Energy Data Privacy: How Climate Changes Everything

Daniel Roesler, UtilityAPI
EFF-Austin Meetup - Nov 12, 2019 - Austin, TX
The Carbon Cycle

The Carbon Cycle

Atmosphere

200 Gigatons

200 Gigatons

Land / Water

The Carbon Cycle

Atmosphere

200 Gigatons

200 Gigatons

Land / Water

200 Gigatons

10 Gigatons

“Sequestered Carbon” (750-1500 Gigatons)

Global Atmospheric Concentrations of Carbon Dioxide Over Time

800,000 BCE to 2015 CE

1950 to 2015 CE

Data source: Compilation of 10 underlying datasets. See www.epa.gov/climate-indicators for specific information.

For more information, visit U.S. EPA’s “Climate Change Indicators in the United States” at www.epa.gov/climate-indicators.
“Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.... Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C.”
CARBON BUBBLE

Emissions from burning all known reserves of coal, oil and natural gas.

2.795 billion tons of CO$_2$

Remaining carbon budget

This is how much CO$_2$ can be emitted until 2050 and still give a reasonable chance of staying below 2 degrees Celsius of global warming.

Source: Carbon Tracker Initiative 2013 | Potsdam Institute for Climate Research
Illustration: Felix Müller (www.zukunft-sebernachen.de) | Licence CC-BY-SA 4.0
My favorite climate change joke

*They say we won’t act until it’s too late...*
They say we won’t act until it’s too late...

Luckily, it’s too late!
Decarbonizing energy

Energy consumption in the U.S. economy, 2010–2050

https://rmi.org/insight/reinventing-fire/
Conclusion:

We need to:

★ Install massive amounts of renewables.
★ Install massive amounts of energy efficiency.
★ Electrify everything.
Renewable Intermittency

https://www.vernier.com/innovate/the-effect-of-sky-conditions-on-solar-panel-power-output/
Figure 2: The duck curve shows steep ramping needs and overgeneration risk.

Net load - March 31

- Overgeneration risk
- Ramp need ~13,000 MW in three hours

Removing carbon from energy

Conclusion:

We need to:

★ Install massive amounts of renewables.
★ Install massive amounts of energy efficiency.
★ Electrify everything.
★ Deploy stupid amounts of load flexibility.
Distributed Energy Resource (DER) - noun - A variety of small, modular power-generating technologies that can be combined with energy management and storage systems and used to improve the operation of the electricity delivery system, whether or not those technologies are connected to an electricity grid.
The need for customer utility data

Customer Acquisition

Installation/Deployment

Operation & Maintenance
The need for customer utility data

Need historical utility data for feasibility analysis.

"How much do you currently spend on energy?"
The need for customer utility data

Need historical utility data for feasibility analysis.
"How much do you currently spend on energy?"

Need ongoing utility data to monitor performance.
Savings reporting in dollars, not kilowatt-hours
Utility data access

Problems:

1) There hasn’t ever been a big reason to share customer utility data.
2) No API or standards for sharing customer utility data at scale.
3) No pre-established privacy protections around utility data sharing.
Utility data

Present day solutions:

1) Manual data entry
   (e.g. dig up old bills and hand type them in)

2) Paper data request form
   (e.g. fax the utility a signed authorization form)

3) Login credentials sharing
   (e.g. ask for access to online utility account)
Energy data is private data

Privacy concerns:

1) Interval data is personal
   (e.g. can tell your lifestyle)

2) Bill data reveals credit
   (e.g. how often you pay your bill)

3) Credential re-use
   (e.g. same logins as banks)

https://spectrum.ieee.org/energy/the-smarter-grid/privacy-on-the-smart-grid
Ownership concerns:

1) Who owns your utility usage and bill data? Mixed rulings:
   - Court Grants Feds Warrantless Access to Utility Records
   - Smart meters protected by the Fourth Amendment

2) Who owns your smart energy device data? Wild west:
   - All your solar panels are belong to ME

3) GDPR? Still unknown:
   - GDPR in the Energy Sector
Conclusion:

We need to:

★ Install massive amounts of renewables.
★ Install massive amounts of energy efficiency.
★ Electrify everything.
★ Deploy stupid amounts of load flexibility.
★ Not destroy customer privacy in the process.
Energy data privacy program

DataGuard (from U.S. Department of Energy SmartGrid.gov)

1) Voluntary Code of Conduct for requesting and handling energy data.

2) Outlines guidelines around energy data privacy.
   a) Scoped consent and transparency
   b) Safe data handling and redress
   c) Basically GDPR for energy data in the U.S. ... except voluntary :(

https://www.dataguardprivacyprogram.org/
Green Button (originally from NIST, spun off into Green Button Alliance)

1) OAuth-style utility data sharing
2) Requires utilities to adopt standard
   a) Unfortunately, usually poorly implemented by utilities
   b) Usually only offered when mandated by regulators
   c) Slowing getting better (hopefully via UtilityAPI adoption)

https://www.greenbuttonalliance.org/
UtilityAPI (platform used by DER/EE companies to request and download utility data)

1) Trying to establish consent-driven as default “best practice”.
2) Helps establish better data access standards/regulation:
   a) On the Green Button Alliance board + technical working group.
   b) Promotes DataGuard guidelines and privacy standards.
   c) Wrote CPUC CDAC “Click-through” technical solutions.
      (California Public Utilities Commission, Customer Data Access Committee)

https://utilityapi.com/
Ask me next time about energy IoT cybersecurity!

Thanks!

Daniel Roesler
Co-founder, CTO, UtilityAPI
daniel@utilityapi.com
diafygi@gmail.com
https://daylightpirates.org

Contact me if you want to use non-cited stuff from this presentation.