

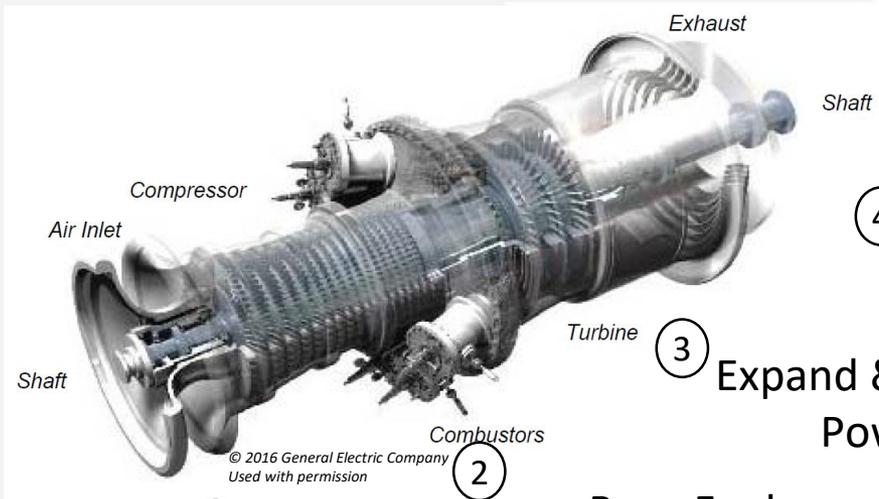
GAS TURBINE MANUFACTURING IN THE UNITED STATES

*TIM LIEUWEN, PH.D., P.E.
EXECUTIVE DIRECTOR,
STRATEGIC ENERGY INSTITUTE*

CREATING THE NEXT®

Gas Turbine 101: High Technology Machine

...Fuel to Electricity or Thrust



①

Compress Air

②

Burn Fuel

③

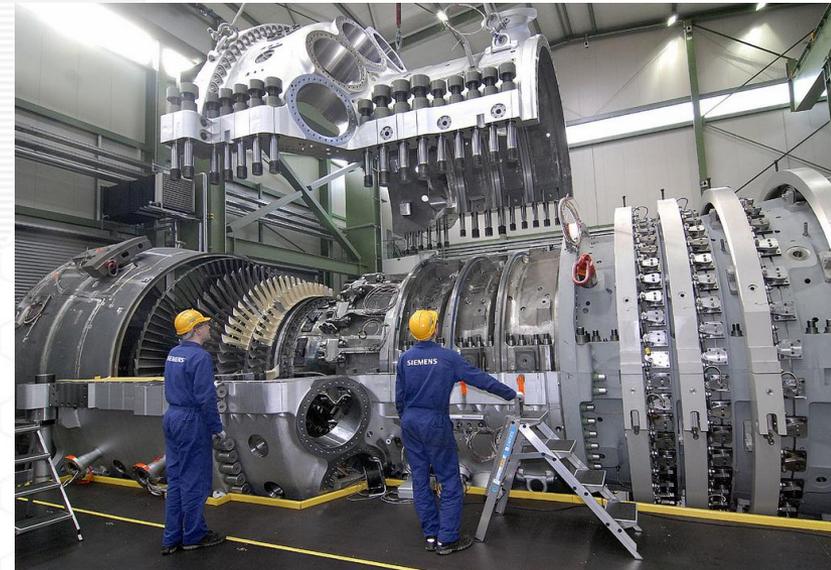
Expand & Extract
Power

④

Exhaust Energy
for more Power

⑤

To Generator to
produce electricity



Industries

- Key platform technology with various industry applications



Aviation (civil & military)
**100% of jet powered
vehicles**



Power Generation
1/3 of US Electricity

**Oil&Gas, Marine
transportation, pipelines**



Gas Turbine Manufacturing Jobs & Payroll, 2012



10,806
\$ 8.65 B annual payroll

14,121
\$1.29 B annual payroll

19,483
*No payroll info

3,484
\$1.29 B annual payroll

3,284
\$2.65 B annual payroll

Data compiled from U.S. Census and related NAICS codes

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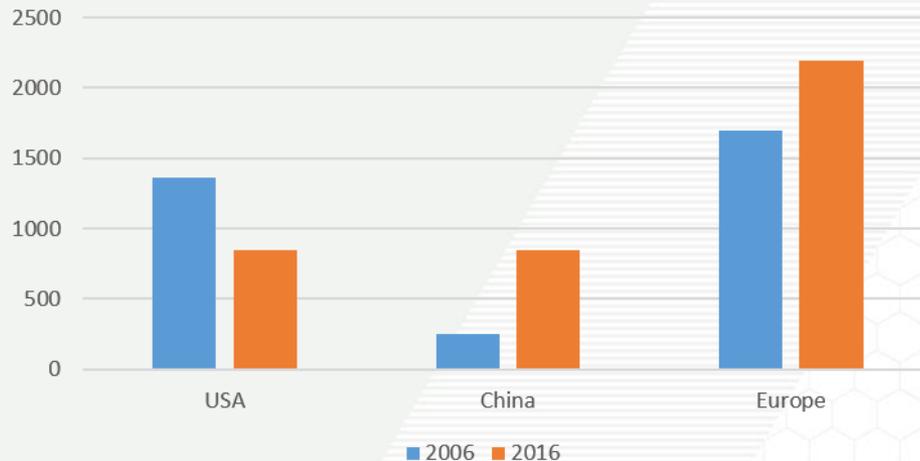


- Legend**
- Repair/Overhaul
 - Engineering/R&D
 - Manufacturing

Threats and opportunities

- Opportunities: 15 year outlook
 - Aviation - >\$1Trillion market
 - Power generation >\$600B
- Federal R&D investments needed to maintain global leadership!
 - Significant investments in China and Europe

of Gas Turbine authors, 2006-2016



China Forms Company To Make Jet Engines

By CHUN HAN WONG

BEIJING—China set up a new state-owned aircraft-engine maker to help fulfill ambitions to develop homegrown aerospace companies and become a significant competitor in global aviation.

Western-made engines.

By setting up AECC, Beijing hopes to create a self-sufficient aerospace sector that could serve commercial and military aviation needs with homegrown technology, industry analysts say.

AECC consolidates existing

Wall Street Journal- August 28, 2016