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SCCER FURIES
PASREN – PV SYSTEMS AS ANCILLARY SERVICES PROVIDERS

MOTIVATION / OBJECTIVES

Traditionally, ancillary services (AS) were provided to the TSO by large generating units (GU). The total required AS power will increase due to the tendency in decrease of the number of traditional generating units and rise of renewable energy resources (RES). New AS providers will be necessary. Thus, RES could cover these new AS needs. This study is focused on the PV system capability on 18 kV network to export AS to transmission level. The goal is to quantify the potential of a PV systems to provide AS.

CASE STUDY DESCRIPTION

To propose active or reactive power, the studied PV system, installed in 18 kV network, exports power through the network levels 5 to 1 (cf. Fig. 1). Hence, these parts of the network have to be considered. The network level 3 - 125 and 60 kV of Fribourg and Neuchâtel areas - and part of the NL5 - 18 kV of Payerne area - are modelled into the PowerFactory environment, based on data provided by Groupe-e and Swissgrid.

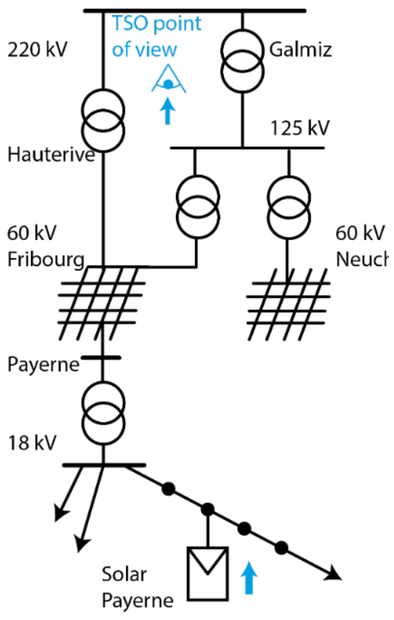

Fig. 1: Limits of the case study

METHODOLOGY

- Modelling of the studied power system;
- Realistic load and generation profiles development (one year with 10 minutes intervals);
- Quantification of AS power: an *Optimal power flow* (OPF) is executed for one year to determine the potential of active and reactive power that can be exported to the transmission network;
- Market assumptions (prices and pool size);
- The available active power can be shared between balancing ancillary services market (BM) and energy market (EM). Three different commercial behaviors, products splits, are proposed, Fig. 2;
- Remuneration potential determination.

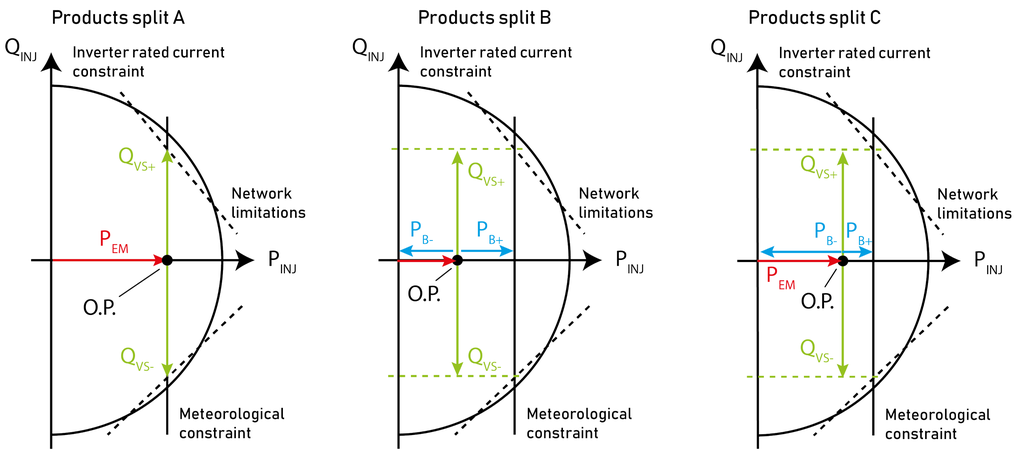

Fig. 2: Product splits definition

REMUNERATION POTENTIAL

In order to evaluate the proposed product splits their revenue is calculated for: balancing market (secondary and tertiary control power), voltage support and the energy market. Injection tariff is fixed by the DSO, voltage support tariff is defined in the Voltage support concept of Swissgrid, since prices for balancing products are the result of the market procedure based on a merit order mechanisms. The possible revenue for each product split is compared to product split A (EM only) and to the maximum total yield potential (MYP), the maximum revenue that could be reached if all prices and tariffs were known prior to the studied time period.

The additional revenue compared to product split A is shown in Fig. 3. The results show that the case of RES prioritization and EM EPEX prices is the most advantageous for AS provision. The monthly percentage of time when the balancing services are used is presented in Fig. 4.

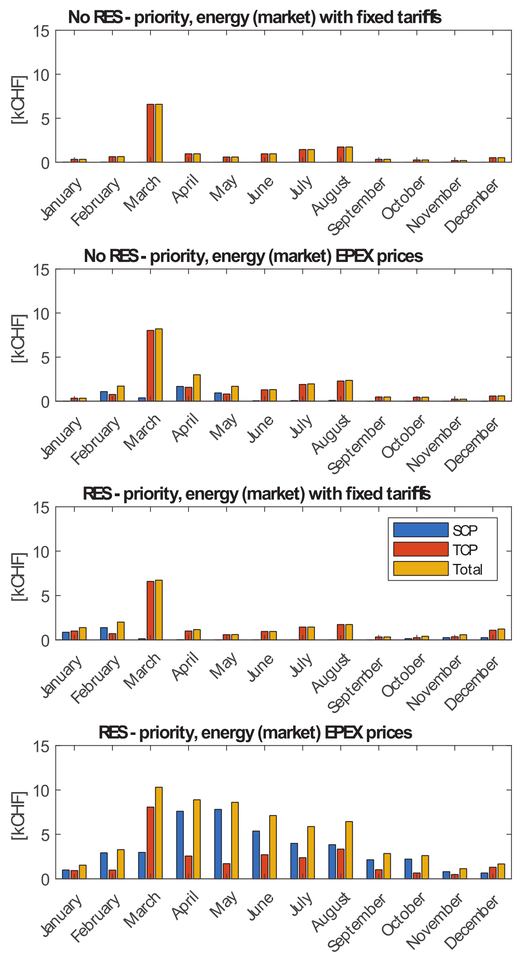

Fig. 3: Revenue results

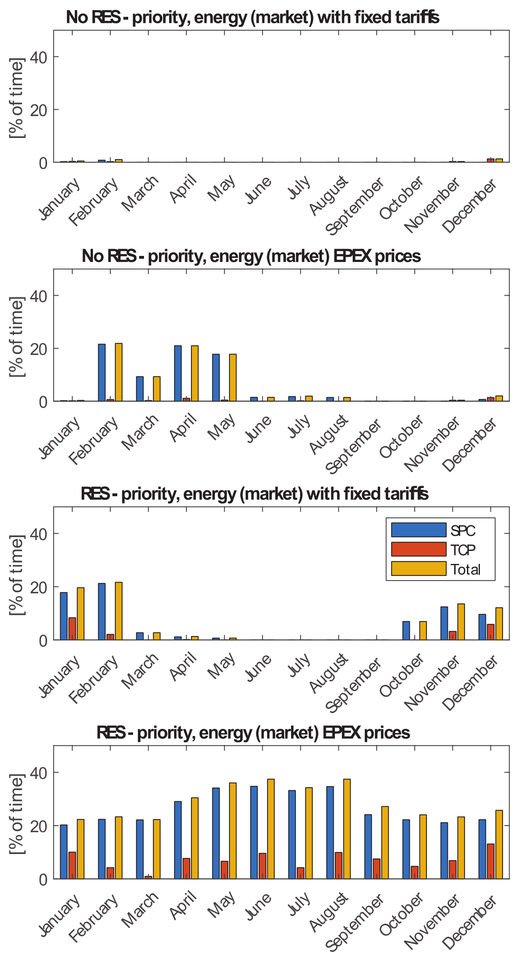

Fig. 4: Time when the AS are used

Research supported by:
Innosuisse (SCCER programme),
Swissgrid, Romande Energie, Groupe-e

Hes·so
Haute Ecole Spécialisée de Suisse occidentale
Fachhochschule Westschweiz
University of Applied Sciences Western Switzerland

Energy research conference, 20 November 2020, Biel