Expert Group Meeting on Sustainable and clean energy in North and Central Asia

Session 2: Sustainable and clean energy as a driver for the 2030 Agenda

BACKGROUND DOCUMENT

Objectives

- To evaluate empirical analysis used to analyze the interlinkages between sustainable energy and social, economic and environmental SDG indicators
- To discuss main determinants of sustainable and clean energy in North and Central Asia and their relationship to sustainable development
- To suggest improvements for the current conceptual framework and future analysis
- To suggest next steps for updating and utilizing presented material in the work of ESCAP and countries in the subregion

Points for discussion

- The current conceptual framework identifies capacity, infrastructure, trade and cost as the main determinants of clean and sustainable energy. Are there other important variables that should be included in the analysis?
- North and Central Asian region is characterized by their own unique energy security, intraregional trade and diversification circumstances. Given this diverse context, What can be a good measurement for the achievement of sustainable and clean energy for the subregion?
- Currently social, environmental and economic indicators are used to evaluate progress towards achieving 2030 Agenda. Which metrics should be used to evaluate SDG progress, and which are the most relevant for the NCA region?
- What are the limitations of the current quantitative model and methodology have? How can we better analyze and identify determinants of clean energy and the relationship between clean energy and sustainable development?
- Next steps for consideration include (i) SONCA to update analysis based on outcomes of the meeting, (ii) expert group volunteer to peer review updated analysis, (iii) updated working paper to be published on SONCA webpage, (iv) findings to be presented at other meetings/ SPECA meeting, (v) any opportunities for collaboration?

Content

Methodology

For the analysis, an unbalanced panel data set was used covering all North and Central Asia countries for the period 1990-2019. The method used for the quantitative analysis is the two stage least squares or multiple instrumental variables approach. The first stage is to run the regression on determinants of sustainable and clean energy and obtain the fitted values. The statistical significance and relationship are assessed through the equation $RE_{it} = x_0 + x_1 capacity_{it} + x_2 plants_{it} + x_3 cost_{it} + x_4 trade_{it} + \mu_{it} + \varepsilon_{it}$, where RE_{it} = renewable energy consumption, $capacity_{it}$ = installed renewable energy capacity, $plants_{it}$ = number of renewable energy power plants, $cost_{it-1}$ = levelized cost of energy, $trade_{it}$ = share of intraregional energy trade, μ_{it} = covariates, ε_{it} = error term. The estimation method used with unbalanced panel data was Fixed Effects approach based on the results of Hausman test.

The second stage of the analysis uses the fitted values of renewable energy consumption as an instrumental variable to analyse the equation $SDG_{it} = x_0 + x_1 \widehat{RE_{it}} + \mu_{it} + \varepsilon_{it}$, where SDG_{it} = sustainable development indicator, $\widehat{RE_{it}}$ = fitted values of renewable energy consumption, μ_{it} = covariates, ε_{it} = error term. Under assumption that RE is uncorrelated with error term in the structural equation, $\varepsilon_{it,}$ it can be used as a valid and appropriate instrumental variable for RE_{it}.

Findings

From the first stage analysis, two important findings stand out. First, greater renewable energy capacity, measured by the maximum net generating capacity of power plants and other installations that use renewable energy sources to produce electricity, increase renewable energy consumption, holding everything else constant. The relationship between capacity and RE consumption is statistically significant at 1% significance level. Second, the results indicate that relationship between intraregional energy trade and renewable energy consumption is positive and statistically significant at 5% significance level. Countries with higher share of energy trade in the region on average have higher levels of renewable energy consumption, ceteris paribus. All other explanatory variables have expected signs. There is an inverse relationship between renewable energy price, measured by LCOE, and RE quantity demanded. As expected, RE plants are positively related to RE consumption.

From the second stage analysis, the results suggest that clean and sustainable energy have statistically significant relationship on social, economic and environmental SDGs. First, in terms of social development indicators, RE consumption has a statistically significant and negative relationship with proportion of population living below the national poverty line. Moreover, holding all control variables constant, higher RE consumption on average increase total electricity access in the NCA region. The result is significant at 5% significance level. Regarding economic development, the findings indicate that clean and sustainable energy are positively correlated with GDP and GDP per capita. Controlling for other macroeconomic variables, such as trade openness, total unemployment, exchange rate and also for governance indicators, countries with higher RE consumption on average have higher GDP and GDP per capita. Lastly, clean and sustainable energy have predicted effects on environmental indicators. There is negative and statistically significant relationship between renewable energy consumption and CO2 emissions of the country.