



# Renewable Energy Sources for Water and Wastewater Facilities

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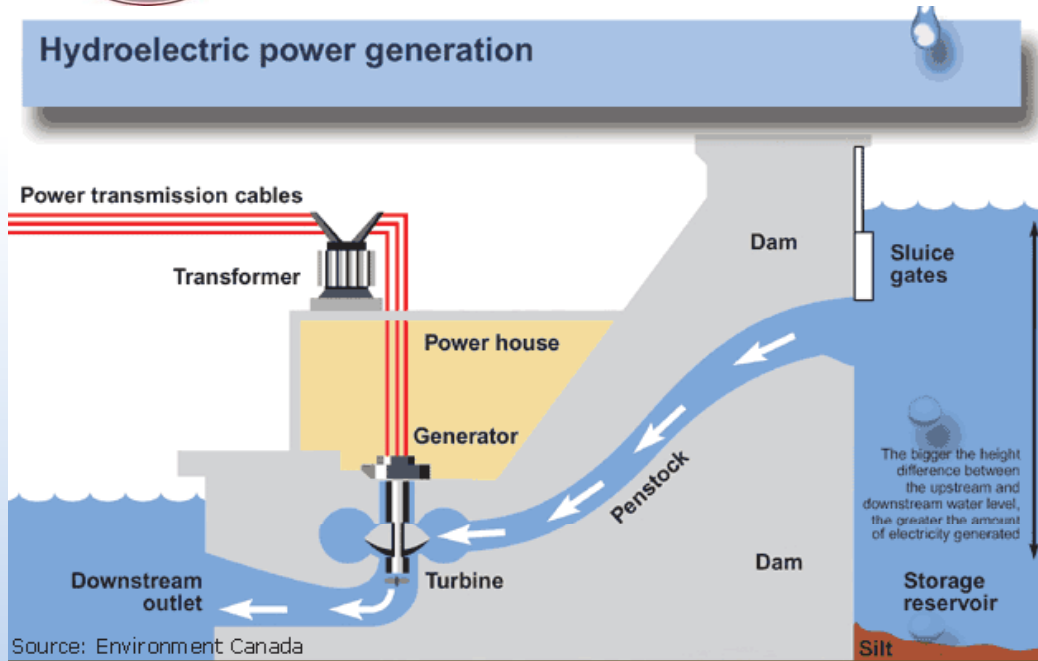


# Renewable Energy Alternatives

- Hydrodynamic – Electricity or Direct Use
- Geothermal – Groundwater Closed Loop/Open Loop or Constant Thermal Source
- Solar- Photovoltaic



# HYDROELECTRIC ENERGY





# TORRINGTON WATER COMPANY: HYDRO PUMP PROJECT



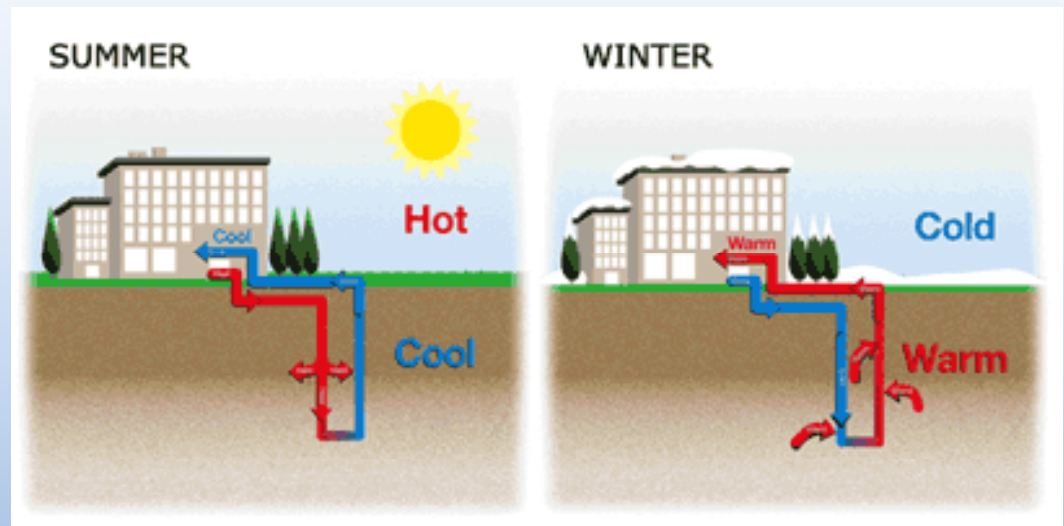
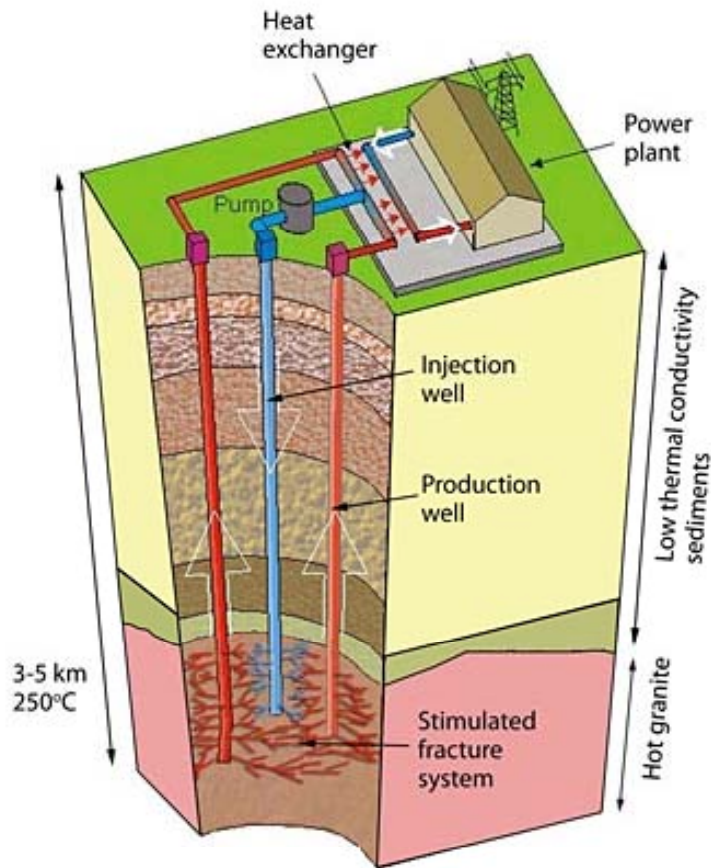
The Torrington Water Company's Hydropump, installed and operating. Note the custom made mounting assembly designed by AVI International in Torrington.



Construction of the bypass pipes needed to direct raw water to the basement of the pumping station. Virtually all of the installation was accomplished by Torrington Water Company employees.



# GEOHERMAL ENERGY





# Heat Pump System



Litchfield WWTF

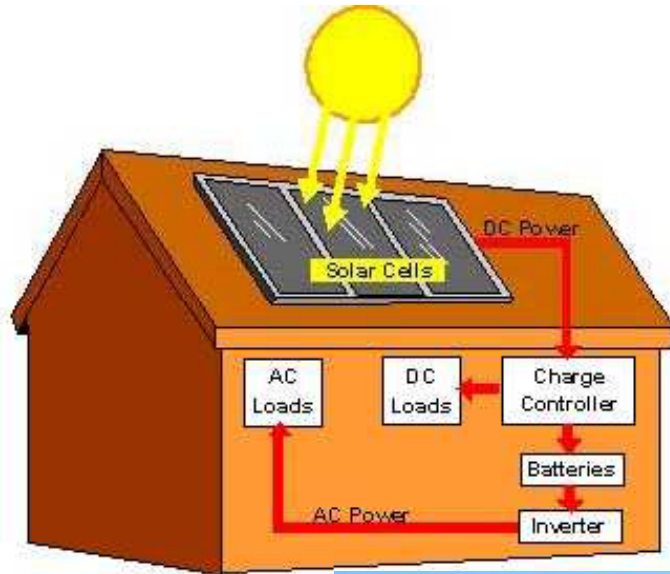


Litchfield WWTF





# SOLAR ENERGY









## Key Technical Parameters

- Is there a need?
  - Is your system a major power or heat user?
- Proximity to the power grid
- Land Availability
- Ability to permit and interconnect in a timely manner



## Key Financial /Institutional Issues

- Is Net Metering allowed?
  - Yes – with some restrictions
- Ability to transfer generation credits to multiple accounts
  - Yes – Municipal – Some restrictions
- Magnitude of the Financial Incentives- Federal and State



# The Connecticut Program

- Definitions
- CT Programs/Incentives
- Federal Incentives



# Acronyms

- CEFIA= Clean Energy Finance and Investment Authority
- DEEP= Department of Energy and Environmental Protection
- DG= Distributed Generation (customer side of meter)
- EDC= Electric Distribution Company (i.e. The Connecticut Light & Power Company and The United Illuminating Company)
- LREC= Low Emission Renewable Energy Credit
- PPA= Power Purchase Agreement
- PURA= Public Utilities Regulatory Authority
- REC= Renewable Energy Certificate or Credit
- RPS= Renewable Portfolio Standard
- ZREC= Zero Emission Renewable Energy Credit



# Renewable Energy Certificates or Credits (“RECs”)

- RPS = Each year a certain percentage of total retail energy sales of the EDCs must be purchased from Class I, II, and III renewable and energy efficient sources with the goal of 27% by 2020.



# Net Metering

- Definition:
  - When a behind-the-meter renewable electric system is generating more power than is used by the facility, with credit for excess production.
- Eligible Renewable DG Technologies (Behind-the-Meter):
  - Solar, Landfill Gas, Wind, Biomass, Small Hydro, Fuel Cells, Municipal Solid Waste, Tidal Energy, Ocean Thermal
- Applicable Sectors:
  - Commercial, Industrial, Residential, Nonprofit, Schools, Government, Agricultural, Institutional
- Applicable Utilities:
  - The Connecticut Light & Power Company and The United Illuminating Company



# Net Metering - *continued*

- System Capacity Limit:
  - 2 MW
- Aggregate Capacity Limit:
  - None
- REC Ownership:
  - Customer owns the RECs
- Meter Aggregation:
  - Virtual Net Metering for Municipal Customers



# ZREC Program

- Contract: Mid 2012 – EDCs are required to competitively procure long-term contracts for ZRECs with owners or developers of “zero” emission generating systems or be subject to a penalty.
- “Zero” Emission Generation Systems: Class I energy generating systems that emit no pollutants (i.e. solar, wind, small hydro).
- System Size: 1 kW to 999 kW
- System Location: Customer side of the revenue meter (on-site)
- ZREC Program Funding: Subject to periodic review by PURA and possible reductions, the procurement of ZRECs by the EDCs is \$8 million in Year 1, increase by an additional \$8 million per year in Years 2 through 6, plateau at \$48 million in Years 7 through 15, and decline by \$8 million per year in Years 16 through 20.
- Plan Approval: PURA must approve an EDC’s Solicitation Plan before the EDC can start its competitive procurement of ZRECs.





# ZREC Program - *continued*

- Competitive Bid Procurement: 15-year ZREC Contracts
  - 2012 contracts capped at \$350 per ZREC
  - ZREC price cap may decline by 3% to 7% in contract years 2013-2017
- Bid Ranking: Bids received by the EDCs from developers or owners will be ranked in order from lowest NPV to highest NPV on the proposed ZREC price.
- Bid Selection: Bids selected by an EDC will be eligible to receive long-term ZREC contracts under the EDC's Procurement Plan.
- Contract Approval: PURA must approve all proposed ZREC contracts in a regulatory proceeding under an EDC's Procurement Plan.



# ZREC Program Summary

- Program Funding
  - \$8/year – up to 6 years
- EDC Competitive Procurement
  - 1 kW to 100 kW – Small (may be non-competitive)
  - 101 kW to 249 kW – Medium
  - 250 kW to 999 kW – Large
- ZREC Bid Price From System Owner or Developer
  - ZREC = 1 MW hr
  - \$350 per ZREC Cap
  - ZREC Cap reduced annually
- Projects with CCEF Funding are ineligible



# LREC Program

- Contract: Mid 2012 – EDCs are required to procure long-term contracts for LRECs with owners or developers of “low” emission generating systems.
- Low Emission Generation Systems: Class I energy generating systems (fuel cells, biomass, etc.) that emit pollutants no more than:
  - 0.07 lbs. per MW hr of nitrogen oxides
  - 0.10 lbs. per MW hr of carbon monoxide
  - 0.02 lbs. per MW hr of volatile organic compounds
  - 1 grain per 100 standard cubic feet
- System Size: Less than 2 MW (1,999 kW)
- System Location: Customer-side of meter plus net metering (on-site generation) and tying into the electric grid.



# LREC Program - *continued*

- LREC Program Funding: Subject to periodic review by PURA and possible reductions, the EDCs must spend up to \$4 million per year in Year 1 through Year 5, plateau at \$20 million per year in Years 6 through 15, and decline by \$4 million per year in Years 16 through 20.
- Competitive Procurements: 15-year LREC Contracts
  - Contracts capped at \$200 per LREC
- Bid Ranking: Bids received by the EDCs from developers or owners will be ranked in order from lowest NPV to highest NPV on the proposed LREC price.
- Bid Selection: Bids selected by an EDC will be eligible to receive long-term LREC contracts under the EDC's Procurement Plan.
- Contract Approval: PURA must approve all proposed LREC contracts in a regulatory proceeding under an EDC's Procurement Plan.



# LREC Program Summary

- Program Funding
  - \$4/year – up to 5 years
- EDC Competitive Procurement
  - Procurements at least annually
- LREC Bid Price From System Owner or Developer
  - LREC = 1 MW hr
  - \$200 per LREC Cap
- Projects with CCEF Funding are ineligible



# Proposed ZREC and LREC Program Schedule

- October 2011
  - EDCs Issued Request for Information (RFI)
- December 2011
  - EDCs File Solicitation Plan with PURA
- March/April 2012
  - PURA Issues Decision on Solicitation Plan
- May/June 2012 (Tentative)
  - EDCs Issue 1<sup>st</sup> ZREC RFP and 1<sup>st</sup> LREC RFP
- August/September 2012 (Tentative)
  - ZREC and LREC Contracts Submitted to PURA
- Contractors have 12 months to design, permit and build the project



# Federal Tax Incentive

- Incentive Type:
  - Corporate Tax Credit (Investment Tax Credit of ITC)
- Eligible Technologies:
  - Solar, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Geothermal
- Applicable Sectors:
  - Commercial, Industrial, Utility, Agricultural
- Amount:
  - 30% for solar, fuel cells, and small wind
  - 10% for geothermal, micro-turbines and CHP



# Federal Tax Incentive - *continued*

- Maximum Incentive:

- Fuel Cells: \$3,000 per 1 kW
- Micro-turbines: \$200 per 1 kW
- Small Wind: No Limit
- Solar: No Limit
- Geothermal: No Limit

- Eligible System Size:

- Solar: No Limit
- Small Wind: 100 kW or less
- Fuel Cells: 0.5 kW or greater
- Micro-turbines: 2 MW or less
- CHP: 50 MW or less

- Service Date:

- In general, credits are available for eligible systems placed in service on or before **December 31, 2016**





# Benefits of Private Developer

- No up-front cost
- Predictable cost of electricity over 15 years
- No need to deal with complex system design and permitting process
- No operating and maintenance responsibilities
- Net metering credit for electrical usage



# Developer Agreements (PPA)

- Electricity price (\$/KWH)
- Annual price increase factor
- Maximum price
- Land lease amount
- Termination schedule
- Buy-out provisions/costs



## Resources

- Database of State Incentives for Renewables and Efficiency [www.dsireusa.org](http://www.dsireusa.org)
- [www.CTCleanenergy.com](http://www.CTCleanenergy.com)
- [www.CT.gov/deep/energy](http://www.CT.gov/deep/energy)
- [www.CT.gov/deep/PURA](http://www.CT.gov/deep/PURA)



# Questions...

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