



Specialist Consultants  
to the Electricity Industry

# PSC NEWS

Helping our clients power the world



Issue 53 | May 2017

## PSC and Harmonic Launch New Analytics Service Offering

PSC and Harmonic have joined forces to launch a new Analytics service offering to the electricity industry, combining Power Systems Engineering and Data Science. Warwick Glendenning, CEO PSC Asia Pacific and Phil Shepherd, CEO Harmonic officially launched the partnership in Wellington on the 26th April 2017.

Recognising the rapid change affecting the electricity sector and the approaching 'data tsunami', PSC and Harmonic will work together to solve complex industry challenges through advanced Analytics.

The proliferation of the Internet of things (IoT), Distributed Energy Resources (DER) and the ongoing pressure on electricity industry companies to optimise existing assets and make 'data driven' decisions on investments makes Analytics a vital asset management tool.

PSC and Harmonic will provide electricity industry companies a comprehensive Analytics service. We will help our clients to unlock the value of big data to solve complex challenges and make sound investment.



### THE NEXT EVOLUTION OF PSC

I am very pleased to announce the next evolutionary step for the PSC group of companies. On April 29th, 2017, the founders and existing shareholders achieved completion of a management and staff buyout led by PSC North American CEO, Alex Boyd.

This transition has resulted in a single PSC Group operation that has consolidated all the global PSC group of companies into a single, global operating entity. This is exciting times for all the staff at PSC as this transition extends ownership to many of them and allows PSC to continue forward as an independent, specialist engineering consultancy. For clients, it provides certainty that the client and employee focused culture that I have worked hard to establish and maintain will continue for the foreseeable future. It also provides certainty that PSC will continue to apply our proven ability to evolve our geographic foot print and service offerings in response to the dramatic changes that are already happening in the global electricity industry.

Over the next month I will be completing our annual staff presentations along with many client visits, I am more than happy to discuss this activity and bring you all up to speed.

Regards

Tony Armstrong, Chairman, CEO & Co-founder

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# PSC joins New Zealand Government Delegation to the USA

For more than 5 years, PSC has delivered critical insight and technical expertise for Distributed Energy Resource projects around the world, dealing with renewable generation, storage, and controls. In New Zealand, PSC has recently directed considerable focus towards the integration of PV installations with electric vehicles, leading to the development of its own electric vehicle solution powered by aggregated solar arrays positioned around New Zealand including the PSC office in Tawa.

In recognition of these efforts, PSC was invited to join a NZ electricity sector delegation led by Energy and Resources Minister Judith Collins on a mission to meet with tech companies, utilities and electric vehicle manufacturers in Silicon Valley, California, in April.

The primary motivation for PSC's attendance, says CEO and Co-founder Tony Armstrong, was to calibrate whether PSC is heading down the right track in its exploration of electric vehicles and DER.

"The big issue facing the industry now is data aggregation and control. What we ultimately gained from this trip was confirmation that it's not just about electric vehicles or embedded generation – it's about what happens once you plug it all in."

One Silicon Valley business to receive a visit was Tesla, in Palo Alto. With the unveiling of the Powerwall and Powerpack battery storage products in 2015, and the 2016 purchase of the United States' largest solar panel installer in SolarCity, Tesla is setting a new standard for what EV service providers can offer consumers.

"Anyone can buy an electric car and plug it in," says Tony Armstrong. "The reality on the horizon for consumers is a life behind the meter, a vertically integrated home environment, generation on the roof in the form of solar panels or solar roof tiles, storage in the form of a battery and a load in the garage in the form of an electric car. Sitting across this is some form of 'smart' integration with the external distribution or community provider."

"PSC's sole focus is data aggregation and control. I am confident we

are well positioned to guide our clients through this new phase in the industry, and that is due in large part to our clear vision of the big picture, and our versatility to provide support across unique markets."

As more and more end-to-end DER solutions like this are adopted at the commercial and consumer level, data aggregation and control of that information will be vital to utilities.

Tony praised California as one of the world leaders in renewable energy and electric vehicle adoption.

"Vertically integrated utilities like California's – those that manage generation, transmission, and distribution – face less conflict of interest in the business model, and that leads to quicker adoption. The challenge for PSC and our clients in regions such as New Zealand is how to make this work in a non-vertically integrated market."

PSC is working with electricity industry clients around the world to design, operate, and optimize the effectiveness and efficiency of DER solutions. Follow PSC's contributions to the DER space on LinkedIn and at [pscconsulting.com/renew](http://pscconsulting.com/renew)



PSC CEO and Co-founder Tony Armstrong (third from right) and the New Zealand Government Delegation

## BIG DATA: LESS APOCALYPSE, MORE 'BIG BANG'

Avalanche, tsunami, explosion – the language we use to describe the rapid growth of enterprise data is telling. Given that corporations and utilities will need to evolve simply to manage, as well as extract value from these giant data flows, it's only natural to perceive this massive influx of information as a challenge to business as usual. But there is also a ton of potential in this wealth of new data.

And while the data storage methods of organizations' architectures will need to adjust to capture all this new information, **the biggest challenge facing utilities today is not collecting data – it's making sense of it all.**

### What's in Store?

Perhaps it is no surprise then that data analytics is one of the fastest growing job markets in the world. Utilities are also betting big on data analytics. In the long run, harnessing big data will allow utilities to:

- Optimize business processes

- Increase agility and responsiveness to outages or equipment issues
- Reduce operational costs
- Improve system resiliency
- Improve customer service
- Improve planning for use of distributed energy resources (DER)

Improvements in the speed and accuracy of usage information will yield many benefits. For example, utilities providing demand response programs will see improved efficiencies.

Increased situational awareness will also improve load forecasting, which can lead to smoother daily operations and planning, as well as more effective implementation of renewable energy into the grid. But it's not just renewable resources that benefit – the more current the information at utilities' fingertips, the more efficient all energy production, transmission, distribution and utilization becomes.

More data analytics will also enable utilities to significantly reduce operations and maintenance costs, by revolutionizing traditionally labor intensive tasks like fault location and call center operation. All of this will in turn improve the customer experience of electricity consumers.

In the long run, the information architecture of utilities is likely to become so advanced that it combines real-time data collection and analysis with automated decision-making.

Clearly, there are tremendous value-creating opportunities for utilities able to translate data into actionable insights. And while the potential benefits of data analytics are known, the deployment of big data infrastructure, software and services poses real challenges to utilities.

## Challenges

Achieving the sort of architecture that allows the right information to reach the right place at the right time is critical to unlocking the value of big data. Utilities will be challenged to revise their information architecture to improve business processes to ensure consistent access to quality data.

Of course, developing a big data-ready architecture is only one piece of the puzzle. One outcome of the fact that data production is vastly outpacing data usage is that **many utilities simply aren't taking advantage of the data they already have.**

Part of the problem might be educational – when 235 utility respondents were asked by Black & Veatch about the type of data analytics they were using to improve operations, more than 30% said they didn't know. The convergence of IT and OT may alleviate some of the confusion around how data analytics is supporting utilities, and how it can be leveraged in the future.

Perhaps a related effect of this is the difficulty many utilities (more

than 40%) have justifying the ROI of automation and analytics projects. When coupled with the commonly cited budget constraints of many utilities, achieving approval for large up front investments can be difficult.

It's also just a daunting exercise. Transitioning from data systems that were designed to facilitate operations toward more advanced systems that capture much larger amounts of information in easily mineable ways presents a major challenge for utilities. The path to unlocking the value of big data is marked by a lot of work to rationalize and restructure unlike systems. **The application of experienced data science talent is becoming increasingly critical to utilities.**

## Moving Forward

Nevertheless, while the maximum value in big data may derive from a real-time operations model that is still years away for many organizations, utilities can see more immediate benefits from gradual evolution in this direction. One path forward has been the adoption of individual analytics projects, rather than an enterprise wide adoption. This allows utilities to explore the value of advanced analytics but within a restrained scope that minimizes the number of stakeholders. It also provides a stepping stone for cleaning up data stores which will be critical to the acceleration of future system rationalization.

The well-informed, strategic adoption of standardized information and business processes will provide utilities with the foundation for implementing analytical tools that can transform their organizations from reactive ones to proactive ones.

The rise of big data is imposing, but it doesn't have to be a threat. **Proper organizational preparedness will allow utilities to navigate the wave of big data, rather than be consumed by it.** That means a smarter grid, a more effective utility, and a happier customer.

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# PSC IMPROVES MODELLING CAPABILITIES AT AVISTA

For Utilities like Avista, keeping the data model for their EMS control system up to date and accurate is a significant effort requiring dedicated staff, tools and processes. Avista was seeking to improve their modelling tools and enhance the capabilities with advanced functionality like the flexibility to work on separate model versions simultaneously, as well as modelling ahead of time and shelving those changes for future rollout. To achieve this, PSC performed the implementation of GE Grid's **e-terrasource**, and worked with Avista to design and build a semi-automated model data entry tool that significantly reduced the manual effort required to perform model updates.

Based on PSC's deep experience with GE Grid's **e-terra** suite of products, and track record of supporting the unique environments of utility customers, Avista asked PSC to replace their internally-developed modelling tools for SCADA/ICCP with GE Grid's **e-terrasource** product. PSC also provided additional functionality to generate interface files for Avista's GAS and OSISoft PI historian systems to keep interface maintenance centralized and straightforward. Finally, to accelerate the modelling activities, PSC and Avista designed and built a semi-automated model data entry tool feeding data to **e-terrasource**.

PSC began with installation and configuration of **e-terrasource** 3.0 on a Microsoft SQL backend server, integrating with Avista's existing infrastructure. After importing Avista's EMS model (SCADA/ICCP but also adding Generation and Alarm) into **e-terrasource**, PSC performed "round-trip" tests which allow verifying model integrity by comparing

the database before and after using **e-terrasource**.

Microsoft tools were used to mine data from the SQL backend database to generate CSV files and reports. Authorized users can use Excel to generate relatively complex CSV interface files and Microsoft Report Builder for user-friendly reports supporting, for example, "point to point" check activities.

Avista has developed strong naming conventions and DNP port number assignment rules and wanted to build upon that framework to generate new parts of the model using these rules rather than having to submit manual entries through the **e-terrasource** User Interface.

PSC and Avista worked together to develop a semi-automated model generation process that takes account of these unique requirements. One of the first model updates using this process on the Avista system generated more than 50,000 model inserts, imported at once into **e-terrasource**. This saved Avista many hours of tedious manual data entry.

On March 28th, 2017, Avista successfully deployed their **e-terrasource** generated model to the production system. They now benefit from the advanced capabilities of **e-terrasource** and a revamped modelling process that greatly reduces the manual strain of performing updates.

The principles used to automate model building steps at Avista form the basis of a methodology that can benefit many utilities seeking to streamline their model update process.



# PSC WELCOMES NEW STAFF

## ALEX LARSEN

PSC is pleased to welcome Alex Larsen, who joins the PSC team in North America. Alex recently completed his degree in Electrical Engineering from Colorado State University. He'll be employing that knowledge immediately as a part of PSC's First Energy System Support Team in Akron, Ohio. Alex has been exposed to many aspects of power generation, transmission and distribution. Prior to graduation, Alex completed a year-long controls and automation internship in Green Bay, Wisconsin.



## TIM BROWNE - GM Power Networks & HVDC, Asia Pacific

Dr Tim Browne has been appointed to the role of GM Power Networks and HVDC, Asia Pacific. This involves leading our power networks and HVDC engineering teams based in Australia, NZ and Singapore. Tim joined PSC in 2008, carrying out power system analysis work for clients in Australia, New Zealand, Singapore, Canada and the USA. His previous Brisbane-based role as Electrical Engineering Manager for Australia had him leading PSC Australia's team of power system studies and substation projects engineers. PSC Australia is Tim's third PSC, following periods with PSC USA in Kirkland and PSC NZ in Wellington. Tim holds a Bachelor of Engineering degree in Electrical Engineering from the University of New South Wales and a PhD from the University of Wollongong in Australia. Prior to joining PSC, he worked as a transmission and field engineer for EnergyAustralia (now Ausgrid) in Sydney, as a research assistant and lecturer in power engineering at the University of Wollongong in Australia, and as a postdoctoral researcher with Arizona State University. His technical background is in power quality and harmonics, electromagnetic transients, and power system studies. He is a member of the CIGRE Australian Panel C4 (System Technical Performance) and a Registered Professional Engineer of Queensland.



## PSC supports Renewable Energy Practicum

This spring, five students of Washington State University's Voiland College of Engineering and Architecture joined PSC Director of Power Networks, Marc Brunet-Watson and other electricity industry professionals to participate in an annual week-long Renewable Energy Practicum hosted by Puget Sound Energy in Bellevue, Washington.

The course provided valuable insight as to what it's like working in the utility and power industry and demonstrated a variety of career directions available to engineering students after graduation. Local industry leaders volunteered their time to participate in these daylong lectures to share practical knowledge with students. Topics covered during the week were:

- "System Design for Renewable Integration" lead by PSC's Marc Brunet-Watson
- "Engineering views of the Distribution System" lead by Potelco's Barry Eronson
- "Wind Integration" and wind farm tour lead by Puget Sound Energy's Steve St. Clair
- "Day in the Life of a System Operator" lead by General Electric's Bruce Bjorklund & Winslow Lee

On the final day, students were asked to use the knowledge gained throughout the week to design and propose a wind farm project in Washington State, before defending their proposals to instructors. PSC is proud of our long-standing commitment to providing educational opportunities to aspiring engineers.



Wild Horse Wind Farm tour at one of Puget Sound Energy's three wind facilities - From left to right; Mahmoud Alhajhouj, Adam Wohlsen, Tim McCall, Steve St. Clair, Chris Riedeman, Troy Coleman, and Lung Chi Lin

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