Preconditions for Improved Energy Efficiency and Increased Use of Renewable Energy in the Russian Barents Region

RESULTS OF A STUDY COMPLETED IN 2010

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Complete report can be downloaded from www.barentsinfo.fi

Objectives:

- to provide guidelines and recommendations for the further use of the Swedish trust fund “The Barents Window”,
- to provide recommendations on priorities for the JEWG (Joint Working Group on Energy within the Barents Council)

Method:

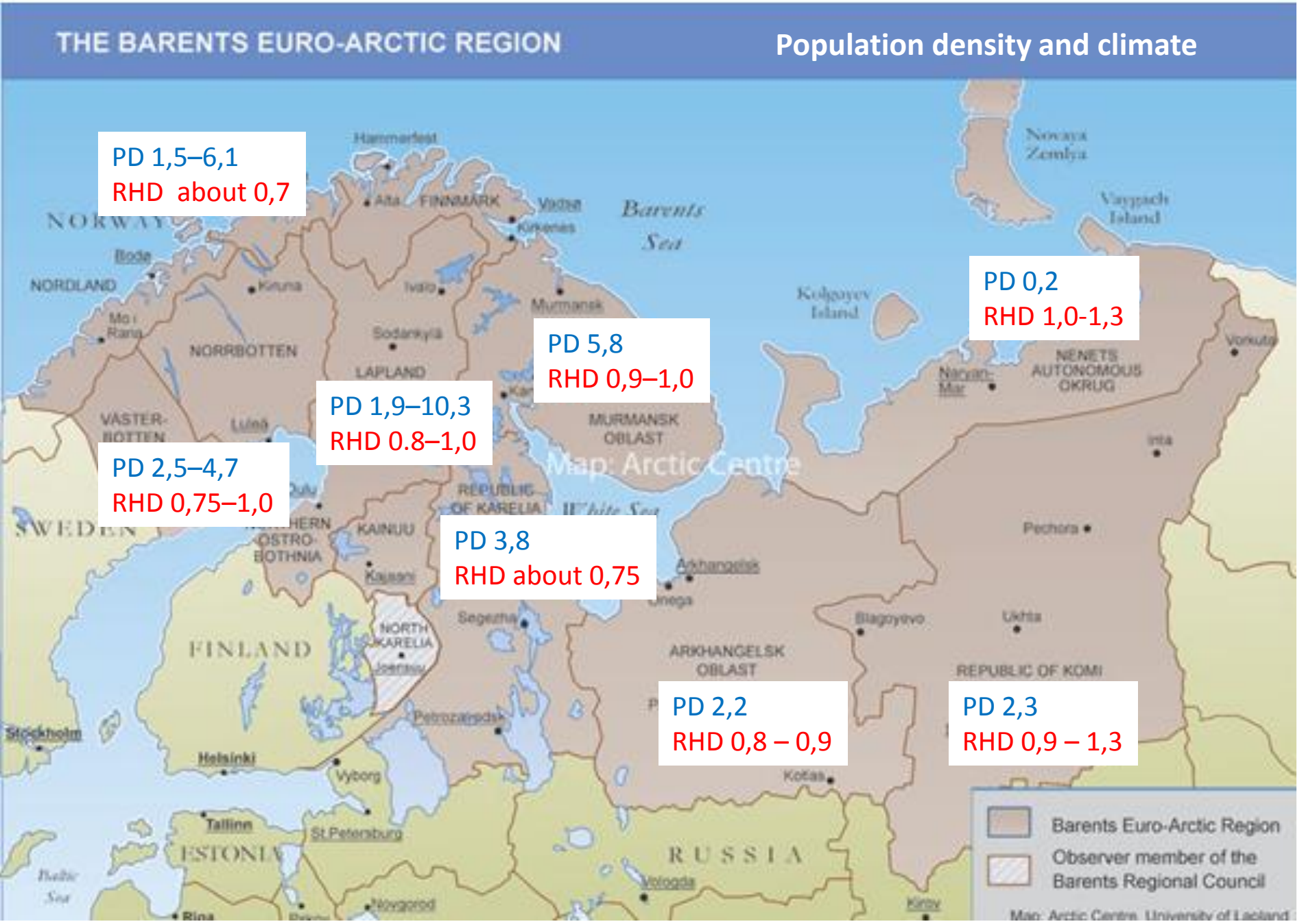
- Define and compare indicators for energy efficiency
- Background data collected from official sources (mainly from 2008)
- Local energy efficiency centres in NW Russia were engaged in this

Impacts:

- The report was presented at the JEWG meeting in Arkhangelsk May 2011. No obvious concrete actions taken so far.

THE BARENTS EURO-ARCTIC REGION

Population density and climate



PD population density persons/km² **RHD Relative heating demand (Kiruna 1,0)**

Other important differences

Industrial structure

Mining, mineral processing and forest industries important in Finland, Russia and Sweden.

Oil and natural gas important in Norway, Republic of Komi and Nenets AO

Housing standard

Average about 40 m^2/capita in Finland and Sweden,

21 m^2/capita in the Russian parts of the Barents region

Urbanization

Larger fraction of the people lives in urban areas in Russian parts of the region

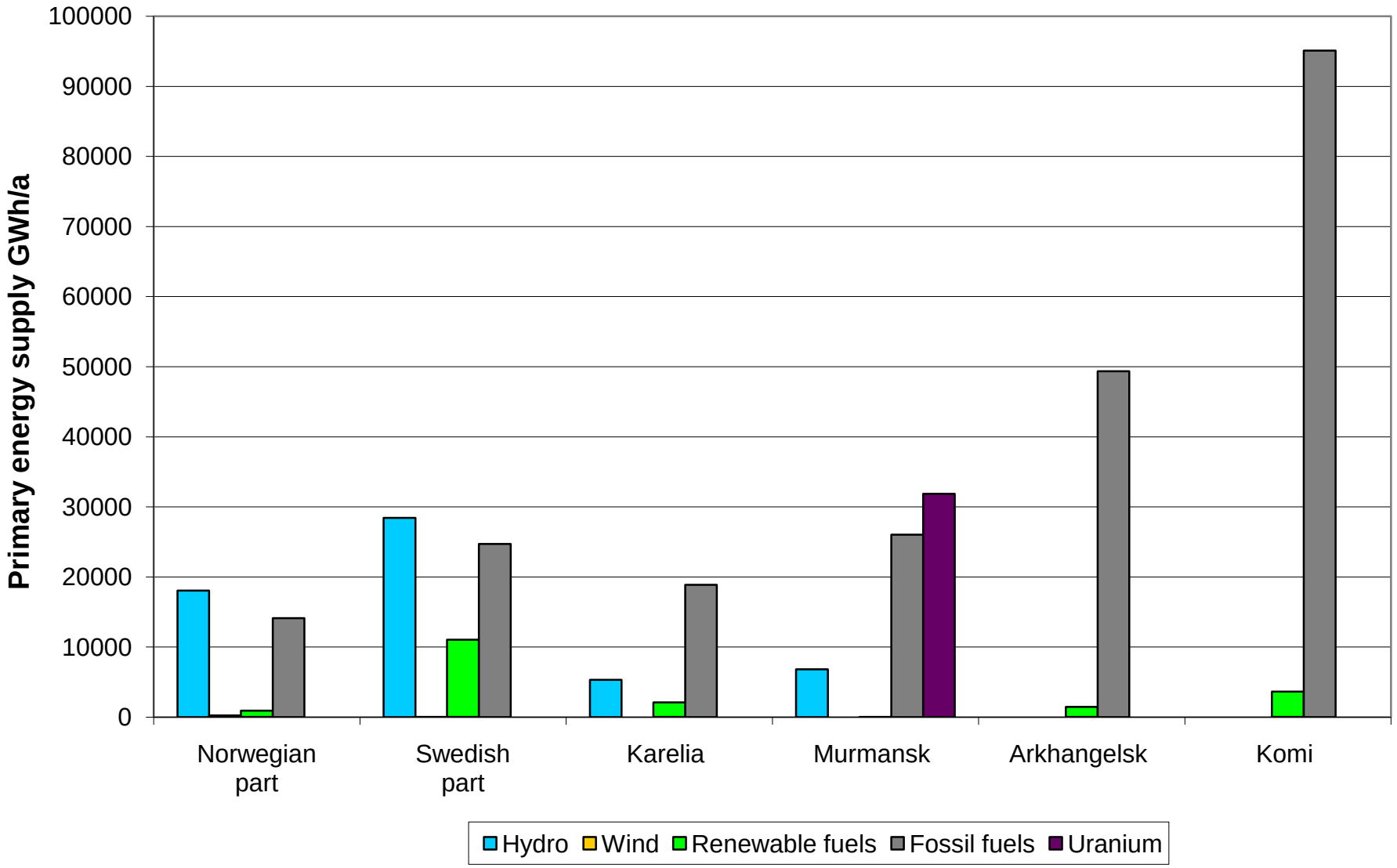
Renewable energy potential

Hydropower important in Norway, Sweden and Russia, wind in Norway and parts of Finland, Russia and Sweden, biomass in Finland, Russia (except Murmansk) and Sweden

Energy prices

Lower prices for fossil fuels and electricity in Russian parts of the region

Structure of primary energy supply in 2008



Hydro and wind shown as electric energy generated. Uranium shown as thermal fission energy.

Comparison of energy efficiency indicators (2008)

Indicator	Swedish parts	Russian parts	Comment
Electricity supply (thermal plants) kWh(fuel)/kWh(el) generated Distribution losses	 1,08 – 1,26 2,6 – 3,0 %	 2,30 – 3,33 5,3 – 10,9 %	Fossil fuels dominate in Russia, biomass fuels in Sweden.
District heat supply kWh(fuel)/kWh(heat) generated Distribution losses	 0,99 – 1,03 3,6 -14,9 %	 1,13 – 1,37 5,3 - ?? %[a)]	Fossil fuels dominate in Russia, biomass fuels in Sweden
Paper and pulp production kWh(fuel)/ton product kWh(el)/ton product	 3800-6600 800-1100	 3500-9800 930-2300	Meaningful comparisons require consideration of feedstocks used, process design and product mix
Mining kWh(fuel)/ton product kWh(el)/ton product	 10 - ??[b)] 11-23	 6 – 170 19 - 120	Meaningful comparisons require consideration of local conditions
Residential heating kWh(heat)/m^2 MWh(heat)/capita	 About 170 10,5-11,3	 420 – 590 8,0-13,5	Fossil fuels dominate in Russia, biomass fuels and electricity (often heat pumps) in Sweden

a) Data could only be found for Archangelsk oblast b) Data could only be found for Boliden, Aitik

Renewable energy – experiences and potential

Hydropower

Commercial technology. Large unused potential in Norway and Sweden.
Environmental restrictions limits further expansion.
Potential in Russia was not quantified in the study.

Solar (for electricity and heat)

Commercial technology. Feasible for niche-applications only.

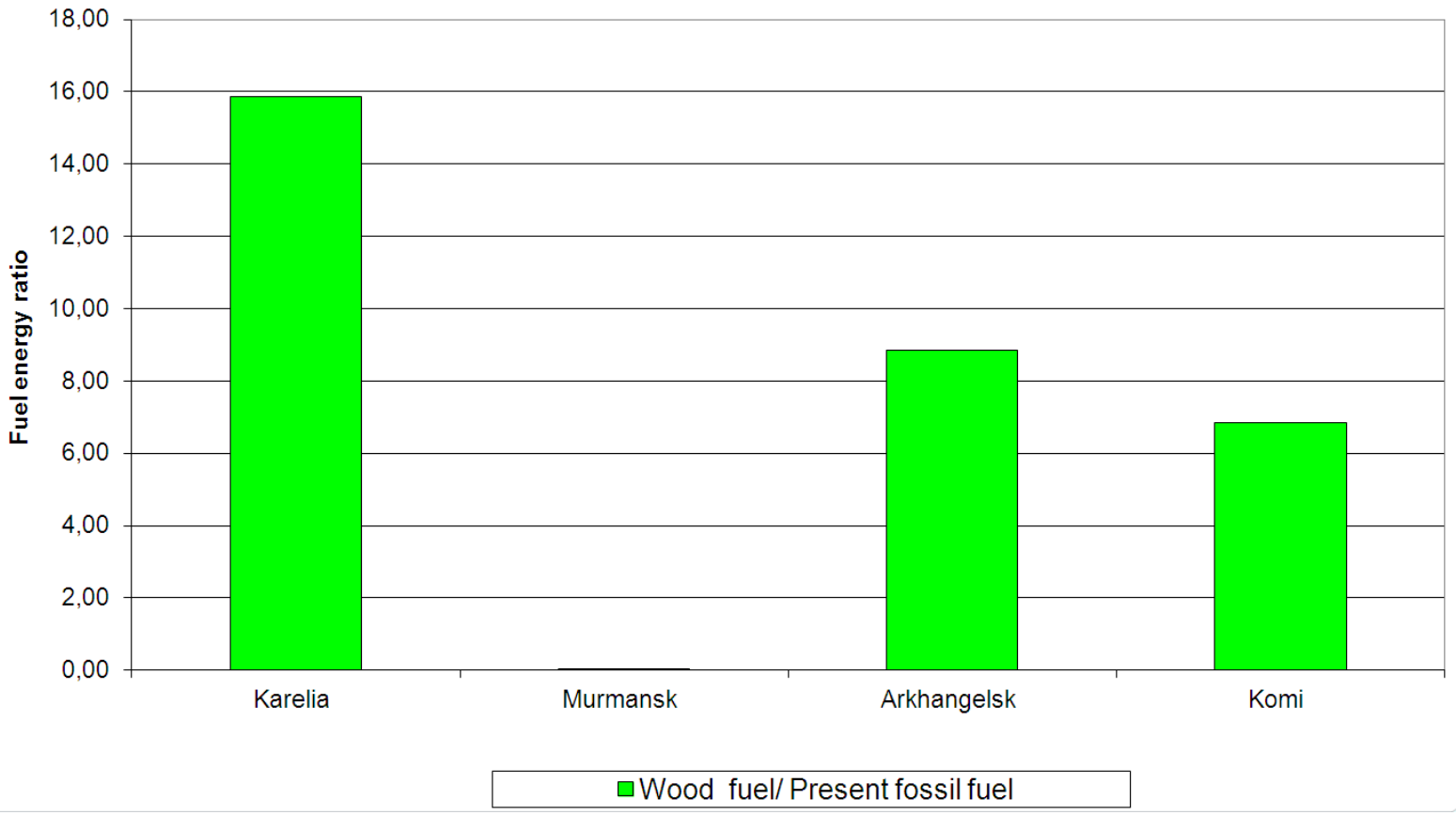
Windpower

A few installations in the region. Good documentation of experiences has not been found. Promising experiences from wind-diesel hybrid plants in Alaska. Sites with good wind conditions can certainly be found.

Biomass (for electricity and heat)

Commercial technology for heat 10 kW – 200 MW and for co-generation of electricity 2 – 100 MW. Promising for plants with capacity 30 kW – 2 MW. Considerable unused potential in Finland, Sweden and Russia.

Wood energy potential compared to present fossil fuel use



Data for Archangelsk from AOEEC.
Data for Karelia, Murmansk, and Komi estimated from forested area.

Conclusions

- Energy efficiency in thermal electricity generation is less in Russia than in Sweden. The reason is that cogeneration is not used to the same extent;
- Energy efficiency in district heat generation is less in Russia than in Sweden. The reason is that the use of biomass fuel allows lower exhaust temperatures (even with recovery of condensation heat);
- Residential buildings are generally less energy efficient in Russia than in Finland and Sweden;
- Meaningful comparisons of losses in distribution of electricity and heat and efficiencies in process industries require more in-depth analysis.
- The Russian parts of the region are much more dependant on fossil fuels than the western parts and the contributions from renewable energy are small;
- The unused technical potential for substitution of fossil fuels with biomass fuels appears as very large in northwest Russia;
- The main reason for less efficiency and less use of renewable energy in Russia is not lack of knowledge but a consequence of lower prices for fossil fuels.
- Transfer of experiences from the Nordic countries can however facilitate a transition of the Russian energy system towards improved sustainability.

Recommendations

General:

- Focus on applications for improved energy efficiency and substitution of fossil fuels with renewables that are already profitable (such as renewable energy for remote settlements)
- Initiate co-operative R&D on issues of common interest.

Recommendations to the JEWG of the Barents Council:

- Identify focal points for the cross-Barents co-operation on energy efficiency and transition to renewable energy;
- Arrange workshops for exchange of information and identification of specific issues for further co-operation (Efficiency of buildings, thermal electricity generation, district heating , biomass energy, arctic wind energy)

Recommendations to the Barents Window Trust Fund:

- Use 50% of the fund (1,2 MEUR) for preparation of selected workshops and the rest for part financing of pilot projects.

Final words

- The study was made in 2010 and mainly based on data from 2008. Still it is believed that the main conclusions are valid;
- Development of Russian energy policy is promising with large emphasis on energy efficiency (40% improvement to 2020) and promotion of renewable energy in particular for remote settlements;
- Russia will benefit from using experiences from the Nordic countries but initiatives for co-operation must come from Russia.