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Industrial energy management in the age of renewables.

Matching industrial energy demand with renewables

Switching from ~~annual~~ to hourly

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What's in a name? – Prepare for a Buzzword Bingo

"Carbon-free energy around the clock"

Google

"24/7 carbon free energy matching"

eurelectric

"24/7 renewable energy matching"

FLEXIDAO

"The 100/100/0 goal"

Microsoft

Source: Google, Eurelectric, Flexidao, Microsoft

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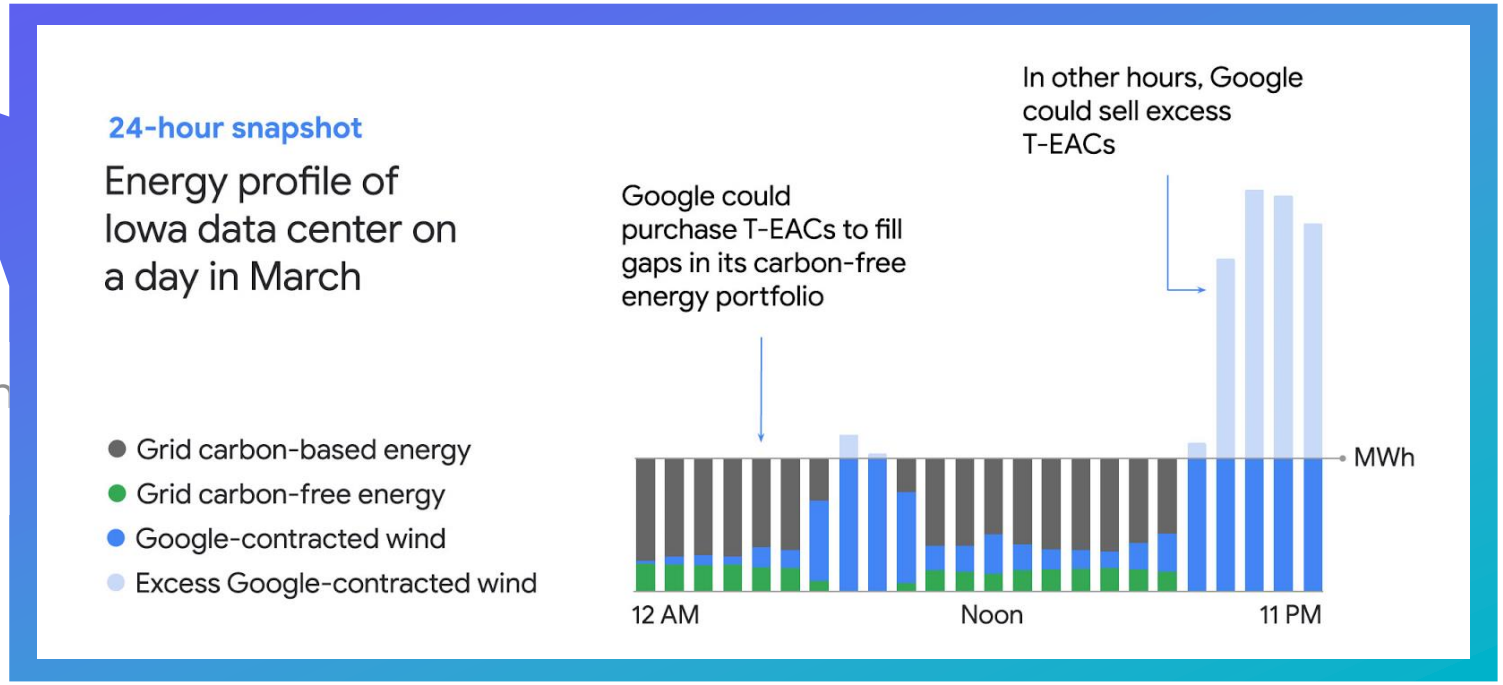

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So, the concept is easy…

From

Offsetting Christmas Eve electricity consumption with summertime solar PV generation.

= 100% renewable 👍

So, the concept is easy…

From

Offsetting Christmas Eve electricity consumption with summertime solar PV generation.

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To

Offsetting Christmas Eve electricity consumption with summertime solar PV generation.

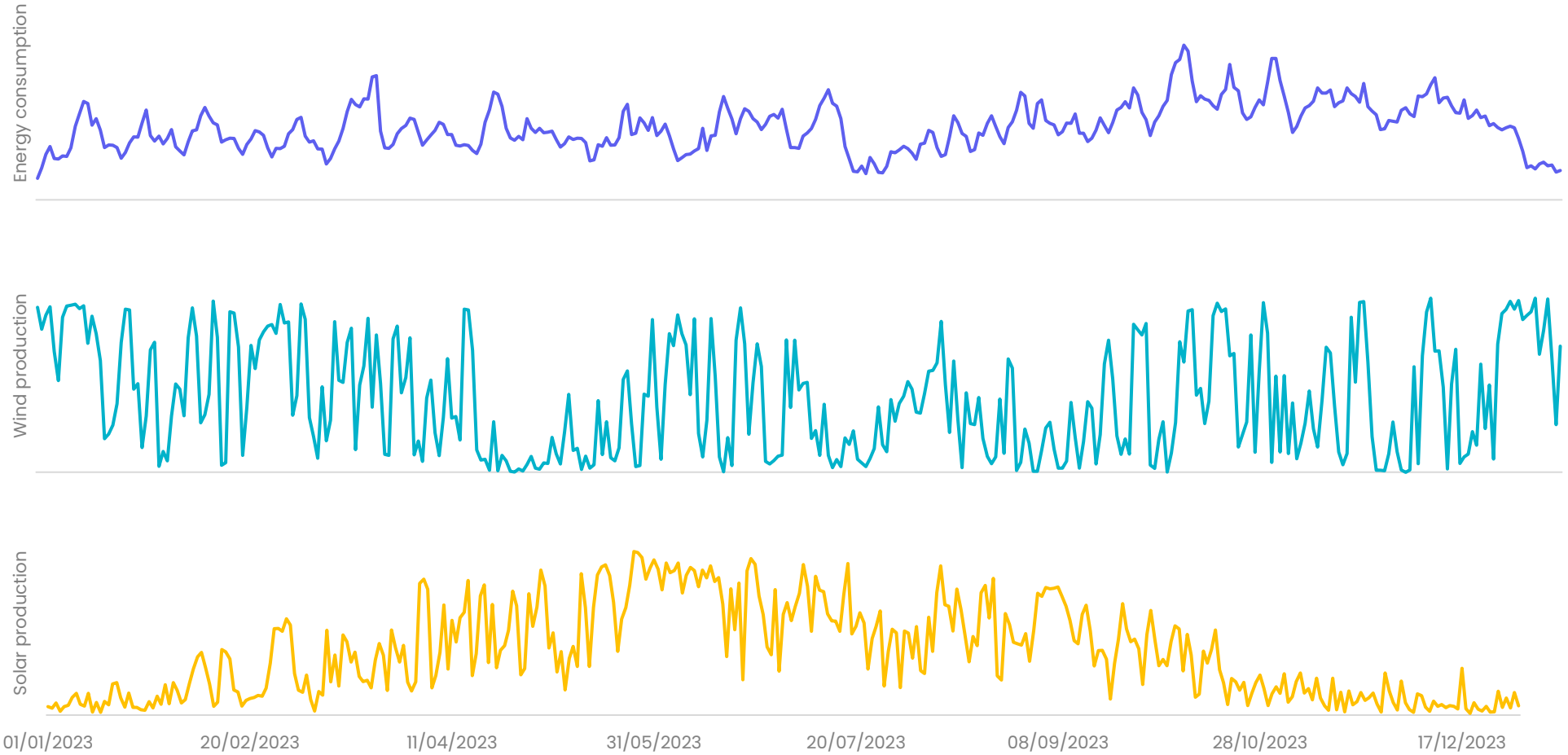
= 0% renewable 👎

The reality not so much – Let’s quiz!

10 GWh/y

10 GWh/y

10 GWh/y



The reality not so much – Let's quiz!

Scenario	Old-school	Future-proof	
	Annual	Hourly	15min
Consumption	0%	0%	0%
Consumption + 100% PV	100%	A ? %	
Consumption + 100% Wind	100%		
Consumption + 50% PV + 50% Wind	100%		
Consumption + 50% PV + 50% Wind + 1 MWh BESS	100%		
Consumption + 50% PV + 50% Wind + 5 MWh BESS	100%	B ? %	

C - ? %

The reality not so much – Let's quiz!

Scenario	Old-school	Future-proof	
	Annual	Hourly	15min
Consumption	0%	0%	0%
Consumption + 100% PV	100%	37%	33%
Consumption + 100% Wind	100%	62%	59%
Consumption + 50% PV + 50% Wind	100%	64%	61%
Consumption + 50% PV + 50% Wind + 1 MWh BESS	100%	68%	64%
Consumption + 50% PV + 50% Wind + 5 MWh BESS	100%	75%	71%

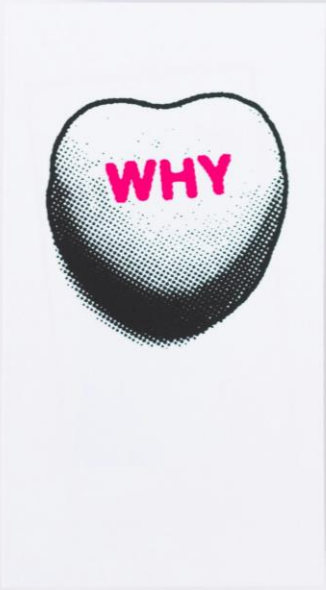
A

B

C -3 to 5 %

Why move? Plenty of benefits.

Environmental	Reduces emissions and promotes renewable energy
Economic	Drives cost savings while mitigating energy price volatility risks
Innovation	Prepares you for data-driven energy management
Regulatory	Meets evolving regulatory requirements (license-to-operate!)
Reputation	Enhances brand image and strengthens stakeholder relations



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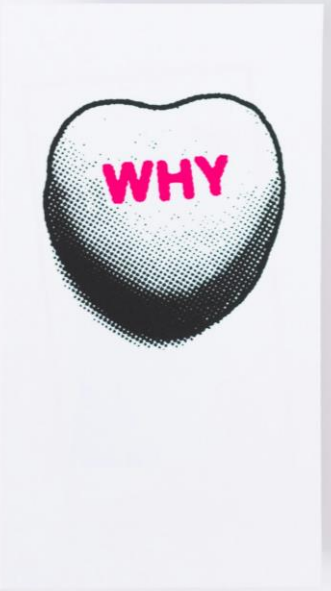
Reputation	Enhances brand image and strengthens stakeholder relations
Commercial	Builds a competitive differentiator in many value chains



How to move?

- Assessment and Planning
- Renewables Sourcing
- Smart Management and Flexibility
- Storage
- Collaboration
- Monitoring
- Engagement

How to move?

Assessment and Planning

Renewables Sourcing

Smart Management and Flexibility

Storage

Collaboration

M

EPRS | European Parliamentary Research Service

Putting in place a policy where renewable energy can be sourced from the grid requires taking the following criteria into consideration:

- **origin (additionality)**: Use of the existing grid mix, or requirement to build 'additional' renewable electricity capacity;
- **temporal correlation (simultaneity)**: the time frame when the generation of renewable electricity and its use for electrolysis are balanced. This can vary from a 15-minute interval[1] to an annual level;
- **geographical correlation**: The electrolyser and the renewable power plant can either be in the same location, the same bidding zone (usually one country) or in a completely different area. Issues such as electricity grid congestion can be taken into account.

Note: not only timing matters

Big Tech is at the forefront.

Characteristics Google

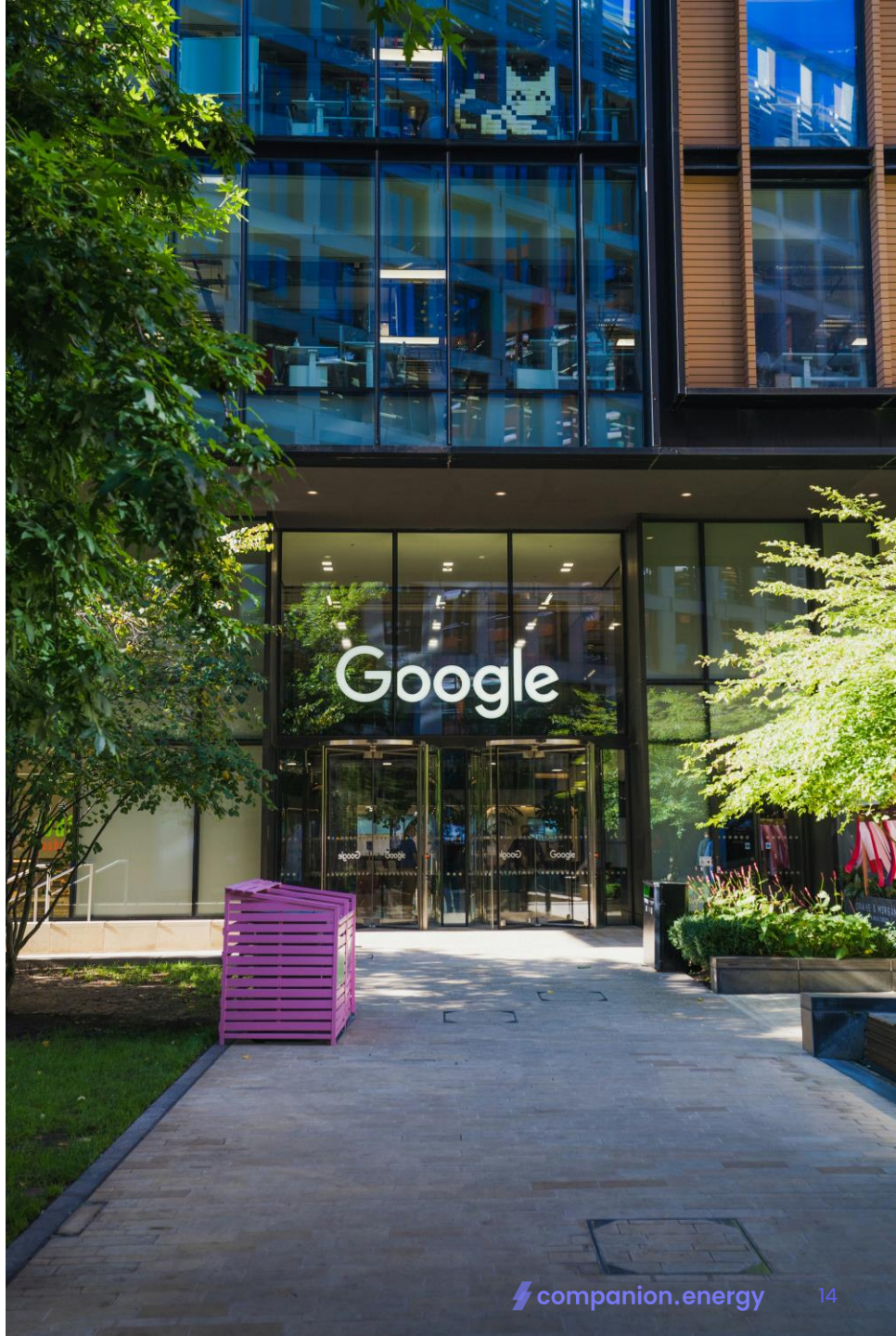
>20TWh
Electricity consumption mainly from data centres

>10GW
Renewable electricity production capacity contracted

Software-based
Tools to:

- Purchase renewable energy efficiently
- Pro-actively steer data centre demand
- Track 24/7 compliance

Collaborative
Working with energy providers, software start-/scale-ups, even competitors.



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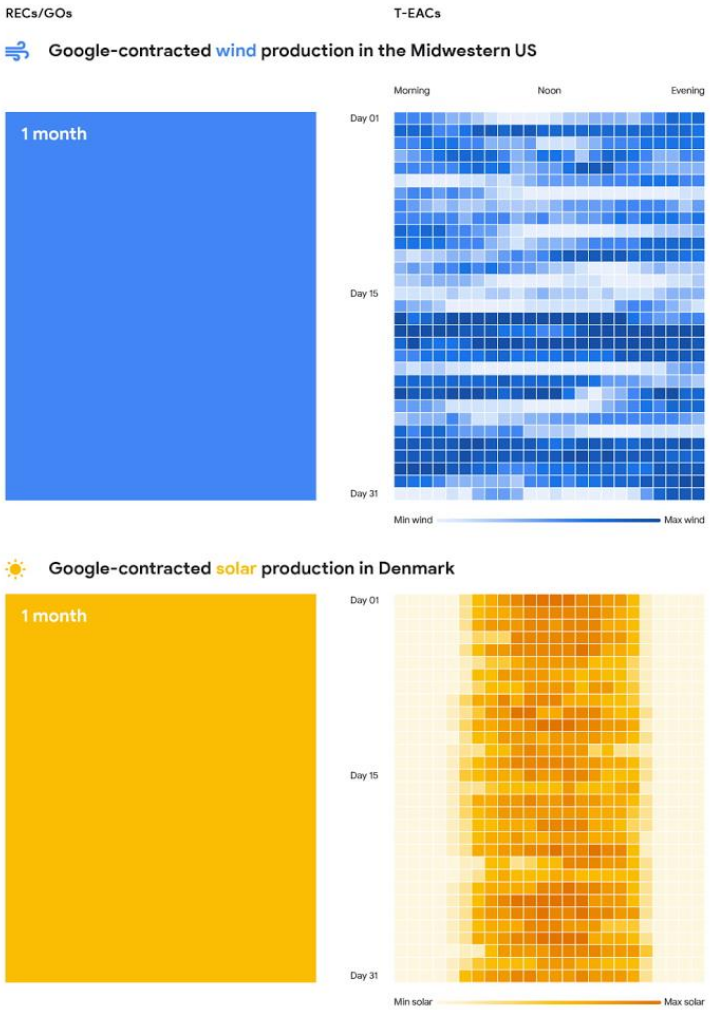

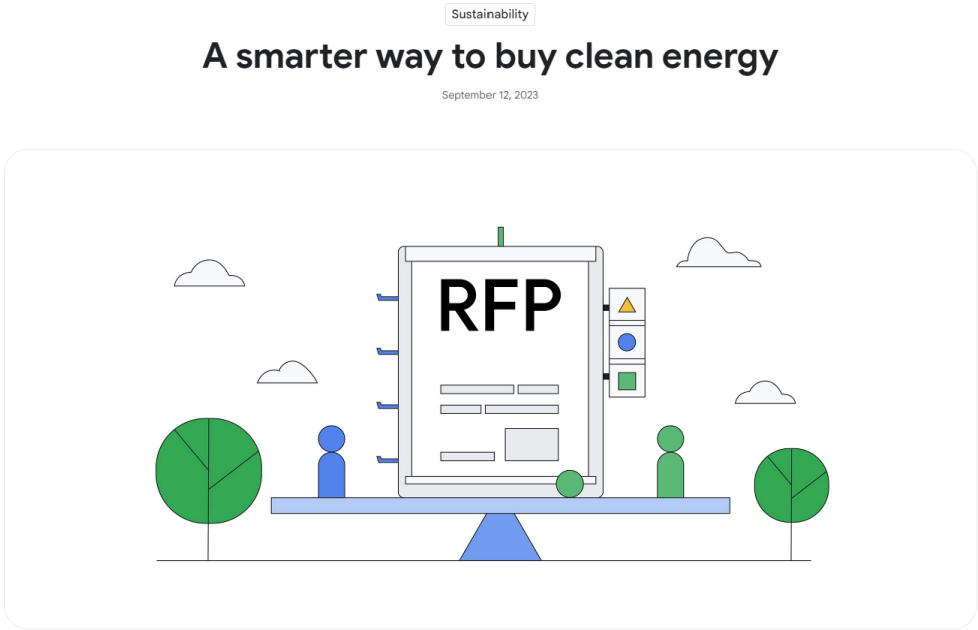

Source: A timely new approach to certifying clean energy, A smarter way to buy clean energy

Big Tech is at the forefront.

Source: Google

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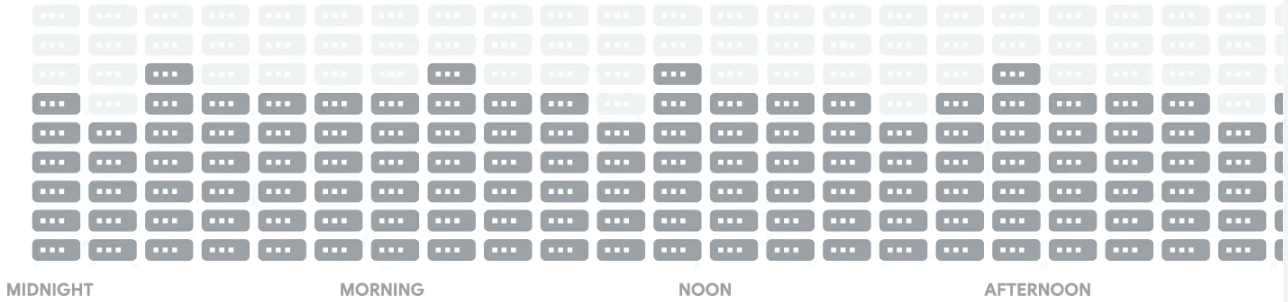
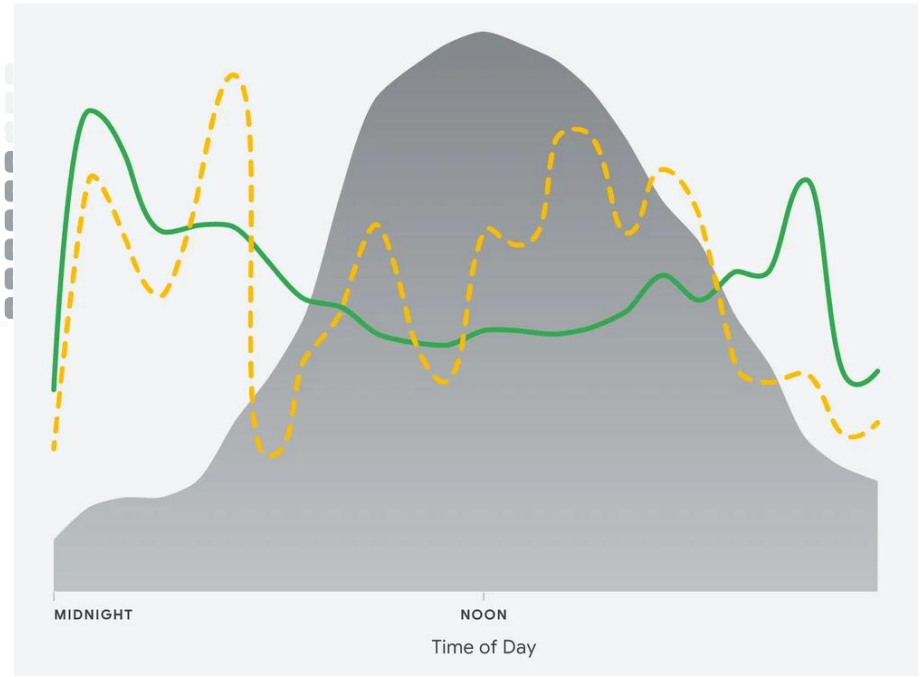
Conventional compute load

Execution of compute tasks throughout the day, regardless of carbon impact



Baseline versus Carbon-aware Load



Source: Google

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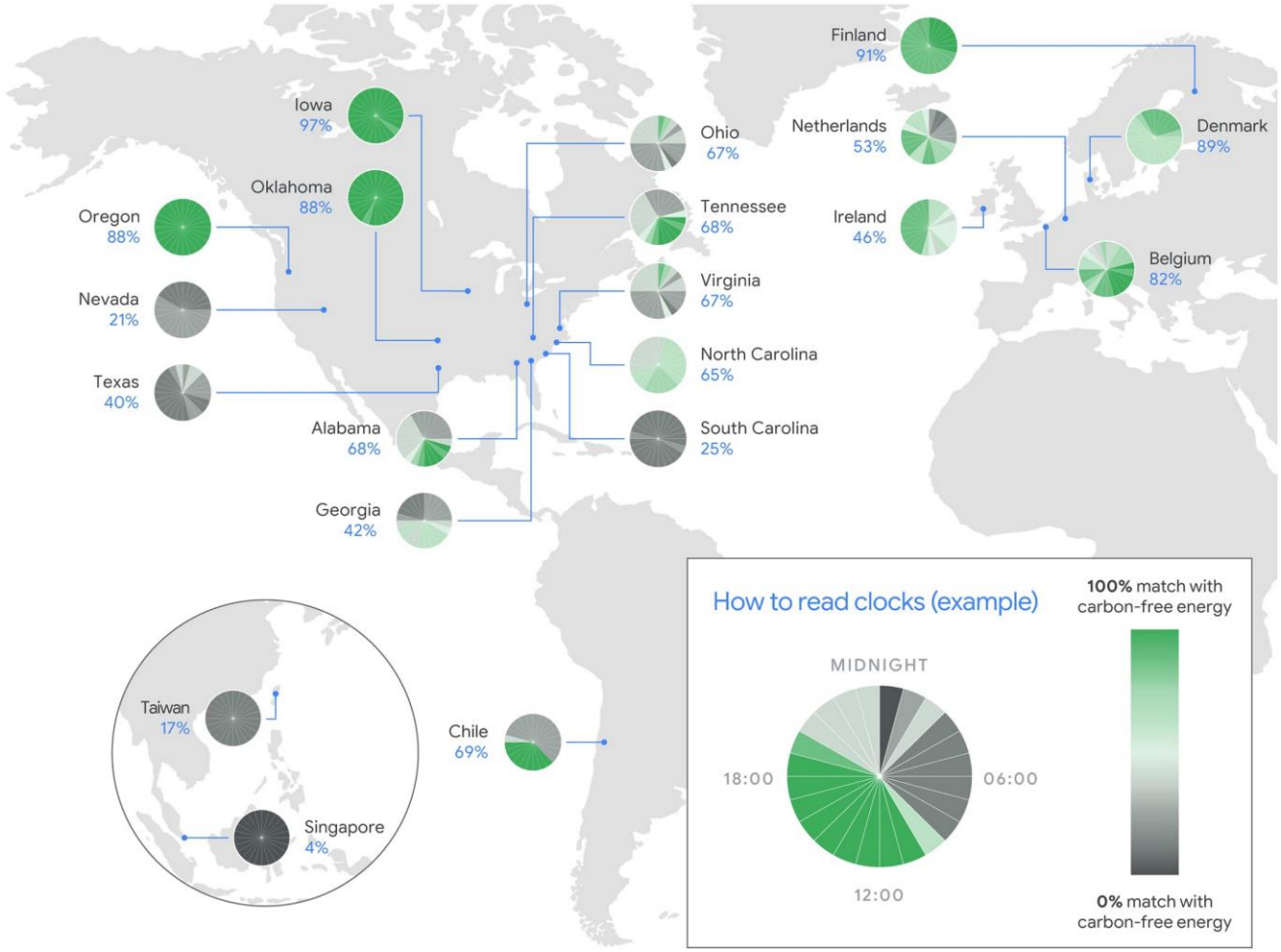
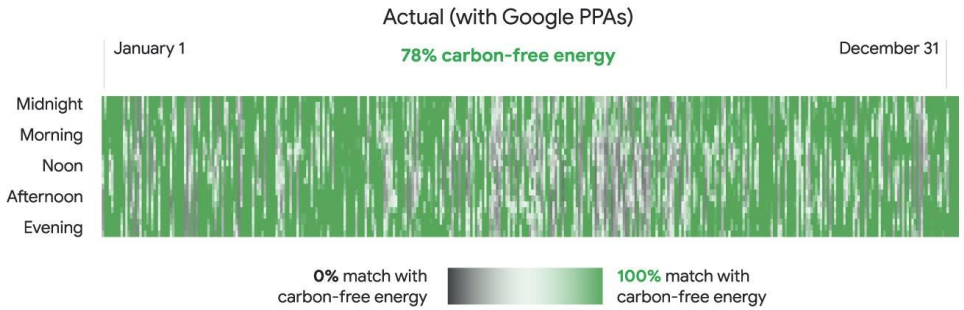


Carbon Heat Map: every hour of electricity use at Iowa data center in 2019



Carbon Heat Maps enable us to visualize each hour of the year and determine how clean our hourly electricity consumption is as we work towards 24/7 carbon-free energy.

Source: Google

Big Tech is at the forefront.

07 July 2022

FlexiDAO secures investment from Google, Microsoft Climate Innovation Fund, SET Ventures and EIT InnoEnergy for first-of-its-kind software platform

FlexiDAO, a leadi
InnoEnergy, has a
Google and the M
companies and g
their electricity a
Read the full press

Google, Microsoft, and Nucor announce a new initiative to aggregate demand to scale the adoption of advanced clean electricity technologies

NEWS PROVIDED BY
Nucor Corporation →
:00 ET

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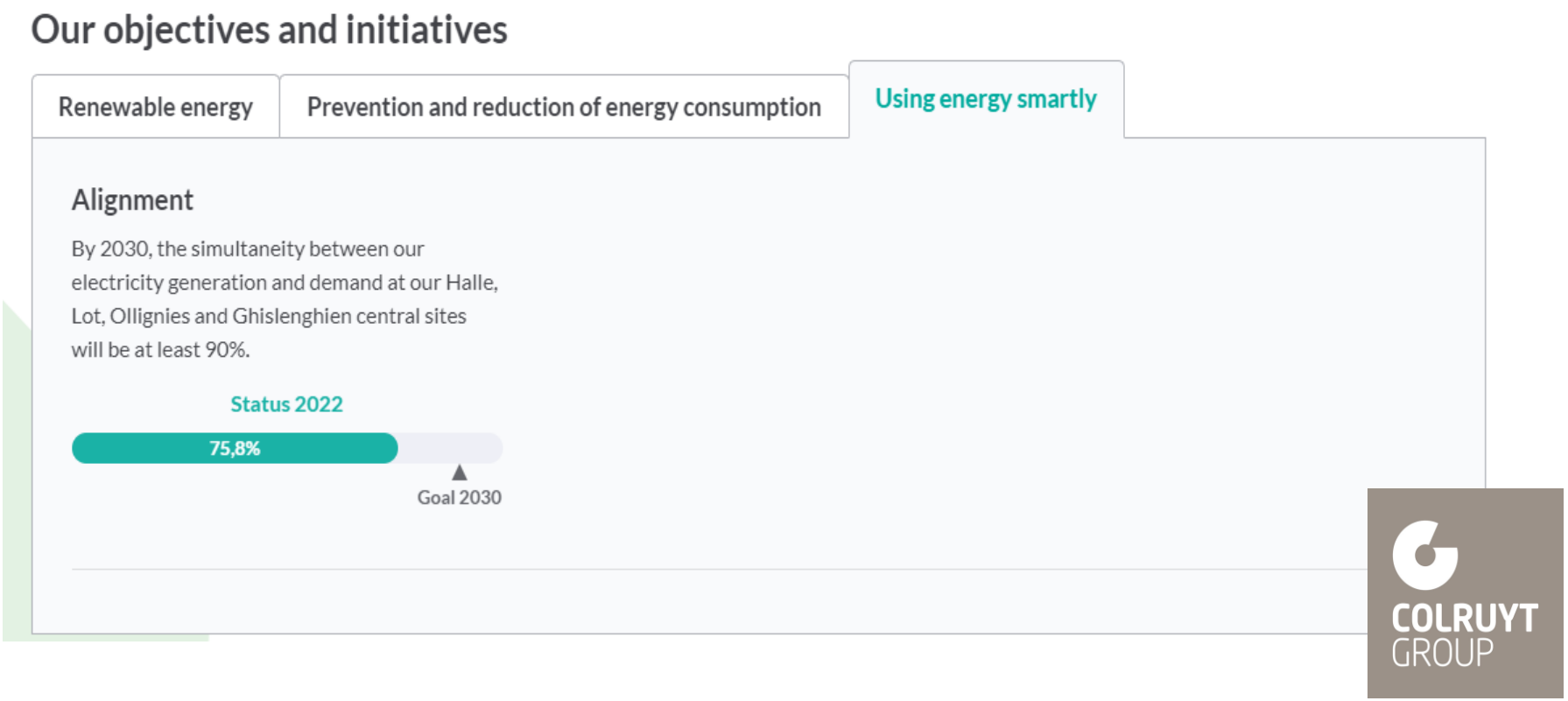
ENGIE to supply Microsoft Data Centers in Texas with 24×7 Renewable Energy Matching Program

Date: 09/20/2023

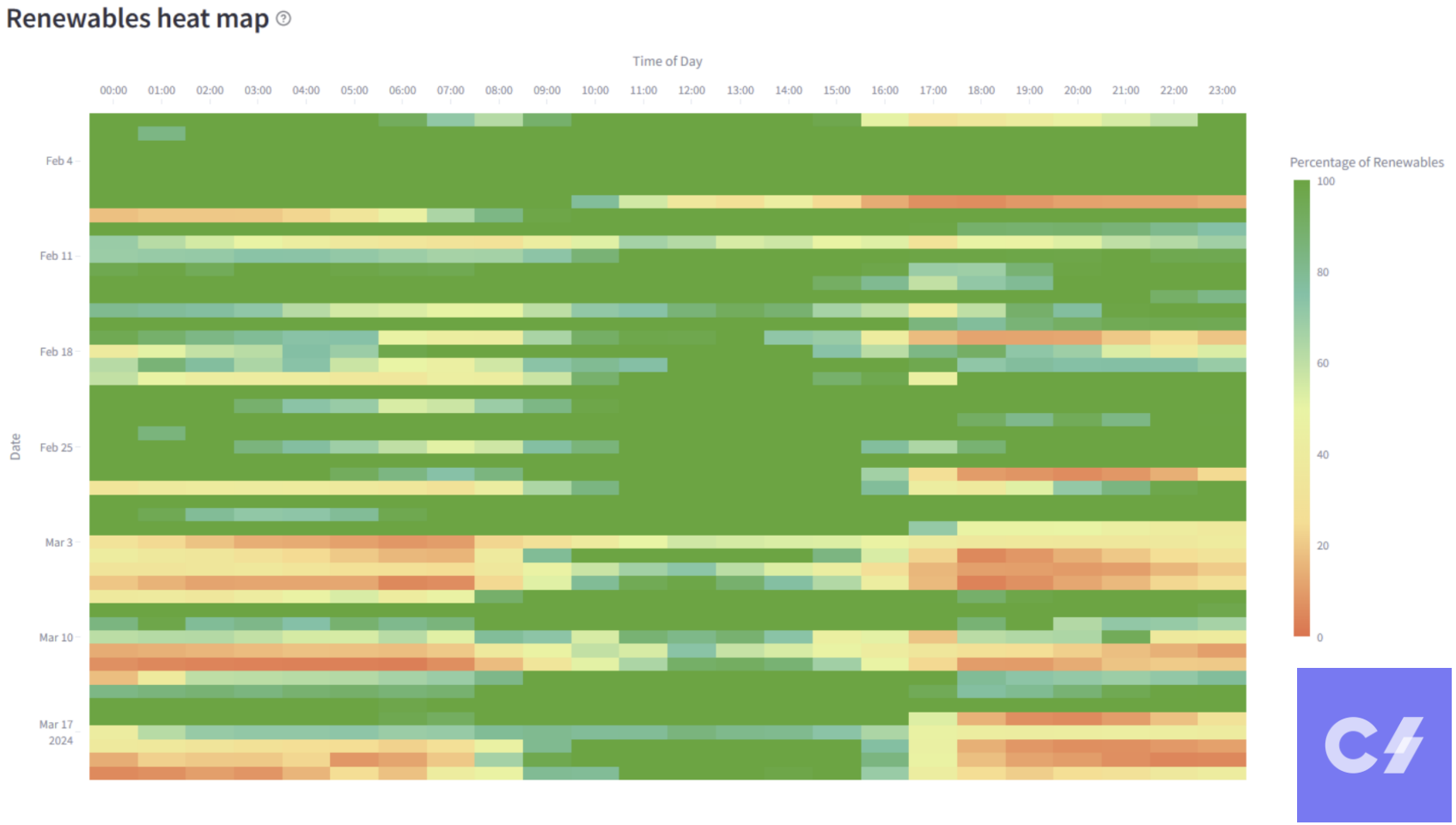
Source: FlexiDAO, ENGIE x Microsoft, Google x Microsoft x Nucor

Others begin to take significant steps.



Source: Colruyt

Our customers too.



Source: companion.energy

Hungry for more?

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Next webinars

- Industrial Electrification: From Barriers to Breakthroughs with Jan Rosenow (LinkedIn top voice) – April 18th
- Powering the EV-centric future: Renewable, Reliable, and Flexible with Irma Stegmann (Equans) – May 6th

Can’t wait?