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RENEWABLE ENERGY and DISTRIBUTED GENERATION

Description:

Renewable Energy and *Distributed Generation* often share the same technologies and, therefore, are included in the same discussion.

Renewable Energy (RE):
RE, often called renewable power, includes those technologies that derive power without the use of nuclear or fossil fuels. Renewable technologies can generate energy from the sun, wind, biomass, tides, moving water, or geothermal sources. These technologies produce little or no emissions and result in minimal environmental impact.

The use of renewable energy sources is not new. Pre-Columbian examples of renewable energy can be found in the southwestern United States, where the Anasazi culture took advantage of solar gain for heating in the winter, when the sun was low on the horizon. Similarly, they utilized the shade of the cliffs to provide cooling in the summer, when the sun was high in the sky. Long before electricity, our ancestors used wind to power the pumps that provided water to farms. In the 1930s, hydroelectric projects provided not only cheap reliable power and flood control, but also created jobs for a nation experiencing the Great Depression.

New York State Renewable Portfolio Standard — In 2004, New York State adopted a Renewable Portfolio Standard. Within the total amount of electricity used by retail customers, this policy set a goal to increase the proportion of *renewable-generated* electricity to 25 per cent by 2013. Renewable systems include solar photovoltaic cells, wind turbines, and energy storage systems. The New York State Energy Research and Development Authority (NYSERDA) is tasked with achieving 24 per cent of the new policy's goal. The remaining one per cent is anticipated to come from utility customers willing to pay a premium to support this effort. The Renewable Portfolio Standard comprises two sections:

- The Main Tier, which is designed for participation by large-scale generators.
- The Customer-Sited Tier, which is designed for on-site generation and use.

These applications have been referred to as “behind the meter” renewable systems.

Distributed Generation (DG):
DG is simply the on-site production of energy. It may also be referred to as dispersed generation, embedded generation, or decentralized generation. DG systems can include continuous prime power and standby generators, combined heat and power (CHP) systems, solar photovoltaic cells, wind turbines, and energy storage systems; this list is increasing with the deployment of new technologies. Renewable systems that are Customer-Sited would be considered distributed generation.

DG systems can be configured to operate in synchronization with the electrical utility grid, or can be independent of the utility grid and continue to supply power during utility power outages. Synchronized systems can often sell excess-generated power back to the grid through a process known as net-metering.

The most common DG systems are those used for backup power generation, which are often used in hospitals and municipal buildings or to supply standby power for other utilities, such as telecommunications or water systems. Because DG systems add to overall generating capacity, they can have a significant impact on reducing peak demand on the utility grid or network. Peak demand, which has been responsible for brown-out or black-out conditions, usually occurs during the hottest part of the summer, when the electric cooling load is running at a maximum.

Renewable Energy Distributed Generation (REDG) systems can be purchased or leased, depending on the type of system and the vendors. In all cases, REDG systems are considered a long-term investment, and the initial cost of a system and its payback and benefits are calculated over the life of the system. This long-term approach to energy tends to stabilize or hedge the cost of power over the life of the system and is less impacted by the commodity-market fluctuations common to fossil fuels.

Benefits:

For consumers

- REDG can be configured to operate with or independent of the local utility company, providing on-site power generation during emergency conditions, allowing for sheltering in place, as opposed to evacuation, in the event of a power failure . . . which is particularly beneficial for frail older adults and people with disabilities of all ages.

- Systems using renewable energy sources provide a healthier environment for residents and building tenants.

- Investment in REDG provides long-term stabilization of energy rates, making energy rates/expenses for homes and buildings more predictable and less subject to commodity market fluctuations—which is an important factor in supporting the ability of residents to age-in-place.

- Financial incentives and tax credits are often available—keeping housing costs affordable.

For the community

- Depending on the type selected, there can be environmental benefits because of reduced or no carbon emissions.

- On-site generation reduces the geographical strain or need for additional transmission and distribution systems.

- REDG can also be used to reduce peak kilowatt demand, thereby avoiding brown-outs and black-outs.

Impediments or barriers to development or implementation:

- Investment in REDG Technology is a long-term commitment, and the owner is responsible for yearly maintenance.

- There may not be adequate space or a good location for the equipment.

- The building's electrical distribution system must be configured to support REDG.

- The project may not be cost-effective. A home or building owner can calculate the Savings to Investment Ratio (SIR) by taking the annual savings in energy costs ($), multiplied by the life expectancy (years) of the system; then, dividing that answer by the initial cost of the system ($). The result is the SIR. If the SIR is 1.0 or greater, the project is considered to have a positive payback.

Resource—written and web:

- *NYSERDA Renewable Portfolio Standard*—a New York State policy, being implemented by the New York State Energy Research and Development Authority, which seeks to increase the proportion of renewable electricity used by retail customers. New York State's goal is to reach 25 per cent by 2013.
  - New York Renewable Portfolio Standard Program Evaluation Report (2009): http://www.nyserda.ny.gov/~/media/Files/EDPPP/Energy%20and%20Environmental%20Markets/RPS/RPS%20Documents/rps-evaluation-final.ashx?sc_database=web.

- NYSERDA DG/CHP Integrated Data System—NYSERDA's web-based DG/CHP data system includes monitored performance data and operational statistics for NYSERDA's Distributed Generation (DG)/Combined Heat and Power (CHP) demonstration projects. http://chp.nyserda.org/home/index.cfm.

- *NYSERDA CHP Projects Performance Data*—provides performance data, monitored hourly, which allows users to view, plot, analyze, and compare performance data from one or several different DG/CHP sites in the NYSERDA portfolio: http://chp.nyserda.org/home/index.cfm.

- *Northeast CHP Applications Center (NAC)*—focused on all aspects of combined heat and power applications, this Web site serves as a focal point for communication among key stakeholders in seven states in the Northeast (CT, ME, MA, NH, NY, RI, and VT). NAC provides services for education and outreach, as well as technical assistance: http://www.northeastcleanenergy.org/home/home.php.

- *U. S. Environmental Protection Agency CHP Partnership Program*—a voluntary program that seeks to reduce the environmental impact of power-generation by promoting the use of combined heat and power (CHP) systems. The partnership works closely with energy users, the CHP industry, state and local governments, and other clean-energy stakeholders to facilitate the development of new projects and to promote their environmental and economic benefits: http://www.epa.gov/chp/index.html.

- *U. S. Department of Energy Distributed Energy Program*—a program that supports cost-effective research and development aimed at lowering costs, reducing program emissions, and improving reliability and performance of distributed energy systems in order to expand opportunities for the installation of distributed energy equipment today and in the future: http://www.eere.energy.gov/de/.

- *U. S. Clean Heat & Power Association*—a nonprofit membership organization of businesses, energy industry groups, individuals, and others, whose mission is to create a regulatory, institutional, and market environment that fosters the use of clean, efficient local energy generation, including but not limited to combined heat and power, recycled energy, bio-energy, and other generation sources that lead to a demonstrable reduction in global greenhouse gas emissions: http://www.uschpa.org/i4a/pages/index.cfm?pageid=1.

- *Association of State Energy Research and Technology Transfer Institutions' (ASERTTI) National DG/CHP Performance and Testing Program*—an association whose purpose is to remove a barrier to the increased use of distributed generation technologies—namely, the unavailability of uniform and documented information on the electrical, environmental, and mechanical performance of distributed generation (DG) and distributed generation/combined heat and power (DG/CHP) systems: http://www.dgdata.org/ and http://www.dgdata.org/about.html.

- *Greenhouse Gas Technology Center (Environment Technology Verification Program)*—a Center operated in cooperation with Southern Research Institute (SRI), whose purpose is to verify the performance of commercial-ready technologies that produce, mitigate, monitor, or sequester greenhouse gas emissions. The Center is part of the U. S. Environmental Protection Agency's (EPA) Air Pollution Prevention and Control Division, which is under EPA's National Risk Management Research Laboratory: http://www.epa.gov/nrmrl/std/etv/center-ggt.html.

Resource—technical assistance and contact names:

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