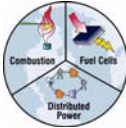
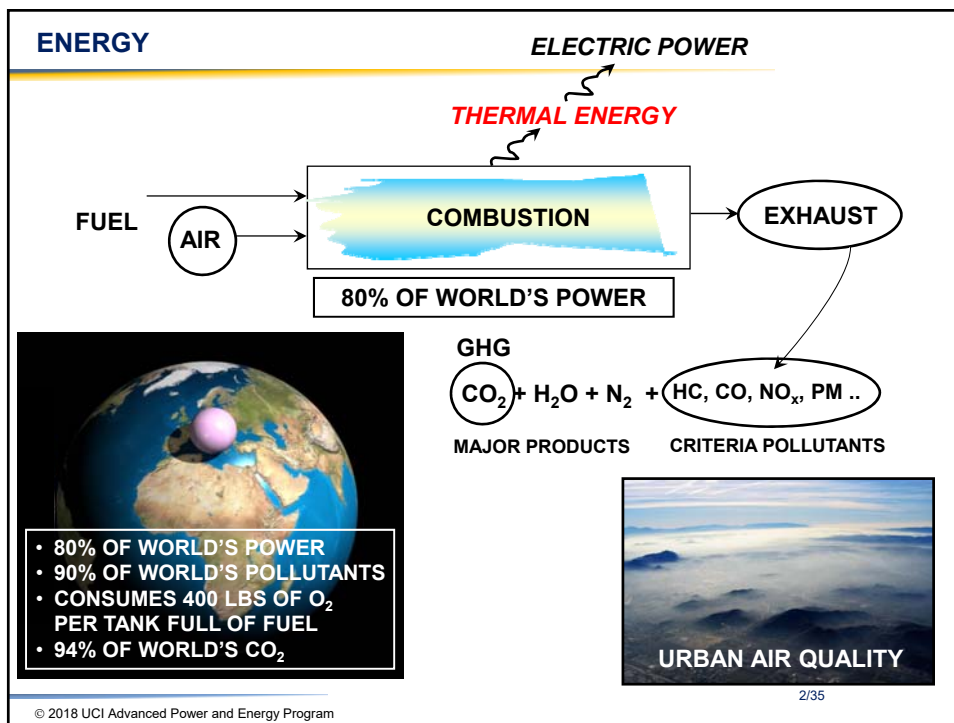


Evolution of the Electric Grid

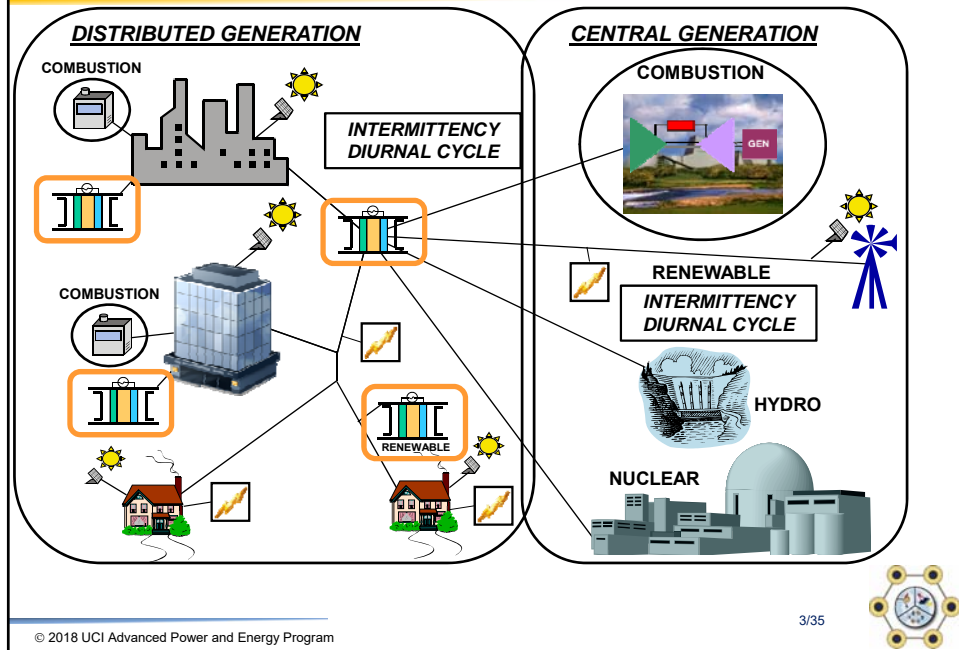


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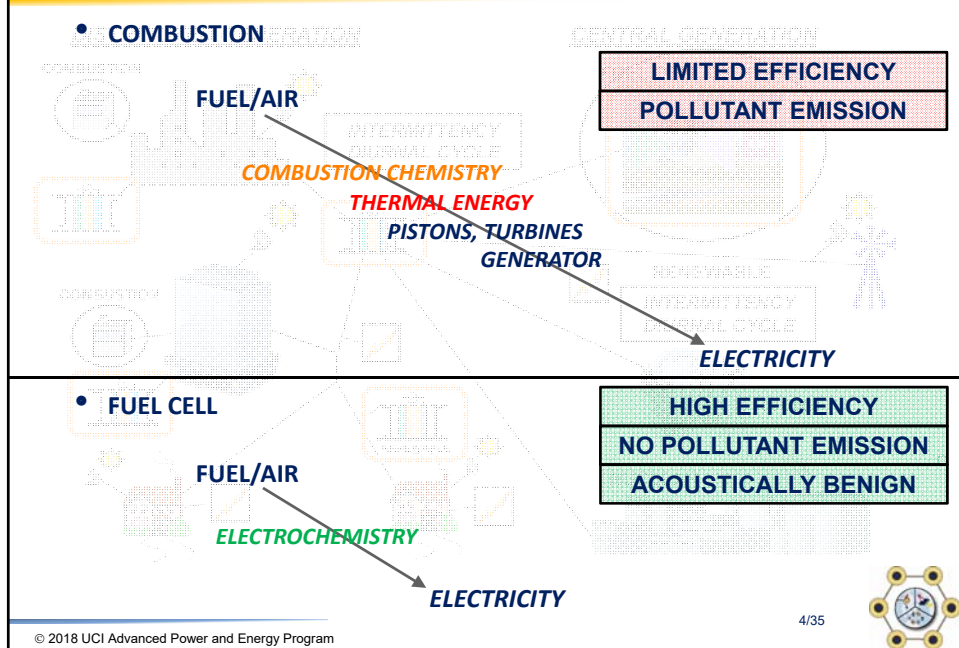
Scott Samuelson
April 10, 2018



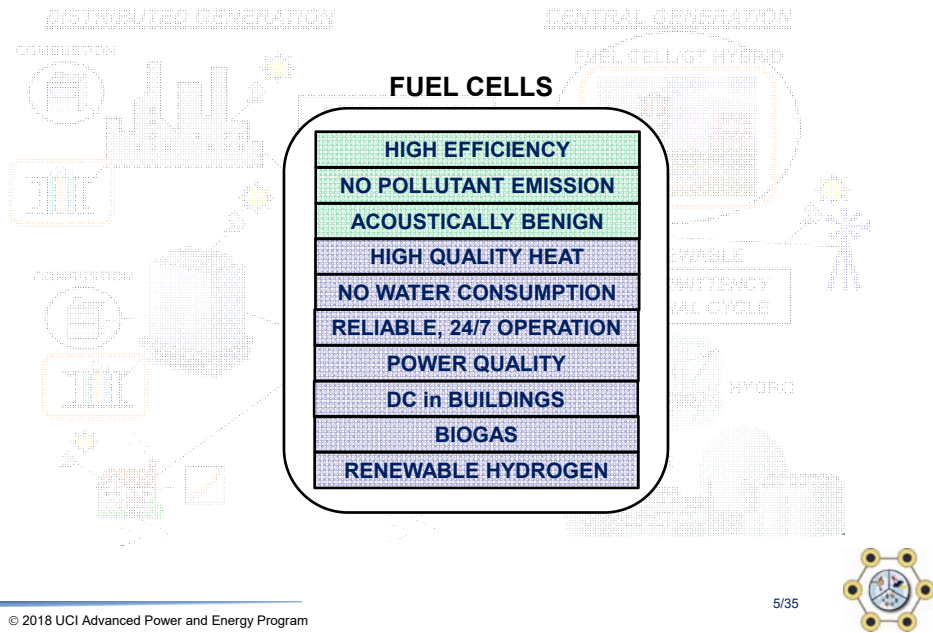
ELECTRIC POWER



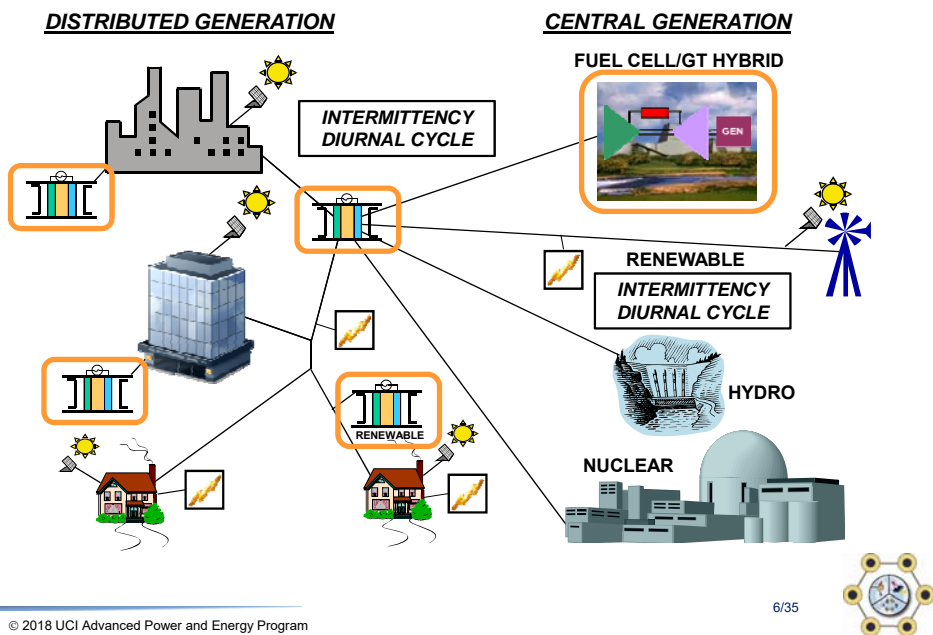
ELECTRIC POWER



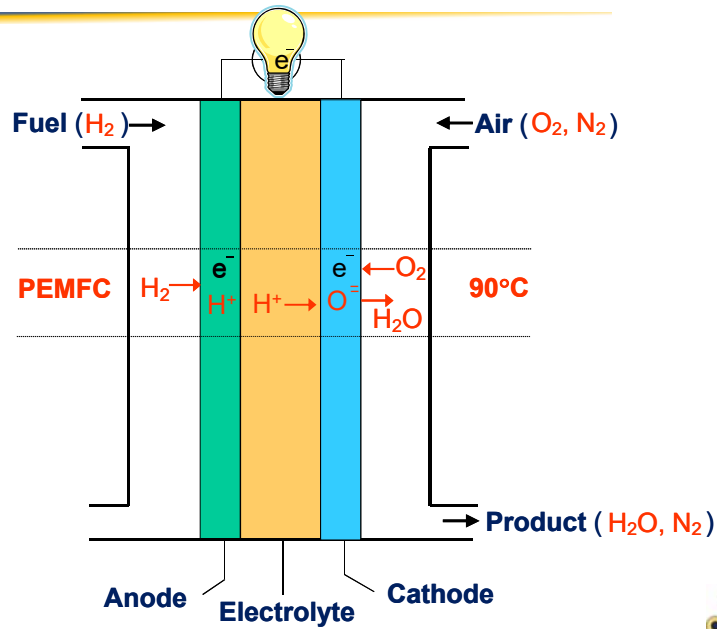
ELECTRIC POWER



ELECTRIC POWER



FUEL CELL

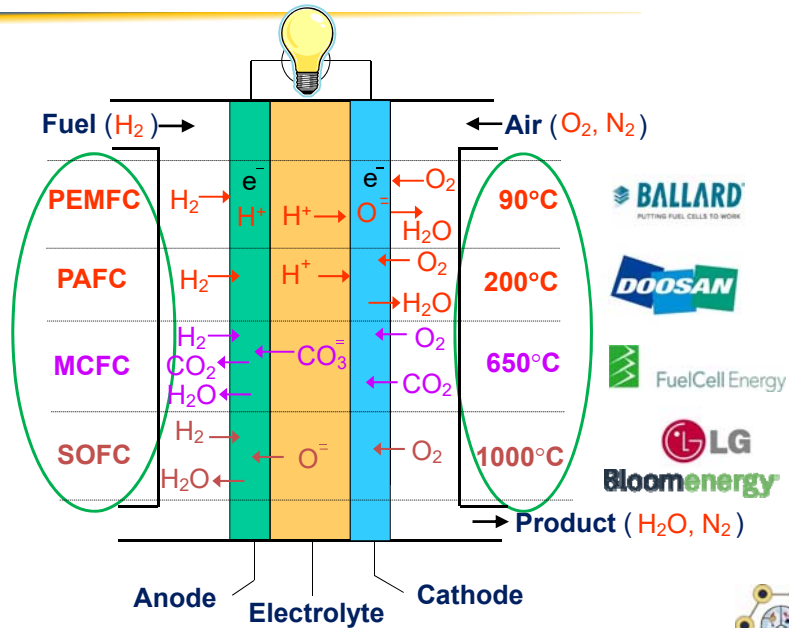


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FUEL CELLS



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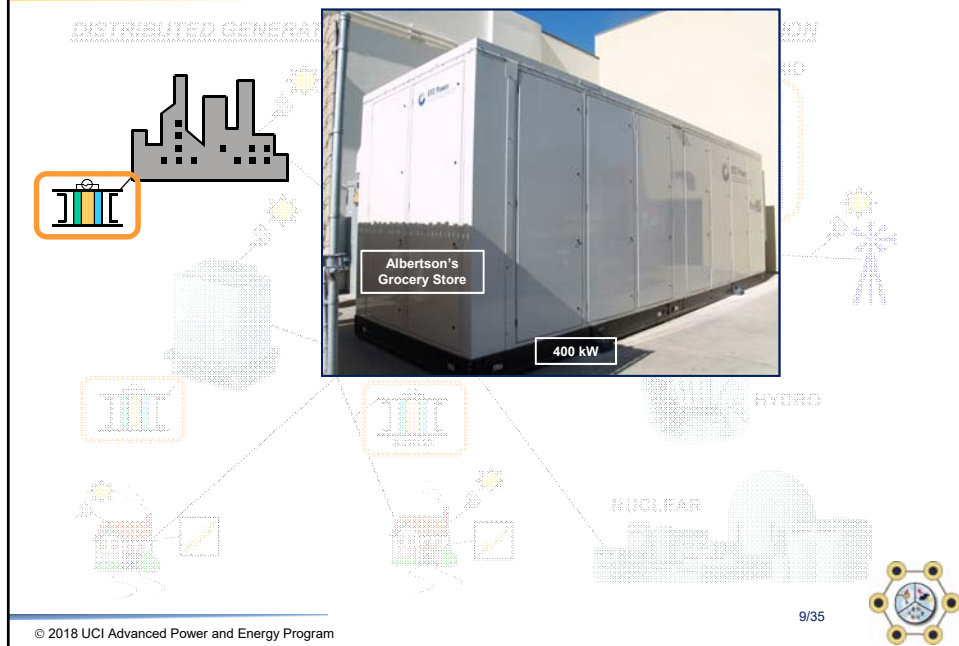
BALLARD
PUTTING FUEL CELLS TO WORK

DOOSAN

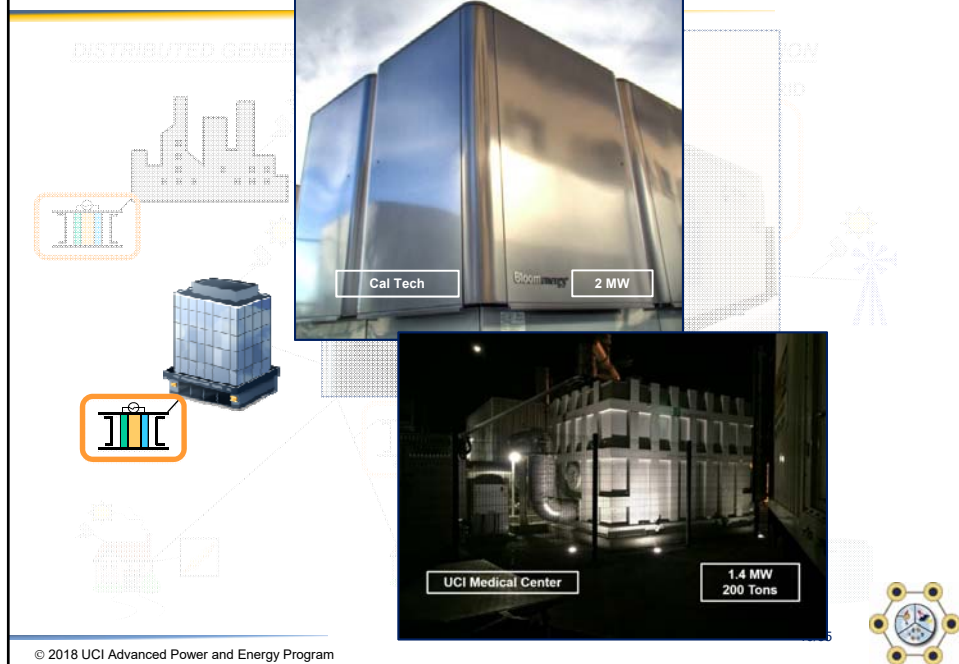
FuelCell Energy

LG
Bloomenergy

ELECTRIC POWER



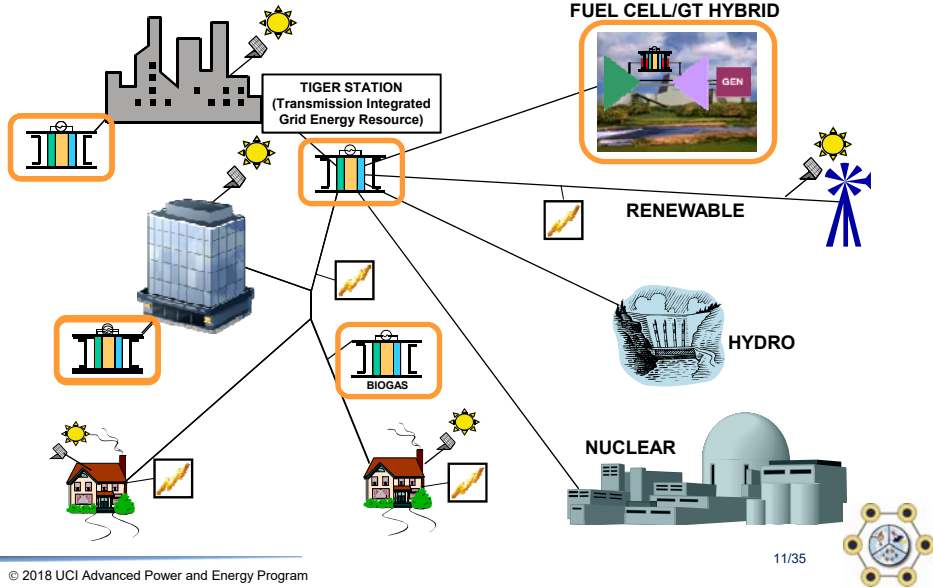
ELECTRIC POWER



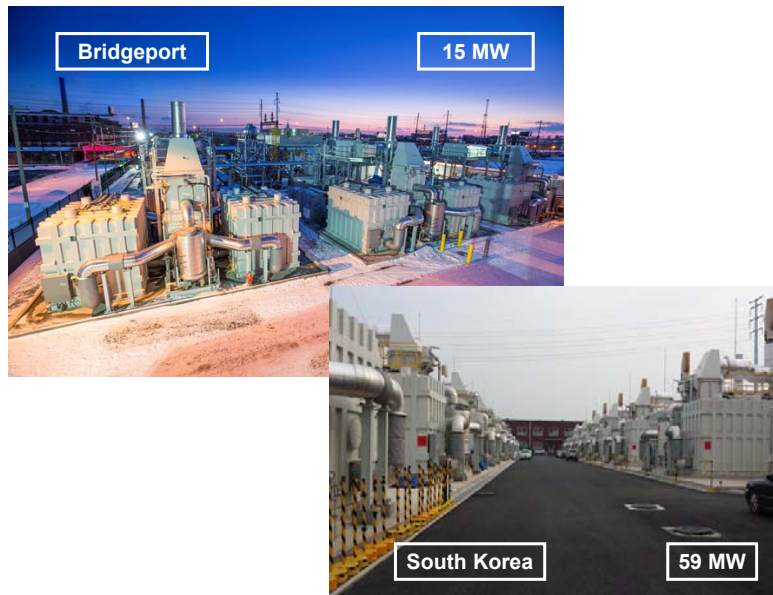
ELECTRIC POWER

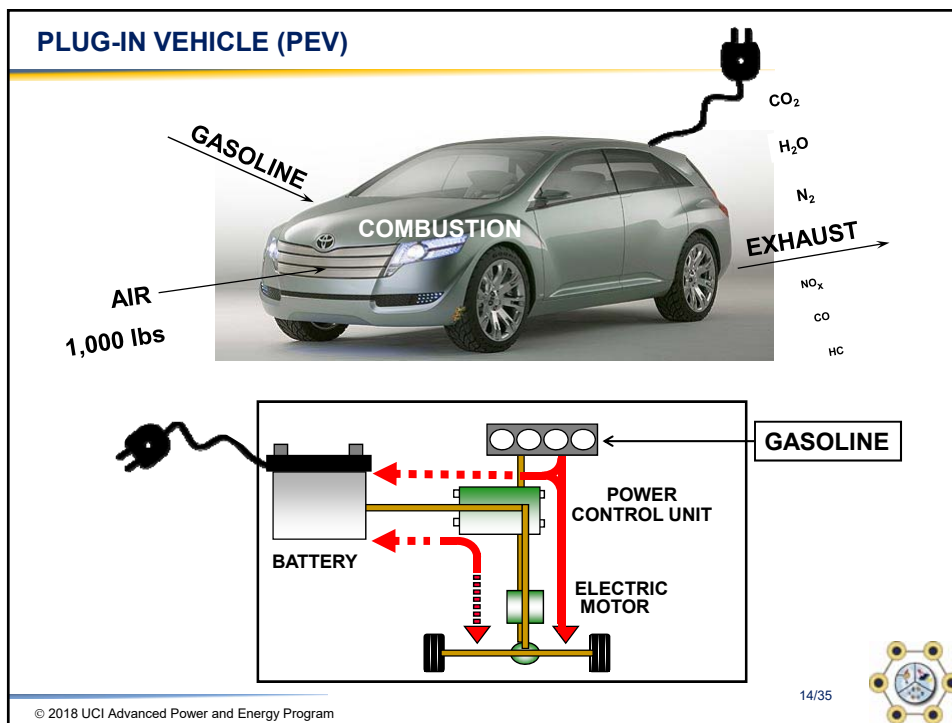
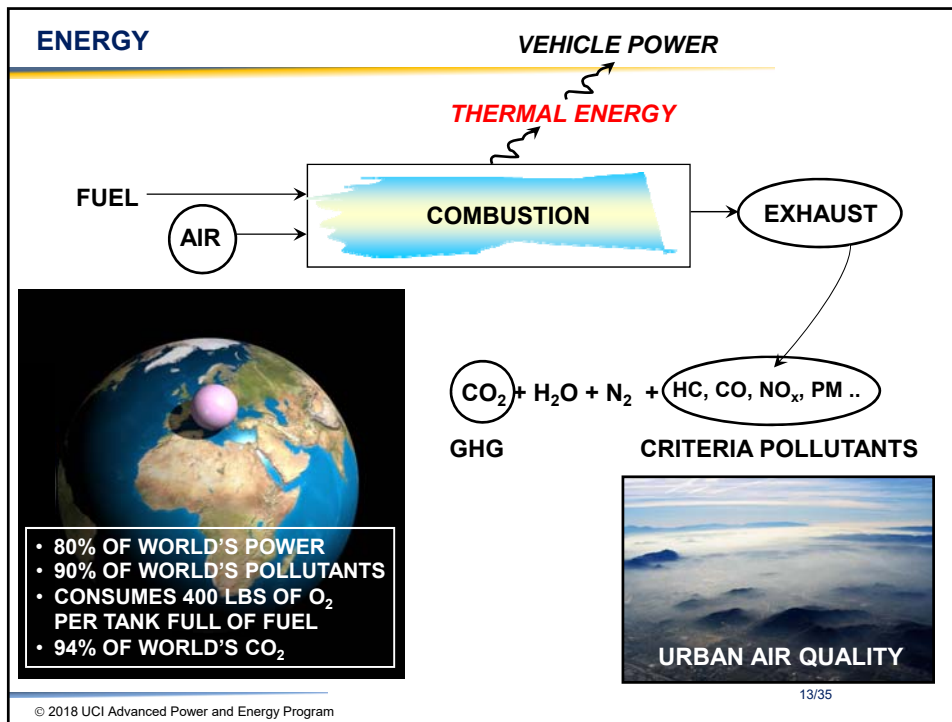
DISTRIBUTED GENERATION

CENTRAL GENERATION



TIGER STATION



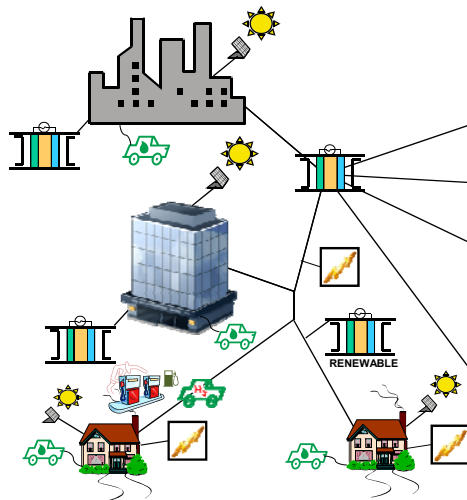


PLUG-IN VEHICLE (PEV)



ELECTRIC POWER

DISTRIBUTED GENERATION



CENTRAL GENERATION

FUEL CELL/GT HYBRID



RENEWABLE

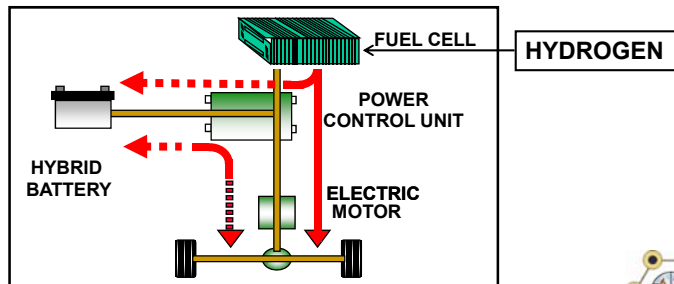


HYDRO

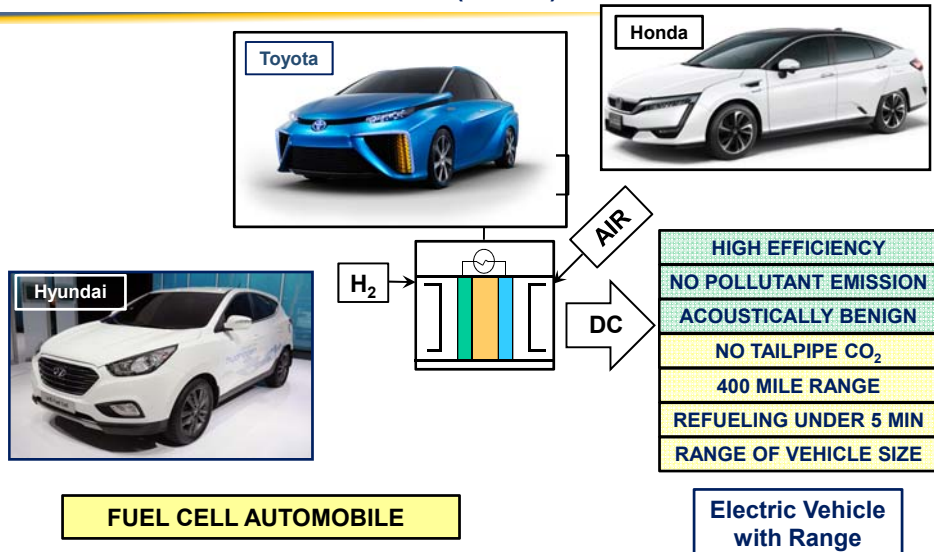
NUCLEAR



FUEL CELL ELECTRIC VEHICLE (FCEV)



FUEL CELL ELECTRIC VEHICLES (FCEVs)



FUEL CELL ELECTRIC VEHICLES (FCEVs)



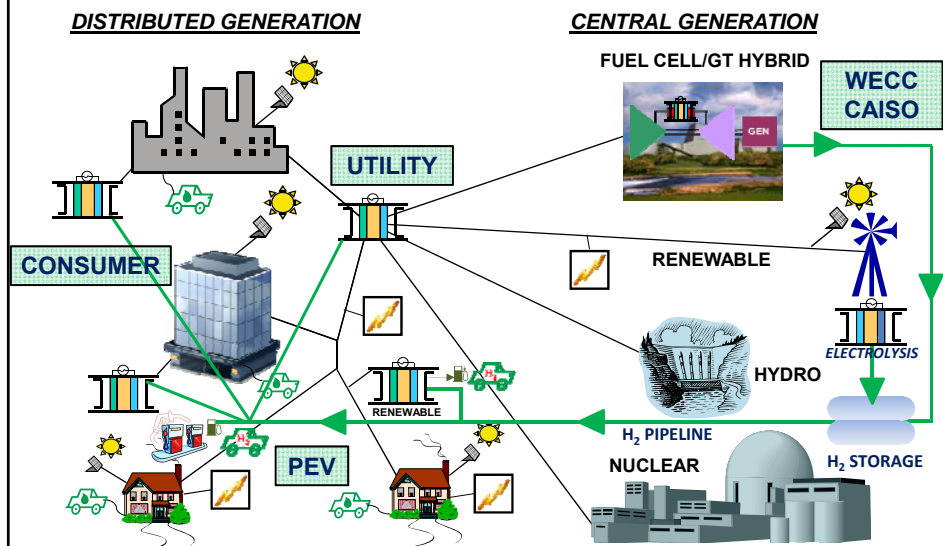
FUEL CELL BUS



FUEL CELL TRUCK

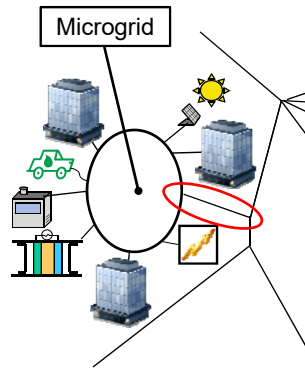


ELECTRIC POWER



ELECTRIC POWER

DISTRIBUTED GENERATION



CENTRAL GENERATION

FUEL CELL/GT HYBRID



RENEWABLE



HYDRO



NUCLEAR

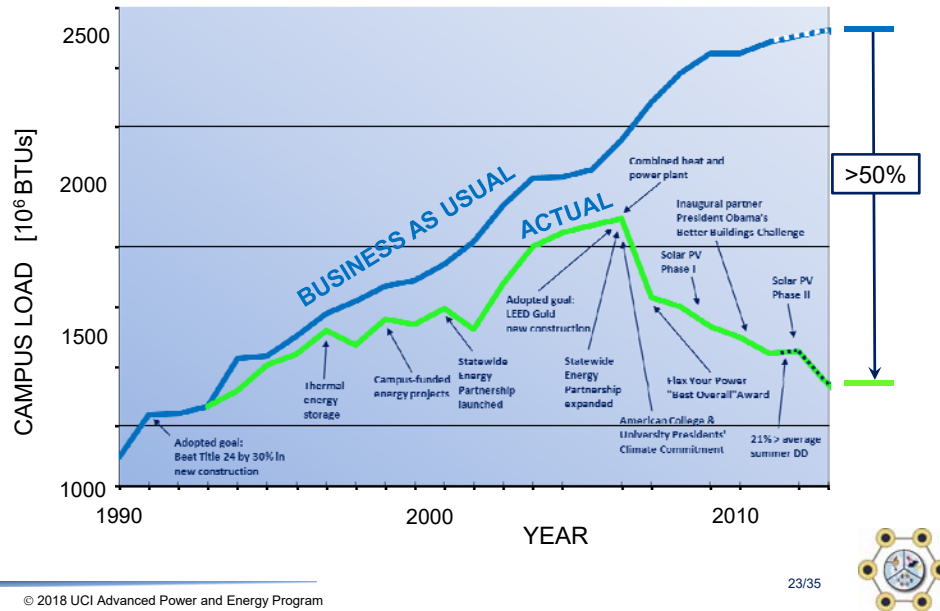


KEY NOTES

- **Energy Efficiency**
 - Nested Microgrid
 - Power-to-Gas (P2G)
 - Connectivity Laboratory
 - Generic Microgrid Controller
 - Islanding



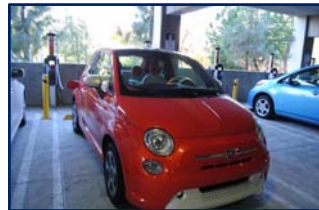
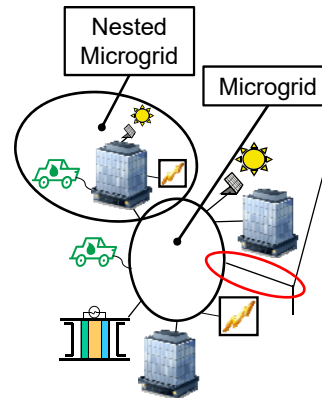
ENERGY EFFICIENCY



KEY NOTES

- Energy Efficiency
- **Nested Microgrid**
- Power-to-Gas (P2G)
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- Generic Microgrid Controller
- Islanding

NESTED MICROGRID



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KEY NOTES

- Energy Efficiency
- Nested Microgrid
- **Power-to-Gas (P2G)**
- Connectivity Laboratory
- Generic Microgrid Controller
- Islanding

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POWER-TO-GAS

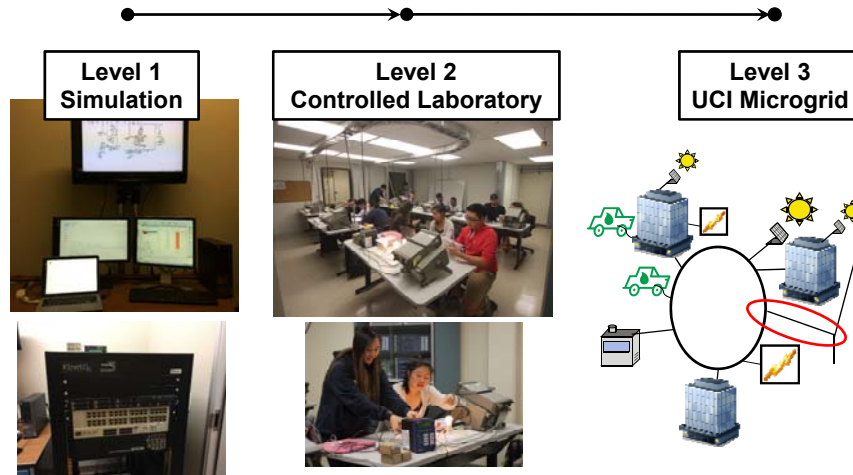


KEY NOTES

- Energy Efficiency
- Nested Microgrid
- Power-to-Gas (P2G)
- **Connectivity Laboratory**
- Generic Microgrid Controller
- Islanding



CONNECTIVITY LABORATORY

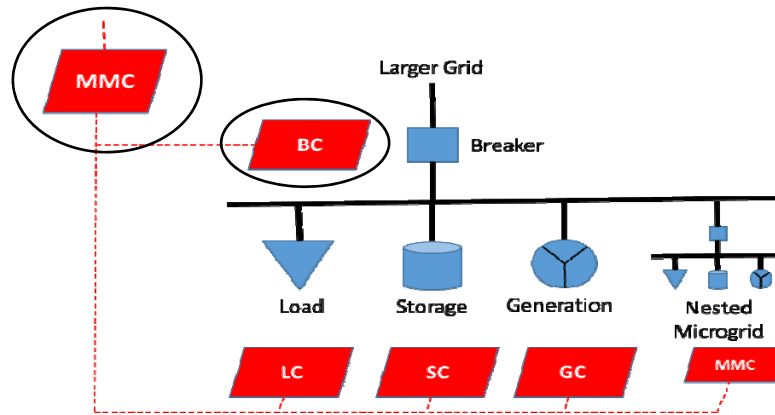


KEY NOTES

- Energy Efficiency
- Nested Microgrid
- Power-to-Gas (P2G)
- Connectivity Laboratory
- **Generic Microgrid Controller**
- Islanding



GENERIC MICROGRID CONTROLLER



GENERIC MICROGRID CONTROLLER

- **Platform**
 - UCI Microgrid
- **Microgrid Partners:**
 - Port of Los Angeles
 - Port of Long Beach
 - Irvine Ranch Water District
 - UCI Medical Center
- **Promulgation**
 - IEEE 2030.7 Standard (January 2018)



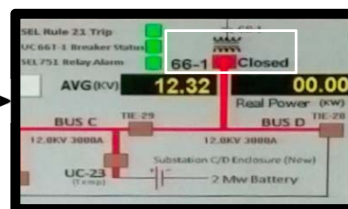
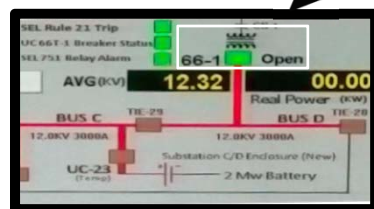
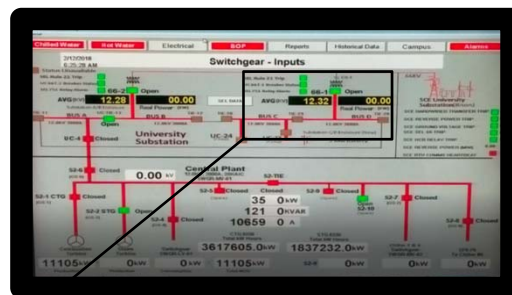
KEY NOTES

- Energy Efficiency
- Nested Microgrid
- Power-to-Gas (P2G)
- Connectivity Laboratory
- Generic Microgrid Controller
- **Islanding**



ISLANDING

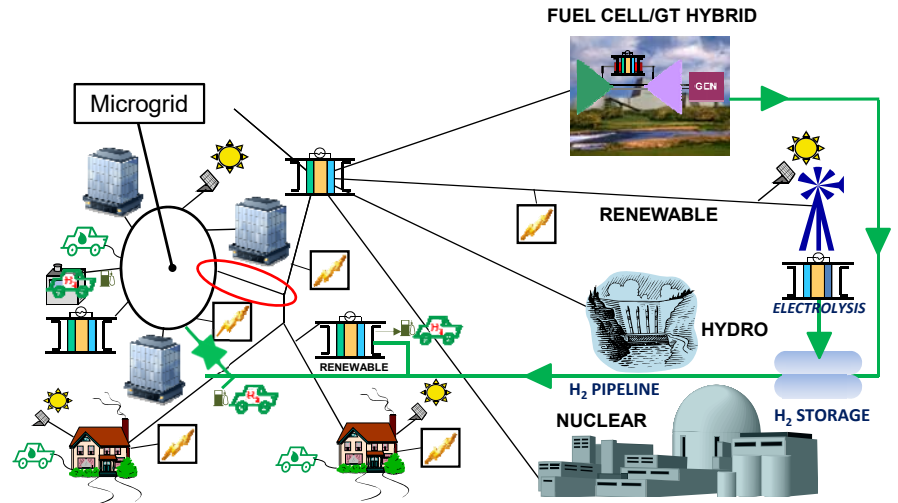
February 12, 2018



ELECTRIC POWER

DISTRIBUTED GENERATION

CENTRAL GENERATION



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Evolution of the Electric Grid



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