Definition of Community Electricity Storage (CES)

Definition

Community electricity storages are a subgroup of electricity storage systems, which are defined as follows: Electricity storages, are "…, from an energy industry perspective, facilities which are able to receive energy and then release it again (…) in the form of electricity (…) at a later time" [1]. Additionally, community electricity storages provide services based on balancing strategies for an association of prosumers, renewable energy producers and loads that are connected to the same distribution grid. At least one of the following operation strategies has to be implemented: maximizing self-consumption for all participants, increasing shareholder's profits in electricity markets, or optimizing community welfare. Optionally the operation strategy should be grid supportive and increase the grid's hosting capacity for decentral renewable generation.

Possible criteria

There are several criteria reported in literature that help to characterize a CES, but they are not consistent:

- Size
- Public grid usage
- Geographical proximity
- Business cases
- Control strategy / Benefits for the grid
- Operator and Owner
- Connected to voltage level

Size

If the CES is a large scale battery, according to [2]: P = 0.1- 10 MW (peak shaving) P = 1 - 100 MW (load levelling)
25 kW[3]
If <2MW; no electricity tax has to be charged (ger. "Stromsteuer") [4]
No size restrictions, but optimal size depending on community size [5]

Public grid usage

If the private grid is not used (e.g. microgrid,..) self-supply according to *RES Act* applies [4], [6]
If the public grid is used the storage needs to be in "*immediate vicinity*"

Geographical proximity

According to RES Act ("*immediate vicinity*") [7] *immediate vicinity* not clearly defined, and cannot be defined with a concrete distance [6], but there several hints, as e.g.: - few hundert meters [4] - Up to 4,5 km if it is connected to the same MV feeder [4] - Within a 4,5 km radius (iCES workshop: presentation Alexander Zeh; Slide 9/)

Very close to costumers [3]

Business cases

Primary business case
Maximizing self-consumption (:=self-suppy) [5]
Local energy market [8], [9]
Micro-energy (power) markets [10,11]
Additional cumulative business cases/ applications
Alternative to grid reinforcement (e.g. voltage control) [12] Redundant transformers [13]
Arbitrage [14]
Primary frequency control [15]
Secondary frequency control (especially night and on weekend)
Tertiary frequency control

Control strategy / Benefits for the grid

PV energy time shift [5]
Peak shaving [12], [14]
Providing standby power [14]
Enhance power quality [14]
Dealing with under-sized distribution grids [16]

Operator and Owner

DSO/ Utility [3]
In Germany because of the unbundling citizen cooperative or external storage owner [12] Perhaps in the future in Germany: Distribution network operator DNO [17]

Connected to voltage level

Low voltage [3], [12], [14]
Medium voltage

Definitions

"Electricity storages"

- Electricity storages, are "…, from an energy industry perspective, facilities which are able to receive energy and then release it again - e.g . in the form of electricity (…) - at a later time" [1].
- Energy generated at one time can be used at another time through storage. Electricity storage is one form of energy storage [18].
- Storage technologies able to re-convert the stored energy into electricity [19].

"self-supply"

shall mean the consumption of electricity which a natural or legal person consumes himself in the immediate vicinity of the electricity-generating installation if the electricity is not fed through a grid

system and this person operates the electricity-generating installation himself. *5(12) - RES Act 2014* [7]

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