EASY-RES

Clustering Activities

Cluster: Ancillary services at distribution level

formed after "H2020 Smart Grids and Storage projects clustering workshop", Brussels 02.10.2018

Projects in the cluster

	Project	Project Website
1	EASY-RES	www.easyres-project.eu
2	TDX-ASSIST	www.tdx-assist.eu/
3	SHAR-Q	www.sharqproject.eu/home
4	United-grid	https://united-grid.eu/
5	DRIVE	www.h2020-drive.eu/
6	Energy Keeper	www.energykeeper.eu/
7	FHP	http://fhp-h2020.eu/
8	RESOLVD	https://resolvd.eu/
9	Pentagon	www.pentagon-project.eu/
10	Flexcoop	http://www.flexcoop.eu/

Initial Definition of AS

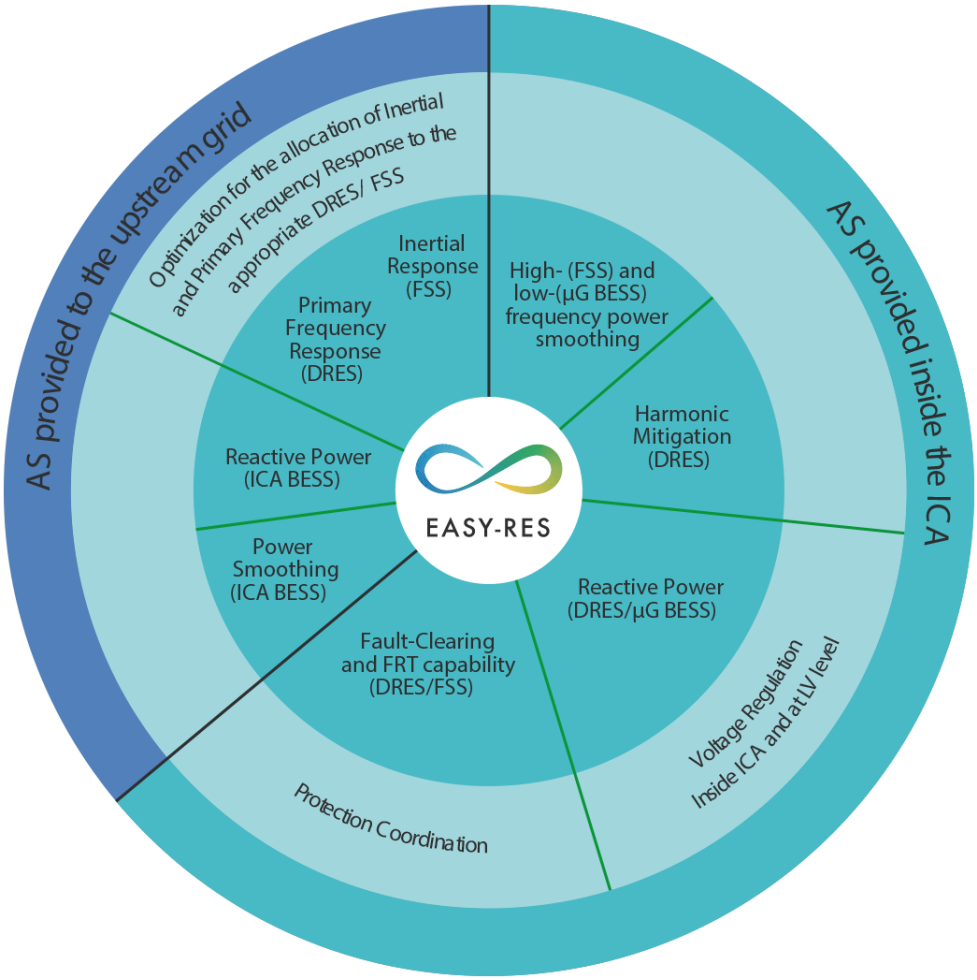
AS offered to the DSO		
AS 1.1	Voltage regulation within the LV microgrids	The LV DRES will exchange reactive power with the distribution grid in order to control the local voltage profile. Through this AS, the following costs will be deferred: • line upgrade • extended use of the LV/MV OLTC transformer • active power curtailment of the DRES
AS 1.2	Voltage regulation within the MV ICA	The MV DRES will exchange reactive power with the distribution grid in order to control the voltage profile, which should be within the preassigned limits. Through this AS, the following costs will be deferred: • line upgrade • active power curtailment of the DRES • extended use of the HV/MV OLTC transformer • imported reactive power from the HV transmission grid • installation of reactive power sources (e.g. capacitors and coils) and voltage regulators • impose of large DRES in dedicated locations in order to support the voltage
AS 2.1	Low-frequency power smoothing	Development of a control system in central energy storage systems for smoothing the active power profile at the LV microgrid and at the ICA level.
AS 2.2	High-frequency power smoothing	Combine the DRES control with fast energy storage systems in order to power smoothing the active power output of each DRES.
AS 3	Contribution to fault clearing	Development of new control strategies in all DRES in order to provide controllable currents during faults. This AS also includes the FRT capability for all DRES in order to remain connected during the faults and support the grid by providing reactive power. In order to ensure the provision of certain

		currents, a Fast Energy Storage is required. The following costs will be deferred: • installation of new protection devices • reconfiguration of existing protection means • installation of other devices in order to provide certain fault currents (e.g. Fault Current Limiters, large inductors) or energy storage systems • the DRES remain connected to the grid without losing energy from disconnections/re-connections
AS 4	Mitigation of harmonics	The DRES will behave like active filters by proper control algorithms. The following costs will be deferred: • installation of passive and active filters • mitigation actions near to non-linear loads
AS 5	Black start capability of microgrid and ICA as a whole	In case of a grid collapse, the DRES and the microgrid will be able to restore the grid by forming the proper grid conditions. Therefore, other specific stand-by sources for providing this AS are not needed.

Aggregated AS offered to the TSO		
AS 6	Inertial response	All DRES, even the inherently inertialess converter-interfaced, will be able to contribute to frequency events by providing inertia to the system. For the converter-interfaced DRES, a Fast Energy Storage System will be connected at the common DC-link. Within ICA, the required inertia will be controllable, following the requirements of the Operators. Therefore, the following costs will be deferred: • need for extra synchronous generators connected for providing energy and AS • connection of other sources for providing inertia (e.g. flywheels, synchronous condensers) • higher penetration of RES in the distribution grids without jeopardising the grid stability

AS 7	Primary frequency regulation	Controllable droop curve for all DRES in order to provide the required frequency regulation. Currently, this AS is offered only by synchronous generators.
AS 8	Power smoothing at the PCC with the transmission system	Control of the Rate Of Change Of Frequency (ROCOF) at the point of connection of the ICA with the transmission grid. This AS will be provided by a Battery Energy Storage System connected at the PCC with the transmission grid. The following costs will be deferred: • installation of more synchronous generators for absorbing these abrupt active power changes • use of demand response mechanisms for controlling the loads on the opposite direction of the DRES outputs
AS 9	Voltage regulation at the transmission system by provision of certain reactive power at the PCC of the ICA with the transmission system	The ICA will exchange with the transmission grid certain required amounts of reactive power. This AS is similar to the voltage regulation at the PCC of the ICA with the transmission grid. The following costs will be deferred: • installation of more synchronous generators • connection of large capacitors/coils • extended use of the HV/MV OLTC transformer

DRES FUNCTIONALITIES IN EASY-RES



FSS = Fast Storage System
BESS = Battery Energy Storage System