

## Assessing the Impact of Renewable Energy on Regional Sustainability: A Comparative Study of Suwon and Seoul

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**Abstract :** The drive to expand renewable energies is often in direct conflict with sustainable development goals. Thus, it is important that energy policies account for potential trade-offs. We assess the interlinkages between energy, food, water, and land, for two case studies, Suwon and Seoul. We apply a range of assessment methods and study their usefulness as tools to identify trade-offs and to compare the sustainability performance. We calculate cross-sectoral footprints, self-sufficiency ratios and perform a simplified Energy-Water-Food nexus analysis. We use the latter for assessing scenarios to increase energy and food self-sufficiency in Suwon, while we use ecosystem service (ESS) accounting for Seoul. For Suwon, we find that constraints on the energy, food and water sectors urgently call for integrated approaches to energy policy; for Seoul, the further expansion of renewables comes at the expense of cultural and supporting ESS, which could outweigh gains from increased energy exports. We recommend a general upgrade to indicators and visualization methods that look beyond averages and a fostering of infrastructure for data on sustainable development based on harmonized international protocols. We warn against rankings of countries or regions based on benchmarks that are neither theory-driven nor location-specific.

**Keywords :** ESS, renewable energy, energy-water-food nexus, assessment

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