TECHNOLOGY FACTSHEET



) BATTERY FOR LARGE	-JUALL I	ENIPORA	AL ELECTI		RAGE								
Date of factsheet	29-4-2019													
Author	Sam Lamboo													
Sector														
	Electricity generation													
TS / Non-ETS	Non-ETS													
	Storage													
Type of Technology Description	Storage NaS batteries store electricity through a reversible chemical reaction. The basic components are a container, electrodes, and an electrolyte. By loading the battery, the electricity is													
Description	transformed into chemical energy, while during discharge, electrochemical reactions occur at the two electrodes generating a flow of electrons through an external circuit (DNV KEMA													
	2013). Large scale NaS batteries are usually used for energy intensive storage applications (e.g. shifting power supply of variable renewables in time, making these more dispachtable), but can also be used for power intensive storage (e.g. frequency control). The factsheet focuses on NaS batteries for temporal storage (with >1h discharge time) for large scale													
	solutions (utility scale or for large distributed systems).													
		-												
RL level 2020	TRL 9													
	Commercial energy storage technology	ogy (JRC ETRI 2	2014).											
ECHNICAL DIMENSIONS			-											
Capacity	Functional Unit			Value and Range										
	kWh		100.000											
				7.000				-				245.0		
Potential	Global	GWh	Current			2030			2050					
				N/A		-								
			-	-	-	Min – Max			Min – Max					
1arket share	Global utility scale electricity	%	ļ	0,28				-		<u> </u>	,	-		
	storage		0,28	-	0,28	Min		-	Max	Min		-		Max
apacity utlization factor										-				
ull-load running hours per year														
nit of Activity	PJ/year													
echnical lifetime (years)	10 (JRC ETRI 2014). 2,500-4,500 cycl	les (Luo et al. 2	2015)											
rogress ratio	94% (JRC ETRI 2014)													
lourly profile	No													
xplanation	Typical capacity refers to NaS batter	ries for tempor	al storage wit	th a typical pow	er rating of 1-40	MW. Discha	irge time	s are 4-	10 hours (see o	thers sectio	n belo	w), lead	ing to	the range
	energy capacities given here.		0.2	,,, p . ,	0				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			,, 230	5.2	-8-
	Potential for all battery types is high	n as there are r	no significant s	space or resour	ce constraints, ii	nstead dema	nd for sto	orage ai	nd costs are usi	ally detern	nining	factors	vhen i	comes to
	potential installed capacity. As of 20		-	•				-		•	-			
	Lifetime of up to 15 years also repor										-	-	7).	
0676														
OSTS	2015													
ear of Euro	2015	- **		6				000				2050		
	Euro per Functional Un	nit		Current				2030				2050		
Investment costs	€ / kWh			335				334				29	7	
Othersen			230	-	641	80		-	334	297		_		297
Other costs per year	€ / kWh			-	- <u>r</u>			-				-		
			Min	-	Max	Min		-	Max	Min		-		Max
ixed operational costs per year	€ / kWh			5,0				5,0	-			4,5	5	
excl. fuel costs)			5,0	-	5,9	5,0		-	5,9	4,5		-		4,5
ariable costs per year	€ / MWh			2,0				2,0				2,0)	
			0,0	-	2,0	0,0		-	2,0	2,0		_		2,0
			,			-								
	Reference investment costs from the		ce (JRC ETRI 2		•	own calculati				nd average		-		
	Luo et al. 2015). JRC ETRI (2014) is st	till used as prir	rce (JRC ETRI 2 mary source b	ecause it has th	e most complet	own calculati e set of data,	, includin	g CAPE	X and FOM/VOI	nd average M estimate	s up to	2050. C	ata po	ints for th
	Luo et al. 2015). JRC ETRI (2014) is st current (2020) set differ in year per s	till used as prir source: 2020 f	rce (JRC ETRI 2 mary source b	ecause it has th	e most complet	own calculati e set of data,	, includin	g CAPE	X and FOM/VOI	nd average M estimate	s up to	2050. C	ata po	ints for th
	Luo et al. 2015). JRC ETRI (2014) is st current (2020) set differ in year per s (2014) are for a generic 7.2 MW bat	till used as prir source: 2020 f tery.	rce (JRC ETRI 2 nary source b or JRC ETRI (20	ecause it has th 014), 2016 for l	e most complet RENA (2017), 20	own calculati e set of data, 13 for JCH JU	, includin McKinse	g CAPE) ey (2015	X and FOM/VOI 5). Investment c	nd average M estimates ost project	s up to ions fo	o 2050. E or 2020-2	ata po 2050 b [.]	ints for th / JRC ETRI
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OTHER												
Parameter	Unit		Current			2030			2050			
Depth of discharge	0/		100			-			-			
	%	100	-	100	Min	-	Max	Min	-	Max		
Charge time	Hours		6			-			-			
		4	_	8	Min	_	Max	Min	-	Max		
Discharge time	Hours		4			-			-			
		4	_	10	Min	_	Max	Min	-	Max		
Self discharge	% / month		30			-			-			
	767 month	2	_	100	Min	-	Max	Min	-	Мах		
Explanation	Charge time for 0.5-50 MW system (DNV KEMA 2013). Discharge time for 1-35 MW systems (IEA-ETSAP & IRENA 2012, Luo et al. 2015, JRC ETRI 2014).											
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Sauer et al. (2007). Detailed cost ca	alculations for stationary battery storage systems. S	econd International R	Renewable Ener	gy Storage Con	ference (IRES	ll) Bonn, 1921	.11.2007					
DNV-KEMA 2013 - Systems Analysi	s Power to Gas (deliverable 1: Technology review)											