

Video Weblink for Paul Werbos, National Science Foudation

- <https://docs.google.com/file/d/0BzYEn42Vg7DKb11Yi03Z2F5aXM/edit?pli=1>

Key Opportunities for Azerbaijan in the World Energy Transition

- Get more from your fossil resources
 - Hold it longer for higher price (low r, Hotelling, ethics)
 - Encourage OECD ability to withstand higher price (Saudis will allow higher price if world economy won't suffer.) How? See www.ieeeuse.org/policy/positions/IEEE-USA_NEPR-2013.pdf)
- New investment – hedge your assets, fill holes in the market
 - Rechargeable Li-air battery (www.excellatron.com)
 - Cheaper solar farms – new Stirling engine or JTEC for dish style solar farms (cutting costs from 20¢/kwh to 10¢/kwh is worth \$2 trillion/year at 2008 levels)
 - Join NSS-Kalam platform for energy from space

To The Rescue: Lonnie G. Johnson

- Founder and President
- NASA (Voyager, Mars Observer, CRAF, Cassini, Galileo)
- Holds over 90 patents
- B.S. in Mechanical Engineering, Tuskegee University
- M.S. in Nuclear Engineering, Tuskegee University
- Ph.D. (Honorary) in Science, Tuskegee University
- Projects relying on Tuskegee labs and students



*“One of the Top Inventors in
the World”*

Time Magazine

Exciting credible new ideas (risky but near term) to leapfrog the world both in batteries and in more efficient heat-to-electricity for flexible cars !!!!!!!

Batteries Too: Two New Concepts to Use Those Membranes to Outperform Asia on Batteries for Plug-in Hybrids (Maybe Even Affordable True Electrics!)

	Specific Energy (Wh/kg)	Energy Density (Wh/l)	Discharge Rate (C)	Specific Power (W/kg)	Cycle Life
Nickel Cadmium	80	150	10	500	800
Nickel Metal Hydride	150	250	5	200	800
Lithium ion	211	577	5	300	500
DMFC	250	75	5	500	500
Johnson Lithium Air	2000	2000	5	400	500

New: www.excellatron.com: Argonne verifies >100 cycles recharge

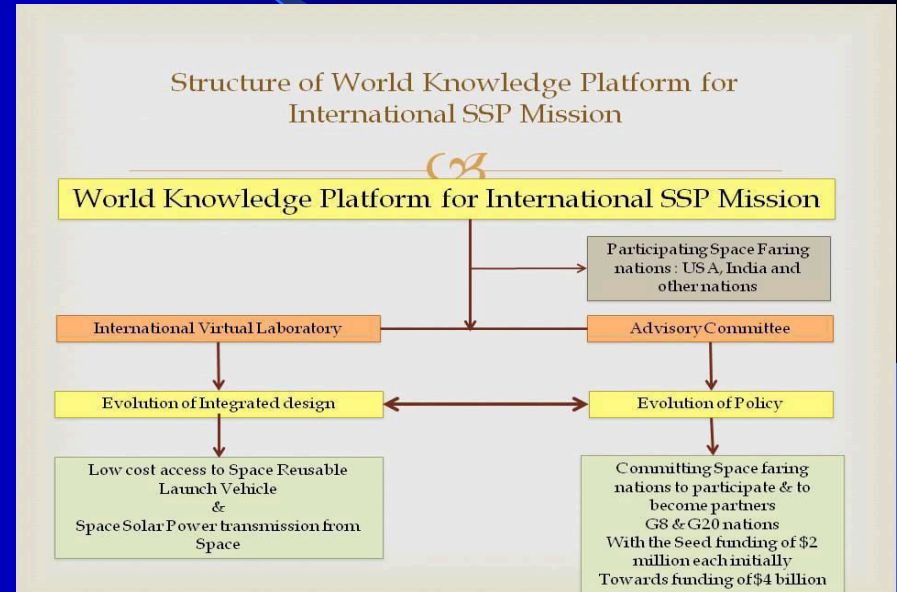
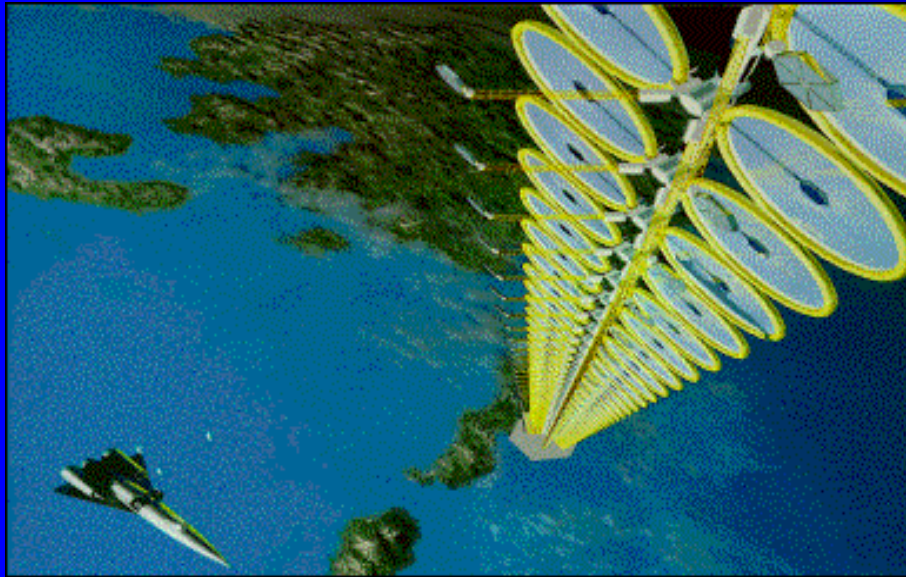
JTEC: A Possible Replacement for Stirling



- Lowest cost solar farms today: 10-12¢/kwh with dish solar (Sandia, SES) with heat to electricity of 30% via Stirling. JTEC at 800°C simulations say they can do 60%: 6¢?
- But options for 55% Stirling may exist!
- The inventor has had many successes from toys to rechargeable Li-Air batteries, featured in Atlantic and CNN News this year
- Successful hardware test at 300°C for NSF grant. Uses new basic method to convert temperature differences to electricity. No solid moving parts, cousin of ceramic membrane fuel cell. Design for 800°C is credible, needs further support.



5/27/2012: Dr. Abdul Kalam, ex-President of India, announces International NSS-Kalam plan to get to 10¢/kwh or less baseload electricity for the world



Builds on substantial work by NASA and NSF, with validation from National Academy of Science. For example, search on “JIETSSP” at www.nsf.gov