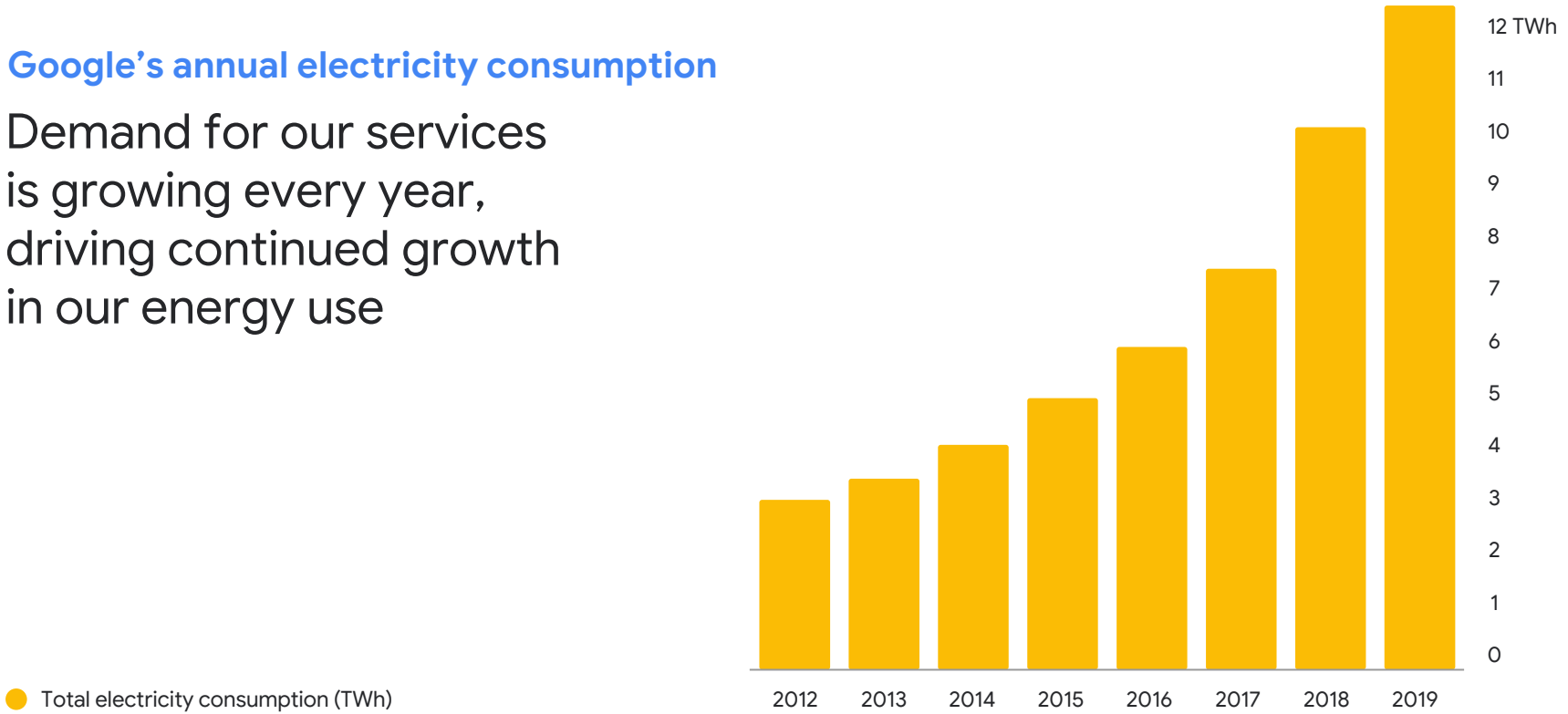
Google

24/7 carbon free energy and energy storage backup at data centers

Google's annual electricity consumption

Demand for our services is growing every year, driving continued growth in our energy use



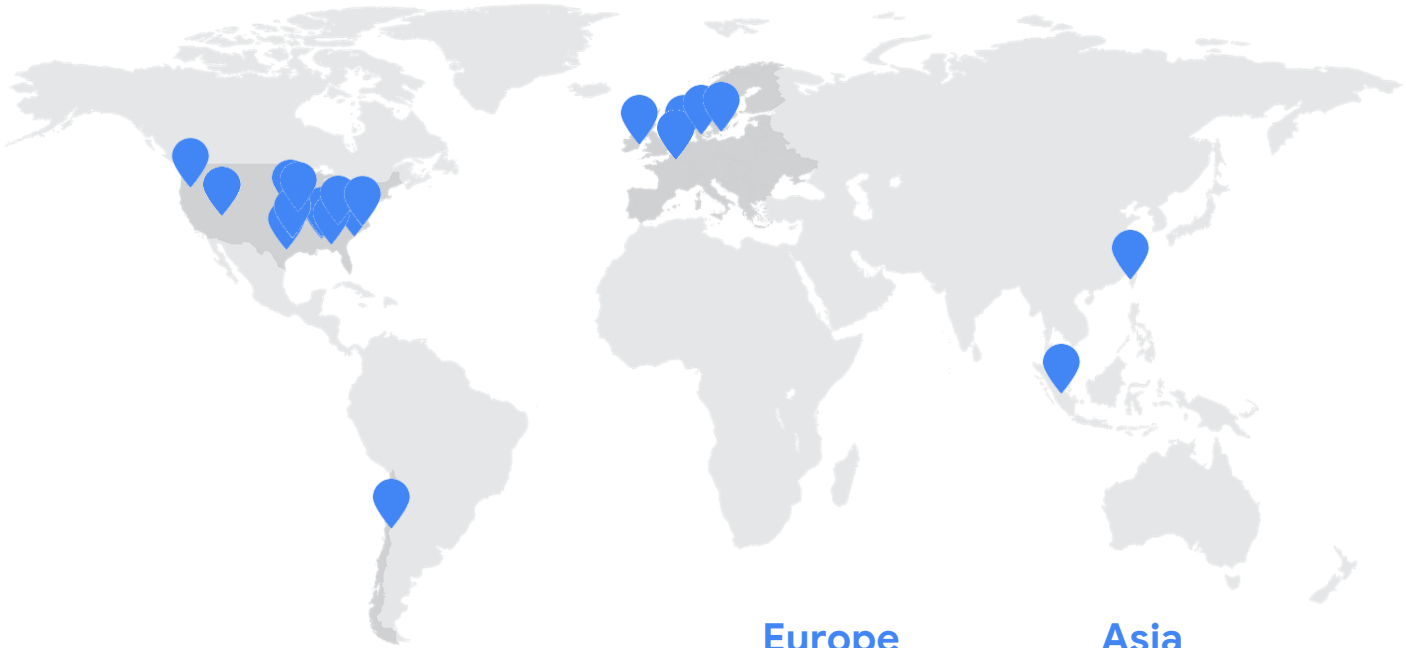
Source: Google Internal Data

Google


In 2019, Google used more electricity than the entire state of Hawaii
Google

21
locations for owned and operated data centers

4
continents



Americas

Berkeley County, South Carolina
Council Bluffs, Iowa
The Dalles, Oregon
Douglas County, Georgia
Henderson, Nevada
Jackson County, Alabama
Lenoir, North Carolina
Loudoun County, Virginia
Mayes County, Oklahoma
Midlothian, Texas
Montgomery County, Tennessee
New Albany, Ohio
Papillion, Nebraska
Quilicura, Chile

Europe

Dublin, Ireland
Eemshaven, Netherlands
Fredericia, Denmark
Hamina, Finland
St Ghislain, Belgium

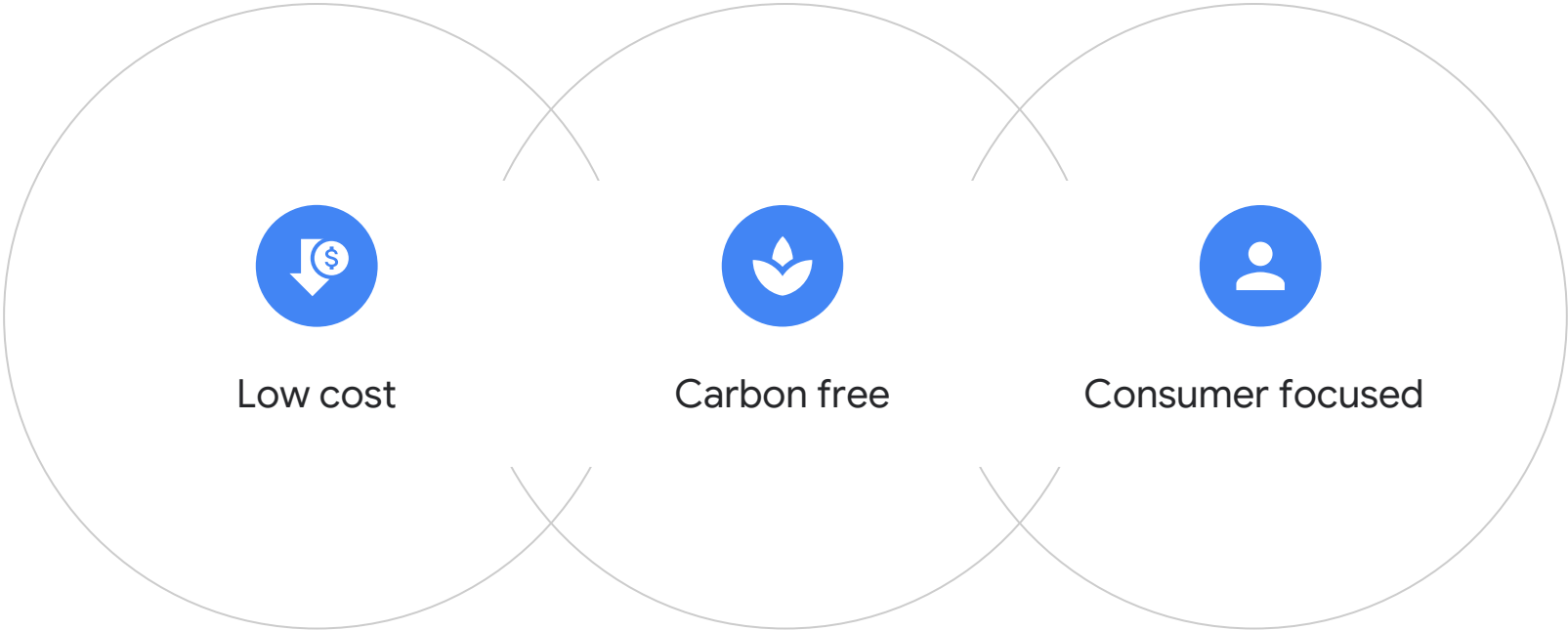
Asia

Changhua County, Taiwan
Singapore

Google

Our objectives

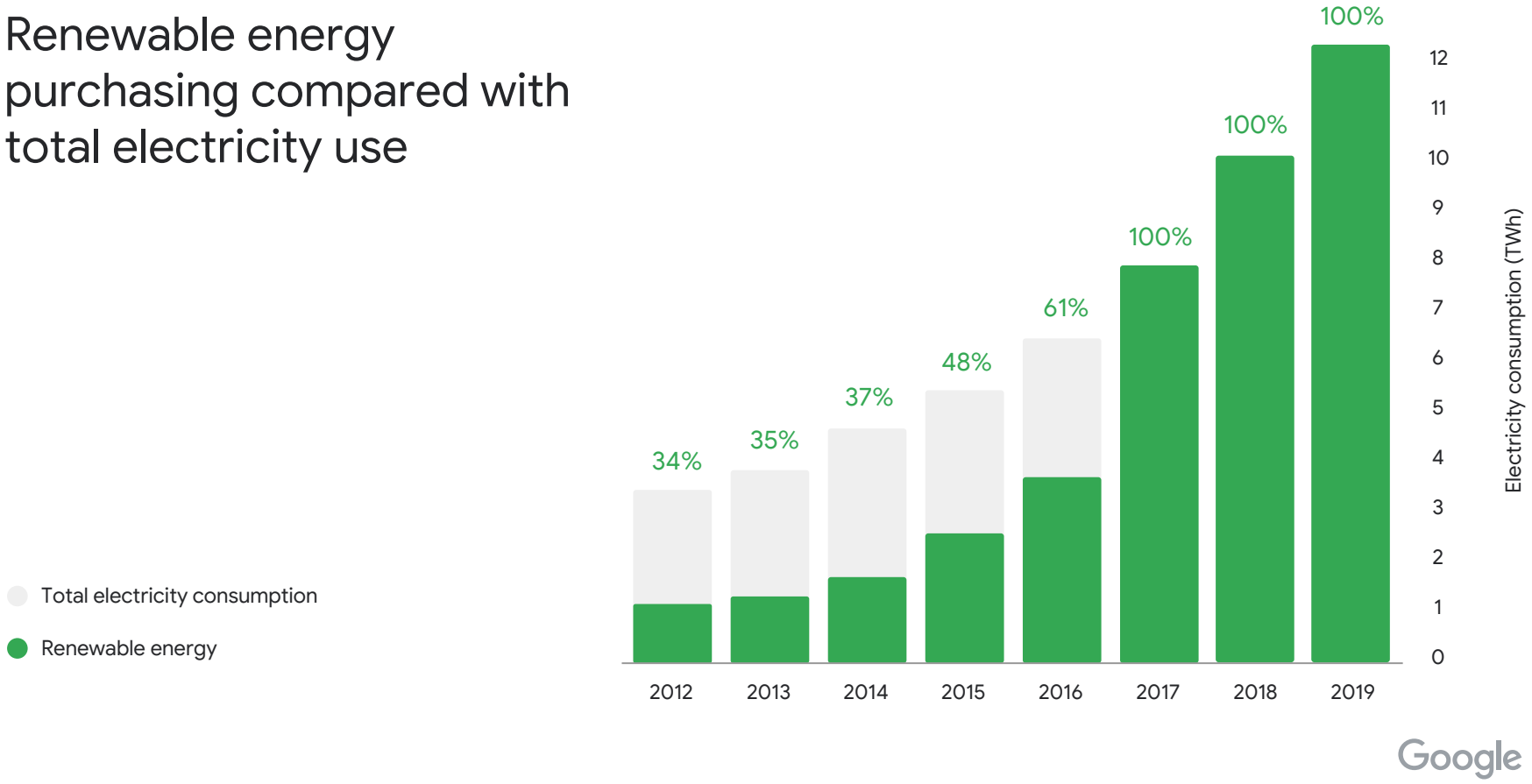
Our objectives



Google


Google is one of the world’s
largest corporate
purchasers of
renewable energy
Google

Renewable energy purchasing compared with total electricity use



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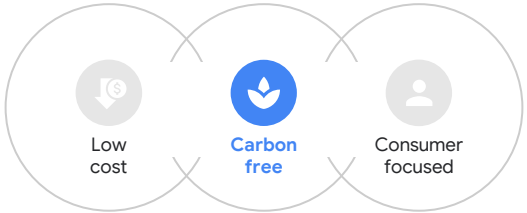
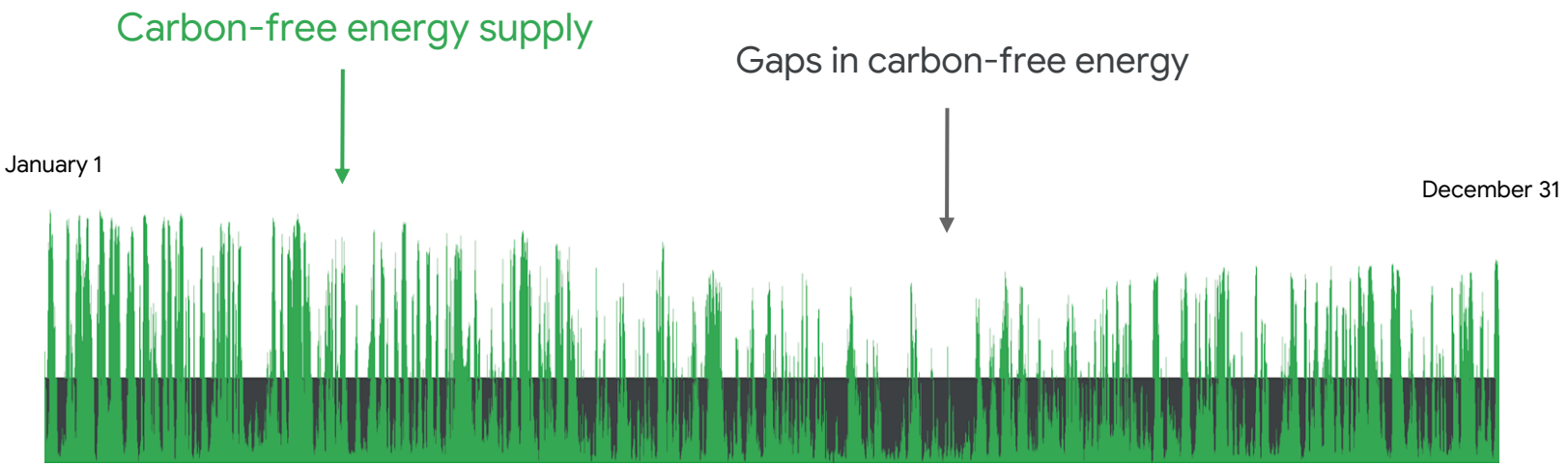
What we're doing

24/7 Clean Energy




Beyond 100% renewable
Sourcing clean energy for Google's operations in all places, at all times
Google

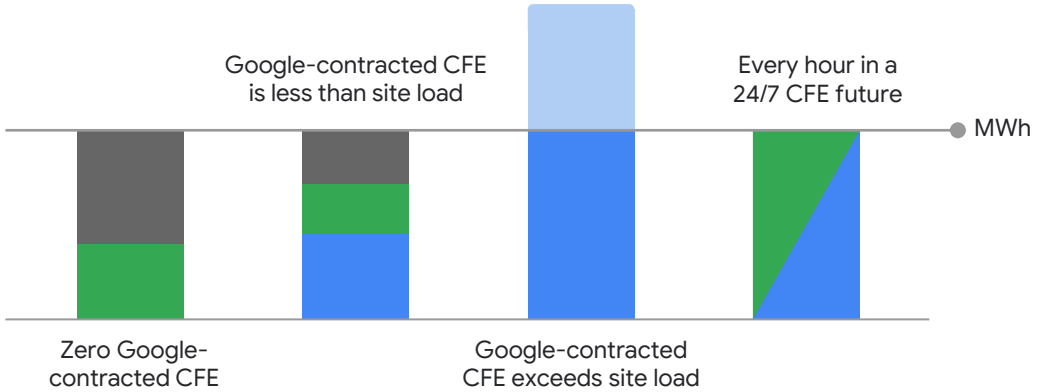
Hourly carbon-free energy performance at an example data center



Iowa data center hour by hour (2018)

Hourly scenarios in our carbon-free energy framework

- Grid carbon-based energy
- Grid carbon-free energy (CFE)
- Google-contracted CFE
- Excess Google-contracted CFE



Source: 24x7 White Paper

Google

What about energy storage backup at data centers?

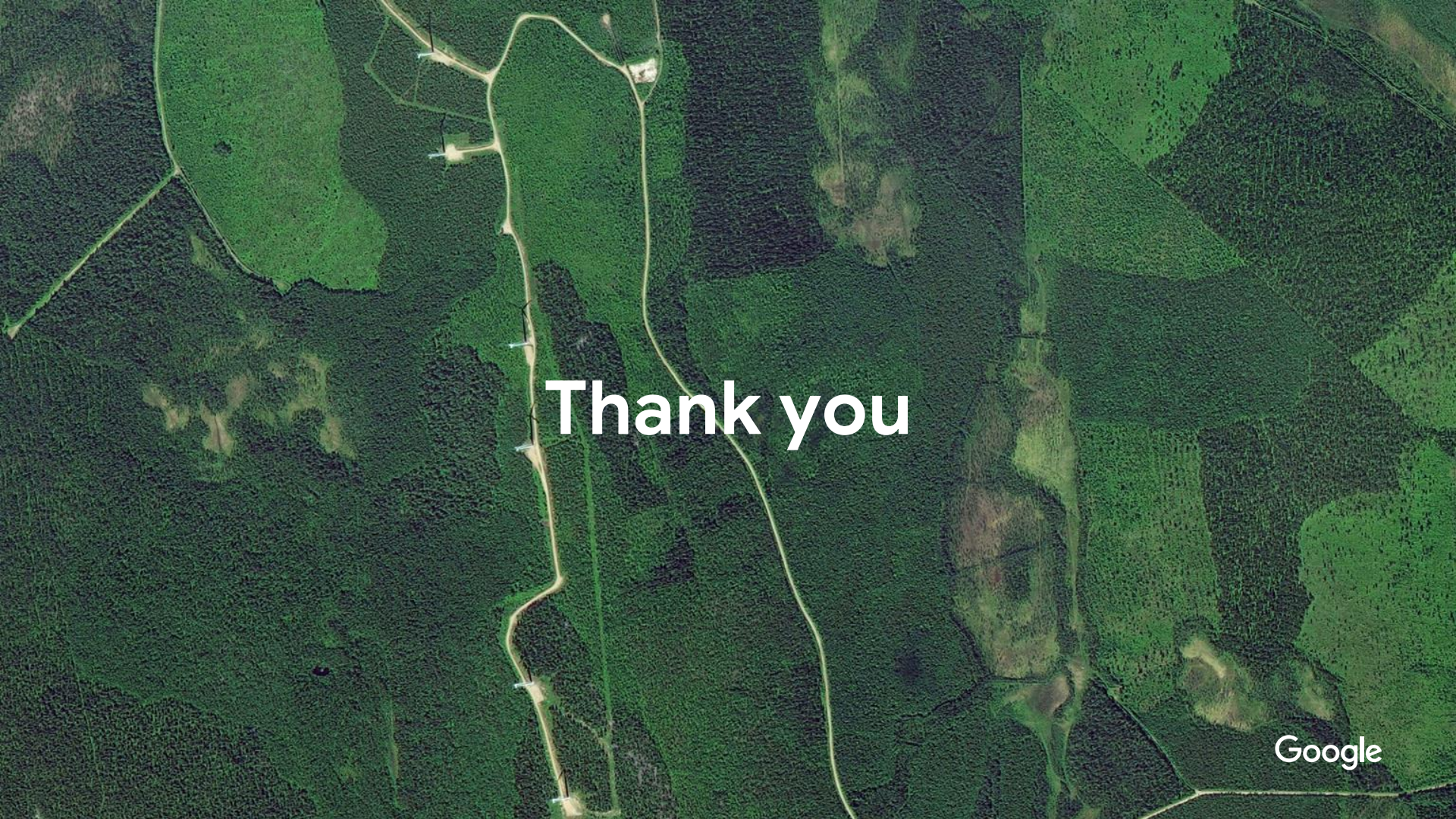
Cleaner backup power to enable 24/7 CFE

First-ever

battery backup system for generator replacement at a hyperscale data center

Flexible capacity

provided to grid, paving the way toward a clean energy future


Thank you
Google