

2015 Tribal Renewable Energy Webinar Series

Questions and Answers

“Energy Efficiency First, Zero Energy Ready Homes and Off-grid Hybrid Diesel Systems. ” Webinar
April 29th, 2015

Speakers

Amy Hollander; National Renewable Energy Laboratory; amy.hollander@nrel.gov
Robert Butt; National Renewable Energy Laboratory; Robert.butt@nrel.gov
Reginald Agunwah; Water and Environmental Specialist for The Ramona Band of Cahuilla;
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Attendees: 111

For Amy Hollander

Q: How does the DOE Zero Energy Ready Home program integrate with Passive House?

A: Passive House is one of several stepping stone programs, part of a pathway towards zero energy homes. Sam Rashkin stated in his May 2015 Energy.Gov Address, “All of the voluntary, high-performance federal government home programs integrate with Passive House. The surprising answer to that question is that we have an incredibly thoughtful set of programs for the housing industry. Yes, in fact good government. This began with a strong DOE commitment to align Zero Energy Ready Home (ZERH) with ENERGY STAR Certified Homes. Then, Zero Energy Ready Home coordinated with Passive House to form a continuum of high-performance label options for home builders. The staircase diagram below shows the resulting relationships. A good basic home begins with a code home complying with 2009 or more recent version of the International Energy Conservation Code (IECC). Then, the ENERGY STAR Certified Home label at the first step of the staircase assures above code performance with comprehensive building science. The next step is the DOE Zero Energy Ready Home program which makes ENERGY STAR Certified Home and EPA Indoor airPLUS a prerequisite to lock in critical building science and indoor air quality and adds best practices from the DOE Building America program. This label ensures high-performance homes to be so energy efficient they can offset most or all annual energy consumption with renewable energy. Lastly, Passive House with PHIUS Certification makes DOE Zero Energy Ready Home a prerequisite and then squeezes the last drop of additional efficiency for greater resilience and minimum energy consumption. Thus, the housing industry has a clear path for progressively more efficient homes that also ensures high-performance. Now let’s all work together moving builders along this path.” Below is the diagram that demonstrates the pathway.





- Q: Do tankless water heaters have special exhaust requirements?
- A: Tankless units come in electric or gas. Gas units require a closed combustion exhaust unit which sometimes requires a new flue that is smaller than a conventional gas hot water heater. Air Pressure Switch (APS) and High Speed Fan, combined with condensing technology allows for 2" PVC venting up to 60', often letting the installer run a flue through the existing chase without requiring an additional penetration to be made. Electric tankless heaters are 99 percent efficient but do not qualify for rebates or an Energy Star rating, which requires a product improve energy output 14 percent over older models. The worst traditional electric heaters are 93 percent efficient. Conventional tank gas heaters are only about 60 percent efficient, according to the Department of Energy.
- Q: On average what is the installed cost of a solar PV system (\$/watt)?
- A: All costs associated with a residential solar PV system are currently running \$2.99 per watt. A residential system is usually 3 to 4 kilowatts per home. Remember a 30% tax credit can make an array affordable. Costs below are from GTE for May of 2015. Equipment remains an important driver of overall system cost structures, comprising between 43% and 61% of modeled total system cash purchase prices. While ex-factory gate prices for modules have declined dramatically in recent years, they still constitute the largest single equipment cost for all system types.

	Q3 2013 (2015 \$/W)	Q1 2015 (2015 \$/W)	Change
Residential-Scale Benchmark	\$3.31	\$2.99	-10%
Commercial-Scale Benchmark	\$2.65	\$2.40	-10%
Utility-Scale Benchmark	\$1.81	\$1.77	-2%

For Robert Butt:

- Q: Do hybrid installations need to be compliant with any existing building codes?
- A: Absolutely. Many code requirements still apply, for example, NFPA 70 (National Electrical Code) Article 230.2 stipulates that equipment that has multiple sources be identified as such. Hybrid installations can have multiple sources of electricity connected to the same distribution panel board. Article 690 covers solar PV



systems. There are also related IEEE and ANSI standards, and organizations that promote these installations provide more information, including the Alliance for Rural Electrification <http://www.ruralelec.org/6.0.html>

- Q: Do you envision the US markets converting to renewable off-grid hybrid power generator systems in the near term (1-5 years)? Assuming the current CAPEX/ OPEX comparison gradually improves over this time frame.
- A: I don't think we'll see a large conversion to off-grid hybrid power generation in the next five years, mainly because the cost of doing so will not yet be viable compared to the status quo. I'd like to think that many utilities start realizing that they need to be part of the solution and start pushing for community microgrids that can share resources. Currently in the United States solar PV is running about 70 cents per watt. Keep in mind there is a 30% tax credit for solar PV residential through the end of 2016. On January 1, 2017 the tax credit reduces to 10% for commercial and residential leased systems, and to 0% for residential owned systems.
- Q: Besides the opportunities listed in the tribal webinar are there other market applications NREL is promoting for these types of systems?
- A: For hybrid systems, the first thing to examine is the available renewable resources. That drives the system costs and ultimately the decision to go forward. After that, the assessment goes toward reducing or eliminating fossil fuel generators, which implies energy storage. In my opinion, it is the energy storage component that will have the biggest impact in the near term, since costs continue to drop. Energy storage will be the future focus problem to solve in order to increase energy reliability, lower costs, eliminate risk of diesel spills, reduce annual fuel/diesel usage and reduce operating costs.
- Q: Do any solar PV systems use DC microgrids to date?
- A: The biggest obstacle to DC microgrids is cost. Retrofitting existing systems is usually cost-prohibitive. However, there are many incentives to build a DC system, since many of the power conversion steps typically needed in AC systems are avoided. Most applications seem to be with data centers, although a project is underway that includes solar PV at the Honda America Parts Plant in California and another is in the works at Xiamen University in China. An international conference on DC microgrids in Atlanta also just wrapped up.
- Q: Does NREL have studies and reports on hybrid systems?
- A: Following are some links for hybrid system case studies and workshops.
http://www.cleanenergyactionproject.com/CleanEnergyActionProject/Hybrid_Renewable_Energy_Systems_Case_Studies.html
http://apps1.eere.energy.gov/tribalenergy/pdfs/course_analysis_taylor2.pdf
 Also here is a link for a paper, "[Hybrid Power Based on Renewable Energies: A suitable and cost-competitive solution for rural electrification](#)"
 Another slide deck with good hybrid examples: "[Hybrid Renewable Energy Systems](#)" by Gary D. Burch.
- Q: What are other applications of hybrid based renewables?
- A: Village power; commercial power parks; industrial power quality; integrated building efficiency (CHP+ for net zero energy buildings); remote (off-grid) power; Distribution (grid) support; water resource management; green power; brownfields to brightfields; and power price stabilization.
- Q: Would a biomass engine be beneficial for remote power? Any case studies you are aware of?
- A: Yes, as long as there were plenty of resources to supply the system and the people to assist with the feedstock. There are many systems operating <http://biomassmagazine.com/plants/listplants/biomass/US/> and the U.S. Department of Energy (DOE) Tribal Energy Program maintains a Web site with information about tribal renewable energy case studies, including biomass projects
http://apps1.eere.energy.gov/tribalenergy/projects_technology.cfm#Biomass



Links to Helpful Resources

There are many resources available to help Tribes decide which renewable resource is best for them. These include:

- The DOE Office of Indian Energy Strategic Technical Assistance Response Team (START) Program is to assist in the development of tribal renewable energy projects. Applications are due March 4 and 5, 2015. To apply find an application here: <http://www.energy.gov/indianenergy/resources/start-program>
- The DOE Office of Indian Energy offers [education and training](#) on project development and financing and renewable energy fundamentals and an [Energy Resource Library](#).
- Tribal-specific renewable energy curriculum developed by the DOE Office of Indian Energy can be accessed any time on the [National Training Education Resource website](#).
- Basic information on the [types of renewable energy](#), as well as [tools and resources](#) for assessing renewable energy potential, are available on the NREL website.
- [Energy 101](#) videos developed by the DOE Office of Energy Efficiency and Renewable Energy provide short, basic overviews of the various types of renewable energy.
- The DOE Office of Indian Energy and Tribal Energy Program offer up to 40 hours of in-depth [technical assistance](#) for federally recognized Indian Tribes, tribal energy resource development organizations, and other organized tribal groups and communities to advance tribal renewable energy and energy efficiency projects.
- The DOE offers information on renewable energy or energy efficiency from their Help Desk: http://apps1.eere.energy.gov/tribalenergy/request_information.cfm
- The DOE offers [approved ESPC contractors](#). Please see this link.
- The DSIRE website records all rebates and resource information by state: <http://www.dsireusa.org/>
- The Tribal Energy Program tribal projects by technology: http://apps1.eere.energy.gov/tribalenergy/projects_technology.cfm#Biomass

Answers are provided by the National Renewable Energy Laboratory and webinar guest speakers. If you have additional questions, email indianenergy@hq.doe.gov. The Tribal Renewable Energy Webinar Series is sponsored by the DOE Office of Indian Energy, Tribal Energy Program, and Western Area Power Administration.

