The security of electricity supplies to Switzerland

Institute for Economic Research (IRE)
Lugano, Switzerland

1. Project goals

The research project «The security of electricity supplies to Switzerland» is financed by the Swiss National Science Foundation and carried out by a group of experts in economics, management and energy markets of the Università della Svizzera italiana (Lugano) and the Université de Lausanne.

The project aims at supporting the definition and updating of a long-term energy strategy for Switzerland, while accounting for the already announced policies and targets, as well as for the consumers' and citizens' preferences with respect to the quality and origin of electricity supplies.

The analysis focuses on the security of electricity supplies to the country in the next few decades. In the aftermath of the Fukushima nuclear accident in 2011, indeed, the Federal Council and the Parliament provided for the decommissioning of all existing nuclear plants at the end of their life cycle. This provision, together with the ambitious targets set for the renewable generation capacity, might lead to an increased risk of blackouts.

2. Project structure

The project focuses on the Swiss electric system and develops in three main steps:

1. The first aims at:
   - Defining and measuring the security of electricity supplies,
   - Detecting the factors that influence it and the relationships among them;
2. The second aims at studying and measuring the preferences of Swiss consumers for an increased security in electricity supplies, as well as for an electricy supply coming from renewable energy sources;
3. The third aims at integrating this information into a general model of the Swiss electric system. The latter should be used to evaluate the impact of alternative long-term strategies on the security of electricity supply to Switzerland, while accounting for already announced decisions (among which the nuclear phase out) and energy policy goals (among which an increased sustainability of electricity generation) on the one hand, and the willingness to pay of Swiss consumers for a more secure or sustainable supply on the other hand.

The IRE contributes to the second part of the analysis, specifically trying to understand:

1. What drives the attitude of Swiss consumers towards the risk of a blackout lasting for a long or short time span,
2. Which factors and attitudes influence the consumers' preferences with respect to selected generation technologies and, more specifically, what drives the choice of subscribing a supply contract that provides certified renewable electricity,
3. How much would Swiss consumers be willing to pay for reducing the frequency of blackouts and for getting a certified renewable supply.

The ultimate goal of this contribution is to assess the amount of resources available for the electric system's restructuring, and to understand what choices and investments will encounter less opposition from the citizens.

4. Conclusions and policy implications

The results of the analysis are important inputs for the fine-tuning of the Swiss energy strategy to 2050. indeed, they highlight the citizens' priorities and their willingness to provide an increasing amount of resources in order to ensure a secure and sustainable supply. The final analysis will also explain which attitudes towards environmental issues and risk influence consumers' preferences and their willingness to pay a higher price for electricity. This information will be useful for minimizing public opposition to the construction of new plants, calibrating supply contracts on the consumers' needs and interests, and optimizing the functioning of the national generation fleet pursuant to the preferences of the Swiss resident population.

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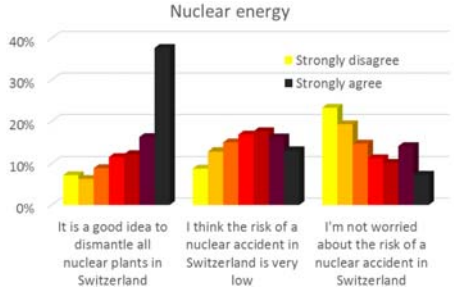
3. Results

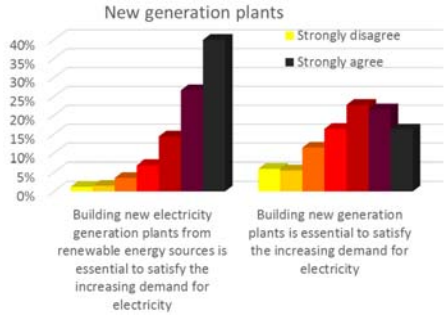
The IRE analysis is based on the information collected through a web-based survey, administered to more than 1,000 respondents representative of the Swiss population.

The survey collected information regarding attitudes, preferences and perceptions of the respondents as regards security of electricity supplies, renewable energy sources, climate change and the dangers connected to specific generation technologies.

The respondents strongly agree on the importance of individual and collective actions to reduce pollution and greenhouse gas emissions. More than 75% of them express concern about the consequences of pollution and climate change, and support for individual and collective actions for a more efficient use of energy and the promotion of renewable-based generation.



More than half of the sample welcomes the idea of dismissing nuclear generation. Slightly less than 50% of the respondents admits to be worried for the risk of a nuclear accident in Switzerland, an event that is considered quite unlikely by more than half of the sample.

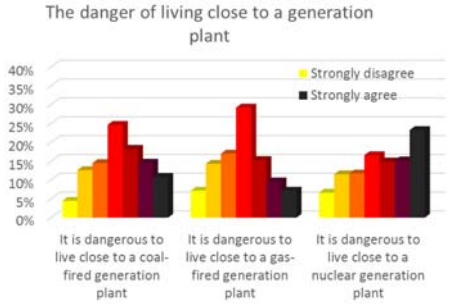


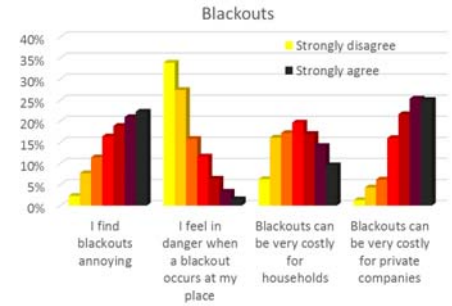
More than 50% of the respondents support the need of building new generation plant to cover the prospective increase in electricity consumptions. This percentage increases remarkably if the new plants exploit renewable primary energy sources.

An increased reliance on electricity imports to cover national consumptions is unwelcome for more than half of the respondents, as it is perceived as risky and potentially harmful for the national economy.

On the contrary, the presence of non-renewable generation plants in the neighbourhoods is not associated with the perception of an increased danger, with the only exception of nuclear plants. Gas- and coal-fired plants are however very rare in Switzerland.

As for the risk of experiencing a blackout, respondents usually relate interruptions to the feeling of nuisance, rather than danger, and perceive them as financially harmful for households, but even more for companies. More than one out of five respondents has experienced a short and a long blackout at home in the last 12 months, and one out of ten has experienced at least a short or a long blackout at their workplace.





Besides being asked about their opinions on the above-mentioned issues, respondents are also asked to express their preference among a set of alternative electricity supply contracts for their own dwelling. The available contracts are distinguished by electricity price, primary energy source used and probability of experiencing a long (4 hours) or short (5 minutes) blackout in the following year.

The statistical analysis of these responses provided an estimate of the value consumers place on an electricity supply stemming from a specified energy source, renewable or not, and on a reduction in the risk of blackout.

The results show a preference for renewable-based contracts (hydroelectric, photovoltaic and wind supplies) with respect to contracts from unspecified energy sources, that are, in turn, prefereed to nuclear-based contracts. Respondents are, moreover, ready to face a moderate price increase in order to benefit from an increased share of renewable-based supply in their contract, irrespective of the specific renewable energy source used.

The analysis also points out that consumers are ready to face a price increase between 6% and 15% (1.2 – 2.1cent CHF/kWh) of present levels (21 cent CHF/kWh) in order to reduce the frequency of short blackouts, and between 17% and 47% (3.6 – 9.7 cent CHF/kWh) in order to reduce the frequency of long blackouts. The price increase that consumers would be willing to pay is higher for renewable-based supplies, and lower for nuclear-based supplies.