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ENERGY

Development of Alternative Energy in New York

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- Energy Technology & UNY
  - Solar
  - Wind
  - Bio-fuels
  - Geothermal
  - Hydrogen Fuel Cells
  - Smart Grid & Energy Storage
- Resources & Next Steps

Solar Energy

- NYS Renewable Portfolio Standard (2004): 25% by 2013
- Photovoltaic PV industry
  - Incentives from NYS
  - Technology advances: thin film, materials and optics
- Upstate NY initiatives & recent growth:
  - Rochester Solar/O'Connell Electric: 40% growth in 2009
  - Labella Associates PC
  - Rochester Solar and Wind; Solar Sentry
  - Sunworks LLC $200 MM Solar Panel Mfg. in Lewiston
  - UR optics; Duncan Moore; Dr. Ching Tang
  - RIT research; RNY

Wind Energy

- DOE: 20% by 2030
- NYPA in 9/09 sought off-shore wind project development in Lakes Erie & Ontario to produce 120 MW by 2014. Canadian proposals similar.
- Two Madison County NYSERDA supported facilities totaling 41.5 MW. Four mega projects in planning by NYSERDA now totaling 425 MW
- For entrepreneurs, small turbines are the market to aim for:
  - Vertical turbines (egg-beater types) offer some new promise
  - Soundless; low profile (10-12 feet); relatively inexpensive at $10K
  - NYSERDA subsidies
- Local wind energy companies: eVan Hee Energywise Partners; Rochester Solar Wind; Gleason Works (large turbine gearing); Labella Associates PC (large scale); Harbek Plastics

Bio-fuels and biomass

- Corn ethanol's dramatic rise and plateau
  - 10 billion gallons in 2008; 10% mandated blend 2009; planned plateau in 2015 at 15 BGY
  - 2007 Farm Bill and mandated ethanol demand levels to 36 BGY
- Cellulosic fuel technology advances
  - Stover and "cellulosic corn"
  - Dedicated energy crops: sorghum, switch grass, wood, high lipid density algae
  - Bio-butanol, triacylglycerols (TAGs), and other alcohols
- Upstate NY initiatives:
  - WNY Energy; SweetWater Energy; Northern Biodiesel, Sunoco (Fulton), Genesee Regional Biofuels; small-scale fuel facilities
  - UR, RIT and Cornell University

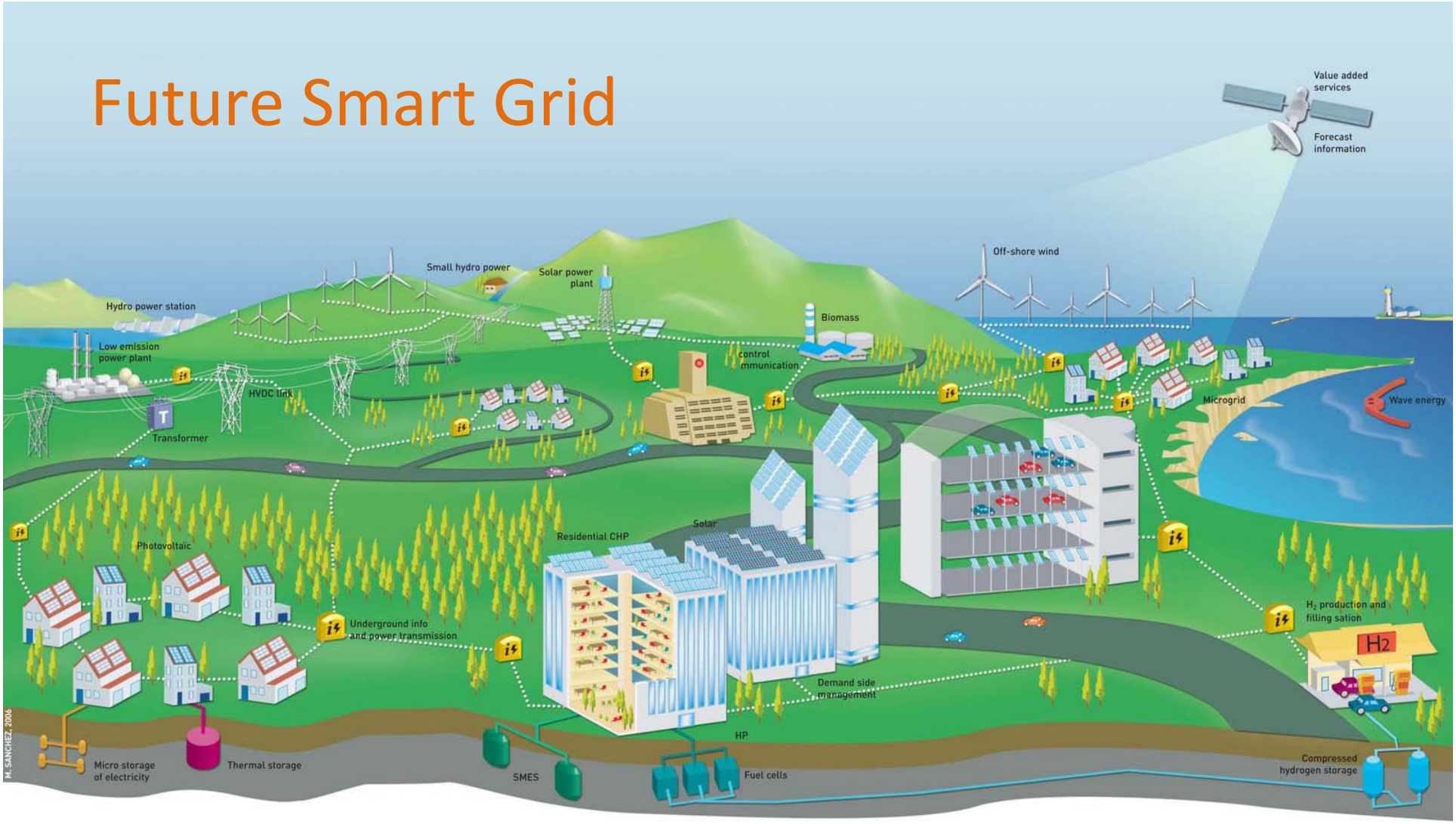
Geothermal Energy

- Now same subsidies as wind and solar – usually about a 30% credit
- Geothermal heat pump systems serve residential and commercial sites, and offer many benefits:
  - Proven, straight forward technology; 30 years here
  - Low Operating Cost; Low Maintenance
  - Significant carbon footprint reduction
  - Integrates well with solar and wind systems
- Upstate NY Entrepreneurs: eVan Hee Energywise Partners: “Every time the price of natural gas, oil, or electricity goes up, our business gets even better.”; LaBella Associates PC (large scale commercial & utility)

Hydrogen Fuel Cells

- Fuel Cell technology is advancing rapidly
  - Hydrogen produced via industrial process Cl mfg. & electrolysis
  - Ample supply for over 2 MM vehicles now; typically compressed H
  - Rochester is one of 4 places in the world and only one in the US for major hydrogen fuel cell production scale research (GM & Delphi)
- H Fuel Cell Vehicle Benefits
  - Emissions are H2O
  - Long distance capability: 2015 commercial target 150K miles
  - Extensive safety testing: Equinox meets 5 star crash test safety
- Obstacles:
  - Distribution!
  - Large scale hydrogen production capacity
  - Auto industry financial issues

Future Smart Grid



"An automated, widely distributed energy delivery network, the Smart Grid will be characterized by a two-way flow of electricity and information and will be capable of monitoring everything from power plants to customer preferences to individual appliances. It incorporates into the grid the benefits of distributed computing and communications to deliver real-time information and enable the near-instantaneous balance of supply and demand at the device level."

"The Smart Grid: An Introduction" US DOE

Smart Grid & Energy Storage

- US Energy Grid evolution
  - Grid infrastructure 2009; Demand Response Programs
  - Grid evolution: from buffer to knowledge-based network with storage
  - Energy management: premise-based, local, regional & systemic
  - Sensor technology at all levels; UR research, Dr. Mark Bocko
- Storage technology development
  - Large scale “battery” technology; Liquid metal and salt technology
  - Municipal, community, industrial and residential “battery” storage
  - Nano-technology in batteries; Ultra-high capacitors
  - All storage technologies have near term mfg. potential in NY

Legal Community opportunity

- Overwhelming legal need for new tech start-up companies:
  - Incorporation
  - Shareholder agreements
  - Funding initiatives
  - Partner, vendor, employee, customer contracts
  - Site preparation
  - Permitting
- Flexible compensation structures win!

Resources and Next Steps

- NYSERDA: www.nyserda.org
- NYSTAR: www.nystar.state.ny.us
- Department of Energy: www.energy.gov/
- Energy Information Administration: www.eia.doe.gov/
- High Tech Rochester: www.htr.org/
- Blue Springs: www.bluespringsenergy.com
- TEN: www.monroecounty.gov/entreprenuers.php
- Finger Lakes Planning Council: www.gflrpc.org/
- Genesee County Eco. Dev. Council: www.gcedc.com/
- Upstate NY Venture Association: www.UVANY.com

Thank you!

Q & A