

CSMART: Driving Innovation through Collaboration and Data Integration

September 23, 2014

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- Transformation is happening across the industry impacting ALL participants
- Smart Grid and Distributed Generation will change the way that consumers use and purchase their energy
- Smart Grid and DG are having significant impacts on the distribution utilities to manage power stability and the flow of data to customers and other eco-system partners.
- CSMART will test new technologies and their economics in an open way

Over the past decade, the #1 driver of US DG Growth has been solar PV installed capacity...

DG Growth and Solar PV Systems

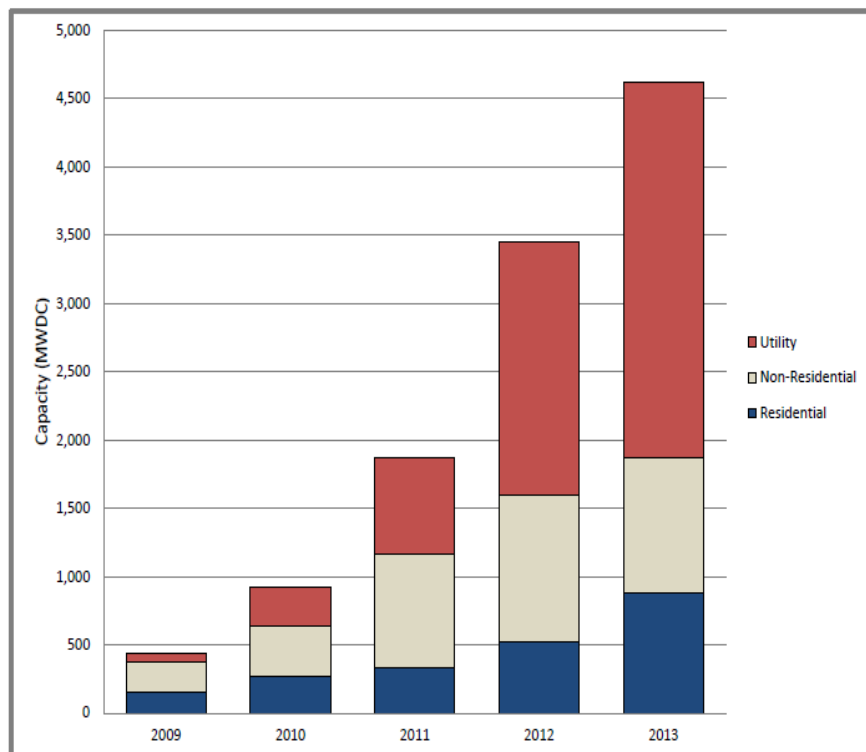
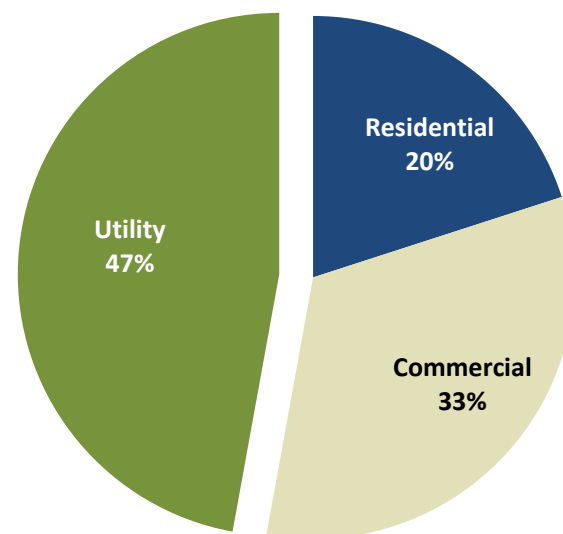


Figure 2: Annual Installed U.S. Grid-Connected PV Capacity by Sector (2009-2013)

12 GW of solar PV installed in US (end of 2013)



53% of US solar PV capacity (or about 6 GW) is feeding into distribution grid systems

... and volume of Interconnection and Net Metering applications.

- Over 150,000 unique solar PV installations occurred in 2013 (compared to ~500 centralized installations greater than 1 megawatt capacity).
- At the end of 2013, 471,000 PV installations were connected to the U.S. grid, including 420,000 residential installations.
- NOTE: The vast majority of solar is being installed in only a handful of states

DG Growth and Solar PV Systems

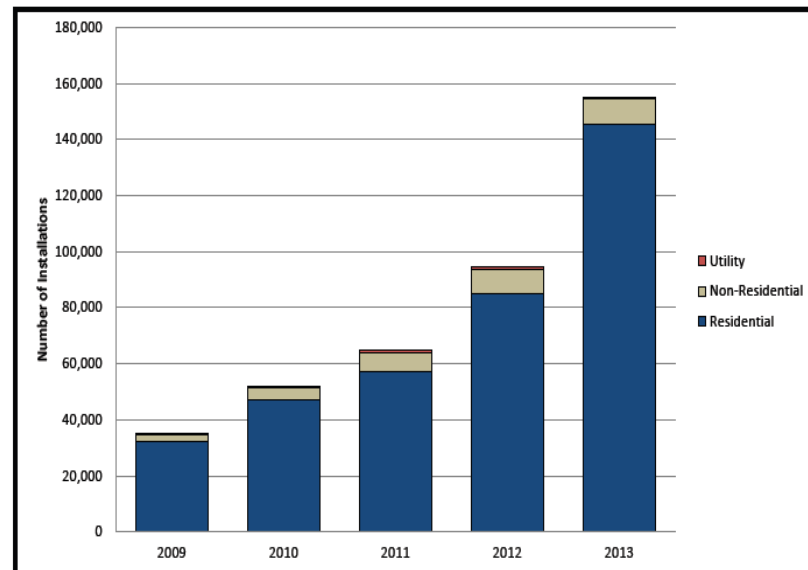
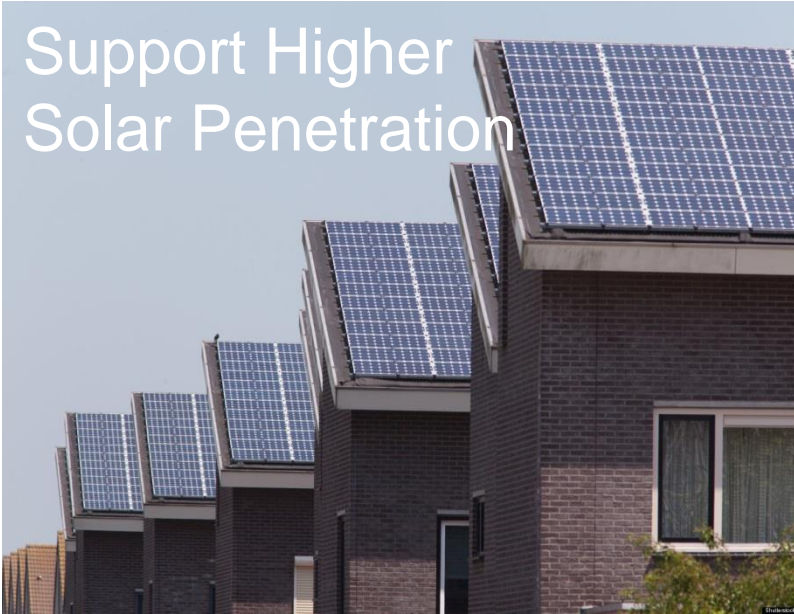


Figure 4: Number of Annual U.S. Grid-Connected PV Installations (2009-2013)

Translation: Every MW of solar PV capacity translates to 300 – 500 utility applications.

Distribution Utility Goals

Support Higher
Solar Penetration



Maintain Grid Stability



Automate the
Interconnection
Process

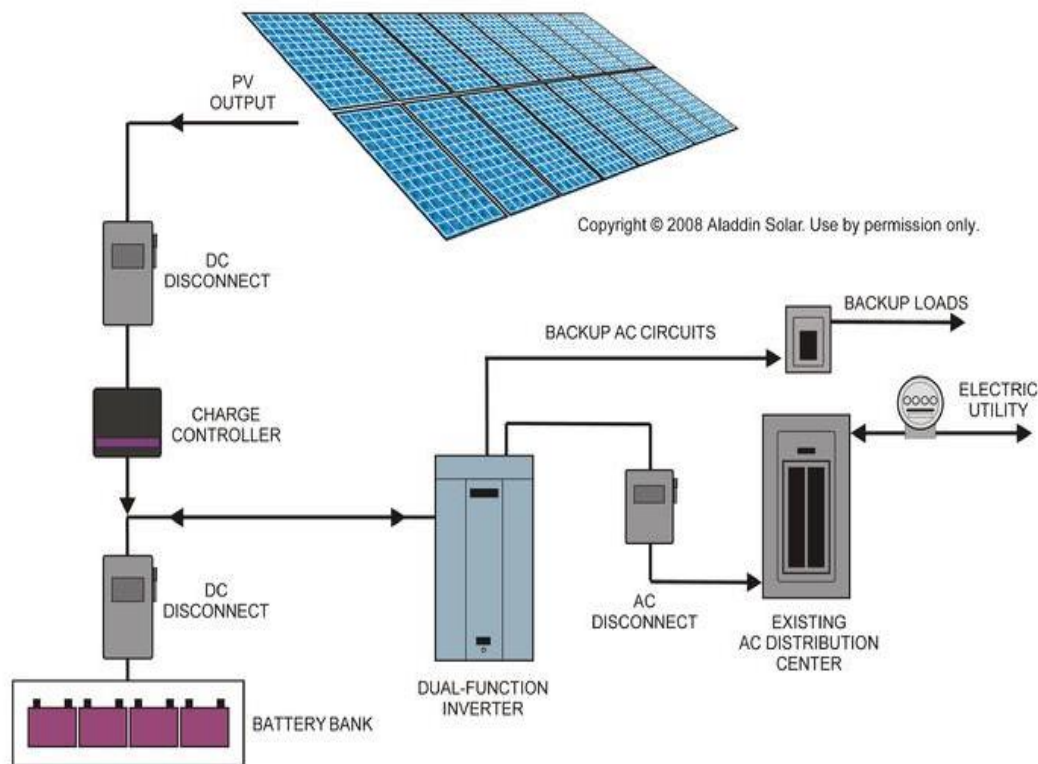


Getting to More Solar Capacity

Challenge: Maintaining Grid Resiliency

Result: Conservative Technical Screening Rules

TYPICAL PV GRID-TIE SYSTEM WITH BATTERY BACKUP



**Actual Output
Varies Based
on Many
Factors**

Comparing the Feeder DG Safety Envelope to Existing DG Output



Illinois Institute of Technology > IIT Feeder Loop 1 > Technical Review

- Max Aggregate Theoretical DC Output in kWh ●
- Max Aggregate Estimated AC Output in kWh (via NREL) ●
- Max Aggregate Actual AC Output in kWh (via OSI PI) ●
- Actual Load Threshold in kWh (via OSI PI) ●

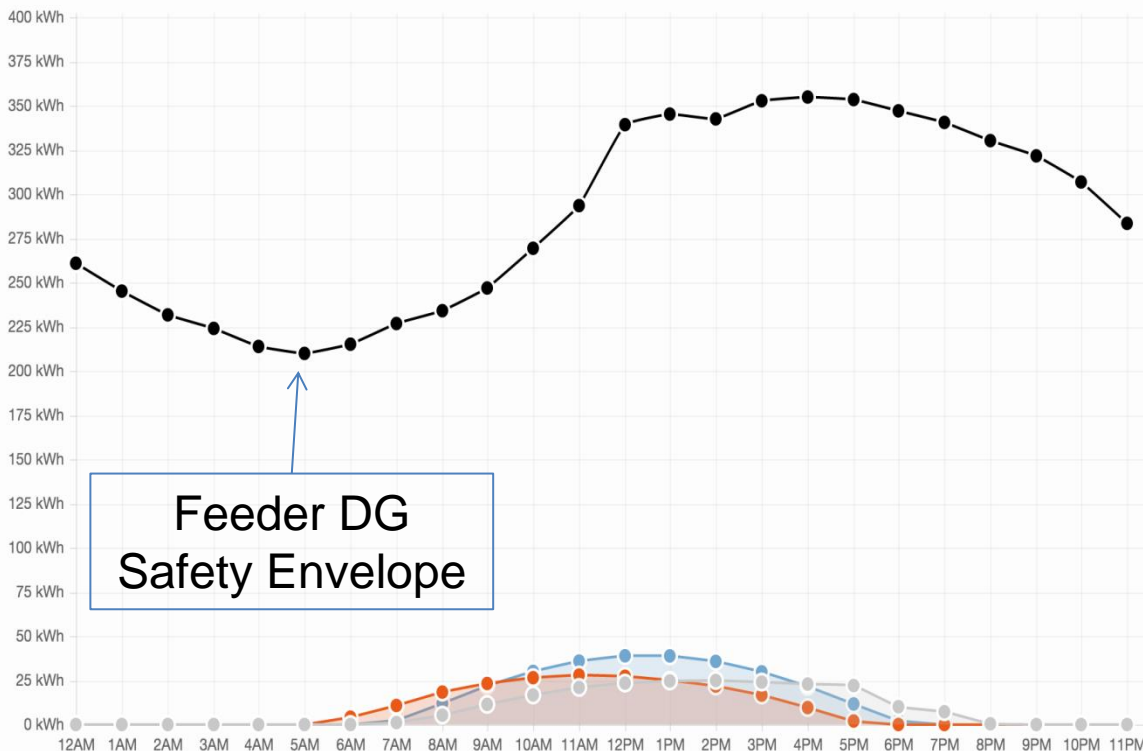
Start Date 08/08/2014

End Date 09/22/2014

Level Livened Approved Proposed

Compute

- 1 Proposed system totalling 500 kW
- 1 Approved system totalling 173.5 kW
- 6 Livened systems totalling 39.96 kW



Feeder DG Safety Envelope

Comparing the Feeder DG Safety Envelope to Proposed DG Output



ConnectTheGrid by westMONROE PARTNERS

Enrollment Operations

DG Analysis



Illinois Institute of Technology > IIT Feeder Loop 1 > Technical Review

Max Theoretical DC Output in kWh



Max Estimated AC Output in kWh (via NREL)



Max Actual/Predicted AC Output in kWh (via OSI PI)



Actual Load Threshold in kWh (via OSI PI)



Start Date 08/08/2014

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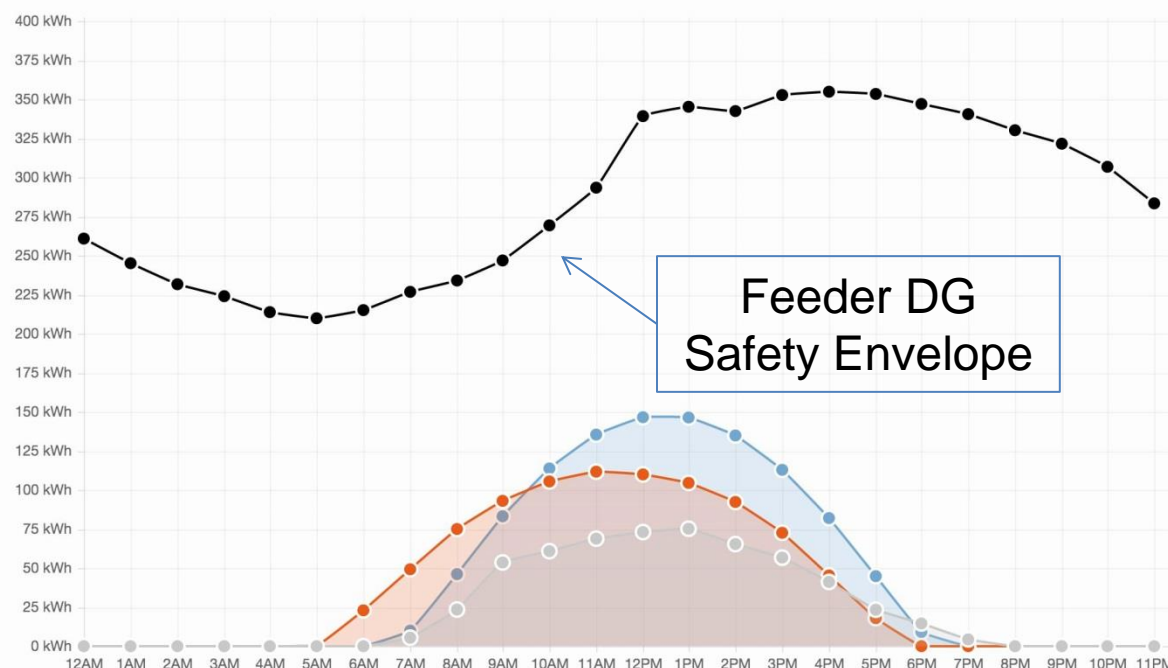
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Feeder DG
Safety Envelope

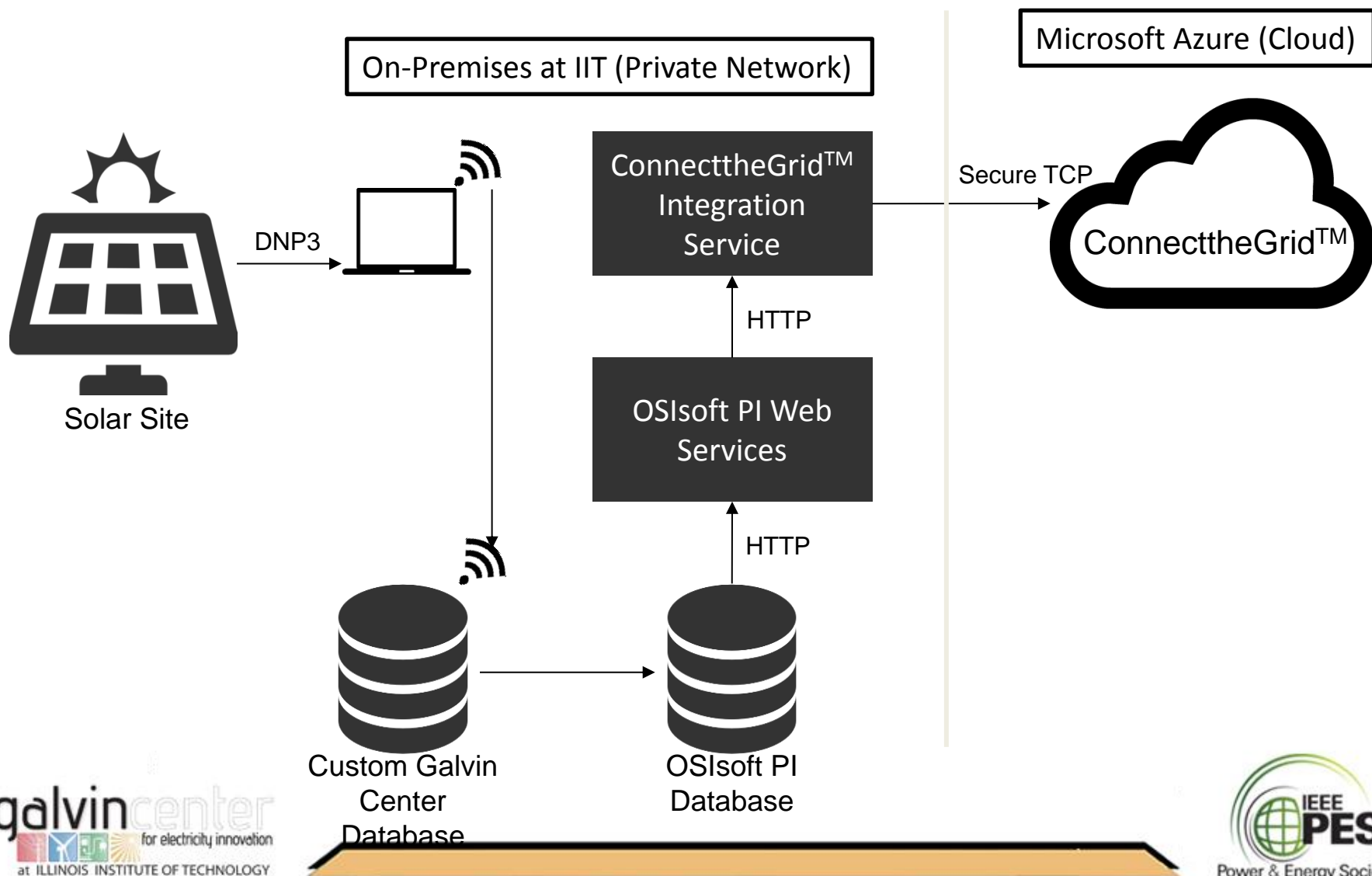
ConnectTheGrid

Platform

Tour

Company

CTG IIT Integration: Architecture Diagram



ConnecttheGrid™: Enrolment to Forecasting

Enrollment

**Customer Distributed
Generation Analysis**

Real-Time Forecasting

Process Automation

Visibility and Operations

Better Resolution

Thank You!



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