

Water Saving in Electricity Generation System Considering Natural Gas Limitation

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Abstract : Power plants exploit striking proportion of underground water consumption. Correspondingly, natural gas-fired power plants need less water than the other conventional power plants. Therefore, shifting unit commitment planning toward these power plants would help to save water consumption. This paper discusses the impacts of water consumption limitation on natural gas consumption and vice versa as a short-term water consumption management solution. To do so, conventional unit commitment problem is extended by adding water consumption and natural gas constraints to the previous constrains. The paper presents the impact of water saving on natural gas demands as well as natural gas shortage on water demand. Correspondingly, the additional cost of electricity production according to the aforementioned constraints is evaluated. Finally, a test system is applied to investigate potentials and impacts of water saving and natural gas shortage. Different scenarios are conducted and the results are presented. The results of the study illustrate that in order to use less water for power production it needs to use more natural gas. Meanwhile, natural gas shortage causes to utilize more amount of water in aggregate.

Keywords : electric energy generation system, underground water sources, unit commitment, water consumption saving, natural gas

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