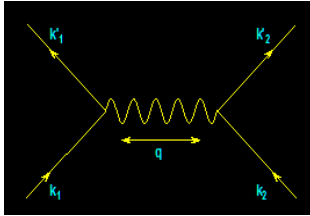


Career Panel – Alternative Energies

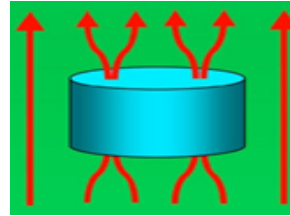
Paul M. Grant, W2AGZ Technologies

Panel Discussion with local university physics students on career opportunities, based largely on personal career experience and 2014-15 APS Distinguished Lectureship Award on Industrial Physics.

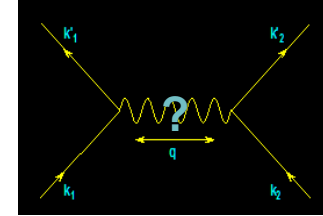
From
Electrons
Paired



To
Electric
Power Delivered



...And...
Back
Again



-- A Personal Journey in Applied Physics --

-- IBM, EPRI, and Beyond --

Paul M. Grant

*Relevant to All
Alternative Energy
Discussions*

IBM (1953-1993)

- Joined 1953 (age 17)
- SAGE/NORAD (MIT)
- Clarkson/Harvard
- Magneto-optics
- Displays/Printers
- Organic Conductors
- DFT
- Superconductivity
- High-Tc
- Sabbatical (UNAM)

EPRI (1993-2005)

- High-Tc Power Apps
- Wide Bandgap SCs
- Power Electronics
- "Safe" Fission
- "Smart Grid"
- "SuperGrid"
- Visionary Energy Societies

W2AGZ (2005-?)

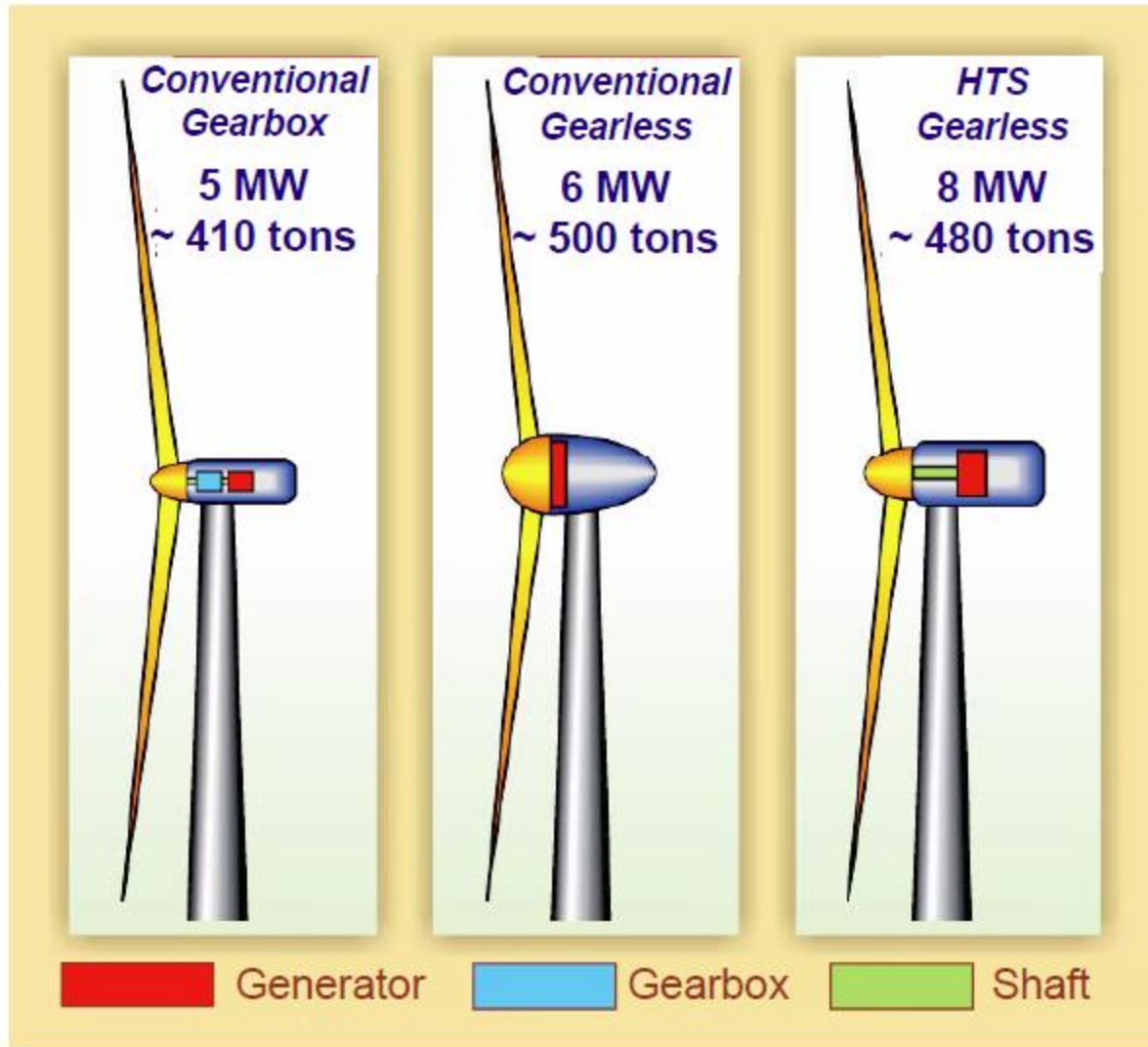
- Due Diligence
- Tet-CuO (Stanford)
- "Proxy" DFT
- RTSC via DFT
- IASS Potsdam
- Dual Use of Energy Delivery ROWs

Alternative Energies

(PMG Definitions! Con Quidado!)

- "Non-Hydrocarbon-aceous"
 - $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- Must be Minimally Eco-invasive
 - Wind Farms ✗
 - Solar Farms ✗
 - Solar Roofs ✓
 - Nukes ✓
 - Hydro ?
 - Biomass ?
 - Energy Transport ROWs ?
- Fuels/Storage
 - Electrochemistry (aka "batteries") ✓
 - Pumped Hydro ?
 - Hydrogen ?

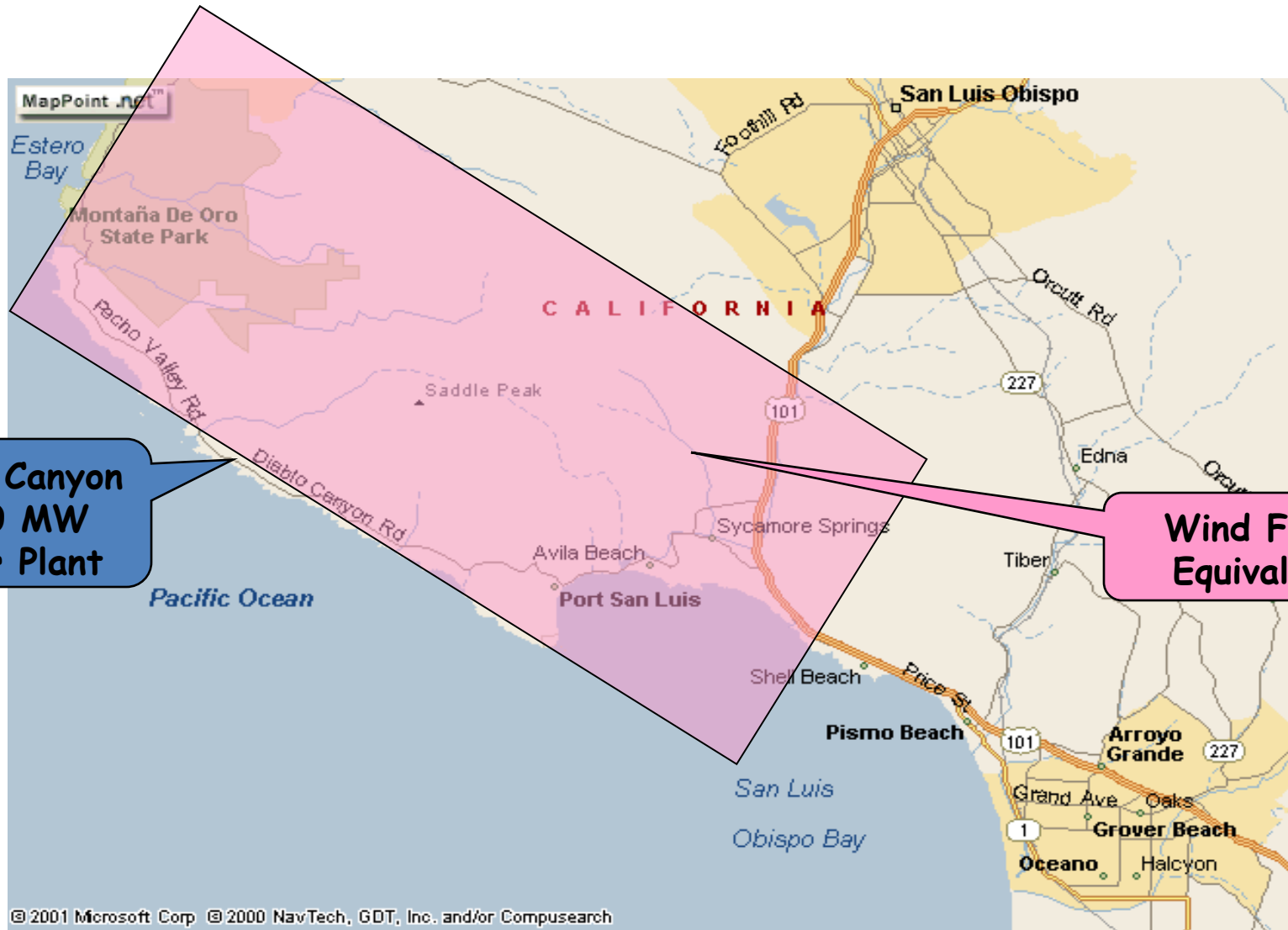
Rotating Machinery - Wind Generators



Diablo Canyon



California Coast Power

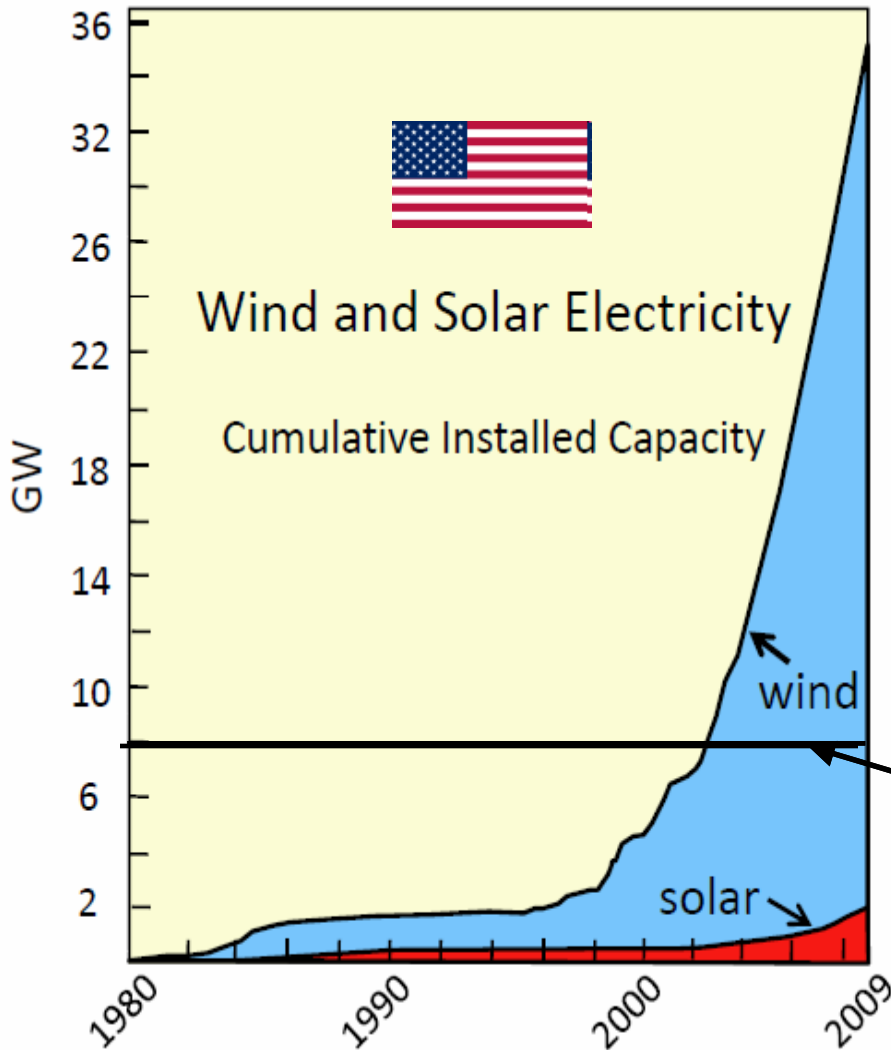


Diablo Canyon
2200 MW
Power Plant

Wind Farm
Equivalent

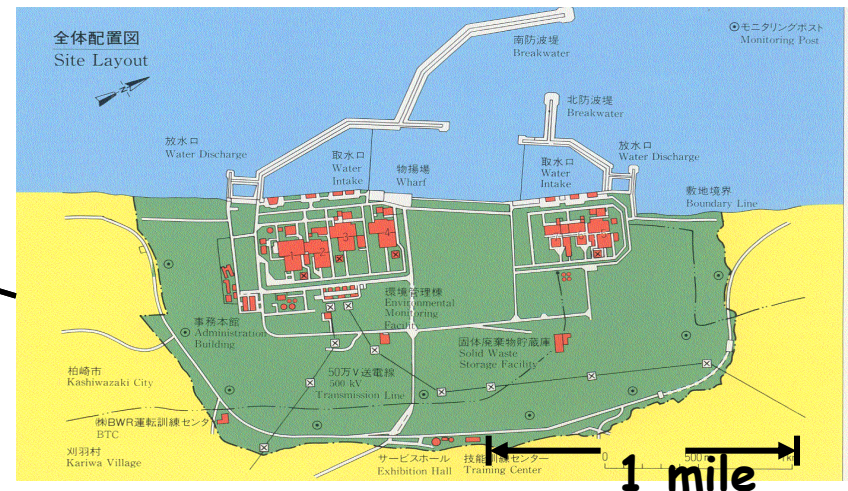


Wind Power Factoids



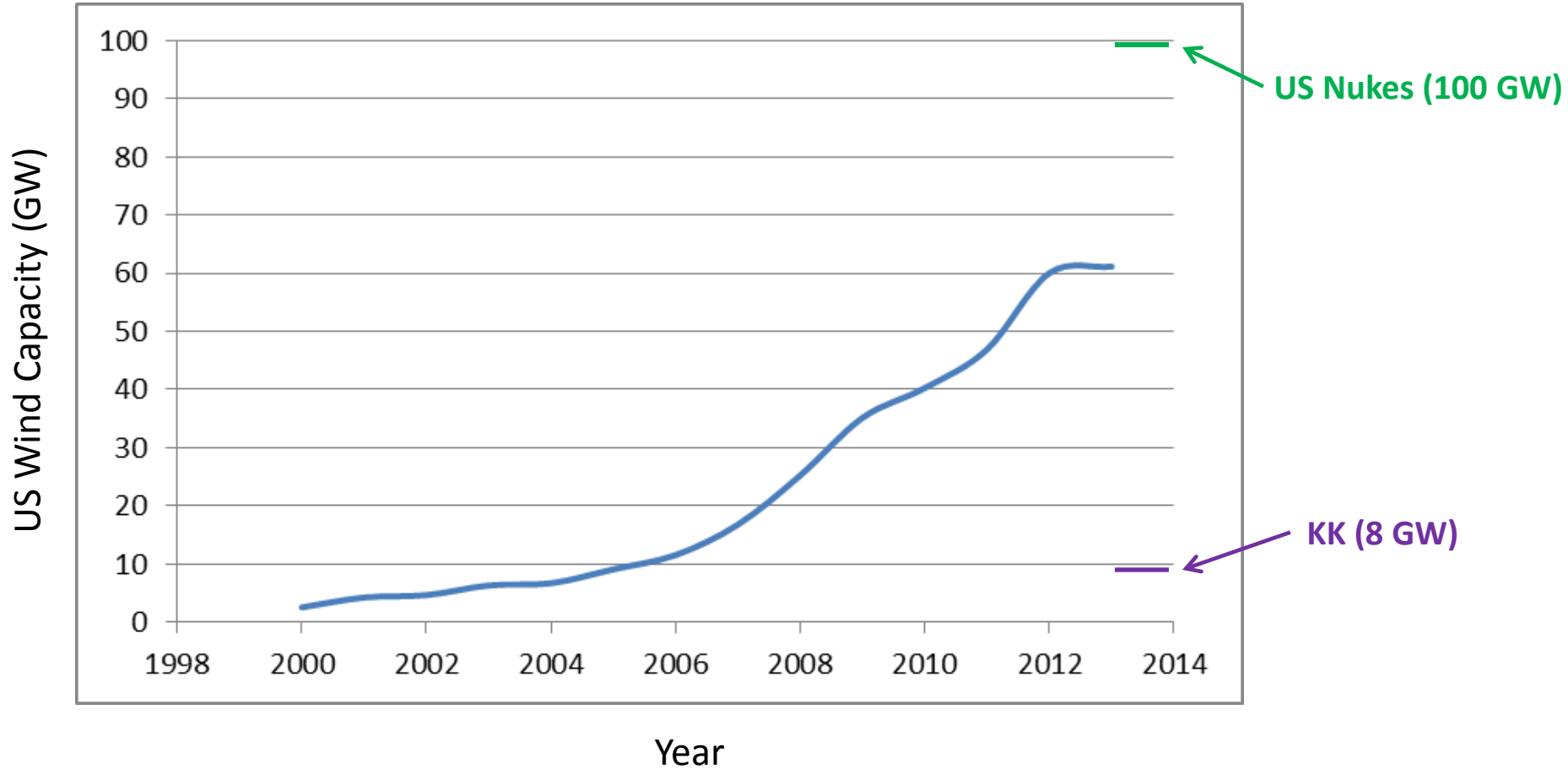
KK Wind Equivalent (8 GW)

- Power per Tower 8 MW
- Number of Towers 1000
- Inter-tower Distance 1000 ft
- Total Area (miles x miles) 43.5 x 43.5

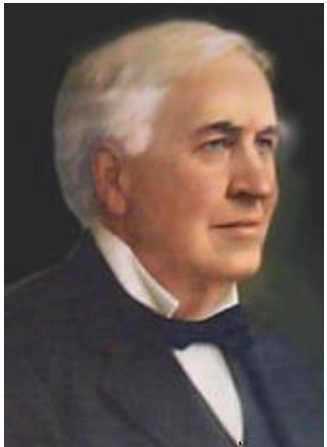


Kashiwazaki Kariwa: 8 GW !

US Wind/Nuke Comparison



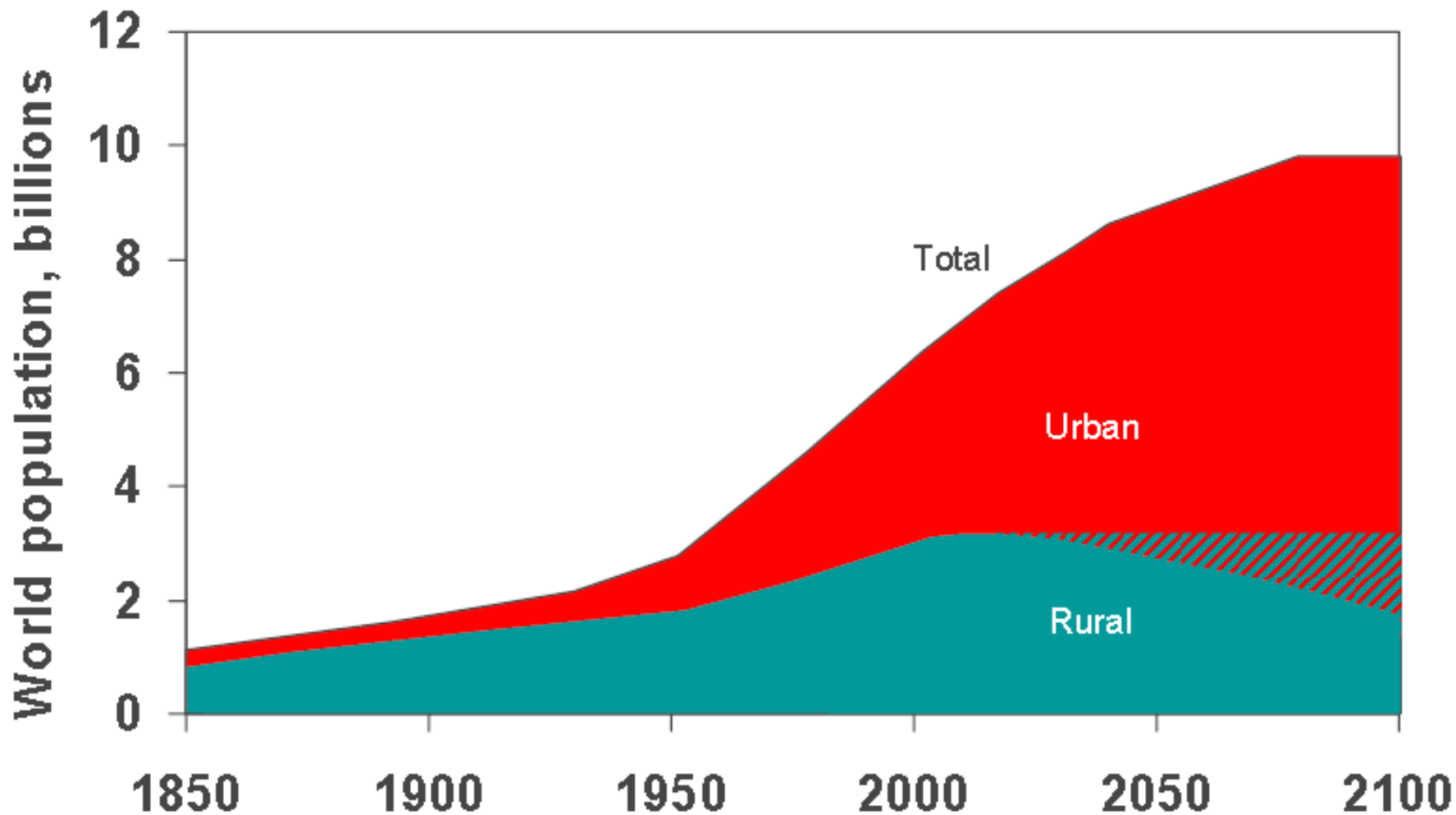
Fathers of Electric Power



What They Didn't Teach Their Kids (Us)

How to store lots of
electrons for us to Recycle!

World Population: 1850 - 2100



Enfranchisement

Oops! Gotta be Politically Correct...Double-X Genotypes!



La Profa. Dra. Maria Eugenia Lopez-Morales de Grant
Chemistry Dept., Ohlone College, Fremont, California



> 50% Her Students -> UC, CSU 4 Year Degrees, 3 MDs from UC Davis

12-Year Old Devin Grant's “ Big Data” Homework Assignment



- How many of GrandPa's *really silly* 1953 IBM Punched Cards does it take...
- ...to fill up a 32 gig iPhone?
- Well?
- **A stack about 30 miles high!**
- **> 3000 miles in a 4 TB home cloud!**
- **Wow!*** That's really **“Big Data!”**

So What's Next?

Putting Your 1's & 0's in a Black Hole?

***Assumptions:**

- 120 bytes/card
- Thickness = 0.007 inches