NGK INSULATORS, LTD.

NAS Battery System for Electric Energy Storage

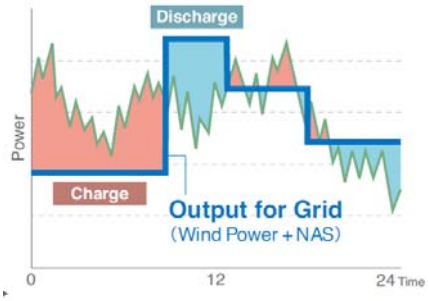
NGK's sodium-sulfur (NAS) battery is the undisputed world leader in megawatt-scale, multi-hour advanced battery energy storage

- High efficiency (~85% DC, ~75% AC)
- High calendar/cycle life – 15-year; 4500, 6 MWh/MW cycles
- High energy density – relatively small footprint
- Prompt response – NAS capable of full power charge to discharge in 1 millisecond
- No emissions, noise or vibrations
- No self-discharge or memory effect
- Over 10+ years of experience with more than 300 MW, 1800MWhr deployed globally

Smoothing Wind

NAS Battery attributes enable intermittent wind and solar resources to be more effectively utilized

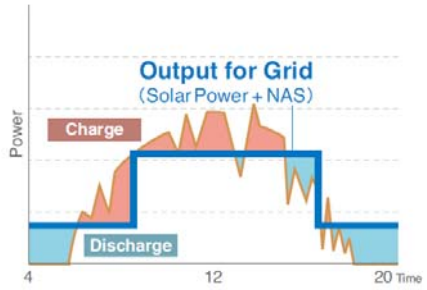
- At the wind farm, prompt injection and absorption of energy converts fluctuating wind generation to dispatchable power
- On the grid, frequency regulation and diurnal ramp management facilitate high penetration of wind generation
- At either location, high capacity energy storage reduces curtailment due to transmission congestion



Stabilizing Solar

Photovoltaic (PV) solar generation is particularly sensitive to changes in cloud cover and widespread use on the grid requires prompt stabilization. NAS batteries can:

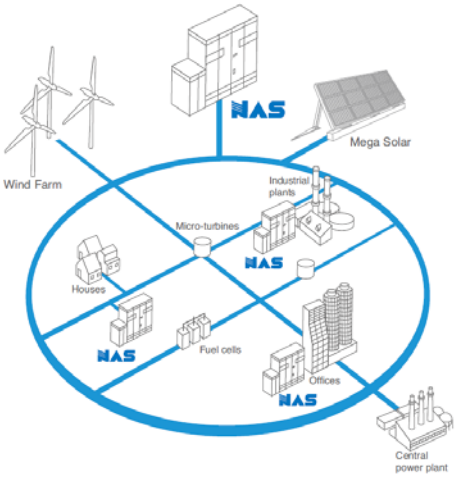
- Inject power near the point of generation to protect the grid and
- Store excess energy for dispatch during periods of peak demand



Smart Grid

In the near future, NAS batteries will be an integral part of the "Smart Grid" and play an essential role in

- Integrating multiple forms of distributed generation
- Maintaining the integrity and reliability of smart grid power, communications and control functions



And Much More…

NAS systems are also being used for T&D substation upgrade deferral and remote feeder reliability enhancement; as well as customer-side UPS, power quality, and electricity bill (energy and demand charges) management.

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