

## **Experts Training of the Eighth Training Abroad for Senior Executive on new energy**



German local time 16<sup>th</sup>-17<sup>th</sup>, June, the Eighth Training Abroad for Senior Executive on new energy received training courses given by experts from power system and power economic research center (FGH) and RWE Transmission Company. Besides, trainees visited WindTest-NRW, a German wind measurement organization.

In the morning 16<sup>th</sup>, June, Professors in Aachen University and experts from FGH gave lectures on advanced power conservation technology and its contribution to the stability of power grid, wind turbine technical requirements from the grid operator aspect, as well as the grid integration guidance for electronic characteristics in distributive power generation companies. Professor Sauer from Aachen University Introduced the pumped storage, compressed air energy storage, underground hydrogen storage, battery energy storage, superconducting capacitors and flywheel energy storage and other electric power system storage means, furthermore, he analyzed the working scope, cost and other details. Technically, all of the energy storage technology is achievable, but they are expensive; in the next 20 years, electric vehicles will have the energy storage function ranging from a few milliseconds to one day; in a farther future, hydrogen energy will become a competitive means of energy storage. FGH Certification Office experts, Mr. Meuser and Mr. Brellie individually introduced grid integration's technical requirements on wind turbine and the development history of German grid integration guidelines, especially low-voltage ride through.

In the afternoon, 16<sup>th</sup> June, Mr. Martin Brennecke from FGH Certification Office gave a lecture on compliance test in grid integration guidelines, with special focus on test methods and processes, the structure of low-voltage ride through, and safety scheme for individual wind turbine and power grid. After, Mr. Ernst from RWE Transmission Company presented wind power prediction and the practical experiences, especially the wind power prediction system with a combination of different meteorological models.

In the morning, 17<sup>th</sup> June, Mr. Brelie from FGH certification office introduced the certification process for the wind power grid integration guidelines, mainly focusing on current German certification process of wind turbine and wind farms. After, Mr. Puffer gave a lecture on dynamic capacity increase technology—utilizing up-to-date monitor to improve capacity of the transmission line.

In the afternoon, 17<sup>th</sup> June, afternoon, trainees visited the famous German wind power testing organization WindTest-NRW. The company engages in professional wind power testing, including wind farm site assessment, wind turbine and wind power prototype testing and compliance test in grid integration testing guidelines, etc.; The Company owns a wind power test site, including 8 typhoon test wind turbines, which will be enlarged to 11. with the company of WindTest-NRW experts, all the trainees first visited the wind power test site, especially the ongoing test of the 2.3MW wind turbine from Siemens. The turbine has a wheel of 135m high, of which 80 meters below used concrete structure, the upper 55 m is steel tube tower, while the blade length is 45 meters. Subsequently, WindTest-NRW experts introduced the company's development history, main business and wind power quality and wind farm characteristics testing procedures, furthermore, they provided analysis the different effects brought from new/old version of the IEC standards, especially low-voltage ride through characteristics, active / reactive power control settings, reactive power capacity, automatic voltage regulation and power grid system protection, etc.

Since opening of the training, trainees showed their great interests in the teaching content, combined with personal working experiences; they actively joined in the courses and expressed their opinions.