

U.S. Department of Commerce
Renewable Energy and Energy Efficiency Advisory Committee
Charter 6, 2020-2022 ● Recommendation Fact Sheet

Recommendation #5 [Approved December 9, 2021] on Building Awareness within the International Trade Administration (ITA) about the Necessity to Help Communities with a Planning & Investment Process for Virtual Power Plants of Integrated and Linked Distributed Energy Resources

To “Build Back a Better World,” we recommend that the Department of Commerce create and distribute a series and variety of digital infographic materials that illustrate the benefits of energy efficiency and linked renewable energy systems, including the integration of distributed energy, hybrid power systems, and storage resources as virtual power plant (VPP) systems. This educational outreach would help increase awareness among Commercial Service’s Global Energy and Environmental Technologies Teams and network partners about the potential benefits of exported VPP systems and how to help communities plan, develop, finance, and build such projects. These systems can be readily integrated to provide baseload and community power and increased energy resiliency utilizing local grids serving multiple industry sectors; agriculture, water, communications, data, healthcare, infrastructure, etc.

Sub-Committee(s):

Trade Promotion & Market Access

Background Information:

Given climate crises, it is imperative that U.S. government help communities plan to become sustainable for resiliency by taking a water/energy/food/security nexus or holistic approach, which is critical to water management (the number one issue in the world) and by competing with China’s “Belt and Road Initiative” (BRI), which is exporting its renewable energy technologies and services e.g., wind and solar power plants.

The U.S. needs to promote the President’s “Build Back a Better World” (B3W) initiative as an alternative to China’s BRI. This would include holistic community planning, which would lead to the exportation of America’s renewable energy and energy efficiency technologies, hybrid power systems, and services in building virtual power plants (VPP) - cloud-based distributed power plants that aggregates the capacities of heterogeneous distributed energy resources (DER) for the purposes of enhancing clean power generation. The planning process would begin with an integrated national and regional resource assessment.

A virtual power plant is a system that integrates several types of power sources to give a reliable overall power supply. The sources often form a cluster of different types of dispatchable and non-dispatchable, controllable or flexible load (CL or FL) distributed generation (DG) systems that are controlled by a central authority and can include micro combined heat and power (mCHPs), natural gas-fired reciprocating engines, small-scale wind power plants (WPPs), photovoltaics (PVs), marine renewable energy power plants, small hydropower, biomass, backup generators, and energy storage systems (ESS).

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This system has benefits such as the ability to deliver peak load electricity or load-following power generation on short notice and improved system resiliency. Such a VPP can replace a conventional power plant while providing higher efficiency and more flexibility. More flexibility allows the system to react better to fluctuations, but whose complexity requires complicated optimization, control, and secure communications.

Virtual power plants represent an “Internet of Energy.” These systems tap existing grid networks to tailor electricity supply and demand services for a customer. VPPs maximize value for both the end user and the distribution utility using a sophisticated set of software-based systems. They are dynamic, deliver value in real time, and can react quickly to changing customer load conditions.

Increasing numbers of cities, regions, and industries find themselves operating with a mix of centrally generated and distributed energy resources, which can represent a mix of energy technologies, including solar, wind, unconventional hydropower, gas and even nuclear. For both developed and developing regions, decentralized distributed power generation and energy production and storage provide a range of benefits, such as improved access, resiliency and efficiency, and faster access to power in communities lacking grid access such as in large parts of Africa. These distributed energy systems can serve both remote areas and high-density populations.

Energy delivery systems worldwide are undergoing unprecedented change. There is a rapidly growing market for smaller, decentralized energy systems as a complement to large central generation assets and grid infrastructure, especially to serve remote rural communities. When distributed energy resources (DER), including energy storage, are integrated, and combined as hybrid and virtual power systems, there can be even greater efficiencies. While opportunities for centralized power generation may be easily identified and communicated to interested bidders/suppliers through public central procurement procedures, opportunities for decentralized power systems are not as easily identified or advertised and cut across many different sectors.

The United States leads in developing and supplying these integrated technologies and control systems. By creating digital infographic materials like “just-in-time production” posters and tent cards illustrating integrated and linked DERs that can provide power to a community, ITA would help increase technical and commercial awareness and competency around the significant potential for the broad application of DER-based hybrid and virtual power systems among U.S. Commercial Service officers and network partners, including Japan-U.S. Clean Energy Partnership (JUCEP), multilateral institutions such as the World Bank Group, Inter-American Development Bank, World Health Organization, and the United Nations. This would highlight the breadth and depth of leadership of the U.S. industry for tailor-made applications, based on community plans, in emerging economies.

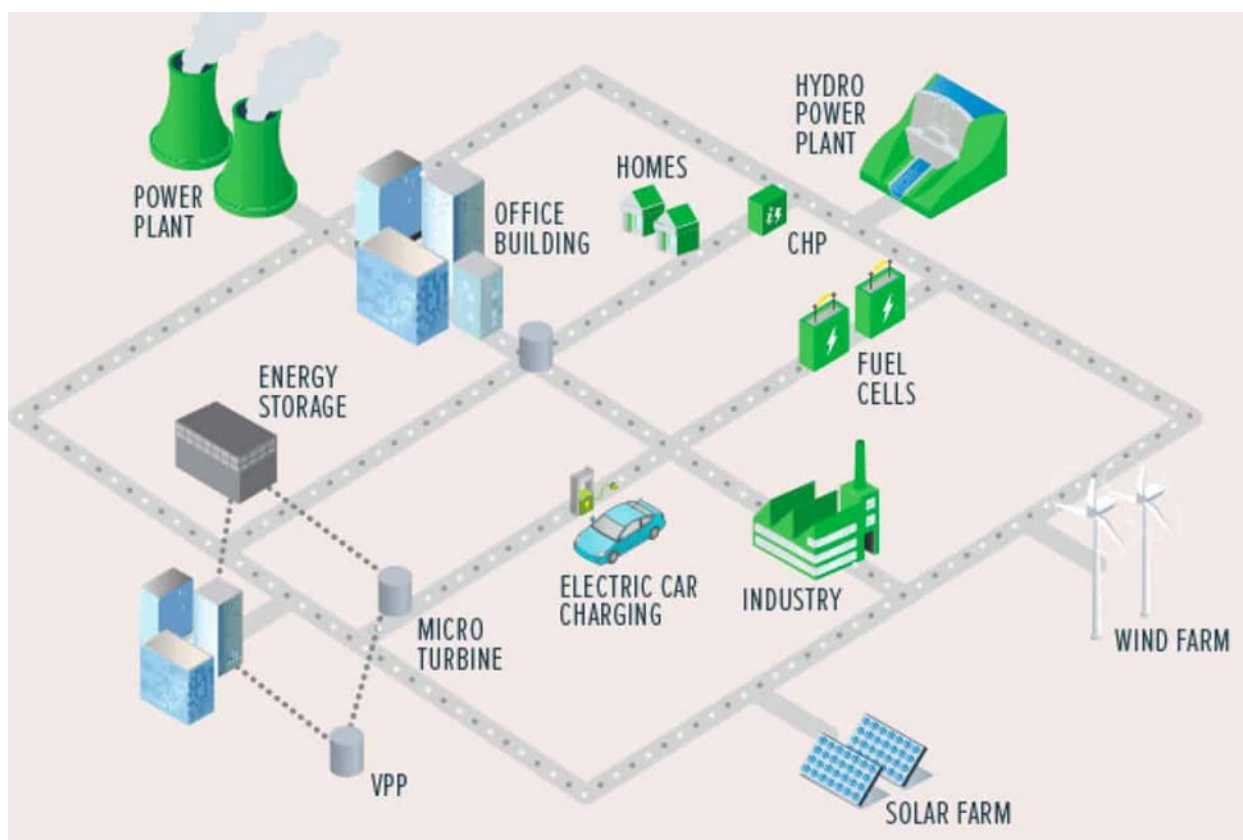
A suggested basic structure for a variety and series of digital infographic “just-in-time production” materials, like posters and tent cards, is as follows:

- Header – Building Back a Better World
- A 3D image of a power grid, with detailed depictions of multi-technologies, microgrids, and community grids – some independent and others integrated with (but able to be separated from) the grid
- Sub technologies (e.g., water, load reduction, sensors/controls/software, energy generation and energy storage, including fuel cells, agriculture, communications, data, healthcare, infrastructure)

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- Within the technology 3D picture, consider including sub-boxes with basic technology descriptions, e.g., MicroCHPs – gas-based generation with heat recovery that provides baseload electric supply and a variety of thermal output options (hot water, chilled water, steam, cooling)
- Weblink to Sample Project Case Studies with project development and financing
- Virtual webinars and seminars with key U.S. stakeholders for targeted prospect countries
- Phone number and email for ITA’s Industry & Analysis Office of Energy and Environmental Industries and/or Anchor Coalition a project of the Ocean Foundation, a 501 (c) (3) organization (see introduction to Anchor Coalition), which empowers communities by helping them prioritize use of clean indigenous resources and create plans for use. To become effective, Anchor will need to include renewable energy and energy efficiency trade associations, universities, system integrators, and NGOs as part of the Coalition and to “partner” with the U.S. Department of Commerce

The following VPP graphic is a sample, which needs to include the utilization of local grids serving multiple industry sectors; water, agriculture, biofuels, communications, data, healthcare, and infrastructure that might serve as a platform for ITA’s series and variety of digital infographic materials like “just-in-time production” posters and tent cards:



Source: renewablepedia.com

Expected Effect on U.S. Export Competitiveness:

Expanded market opportunities for U.S. RE&EE products and services through “Build Back a Better World” that increase more affordable energy supply, while enhancing reliability and controlling costs. Establishing

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U.S. (and Japanese) companies as leaders and the most desirable providers of the products and services needed for rapidly evolving energy and water supplies.

Specific Agencies Responsible for Implementation:

U.S. Department of Commerce, Department of State, USAID, USTDA

Measures of Success:

- Increased generation of trade leads for DER and virtual power plant systems
- Increased ITA market outreach content (e.g., Export and Investment Promotion Programs, webinars, Discover Global Markets panels, U.S. Embassy trade promotion events, workshops)
- Percentage of U.S. Embassy commercial and business offices that display materials like a poster
- Working sessions at REEEAC meeting
- Building collaboration among sector trade industries through entities like Anchor Coalition