QUANTITATIVE ASSESSMENT OF SOLAR ENERGY GEO-POLICY RISKS

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ABSTRACT.

Contemporary, the global energy mix is mainly constituted by fossil fuels – coal, oil, gas and wood. Solar energy has the biggest potential by year 2100, up to 70% of global energy mix. Risks (social, health – related, geopolitical, industrial) incorporated in solar energy use growth exist indeed and should be addressed before consequences happen. Surprisingly, extremely little research addresses systemic risks pertaining to the wide spread of solar energy. The novelty of the current research would be in (i) identifying geopolitical risks associated with solar energy use proliferation; (ii) quantifying some of those (geopolitical) risks while analyzing statistically. Knowing those risks might help policy-makers, industry and international organizations prevent possible conflicts for solar energy control.

The working hypothesis of the paper assumed that nations with higher military expenditures per capita, which now have also higher installed solar capacity per capita as indication of their interest in solar energy, could be in a better position to compete for solar energy-related resources in future should the competition get severe (like in case of oil).

Two non-parametric correlation coefficients – Spearman's rho and Kendall's tau b - indicated significance of correlation between ISC/capita and ME/capita (ME=Military Expenditures; Kendall's tau= 0.33, significant at $p<0.01$ level; Spearman's rho= 0.51, significant at $p<0.01$ level). The simultaneous regression model produced $R^2=0.48$ (model fit F change=15.64 significant at $p<0.01$). That indicated that ISC/capita could be substantively predicted through the use of independent variables GDP/capita and ME/capita. Both independent variables had significant effect on the dependent variable (t-tests were significant for both GDP/capita and ME/capita at $p<0.05$). The stepwise regression also included both predictor variables to explain ISC/capita: GDP/capita and ME/capita. For both independent variables, F values were significant at $p<0.05$ level. Thus, the relationship of ISC/capita with both GDP/capita and ME/capita was confirmed as significant and parsimonious.

The findings confirmed the working hypothesis: nations need sustained supply of energy for development, and might be interested in securing stable supply of solar energy in future. If so, should competition for solar energy get more severe, nations could compete for solar energy - related resources (rare metal deposits, areas of high insolation etc.) by all means, including commercial and military interventions (as the case of control over oil). Nations with higher ISC/capita, interested in leading solar energy development, could be in stronger military positions than less developed countries. But, we expect that addressing early the question of geo-policy risks of solar energy development, will help to prevent the final conclusion from our hypothesis to happen and strike the society. That awareness could help elaborate an international legal and other-side framework for sustainable and peaceful solar energy development.