Energy Storage, Renewable Energy, and Grid Decarbonization

IMRE GYUK, CHIEF SCIENTIST, ENERGY STORAGE RESEARCH, U.S. DOE



WILDFIRES

DROUGHTS





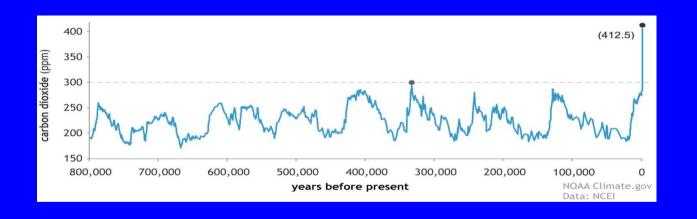
HURRICANES

FLOODS

Floods and Droughts,
but also
Sea Level Rise, Coastal Erosion,
Reduced Crop Yield, and Health
Impacts

Global Warming has Emerged as a Paramount Issue - World Wide!

Burning Coal. Oil, Natural Gas: for our Electric Grid, Transportation, and Industry has increased CO2 to twice the Highest Levels In 800,000 Years!



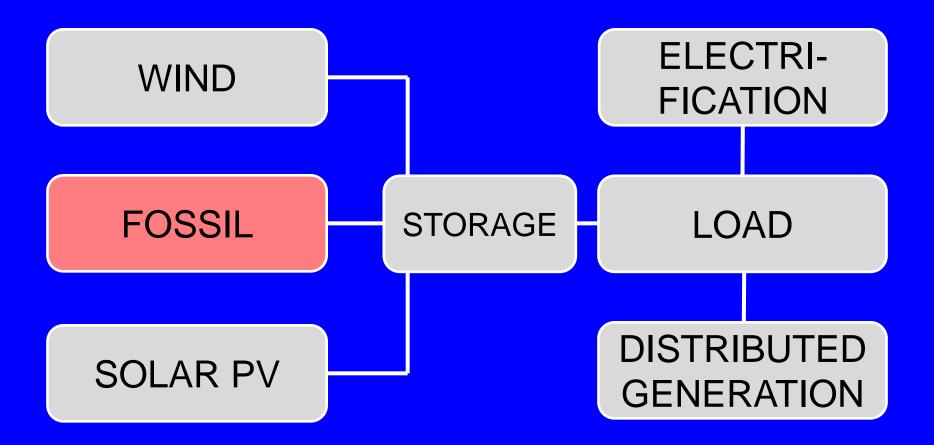
We all understand that we must Decarbonize Electricity, we must change to Renewable Energy! And we have to do it soon!

We must Decarbonize Electricity but also <u>all</u> other sectors:

Buildings, Transportation
Agriculture, Manufacturing

These sectors
need to be Electrified first
and then utilize
Decarbonized Electricity
(=Renewable Energy))

Generation has become Variable - and so has the Load!



Storage is needed for reliable Resource Adequacy

Renewable Energy requires Energy Storage