

Measuring the effects of power system reform in Jiangsu province, China from the perspective of Social Cost Benefit Analysis

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Jiangsu is one of the most well-developed provinces in China and has made a remarkable progress on medium and long-term electricity markets (one-month-ahead and one-year-ahead markets) since 2015. To better evaluate the effect of the reform, this paper examines the progress with power market reform beginning in 2012, detailing the emergence of bilateral electricity trading and progress with annual and monthly markets following the No.9 Document of 2015. The study period includes the pre-reform period (before PSR 2015) and the period after the reform (2016 to 2020). The effects of the reform can be visualized by the changing industrial and commercial electricity price trend. However, what we highlight is the extent to which the effects of the reform came from the introduction of market prices for generation or reductions in regulated network prices and additional charges (such as VAT or renewables subsidies). We want to show the sources of price reductions and the impact of the reform on prices paid to generators and on the transmission and distribution charges received by the grid companies.

The major contributions of this paper can be summarized as follows:

- 1) This paper does a comprehensive review on the power system reform in Jiangsu Province.
- 2) The paper quantifies and visualizes the effects of the PSR 2015 on the industrial and

commercial retail price in Jiangsu Province. The components of the monthly price reduction are calculated.

3) A Social Cost Benefit Analysis (SCBA) is proposed to evaluate the welfare change of the industrial and commercial customers in Jiangsu Province and the calculation result is compared with other power system reforms.

According to our analysis, the following conclusions can be drawn.

(1) This paper has sought to discuss the electricity price change in Jiangsu province before and after the new round of power market reform from a societal perspective. All the figures and tables in the paper are all generated based on online public data resources. **From the analysis, the reform brought the electricity price down substantially to 2020.** Among the components of the reduction, the reduction of generation prices and network charges are the most significant ones. However, many estimations need to be made due to the lack of published data, such as the monthly breakdown of the annual trading contract volumes. More detailed and accurate analysis could be done if the missing data was available.

(2) The overall electricity price can reflect the changing generation cost (essentially the medium- and long-term coal price) and the relationship between supply and demand to a certain extent, especially in the monthly centralized market. However, since there is only medium- and long-term market existing, actual time and space value of electricity cannot be fully reflected in the price at the moment. **At present we find that Jiangsu is in the early stages of the power market reform and only has a medium and long-term market.** Whether the overall electricity price may change after the implementation of spot market is yet to be known.

(3) The power system reform has a positive welfare impact for society in terms of reducing the industrial consumer price. **Based on the assumptions in the study, the result shows that despite the existence of the reform costs, there is still a considerable total societal net benefit.** This comes mainly in the form of lower prices (and potentially costs). There are some limitations to our study. For example, it is difficult to distinguish whether the SO₂ and CO₂ savings are the impact of the power market reform or the impact of government policies to reduce emissions in electricity sector (i.e. the “Dual Carbon Goals”). Furthermore, due to poor data availability, there are many assumptions made to estimate the net benefit, so are results can only be taken to be indicative of magnitude and direction of reform impact.