

# IEEE 1547

## Interconnection Standard Update

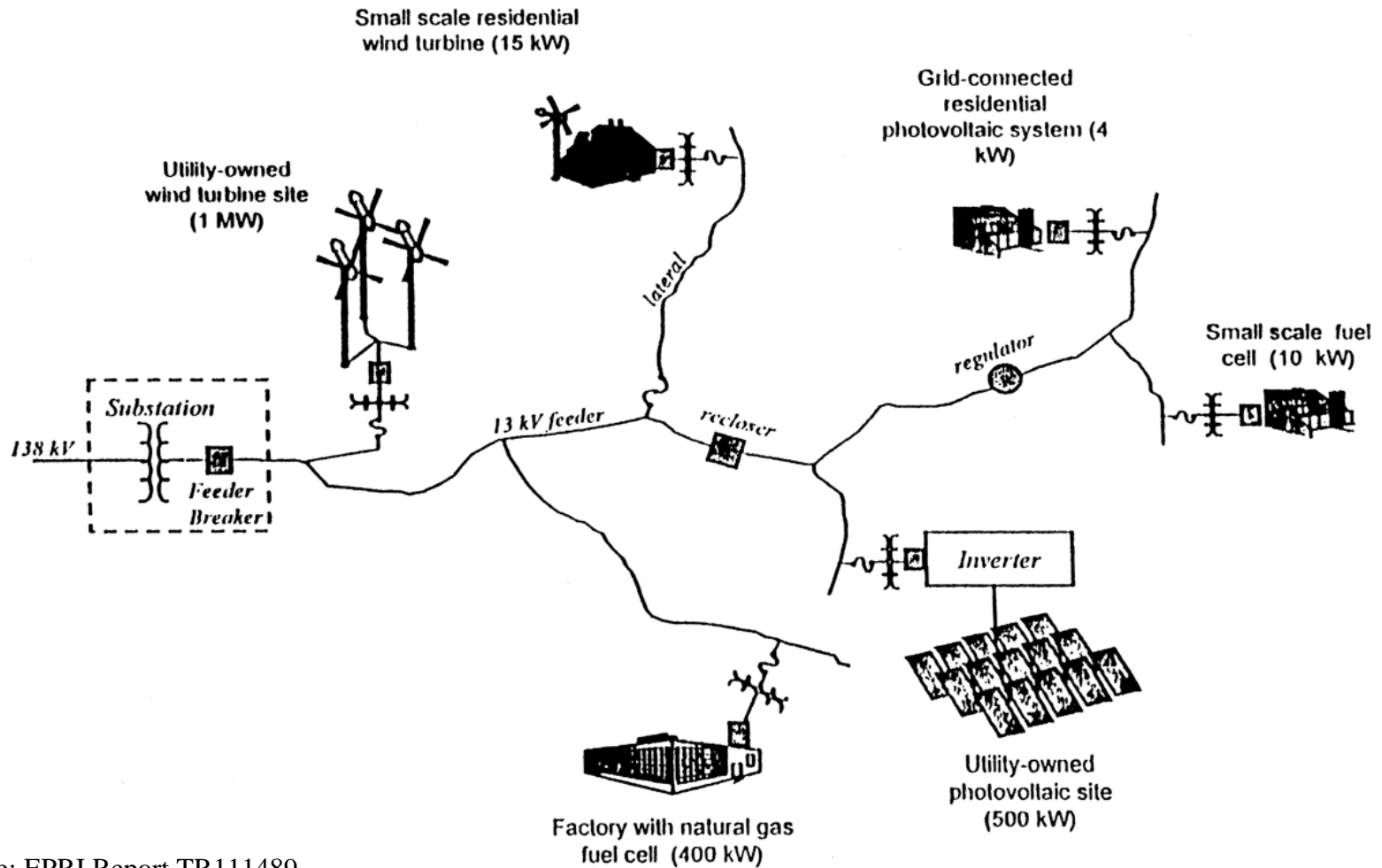
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# Utility Grid of the Future?



# Electric Power Systems Not Designed for Distributed Generation

- Utility Concerns:
  - EPSs designed for one-way operation
  - Safety and grid stability are dominant concerns
  - Distrust of customer-supplied protective relays
- Customer/Manufacturer Concerns:
  - Utility interconnection costs can be a “deal breaker” for smaller projects
  - Interconnection requirements are far from standard
  - Interconnection requirements may be hard to understand, or appear unreasonable

# 1547 Development Overview

- Industry groups began pushing for interconnection standard in late '90s
- IEEE SCC21 Working Group began work on a consensus standard in 1998
- Nearly 5 years, 10 drafts, 2 ballots, 352 working group “members”
- Successful Working Group ballot, Feb. 03
- To the IEEE Standards Boards June 03
- Anticipated publication summer 03

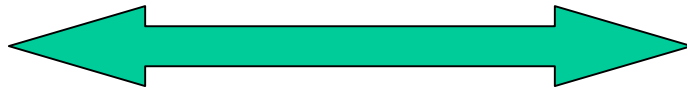
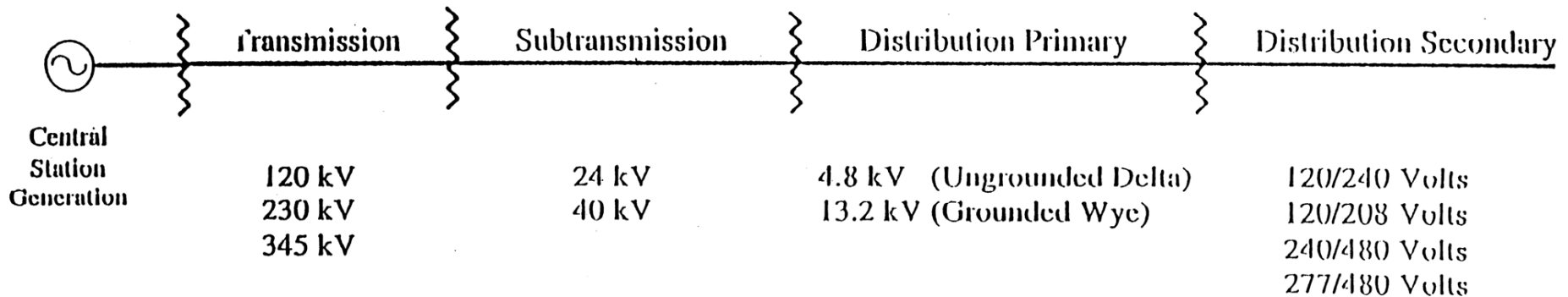
# IEEE 1547

***Title:*** Standard for Interconnecting Distributed Resources with Electric Power Systems

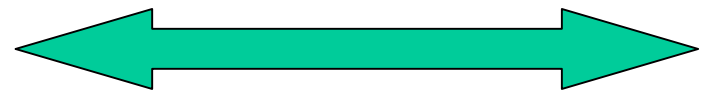
***Purpose:*** Provide a uniform standard for interconnection of distributed resources with electric power systems and requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection

***Limitations:*** Distribution-connected generation  
 $\leq 10$  MVA

# Transmission and Distribution System Voltages



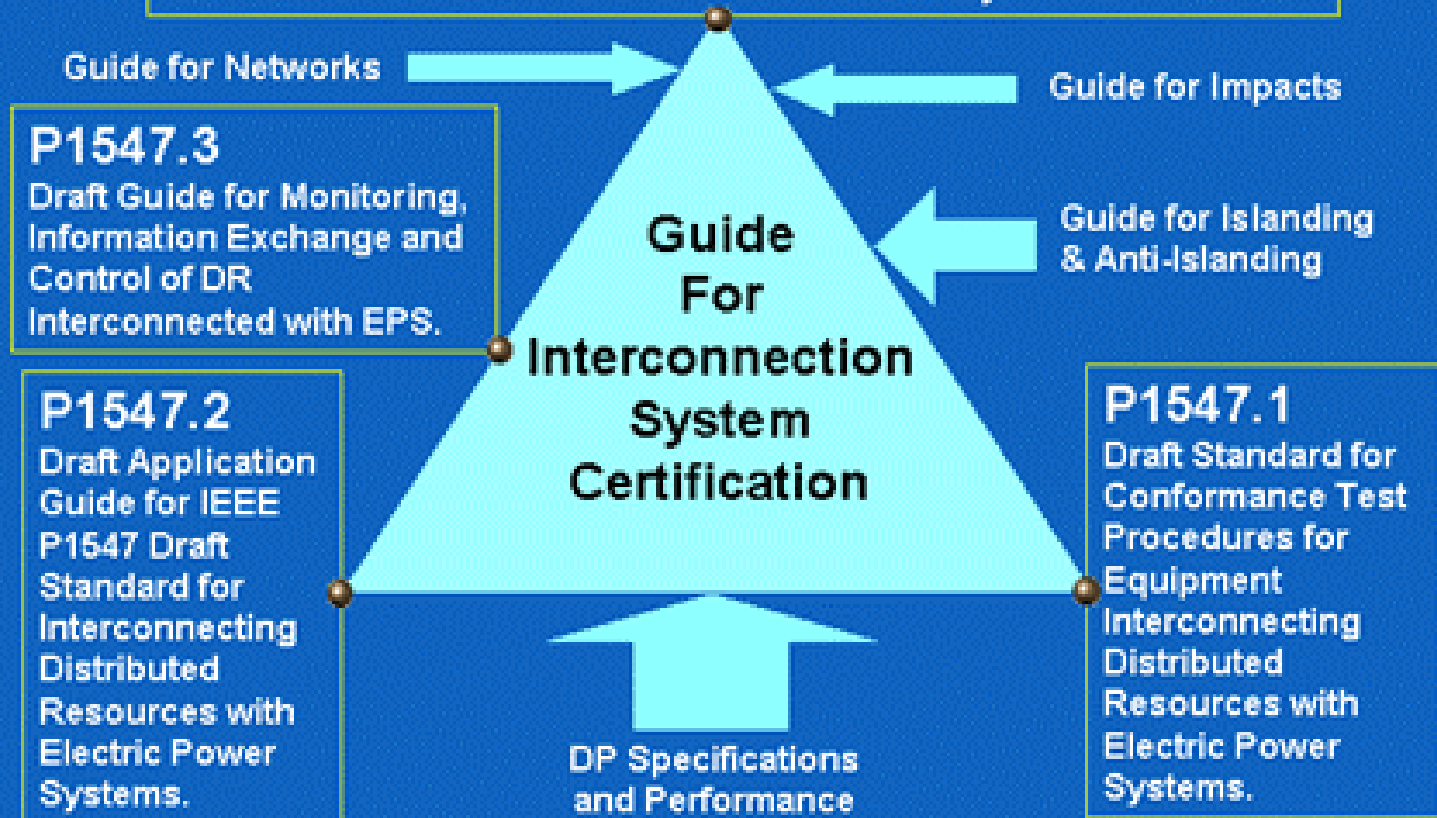
Wind Farm  
Interconnections



Distributed Generation  
Interconnections  
per IEEE 1547

## Body of Standards -- DR Interconnection

**P1547** Draft Standard for Interconnecting Distributed Resources with Electric Power Systems.



The above schematic identifies existing standards development projects and potential future activities under discussion by P1547 Work Group members.

# Impacts for Wind Power

## For Distribution-Connected Wind Turbines...

- Anti-islanding protection functions
- Testing of discrete interconnection functions
  - Production testing
  - Commissioning testing
  - Periodic field testing
- Integration of protective relays into the turbine controller?
- Small turbines with grid-connected inverters will see minimal impact (IEEE 929 compliant)

# 1547 Implementation

## **A legal authority must invoke the standard:**

- In most cases... state PUCs
- Some group must initiate the action: utility(s), industry, or the PUC itself
- FERC is issuing interconnection rules which may influence state PUCs
- Regional ISOs may invoke 1547 via contractual authority

# Wrap Up

- IEEE approval and publication of 1547 is anticipated during 2003
- Widely expected to become the basis for interconnection of distributed generators
- Manufacturers are already gearing up with 1547-compliant products
- Supporting standards are in development (test protocols) by IEEE and UL