



# Basics & Beyond: OFF-SITE ENERGY SOLUTIONS

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# Why is a Renewables Strategy Important to DC Operators?



## ECONOMICS

Make/save money while achieving environmental goals, tax advantages of incentives & subsidies



## PUBLIC COMMITMENTS

Stated public goals related to sustainability and/or renewable energy including (but not limited to); Carbon Neutrality, SBTi, NetZero, RE100, % targets, etc.



## MANAGE POWER/REC PRICES

Hedge existing short position, secure fixed price at a discount, mitigate risk of future electricity and EAC/REC cost increases



## ENVIRONMENTAL REPUTATION

Increasing stakeholder pressures: customers, investors, value chain partners, employees, competitors. Reduce impact & climate risk, stated environmental goals

# Buying renewable energy



## 3 main ways to purchase renewable energy:

### Energy attribute certificates

- EACs are the way clean energy use is tracked and traded
- Types of EACs include: RECs, GOs, I-RECs, LGCs, TIGRs, etc.
- EACs are required to make environmental claims
- They can be purchased unbundled or bundled, or as part of a green tariff

### Onsite/distributed generation

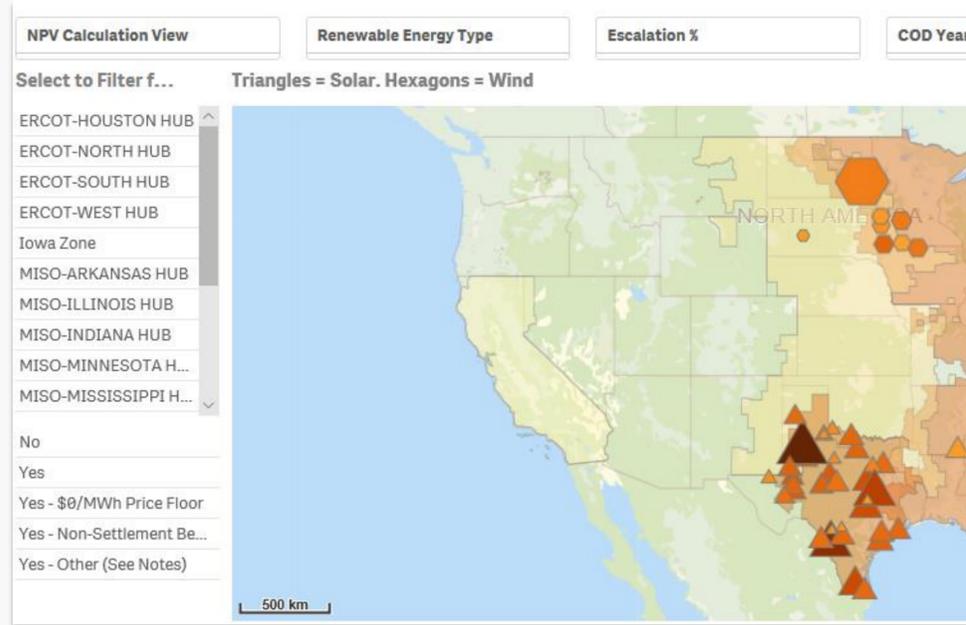
- Onsite options include ownership, lease, or PPA
- Primary benefit is direct reduction of energy at a facility
- Onsite systems have a high visual appeal
- There can be scalability challenges

### Offsite generation

- Power purchase agreements (virtual, direct, retail) are the primary mechanism
- Typically large-scale purchases via utility-scale projects
- Achieves additionality and scale without CAPEX
- Usually includes EACs

# Setting Your Global Strategy

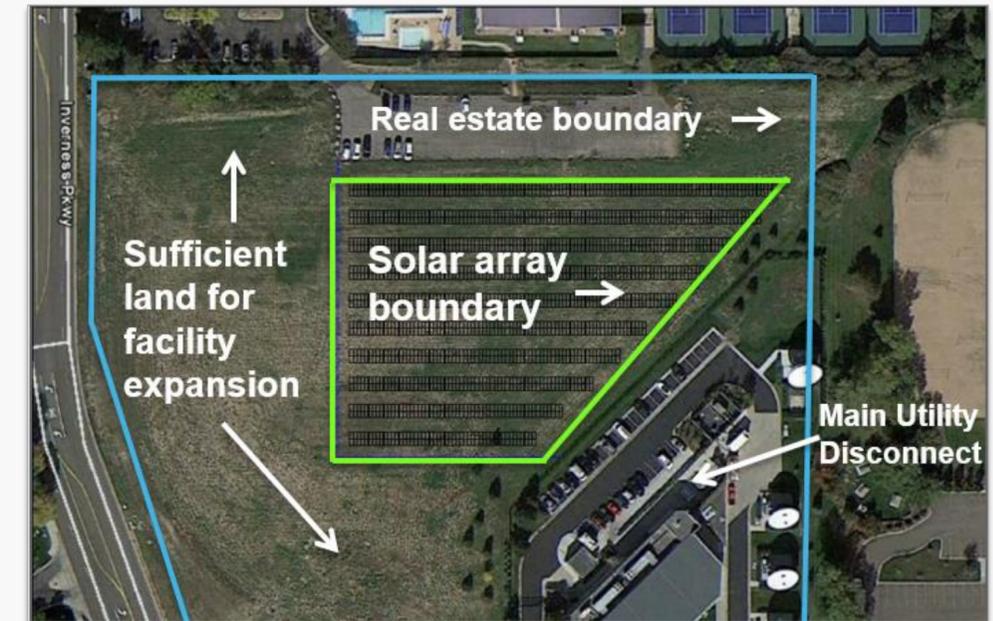
Key considerations to determine best options



- High level economics to achieve RE project diversification
- Provides validation to internal finance
- Identify risks and price sensitivity

Options	Availability	Indicative Pricing	Indicative Savings/Premium	Emissions Savings/Annum	Recommendation
Current Supply Tariff	Current	\$0.0690/kWh	N/A	N/A	N/A
PPA Offsite Physical	Limited - due to regulated nature of market	TBD - subject to negotiations with developer/ utility	TBD - subject to negotiations with developer/ utility	TBD - subject to negotiations with developer/ utility	Suggest opening up discussions with utility
PPA Offsite Virtual	High - several attractive projects available in IN and nearby states	ERCOT: \$19-23/MWh SPP: \$18-23/MWh PJM: \$22-50/MWh CAISO: \$30-4/MWh MISO: \$19-23/MWh	Depending on the market, 5-20% savings over the life of the 12-20 year PPA term	100% of IN portfolio - 675k MT CO2e	Highly recommended - take action to take advantage of ITC & PTC. Prices attractive due to low grid pricing & TCs
On-Site Project Development Opportunities	High	\$0.07-0.10/kWh for solar PPA	25-50% premium for generated volumes for larger facilities. Close to grid parity for smaller sites.	Systems typically produce 3-5% of facility needs, potentially between 20-34k MT CO2e reduction across entire IN portfolio	Recommend further study focusing on facilities with higher unit cost.
Utility green rate option	High	\$0.001-0.009/kWh	\$751.3k-6.76M premium per year	100% of IN portfolio - 675k MT CO2e	Not recommended due to price premium compared to purchasing RECs in open market
REC Procurement	High	\$0.0003-0.0005/kWh for national wind RECs	\$225.4-375.6k premium per year	100% of IN portfolio - 675k MT CO2e	Potentially - tertiary option compared to offsite virtual PPA or offsite physical PPA

- Detail impact of incentives
- Provides validation for internal legal
- Plan for future regulatory uncertainty



- Determine viability of project
- Provides validation for internal ops
- Identify gaps for further technical analysis



# Renewable Procurement Decision Factors



Cost to business ↑  
↓  
Potential Cost Benefit

	Additionality Benefits	Scalability	Hedge Effectiveness	Market Leadership	Transaction Ease
Energy Attribute Certificates (unbundled)	○	●	○	○	●
Utility or Supplier Green Program	●	○	○	●	●
Onsite Renewables	●	○	●	●	●
Offsite PPA	●	●	○	●	○

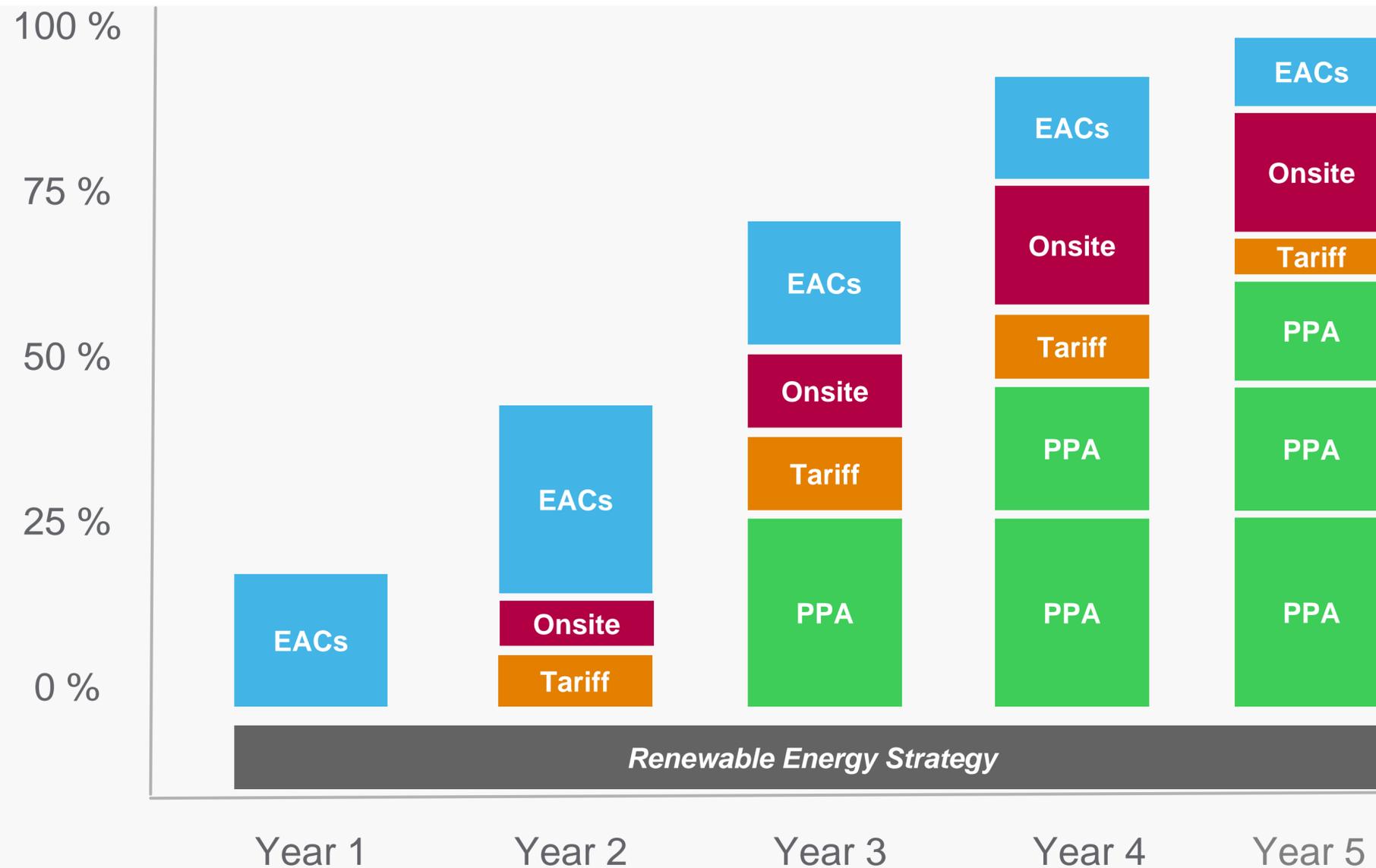
KEY

- Readily Meets Goals
- Meets Goals
- Requires Consideration

The ideal solution will depend on the requirements in terms of market risk, financial benefit, carbon reduction/required scale, locality and additionality

# Smart Ramp to Renewable Energy Goal

Offsite PPAs or EACs are necessary to hit GHG emissions reduction goal



## Portfolio Approach

- Maximize onsite generation
- Pursue offsite power purchase agreements (PPAs)
- Purchase energy attribute certificates (EACs, such as RECs, LGCs, or GOs) for the balance
- Explore green tariff availability

# Status Quo vs. PPAs

## Typical Retail Contract



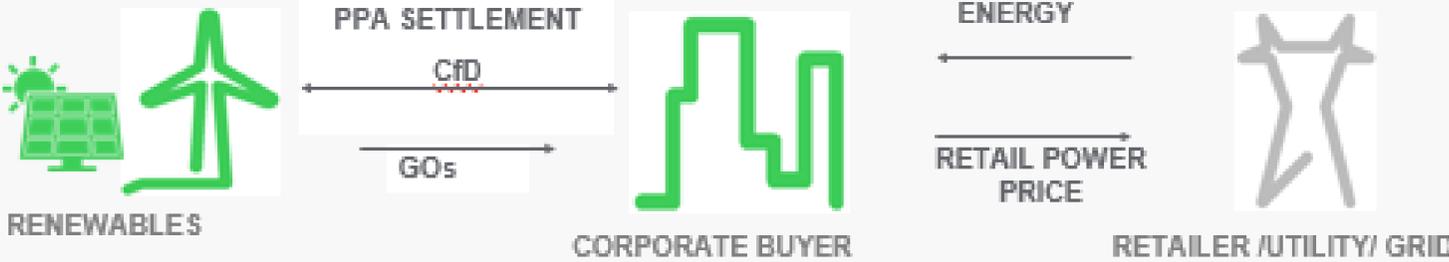
## Advantages

- Business as usual
- Simple sign-up process
- Green products available

## Considerations

- Retail price premiums
- No potential upside
- No additionality
- Short-term

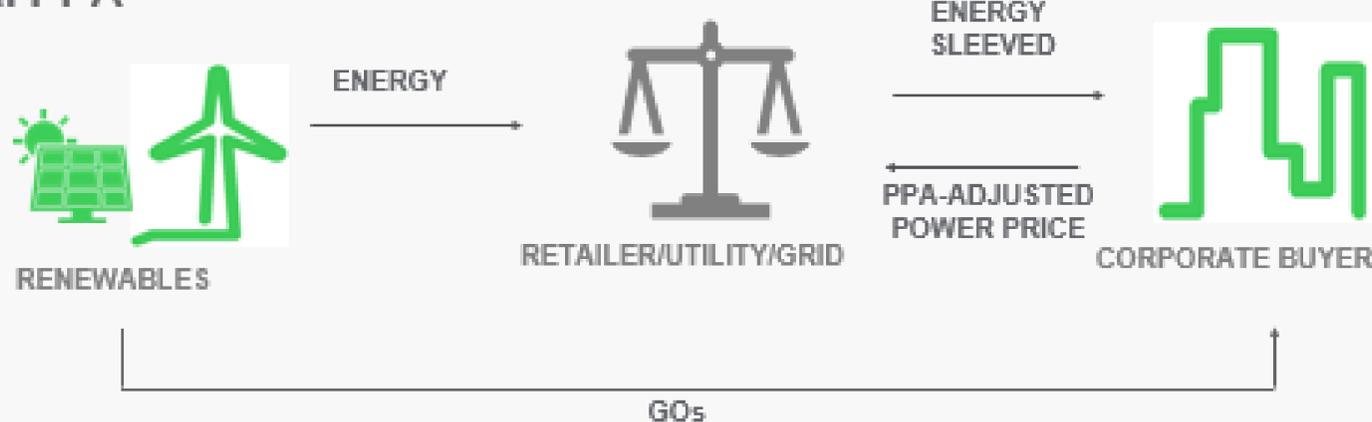
## Virtual/Financial PPA



- Additionality
- Potential savings
- Pan-European allowing economic optimization
- Help to address disaggregated load
- Operational flexibility

- Accounting implications (especially with IFRS)
- Imperfect hedge
- Long-term
- Financial contract
- Pan-European GOs

## Direct/Physical PPA



- Additionality
- Potential savings
- Familiar procurement practices
- Hedge effective
- Fewer accounting implications

- Complicated deal structure
- Reduced operational flexibility
- Long-term
- In-country competitiveness

# European Corporate Renewable Energy Market Update



## Outlook on EACs – GOs and REGOs

### Increased EAC volatility expected

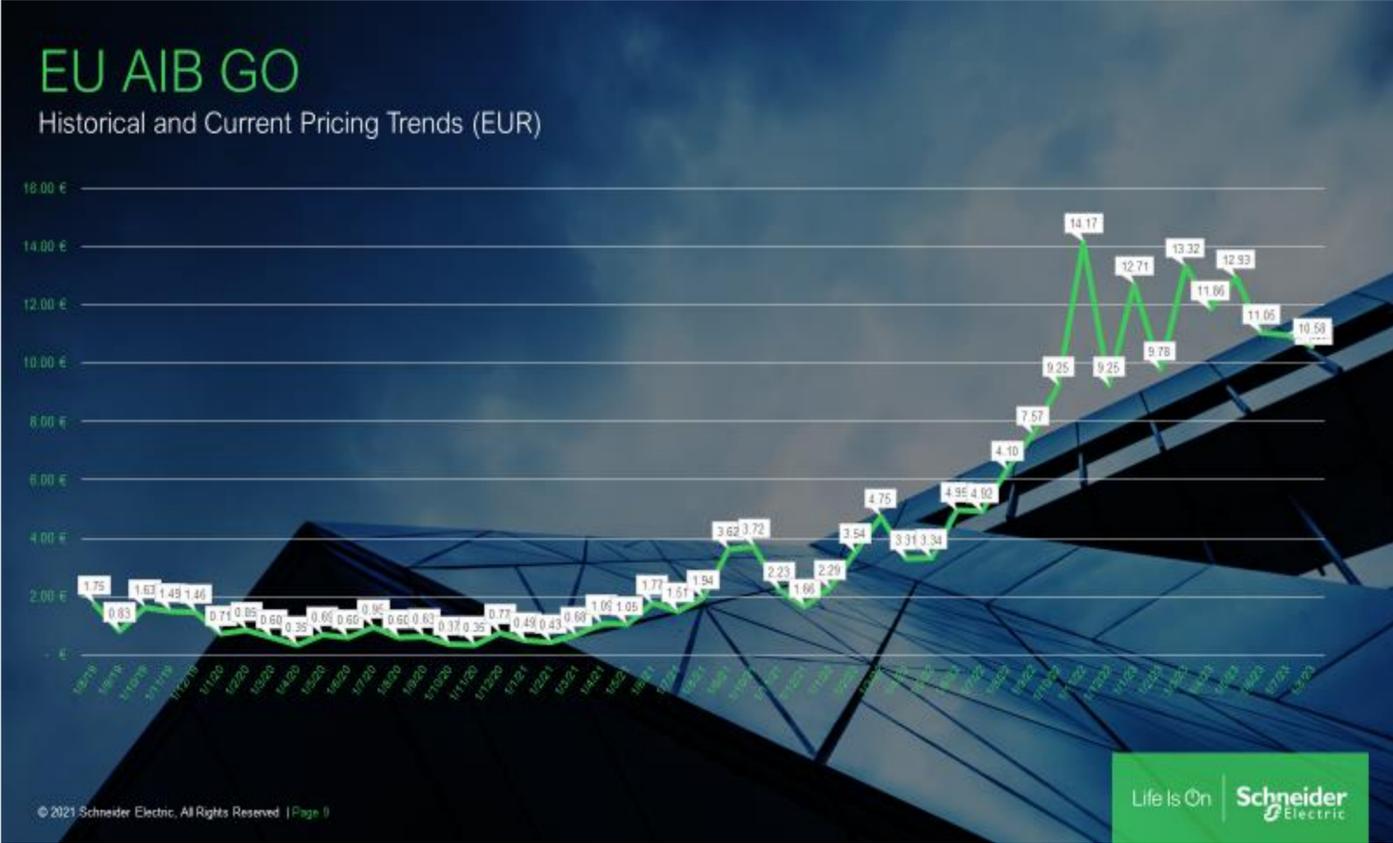
### Demand for certificates set to soar

### Supply constraints likely

- New renewable energy projects facing headwind with permitting and financing in several countries
- More companies shifting procurement to avoid, being exposed to price swings and paying high premiums
- GOs no longer accepted in the UK as of April 2023. Current high REGO price makes UK renewable energy projects more attractive to investors

- 78% of companies based in Europe have set a climate target by 2030; EACs will be critical to achieving goals
- Scope 1 emissions reduction targets will be tackled by electrification of processes and powering those with renewables
- Electric mobility will increase need for renewables
- Pressures from companies to decarbonize their supply chain (scope 3) leads to bigger pool of buyers

- EACs from new renewable energy assets developed for dedicated Corporate PPAs will not reach the open market
- New EAC may take longer to reach the market given project delays
- In Europe approx. 30-40% approx. of the total EAC supply will not be compliant with new RE100 (and CDP) guidelines



# North American Corporate Renewable Energy Market



## Key Trends for 2023

### Corporate Demand for Renewable Energy is Skyrocketing

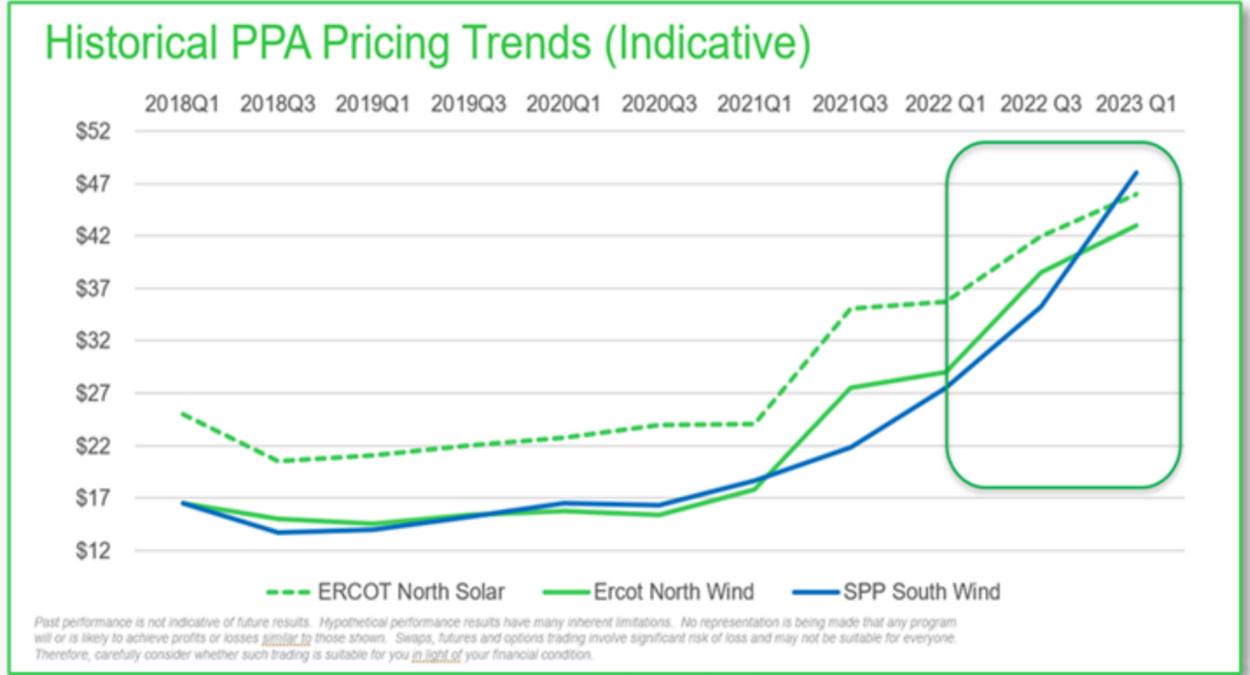
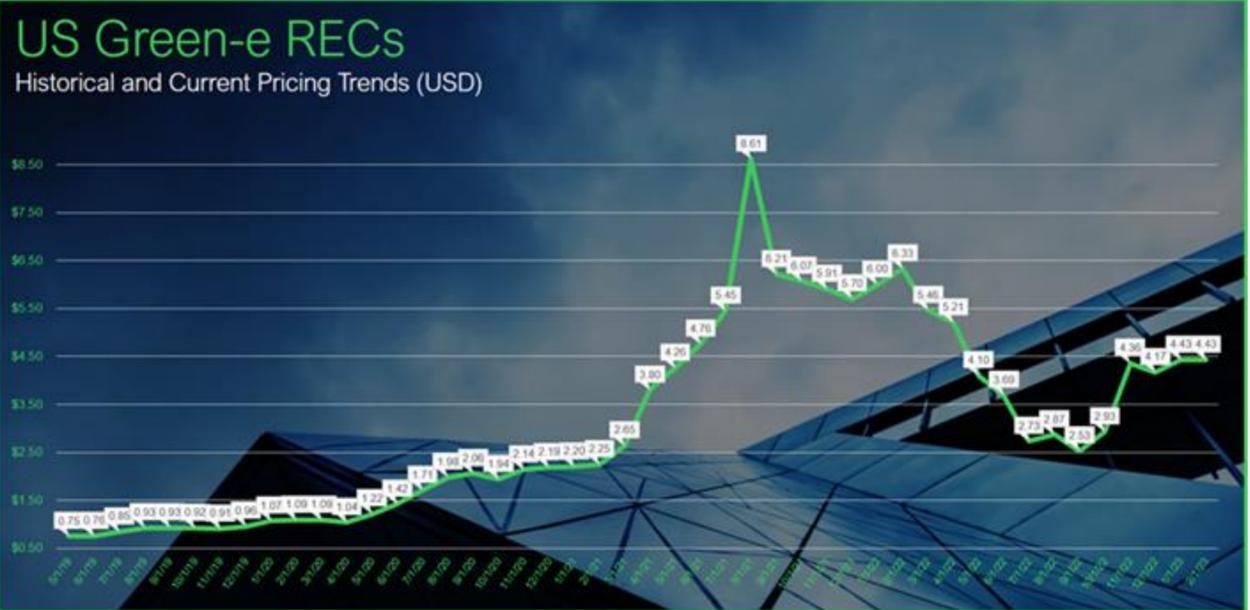
- 2,500+ companies are now participating in the Science Based Targets initiative
- Historically a buyer's market; dynamic has shifted with increased demand and limited project availability = now a seller's market
- Unbundled RECs which have historically been stable at ~\$1 have seen extreme volatility over the past 18 months
- PPA prices increasing

### External Factors are delaying projects

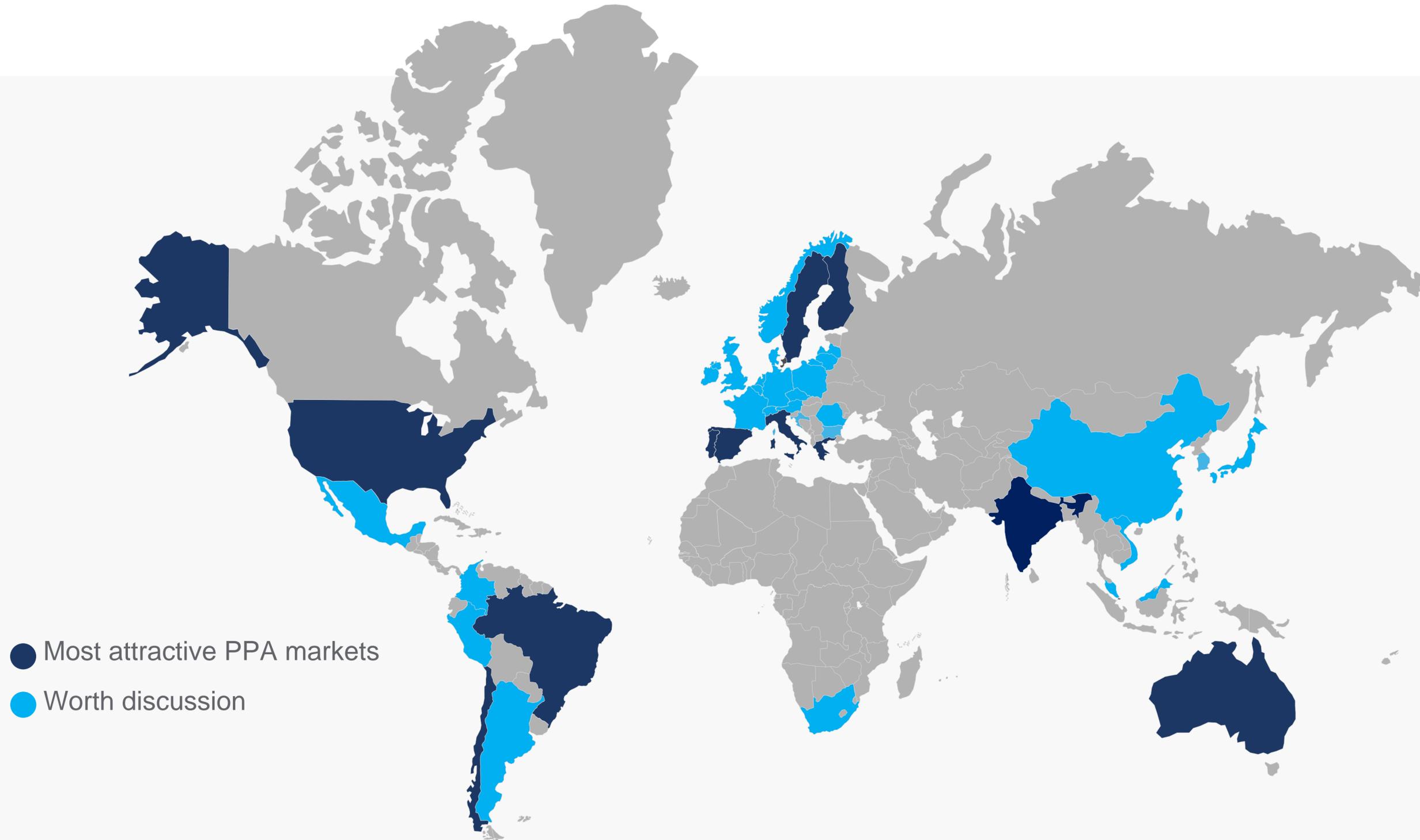
- Inflationary pressure and tariffs are driving up material costs
- Steel costs (85% weight of a wind turbine) are up 80% in the last 12-24 months.
- Pricing for modules is increasing as companies rush to buy them.
- Supply chain issues have resulted in transport delays of all materials

### Inflation Reduction Act provides new opportunities

- Renewable energy landscape changing rapidly in US, offering new opportunities for corporates
- Market still 'developing' but leading corporates are positioning themselves to take advantage of new offers



# Global Renewable Energy PPA Opportunities



# 7 Pillars of Risk to Evaluate and Mitigate

Market Price Risk

Operational / Technology Risk

Basis Risk

Counterparty Risk

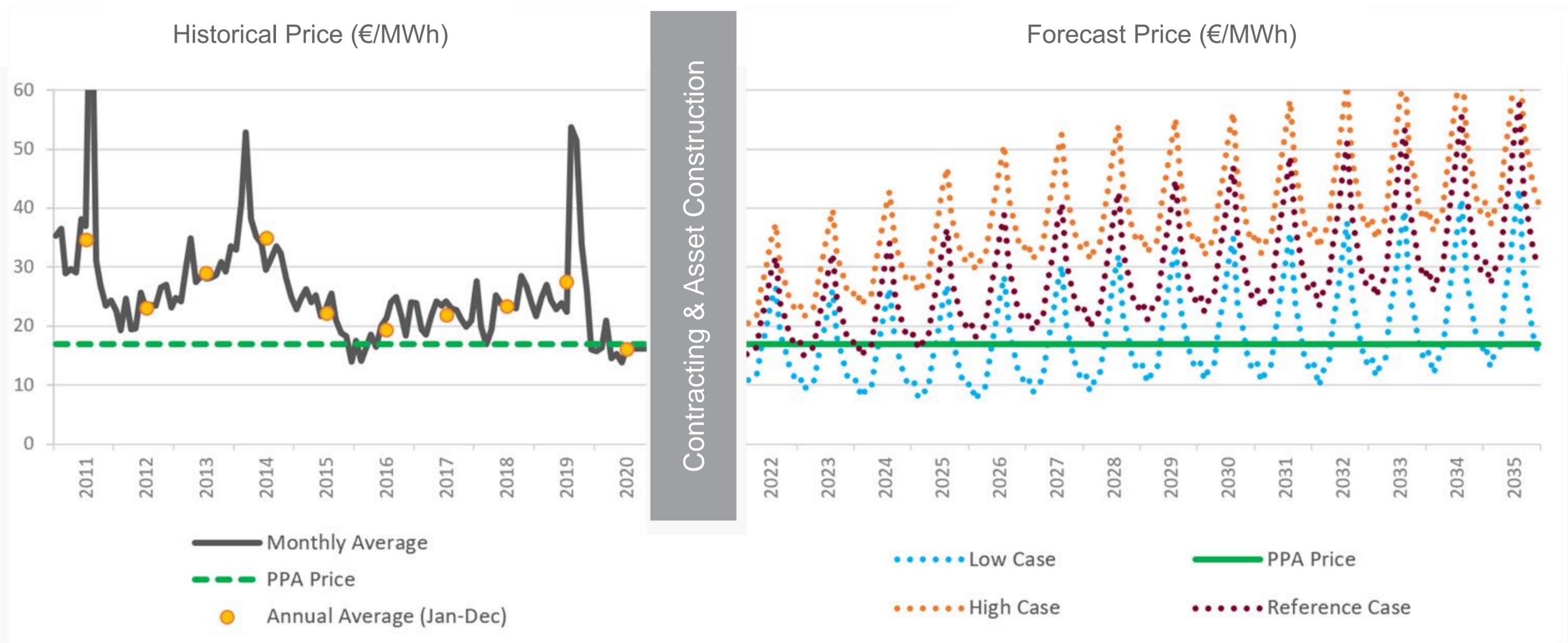
Resource Risk

Market Saturation Risk

Execution Risk



# Modelling Performance and Potential Risk



Past performance is not indicative of future results. Hypothetical performance results have many inherent limitations. No representation is being made that any program will or is likely to achieve profits or losses similar to those shown. Swaps, futures and options trading involve significant risk of loss and may not be suitable for everyone. Therefore, carefully consider whether such trading is suitable for you in light of your financial condition.

# 7 Pillars of Risk to Evaluate and Mitigate

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Execution Risk



# 5 Reasons the Vast Majority of Global Corporates Use Advisors

1

Lack of internal resources

2

Insight into best available terms and market pricing

3

Gain buy-in from key decision makers and stakeholders

4

Available data analytics and resources

5

RFP reach (150+ projects)

# What's Next



**24/7 carbon free energy is the logical next step for renewables sourcing**



# 24/7 Carbon-Free Energy by 2030

A photograph of several offshore wind turbines in the ocean at sunset. The sky is a mix of orange, pink, and purple, with a thin crescent moon visible in the upper right. The water is dark and calm. The turbines are silhouetted against the bright sky.

Google

Joe Kava  
Vice President, Global Data Centers

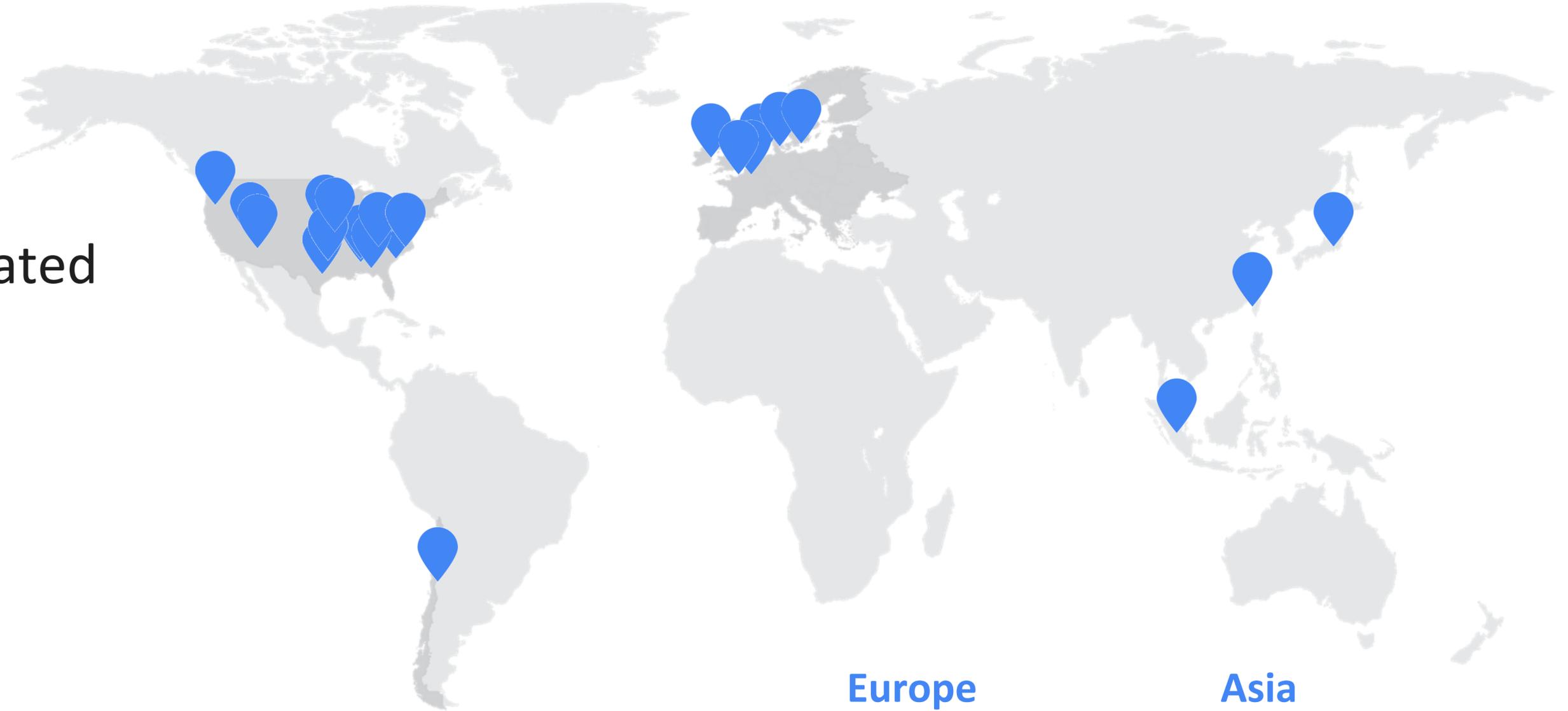
12 September 2023

# 24

## 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
- Storey County, Nevada
- Quilicura, Chile

### Europe

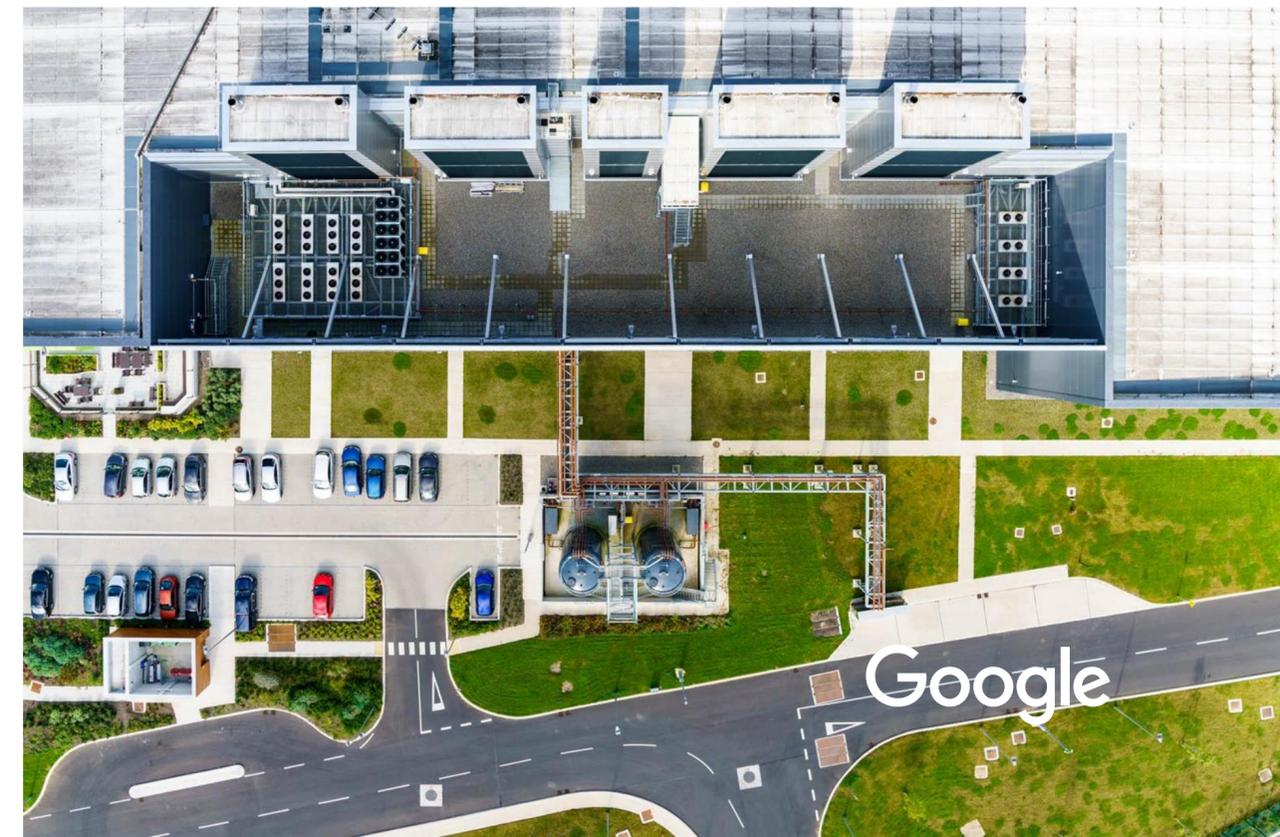
- Dublin, Ireland
- Eemshaven, Netherlands
- Middenmeer, Netherlands
- Fredericia, Denmark
- Hamina, Finland
- St Ghislain, Belgium

### Asia

- Changhua County, Taiwan
- Singapore
- Inzai, Japan

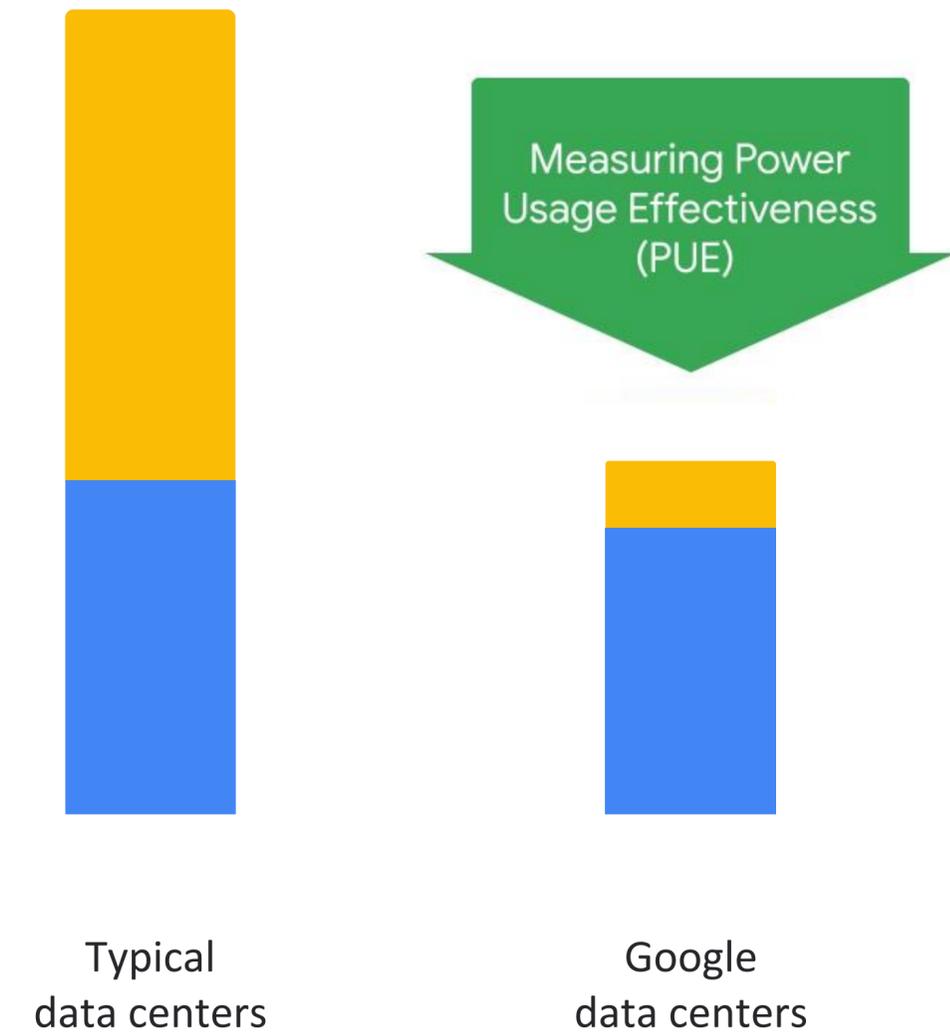


Efficient data centers help us better serve our users, in a more sustainable way

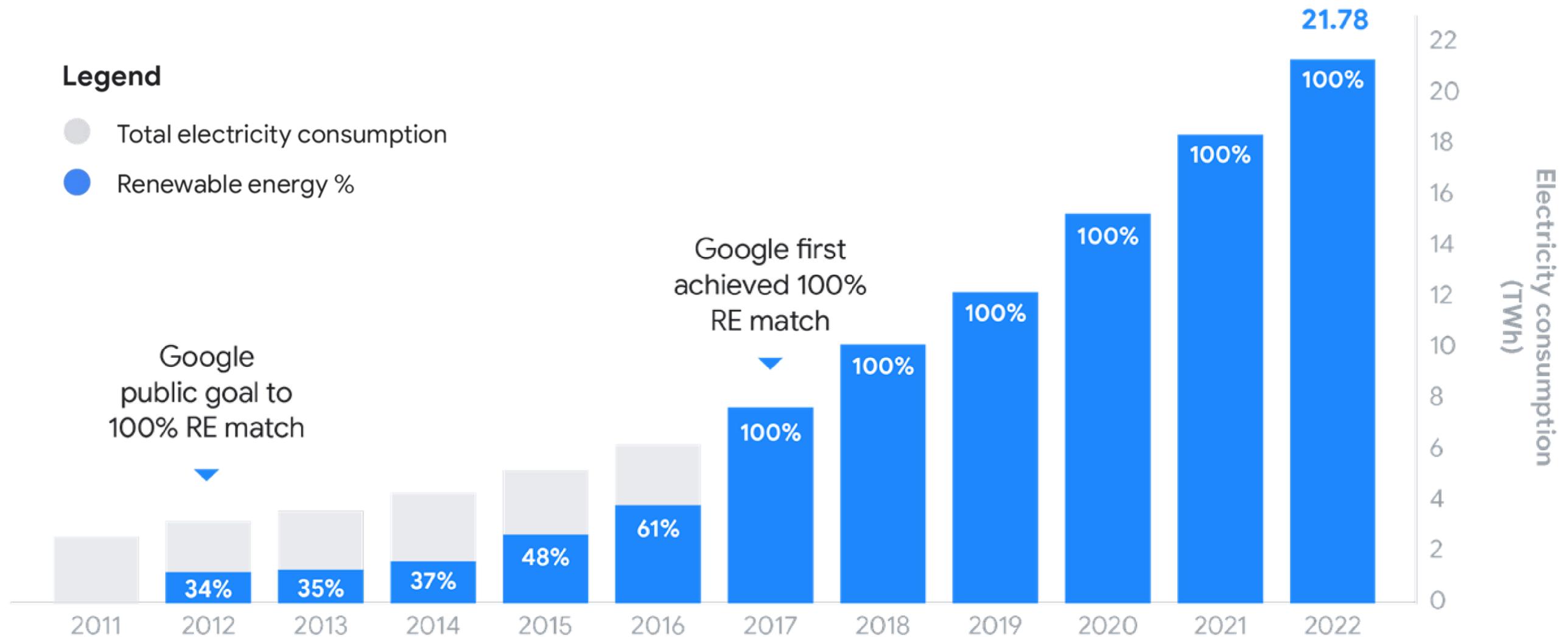


Google data centers are  
**1.5X** more energy efficient  
than a typical data center

● Servers ● Facilities



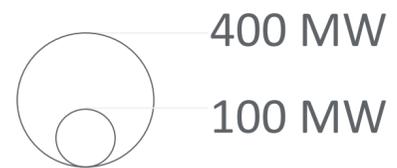
# 100% renewable energy matching Six years in a row.



# 80+

Renewable energy projects

# 10+ GW



- Wind
- Solar
- Hydro
- Storage





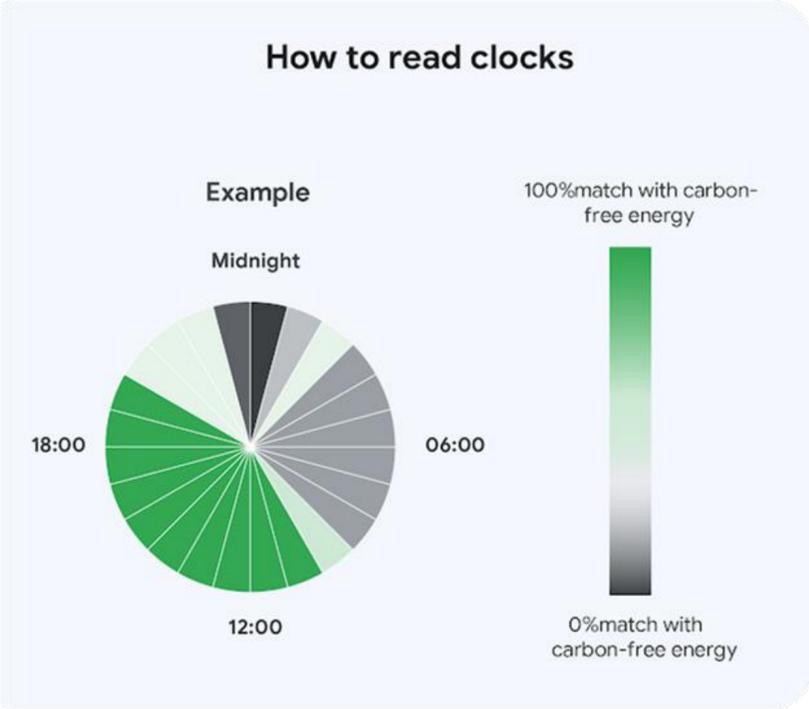
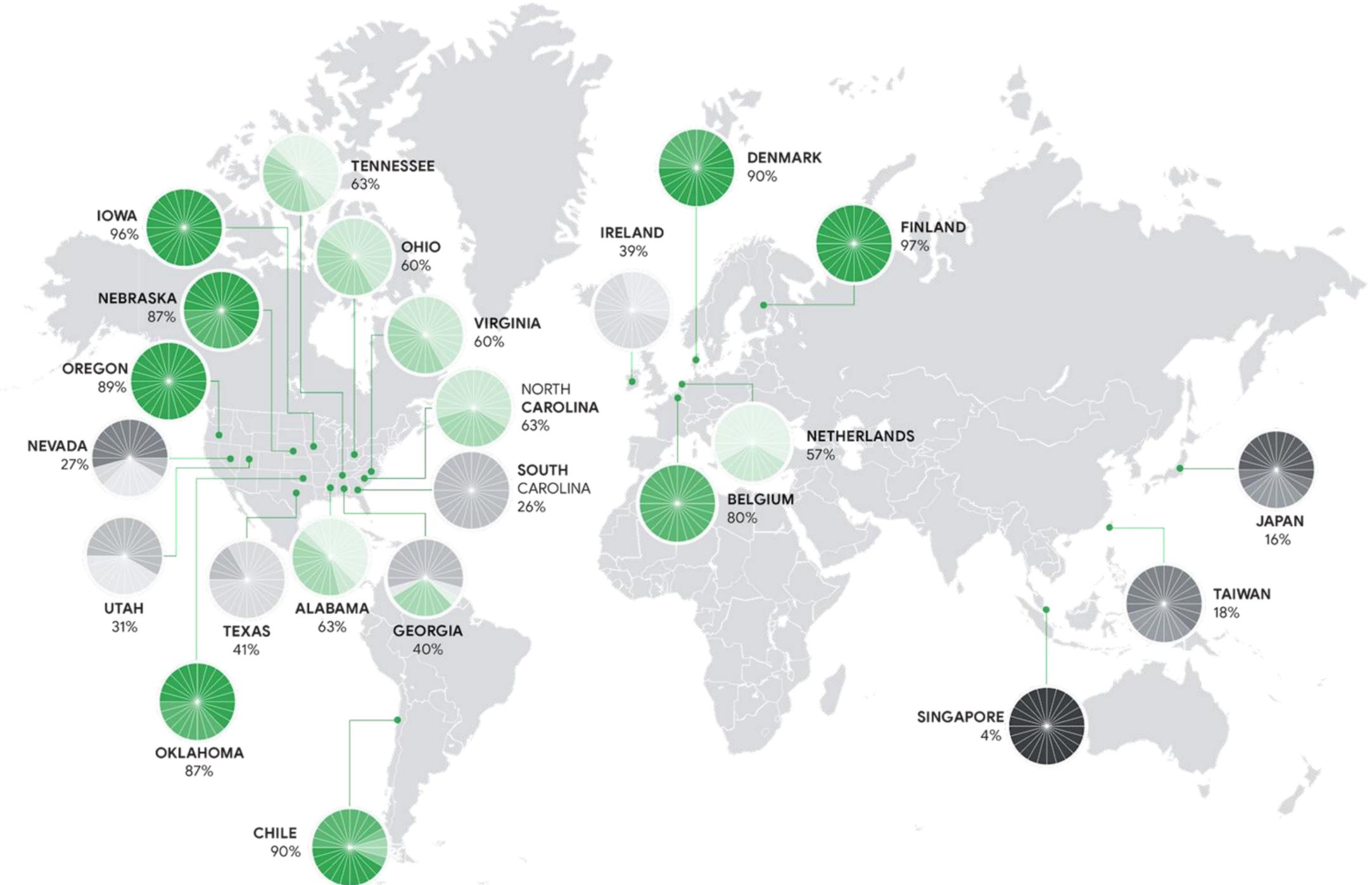
# 24/7 Carbon-free energy

Sourcing **carbon-free energy** for Google facilities in all places, at all times by 2030.



In 2022, Google reached **64%** carbon-free energy globally on an hourly basis,

Seven of our data centers operated at or near **90% carbon-free energy**, and at least thirteen achieving at least 85%.



# Cleaner backup power

## 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



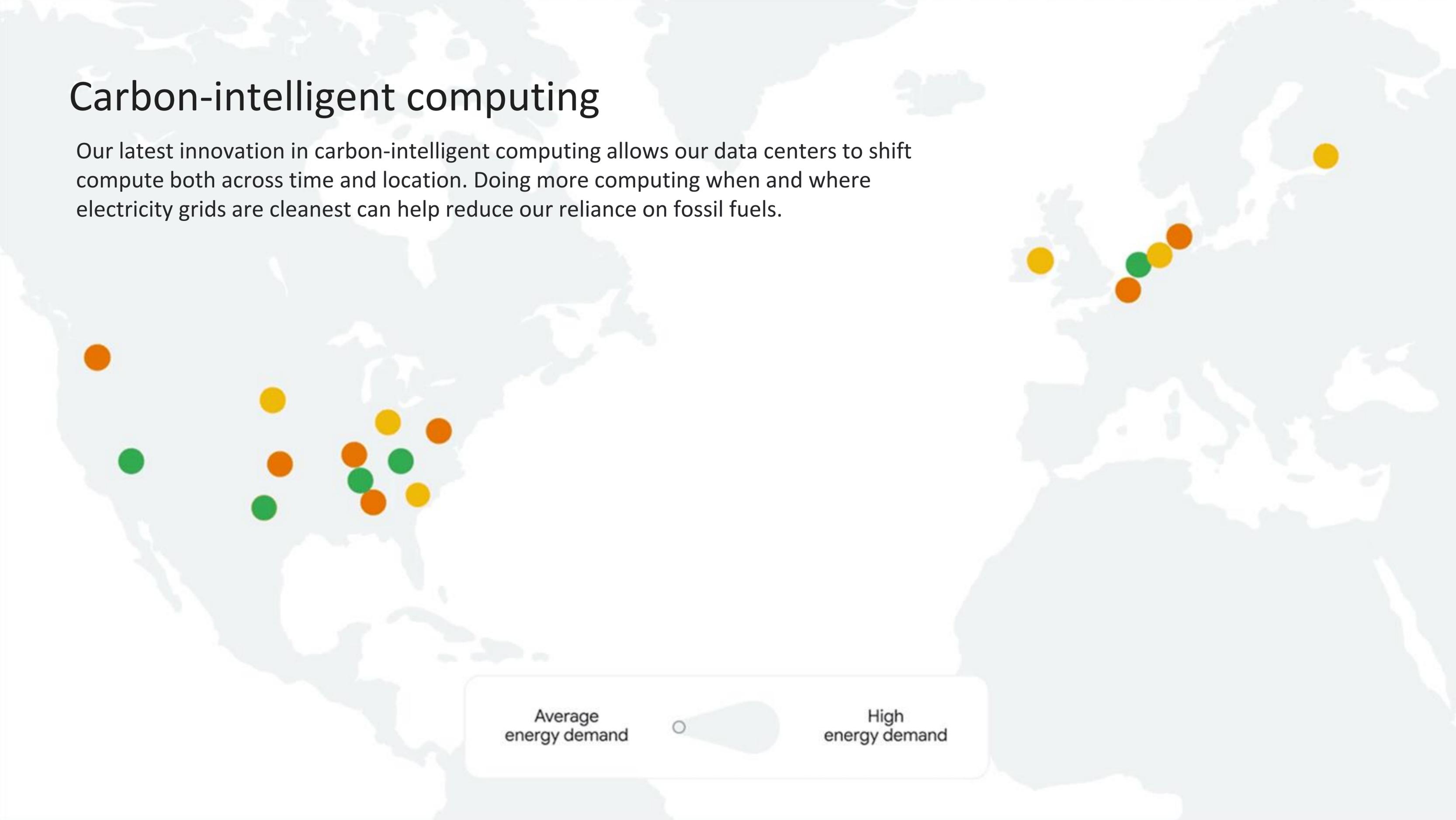
# Shifting compute across time and locations

By shifting compute across time and location, we're able to further reduce the carbon intensity of our applications around the clock and around the globe.



# Carbon-intelligent computing

Our latest innovation in carbon-intelligent computing allows our data centers to shift compute both across time and location. Doing more computing when and where electricity grids are cleanest can help reduce our reliance on fossil fuels.



# Supporting an equitable energy transition

**Lowering energy burden** for  
Low-to-Moderate Income (LMI) communities in in  
states where we have data centers\*

**10%+ energy bill savings** for 25,000 Households  
each year through utility bill credits

Community Investment Funds to address **Pre-  
Weatherization and Energy Efficiency**

\$12M (Partnership with EDPR)  
\$4M (Partnership with Sol Systems)  
~3,000 Households will benefit

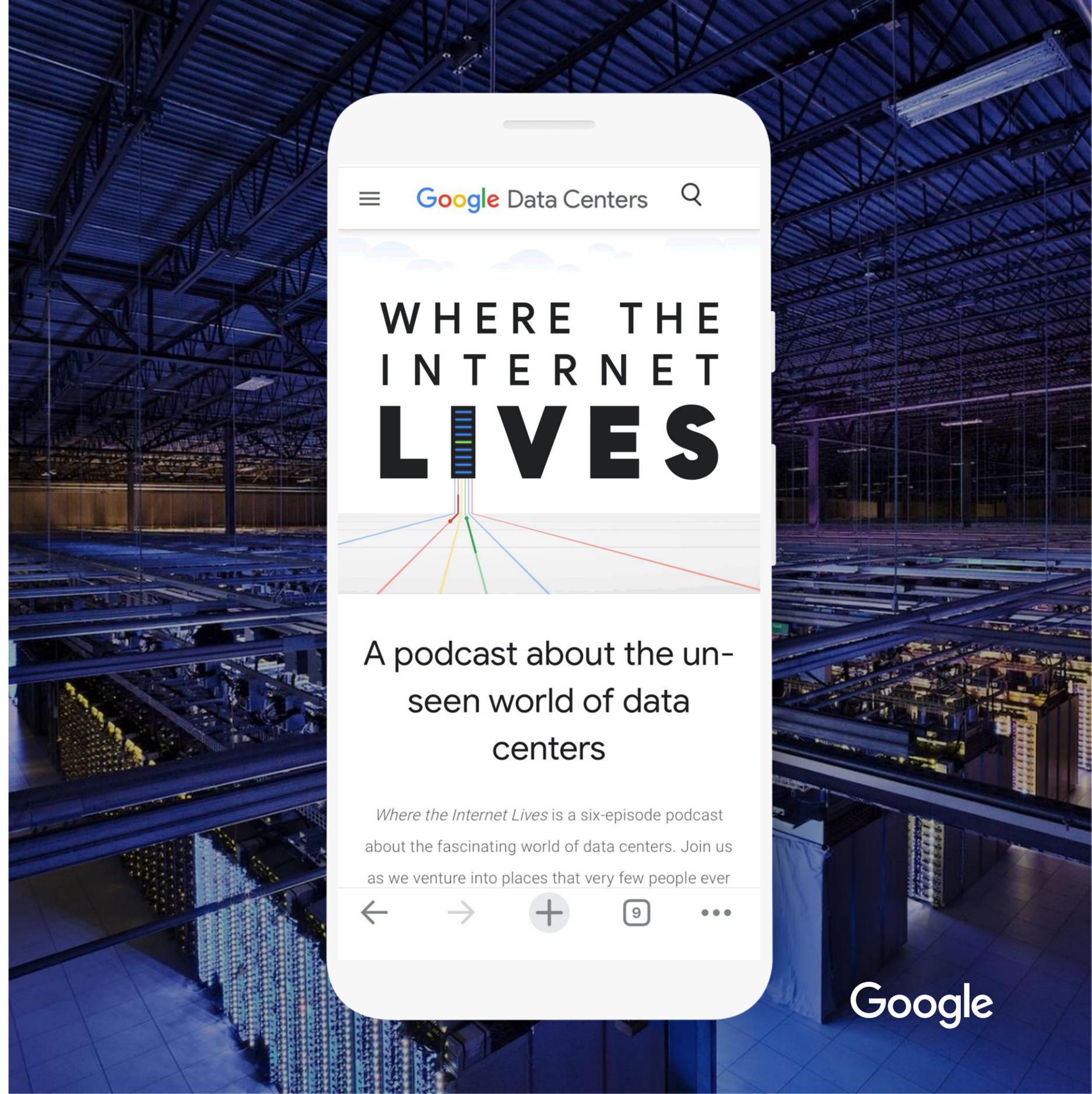
\*As part of our 24/7 Carbon Free Energy Purchasing



Listen to Google's  
podcast about data centers  
to learn more. 🎧 → [goo.gle/WTIL](https://goo.gle/WTIL)



[google.com/datacenters](https://google.com/datacenters)



☰ Google Data Centers 🔍

# WHERE THE INTERNET LIVES



A podcast about the un-  
seen world of data  
centers

*Where the Internet Lives* is a six-episode podcast  
about the fascinating world of data centers. Join us  
as we venture into places that very few people ever

← → + 9 ...

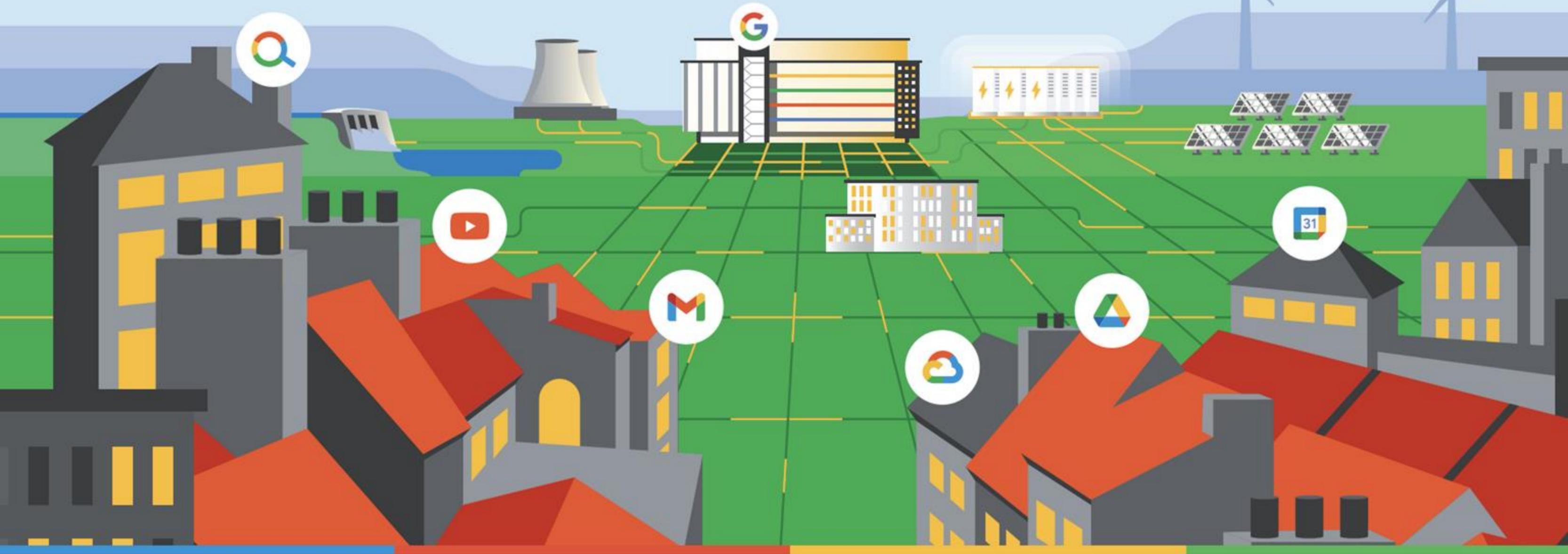
Google

Google

# 24/7 Carbon-Free Energy

Every hour. Every day. Everywhere.

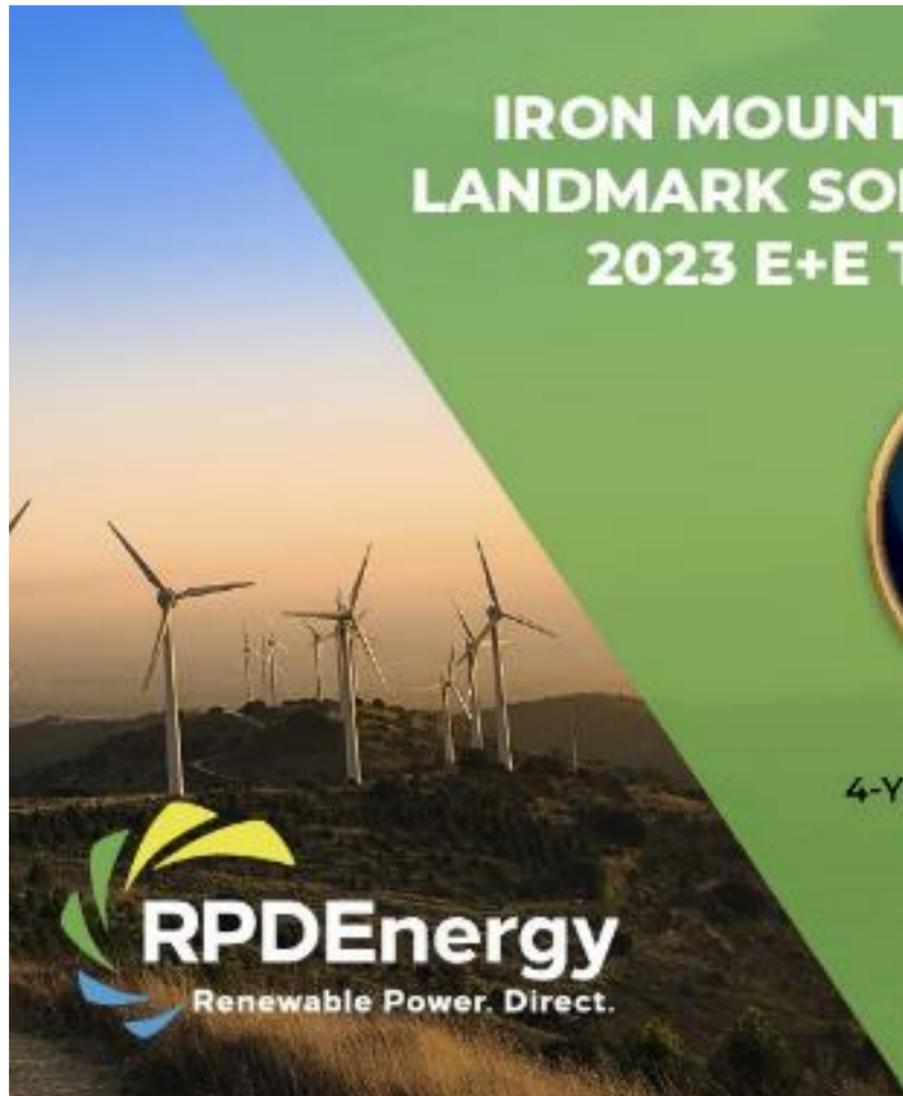
By 2030.



Thank you

[goo.gle/carbonfreeby2030](https://goo.gle/carbonfreeby2030)

# IRON MOUNTAIN 24/7 CFE LANDMARK SOLUTION WINS 2023 E+E TOP PROJECT

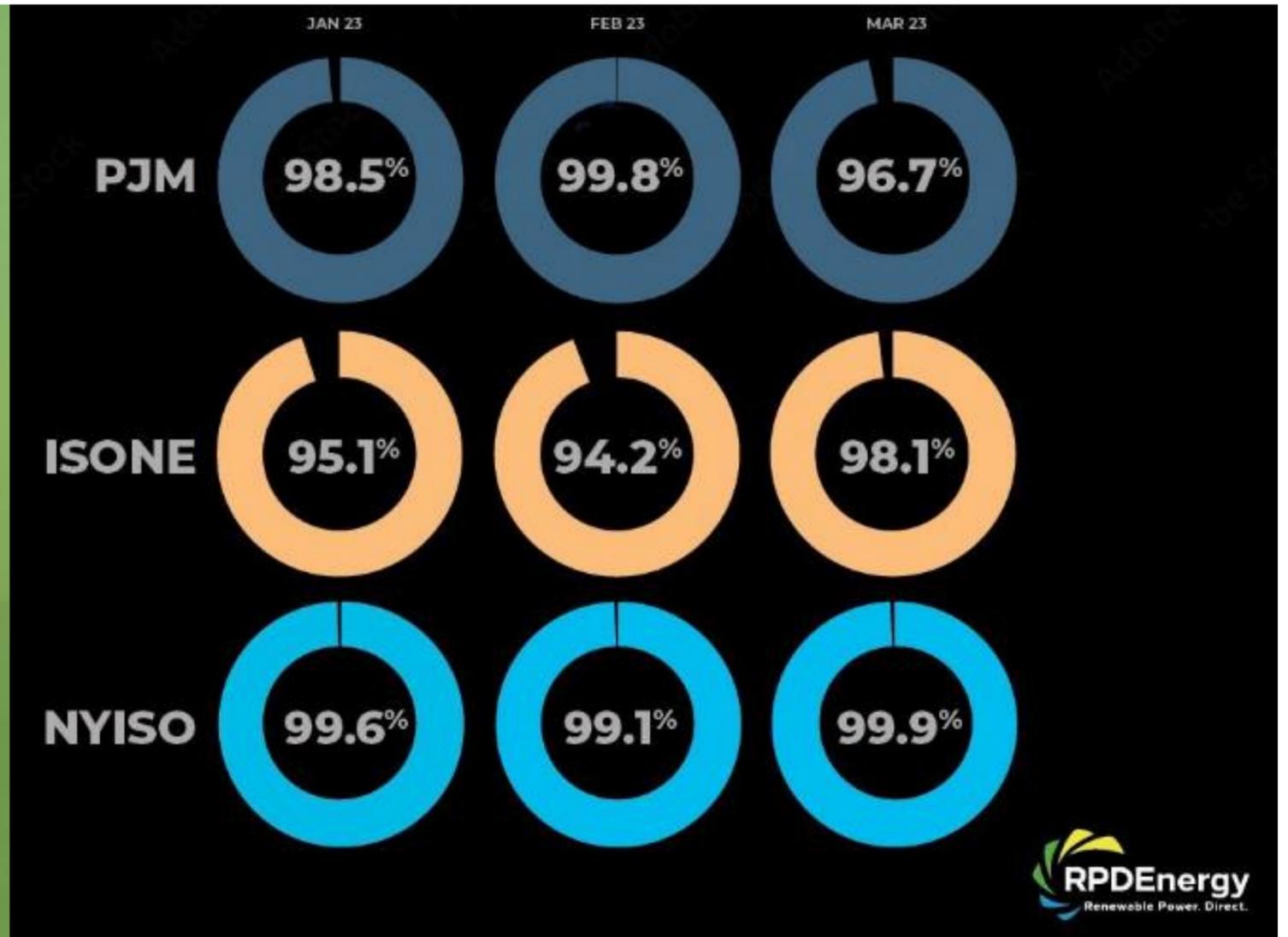


TOP PROJECT  
Environment  
+ Energy  
**LEADER**  
AWARDS  
2023

4-YR 24/7 CFE CONTRACT  
**250** ACCOUNTS  
**100+** FACILITIES  
**3** ISO REGIONS



**RPDEnergy**  
Renewable Power. Direct.



CFE Profile

Year 2023

