

## **Macroeconomic impact of the energy technologies changes in Russia: input-output approach**

Topic: Modelling energy use and production in interindustry models

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### Research question

The world energy sector is dynamically transforming under the influence of new technologies in the fields of road transport, electricity generation, energy efficiency, digitalization and automation. The spread of new technologies leads to a change (\*changes) in the structure of energy resources and construction materials consumption, trade and anthropogenic emissions. This means a large-scale change in the structure of cost and value added in the economy. With the spread of electric vehicles and renewable energy sources we should estimate CO<sub>2</sub> (carbon) emissions in the most complex way. These technologies are characterized by zero emissions at the stage of use, but significant amount of pollution is concentrated at production and recycling stages. Therefore, it is important to estimate the total life cycle emissions, taking into account inter-industry interactions and the composition of the economic activities included in the technological chains.

This research problem is strongly relevant for Russia, since a significant share of exports and budget revenues are provided by the national energy sector, which is based on fossil fuels. The adaptation to the world energy sector transformation is of high priority for the Russian economy.

### Methods used

The calculations are made using the dynamic inter-industry model, which is developed by the Institute of Economic Forecasting of the Russian Academy of Sciences and called RIM. It belongs to Inforum-type Input-Output models and involves an econometric calculation of the final demand and value added elements, as well as particular technological coefficients. In the RIM model, the nomenclature of economic activities includes 44 items. The model includes energy balances, corresponding to the International Energy Agency methodology, and the unit for CO<sub>2</sub> emissions calculating.

### Data used

The basis of our approach is input-output tables for Russia for 1980-2015. We use the data of the Russian national accounts system, National inventory report about anthropogenic emissions and WIOD database.

### Novelty of the research

The novelty of the research is determined by the development of a dynamic inter-industry model for the Russian economy, as well as the modeling of a number of technological coefficients. Such problem statement is implemented in the Russian economy for the first time.