ISGAN TCP Annex3
Cost-Benefit Analyses and Tookits

Social costs and benefits of Smart Grid technologies

The IEA-ISGAN Annex 3 mission is the study and the development of tools to be used by analysts, regulators, utilities and other electricity system stakeholders to define smart grid system investment and regulatory changes. Recent activities have been focused on evaluating existing approaches and developing new approaches for analysing the benefits and costs and comparing a range of scenarios at electrical system level, and on a regional level. In particular, socioeconomic impacts of smart grids and the related regulatory implications have been investigated. Three reports have been published with the aim to identify existing gaps and shortcomings in current cost-benefit analysis when applied to Smart Grid projects (Fig.1), to include new metrics for the assessment of benefits that with Smart Grids are not uniformly shared amongst the stakeholders and, finally, to propose new tools that can further improve the Cost Benenefit Analysis (CBA) with Multi Criterial Analysis (MCA) that can fill some of the gaps of CBA and is better suited to non-monetizable and asymmetrical benefits (Fig 2).

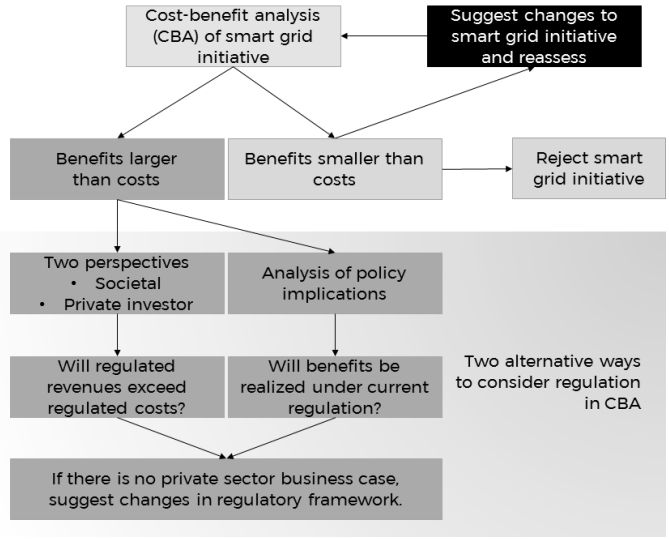

Figure 1 - CBA and Regulation for Smart Grid. Source: *Social costs and benefits of Smart Grid technologies, ISGAN Annex 3 Report 2018*

Figure 1 – A screenshoot of the ISGAN software package for MCA-CBA (the web based version to be launched soon)

Asymmetric benefits of Smart Grids

Annex 3 analysed the distribution of costs and benefits primarily in relation to decentralized electricity consumption on the residential level and published a related report. The aim is to discuss whether social imbalances are induced by shifting the burdens of financing the grid towards lower income classes. Such imbalances may be aggravated by the tendency to go off grid, thereby challenging current cost recovery schemes. The report especially focuses on the question how own, decentralized electricity production changes pricing and tariffing schemes and which socioeconomic factors should be taken into account when designing new cost and benefits models to analyse and assess investments in smart grids related technologies and smart grid regulation. When assessing smart technologies and regulatory regimes in the context of smart grids, socioeconomic analyses highlight their associated social impact, thereby looking at how related measures affect energy consumption, income and wealth distribution, equity and participation. Consumption goes up to 4,000 kWh or in extreme cases even up to 6,000 kWh (Figure 3). **Social imbalances are induced by shifting the burden of financing the grid towards lower income classes**. Imbalances may be aggravated by the tendency to go off grid, thereby challenging current cost recovery schemes. **Innovation can cause a significant social imbalance induced from shifting the burdens of financing the grid towards lower income classes**. The risk is a "***death spiral scenario***" where **higher network tariffs will be charged to poorest customers (the majority) and the growth of extreme positions against** policies that aim at promoting **renewable energy sources and local generation**. Tariffs combining measured capacity demand and volumetric components could provide a new balance for the distribution of network costs – as these tariffs are cost reflective, due to the peak load charge, they also signal the consumer to decrease their overall consumption and they do not penalize any group of consumers for a decrease in electricity demand. Such tariffs could provide a solid response to the increase of prosumers while avoid shifting burdens towards households not yet ready for taking this step.

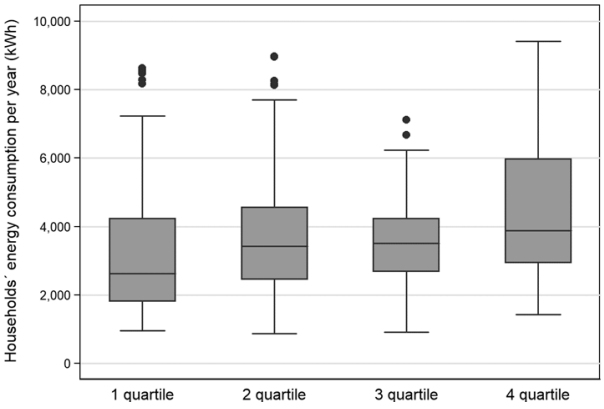

Figure 3 – Relationship between energy consumption and income – the higher the income the higher the consumption. Source: *Asymmetric benefits of Smart Grids, ISGAN Annex 3 Report 2018*