

Role of inverters in grid of the future

need larger, faster inverters to supply additional attributes

need students to hire from consortium – to become graduates and serve industries... form consortium

Big role in future to support separate islands on the grid

dist + residential side of inverters

micro grids need to be at residential area to control area

Inverters need to be considered in relation to entire system

High-bandwidth real time control of real and reactive power on grid

need standards

com

SAFETY

Interconnection

Within grid and within inverters

Use high bandwidth devices to increase transmission line capability through stability enhancements... and to access useable thermal capability within loss constraints

Inverters 2

Renewables and islands aren't co-located... need transmission capabilities to connect them

IEEE has subcommittees on islanding, one that focuses on generators > 10 MW

Another on Intentional islanding

Achieve markets for future inverter attributes

Spinning reserve

Voltage regulation

VARs

Sag mitigation'

Active filtering (harmonics)

ramp rates

storage
Phase balancing

100 MW Static VAR compensators are being added by utilities.

EERE working on value of attributes

Regulators must recognize value of attributes

Eastern utilities buying selling small quantities of VARS

Dynamic VARS can be produced by wind generators and peaking turbines
1547.4 is a forward battleground (islanding)

Excel Energy \$5 M investment in NaS bat for storage

Smart grid does not have to be a complex grid

Key development Requirement (1 MW → 100/200 MW Inverters)

Lower cost
better reliability
Bandwidth capability

SiC-based components
Control systems for inverters
Better plastics in packaging that lasts more than 10-15 years.

Technology Gaps, components, systems, etc

No big technology gaps other than above

Need standards that can accommodate attributes of advanced inverters

1547.3 communication standards for DG

Need to evolve from existing utility requirements

Cree needs guidelines in terms of what products to SiC based products to develop

Micro-grids should have eight 9's reliability

Better simulation models need to support system development

Voltage levels are increasing

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DOE has SmartGrid Committee. Should this ad hoc group (us) become associated with smart grid committee

DOE needs to participate in demonstration of technologies and DOE has \$100 Million/year to support demonstration of smart grid

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Potential Role within IEEE

Address overview of Workshop at IEEE PES national meeting in Pittsburgh in July

What should we don next... would this group be willing to draft a roadmap?

Lee

Le

Bob

Charlie

Jason

George

Madhav

Frank

Maric

Alex

Dave

sumit

How do we do the roadmap

Commonalities of different applications

Need summary of related activities ... e.g., all programs in smart grid

Literature search in commonalities

coordinate with IAPG

There are things that can have a big impact if we can agree upon:

If SiC came in at cost of siX5 that would be a big game changer

High bandwidth devices would be a big asset

Communication control and standards