CURRENT CONDITION AND FUTURE OF THE WIND POWER

Dzhankhotov V.V., Kankainen L., Pääkkönen M.T.

2010. Agreement between Siemens, Rostechnologii and RusGidro

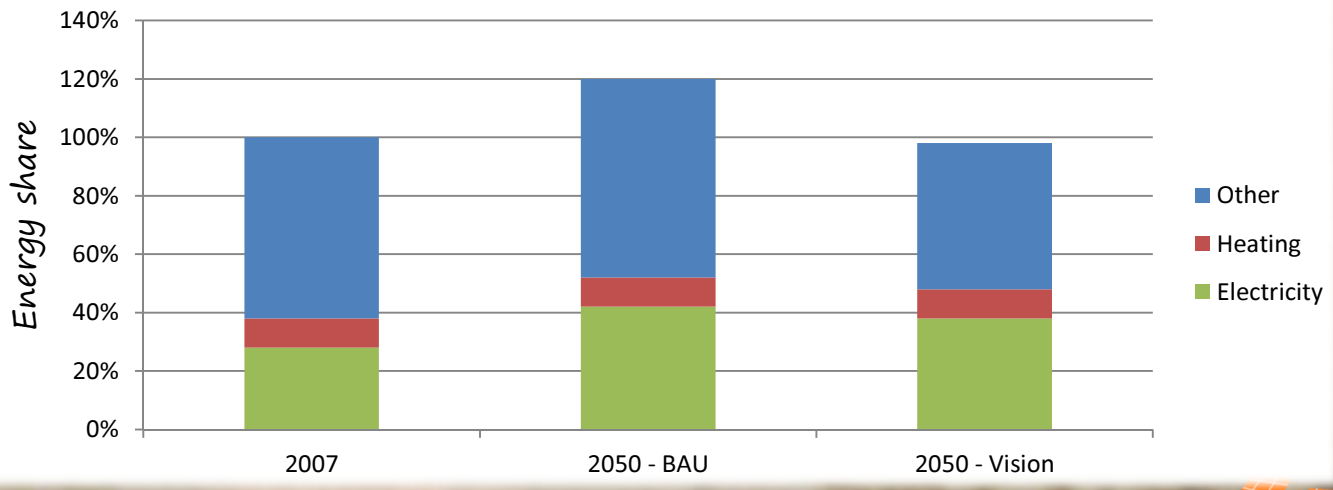
1997. Kyoto protocol: to minimize greenhouse emissions.

2002. Russia joins Kyoto protocol.

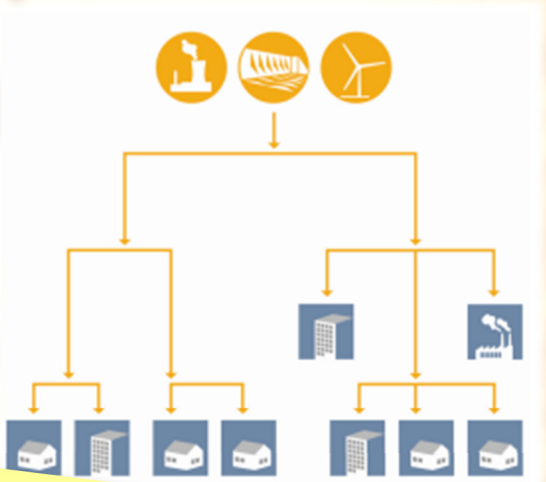
2020. 5 GW of wind power installations in Russia.

$$\textbf{EMISSINS}\downarrow = POPUL.\uparrow \cdot GDP_{man}\uparrow \cdot \underbrace{\frac{ENERGY}{GDP}\downarrow}_{\text{EFFICIENCY}\uparrow\ \text{ENERGY CONSUMPTION}\downarrow} \cdot \underbrace{\frac{EMISSIONS}{ENERGY}\downarrow}_{\text{ALTERNATIVE ENERGY SOURCES}\uparrow}$$

POWER CONSUMPTION IN 2050



TRADITIONAL GRID



Centralized energy generation

One-directional power flow

Operation based on historical experience

SMART GRID

Centralized and distributed energy generation

Controlled multidirectional power flow

Real-time control

Good integration into the market

WIND POWER FUTURE VISION

Stricter standards on fault ride-through situations, energy quality, integration into the grid, security and reliability

Increasing of the powers of the turbines

Power wind-mills: offshore installations

Small power wind mills: cheapening in order to be used widely

CHARACTERISTICS OF THE SMART GRIDS

Capable to interact with energy consumers

Adaptive to the changes in the grid

Optimized for best usage of the resources and equipment

Proactive against failure situations in the network

Self-healing after the failures

Secure and reliable