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Role of utilities and energy service companies in improving energy efficiency**Role of utilities and energy service companies in improving energy efficiency****Background paper on energy efficiency programmes operated by a Swiss utility¹****Note by the Secretariat****I. Introduction**

1. Two major potential actors for improving energy efficiency are utilities and energy services companies (ESCOs). Their role in delivering energy efficiency improvements has been largely demonstrated in many countries through various mechanisms, both on the demand and supply sides. There is a need for an increased effort to consider energy market policies that mandate, enable and motivate utilities and ESCOs to profit from improved retail and distribution policies and practices. The Group of Experts on Energy Efficiency enhances exchange of approaches and best practices for utilities and ESCOs to improve energy efficiency in the United Nations Economic Commission for Europe region, and explores, in cooperation with experienced policy makers, the barriers to and options for delivery of energy efficiency improvements.

¹ This background paper has been prepared by the ECE secretariat based on documentation provided by Mr. Martin Kumar Patel, Vice-Chair of the Group of Experts on Energy Efficiency, and Ms. Alisa Yushchenko, member of the Group of Experts on Energy Efficiency, and on their article “Contributing to a green energy economy? A macroeconomic analysis of an energy efficiency program operated by a Swiss utility”, *Applied Energy* (2016), <http://dx.doi.org/10.1016/j.apenergy.2015.12.028>.

2. In order to enhance energy efficiency as a pillar of transition to a green energy economy, it is important to understand, whether and under which conditions energy efficiency programmes could have positive economic and social impacts. There are a growing number of studies on macroeconomic impacts of energy efficiency programmes for various countries and regions. This paper evaluates the impacts of an energy efficiency programme operated by a local utility in Geneva on Swiss gross domestic product (GDP) and employment. This example from Switzerland demonstrates that energy efficiency programmes can have positive macroeconomic impacts, in particular, on employment and GDP and it helps to understand how to enhance them. Additionally, policy recommendations for further development of energy efficiency programmes are provided.

II. Case study of the energy efficiency programme portfolio operated by a Swiss utility

3. The Geneva energy efficiency programme portfolio *éco21* was launched in 2006 and became fully operational in 2009. The programme administrator is the publicly owned utility Services Industriels de Genève (SIG) which runs the electricity saving and CO₂ reduction programme portfolio *éco21* based on an agreement with the local authorities. The chosen case study is of special interest, because *éco21* is one of a few examples of utility-led energy efficiency programmes in Switzerland. In contrast, most energy efficiency programmes in the country are administered by state, cantons, municipalities or ESCOs. Defining the role of utilities with regard to energy efficiency policy is one of the major topics currently being debated in Switzerland.

4. The functioning of the programme portfolio *éco21* is similar to other ratepayer-funded energy efficiency programmes:

- (a) Ratepayers (consumers) pay their energy bills to the utility;
- (b) The utility transfers a part of the revenue from the energy bills (i.e., energy efficiency surcharge) to the programme administrator (e.g., *éco21* department of SIG);
- (c) A part of the energy efficiency surcharge is used to finance energy efficiency measures. The financing is used for full or partial coverage of the cost of energy equipment and its installation, training activities for installers, and energy advice for consumers. These activities are done through financial incentives for programme participants or through direct payments to contractors;
- (d) Another part of the energy efficiency surcharge is used to cover programme administration costs;
- (e) In some programmes, third parties take part in financing energy efficiency measures (e.g., municipalities);
- (f) Participants pay the difference between total costs of energy efficiency measures and the part of costs covered by the programme administrator and its partners;
- (g) The participants' energy costs decrease due to the implementation of energy efficiency measures.

5. The study focuses on two *éco21* programmes called *Opérations éco-sociales* (hereinafter called *Eco-sociales*) and *Communs d'immeubles* and analyzes the impacts of the programmes resulting from their implementation in the period 2009–2014. Both of them started in 2009 and focused on electricity savings in the residential sector in the canton of Geneva. The programme *Eco-sociales* targets social housing. The programme administrator provides households free of charge with energy efficient lighting equipment and on-site installation services. Three types of household appliances (boilers, power stripes and hot

water flow restrictors) are also provided free of charge. In addition, there are rebates on refrigerators. On-site installation is accompanied by energy advice. The programme administrator works in partnership with municipalities, which partly cover the costs of energy efficiency measures. The programme *Communs d'immeubles* targets common spaces in buildings (i.e., entrance areas, corridors, and cellars). It promotes energy efficient lighting, circulation pumps for heating systems, commonly used washing machines and laundry dryers. Initial expenditure on energy efficiency measures is incurred by programme participants (building owners represented mainly by real estate companies) but the programme administrator provides incentives through subsidies based on the size of energy savings achieved and the chosen electricity tariff.

6. The two programmes have performed in accordance with their initial energy saving objectives. According to the study, the total of all first-year energy savings of *Eco-sociales* and *Communs d'immeubles* amounted to about 23 GWh in the period 2009–2014, which is about 27% of all first-year energy savings achieved by *éco21*, and about 0.1% of electricity consumption in the canton of Geneva (not including the European Organization for Nuclear Research (CERN)) in this period. The initial expenditure (including energy efficiency measures and programme administration) amounted to about 37 million Swiss Francs (CHF) in 2009–2014, which is equivalent to about 0.01% of Geneva's GDP over this period.

III. Analysis of macroeconomic impacts on gross domestic product (GDP) and employment

7. With the help of an input-output model applied to the *éco21* programme portfolio, the impacts of the energy efficiency programmes on GDP and employment in Switzerland were estimated. In general, input-output models are particularly suitable for modelling the impacts of small-scale programmes and policies as well as estimation of short-term effects.

8. According to the obtained estimates, the total gross and net impacts on GDP and employment are positive for both *Eco-sociales* and *Communs d'immeubles*. Each Swiss Franc spent on the energy efficiency programme creates approximately 0.2 CHF of additional GDP compared to the reference case scenario. Net impacts on employment are approximately 0.7 and 1.6 additional jobs in full-time employment equivalent for each 1 million CHF of expenditure driven by *Eco-sociales* and *Communs d'immeubles* respectively, compared to the reference case scenario. However, these results are highly dependent on several hypotheses, including the impact of energy savings on the domestic energy sector, the share of imports in consumed goods and services, electricity prices, lifetime of energy efficiency measures, and assumed expenditure patterns. The majority of the positive impacts are related to post-installation period when energy cost savings are used to purchase other goods and services.

9. Several major uncertainties need to be emphasized, among which is the unpredictability of the expenditure patterns, in regards to the reference case scenario, use of energy cost savings, and expenditures by ratepayers and utility owners. Implementation of the energy efficiency programmes has different impacts on economic sectors. For example, it increases employment of contractors, while reducing demand for energy generation. Other studies provide examples that negative employment effects in the energy sector should not be seen as job losses, but as potential transfer of jobs to energy efficiency business. In the present study, the negative employment effects take place in sectors, from which the expenditure is diverted in order to finance the energy efficiency programme. Since reorienting the workforce from one sector to another demands training and time, the energy efficiency programmes should have a long-term character and be accompanied by adequate education and training policy in order to minimize employment losses and to

support professional re-orientation. While the considered aspects do not represent a concern for the programmes analyzed, these aspects should be taken into account for large-scale programmes (e.g. at the national level).

IV. Policy implications

10. The results presented in the paper show that energy efficiency programmes operated by utilities could contribute to the transition to a green energy economy in Switzerland by combining energy savings with positive impacts on GDP and employment. However, the positive impacts of energy efficiency programmes are not unconditionally granted, since the outcomes depend on multiple factors, related to the programmes themselves (for example, their cost-effectiveness, types of measures supported and purchase patterns), but also to the energy sector from a wider perspective (e.g., structure of energy supply and impact of energy savings on energy supply). Thus programme administrators and policy makers could undertake a number of possible measures in order to maintain and enhance positive macroeconomic impacts of energy efficiency programmes:

(a) Programme administrators should aim to increase the cost-effectiveness of their programmes (i.e., maximize energy savings per unit of expenditure, including expenditure of participants and partners). One of the possible options for achieving this objective would be through economies of scale. This could allow decreasing both relative programme administration costs and equipment costs due to the stronger negotiating power of utilities when making contracts with equipment suppliers and contractors (as in the case of Eco-sociales programme);

(b) A preference could be given to procurement of local goods and services (for example, engagement of local contractors). This could not only increase direct positive impacts on domestic economy (in terms of jobs and GDP generated by companies engaged within the programme) but also foster energy efficiency business development in general (spillover effects), and potentially increase public acceptance and engagement in energy efficiency programmes;

(c) Energy efficiency should be recognized as a fuel or a resource and thus be integrated with energy supply planning. This means that energy efficiency programme administrators should carefully consider energy supply needs.

11. The paper also analyzes the main barriers to each presented policy measure as well as possible solutions to overcome them. In order to make energy efficiency programmes and policies a successful tool of the transition to a green energy economy, they should be well coordinated with other policies in practice. Such coordination should not be limited within the energy domain (energy supply, energy efficiency, and renewable energy) but should expand to other domains like development of clean technologies and urban planning. In addition, the roles of stakeholders should be clearly defined, and they should be provided with the necessary instruments and powers.

12. There are a number of possible measures, which programme administrators and policy makers could adopt in order to support and enhance positive macroeconomic impacts of the programmes. While the case of Switzerland has its specifics due to the structure of its economy and political context, the key features of energy efficiency programmes including their potentially significant benefits and the challenges of their integration with other policies are relevant for other countries.