

**EPRI**

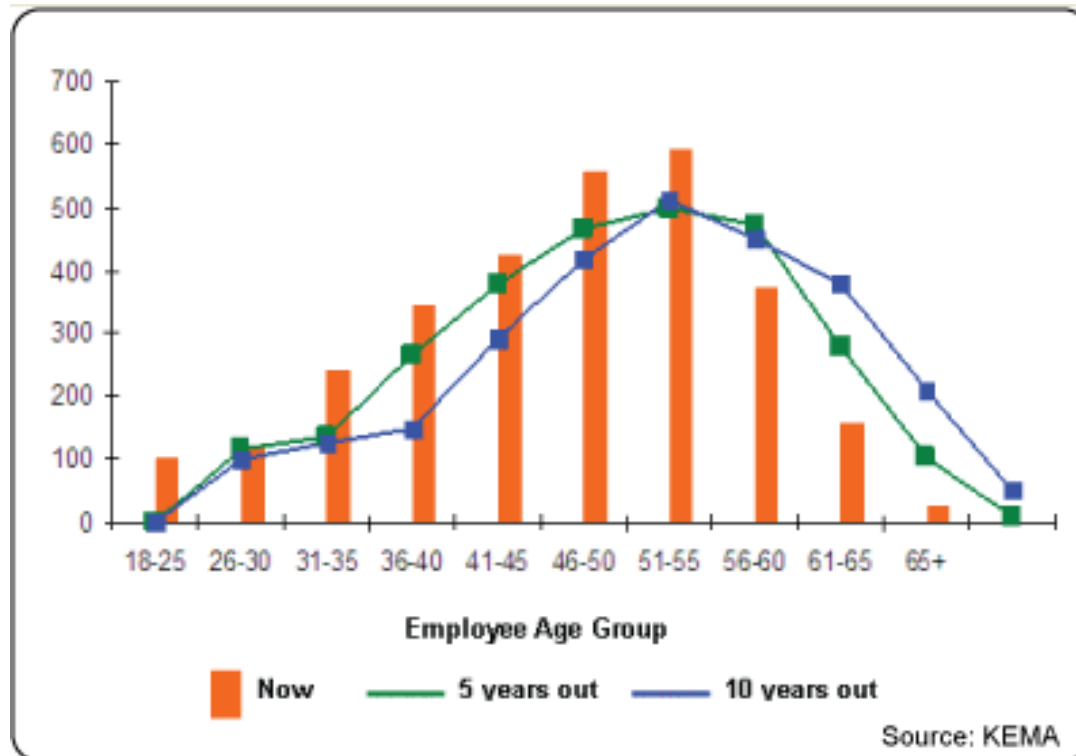
ELECTRIC POWER  
RESEARCH INSTITUTE

## **The Need for Electrical Engineers**

Workshop on Reforming Electric Energy  
Systems Curriculums  
February 4, 2010

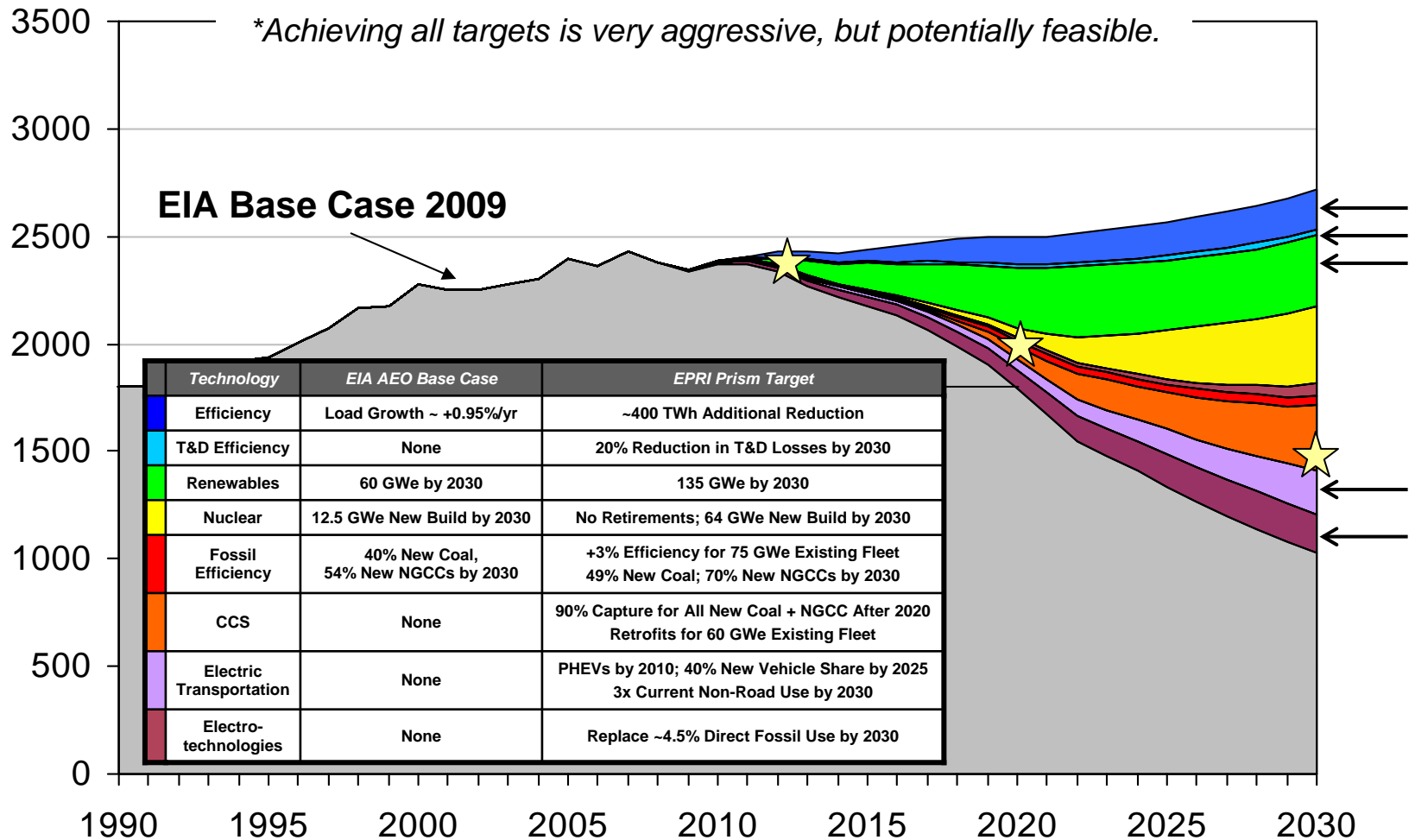
Clark W. Gellings  
Fellow

# Aging Workforce

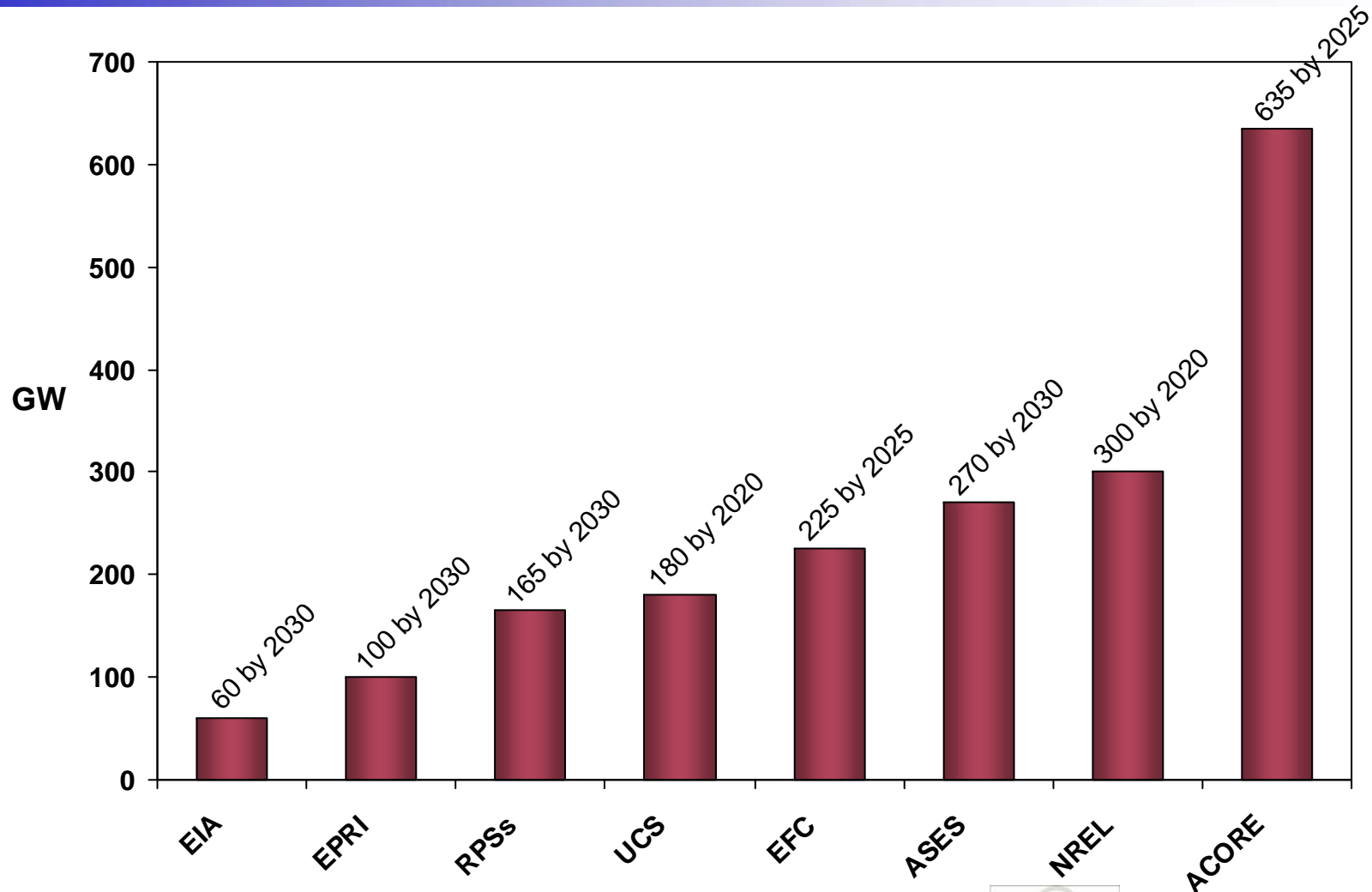


# CO<sub>2</sub> Reductions ... Technical Potential\*

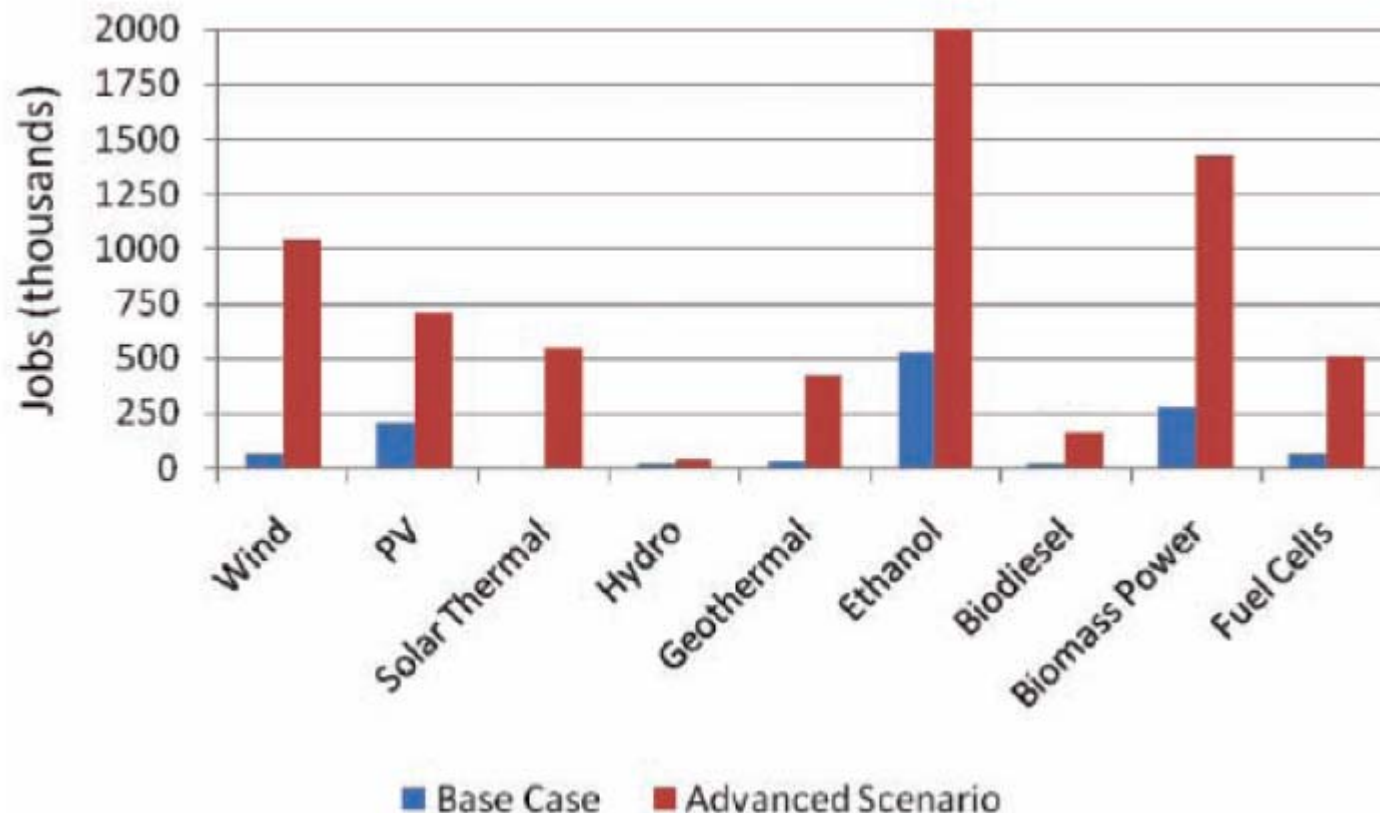
U.S. Electric Sector CO<sub>2</sub> Emissions  
(million metric tons)



# Renewable Generation Targets (new GW)



# U.S. Jobs Created by Renewable Energy in 2030 (Total Jobs Created – Selected Technologies)

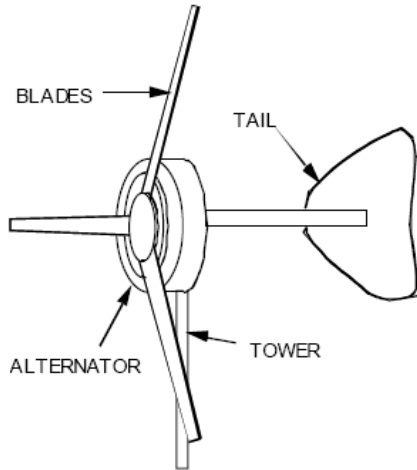


Source: Management Information Services, Inc. and American Solar Energy Society, 2008

# Wind Technology Development



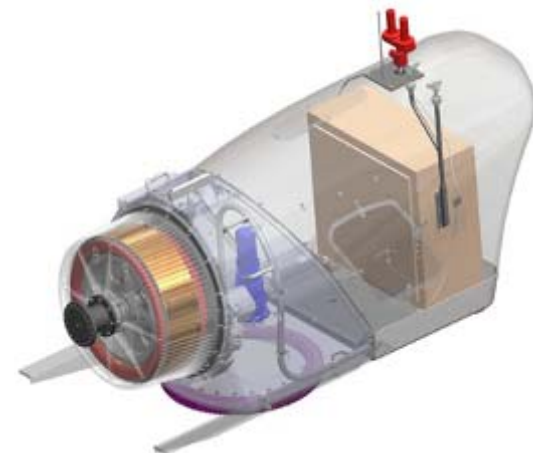
Towers



Rotors & Blades



Off-Shore Systems



Drive Train



Grid Interfaces  
& Integration

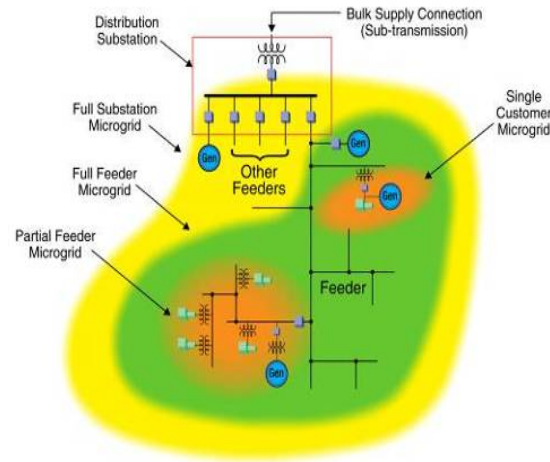


Operations  
& Maintenance

# Solar Technology Development



Photovoltaic Cells



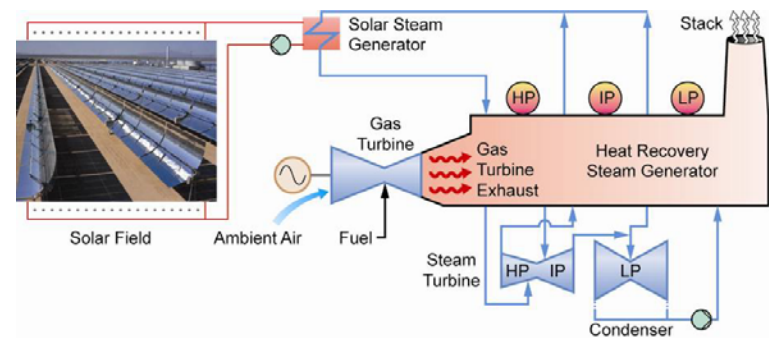
Deployment & Integration



Central - Station



Thermal Storage

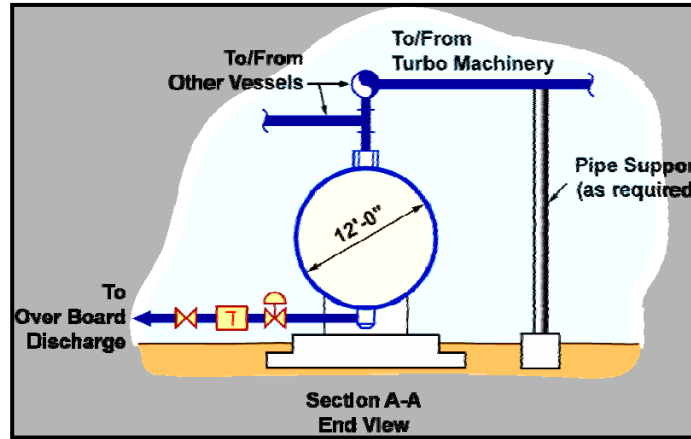


Hybrid Systems

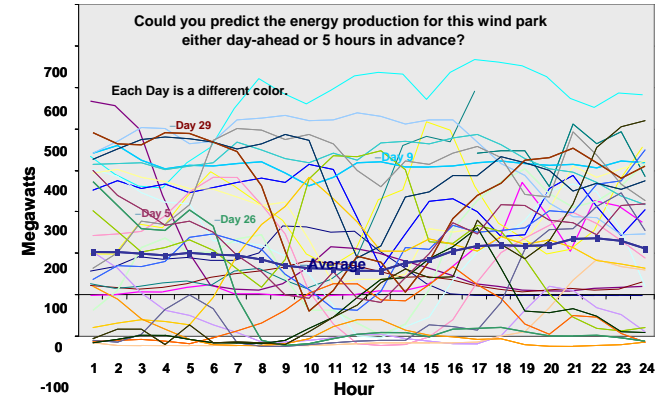
# Integration Technology Development



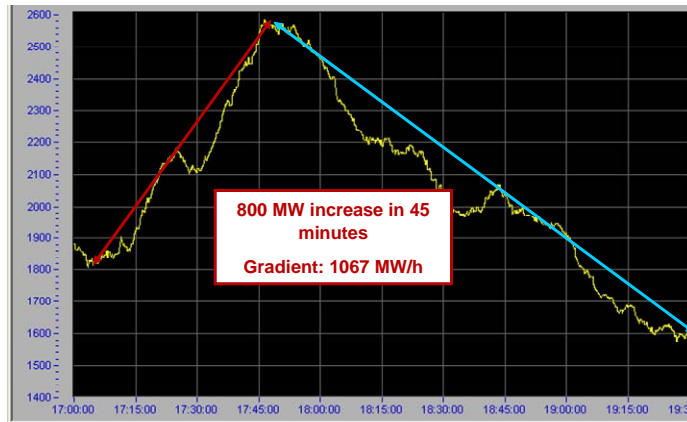
Transmission



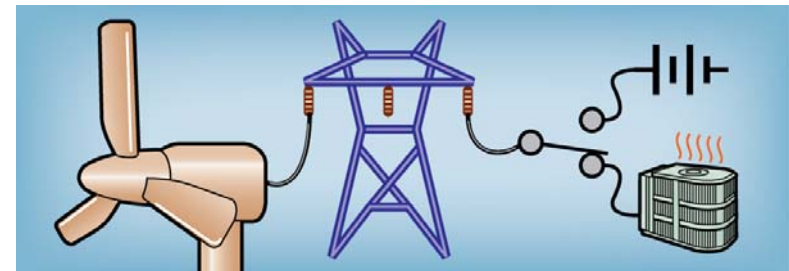
Storage



Forecasting



Planning Tools



Demand Response



# Hyper-Efficient Technologies



**Variable Refrigerant Flow  
Air Conditioning**



**Ductless Residential Heat  
Pumps and Air Conditioners**



**LED Street and  
Area Lighting**



**Heat Pump Water Heaters**



**Hyper-Efficient  
Residential Appliances**

# Gateway to the Electromagnetic Spectrum

