Recapitulation

From Last Year's Peer Review: It's 2015 and we have:

- A world at peace
- CO_2 global warming is established
- The world aspires to the American standard of living

Our vision of the emission-free energy economy

The Answer

CyroEnCom

A foundation for energy delivery based on a spread of cryogenic technologies

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DOE Peer Review 17 July 2000

What's New This Year?

MgB_2!

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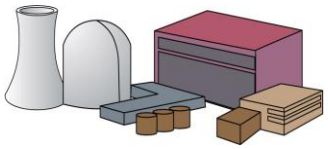


The Ideal Energy Infrastructure

- Safe, "renewable," nuclear fission power
  - "Pebble"-based, He cooled
  - Fuel reprocessing to capture actinide cycle
- "All-Superconducting" electric power generation and delivery
  - Cables, transformers, storage
- The "hydrogen economy" realized
  - Cryogen for superconductivity
  - End-use thermal energy

The Model Community "Laguna Genome"

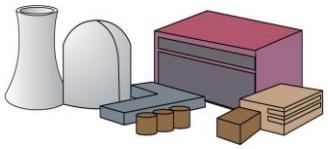
- Industrial/Academia
  - 5 factories - IDCs/1 University
- Service Support
  - 3 Shopping Centers
- Residential
  - 100,000 Homes

Electric/Thermal End Use Assumptions

- What is average thermal energy consumption (e.g., space heating, domestic hot water, cooking, drying, swimming pool, fireplaces…etc.?
- About the same as electrical energy consumption (Southern California)

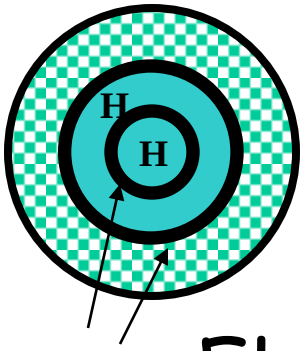
Laguna Genome: Energy Requirements

	Electrical (MWe)	Thermal (MWt)
6 "I/A" @ 10 MWe ea.	60	60
3 "Malls" @ 10 MWe ea.	30	30
100,000 "Homes" @ 4 KWe ea.	400	400
Total	490	490



Generation

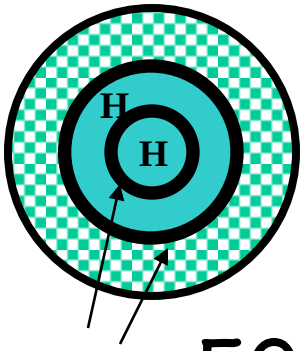
- 1500 MWe Total
  - 1000 MWe
  - 450 MWt (H_2 from electrolyzed H_2O)
  - 50 MWe for cryogens



Transmission

Overview

- Electrical
  - Low voltage dc superconducting bipolar coaxial cable loop
- Thermo-Chemical
  - Circulating Liquid H_2 ring (used to cool lvdcsc cable)
- Common Corridor
  - Sealed subterranean tunnel



Transmission

Particulars

- 500 MW, 10,000 A, +/- 25,000 V
- 1.5 B btu/hr, liquid H circulation
- 150 km, 2-m diameter, 20-m deep sealed tunnels (trickle-down from Fermilab's Big-Bang-atron)

Distribution

10 MW Community Substation

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dc XFMR

H_2 Fuel Cell

H_2 Storage

Distribution

Overview

- Liquid H_2 to Gaseous for Cooling
- 2000 A @ +/- 100 Vdc

End Use

Streetside Service

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100 A @ +/- 25 Vdc

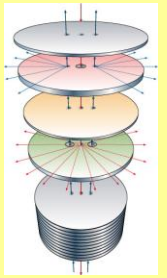
H_2 @ 200 K, 100 psi

PLC @ 5 MHz

H_2 Heat Exchanger for AC

H_2 for Heat/Hot H_2O

Household Fuel Cell



Inv/Conv for Electricity

H_2 Storage for Auto

Hindenburg Hysteria

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