

Delaware Energy Working Group

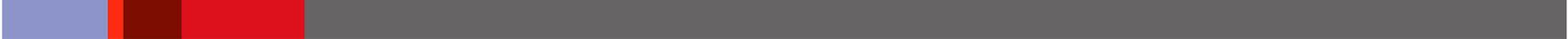
Energy Storage Market Opportunity

September 30, 2008



The miracles of science™





Energy Storage Market Segment

- ◆ Energy Storage has many very large segments that enable a wide variety of applications
- ◆ Total Market >\$60B Sales annually, major segments are batteries and capacitors
- ◆ US Government is expanding R&D funding from ~\$100MM in 2008 to an expected ~140MM for 2009
 - Focus for R&D spending to drive US capability in materials and device manufacturing
- ◆ Many states have established Energy Storage as part of their local support for R&D, investment support and tax relief to drive programs





Energy Storage Regional Activity

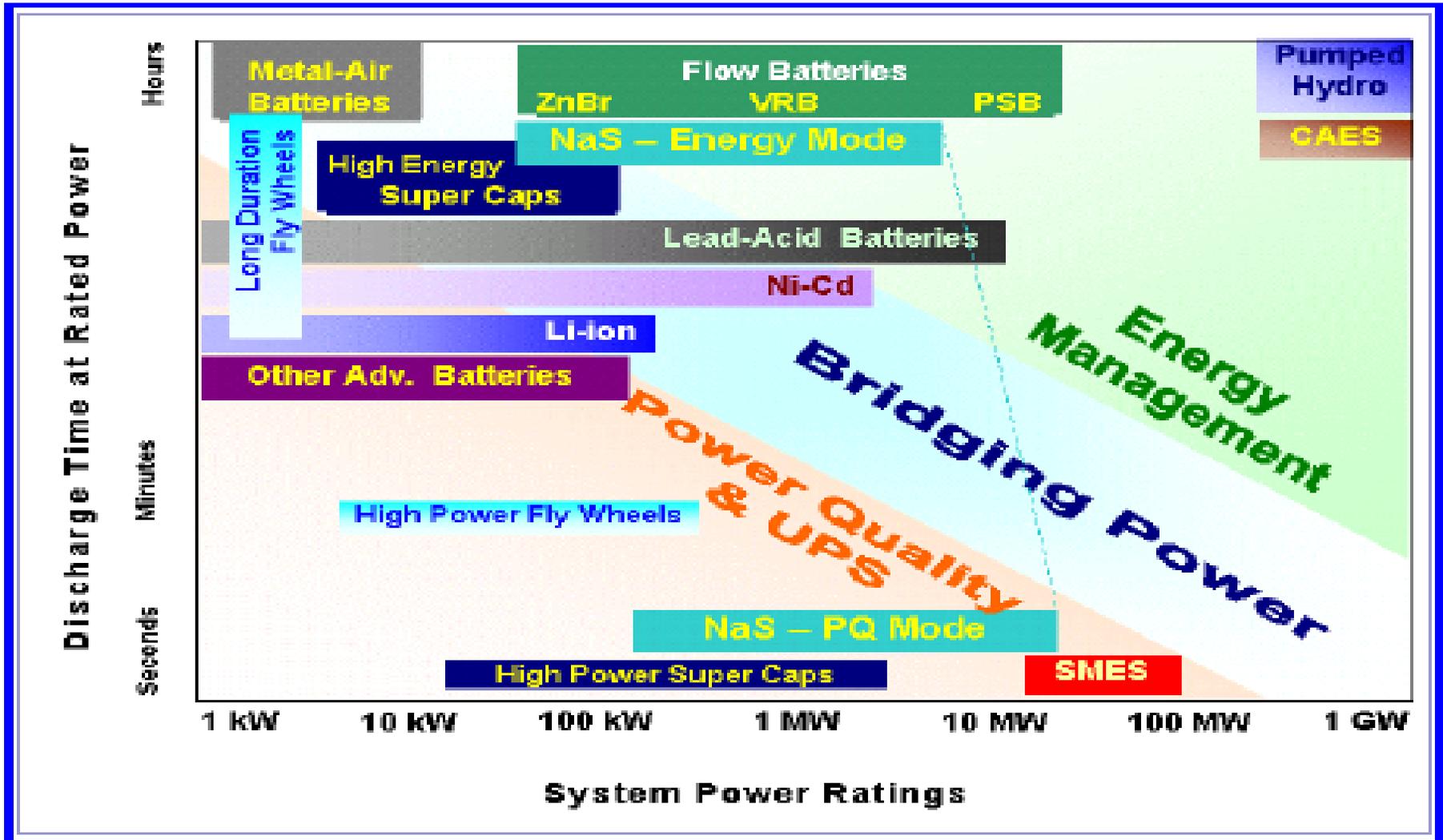
◆ Regional companies are active in Energy Storage:

- DuPont: (Research at Experimental Station), Electrode binder, Separators, Electrolytes
- Gore: (Research), Electrodes, Separators, Electrode binder
- Air Products: Electrolyte Materials
- A123 – MIT start-up based in Boston – LIB development and Production

◆ U of D has established programs in ES Research



Storage Technologies & Regime of Application



Source: DOE (Imre Gyuk)

Energy Storage Solutions – Key Enabler for End Users

Alternative Energy and Electrical Devices need better Energy Storage Capability:
Smaller Devices, Less Wasted Power, Better Power Delivery and Safety

Generation Storage, Operational Energy and Links to Power Grids

Wind Power



Photo-Voltaics



Fuel Cells

Current and Future Power Grid

- Next Generation Power Grid
- Alternative Energy Sources supplying the Power Grid



Primary Energy Storage

Hybrid Vehicles



Electric Vehicles



Power Tools

Computers



Cell Phones



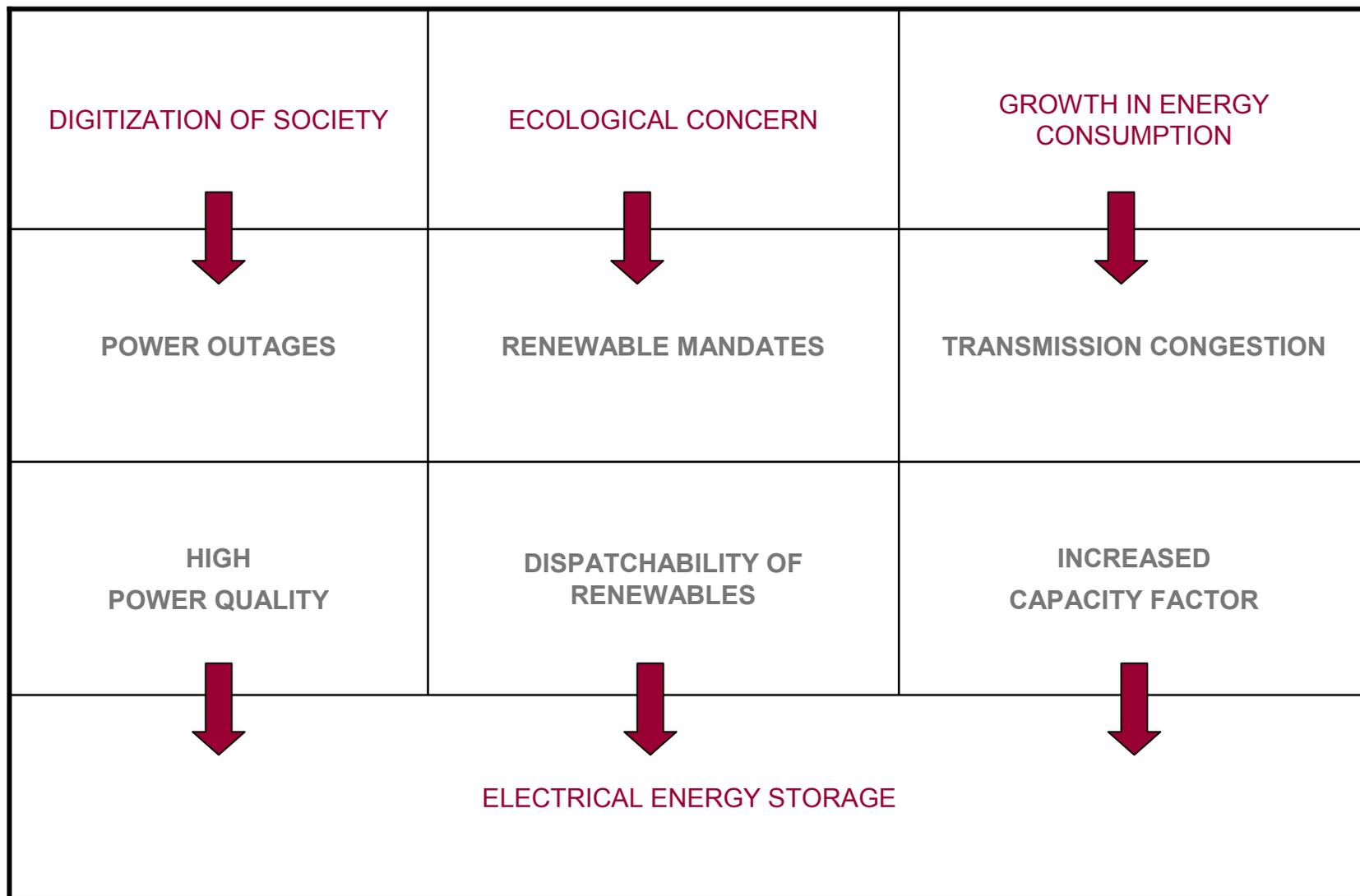


Energy Storage Global Market Value

- EPRI-DOE estimates the NPV (10yr, 10% DCF) of the potential savings in the USA achievable by the use of electrical energy storage to be **\$110B**.^[1] This equals a potential annual net cash flow benefit (not discounted) in the USA on the order of **\$15B/yr**.
- Global 10 yr NPV of electrical energy storage could be **\$330B** (assumes ~3x USA market) or an annual net cash flow benefit (not discounted) of about **\$50B/yr**.
- 10GW and 100GWh energy storage needed per year in the USA until 2010. \$2.5 B/yr conservative estimate. “DOE estimates of market benefits are \$3.8B/yr and Pearl Street \$11B/yr.”^[2]



DOE – Key Drivers for Energy Storage



TRENDS
CHALLENGES
NEEDS
SOLUTION



Source: Imre Gyuk, DOE



The miracles of science®

