

U.S. Dept. of Energy Annual Merit Review (Hydrogen)

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The solution to so many
military challenges is
Hydrogen, and the answer is
all around us!



Military Challenges Fall into Three Major Categories

- **Strategic:** Energy Security, Logistics, Reliability, Safety
- **Operational:** Flexible, Efficient, Survivable, Scalable
- **Tactical:** Silent, Light Weight, Available, Low Heat Signature, Powerful

Strategic Advantages

Logistically Smart: Energy is a commodity, has a cost, has mass/weight/cube

Ship less, use less, move more of what you need/quicker/farther

Spend less, transportation is “non value added” (Fuel is a HUGE military bill)

Energy Security: Where do you buy your energy?

If you can make energy where you are and store it, you should have it when

you need it

Reliable: Consistent quality, standard across the services

Safe: Great safety characteristics – Take a second look!
(Show Trailer Video)

Operational; Flexible, Efficient, Survivable, Scalable

Flexible: Make it several ways

Hydrogen can be made from waste (Steam reforming), combining acid and metals, applying renewable energy to water (and make medical O₂ while you do)

Store it; At low pressure, high pressure, in liquid form, in metal hydride

Efficient: Make electricity (and recover pure water), replace internal combustion with electric power 40-50% more efficient, cook with gas

Survivable: Disburse it, bury it, hide it where you make/use it

Scalable: Hydrogen power scales effortlessly – Nano to Mega

Tactical Advantages

Silent: Nearly silent H₂ manufacturing and power production

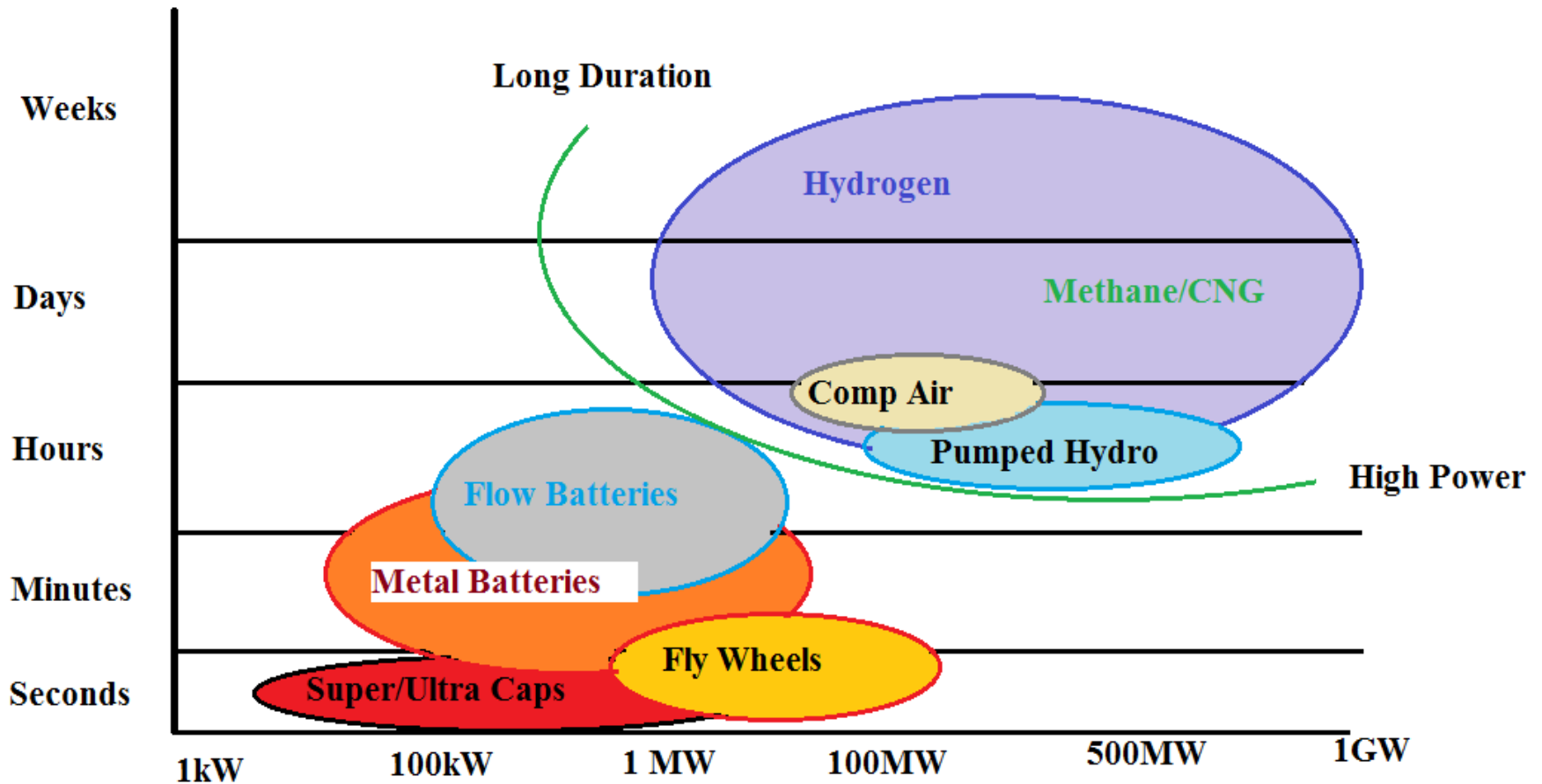
Light Weight: Lead Acid 55ah/kg, NiCad 165 ah/kg
Lithium 685 ah/kg, Hydrazine 2100ah/kg
Hydrogen Fuel Cell 26,000 ah/kg (define)

Available: Hydrogen is the most common element in the Universe

Low Heat Signature: Hard to thermal image

Powerful: More torque, quick response, clean signal

High Power Requirements and/or Long Duration Drives Energy Storage Choice!!!





Hawaii Hydrogen

100% Clean Energy by 2045

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