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PALTEK CORPORATION**Briefing on Smart Grid Initiative**

PALTEK CORPORATION, hereinafter PALTEK or the Company, launched its smart grid business unit from 2010. Since then, it has stepped up efforts to develop low-environmental impact technologies provided through wireless communications solutions, research and development of next-generation power generation systems for production plants using wireless sensor networks, and Power Line Communications (PLC) products. In addition, PALTEK is playing a central role, along with Smart Energy Laboratory. and dSPACE Japan Co., Ltd., in the Yokohama Smart Community, a technology development project supported by the municipal government of Yokohama to utilize naturally renewable energy sources involving 20 companies, government agencies and academic institutes that was established in June 2011. The initiative has begun the development of technologies for a dispersion switch system for power generated locally through naturally renewable energy sources.

PALTEK briefed shareholders and investors on its smart grid initiative on October 27, 2011 to introduce the Yokohama Smart Community project and other proprietary activities. PALTEK Chairman of the Board and President Tadahito Takahashi, Smart Energy Laboratory CTO Yoshimichi Nakamura and dSPACE CEO Hitoshi Arima took part in the briefing. The following is a summary of the event.

**Building the Smart Community of the Future:
Yoshimichi Nakamura, CTO of Smart Energy Laboratory****Grand Vision for Smart Energy: To produce, store and use wisely**

The Smart Community concept emerged from the idea that the essence of energy was to be found in nature. Plants possess the capacity to produce, process and store energy, and they skillfully exploit this ability to create, store and wisely use energy. Based on this understanding, a Grand Vision initiative was created to apply this capacity by plants as a conceptual basis for smart houses.

A smart house is a house equipped with a self-regulating energy coordination system with the following four capabilities: first, the ability to introduce naturally renewable energy on a smooth basis; second, it standardizes systematized power and cut peak power consumption on demand; it can recharge electric vehicles; and lastly, it can cope flexibly with blackouts. In specific terms, the project

will be creating four processes that take into account these four capabilities.

- 1) Creation of electric power: By utilizing naturally renewable energy sources, it resolves the reverse power flow problem
- 2) Control: It possesses a self-regulating energy control system using an “interactive” AC/DC inverter, which will be particularly vital developing such a system in the future
- 3) Management: It uses an advanced home energy management system (HEMS) that optimizes power management that is most appropriate to the energy needs of the smart house’s resident; the system is comprehensive in that it includes IT, as well as meteorological, power consumption and other information.
- 4) Storage: It can charge EVs at home and has storage cells that serve as a power backup in case of emergencies

A smart community is a systematized aggregation of houses installed with self-regulating energy control systems. By connecting to this community, it becomes possible to exchange both information and energy. A smart community not only provides greater stability against energy burdens, it concurrently has the capacity to both store and generate power. Moreover, the Yokohama Smart Community proposes to establish a community center as a place to collate the information that is exchanged.

This smart community concept aims to support an entire city through the coordination between smart houses and smart community center. To achieve this, answering how to construct such a city and how to make it more vibrant assumes great importance.

Building the Yokohama Smart Community: Hitoshi Arima, CEO of dSPACE Japan

Launched from June 2011, the project aims to create safe and prosperous communities that will extend to the future. While 39 companies are presently participating in the project, more are expected to join; it is also being positioned to partner with the Smart House Consortium that has been launched in Fukuoka. It aims to construct self-regulating energy systems within the community through the systematic coordination and integration of smart houses.

The role of dSPACE—which will provide the development tools for the mechatronics management software—will begin with applying automotive industry technologies to energy systems, and to create power management system model to be used in motor vehicles and home appliances.

dSPACE is currently engaged in management design by conducting simulations based on a mathematical model developed for the object to be controlled. In addition, the real-time power controller to generate simulations of solar cell power output being developed by PALTEK is using a model base design product provided by dSPACE. By using dSPACE technology, it becomes possible to control the supply of photovoltaic power in response to weather information and the amount of solar radiation available.

By exchanging information with other countries, dSPACE believes that this system can be adopted not only in the cities of Fukuoka and Yokohama, but as a global standard in the future.

Smart Grid Initiative: PALTEK Chairman and President Tadahito Takahashi

Developing a Grand Vision

PALTEK established its smart grid business unit in 2010, a decision that arose from the Company's desire to enter a business that would lead to the protection of the environment, making it the second core business following its current core competence of semiconductor engineering. The Company believed that the key first step in this initiative was to develop a grand vision. Following the great earthquake and tsunami of March 11, 2011, dialogue on converting to smart energy took on greater intensity. Yet much of the discussions lacked a grand vision, and was thus unfocused and ambiguous. In light of this situation, PALTEK began engaging parties that have both the seeds as well as needs in discussions on a grand vision, and furthermore, aims to facilitate the development of new products as well.

Additionally, PALTEK became a participant in Fukuoka city's smart house project in August 2010 as an arena sharing a grand vision regarding smart communities. Having established the Yokohama Smart Community project in June 2011, the Company will be concentrating its resources on this project in the future.

Development of New Products

PALTEK is now marketing a photovoltaic simulator that it developed in-house. By using simulation data provided by dSPACE mentioned above, as well as using a model base design derived from smart house proof-of-concept tests, the Company was able to control the output of an interactive AC/DC inverter and generate a simulated power output environment for solar cells. PALTEK was mainly responsible for high-speed computational processing and hardware design. This simulator optimizes electricity supply in response to the amount of sunlight available at any given time, and the objective is

to reproduce the electric power generation of a specific area based on forecast data provided by the Japan Meteorological Corporation.

Yokohama Smart Community

The project seeks to capitalize on the technological expertise of companies, including those from abroad and venture firms, which are participating in this community. For instance, one startup based in Yokohama is currently engaged in the R&D of a bifacial solar cell that boasts a 30%-increase in the power generation efficiency of single-sided solar cells. These bifacial cells allow for vertical installment, sparing users living in areas that experience winters with significant snowfall the hassle of constantly removing snow from their solar panels. Another Yokohama startup is developing a large-capacity and portable lithium-ion battery to be used as an external battery pack. PALTEK aims to maximize these technologies by setting up a framework that matches them to the daily-life needs of people. In addition, condominiums that will be constructed in the community will be co-developed between technology firms and condo developers, equipped with such new solutions as energy optimization systems featuring wireless power management, as well as making existing central heating systems “smarter” through software and hardware upgrades. 🏠