical Specification of wind turbines at Stamåsen

Model	Manufacturer	Nominal power
SWT-2.3-113	Siemens	2.3 MW

- The wind turbines are operated without a gearbox, so called SWT-2.3-113 wind turbine for low to moderate wind conditions.
- Stamåsens wind farm consists of each 100 meter high towers.
- The Quantum Blade is 55 meter long and made of fiberglass it weighs about 12 tons and are paired to extract as much energy as possible from the wind.

- There are three blades mounted on each turbine.
- The foundations that are being built are casted with concrete and manufactured on site.
- It has been used about 500 tons of cement and 40 tons of reinforcement.
- No oil is used for turbines.
- Noise-wise, these work more quietly than the previously approved wind turbines.
- The Wind towers are each built with 14 rounded "shell".
- The towers will meet 115 meters above ground and assembled with approximately 15,000 gross bolts.

2.1.1 Problem

An upcoming major improvement of the power grid is necessary

2.1.2 Amount of wind turbines

The agreement of the project covers a total of 253 wind turbines

2.1.3 Power outcome

The plant is expected to generate around 200 GWh annually. The 26 SWT-2.3-113 turbines are driven directly and deliver 2.3 MW per turbine.

Chapter 3 – Environmental impact statement

Environmental Testing Advisory Board finds that the EIS meets the requirements of Chapter 6 of the Environmental law (code).

(Ref: [Stamåsen pdf, 15th December 2008](#))

Chapter 4 – Financial aspect

Each wind turbine costs 36 million SEK and the total cost is just below one billion including infrastructure. The power from the 26 turbines in this first round will supply 29,000 households with electricity. Each wind turbine supplies electricity to 1115 of the approximately 3.8 million households in Sweden. At the end of the project they will supply 282,095 with electricity.

It has been invested so far about 35 483 SEK in each of these households. Each household uses approximately 20 000 kWh per year and pay about 13 160 SEK. The yearly maintenance and operation of a wind turbine is 10 to 16 cents / kWh i.e. 3200 SEK per year. A quarter of the investments costs consider road construction, concrete work, excavation, electrical wiring, etc. Stamåsen has built 28 km road in partially unbroken terrain connecting the wind turbines.

At the end of 2020 the estimated cost will be 18 billions to finalize the project.

Chapter 5 – Discussions for and against wind power - Money

Let's compare with a nuclear plant, Simpevarpshalvön. This costs about 20-25 cents per kWh and 4,000 per year. This nuclear power plant which began operating in 1985 had an investment cost of 20 billion and with inflation, this would be 40.5 billion today.

Nation wide and global cost of Tjernoby1, no insurance coverage

1986 Chernobyl nuclear power plant catastrophe affected the entire globe economy. The explosions that ruptured Chernobyl's reactor released a cloud of radioactive Caesium-137 particles that spread over Europe.

7 million people nearby were affected. 1,000 people was exposed to high levels of radiation... 4,000 children got thyroid cancer from drinking contaminated milk. 600,000 emergency workers were also exposed to radiation. Five million people currently live in radiated areas and until today the cost have grown to several hundreds of billions.

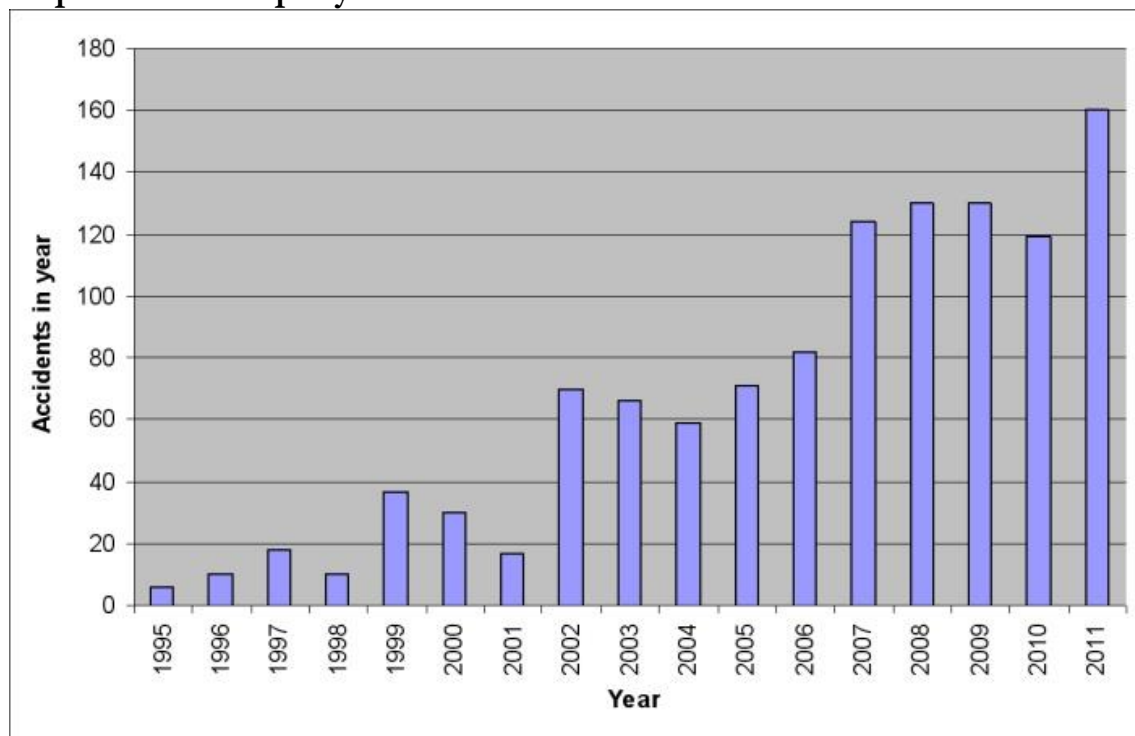
In the rebuilding 330,000 people had to move, they needed special medical care for years and the additional cost for new orientation to find ways to survive after the catastrophe like finding out how to produce non radioactive food... There were disposal of radioactive waste and only the removal of the contaminated soil added up to almost 6,000 square miles of farmland and forests.

Loss of power source!

Wind power as contestant or energy partner

30 TWh of electricity through wind power across the country is planned to be reached by the end of 2020. This represents approximately 20 percent of the country's current electricity consumption.

Costs of accidents due to workplace hazards that was covered by responsible Company insurance



Arguments against development and investments of wind power in Sweden

The Royal Academy of Science and Energy in Sweden has stated that the development of wind turbines is significantly over dimensioned for a country

as Sweden and the financial resources should be placed in other projects to minimize the carbon dioxide levels in the transportation sector.

Counter arguments

In the beginning of 2012 the environmental responsibility that formerly belonged to the county administration, the environmental board and other government boards now have been assigned to municipalities. Ex. – commitment to reduce emissions from fossil fuels, reduce household waste and waste from preparation and building of infrastructure. Today they have the responsibility to increase the use of recycled materials and should do so in an early planning stage.

It is not the responsibility of the municipality to organize the delivery of resident's electricity but in the realm of our country interest and global future interests of our environment.

This is according to law, our responsibility and in the nation interest, a goal of the European Commission Board to be done between the years 2012-2020.

We will find that the transportation sector has the largest amount of environmental hazardous emissions as carbon dioxide and this is thru overall driving distances between workplace and dumping grounds, too high speed with heavy trucks and over load on the machines flatbeds. In this case the solution can be that the municipality works in an early planning state, for less transportation distances when building new infrastructure. They can work to find the closest dump for waste, for clean and unclean masses. Much of the waste can also be used as filling materials in nearby projects. Old asphalt can be reused with as much as 60% and mixed with bitumen.

Preliminary planning of transport distances and higher acceptance of recycled materials in building of infrastructure lowers carbon dioxide considerably.

By building Stamåsen wind farm they will decrease the emission of carbon dioxide by 2 million tons

Recently Vattenfall signed a contract with Teracom for environmental renewable energy and through this the company will reduce their carbon dioxide emissions by 70%.

Vattenfall will invest 18 billion in renewable energy across Europe. This is their environmental policy sustainability efforts.

And...The last statement from the Royal Academy of Sciences Energy Council is that the electricity supplier will make money regardless of electricity is consumed or not. This claim has nothing to do with energy or environmental issues, but it is a challenge to change the applicable Swedish energy certificate and this is a minor and "delicate problem".

Chapter 6 – Conclusions

This information that was gathered about sub issues (controversy questions) that, affects the main task which is development and future progress of wind power production in Sweden.

Overall the summary seems to be that the information is very scattered and causes split divisions about renewable energy and future investments. The information also clearly state that the risk of using nuclear power is heavily underestimated but a preferable source because there are no new expenses involved.

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