M. Vincent DELCOURT is a automation and signal processing Engineer (Ecole Supérieure d'Ingénieur en Génie Electrique, Rouen, 1996), with a Master in "Image Processing" graduated from University of Rouen in 1997.

He works at SNCF's Innovation and Research Department since year 2000, first as project manager and now as manager of a business unit called "ETM", dealing with energy efficiency for SNCF and railway system, with three main domains of activity:

Infrastructure :
- Innovative concept and tools for Future Electrical Infrastructure railway will integrate delocalized renewable production sources and storages systems

Rolling Stock:
- Modeling and Design of Command Structure for Railway Hybrid Systems.
- Real-time's platform simulation of hybrid railway traction for the evaluation of energy managements

Buildings: Global model based anticipative energy management of a complex railway station

Nextstation 2013 Conference

Moscow – Kazanskiy Station
17th – 18th October 2013

Application form

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Organisation SNCF/ Innovation & Research	
Title in the organisation Group Manager for energy and maintenance	

Short summary

Title of the lecture: How energy smart meters could help to reduce energy bills of train stations
Theme (1 to 6) 4 Energy
Smart grid systems can provide significant opportunities to save energy. Data provided by smart meters allows trains stations managers to better understand their own energy use, helping them identify energy saving opportunities. Smart Meter Systems are an integral part of the Smart Grid infrastructure in data collection and communications. SNCF has set up experimental equipment to conduct test trials of Smart Meters Technologies, and has Begun Partial Verification Testing. SNCF has implemented a smart metering experiment in Versailles Chantier Station. The objective of this experiment is to operate a real system, in the field, to log data and to validate fundamental technologies. System operations began in 2011.We compare different kind of technologies: A sub-metering system gives the readings about a limited number of appliances specified beforehand. Therefore, the installation of a further appliance requires a new, intrusive, costly sub-meter. Nialm technology for Non-intrusive load monitoring (NIALM), or energy disaggregation, aims to break down a station's aggregate electricity consumption into individual appliances. Nialm is it the future of smart meters technologies? What are benefits for customers? We would like to present you our feedback about this experimentation.

Please send this form to guigon@uic.org
Before May 22nd 2013

Way to increase energy efficiency of stations

Since October 2010, SNCF has been engaged in an exploratory project at the Saint-Denis and Versailles Chantier Stations. The aim of this project is to develop the systems needed to design a "smart" station capable of managing its supply, production and consumptions of energy, with the ultimate goal of creating positive-energy train stations.
In order to reach this goal the first part of our work has been to determine energy Consumption and Load of stations. It's the first step of the process to increase energy efficiency of stations. Significant saving in energy consumption can be achieved by better energy management and control in stations. Recent studies indicate that providing a building energy manager with a continuous feedback on the building appliance-specific power draw can lead to significant energy saving around 10%. But we can't do that with traditional electrical and gas meters. They measure total consumption but they provide no information of when the energy has been consumed and by which appliances.
Such feedback must be based on continuous monitoring of building appliances. By attaching a sensor or a communication device to each appliance, it is possible to collect and disseminate the power-draw information in near real time.

A first series of measurements was done with 200 wireless sensors installed on about fifty electrical cabinets to glean as much information as possible about where the energy is going. Unfortunately, this method is costly and requires significant installation and maintenance efforts.

A more sophisticated way to obtain appliance-specific data is by disaggregation of total power consumption data acquired at the main breaker level. Such nonintrusive appliance load monitoring (NIALM) uses a single point of power measurement (e.g., of the electric feed for the whole station), combined with special signal processing techniques.

In a station, each appliance has a unique energy "signature" called a *power jump*: the increase in energy consumption when an appliance is turned on. By analyzing power jumps, we can identify a signature for most devices in the station, then used a sophisticated algorithm to separate those signatures from the overall energy consumption.
Instead of a single aggregate total for energy consumption, users can now see just how much heating, lighting, displays, lifts …. is tacking onto their monthly electricity bill. Beyond the obvious advantages, there are other benefits to NIALM:

- A user can tag and track individual appliances over time. This makes it possible to determine which devices consume the most power, and how much energy is wasted by leaving devices powered on for longer than necessary.
- This process can also help identify inefficient or malfunctioning appliances, and allows users to determine whether or not replacing them will ultimately be a cost-effective decision.
- Users on a plan where energy expense varies with time of day can use this information to plot the most cost-effective time to use particularly energy-intensive appliances.
- Utilities can also use NIALM data to quickly detect and identify outages in their grids.

The first conclusion of our experimentation is: Office activities and lighting are the places to look for gains in efficiency. By applying a few best practices which consist in turning off systems that are left on unnecessarily, like heating, lighting and computer, energy savings of about 15% can be obtained quickly and easily.
To go further, SNCF works with partners to develop an energy management system. Unlike BTM (Building Technical Management), this one will be able to make adjustments automatically according to changes inside the stations: e.g passager and train flows and the state of equipment (lighting, escalators, etc…). The potential energy savings of 30% have already been demonstrated on lightning consumptions

The next step to increase the energy efficiency of the station is to use passive techniques. The idea is to optimize solar gain, and using advanced active systems, such as mechanical ventilation with heat recovery. Making your building as energy efficient as possible, for example by installing high levels of insulation and double glazing, before investing in renewables will ensure you get the maximum benefits from any renewable technology. After maximising energy efficiency, use of renewable energy can offer a means to further reduce the carbon dioxide emissions generated by the use of a building

This kind of Low-energy station could play an important role in running a micro-grid by connecting the station to other buildings in order to optimize energy management of a district in the future.