Smart Cities from the Utility Perspective

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The Evolution of Smart Cities
What's the Driver?
Status Report - California
Timeline – Past & Present
Taxonomy - Smart X and Utilities
  • EV Growth
  • Smart Meters
  • Smart Streetlights
Why are Utilities Further?
The Intersection of Smart Cities and Utilities
  • Challenges
  • Disrupters
  • What's Next?
Questions
The Evolution of Smart Cities and Smart X

- Whether we like it or not, technology is disruptive and agencies must adapt
- Customers / residents are becoming more sophisticated, Utilities and Cities need to accommodate this new relationship
- Societal benefits are coming into play more so than ever (Sustainability)
- Research and Surveys suggest to further Smart City growth in the next 6-10 years
- Continue to look at CA as one of the leaders in these technology shifts

*2012 DistribuTECH – EV’s as a mobile generator in a microgrid???
What are Driving these Smart X Shifts?

Published sources indicate....

1. Improve Operations Efficiency / Reduce Costs
2. Environmental / Sustainability
3. Better Management of Community Systems
4. Improve Reliability
5. Attracting Business Investment
6. **Improve Customer Satisfaction Score**
7. Attract New Residents (Portland, Austin – Urban Centers)
8. Improve Safety & Security

**Key Theme – Drive Community Involvement**
What is California Doing?

• California will likely lead the way...
  • CA has 45% of the Distributed Solar Market – Mainly Residential
  • CA has 81% of the Distributed Energy Storage Market – Mainly Commercial
  • CA has 47% of all EV’s in the US
  • CA has greater than 80% AMI penetration
  • PG&E, SDG&E and SCE each filed DER plans on July 1st 2015 with multi-year roll-outs
  • Next - Drones, Robotics, AV’s
Technology Innovation Timeline – Past & Present

1960
- Microprocessors are developed in the 1950’s and SCADA is being used at Utilities, Telemetered devices are born
- ARPANET officially links two Universities – UCLA & Stanford. The beginning of the Internet and WWW
- TCP/IP is developed a few short years later

1969
- Handheld Cellular technology is hitting the mainstream (Motorola StarTac)
- LG announces that it wants to build an internet refrigerator

2000
- Data volumes are exploding, more data has been created in the past two years than in the entire previous history of the human race.
- IoT, Cloud, AWS all contributors. BIDA is heating up

2008
- Boulder CO is first Smart City w/ XCEL Energy, 50,000 Customers
- In 2009 the DOE launches (SGIG) program, $3.4 Billion invested through the ARRA to modernize the nation’s electricity system

2011 / 2012
- Home Automation is real, Autonomous Vehicles are being piloted in CA

2015 / 2016
- Columbus chosen for $50 Million grant from the federal government and Vulcan for Smart City pilot
Taxonomy – Smart X & Utilities
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(1) Telecom Networks
The Foundational Element
- Fixed, Wireless, Cellular
- Speeds are improving
- Technology is improving
- Costs are decreasing

(2) SCADA
Early Smart Grid?
- Employed since the 1960’s
- Brains behind SG systems
- Early use on G&T
- Systems are changing
  - D-SCADA, DERMS

(3) SMART Metering
Game Changer
- Along with Tcom Networks
- Situational awareness
- Connecting to the customer / DR
- The data pipeline

(4) Distribution Automation
Self Healing Networks
- Systems working in concert
- Operate independently
- Improve utility operations
- Introducing DMS aka D-SCADA
Taxonomy – Smart X & Utilities Cont’d

(5) Smart Streetlights
- Logical Extension?
- Share networks
- Technology is improving
- Capture new data sources
- Public safety

(6) Cyber Security
- Protecting your Assets
  - Greater number of intelligent devices
  - Customer security “Privacy”
  - Physical security
  - DHS 7 Steps to Cyber Sec
  - Crosses many groups & stakeholders

(7) Energy Storage
- The Missing Link
  - Needed for Microgrids & DER
  - Big leaps are being made
  - Still expensive, chemistry is tricky
  - Affordable energy generated from renewables

(8) Renewables & DER
- Alternative Energy Sources
  - PV growth continues in both Res and C&I
  - Policy’s are underway REV & DRP
  - Improve utility operations
  - Introducing DMS aka D-SCADA
Taxonomy – Smart X & Utilities Cont’d

(9) EVSE
They are Coming!
- ~7 million cars by 2025
- New infrastructure & data
- New mobile energy sources
- New utility load profile

(10) Analytics
Data Revolution
- You have the data, now what?
- Operational efficiency
- Predictive analytics
- Develop, drive stronger KPI’s

(11) CX
Changing the 80+ year old model
- Banks have set the stage
- Customers want multi Channels
- Customer satisfaction metrics & CCO
- Needed with the rise of DER

(12) IT/OT
Convergence of Systems
- Consolidate, standardize systems
- Drive efficiency and savings
- Improve operations
- Streamline organizations
EV Growth

Source: Edison Electric Institute
Smart Meters – Why are they Actually Important?

• A network of sensors providing continual data on your network
  • Traffic Information Center – Green Button, Orange Button
• The communications foundation across your operating footprint
• Situational Awareness!
  • UBER, Waze, Google Maps – crowd sourced networks
  • This applies to EVSE, Streetlights, Metering, Traffic Sensors / Congestion etc.
• Your gateway to the customer and alternative programs
Smart Streetlights – A Deeper Dive

• Hard Benefits
  • Energy Monitoring & Billing
  • Performance Monitoring
  • Color Controls
  • Adaptive Lighting
  • Emergency Response

• Soft Benefits and Applications to a Smart City
  • Environmental Monitoring
  • Traffic Monitoring
  • Smart Parking
  • Gunshot Detection
Why are Utilities Farther Ahead?

- Large Customer base for recovery of project costs because tech is improving
- They own the infrastructure – Poles, ROW
- Economy of scale allows the business case to make sense
- Networks can be multi-purposed
- The Utility industry is going through a profound transnational change
  - Residential Solar
  - Tesla PowerWall
- Utilities want to lead and have been natural leaders in the R&D space
- Electric Model moving to a Network Model?
The Intersection of Smart Cities & Utilities

- Large Electric Utilities have been leading the charge on many initiatives
- Sustainability Leaders in the community
- Resiliency - Puerto Rico
- Agencies need to partner to share networks and certain infrastructure
  - Smart Streetlights
  - Metering
  - Data
  - Telco
Key Challenges to Implementation

- Who is paying for this?
- How do you staff around the new technology and role requirements?
- Utility of the Future, City of the Future
- How do you attract young talent?
Disrupters

• The Utility Death Spiral....
  • Tesla’s PowerWall and Solar Offerings

• Electric Vehicles – Volvo Electric Or Hybrid Starting In 2019
  • Plan for EVSE now
  • Comparative Advantage

• Data Growth and how to make it further actionable

• Autonomous Vehicles, Master Plan Part II

• Drought, Water Scarcity

• Consolidation of Smaller Utilities?

• Urban Migration Globally - Metropolitan Centers will grow over the next 30 years
What’s Next

- Technology, Customer Engagement and Data are all converging
- Smart Cities are here, this will be an evolution and not a revolution
- Collaboration will be a key theme to achieving success
- Technology is going to continue to change, so must the utility and the city
  - Drones, AV, VR, Robotics, etc.
  - I thought the mobile battery was crazy 5 years ago!
  - Waze and social networks will evolve further for transportation and traffic
Questions?