Energy Storage

for Increased Resiliency and Grid Decarbonization

IMRE GYUK, DIRECTOR,
ENERGY STORAGE RESEARCH, DOE-OE

DOE - Office of Electricity Energy Storage Program:

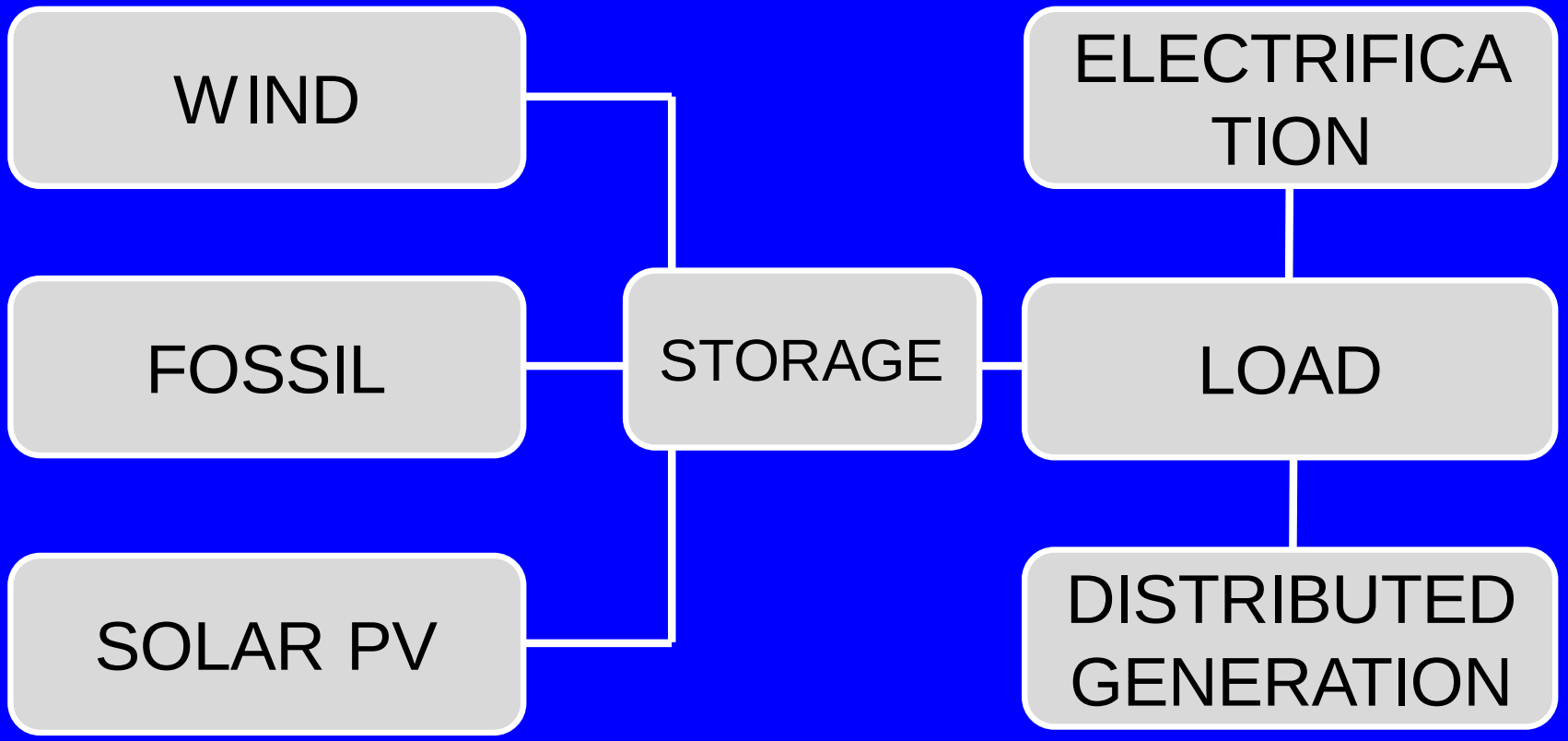
Broad Range of R&D, Deployment, and Analysis Efforts
Materials – Devices – Systems – Analysis – Standards – Policy

Teaming with Sandia, PNNL, ORNL, ANL, LANL
to work with Industry, States, and Utilities.

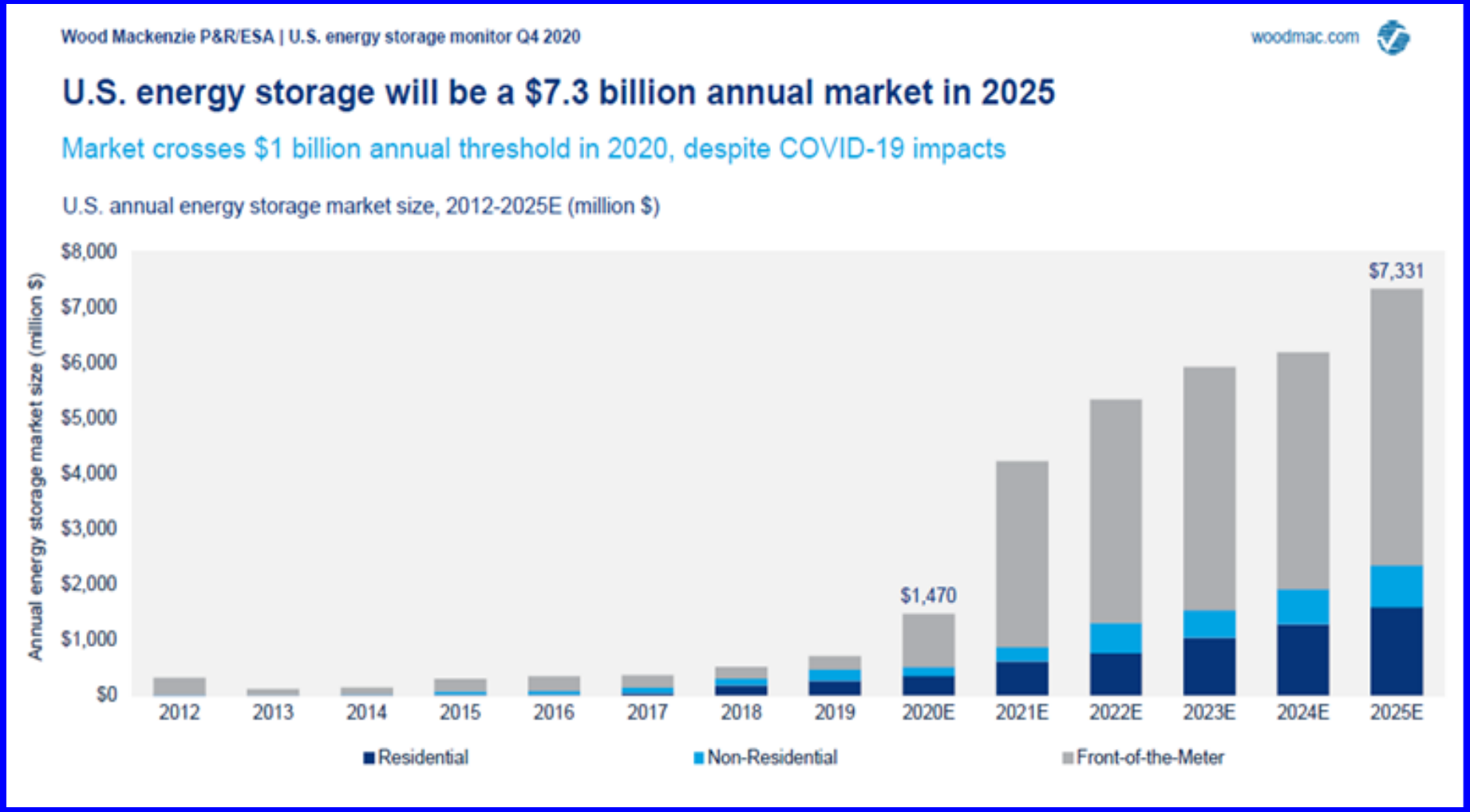
10 R&D 100 Awards, 2 EPA Green Chemistry Awards

The grid used to be Simple and Deterministic!

The grid has become stochastic!

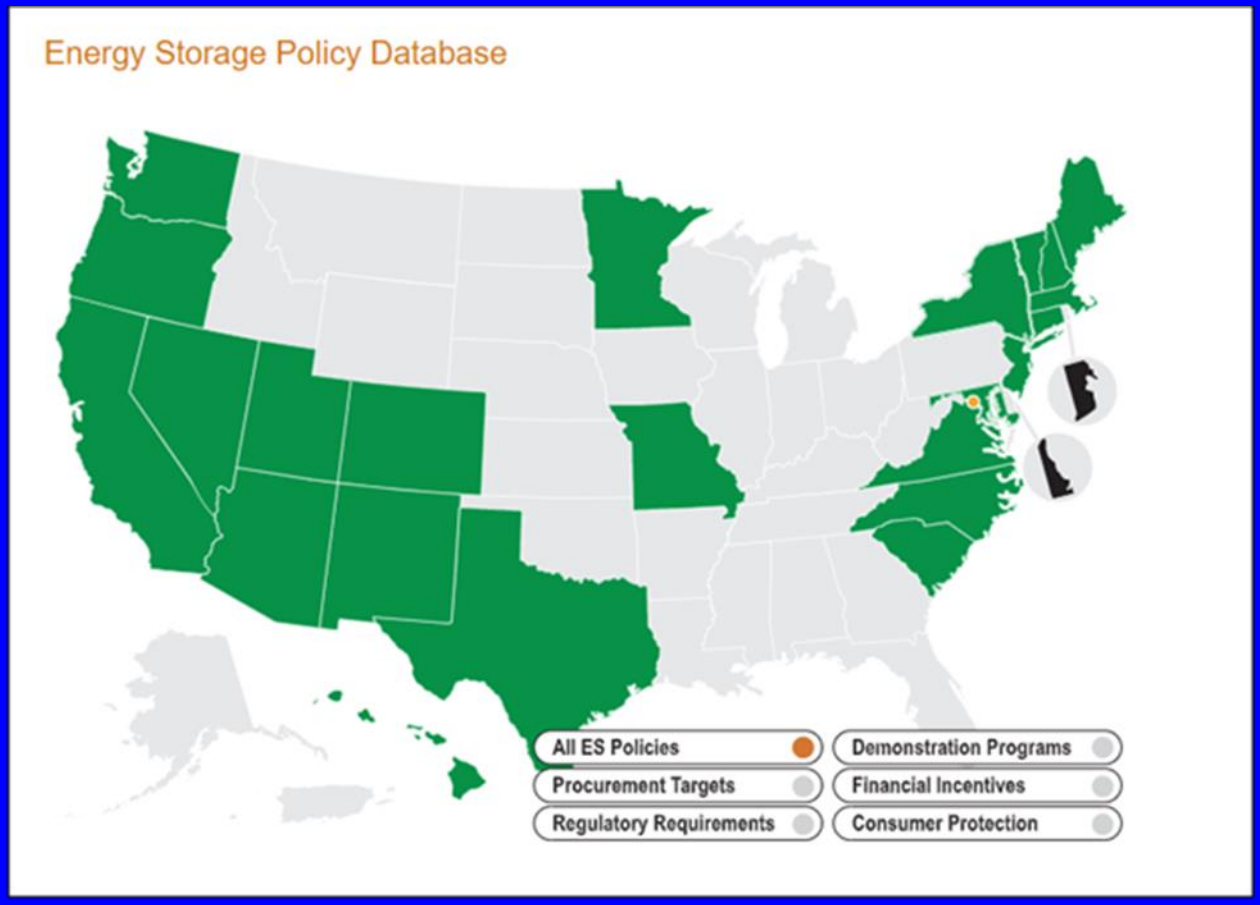


Energy Storage has become a Resounding Success!



Despite Covid 2020, has seen extraordinary growth of ES

Energy Storage Policy Data Base



https://energystorage.pnnl.gov/regulatoryactivities.asp

Many Applications have been identified,
Valuation Models have been developed.
Business Cases with multiple
Benefit Streams have been established.

Global Energy Storage Data Base
at Sandia.gov/ess

Innovative Pilots under Development

- Alliant Energy, Decorah, IA, 2.5MW / 2.915MWh
  Accommodating more solar
- ABQ Public Schools, NM: 500KW /2000kWh. Demonstrate ES economic & resilience benefits. 13 high schools, 140 campuses.
- Poudre Valley (NRECA), CO: Remote community developing microgrid to enhance reliability, expand essential services
- Ellsworth Air Force Base, SD: Resiliency for critical military missions.
- ES residential project with Navajo Tribal Utility Authority to deploy 3 25kW/10hr Zn-MnO_2 batteries for resilience.
- Puerto Rico: Large Microgrid for 5 Central Mountain Utilities

Emergence of Storage Ecologies

California: Mandate, CEC, PUC, Utilities

New York: BEST, NYSERDA, CCNY

Northwest (WA, OR, AK): PNNL, WA Clean Energy, PUCs, Senate

New Mexico: Sandia, Congressional/State Support, Projects

Massachusetts: DOER, Projects, National Grid, Universities

Congressional and State Support, Regulatory Structure,
National Laboratories, Universities, Utilities, Real Projects

Incumbent Lithium-Ion Technology:

Sourcing, Ecological, and Sociological Issues

Safety, Reliability,

Re-Use, Recycling, Disposal

To achieve real Sustainability
we would Ultimately like
to have a Circular Technology
Based on
Earth Abundant and Inexpensive
Materials!

Supply Chain and Waste Stream
Must be part of the design!

An Urgent Situation!

30 states, Washington, D.C., and 3 territories have adopted Renewable Portfolio Standards:

CA 100% by 2045, CO 100% by 2050
DC 100% by 2032, HI 100% by 2045
NM 10% by 2045, NY 100% by 2040
VT 75% by 2032, WA 100% by 2032
……

As Penetration of Renewable Generation
Continues to increase,
Incremental Solutions
will no longer be sufficient

Longer Duration Storage
is urgently required!

8 Hours – 12 Hours – Days – Seasons

Meanwhile:
Storage Cost will go down,
Safety and Reliability will increase

With every successful Project
the Value Propositions will
also continue to increase!

More jobs will be created!!

Now and in Future,
Energy Storage
should be in
the Toolbox of every Utility!