

Future Sustainable Energy Systems towards 2050

The energy industry is one of the few industrial sectors, which affect prosperity of every sphere of economic and social life and exert a direct influence on general technological progress. Much of the world's energy, however, is currently produced and consumed in ways that could not be sustained. The need to control atmospheric emissions of greenhouse and other gases and substances will increasingly need to be focused on efficiency, cost and sustainability in energy production. Renewable energy sources (RES) can help provide for our future needs by harnessing abundant, naturally occurring sources of energy, such as the sun, the wind, and biomass. Effectively harnessing these renewable resources requires careful planning, advanced technology and new optimisation tools. The plenary talk will cover the developments of future sustainable energy systems and strategies towards 2050. The European Union's energy policy will be discussed, the main long-term goal of which is the conversion of the existing energy system, now heavily dependent on fossil fuels, to a sustainable energy system based on differentiated energy sources of higher energy efficiency. Recent research work regarding the development of advanced simulation tools for the techno-economic optimisation of the future sustainable energy systems will be discussed. An optimum scenario leading to hydrogen economy will be presented and the relevant energy cost towards 2050 will be discussed and justified through various examples of the use of sustainable energy technologies.