WIND ENERGY

Potential in the United States Estimates of the electricity that could potentially be generated by wind power and of the land area available for wind energy have been calculated for the United States. The potential electric power from wind energy is surprisingly large. Good wind areas, which cover 6 % of the U.S. land area, have the potential to supply more than one and a half times the current electricity consumption of the United States. Technology under development today will be capable of producing electricity economically from good wind sites in many regions of the country. A wind energy resource atlas of the United States shows that areas potentially suitable for wind energy applications are dispersed throughout much of the United States. Estimates of the wind resource in this atlas are expressed in 13 wind power classes ranging from class 1 to class 7, with each class representing a range of mean wind power density or equivalent mean speed at specified heights above the ground. Areas designated class 4 or greater are suitable with advanced wind turbine technology under development today. Power class 3 areas may be suitable for future generation technology. Class 2 areas are marginal and class 1 areas unsuitable for wind energy development. Several factors determine the amount of land area suitable for wind energy development within a particular grid cell in a region of high wind energy potential. The important factors include the percentage of land exposed to the wind resource and land-use and environmental restrictions. The land area exposed to the wind for each grid cell was estimated based on a landform classification and ranged from 90 % for relatively flat terrain down to 5 % for mountainous terrain. Estimates of land area excluded from wind energy development, in percent per grid cell, were made for various types of land-use (e. g., forest, agricultural, range, and urban lands). Environmental exclusion areas were defined as federal and state lands (including parks, monuments, wilderness areas, wildlife refuges, and other protected areas) where wind energy development would be prohibited or severely restricted. The wind electric potential per grid cell was calculated from the available windy land area and the wind power classification assigned to each cell. The amount of potential electricity that can be generated is dependent on several factors, including the spacing between, wind turbines, the assumed efficiency of the machines, the turbine hub height, and the estimated energy losses (caused by wind turbine wakes, blade soiling, etc.). Estimates of wind turbine efficiency and power losses are based on data from existing turbines. For advanced turbines, efficiency is projected to be 30 %–35 % and power losses 10 %–15 %. The considerable wind electric potential has not been tapped before because wind turbine technology was not able to utilize this resource. However, during the past decade, increased knowledge of wind turbine behaviour has led to more cost-effective wind turbines that are more efficient in producing electricity. The price of the electricity produced from wind by these advanced turbines is estimated to be competitive with conventional sources of power, including fossil fuels. Because of the increasing competitiveness of wind energy, wind resource assessment will become essential in incorporating wind energy into the nation's energy mix. The importance of accurate wind resource assessment is also recognized in other parts of the world. Detailed wind resource assessments have been proposed or are being considered as part of a plan to increase the use of wind energy in Europe, Asia, 14 Latin America, and other regions. The decreasing cost of wind power and the growing interest in renewable energy sources should ensure that wind power will become a viable energy source in the United States and worldwide.

**Potential of Europe**

Wind turbines are now a relatively common sight across Europe, with countries such as Denmark, the Netherlands, Germany, UK, Spain and latterly France, all investing in wind farms. Offshore wind development, although far less advanced, is the greatest prize in this field. However, relative costs of offshore compared to onshore are higher. This project is aimed to demonstrate the economic as well as technical viability of offshore wind energy. The former was achieved through the innovative use of a floating jack-up barge which reduced the time and costs of installation. The latter was achieved mainly through the incorporation of new electronic control systems which improved the compatibility with the grid network, and reduced the need for expensive grid strengthening measures. Five turbines were installed, about 4 km off the coast of Gotland. Each turbine is rated at 500 kW. The average annual output is some 8 GWh/y, from mean wind speeds of 8 m/s. Rock-socketed steel mono-pile foundations, to water depths of 5 to 6.5 m were used to secure the turbines. Total construction time was only 35 days. Monitoring of impacts on local flora and fauna, such as the seal population, is also being carried out.

**Vocabulary**

estimates – калькуляция,

сметные предположения

to disperse – рассеивать,

рассредоточивать to range – классифицировать

range – диапазон, область, сфера

mean – средний

suitable – подходящий

to expose – подвергать действию

to prohibit – запрещать

to restrict – ограничивать

to assume – предполагать

to cause – вызывать

competitiveness – конкуренция

viable – жизнеспособный

wind power – энергия ветра

electricity consumption – потребление электричества

wind resources – ресурсы ветра

power density – плотность рассеиваемой мощности

wind turbine – ветряк, ветротурбина

turbine weight – вес турбины

turbine hub – корпус турбины

turbine wake – последствия аварии турбины

blade soiling – порча лопасти

wind farm – ветровая электростанция

to install – устанавливать

grid – энергетическая система

**Упражнение 2. Найдите русские эквиваленты в b) для следующих английских словосочетаний из а):**

а) b)

1) wind power 1) применение энергии ветра

2) current electricity consumption 2) сегодняшнее потребление электричества

3) wind energy resource atlas 3) энергия ветра

4) wind energy applications 4) оценка ресурсов энергии ветра

5) mean wind power density 5) атлас энергоресурсов ветра

6) advanced wind turbine technology 6) высота корпуса турбины

7) wind power classification 7) средняя плотность энергии ветра

8) turbine hub height 8) передовая технология разработки ветряков

9) wind resource assessment 9) применение энергии ветра

**●Упражнение 3. Найдите в тексте синонимы следующих слов:**

a) appropriate, c) limitation , e) to suggest, b) unprotected, d) to appreciate, f) fruitful. **●Упражнение 4. Определите, соответствуют или не соответствуют следующие** **утверждения тексту**.

1. The potential electric power from wind energy is surprisingly small. 2. Technology under development today will be capable of producing electricity economically from good wind sites in few regions of the country. 16 3. The important factors include the percentage of land exposed to the wind resource and land-use and environmental restrictions. 4. The amount of potential electricity that can be generated is dependent on nothing. 5. Estimates of wind turbine efficiency and power losses are based on data from existing turbines. 6. The increasing cost of wind power and the growing interest in renewable energy sources should ensure that wind power will become a viable energy source in the United States and worldwide. ●

**Упражнение 5. Ответьте на вопросы**. 1. In what countries are wind turbines a relatively common sight? 2. What is the aim of the project? 3. How many turbines were installed? 4. What was total construction time?