

CyroEnCom

A Cryogenic-Based
Energy/Communications
Delivery Concept

EPRI



2015

- **A World at Peace**
- **Global Climate at Risk**
- **Continuing Industrialization Reaches All Corners of the Planet**

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Laguna Genome

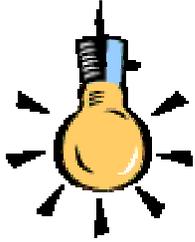
- State of Durango, Mexico
- 2000 km² of Semi-Arid Arroyos
Bordering El Golfo de Cortez
- "Greensite" Location of a New
Biotech Industry/Residential
Community of 50,000

Our Mission: To design and install the societally optimal energy and communication delivery system for Laguna Genome

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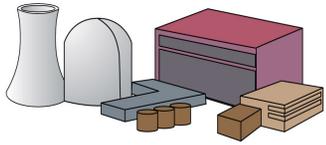


Solution

CyroEnCom - A foundation for energy and information delivery based on a spread of cryogenic technologies

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Energy Generation Potential & Kinetic

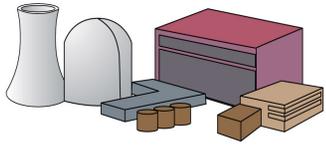
Renewable Nuclear Fission Power

- Recyclable Actinide Fuel Reactor
- SuperGM-derived dc Generators
- Hydrogen from H₂O Electrolysis

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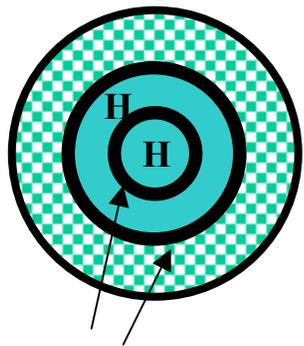
Particulars

- Breeder/Recovery Technology
- 1000 MWe Total
 - 500 MWe
 - 450 MWt (H_2 from electrolyzed H_2O)
 - 50 MWe for cryogenics

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HTS

Transmission



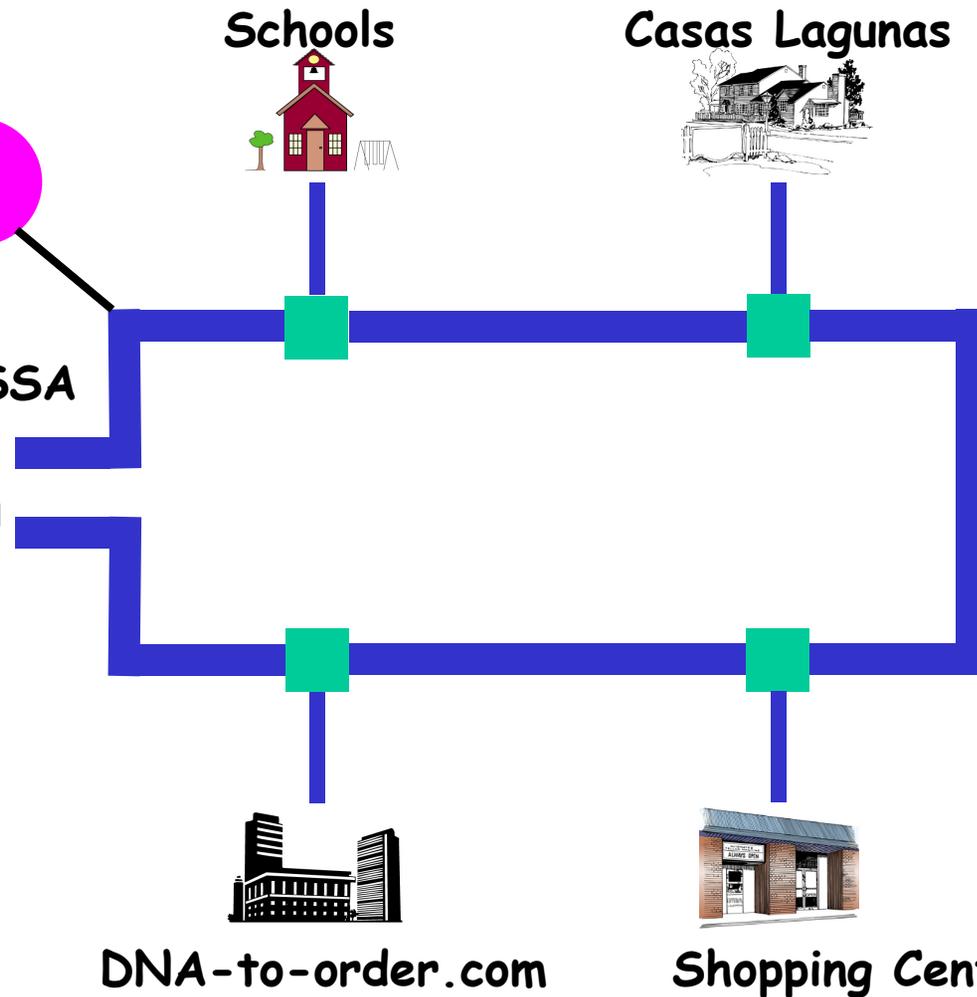
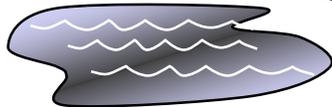
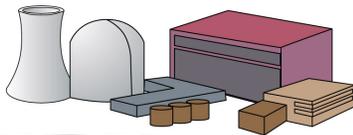
Schools



Casas Lagunas



Energia Durango, SSA



Fiber Optic/
Satellite Link



T&D
Crossover



DNA-to-order.com

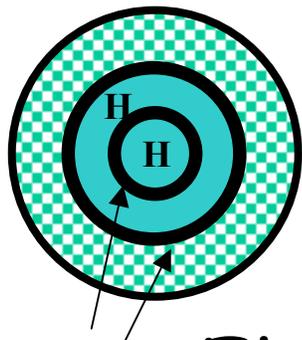


Shopping Center

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Transmission

Overview

HTS • Electrical

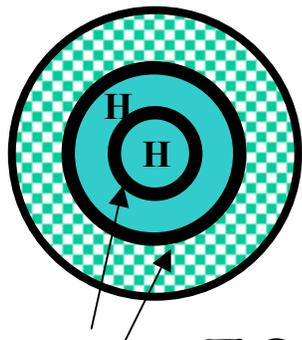
- Low voltage dc superconducting bipolar coaxial cable loop

• Thermo-Chemical

- Circulating Liquid H_2 ring (used to cool lvdcs cable)

• Common Corridor

- Sealed subterranean tunnel



Transmission

Particulars

HTS • 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)

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Telecommunications

Overview

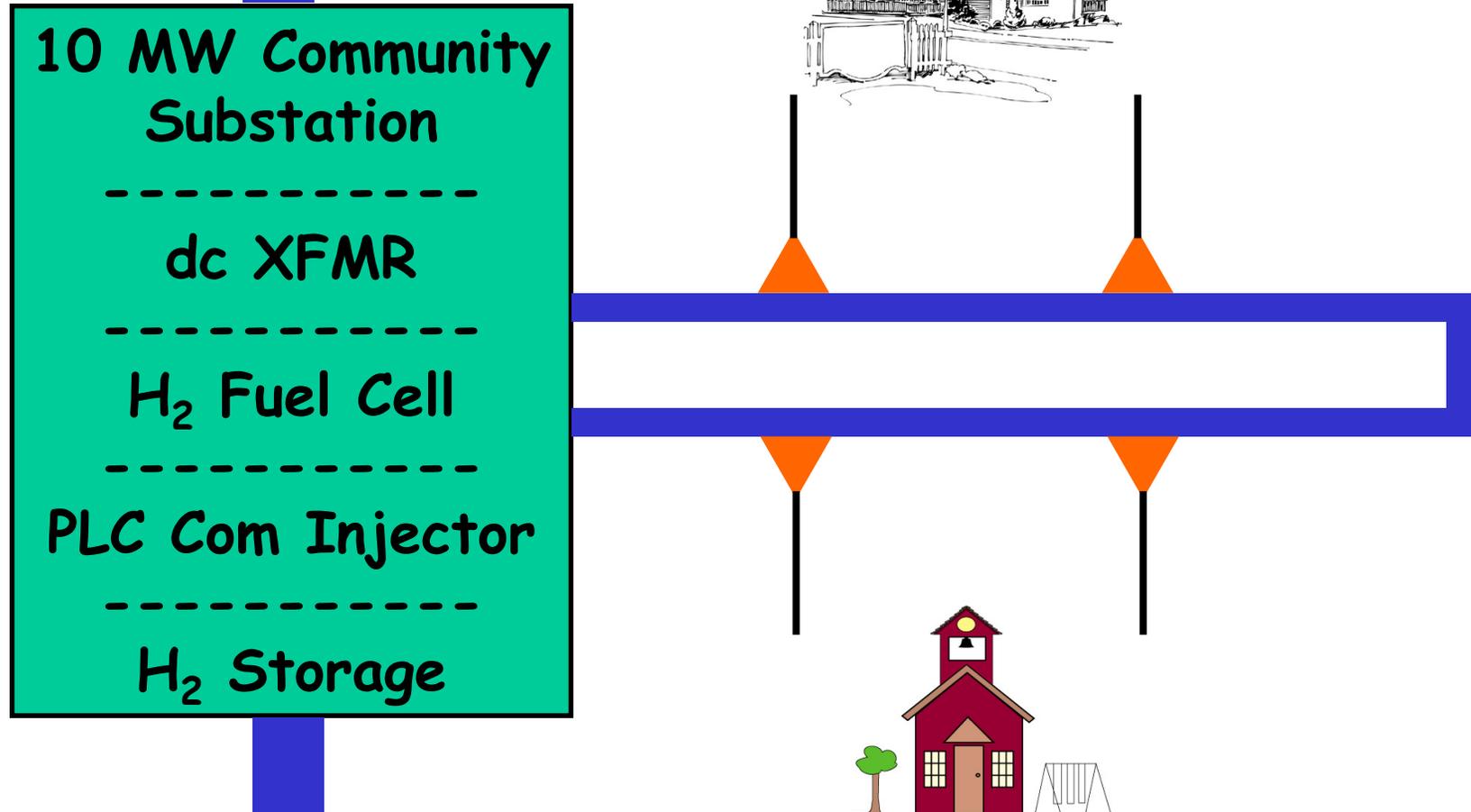
- Insert Fiber Optic/Satellite Downlink into Distribution Network
- Employ DSL Protocols for Signaling

Telecommunications

Particulars

- DSL link distances limited to <5 km due to skin depth losses at 5 MHz
- $R/I \approx \rho^{3/2}/a$, where
 - a = wire radius
 - ρ = wire resistivity
- For sc wire,
 - a = 10 times 28 gauge Cu telecon wire
 - ρ = 1/1000 resistivity of Cu
 - $R/I = (R/I)_{Cu}/300,000$

Distribution



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Distribution

Overview

- Liquid H₂ to Gaseous for Cooling
- 2000 A @ +/- 100 Vdc

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End Use

Streetside Service

100 A @ +/- 25 Vdc

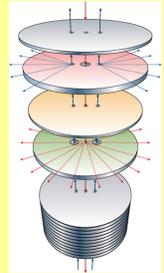
H₂ @ 200 K, 100 psi

PLC @ 5 MHz

H₂ Heat Exchanger for AC

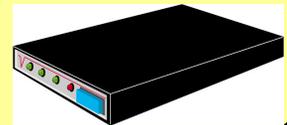
H₂ for Heat/Hot H₂O

Household Fuel Cell



Inv/Conv for Electricity

DSL Digital Modem



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Conclusion

CyroEnCom provides a zero emission, high efficiency, energy/telecom infrastructure for greensiting new industrial - residential complexes in developing nations

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