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in this paper, the strategic technology options, especially the potential role of natural gas combined cycle and nuclear power plants, in mitigation of co2 emission in electricity sector in china are assessed. we analyse the influence of different power generation technologies on co2 emission volume and abatement cost based on energy market and electricity demand prospects, and least-cost expansion of electricity generating system. in the latter model, we take into account electricity supply quality and co2 emission. the co2 abatement cost is estimated in a period of time rather than the traditional abatement cost estimation performed for a target year. the proposed model is applied to the case of shanghai municipality in china to assess potential role of natural gas combined cycle power plants (ccpp) in mitigation of co2 emission. impact of the baseline technology choice on co2 abatement cost is analysed through the formulation of three scenarios. for the first one (baseline scenario), it is assumed that expansion of the electricity supply system is based only on coal-fired power plants; for the second scenario, it is supposed that the decision makers have already envisaged the use of natural gas combined cycle power plants (ccpp) in addition to coal fired ones; the third scenario mixes coal-fired, natural gas ccpp and nuclear power plants. it is found that on the horizon of the study (2020), maximum co2 emission mitigation potential of natural gas ccpps can reach 42.4 million tons (mtco2), whereas maximum co2 emission reduction potential of nuclear power plants can be 298.2 mtco2. the co2 abatement cost estimation falls into the range from us19/tco2 to us51/tco2 depending on the level of imposed co2 penalty, volume of carbon emission reduction and baseline technology choice.

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yen-fang li was born in taiwan, the republic of china in 1966. he received the bs, ms and phd degree in electrical engineering from national taiwan university of science and technology, taipei in 1990, 1992 and 2001, respectively. in 1992, he joined the department of electrical engineering, ming hsin university of science and technology, hsin-chu, taiwan, where he was employed as an instructor from 1992 to 2001 and as an associate professor from 2001 to present. his main research interests include robust control, nonlinear control, h-infinity control, pc-based real-time control and applications, analog and digital circuit design, and high-efficiency switching-mode tuned power amplifier design. recently, the model-free controller syntheses have been paid attention to as one of promising controller tuning methods. the authors proposed the fictitious correlation-based tuning (fcbt) which obtains reasonable controller parameters using the input/output data set. however, the stability of the tuned closed-loop system was not guaranteed in this approach. this paper proposes the controller tuning method guaranteeing the closed-loop stability at each parameter update without any plant models. the data-based stability test is imposed at each parameter update to make the tuned closed-loop system stable at least. moreover, particle swarm optimization (pso) is introduced to reduce the initial-value dependence in the nonlinear optimization instead of the gauss-newton method. the effectiveness is confirmed by experimental results. in this paper, the strategic technology options, especially the potential role of natural gas combined cycle and nuclear power plants, in mitigation of co2 emission in electricity sector in china are assessed. 5ec8ef588b