

# The Internet of Things for Energy

Michel Kamel Ph.D., Paul Donahue - MelRok LLC

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*Can the emerging Internet of Things “IoT” deliver more energy efficiency; enhanced sustainability; dispatchable demand management; and even dispatchable distributed solar generation?*

*If so, how can billions of energy devices (i.e., smart meters, sensors and energy management systems) be made to interoperate and communicate with each other within seconds when none are Internet (IPv6) compatible?*

*This White Paper answers these questions and reveals how a new Energy IoT platform called the OneTouch helped a seven million square foot University of California campus win national awards for exceeding their 2020 Energy Savings and Sustainability goals 6 years ahead of schedule.*

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## Ushering in a New Era

In 2013, MelRok deployed its OneTouch Energy IoT throughout more than one hundred buildings at the University of California, Irvine’s 7 million square foot campus to connect energy devices and systems to the cloud for fast demand management, optimum energy efficiency and integration of distributed renewable resources. In 2014, UCI won a DOE national award for achieving sustainability and energy reduction goals 6 years ahead of schedule.<sup>1</sup>

The UCI deployment proved that the OneTouch’s real time streaming of energy information, analytics, and control to and from all energy devices and the cloud is scalable and the best and lowest cost way to achieve optimal energy efficiency. More importantly, the OneTouch has ushered in the Energy Internet of Things.

### Energy IoT: A Necessity

The Energy Internet of Things means the real time connectivity of all energy devices in order to enable dispatchable demand and dispatchable distributed power generation. These capabilities are essential for the integration of renewables into the grid and to ensure resiliency of the power grid. Currently renewable resources are not networked and not controlled, and thus represent a threat to the grid as more renewable resources are deployed. Successful integration of renewable resources into the grid also requires the dynamic and real time demand management of residences, buildings, campuses and microgrids.

## Energy IoT: An Impossibility?

The core innovation of the Internet is that any computer device (i.e., laptop, tablet or smart phone) can communicate with any other device for information, commerce, communications and social media because common IP protocols connect all devices to the cloud. This core innovation still eludes the world of energy devices.

Today up to 18 incompatible protocols are used for commercial and residential energy meters, devices, and systems, including smart inverters and utility Smart Meters. As such, the bulk of energy devices and systems are islanded and cannot communicate with each other for real time analysis and control of energy.<sup>ii</sup>

This lack of interoperability impedes Energy IoT.

## Real Time Connectivity: Energy IoT's Fifth Element

The Internet of Things was originally defined by three elements: (1) Universal IP addressing ("IPv6"); (2) Secure Universal IP Cloud interconnection; and (3) Big data Cloud computation.

Recently, experts have added a fourth element: secure communications and networking (i.e., Software Defined Networks or "SDNs").<sup>iii</sup>

MelRok has discovered and patented a 5th element essential for Energy IoT: real time connectivity, i.e., "streaming", of energy information, analysis, and control to and from all devices.

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## The Challenge of Existing Energy Devices

Energy researchers believe that open systems and standards will lead to a plethora of new demand management and energy efficiency opportunities through access to big data analytics, and control of devices using open cloud technologies.

The challenge is enabling open cloud technologies to economically connect to the billions of energy devices that are already installed and working at utility customer locations.

In addition to connecting billions of installed devices, hundreds of millions of these devices must be controlled within seconds to ensure grid resiliency — a daunting task even for Internet connected devices.

To enable this, MelRok made the OneTouch backwards compatible with all legacy devices and their native protocols while also incorporating all emerging open systems and new standards.

## Introducing the OneTouch

*Universal compatibility - Real time connectivity - For all energy devices*

The OneTouch communicates and interoperates with all energy devices, sensors, sub-meters, renewable systems, and Smart Meters through their native protocols, and instantly forms a fully compatible ad hoc Energy IoT network to connect within seconds and stream real time energy information, analytics, and control between the cloud and all energy devices and systems.



### **MelRok's OneTouch Makes The Impossible, Possible**

Distributed solar (rooftops) cannot yet replace centralized carbon generation for the Grid because distributed renewables cannot be managed in real time or made to be “dispatchable”.<sup>iv</sup>

The OneTouch can reach all devices in its network within a second. MelRok's OneTouch real time Energy IoT enables distributed renewable systems to precisely dispatch the amount of energy required by a local facility, the grid, or a microgrid at any moment.

With OneTouch Energy IoT, Dispatchable Demand management can now act “hand in glove” with distributed renewables at a facility, on the grid, or on a microgrid.

The OneTouch rapidly analyses, controls, and balances energy loads to accommodate variability in supply from renewable energy systems.

OneTouch's networking of all distributed renewable energy resources and loads overcome every obstacle to integrating distributed renewable energy onto the Grid.

### **OneTouch is now available**

MelRok's OneTouch is available for purchase by customers, including VARs, consultants and utilities. MelRok OneTouch Energy includes a fully compatible OpenADR 2.0 client.

For more information Contact Charlene Richards, [Charlene@melrok.com](mailto:Charlene@melrok.com), (855) Melrok1 ext. 1201

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## **About the Authors**

### **Michel Kamel, Ph.D.**

Dr. Kamel is the CEO of MelRok LLC. He is a former rocket scientist and a world expert in energy systems and analytics. He is the author of several research publications and patents in aerospace and Energy IoT. Michel is a member of the Engineering Leadership Council for the Henry Samueli School of Engineering at UC Irvine, and the Board of CleanTech OC. Prior to MelRok, Michel founded Space Launch Corporation, a defense contractor focused on the development of micro satellite launch vehicles. Michel has a Ph.D. from Stanford.

### **Paul Donahue**

Mr. Donahue is the Chairman of MelRok LLC. He is a former Senior VP of Gannet Media and was the founding CEO of StarGuide. Paul led the regulated broadcast industry in its multi-billion dollar conversion to HD digital transmission standards. Paul is a member of the IEEE Power Engineering Society. He holds numerous Patents in internet media transmission and Energy IoT.

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## **About MelRok**

MelRok provides its patented OneTouch Energy IoT Technology and Platform as a Service (PaaS) for commercial and industrial enterprises, energy service companies (ESCOs), OEMs and utilities. MelRok is based out of Reno, NV, with engineering offices in Orange County, CA, and sales offices in Bentonville, AR, and Liverpool, UK.

 **MelRok** Energy IoT™



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<sup>i</sup> UCI Press release, May 12 2014

<sup>ii</sup> Broadcom presentation: CaliT2 conference 2014

<sup>iii</sup> IEEE Spectrum November 2014 special report on Software Defined Networks or SDN

<sup>iv</sup> Renewable energy article, IEEE Spectrum November 2014