

# Beyond the Central Grid: Remote Energy Networks from Pole to Pole

PRESENTATION FOR THE NATIONAL ASSOC. OF STATE ENERGY  
OFFICIALS

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# MEET THE LEADERS IN ADVANCED CLEAN DIESEL

The members of the Diesel Technology Forum are leaders of the diesel industry including engine and equipment makers, key component manufacturers, fuel producers and emissions control technology manufacturers.



[WWW.DIESELFORUM.ORG](http://WWW.DIESELFORUM.ORG)



# Technology Choices for Standby & Prime Power

## Stored Energy Systems

Solar with storage,  
Flywheels

## Uninterruptible Power Supplies (UPS)

Battery Based

## Turbines

Combined heat and  
power

## Fuel Cell Systems

## Generator Sets

*(Internal combustion engine + electrical power generator + electrical controls/switchgear)*

- \* Diesel
- \* Gasoline
- \* Natural Gas
- \* Propane

# Why Diesel for Emergency Power?

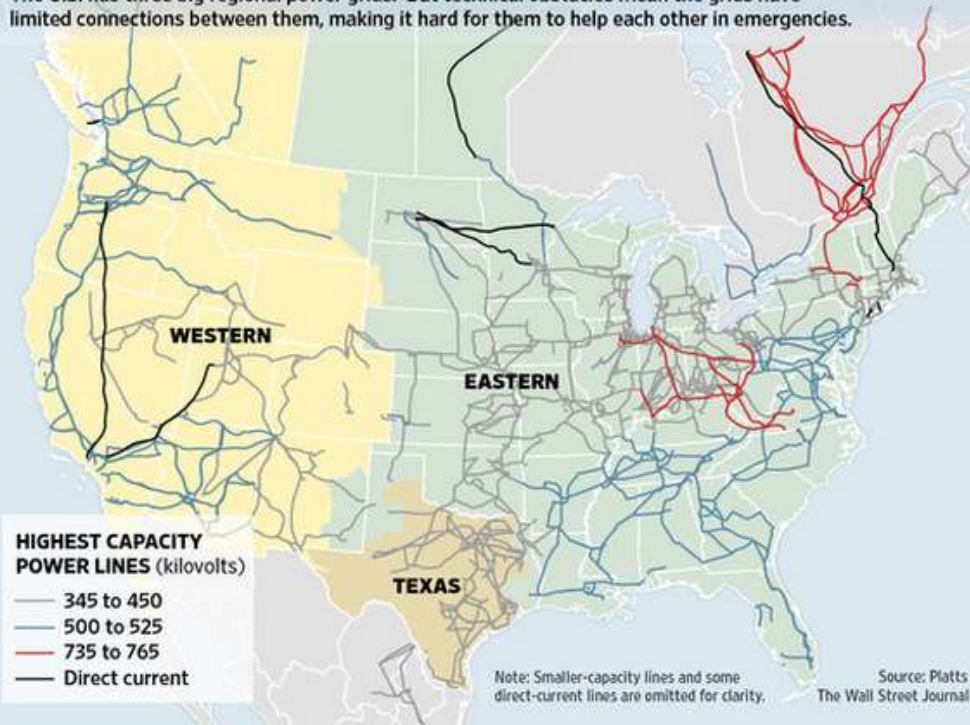
- ✓ Quick start-up time/load handling ability
  - 10 seconds or less to start-up and load handling. Other fuel sources may take up to two minutes, which may be too long in many emergency situations and out of compliance with state and federal laws.
- ✓ Power density, fuel efficiency and reliability
- ✓ Disaster utility
  - Diesel generators have their own storage for clean diesel fuel, which is readily available and replenishable.
- ✓ Portability



# Gensets Supporting Grid Resiliency

## Separate Systems

The U.S. has three big regional power grids. But technical obstacles mean the grids have limited connections between them, making it hard for them to help each other in emergencies.



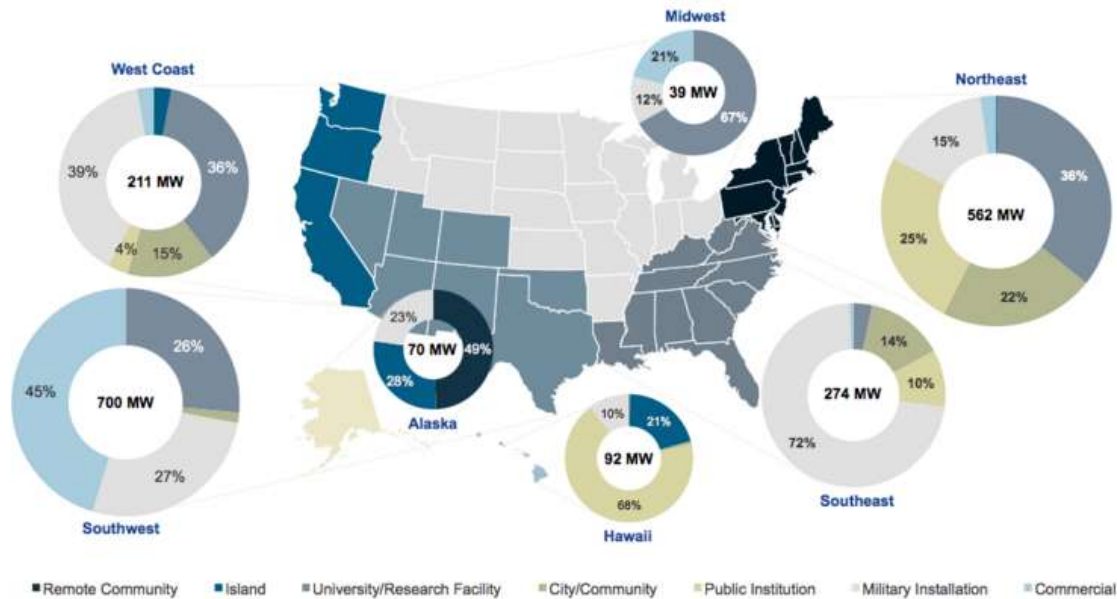
March 12, 2014:

The U.S. could suffer a coast-to-coast blackout if saboteurs knocked out just nine of the country's 55,000 electric-transmission substations on a scorching summer day, according to a previously unreported federal analysis.



# A Tried & True Partner in Prime Power

FIGURE: Total Microgrid Generation Capacity by End-User Type and Region



“At Fort Carson, a field of solar panels and diesel generators provide power that can be used immediately, or stored in the batteries of the base’s electric vehicles for later use.” - **Military Marches Forward With Microgrids** by Dan Boyce, Inside Energy (9/4/2015)

Source: GTM Research

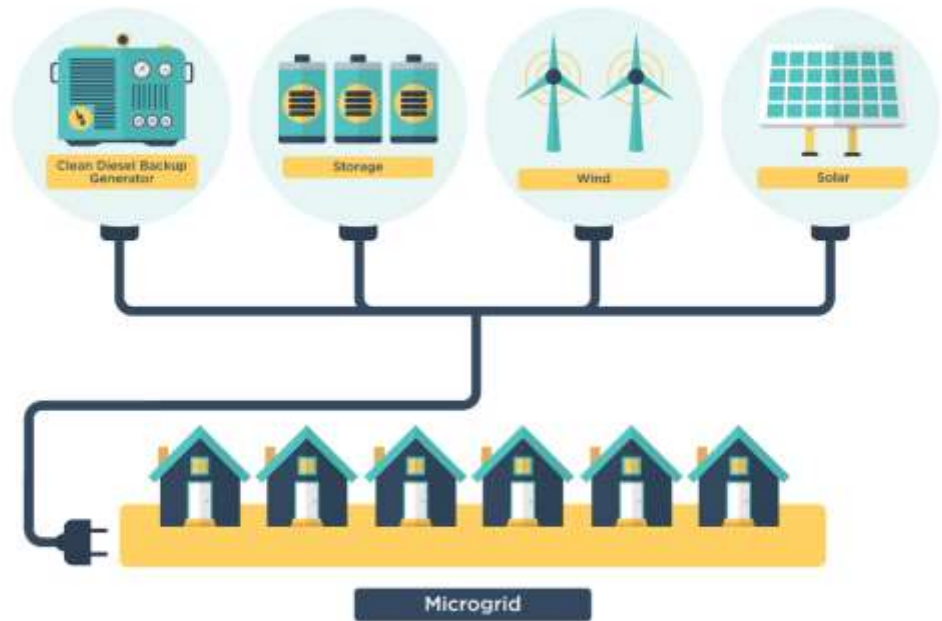
# Microgrids:

► Renewables that you want;

Reliability that you need.

## COVERING ALL THE BASES

Diesel Generator + Storage + Wind + Solar = Microgrid



Renewables that you want (solar, wind) with the reliability that you need (clean diesel): Sustainable Power for the Future

# Diesel Is A Part of a Sustainable Energy Future



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Indian Energy

National Strategy for the Arctic Region (NSAR) – Ten Year Renewable Energy Plan

## **Priority Area #1: Optimizing Existing Infrastructure**

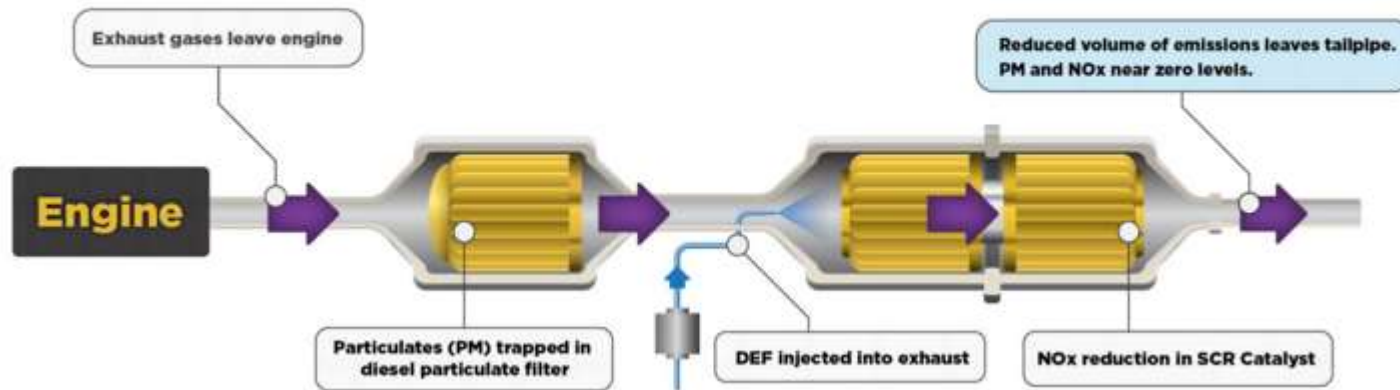
Renewable energy only makes sense if the supporting infrastructure is intact. Because rural Alaska communities operate on microgrid systems, in the long term, diesel generation or some other hybrid fossil/renewable system is a practical expectation when considering how renewables can be successful. Renewable energy is a desirable goal. However, reliable basic infrastructure must also be addressed. A holistic approach is critical in sustaining all basic infrastructure needs as each relies on a robust energy system.



# Diesel is a Platform for Continuous Improvement

- ▶ Advanced Emission Control Solutions to Meet Tier 4 Requirements

## Diesel Emissions Control System



Depending on horsepower range, Tier 4 final clean diesel equipment delivers 85% to 95% reduction in emissions for NOx and PM

# Latest Clean Diesel Technology Generates Air Quality Benefits

	T4i (752–1207 hp)	T4i (>1207 hp)	T4F (>751 hp)
On Jan 1 of	2011	2011	2015
NOx	3.50	0.67	0.67
HC	0.40	0.40	0.19
CO	3.50	3.50	3.50
PM	0.10	0.10	0.03



91%



70%

(All figures are in g/kW-hr)

# Benefits of Advanced Biofuels in Prime Power Applications

 PRESS RELEASE

## PRO FOOTBALL'S MAIN EVENT KICKS- OFF WITH CLEAN DIESEL TECHNOLOGY AND RENEWABLE FUEL



**NESTE**

40,000 gallons of renewable diesel fuel powered Tier 4 generators to provide power to Super Bowl City and cut **238 tons of CO<sub>2</sub>**



# Thank You

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