CenterPoint™ Energy Minnegasco

Distributed Energy Tariffs & Interconnection in Minnesota

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Minnegasco

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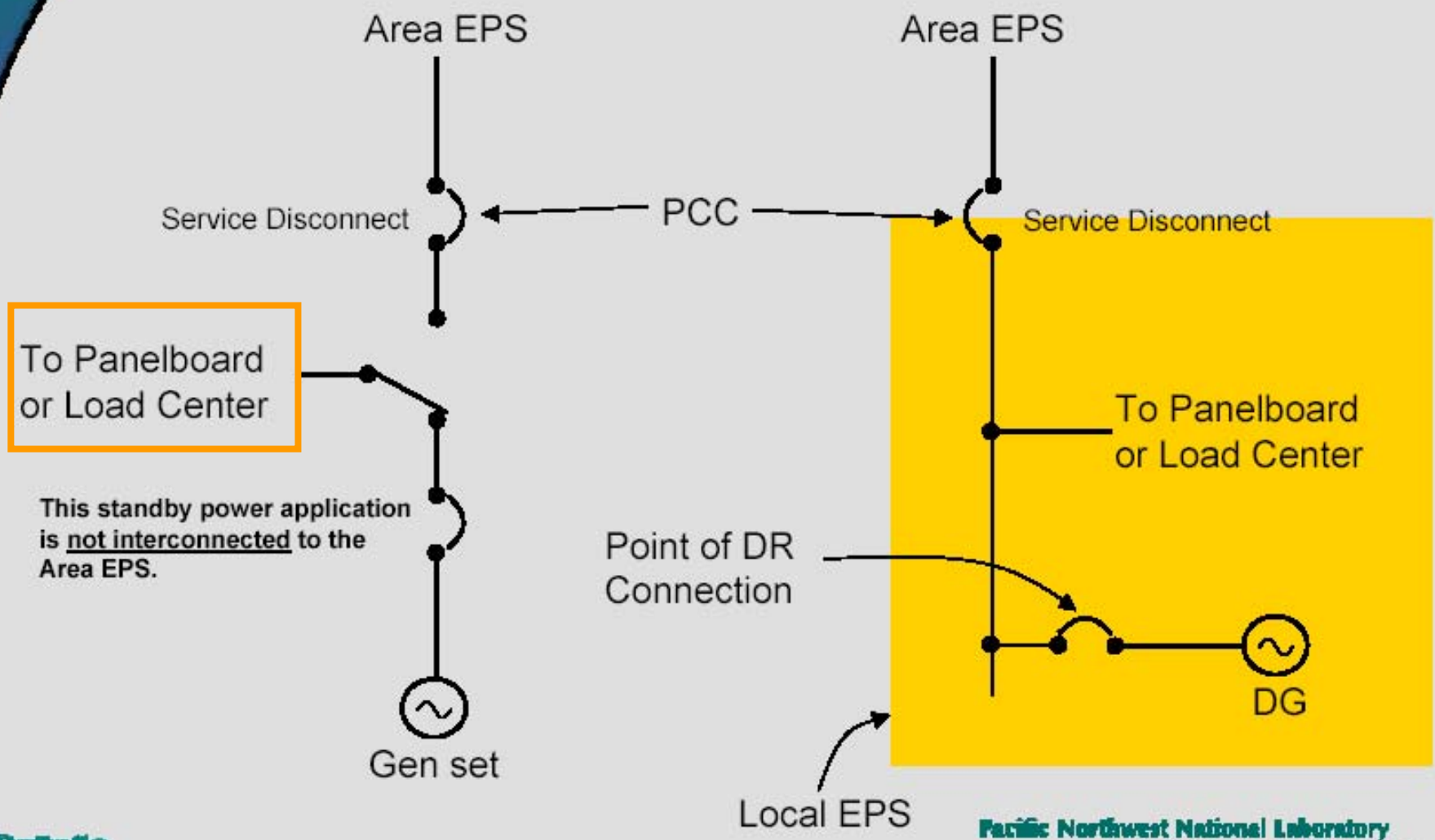
DG Interconnection

- Basics of Interconnection
- Current State of Interconnection in Minnesota

Definitions

What is an interconnection?



Difference in Use/Benefits

Generator Not Interconnected

- Backup Power
- Interruptible Power
- Demand Reduction
- Few Operating Hours

Generator Interconnected

- Reduce Demand and KWH
- Potential High Efficiency
- Many Hours
- Versatile Applications

Interconnection

- Electrically Connected
- Customer Generator in “Parallel” with utility grid.
- Power and Vars may flow from or into grid.

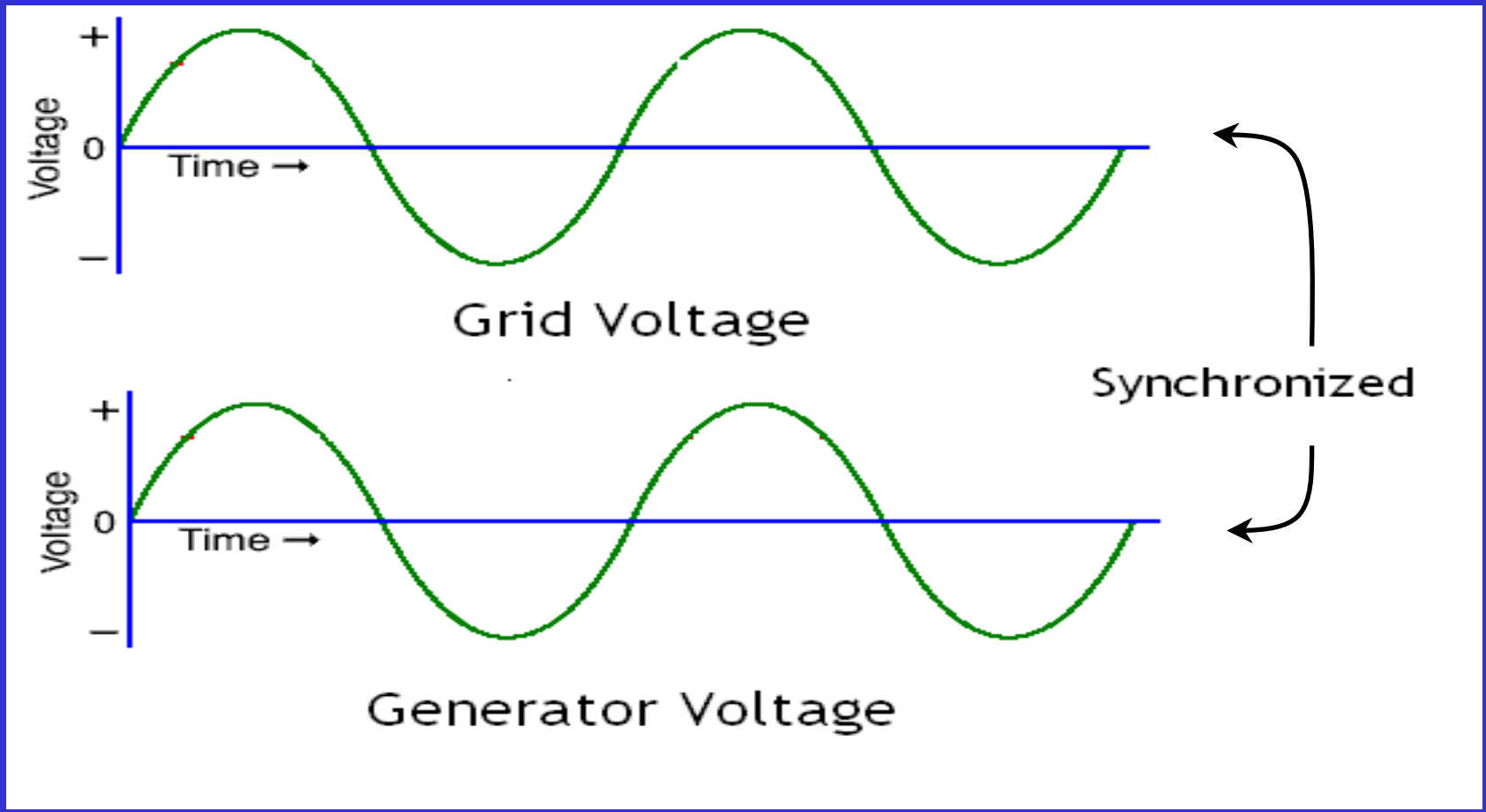
Regional Electric Grids

Parallel Operation

- Your Generator is connected to and become a part of the Electric Grid.
- Frequency is controlled by the Grid.
- Voltage is controlled by the Grid – (local influence)

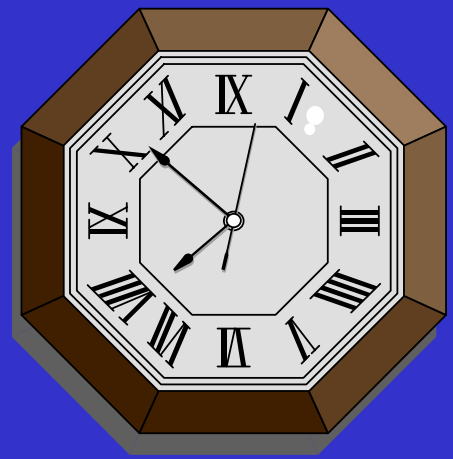
Variable	Isolated	Paralleled
Fuel	Speed	Power
Excitation	Voltage	Power Factor

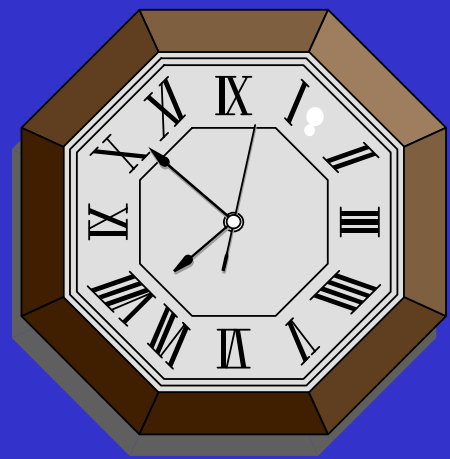
Synchronized Generator



Why Interconnect?

- Keep your clocks on time.
- Reliability
- Flexibility
- Optimize DG size
  - Heat Recovery
  - Load
  - DG Equipment





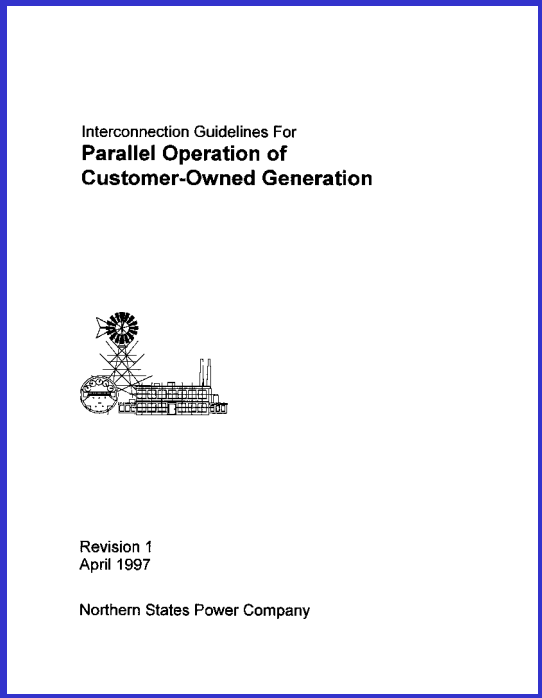
Typical Customer DG Equipment

Interconnection “Rules”

Interconnection
What are some Concerns?

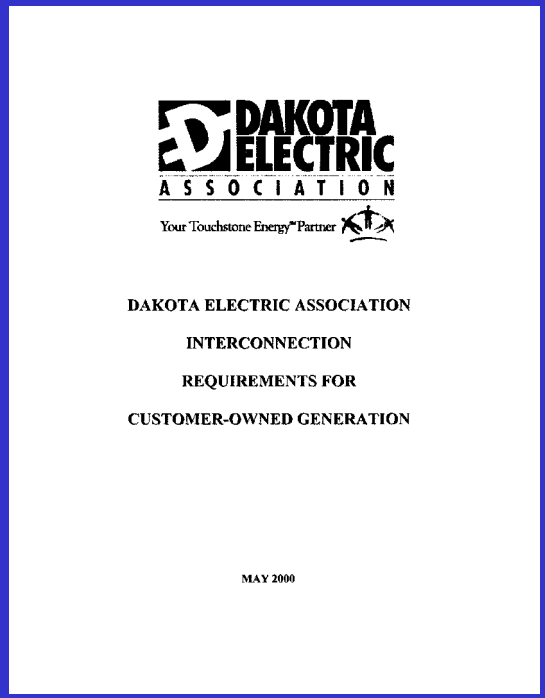
- Safety Of Utility Workers
  - Prevent ***"Islanding"***
  - Lock out disconnect
- Protection of Utility and Customer Equipment
- Loss of Utility Revenue (Utility)
- Bureaucratic Delay (Customer)

Current Interconnection Requirements in Minnesota


Interconnection Guidelines For
Parallel Operation of Customer-Owned Generation

Revision 1
April 1997

Northern States Power Company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Your Touchstone Energy™ Partner

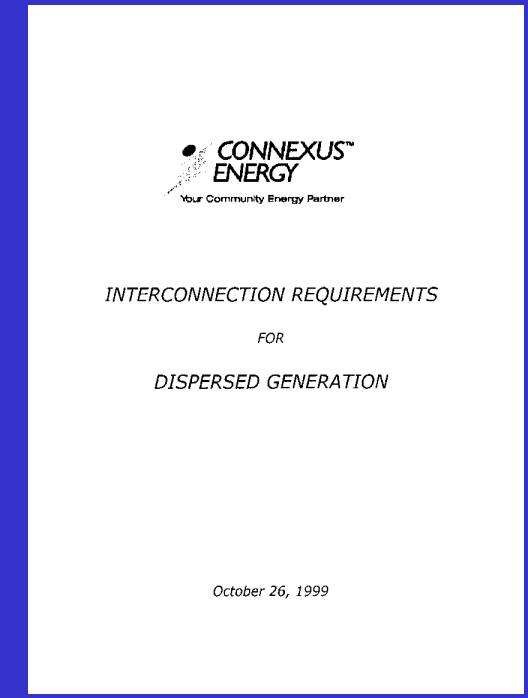
DAKOTA ELECTRIC ASSOCIATION

INTERCONNECTION

REQUIREMENTS FOR

CUSTOMER-OWNED GENERATION

MAY 2000


CONNEXUS™ ENERGY
Your Community Energy Partner

INTERCONNECTION REQUIREMENTS

FOR

DISPERSED GENERATION

October 26, 1999

Every Utility Has Their Own Requirements -

Minnesota DG

- Historically utilities have been less than enthusiastic toward Customer DG
- Texas and New York establish standard rules for Interconnection
- 2001 Minnesota Energy Security and Reliability Act
- PUC to establish generic standard tariffs
- PUC setup two Work Groups
- Tariff Work Group, Technical Work Group
- Final reply comments to PUC June 27th

Energy Security and Reliability Act – DG

- T&C's for interconnection and parallel operations
- Cost savings and reliability benifts
- Establish technical requirements that will promote safe and reliable parallel…
- Enhance …reliability…efficiency …

Energy Security and Reliability Act – DG

- PUC to establish generic tariffs for interconnection and parallel operation
- Consistent with industry… federal and state …standards
- Provide low cost standarized interconnection
- Establish standard agreements and applications

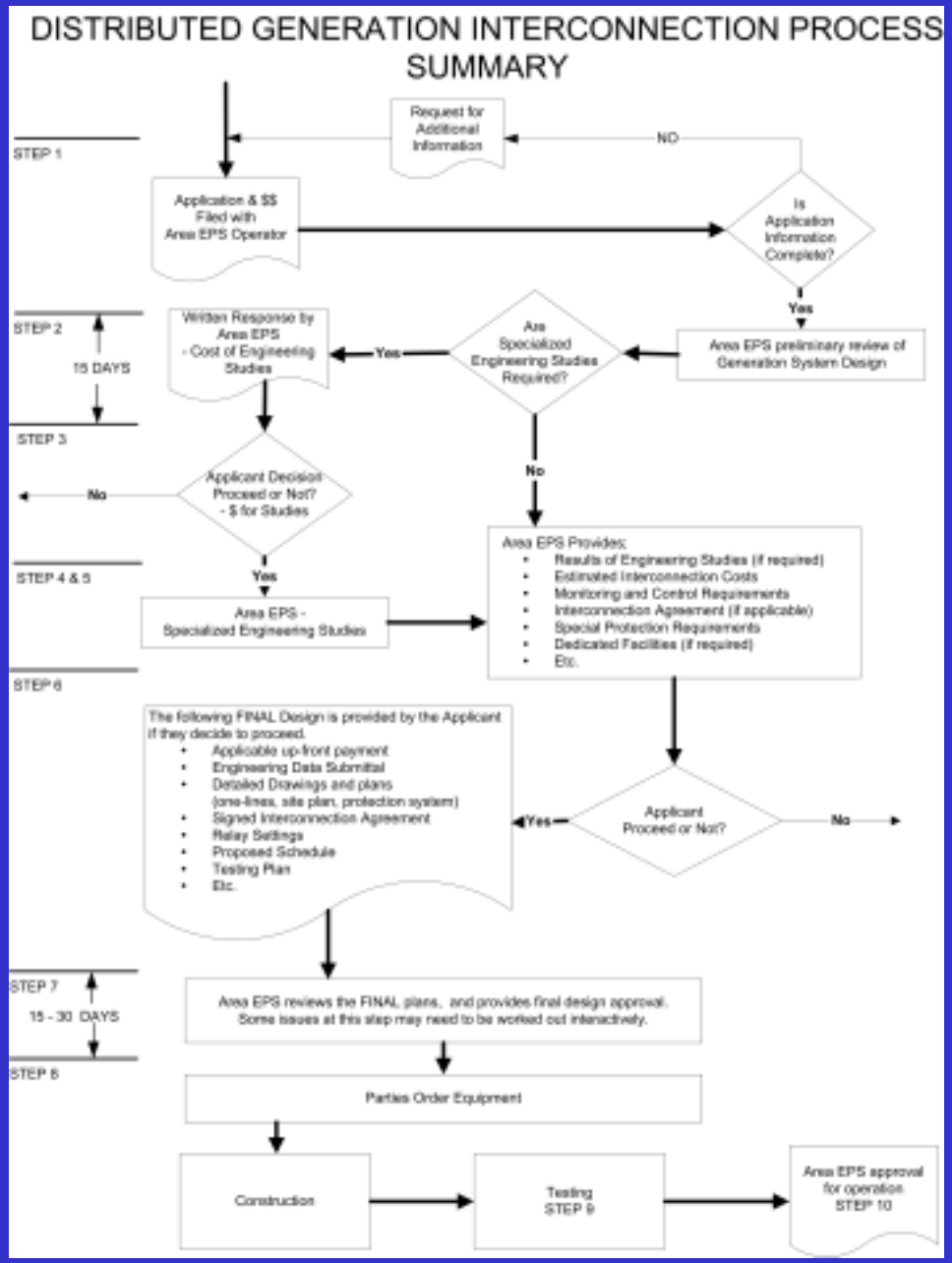
Rates Work Group

- Guidelines for tariffs
  - Price for services such as: backup power, for maintenance, Supplemental services, standby charges
  - Price for power purchased by utility

Technical Work Group

- Application Procedure
- Study Fees and Timelines
- Pre-certification of equipment
- Technical Requirements – relays, standards,etc
- Standard Contracts

Example:


DISTRIBUTED GENERATION INTERCONNECTION PROCESS SUMMARY
STEP 1
Request for Additional Information
NO
Application & $$ Filed with Area EPS Operator
Is Application Information Complete?
Yes
STEP 2
15 DAYS
STEP 3
Written Response by Area EPS - Cost of Engineering Studies
Yes
Are Specialized Engineering Studies Required?
Area EPS preliminary review of Generation System Design
No
Applicant Decision Proceed or Not? - $ for Studies
No
Yes
STEP 4 & 5
Area EPS - Specialized Engineering Studies
Area EPS Provides:
Results of Engineering Studies (if required)
Estimated Interconnection Costs
Monitoring and Control Requirements
Interconnection Agreement (if applicable)
Special Protection Requirements
Dedicated Facilities (if required)
Etc.
STEP 6
The following FINAL Design is provided by the Applicant if they decide to proceed.
Applicable up-front payment
Engineering Data Submittal
Detailed Drawings and plans (one-lines, site plan, protection system)
Signed Interconnection Agreement
Relay Settings
Proposed Schedule
Testing Plan
Etc.
Yes
Applicant Proceed or Not?
No
STEP 7
15 - 30 DAYS
STEP 8
Area EPS reviews the FINAL plans, and provides final design approval. Some issues at this step may need to be worked out interactively.
Parties Order Equipment
Construction
Testing STEP 9
Area EPS approval for operation STEP 10

National Codes

- IEEE 1547 - Draft Interconnection Standard
  - Technical only no fees or procedures
- UL 1741 - Inverters
- UL 891 and UL 1558 - Paralleling Switchgear
- NFPA 70 – National Electric Code

IEEE P1547 Draft Standard for Interconnecting Distributed Resources with Electric Power Systems

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This standard establishes criteria and requirements for interconnection of distributed resources (DR) with electric power systems (EPS).

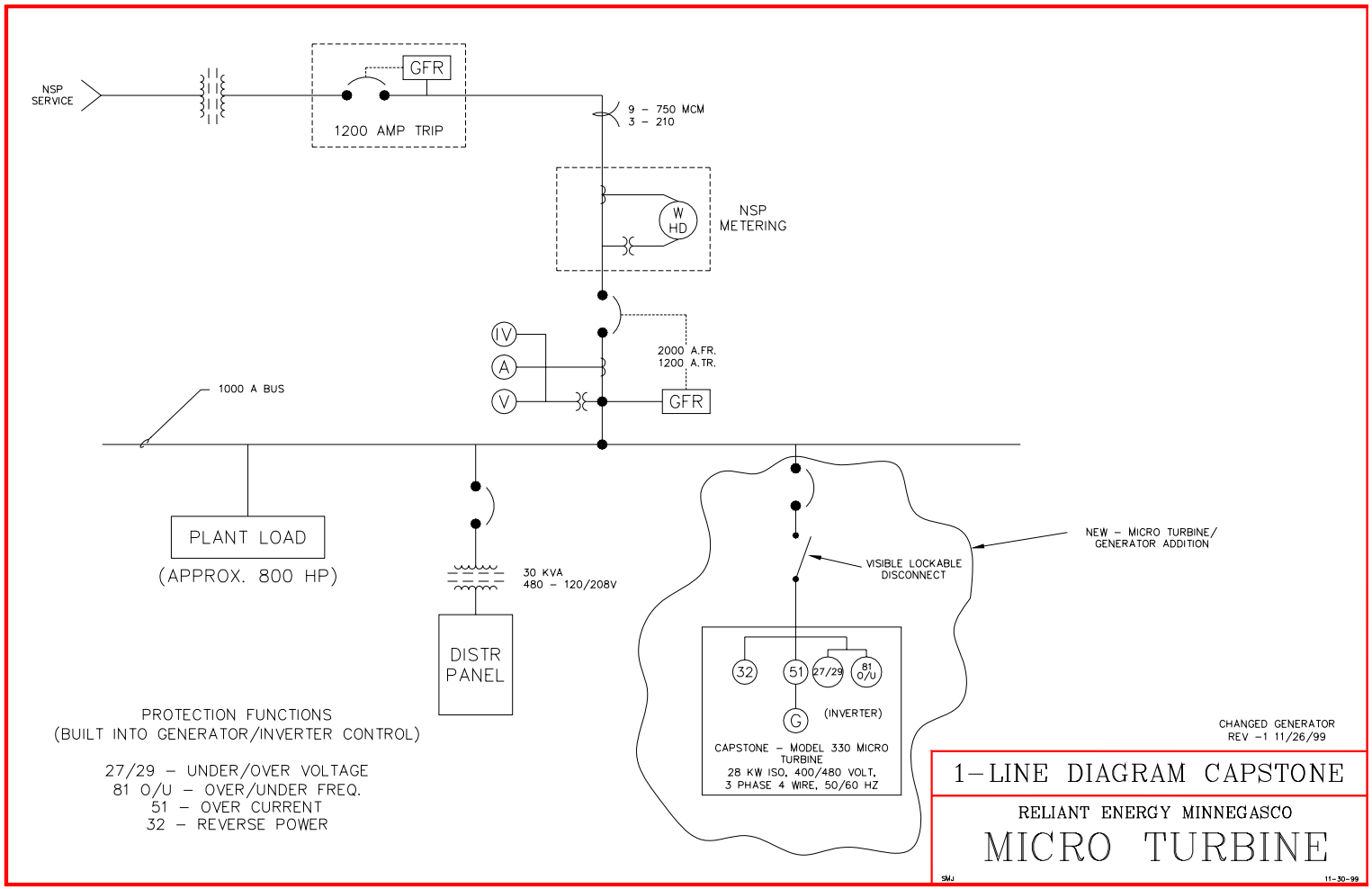
Purpose

This document provides a uniform standard for interconnection of distributed resources with electric power systems. It provides requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection.

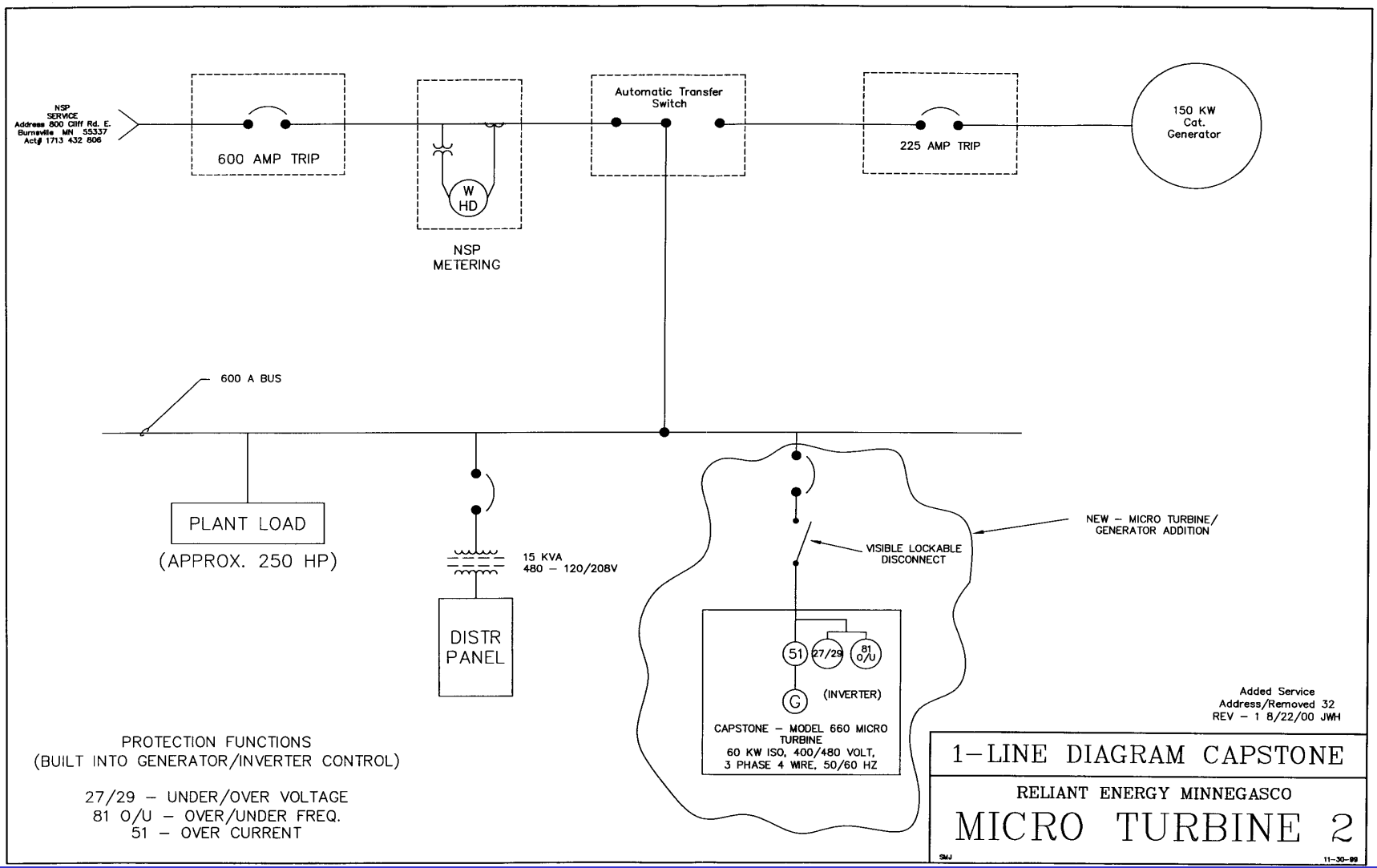
UL 1741

- Applies to DG using inverters
- Inverters are used with solar power, wind, fuel cells and micro turbines
- Best candidates for “pre-certification”

Typical Interconnection 1-Line



Typical Interconnection 1-Line



Micro Turbine Connection

Future of Interconnection in Minnesota

- PUC will establish generic tariffs
  - Outcome unclear
  - Utilities and DG proponents still have major difference of opinion
- Utilities create tariffs based on generic
- Customer attempt to use tariffs
- Impact of FERC unknown at this time

Keys to Simplified Interconnection

- Minimum technical requirements to safeguard people
- Pre-certification
- Reasonable study fees with defined timelines
- Educated customers and regulators
- Cooperative relationships