

# Delivering INNOVATION

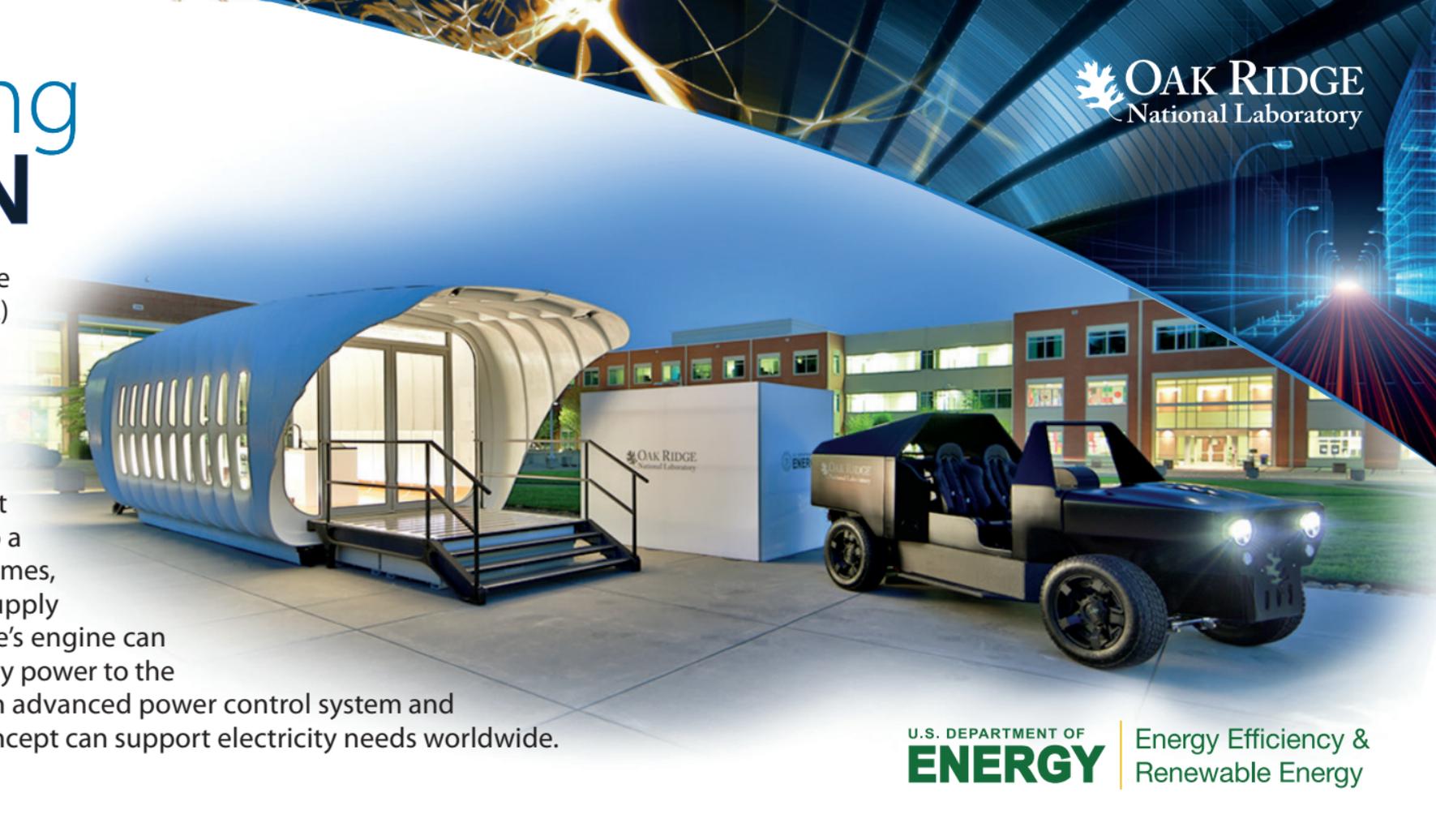
ORNL and many industry partners developed the Additive Manufacturing Integrated Energy (AMIE) demonstration to address electricity supply and reliability challenges via an integrated approach to power generation, storage, and use.

AMIE demonstrates rapid innovation through additive manufacturing (3D printing) to connect a natural-gas-powered hybrid electric vehicle to a high-performance building that produces, consumes, and stores renewable energy. To offset power supply

disruptions, the vehicle's engine can provide complementary power to the building. Fitted with an advanced power control system and then scaled up, this concept can support electricity needs worldwide.



AMIE  
YouTube  
video



 **OAK RIDGE**  
National Laboratory

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

## Expertise in these research areas is vital to the AMIE demonstration

**Advanced manufacturing**—The vehicle and building were 3D printed using ORNL's Big Area Additive Manufacturing system, demonstrating how 3D printing can work to get products to market more quickly than traditional manufacturing techniques.

**Vehicle technologies**—The vehicle has a hybrid electric powertrain with onboard power generation from natural gas. A single engine extends the vehicle's range and produces power for both vehicle and building. Both share energy using fast, efficient level-2 bidirectional wireless power transfer—the first demonstration of this technology.

**Building technologies**—Through the UT-ORNL Governor's Chair for Energy and Urbanism collaboration, a team of researchers and architects designed a single-room building to demonstrate new manufacturing and building technologies. It incorporates low-cost vacuum insulated panels into a 3D printed shell that was assembled at Clayton Homes, the nation's largest manufactured home builder.

**Sustainable electricity**—A 3.2 kW solar panel system paired with electric vehicle batteries generates and stores renewable power. Advanced building control and power management strategies integrate the various energy systems and enable the building to function as a "virtual battery." The building charges the vehicle, and the vehicle can provide power to the building.

## The AMIE demonstration is made possible by collaboration among these partners:

Alcoa/Kawneer	Liberty Utilities
Axalta Coating Systems	Line-X
Cincinnati Incorporated	Mach Fuels
Clayton Homes	NanoPore
DowAksa	Skidmore, Owings & Merrill LLP
EPB of Chattanooga	Spiers New Technologies
General Electric	Techmer ES
Hexagon Lincoln	Tru-Design
IACMI the Composites Institute	University of Tennessee
Johnson Controls	
Knoxville Utilities Board	