GE
Fuel Cells

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November 18, 2014

GE's portfolio … structured for growth

- 8 businesses operating in more than **100** countries … **125+** years
- **>300,000** employees worldwide

Power & Water	Oil & Gas	Energy Management	Aviation	Healthcare	Transportation	Home & Business Solutions	GE Capital
17%	11%	5%	15%	12%	4%	6%	30%

Power & Water … largest industrial business

>37,000 employees **>120** countries

Power Gen Products

Power Gen Services

Distributed Power

Renewables

Water & Process Technologies

Nuclear

Diverse technology & services solutions … >1,000GW installed globally

GE's capabilities are a differentiator

Aviation heritage

- >60,000 turbines installed[1]
- Aerodynamics, adv. materials, reliability

Engines heritage

- >55,000 gas & diesel engines installed[2]
- Combustion, emissions, efficiency

Research centers

- 7 centers spread across 4 continents
- Investments in software & services

Global footprint

- Global Growth Organization (GGO)
- Global supply chain

Breadth of resources to enable success

[1] Includes Aviation & Aero turbines. For Aviation includes GE (40k), CFM (18k) & EA (0.2k). CFM is a 50/50 JV between GE & Snecma. EA is a 50/50 JV between GE and Pratt & Whitney [2] Includes engines from GE Transportation & Distributed Power

Mega trends driving growth

↑ Efficiency & ↓ Pollution

Grid firming for

Need for resiliency

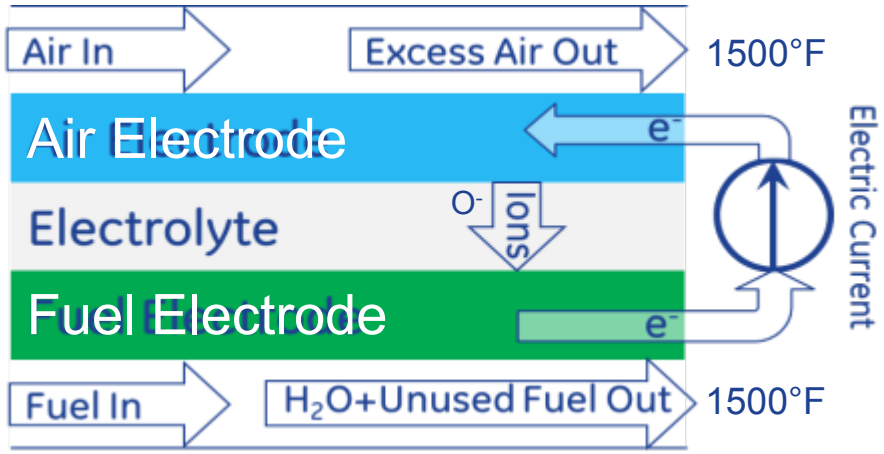
Increased gas availability

These trends drive the need for distributed power globally

Why fuel cells?

Technology

Converts fuel
to electricity chemically



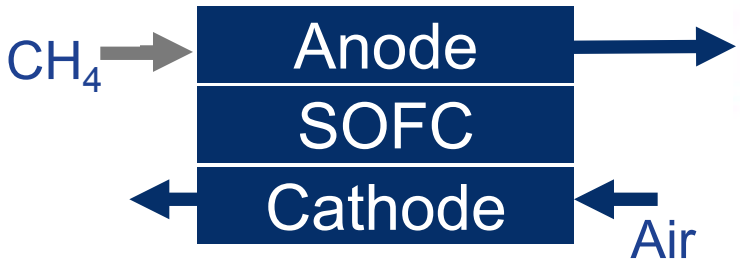
Advantages

- High Efficiency
- Ultra low emissions
- Fuel flexible
- Power when you need it
- Power where you need it: Sized for Distributed Power

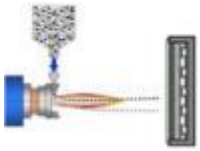
50+ years of development … cost always the challenge

GE – Fuel Cells

SOFC/Recip Hybrid System...



GE differentiation



Advance manufacturing
- Plasma spray technology

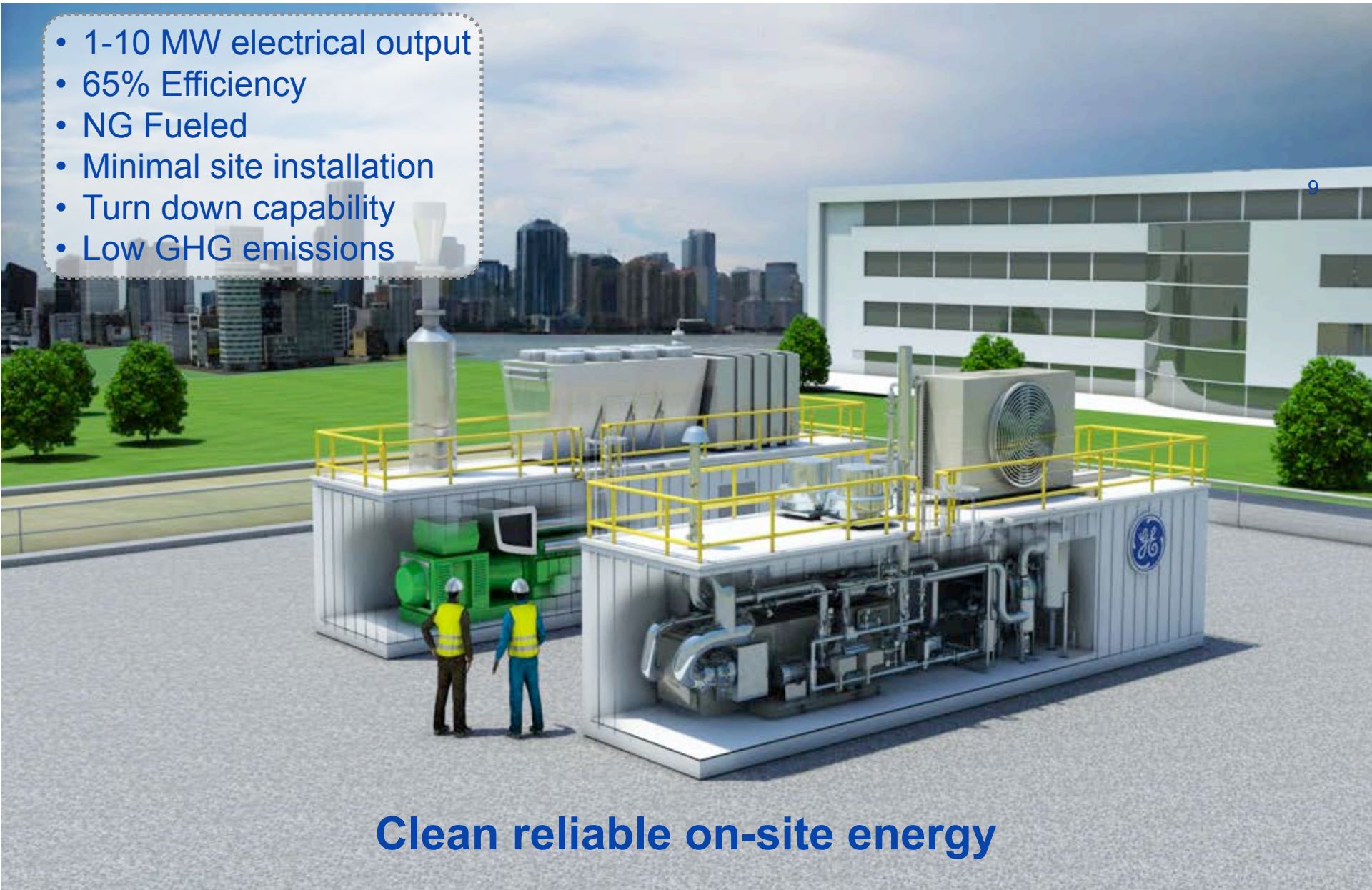
Simple Hybrid System
- Integrated gas engine generator set

…Revolutionary

- 65% system efficiency
- Scalable: 1-10 MW
- Retrofit capability
- Resilience

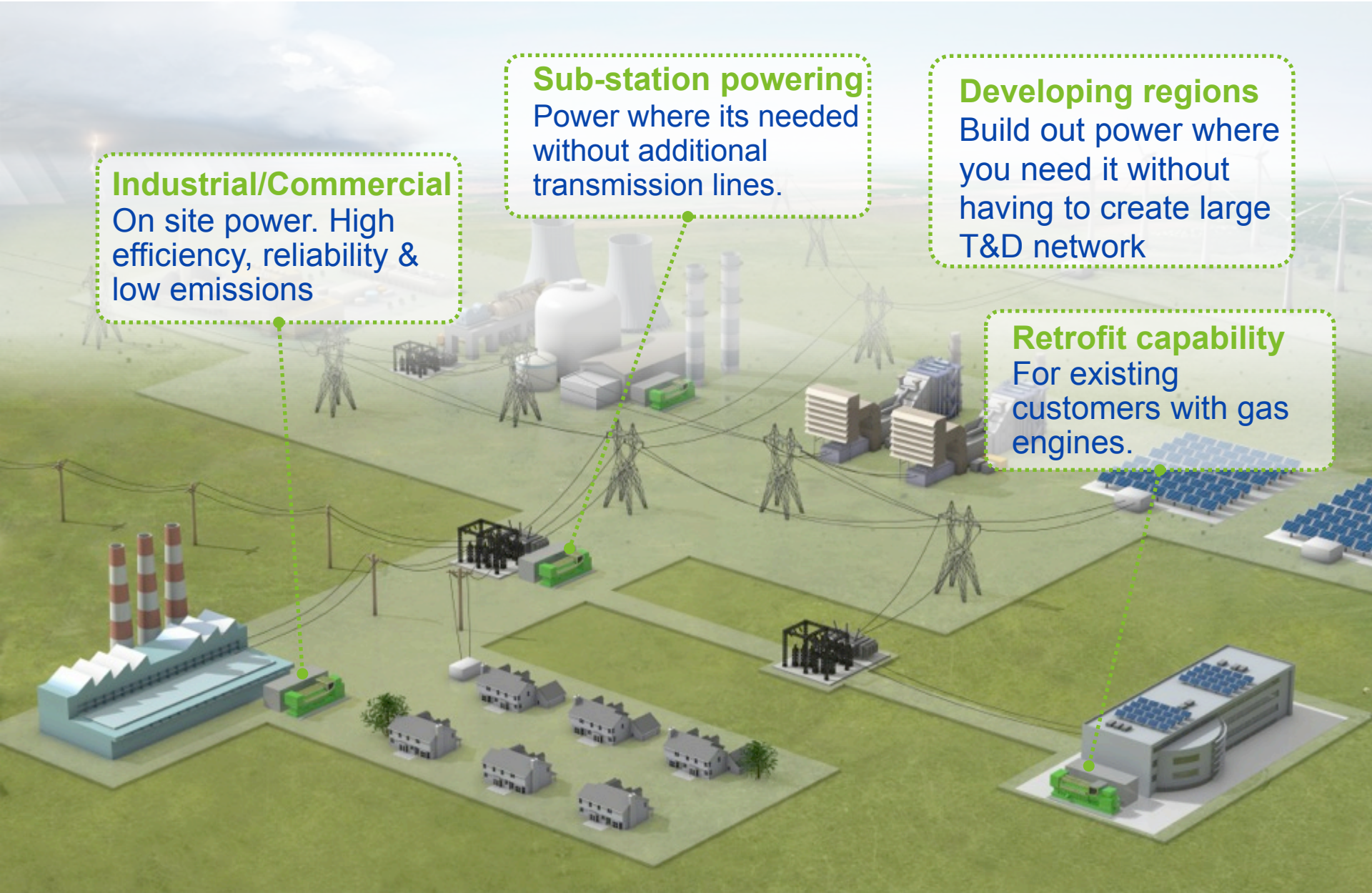
Innovating to address the fuel cell cost challenge

Hybrid Fuel Cell System



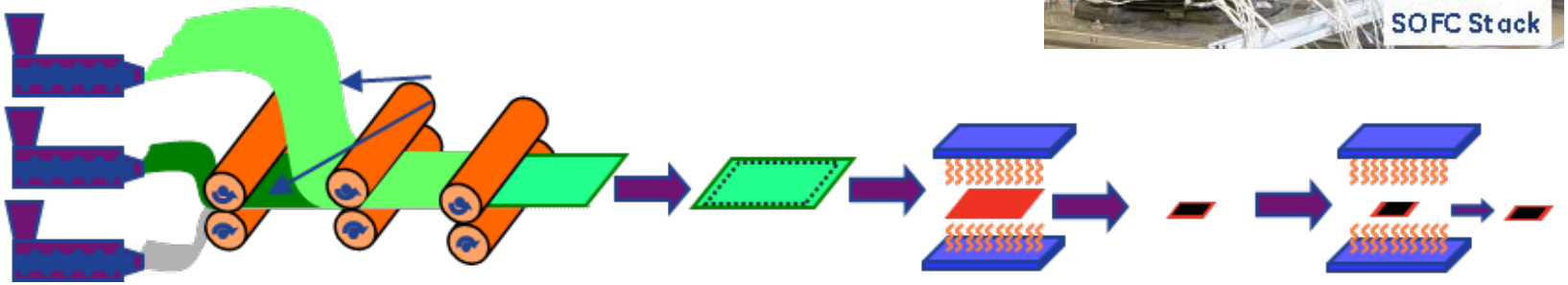
Clean reliable on-site energy

Distributed power generation



A look back at GE's SOFC research

Background:
GE program with DOE 2000-2006:
Sintered Manufacture of SOFC Cells

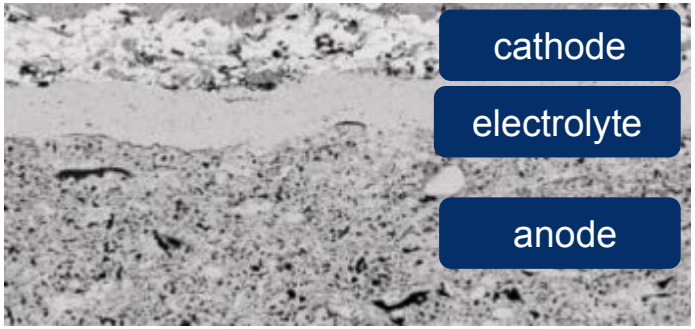


- Large investment required for sintering factory
- High projected Cost of Electricity
- In 2006 GE abandoned sintering research . . .
  refocus on low cost manufacturing

Advance manufacturing - Thermal spray

State of the art spray cells:

- ✓ Leverage GE thermal spray expertise
- ✓ Larger cell area
- ✓ Simplified sealing
- ✓ Low Capex
- ✓ Low-cost materials set
- ✓ Repeatable



GE's Fastworks approach. . .

- Drives speed to market & customer value
- Internal incubation with independent leadership
- Ramping up off site facility with pilot manufacturing capability

Speed, agility and focus of a small start-up …
with access to all the strength of a big company

Building an internal start-up. . .

- LLC under GE Ventures …fully funded by GE
- Independent leadership with Board of Directors
- Currently 24 employees
- Leasing off-site space at NYSERDA's Saratoga Technology & Energy Park – Malta, NY
- Grand Opening August 26th

Malta pilot facility

50kW demonstration

Hudson Valley Community College (HVCC) Tech smart campus

Test and evaluation platform housed in a 40ft container

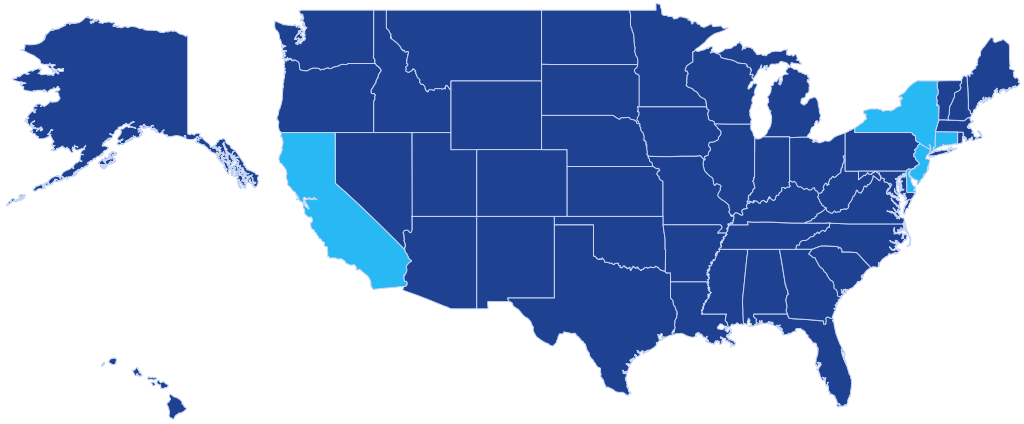
Incentives

The US stationary fuel cell market now exceeds 225MW installed, supported primarily by subsidies in five states

Bloomberg Energy Smart Technologies – Fuel Cell Research Note 14 August 2014

Existing incentives

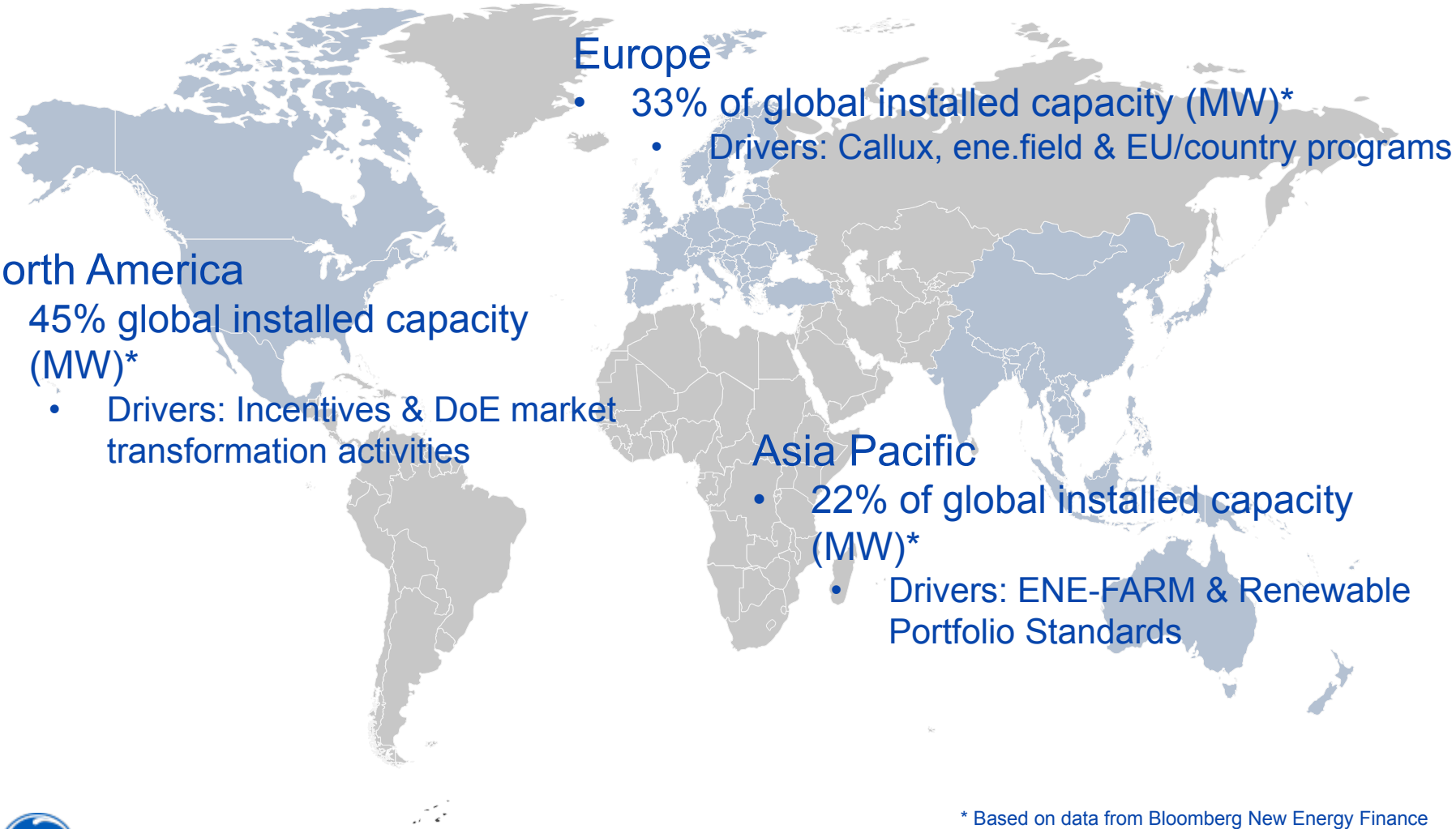
- Federal business energy investment tax credit
- States - CA, CT, NY, NJ & DE



Incentive and market transformation activities are required to drive adoption and reduce costs through economies of scale.

Globalization

International competition increasing



Europe

- 33% of global installed capacity (MW)*
  - Drivers: Callux, ene.field & EU/country programs

North America

- 45% global installed capacity (MW)*
  - Drivers: Incentives & DoE market transformation activities

Asia Pacific

- 22% of global installed capacity (MW)*
  - Drivers: ENE-FARM & Renewable Portfolio Standards

* Based on data from Bloomberg New Energy Finance