

Threats and Challenges for Clean Electric Power Grid

Threats to the Grid: Resiliency and Cybersecurity
2019 Energy Leadership Summit

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1

Current State

Power Flow

Communication

Grid Consumer

Gen. Trans. Distr.

Utilities

Institutions

NERC E-ISAC U.S. DEPARTMENT OF ENERGY

Threats

INSIDE THE CUNNING, UNPRECEDENTED HACK OF UKRAINE'S POWER GRID

The Ukrainian Power Grid Was Hacked Again

Alert (TA18-074A)
Russian Government Cyber Activity Targeting Energy and Other Critical Infrastructure Sectors

Systems Affected

- Domain Controllers
- File Servers
- Email Servers

Homeland Security Federal Bureau of Investigation

JOINT ANALYSIS REPORT

Reference Number: JAR-17-20114 June 28, 2017

ADVANCED PERSISTENT THREAT ACTIVITY TARGETING ENERGY AND OTHER CRITICAL INFRASTRUCTURE SECTORS

Summary

<https://www.wired.com/2016/03/inside-cunning-unprecedented-hack-ukraines-power-grid/>

<https://www.nytimes.com/2017/07/06/technology/nuclear-plant-hack-report.html>

<https://www.us-cert.gov/ncas/alerts/TA18-074A>

<https://www.cyberscoop.com/greenergy-eset-ukraine-sandworm-telebots/>

<https://www.cyberscoop.com/energy-sector-hackers-15-firms-dhs-fbi/>

page 02

2

Future Risks

Power Flow
Communication

Utilities
Institutions

Grid
Gen. Trans. Distr.

Aggregator
Consumer
Industrial
Microgrid

New/Unmanaged Risk Energy

PV Growth
- 37.9 GW in 2019
- Double by 2024

State Goal for 50% Renewables
- California
- New York

100M EVs by 2030
- MW Scale EV Charging

Growing Grid Threats from IoT Devices

Threats

NERC NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
E-ISAC ENERGY INFORMATION SHARING AND ANALYSIS CENTER
U.S. DEPARTMENT OF ENERGY

<https://www.seia.org/us-solar-market-insight>
California's 2030 Climate Commitment Renewable Resources For Half of the State's Electricity By 2030. California Energy Commission. July 2015.
New York State Plan. NYSEEDA. 2015
Cooper, C. "Annual Merit Review and Peer Evaluation Meeting". DOE Vehicle Technologies Office June 6, 2016.

page 03

3

Grid/IoT Nexus

Power Flow
Communication

Grid
Gen. Trans. Distr.

Aggregator
Consumer
Industrial
Microgrid

Vendor Cloud
PPA/Aggr.
Internet

Vendors collect real-time data from consumers operations (and control?)

All Your Solar Panels are belong to Me

800,000 Microinverters Remotely Retrofitted on Oahu—in One Day

PPA's lease inverter to consumer, and then manage the devices

SolarCity reports surpassing 300,000 installed solar customers during last quarter before Tesla merger

Internet connectivity required - devices support:

WiFi

DER devices connected to consumer home networks and devices

HACKERS COULD TAKE DOWN THE INTERNET WITH MILLION-DEVICE BOTNET WORSE THAN MIRAI

BY ANTHONY CYRUSBERGSON ON 10/20/17 AT 8:36 AM

[1] <https://www.pge.com/includes/docs/pdfs/shared/customerservice/nonpgeutility/electrictransmission/handbook/rule21-implementation-guide.pdf>
[2] Fred Bret Mounie, "All your solar panels are belong to me" Defcon 2016.
[3] <http://www.newsweek.com/hackers-take-down-internet-million-device-botnet-mirai-689255>
[4] <https://electrek.co/2016/11/09/solarcity-reports-surpassing-300000-installed-solar-customers-during-last-quarter-before-tesla-merger/>
[5] <https://qa.spectrum.ieee.org/energywise/green-tech/solar/in-one-day-800000-microinverters-remotely-retrofitted-on-oahu>

page 04

4



5

thank you.

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6