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Smart Grid Vendée prepares the energy transition

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The energy transition now under way will see a growing share of electricity coming from distributed energy resources (DER), largely connected to the distribution grid. Under the lead of ERDF, France's distribution network operator, SyDEV, Vendée's distribution network owner, and together with six other partners, the Smart Grid Vendée project shows how different players in the energy chain can work together to support the energy transition with cost-effective solutions.

The Vendée area is located on France's Atlantic coast. It covers a population of over 600,000 people across the whole 6,700 square kilometre département (one of the country's administrative subdivisions). We asked Said Kayal, Alstom Smart Grid Innovation Director, to outline the project's ambitions and why they chose the Vendée. "Distributed renewable generation will be a feature of tomorrow's electricity supply, and it is important to study the implications all along the supply chain. Already 9.5% of the electricity generated in the Vendée comes from wind and solar photovoltaic (PV) – more than twice the French national average – and is totally fed into the distribution grid. So the Vendée

presents an ideal test bed to study the impact of significant input from renewables on distribution network operations.”

1 __ Look-ahead grid management opens smart perspectives



Generation from multiple, renewable sources that may only operate intermittently, as well as new electrical uses such as electric vehicles, are leading to growing constraints on the distribution grid. Look-ahead power system analysis, based on accurate generation and load forecasts, becomes critical in order to anticipate, detect and resolve these constraints on a timely basis on the distribution network.

“In the past, the distribution network operators mainly used internal levers to alleviate local network constraints. This includes voltage regulation in the substations, reactive power management, or optimised network topology switching. In Smart Grid Vendée, the objective is to go further and explore new external levers based on the use of the DER flexibilities, which are available in the electrical loads and storage, as well as generation.”

2 __ Flexibility, a new lever



Flexible use or network upgrade become choices to be made on a case-by-case basis, in the context of growing penetration of DER on the distribution network. New strategies based on DER flexibility in long-term network planning, day-ahead or real-time operations may unveil sustainable and viable technical/economical options for the electrical system.

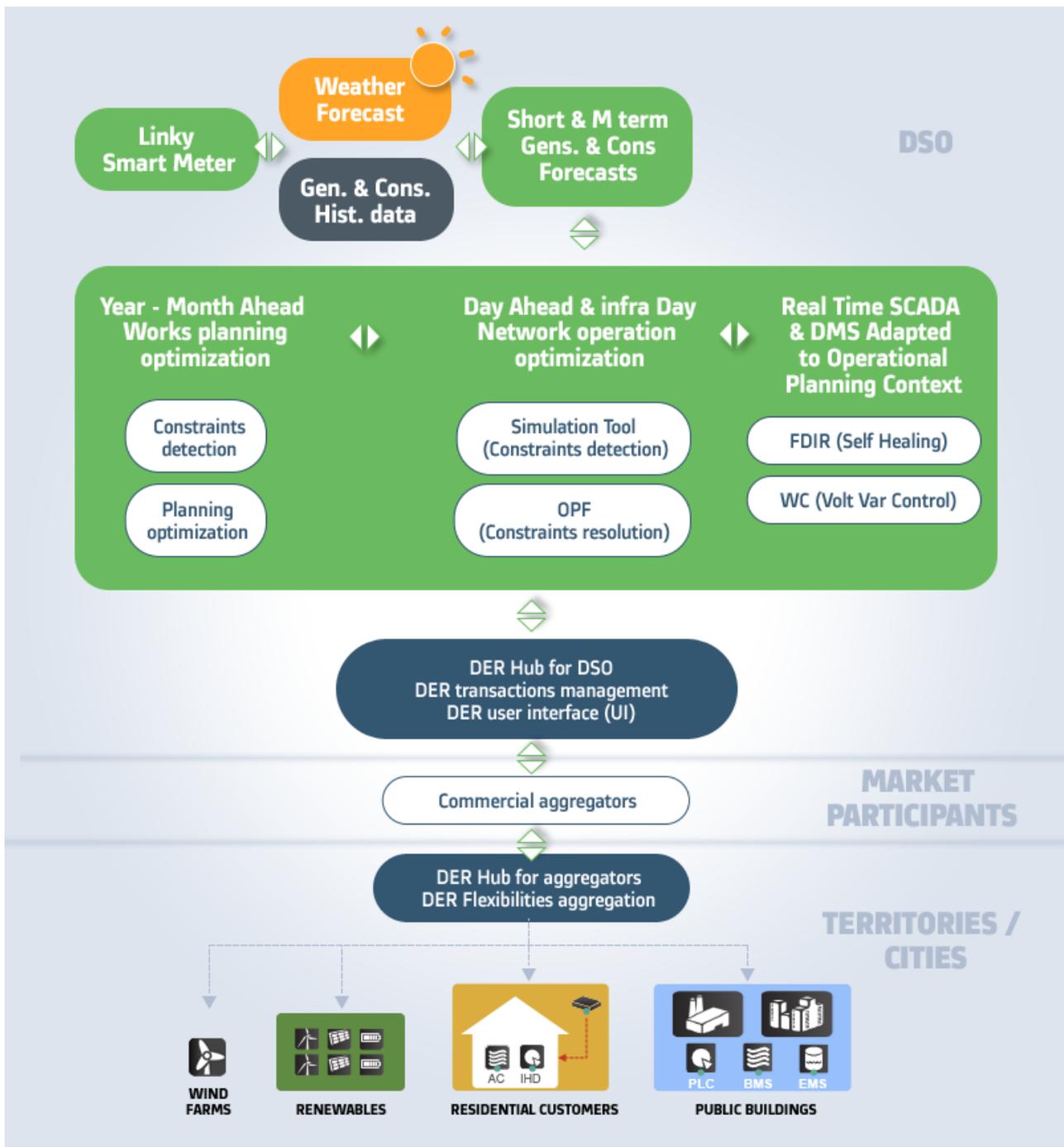
In order to develop the use of DER flexibility on the distribution network, a new market mechanism is being tested in Smart Grid Vendée. The distribution network operator is evolving into a new role, that of “market facilitator”. Here, Alstom’s DERHub for DSO will help ERDF take advantage of, and manage, DER flexibility transactions with the flexibility aggregators.

3 __ Weaving local threads



The decentralisation of energy production means that local authorities will have increased responsibilities regarding the energy chain. Aware of this step change, and strongly committed to energy efficiency measures, the SyDEV is deploying new technical aggregation and automation platforms to better monitor and dispatch the DER flexibilities they have on their own public assets (buildings, street lighting, distributed generation). Alstom’s DERHub for aggregators will allow territories and cities to intelligently aggregate and weave the individual flexibilities – smart homes, smart buildings, energy storage, solar panels – into an aggregated flexibilities potential. Such potential is then translated by a commercial aggregator into market mechanisms, including the new one managed by ERDF.

Kayal is pleased at the way Smart Grid Vendée has integrated all the players into a complete smart grid on such a wide scale. But he and his partners in the project are impatient too. “This is only the pre-industrial phase. We are looking forward to scaling up to regional level.”



New ICT tools for DSO and territories to take advantage of and manage DER flexibilities

4 __ Three questions to Regis Le-Drezen, ERDF Vendée Director



Does the energy transition need new technologies?

Traditional, centralised systems designed to efficiently distribute energy have difficulty coping with new electricity uses. For example, the electricity is now flowing both ways and customers expect the same flexibility for charging their cars as for charging their phones! To operate more efficiently we need new technical and organisational solutions. That is why we are investing in smart grids.

Do the key technologies exist?

Yes, to some extent. For example, following an incident on our medium voltage network, automatic control systems can reconnect 70% of the customers who were cut off in less than 2 minutes without any human intervention thanks to advanced management software and self-healing systems. The challenge is to extend this type of solution to low voltage distributed generation from wind and solar energy and to electric vehicle load management.

How do new technologies and processes work together in Smart Grid Vendée?

Take demand response for example: the DSO wants to predict short-term needs for a given infrastructure and incorporate a degree of flexibility into long-term planning. The local constraint management mechanism we are developing with Alstom will enable us to make good use of local flexibility to avoid constraints as well as to reduce the grid operating costs.

5 __ Dialogue with Yann Dandeville, SyDEV – Smart Grid Vendée Development and Innovation Director



What is SyDEV?

It stands for **Syndicat Départemental d'Énergie et d'Équipement de la Vendée** – the Vendée Departmental Authority for Energy and Infrastructure. SyDEV represents the 282 municipalities that make up the department. It owns the low and medium voltage electric distribution network (22,000 km) as well as the gas network (2,400 km). Like its sister organisations in other parts of France, it is in charge of public services regarding energy supply. But SyDEV stands out for its expertise in public lighting

and assistance in energy audits for municipalities. SyDEV is also known for its commitment to renewable energy production, electronic communications and charging infrastructure for electric vehicles.

Why did SyDEV join Smart Grid Vendée?

We react to our users' needs, but we also want to anticipate changes that will affect them. That is why we're focusing on clean energy and other environmental aspects. We're a renewable energy producer, with six wind farms totalling 51 MW, and 36 solar-powered generators of 2.9 MW in all, located in buildings. We see the Smart Grid Vendée project as a way of providing our members with cost-effective, environmentally sustainable solutions.

What are you hoping to get from the project?

We want to evaluate the cost savings from new technologies, given the need to reinforce and upgrade our network. We would also like to test the technical and economic feasibility of managing the grid and public lighting on the Vendée scale. And we would like to discover innovative solutions to cut energy costs for public buildings. The expertise of partners like Alstom helps us do all that.

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