

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

## **CHP/DE Portfolio Meeting – Day Two**

Bob Gemmer, CHP Program Lead EERE Advanced Manufacturing Program San Antonio, Texas June 9, 2022





2018 Lab Call - Research to support more efficient turbines for CHP

- **NETL/ORNL:** Advanced Turbine Airfoils for Efficient CHP Systems Additively manufactured turbine airfoils
- **ORNL/ANL:** High Performance, High Temperature Materials to Enable High Efficiency Power Generation
  - Advanced materials characterization

### **High Power-to-Heat Ratio CHP Systems**

- Today's CHP systems are thermally driven; sites with low thermal demand are often not a good fit for CHP
- Future CHP systems produce more electricity and less thermal energy would expand the potential market for CHP:
  - Manufacturing sites with low thermal demand
  - Commercial facilities
  - Institutional facilities
- AMO currently supporting three R&D projects that are developing high power-to-heat ratio CHP systems
  - Hybrid fuel cell/gas turbine (Georgia Tech)
  - Novel Argon Power Cycle (Noble Thermodynamic Systems)
  - Supercritical CO2 heat-to-power solution (University of Wisconsin Madison)

#### **High Power-to-Heat Ratio CHP Systems**

Using waste heat for electricity generation (1 or 2 bottoming cycles) could produce ultra-efficient distributed electricity generation systems

Key:

engine

cell

FC = fuel cell

GT = gas turbine

RICE = reciprocating

internal combustion

SOFC = solid oxide fuel



Source: DOE Quadrennial Technology Review 2015

### **FY19 Multi-Topic FOA Projects**

- High Power to Heat Ratio, High Efficiency Combined Heat and Power
  - Georgia Tech
    - Robust Combined Heat and Hybrid Power (CHHP) for High Electrical Efficiency Cogeneration
  - University of Wisconsin-Madison
    - Additive Manufactured Supercritical CO2 Heat to Power Solution
  - Nobel Thermodynamic Systems, Inc.
    - Ultra-Efficient CHP with High Power/Heat Ratio Using a Novel Argon Power Cycle

### **Day 2 Meeting Overview**

- Day Two
  - National Laboratory Projects
    - National Energy Technology Laboratory Morgantown, West Virginia
    - Oak Ridge National Laboratory Oak Ridge, Tennessee
  - High Power to Heat Ratio CHP Development
    - Georgia Tech Albany, Georgia
    - University of Wisconsin Madison, Wisconsin
    - Noble Thermodynamics Alameda, California
  - Tour of Southwest Research Institute



# **Questions?**

