

Study on Grid Support Services from BESS for Indian DISCOMS

Commissioned by: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

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26th August 2022



Implemented by



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Agenda

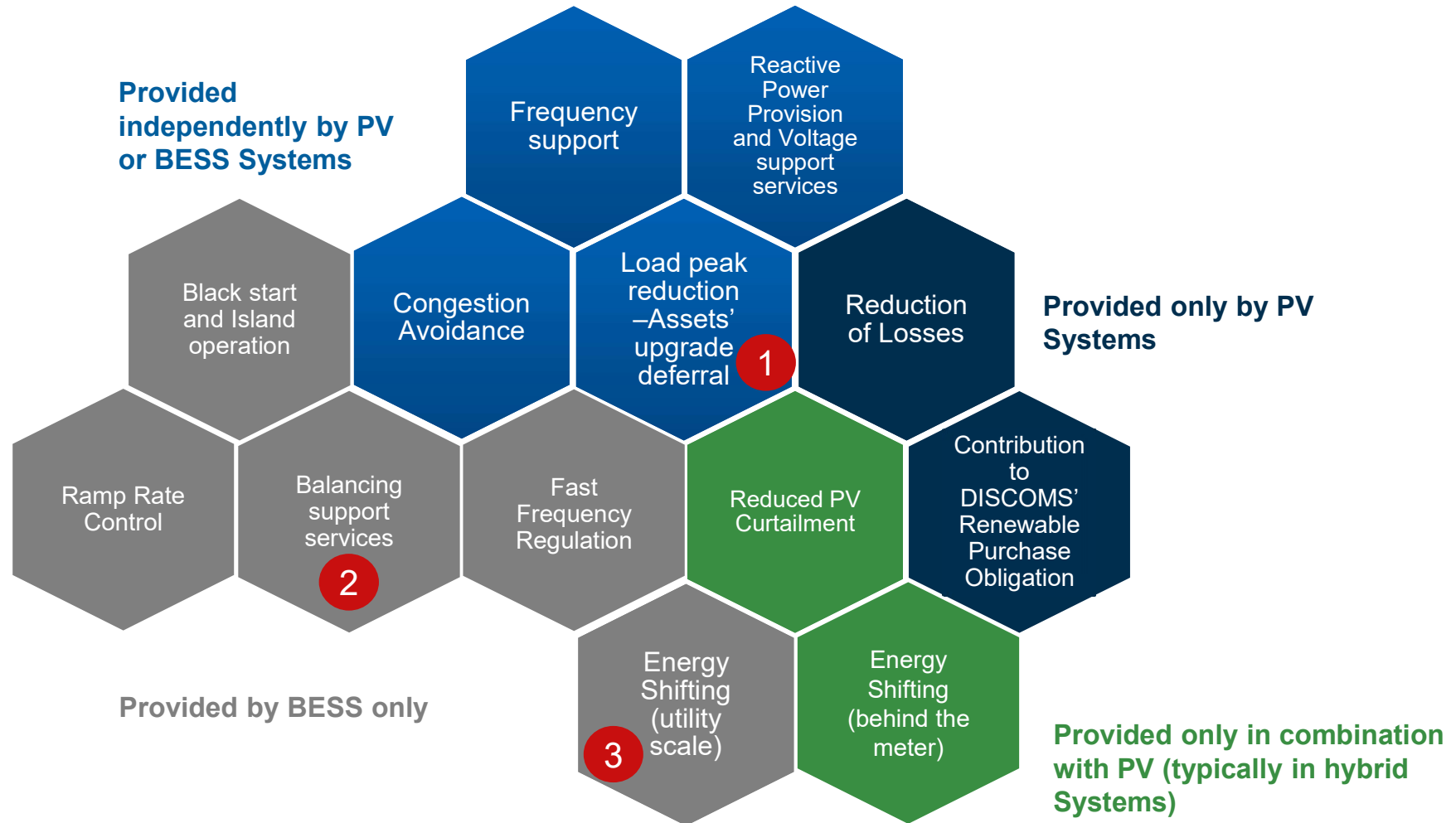
1. Overview on PV and BESS Services

2. Case Study of Indian DISCOM BRPL

- Case 1 Reduction of Transformer Loading
- Case 2 Balancing of Scheduled and Actual Consumption
- Case 3 Energy Shifting

3. Conclusions and Recommendations

Overview on PV and BESS Services

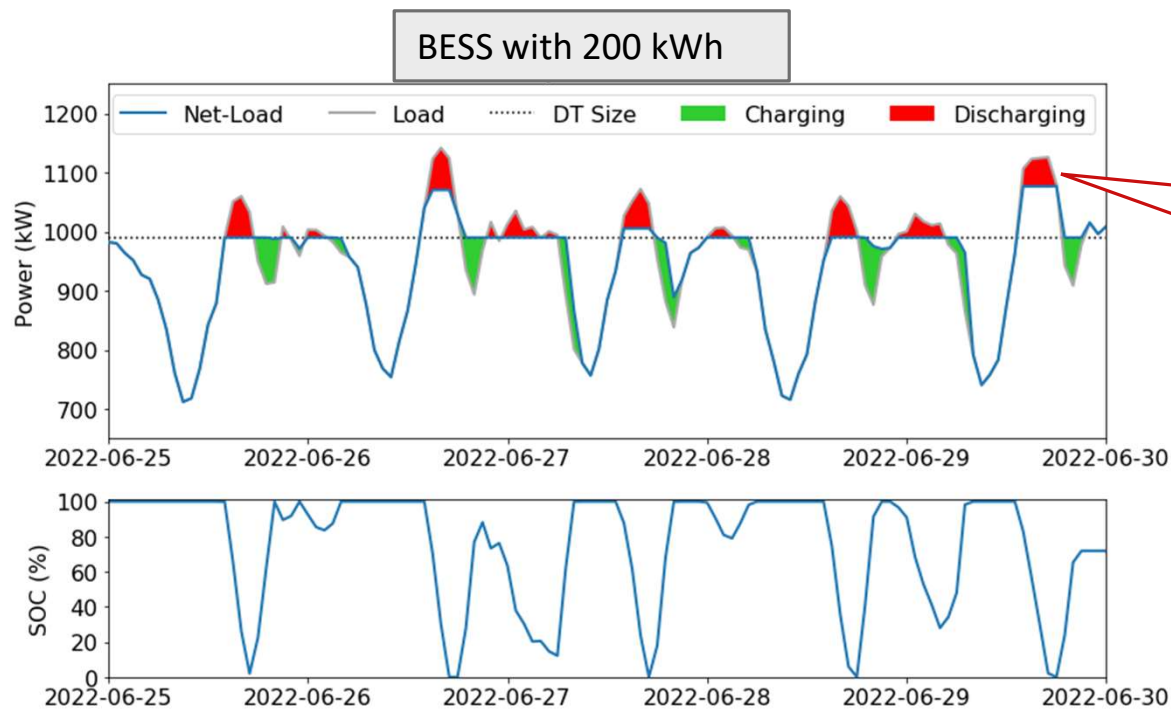


Summary of Services Analysed for BRPL

Level of Analysis	Grid Support Service	Economic value for DISCOMS	Service provided by
DT Level	1 Load Peak Reduction	Distribution assets upgrade deferral	PV and/or BESS
	PV Peak Reduction	Distribution assets upgrade deferral	BESS
	Voltage support	Improved Voltage	PV and/or BESS
	Reactive Power Provision	Avoided reactive power balance penalties	PV and/or BESS
	Reduction of Losses	Avoided cost of power losses	PV systems
DISCOM Level	2 Balancing	Avoided Deviation charges	BESS
	3 Energy shifting	Avoided PPA variable costs	BESS
	Power demand reduction by PV	Avoided PPA variable costs	PV systems
	Contribution to DISCOMS' RPO	Avoided purchase cost of REC	PV systems

1

Reduction of Transformer Loading for Assets Upgrade Deferral

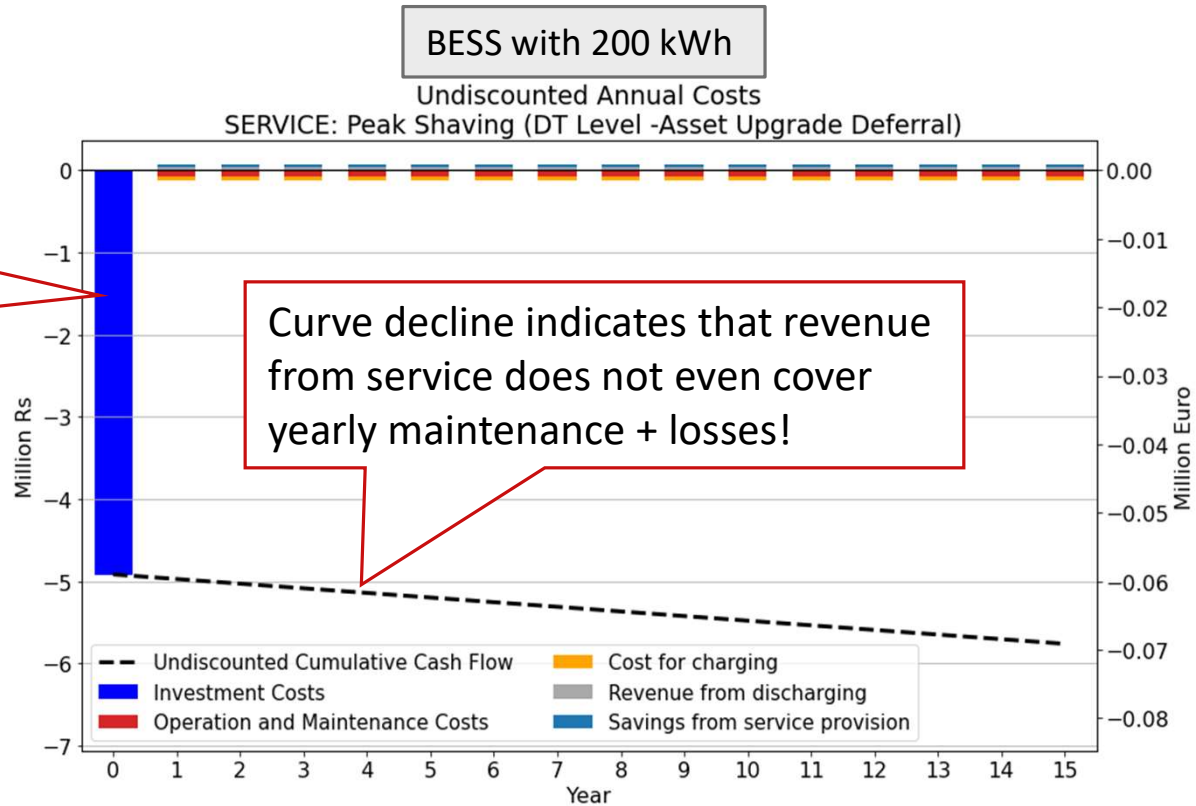


Load peak shaving if the consumption exceeds the transformer capacity

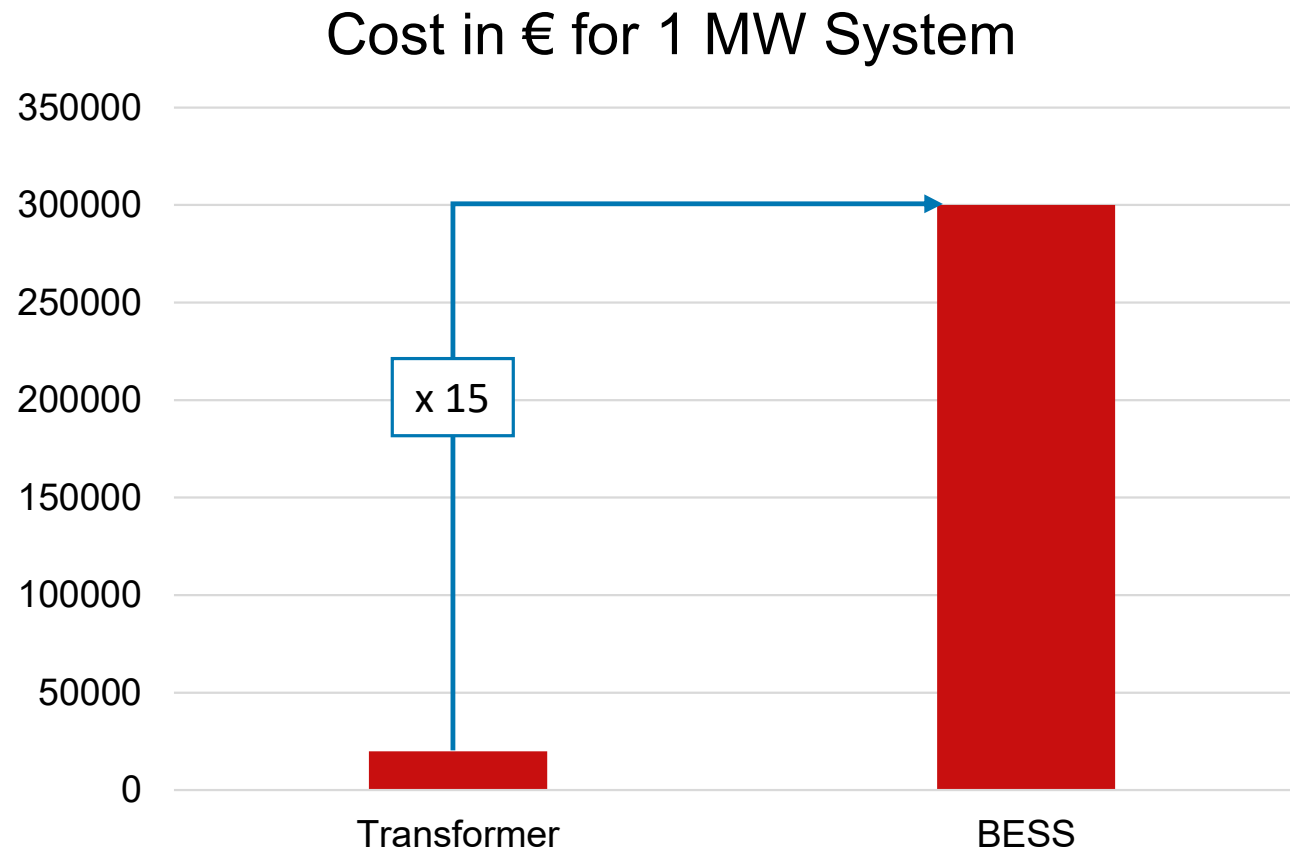
➔ Transformer lifetime increased by 4 years

1 Economic Analysis Results: Grid Asset Upgrade Deferral

Large Investment required!



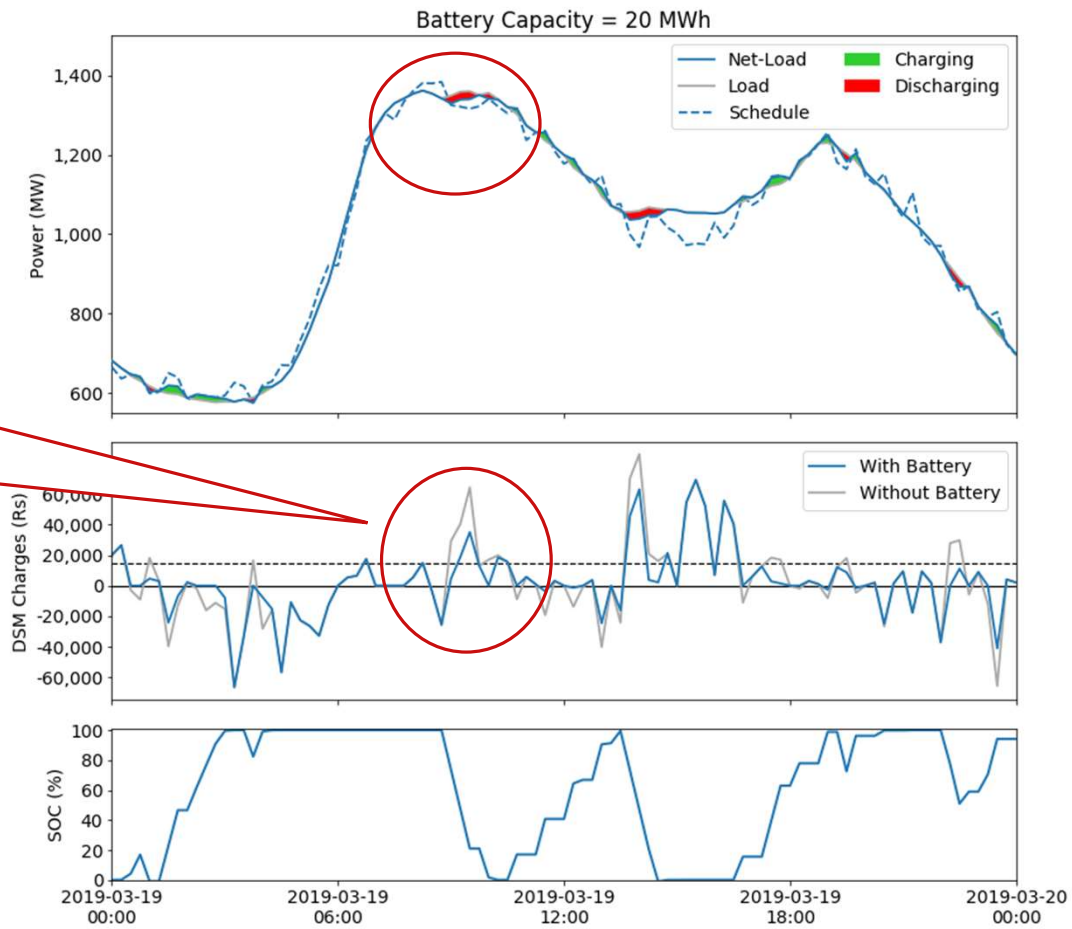
Cost Comparison BESS vs. Transformer



2

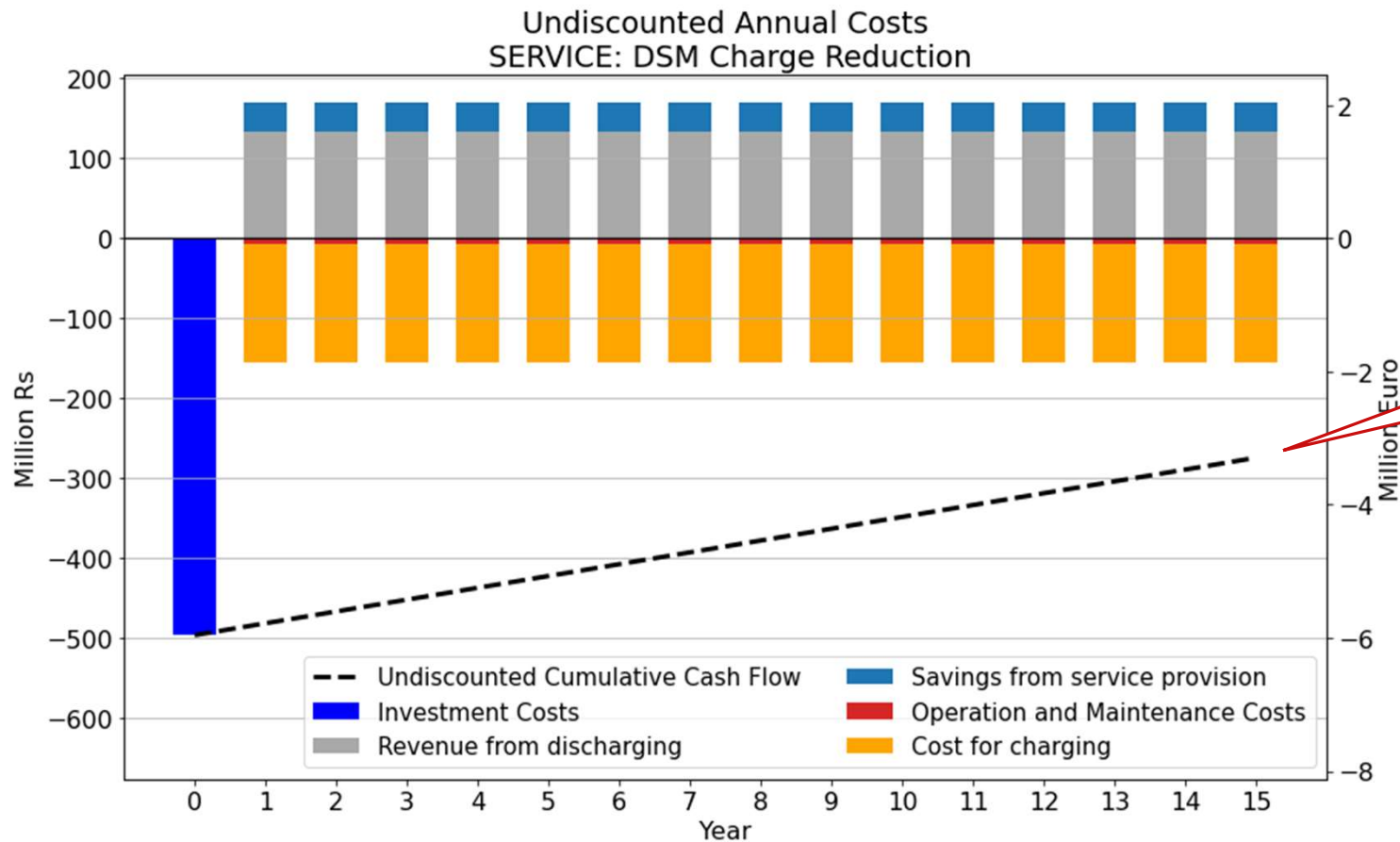
Balancing of Scheduled and Actual Consumption to avoid Deviation-Charges

Battery balances mismatch between scheduled and actual consumption.



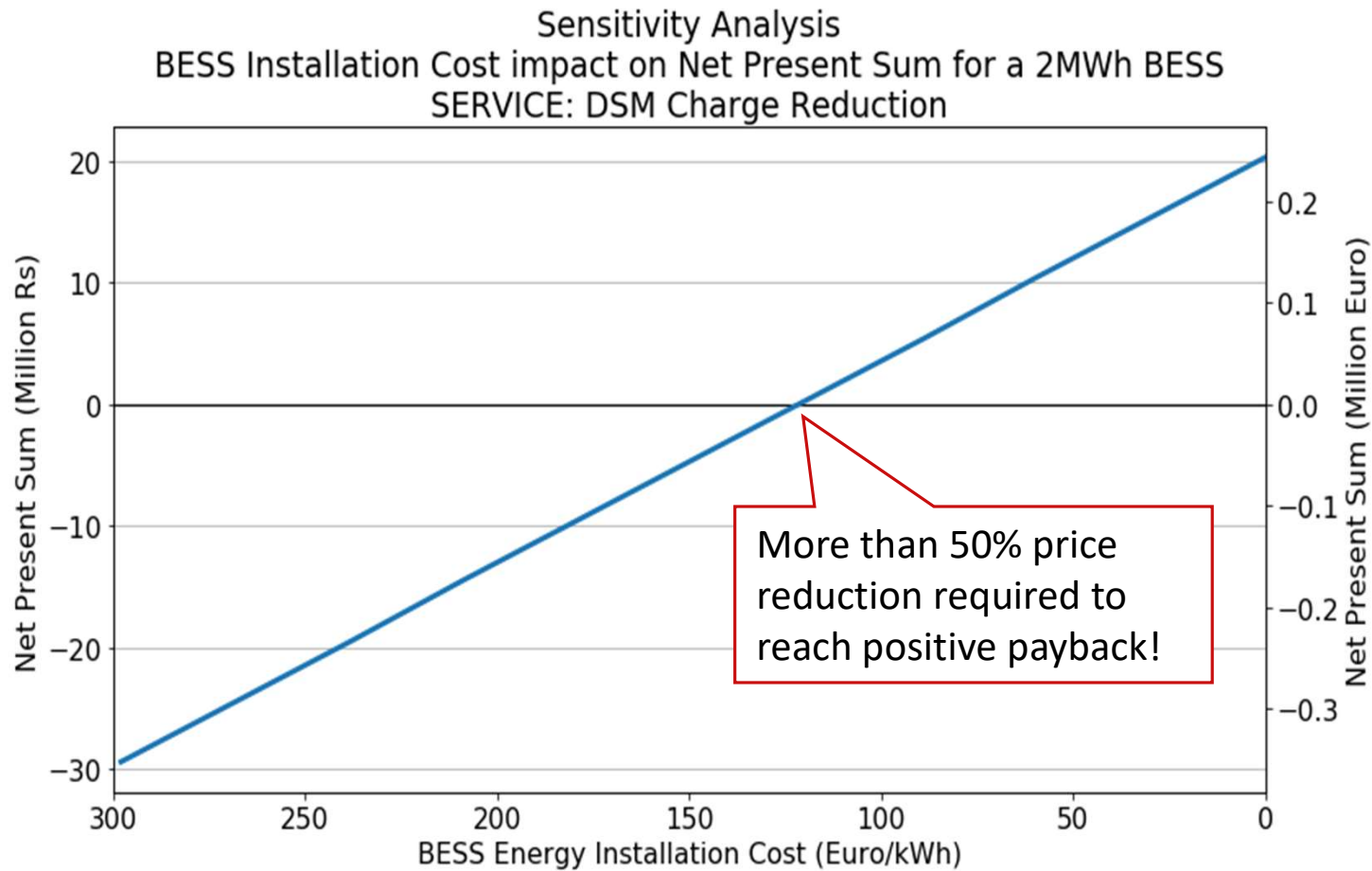
2

Economic Analysis Results: Balancing avoiding Deviation Charges

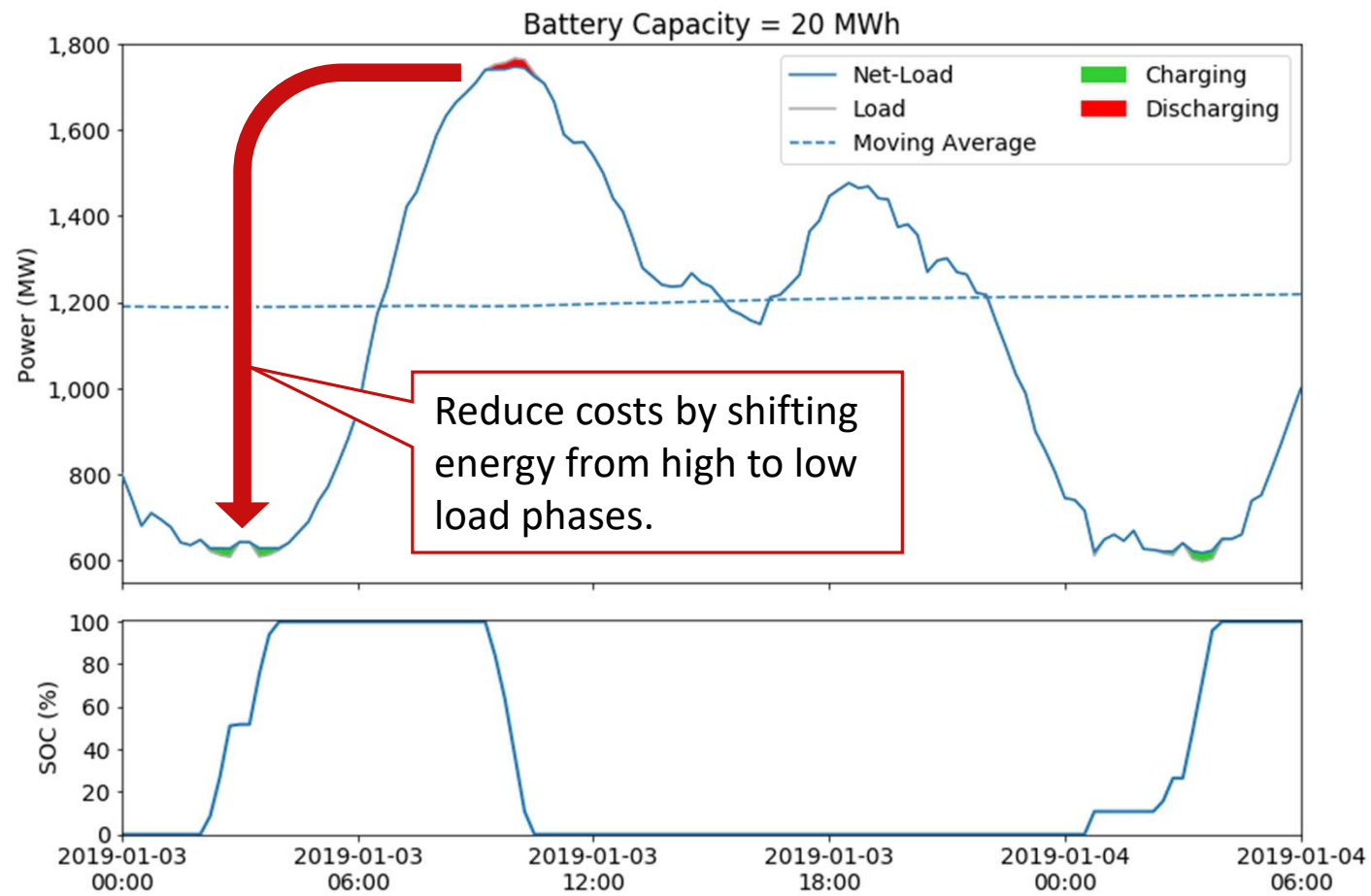


Positive Cash-Flow, but
not sufficient to cover
initial costs!

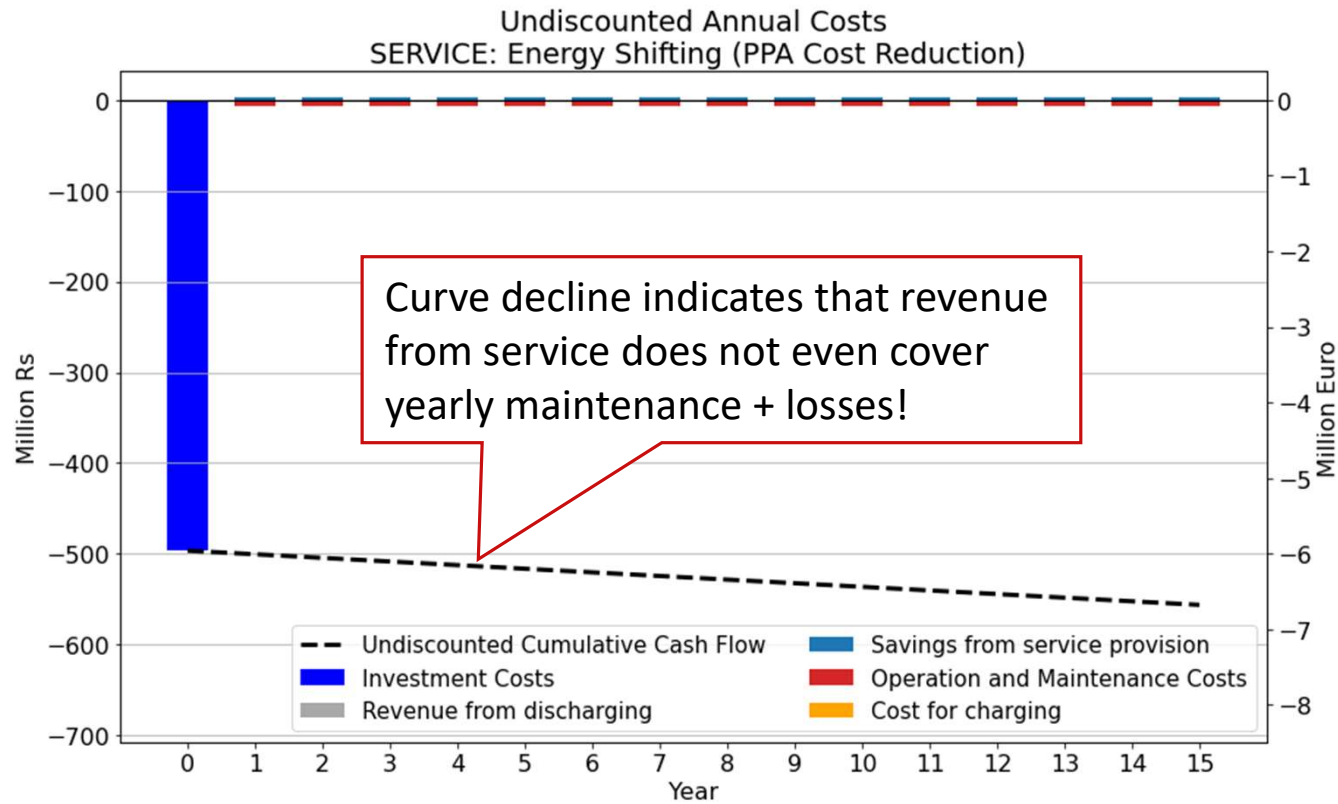
Sensitivity Analysis Results on Balancing



Energy Shifting to avoid PPA costs

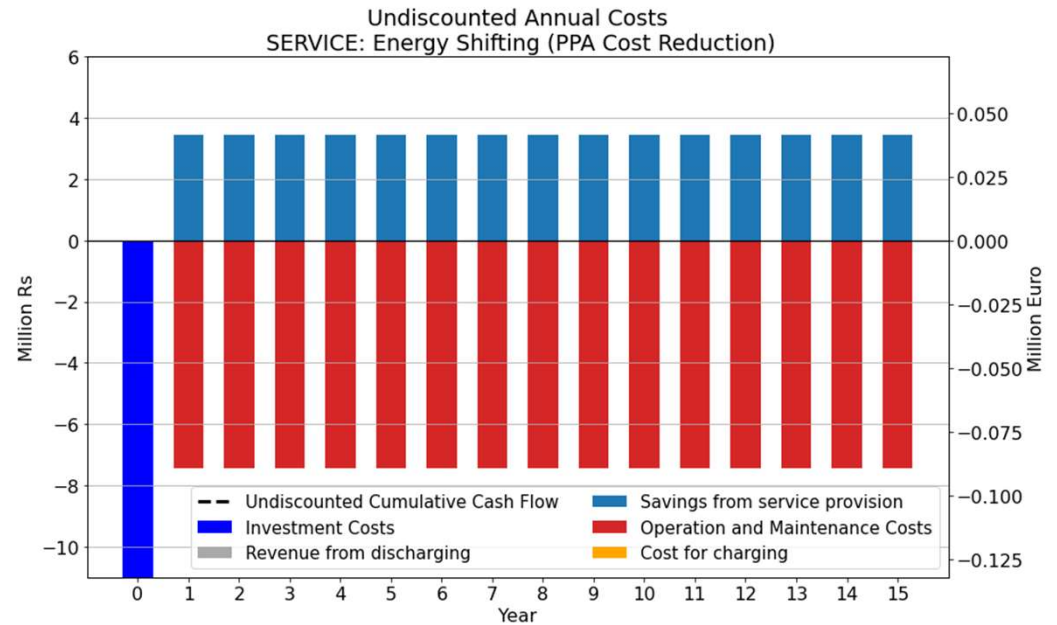
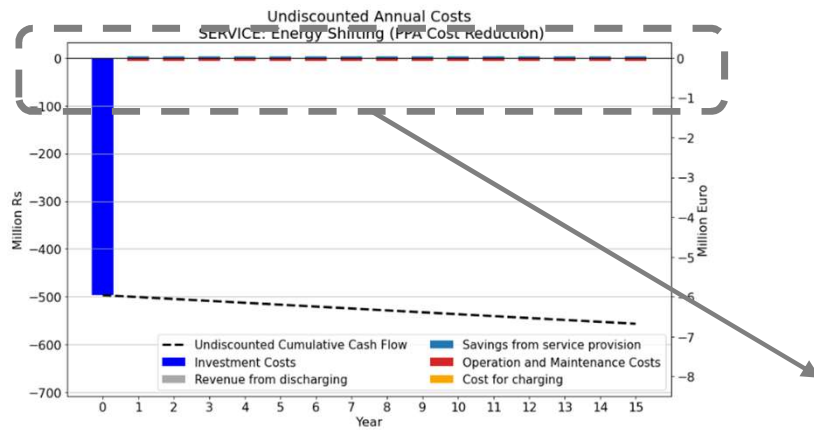


Economic Analysis Results: Energy Shifting



➔ No business case due to low price spread!

Economic Analysis Results: Energy Shifting



Yearly savings are lower than maintenance costs.

Overview: Economic Analysis of Battery Storage

Level of Analysis	Grid Support Service	Installed Battery			Yearly Savings [EUR]	Battery Installation Costs [EUR]	Net Present Sum [EUR]
		C-Rate	Max. Power	Capacity			
DT Level	1 Load Peak reduction	0.5	100 kW	200 kWh	250	59,600	- 65,800
	PV Peak Reduction	0.5	100 kW	200 kWh		59,600	- 54,200
DISCOM Level	2 Balancing	1	20 MW	20 MWh	445,200	5,960,000	- 6,443,000
	3 Energy shifting	1	20 MW	20 MWh	41,600	5,960,000	- 6,443,000

Many use cases but no business cases!

Assumed BESS cost: 300 €/kWh

Conclusions and Recommendations on BESS in Distribution Systems

There are many benefits for DISCOMS to install BESS in their distribution system....

...but on the SHORT TERM, handle with care:

- No real business case for DISCOMS has been identified!
- Operation costs might even be higher than savings!
- BESS will produce additional losses in the system!
- Individual situation needs to be evaluated, it is not yet the time for a massive rollout.

...and on LONG TERM, with a massive increase of renewable energies, storage will be inevitable, thus storage should be supported:

- A regulatory and market framework should be developed including among others the definition of tariff structure, incentives, grid connectivity and operational norms.



Thank you for your attention!

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