

# Alternative Energy Market Update – Q3'23

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*August 2023*

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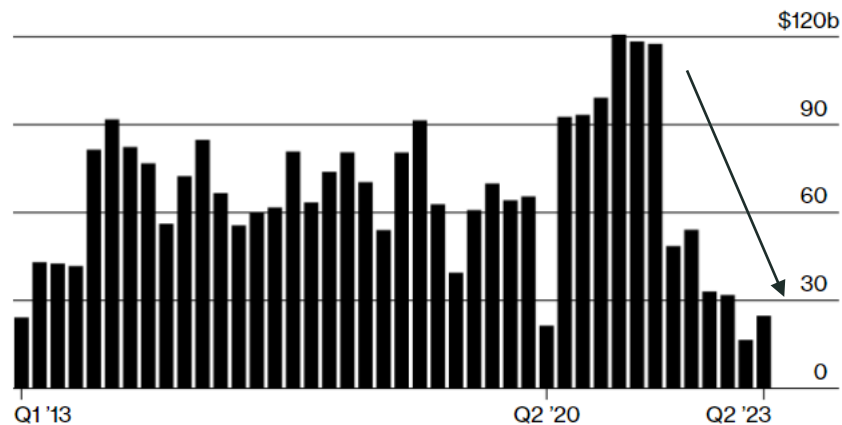
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# Macro Environment | Summer 2023

*Significant slow-down of PE exits appears to be improving*

## Market Disruptions Caused a Broad Pause on Sales by Private Equity Firms...

- 1 COVID
  - 2 Rising Interest Rates
  - 3 Silicon Valley Bank
  - 4 Regulatory Uncertainty – IRA Clarity
  - 5 Ukraine
- 



## ...Although Recent Events Could Mark a Trend Reversal

- 1 **Expected Uptick in Fall IPO Activity**







*SoftBank's prospective \$60bn September listing of semiconductor unit Arm Ltd.*




*L Catterton's expected IPO of Birkenstock for \$8bn valuation*

- 2 **Recent Energy Transition PE Sale activity**

*Case Study – ENCAP INVESTMENTS L.P.*

Company	Status	Commentary
 BROAD REACH POWER	Sold	Engie acquired Broad Reach's battery storage business for \$1bn
 TRIPLE OAK	In Market	Developer of onshore wind assets; sources say the transaction is advancing to round two of bidding
 SolarProponent	In Market	Developer of utility-scale solar assets; sources say the transaction is advancing to round two of bidding

Source(s): Bloomberg, Preqin, Infralogic, Company Press Releases

## Traditional Renewables | Utilities Retrench to Regulated Models

*After years of contracted renewables growth, utility holding companies are selling unregulated renewables arms*



**June 12, 2023: Duke Energy (NYSE: DUK) announced the sale of its unregulated utility-scale renewables business to Brookfield Renewable**

- Purchase price of \$2.8bn; the deal is expected to close by YE 2023
  - Duke expects net cash proceeds to be \$1.1bn, which will be paid in two equal installments over 18-months
  - Duke took an \$800mm write down on a previous \$3.6bn mark
  - Portfolio 90% contracted with IG counterparties and a 13-year weighted average remaining contract life
- Brookfield will acquire 5.9 GW of operating and under construction wind, utility-scale solar, and storage assets, and a 6.1 GW pipeline
  - Due to a minority sale of Duke's unregulated portfolio to John Hancock in 2019, Brookfield's net share of the operating assets will be approximately 3.4 GW
    - John Hancock acquired 1.2 GW of wind, solar, and storage capacity for \$1.25bn
- **GreenFront's Take:** This transaction cleared ~\$0.82/W<sub>ac</sub> of operating projects, which is about a 20% discount to Duke's 2019 minority interest sale to John Hancock. When accounting for 1.3 GW of projects under construction and a 6.1 GW pipeline, the discount is more like 30%. Floating rate debt on operating projects likely resulted in break-even economics for the remainder of the 13-year weighted average operating period. Brookfield's strategic rationale was likely influenced by the large wind repower opportunity presented by the intersection of unprofitable PPAs and a fresh PTC runway created by the IRA. Thus, after years of frothy M&A markets for renewable developers, this transaction sets the new marker for rational transaction metrics

**August 16, 2023: American Electric Power (NASDAQ: AEP) completed the sale of its 1.4 GW unregulated renewables portfolio to a partnership owned by Invenergy, CDPQ, and Blackstone**

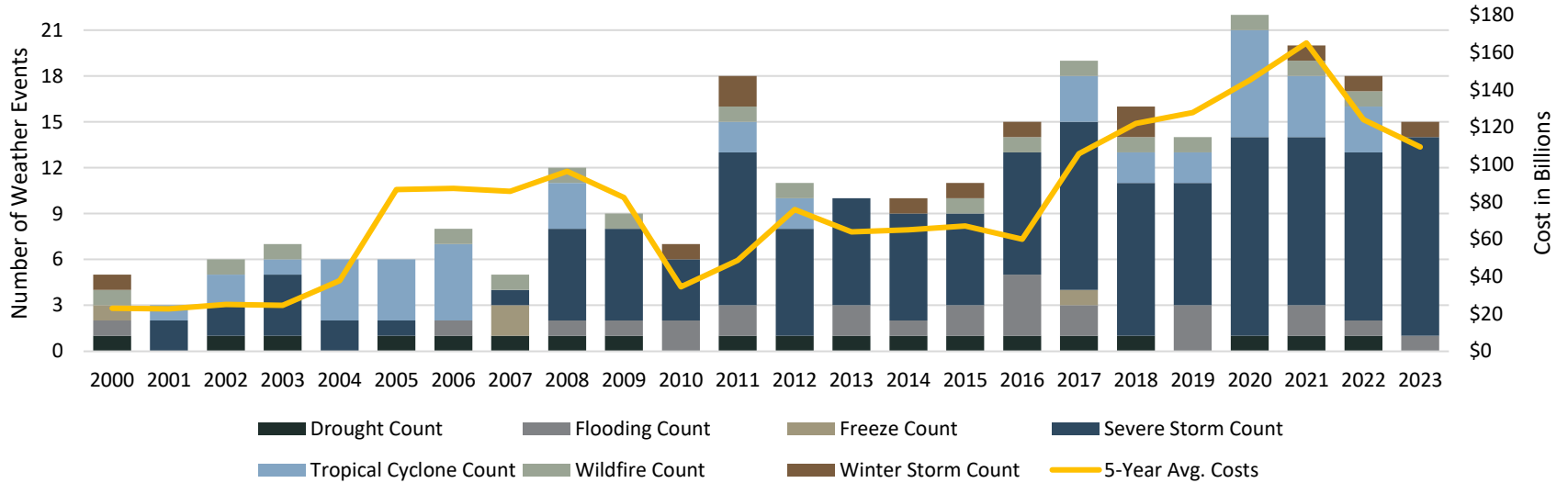
- IRG Acquisition Holdings (IRGAH), a partnership between Invenergy (20%), CDPQ (40%), and Blackstone (40%), paid \$1.5bn, including project debt, for AEP's operational 1,365 MW unregulated portfolio. AEP will net approximately \$1.2bn in cash after taxes, transaction fees, and other customary adjustments
  - The valuation implies a \$1.10/W acquisition
  - AEP's net investment (equity position) in the portfolio was \$1.5bn as of 9/30/2022
- Portfolio consists of 14 projects, representing 1,200 MW of wind and 165 MW of solar in 11 states. Portfolio average remaining contract life is greater than 10-years
- IRGAH secured a \$580mm commitment for a PTC transfer from Bank of America, which represents the first announced large-scale transferability transaction to close since the passing of the IRA
- **GreenFront's Take:**
  - The purchase price on these assets roughly approximates the new build replacement cost, but circumvents development headaches like interconnection and turbine supply
  - Additionally, the legacy contracting CODs in 2011 – 2017 suggest healthy PPA prices
  - Repowering is likely not central to the strategy here, as only ~15% is repower eligible and is in lower wind resource areas

Source(s): Company press releases, earnings presentation, and SEC filings

# Macro Environment | Summer 2023

Severe weather events underpin a general acknowledgement of the need for further regulatory support to enable Energy Transition

## U.S. Billion-Dollar Disaster Events (CPI-Adjusted)<sup>1</sup>



## Reaction Quotes

“Transmission is a key electric reliability tool, particularly during weather events that span hundreds of miles. Long-distance transmission and inter-connectivity enables power to move to where it’s needed And as we’ve seen in Texas and other parts of the country, the areas that need the power aren’t just blue states with aggressive climate targets”

– Senator Joe Manchin,  
July 26, 2023

“One big hurdle—and a big opportunity—is permitting. Right now, the permitting process for clean energy infrastructure, including transmission, is plagued by delays and bottlenecks”

– Senior White House Advisor John Podesta,  
May 10, 2023

Source(s): <sup>1</sup> National Oceanic and Atmospheric Administration (as of August 8, 2023), Senate Committee on Energy and Natural Resources, White House Briefing Room

# Alternative Energy | Public Market Overview

Ticker	Price 8/30/2023	Market Cap (\$mm)	Enterprise Value (\$mm)	YTD Total Returns (%)	Valuation			Credit		S&P Credit Rating
					2023E EV / EBITDA (x)	2024E EV / EBITDA (x)	Debt / Total Cap (%)	2023 Net Debt / EBITDA (x)		
<b>Alternative Energy</b>										
Array Technologies	ARRY	\$24.68	\$3,728	\$4,653	27.7%	16.0x	12.3x	55.3%	2.1x	B
Brookfield Renewable Corporation	BEPC	28.45	10,507	34,701	6.8%	14.5x	13.4x	45.5%	5.5x	BBB+
First Solar	FSLR	184.96	19,760	18,359	23.5%	16.0x	9.6x	7.4%	NA	NA
Hannon Armstrong	HASI	22.10	4,168	7,352	(21.5%)	63.5x	54.7x	62.1%	27.1x	BB+
Ormat Technologies	ORA	75.47	4,548	6,480	(12.4%)	13.3x	11.8x	45.8%	3.6x	NA
Sunnova Energy International	NOVA	13.78	1,674	8,463	(23.5%)	37.4x	25.4x	76.3%	27.3x	NA
SunPower Corporation	SPWR	7.24	1,268	1,559	(59.8%)	24.5x	12.1x	45.8%	4.6x	NA
Sunrun	RUN	15.43	3,351	14,296	(35.8%)	NA	NA	55.0%	NA	NA
<b>Cleantech</b>										
Bloom Energy Corporation	BE	\$15.15	\$3,173	\$4,014	(20.8%)	59.3x	20.3x	81.9%	11.9x	NA
Enphase Energy	ENPH	128.11	17,415	16,935	(51.6%)	19.4x	15.2x	57.6%	NA	NA
FuelCell Energy	FCEL	1.42	639	487	(48.9%)	NA	NA	12.8%	2.6x	NA
Plug Power	PLUG	8.57	5,159	5,045	(30.7%)	NA	105.8x	20.6%	0.2x	NA
SolarEdge Technologies	SEDG	164.11	9,282	8,966	(42.1%)	12.7x	9.6x	22.6%	NA	NA
Tesla	TSLA	256.90	812,858	796,646	108.6%	44.7x	31.7x	10.0%	NA	BBB
<b>Solar / Wind IPP</b>										
Clearway Energy	CWEN.A	\$23.81	\$2,786	\$11,823	(18.3%)	10.5x	10.0x	64.3%	6.3x	BB
EDP Renováveis	EDPR	18.81	19,257	28,524	(15.3%)	12.9x	11.1x	39.6%	3.4x	BBB
NextEra Energy Partners	NEP	50.00	4,672	21,706	(25.4%)	11.1x	9.6x	30.9%	3.0x	BB
Ørsted	ORSTED	61.75	25,944	32,762	(31.8%)	9.4x	7.9x	45.9%	1.9x	BBB+
<b>Alternative Fuels / RNG</b>										
Ameresco	AMRC	\$43.37	\$2,264	\$3,922	(24.1%)	18.4x	13.5x	63.8%	7.4x	NA
Clean Energy Fuels Corp.	CLNE	4.30	959	987	(17.3%)	19.8x	8.6x	23.2%	0.4x	NA
Darling Ingredients	DAR	62.81	10,018	14,733	0.4%	7.8x	7.4x	51.6%	2.5x	BB+
Montauk Renewables	MNTK	9.66	1,369	1,362	(12.4%)	25.6x	17.0x	24.1%	NA	NA
Neste	NESTE	37.21	28,583	31,312	(20.5%)	8.7x	8.0x	31.2%	0.8x	NA
OPAL Fuels	OPAL	7.22	1,228	2,558	(0.8%)	31.9x	15.3x	25.6%	1.5x	NA
<b>Electric Vehicle Infrastructure</b>										
ChargePoint Holdings	CHPT	\$7.32	\$2,586	\$2,623	(23.2%)	NA	NA	49.4%	NA	NA
Evgo, Inc	EVGO	4.03	417	997	(9.8%)	NA	NA	8.3%	2.9x	NA
Blink Charging Co.	BLNK	3.99	255	197	(63.6%)	NA	NA	4.7%	0.8x	NA
<b>Battery Storage</b>										
Enovix Corporation	ENVX	\$13.92	\$2,229	\$1,995	11.9%	NA	NA	41.5%	2.9x	NA
Eos Energy Enterprises	EOSE	3.37	452	666	127.7%	NA	NA	NA	NA	NA
Fluence	FLNC	26.36	3,124	3,032	53.7%	NA	45.9x	8.9%	1.3x	NA
Li-Cycle	LICY	4.63	825	879	(2.7%)	NA	NA	44.3%	NA	NA
QuantumScape Corporation	QS	7.15	3,469	2,665	26.1%	NA	NA	8.0%	2.9x	NA
Stem Inc.	STEM	5.26	820	1,293	(41.2%)	NA	41.3x	54.1%	NA	NA

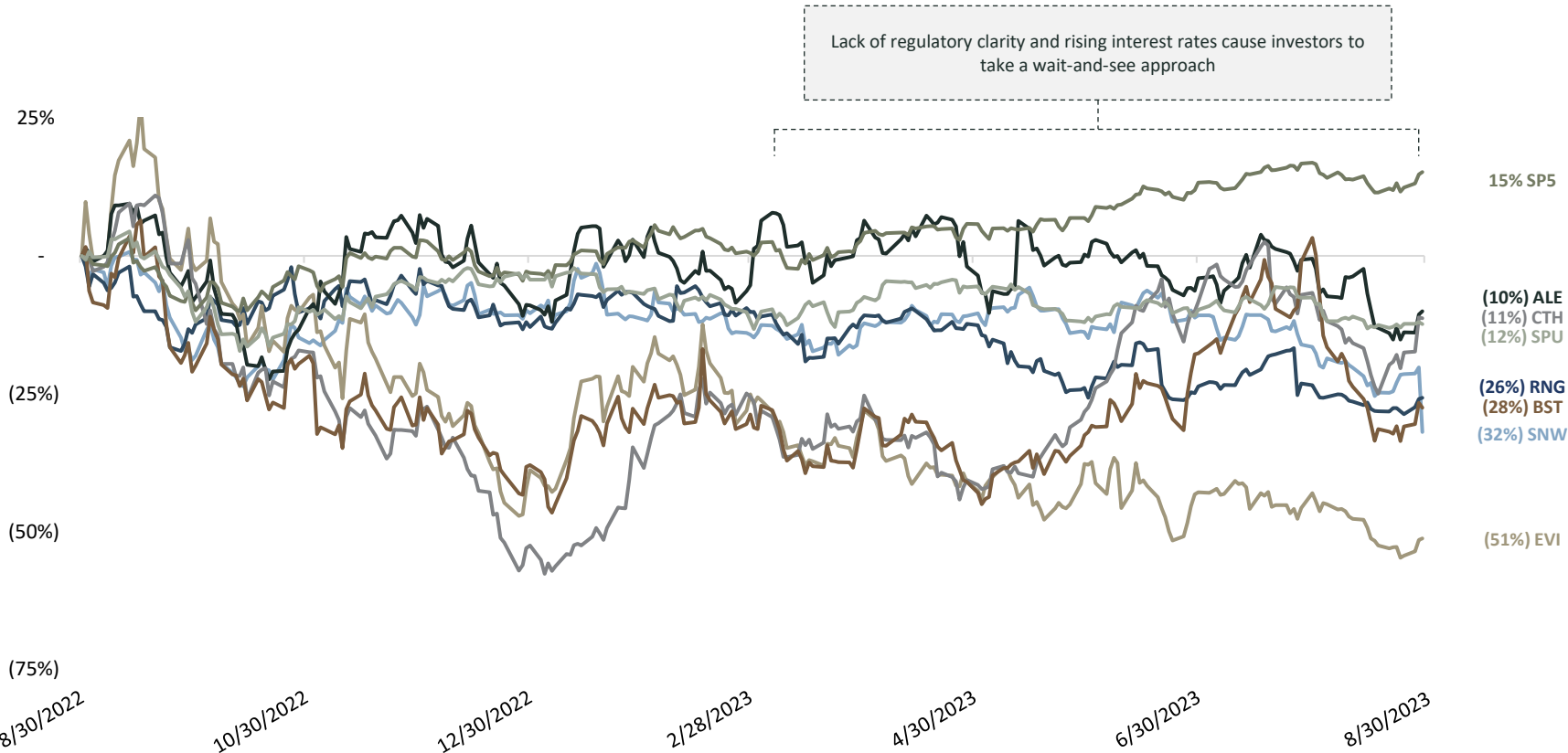
Source(s): S&P CapIQ Pro. Note: Prices as of 8/30/2023

# Alternative Energy | Stock Market Performance

Alternative Energy (ALE)		Cleantech (CTH)		Solar/Wind (SNW)		Renewable Fuels/RNG (RNG)		EV Infrastructure (EVI)		Battery Storage (BST)		S&P Utilities Index (SPU)	S&P 500 (SP5)
ARRY	ORA	BE	PLUG	CWEN.A	NEP	AMRC	MNTK	CHPT	BLNK	ENVX	LICY		
BEPC	NOVA	ENPH	SEDG	EDPR	ORSTED	CLNE	NESTE	EVGO		EOSE	QS		
FSLR	SPWR	FCEL	TSLA			DAR	OPAL			FLNC	STEM		
HASI	RUN												



















## Indices Total Return (LTM)

Lack of regulatory clarity and rising interest rates cause investors to take a wait-and-see approach



Source(s): S&P CapIQ Pro. Note: Prices as of 8/30/2023

## Traditional Renewables | Utility-Scale Solar Transactions

Date	Investor(s)	Target	Commentary
Aug'23	  		A partnership between Invenergy, CDPQ, and Blackstone, closed the acquisition of AEP's 1,365 MW unregulated, contracted renewables portfolio for \$1.5bn. The portfolio includes 14 operational projects in 11 states and is comprised of 1,200 MW of wind and 165 MW of solar. The transaction included a first-of-its-kind \$580mm PTC transfer
Jul'23			Duke Energy announced the sale of its unregulated utility-scale renewables business to Brookfield Renewable for \$2.8bn; the deal is expected to close by the end of 2023. Brookfield will acquire 5.9 GW of operating and under construction wind, utility-scale solar, and storage assets, and a 6.1 GW pipeline
Jun'23			Hawthorne Renewables, a newly established solar development company backed by Omnes Capital, announced it will pledge \$250mm in solar projects across the U.S. The Hawthorne team is targeting 2 GW of operational solar assets over the next five to seven years.
Jun'23			Great Bay Renewables announced it made a \$45mm royalty investment in U.S. renewable energy developer, Hexagon Energy, to gain future royalties related to Hexagon's portfolio of solar, solar plus energy storage and standalone energy storage development projects. Hexagon is committing its portfolio of 43 projects, totaling 5.3 GW <sub>ac</sub> located across 12 states, to the new royalty investment, as well as future projects added to its portfolio
Jun'23			Invenergy announced an approximate \$1bn equity investment from Blackstone. The investment builds on Blackstone's nearly \$3bn investment in Invenergy in 2021 and 2022. Invenergy's ownership includes Blackstone, CDPQ, and Invenergy management
May'23			Encore Renewable Energy announced that it secured an equity investment from SUSI Partners. With the support of SUSI, Encore aims to develop over 500 MW of community solar and energy storage projects, in addition to a portfolio of utility-scale systems, over the next five years
Apr'23			Greenwood Sustainable Infrastructure acquired Saturn Power's solar and battery development portfolios, which includes a ~1.4 GW pipeline of early to late-stage solar and energy storage projects in five U.S. states and two Canadian provinces. The acquired pipeline includes 72 solar projects, 90% of which are community solar projects, and six battery storage projects
Mar'23			Birch Creek Energy, a St. Louis based renewable energy company, has acquired Foundation Solar Partners, a Washington, DC-based solar developer focused on greenfield development of solar projects primarily in MISO and PJM

Source(s): Company Press Releases



## Traditional Renewables | Distributed Generation Solar Transactions

Date	Investor(s)	Target	Commentary
Aug'23	 Investing in Climate Solutions®	 SUMMIT RIDGE ENERGY	HASI and Summit Ridge Energy announced that they are expanding their partnership by constructing, owning, and operating a 250 MW community solar portfolio in Illinois and Maryland. HASI will serve as the financier for Summit's pipeline, and the companies expect the portfolio of ground-mount and rooftop community solar projects will avoid 51,000 MTpa
Jul'23	 ARCLIGHT	 DUKE ENERGY	Duke Energy has reached an agreement to sell its commercial DG business to an affiliate of Arclight in a deal with an enterprise value of about \$364mm. Duke expects net proceeds from the transaction of about \$259 million. The sale is expected to close by the end of 2023
Jun'23	 OSAKA GAS	 SUMMIT RIDGE ENERGY	Summit Ridge announced an expansion of its partnership with Osaka Gas USA to construct, own, and operate more than 100 MW of solar projects throughout the state of Virginia and 8 MW of energy storage systems in New York. The joint venture deals represents a nine-figure investment in clean energy development
Jun'23	 NautilusSolar	 esa	Nautilus Solar Energy has acquired up to 270 MW of community solar projects in the Midwest from ESA Solar Development Group. The projects are in the early stages of development and will be co-developed by both companies. The purchase price wasn't disclosed
May'23	 aspEN POWER	Not Disclosed	Aspen Power acquired a portfolio of 15 ground-mount community solar projects in Maine. The projects, ranging in size from 1.4 MW to 7 MW, total 37 MW and are located across the state, from the southern region through Bangor. One of the projects in Berwick, ME has already reached commercial operation, with a capacity of 2.36 MW
May'23	 TRUE GREEN CAPITAL	 CleanChoice ENERGY	True Green Capital Management announced the acquisition of a majority stake in CleanChoice. TGC will maintain the CleanChoice brand and team and committed to invest an additional \$100mm to develop, acquire, own, and operate projects. CleanChoice currently has a development portfolio of over 300 MW in various stages of development
Apr'23	 DIF   CAPITAL PARTNERS	 GREEN STREET POWER PARTNERS	DIF Capital Partners closed a deal, for an undisclosed amount, to acquire a majority stake in Green Street Power Partners, a US DG solar platform that has developed more than 300 MW of operating projects. Green Street currently has more than 2 GW of solar projects in its pipeline
Apr'23	 Investing in Climate Solutions®	 FOREFRONT POWER	C&I solar and storage developer ForeFront Power and Maryland-based climate investor HASI entered into a follow-on equity investment agreement for a roughly 50 MW California distributed solar and solar-plus-storage portfolio. The portfolio includes 48.5 MW of ground-mounted, carport, and rooftop C&I solar paired with 3.7 MW of storage

Source(s): Company Press Releases

## Traditional Renewables | Battery Storage Activity

Date	Category	Involved Parties	Commentary
Aug'23	Financing	 	Peregrine Energy, a clean energy platform focused on utility-scale energy storage, announced an agreement with AB CarVal to raise over \$700mm of credit, equity, and debt to fund Peregrine's pipeline of over 7 GW of standalone battery, solar, and wind projects. Peregrine's project portfolio spans five ISOs and 10 states
Aug'23	Acquisition	 	Engie has agreed to acquire the Broad Reach battery storage business for \$1bn, which includes 350 MW of operational assets and 880 MW under construction, primarily in the ERCOT market. The acquisition also includes a 1.7 GW pipeline of projects in advanced stages of development and a significant pipeline of early-stage projects
Aug'23	Financing	 	BESS Power has closed a \$15mm financing facility with Leyline to develop utility-scale projects with a cumulative capacity of 2.4 GWs over the next four years. The proceeds will allow BESS Power to continue with its Lund Storage Center project. Located in Travis County, Texas, Lund Storage has a capacity of 408 MW, establishing it as one of the largest utility-scale standalone energy storage projects in the state of Texas
Aug'23	Financing	 	SUSI Partners secured a tax equity investment from Greenprint Capital for a co-owned 100 MW battery storage portfolio located in South Texas. The portfolio consists of 10 utility-scale projects with COD expected in the coming months. The majority of the projects in the portfolio qualified for the Energy Community ITC adder
Jul'23	Financing	  	BlackRock-backed Jupiter Power closed a \$70mm debt package to fund two battery energy storage projects in Texas, totaling 160 MW / 320 MWh. BankUnited and Siemens Financial Services participated as joint lead arrangers in the financing. Jupiter Power holds 655 MWh of operating projects, 740 MWh in construction, and more than 11,000 MW of new projects in development from Maine to California
Jun'23	Financing	 	Leyline announced a non-dilutive loan facility of up to \$22.5mm for Grid Connected Infrastructure (GCI), a developer focused on utility-scale energy storage projects. GCI will be launching at least six projects over the next six months in tradable markets such as CAISO, NYISO, and ERCOT
Jun'23	Investment	  	Miami-based battery developer On.Energy raised \$20mm in equity in a Series B round, which was led by Ultra Capital with participation from Phalanx Impact Partners. Management stated a significant amount of the funds would go toward developing a 300 MWh portfolio near Houston, Texas
Mar'23	Project M&A		Agilitas Energy has agreed to acquire a portfolio of six standalone battery storage systems in Texas for \$75mm. The acquisition is Agilitas Energy's largest acquisition since raising \$350mm from CarVal Investors last year. The acquisition and new market entry will add 60 MW to Agilitas Energy's renewable energy and battery storage project pipeline of more than 1 GW

Source(s): Company Press Releases

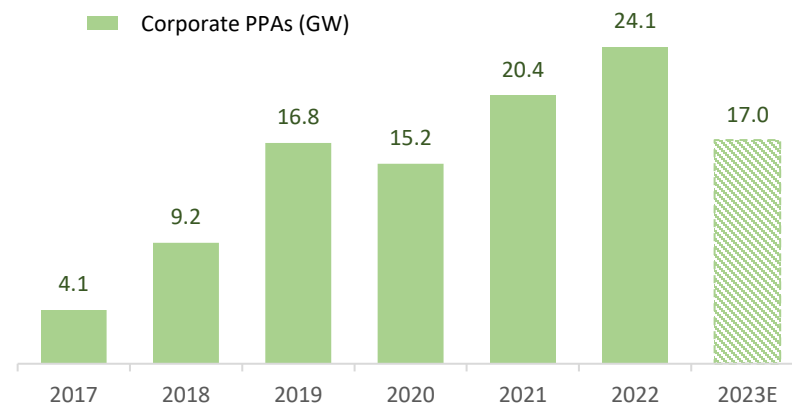
# Corporate Sustainability | Corporate PPA Market Overview

*PPA price escalation diminishes, developmental issues ease (slightly), and announcements slow*

## PPA Market Dynamics

- U.S. Corporate PPA signings have slowed meaningfully in 2023 as PPA prices remain elevated and the “Big Five” tech giants (Amazon, Apple, Google, Meta, Microsoft) pivot to decarbonizing overseas operations
- After a dramatic rise in PPA prices in every part of the country over the past two years, prices are beginning to stabilize at the ‘new normal’. Until recently, higher PPA prices have been generally offset by a higher forward outlook on wholesale power prices, mostly due to a tight natural gas market through the end of the decade. Over the past two quarters however, long-dated natural gas futures prices are down more than 15%, taking forward electricity prices with them
- The development difficulties that emerged in 2021 and 2022 are beginning to fade, or at least be more easily digested by the market
  - The Department of Commerce tariff circumvention investigation concluded, with Commerce affirming its preliminary determination that a subset of the solar module manufacturers exporting from Southeast Asia were guilty of tariff circumvention and applicable tariffs will apply starting in June 2024
- Delivered solar module prices have given back some of their 2022 price increases, mostly due to more reasonable transportation costs
- PJM queue reform, which has delayed nearly every project in the area, was recently approved and is inching toward implementation
- Texas (ERCOT) reform avoided the most Draconian of outcomes for renewables in the sector’s biggest market. While existing renewable-friendly features like local tax abatements or interconnection cost socialization were partially eroded, most in the industry breathed a sigh of relief that cooler heads prevailed, and renewables were not allowed to serve as Winter Storm Uri’s scapegoat

## Americas Corporate PPA Volume (2017 – 2023)<sup>1</sup>



## Noteworthy Recent PPA Announcements

Corporate	Seller	Size (MW)	Fuel Source	Location
NUCOR	NEXTera ENERGY RESOURCES	250	Solar	MISO
Google	APEX CLEAN ENERGY	189	Wind	PJM
RIVIAN	BRIGHTNIGHT	100	Solar	PJM
Steel Dynamics, Inc.	NEXTera ENERGY RESOURCES	308	Wind	ERCOT
Meta	rPlus Energies	200	Solar	Idaho/WECC
SAVION	TOYOTA	100	Solar	PJM

Source(s): American Clean Power, Infralogic, S&P Market Intelligence, BNEF, <sup>1</sup>2023 is GFEP projection

## Corporate Sustainability | Corporate PPA Market Overview

*Regulatory clarity improves, supply chain remains a constraint*

### Energy Community Projects Take Hold

The Inflation Reduction Act provides for enhanced tax credits for renewable generation assets placed in “Energy Communities”, which largely means communities negatively impacted by the shift away from fossil fuels. The language in the law is relatively straightforward and IRS guidance in April and again in June have provided sufficient clarity for developers to underwrite to the higher tax credit level. In the past few months, several developers have announced projects in Energy Communities, including NextEra, Savion, and BrightNight.



### Domestic Content and LMI Enhancements Moving Much More Slowly

Unlike Energy Communities, qualification for enhanced tax credits include a fair amount of uncertainty and complexity. Resultingly, we’ve seen fewer announcements around projects expecting to qualify under these provisions. More than 80 new or expanded clean energy manufacturing facilities (solar panels, batteries, trackers, towers, etc.) have been announced since the passing of the IRA<sup>1</sup> but much of that industrial capacity will not come online until 2025 or after, leaving supplies of domestic content materials very tight in the meantime.



### Supplier PPA Aggregation

The most ambitious corporate renewables buyers, having already decarbonized their own scope II emissions, are now pivoting to addressing their scope III emissions through partnerships and agreements with suppliers. Solving for issues like creditworthiness, procurement size, contractual structure constraints, among others, large corporates are enabling their suppliers to meet renewables goals that might otherwise be unrealistic for companies of comparable size and scale. Notable corporates pursuing these initiatives include Apple, through its Supplier Clean Energy Program, and Walmart’s Gigaton PPA.



### Wind is Back in Fashion...if Supply Chain Can Rise to the Challenge

Prior to the passage of the IRA, wind generation had yielded a considerable piece of the renewable growth story to solar, largely because the wind PTC phase out was further along and more dramatic than the solar ITC phase out. Now that a long runway of PTC availability is certain, more projects outside of the core windy grain belt are able to paper. A prime example of this is the recent Apex’s Timbermill wind farm in North Carolina and their Goose Creek wind farm in Illinois. These government incentives and demand side incentives aside, the wind supply chain is severely challenged. Siemens Gamesa’s bearings issue has sidelined nearly 25% of its onshore turbine production at the same time the company is dealing with slower than expected ramp in offshore turbine production. This Summer, developers of two offshore wind farms in Massachusetts paid more than \$100 million to cancel PPAs due to increased equipment, labor, and interest rate expenses. In late August, Orsted announced a \$2.3 billion impairment, largely due to delays and cost escalations in its U.S. offshore business.



Source(s): <sup>1</sup>S&P Global, company press releases

# Carbon Capture | Key CCUS Industry Themes



**CCS development is hard**  
(all the challenges of traditional development, plus tech integration risk)

## Emitters



- Overcoming reluctance from emitters to sign ship-or-pay contracts

## Midstream



- Significant CapEx
- Landowner and NIMBY hurdles

## Injection



- Subsurface expertise required
- Long permitting waits

## Financing



- Enhanced 45Q is a very positive game-changer



Permitting process is excruciating, but progress is being made

## Permitting Challenges

**North Dakota regulator rejects Summit Carbon Solutions carbon pipeline application**

- Reuters 8/4/2023

- Summit Carbon Solutions petitioned the rejection and proposed a new pipeline route around Bismarck, North Dakota

## Permitting Progress

**EPA seeks public comment on carbon storage draft permits for company in Indiana**

- EPA 7/7/2023

- EPA announced its intent to issue two Class VI well permits for Wabash Valley Resources ammonia production facility in Vigo County, Indiana

# ExxonMobil

Exxon is taking the lead

**Denbury**

- July 13, 2023: Exxon entered a definitive agreement to acquire Denbury for \$4.9bn

**NUCOR**

- June 1, 2023: Exxon to capture, transport, and store 800,000 mtpa of CO<sub>2</sub> from Nucor's DRI site in Convent, LA



- April 4, 2023: Exxon to transport and store ~2.2 mtpa from Linde's H<sub>2</sub> production facility in Beaumont, TX



- October 12, 2022: Exxon to transport and store 2 mtpa from CF's Vermillion Parish, LA plant



Other majors are hanging around the hoop



- August 15<sup>th</sup>, 2023: Occidental announced it will acquire the outstanding equity of Carbon Engineering for total cash consideration of \$1.1bn
- Carbon Engineering develops and deploys large scale direct air capture (DAC) technology



- Other recent transactions/announcements
  - Trace Carbon Solutions received funding from Climate Investment to develop & operate CCS projects
  - Battelle, Climeworks, Gulf Coast, and others submitted a funding proposal to the DOE for the Direct Air Capture (DAC) Hub program
- GreenFront is aware of numerous other CCS strategic processes that are currently underway

Source(s): EPA, Reuters, Company data, Press Releases

# Carbon Capture | Noteworthy CCS Activity

Carbon Capture Sequestration projects to date are clustered in three regions of the country

## Most Active CCUS Regions in the U.S.

### 1 Gulf Coast

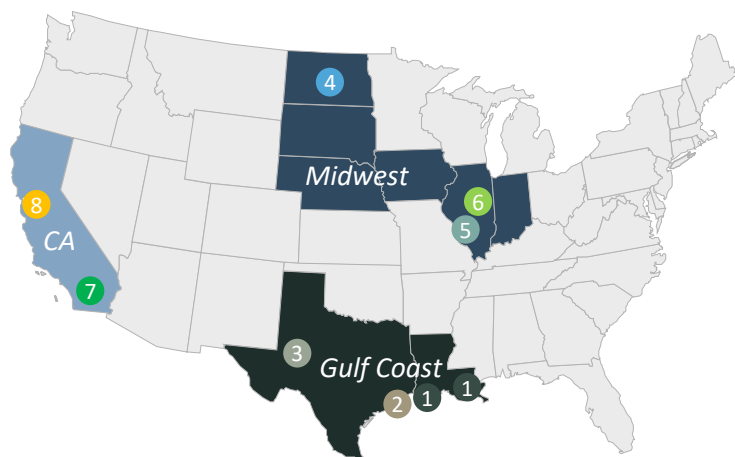
- The Gulf Coast is the most active area of CCUS development in the U.S. as the epicenter of the Oil and Gas industry and Louisiana is one of the friendliest regulatory states for CCUS

### 2 Midwest

- Mount Simon is the deepest, most significant saline reservoir in the midwestern U.S. and has a potential sequestration capacity of between 27 billion and 109 billion metric tonnes of CO<sub>2</sub><sup>1</sup>. Both Navigator and Wolf are planning to sequester CO<sub>2</sub> in this formation for their respective CO<sub>2</sub> pipeline projects

### 3 California (CA)

- In 2022, CA Governor Gavin Newsom signed three bills addressing CCUS and CO<sub>2</sub> removal to help the state reach its carbon reduction goals by 2030 by providing regulations for streamlined permitting, and governing frameworks

















## Selected Noteworthy Activity

Developer(s)	Project
<b>1</b> ExxonMobil Denbury NUCOR	<ul style="list-style-type: none"> <li>In July 2023, Exxon agreed to acquire carbon capture developer Denbury for \$4.9bn</li> <li>In June 2023, Exxon agreed to capture up to 800,000 metric tons per year of CO<sub>2</sub> from the Nucor DRI plant and store the CO<sub>2</sub> at an Exxon-owned facility in Louisiana</li> </ul>
<b>2</b> equinor Chevron TALOS	<ul style="list-style-type: none"> <li>In August 2023, Equinor acquired a 25% stake in Bayou Bend CCS and joins 50% stakeholder Chevron and 25% stakeholder Talos Energy. The Bayou Bend project has rights to 140,000 acres of underground CO<sub>2</sub> storage space beneath Texas and the Gulf of Mexico, which could store upwards to 1bn MT of CO<sub>2</sub></li> </ul>
<b>3</b> OXY	<ul style="list-style-type: none"> <li>In April 2023, Oxy started construction of its direct air capture hub in West Texas. The newly-named Stratos plant, is scheduled to launch in 2025 with an initial capacity to capture 500,000 MTPa of CO<sub>2</sub>, and could scale up to capture 1 MMTpa of CO<sub>2</sub></li> </ul>
<b>4</b> SUMMIT CARBON SOLUTIONS	<ul style="list-style-type: none"> <li>Summit Carbon Solutions with \$4.5bn in financial backing from TPG Rise, Tiger Infrastructure, Continental Resource, SK E&amp;S, among others, is building a 2,000+ mile CO<sub>2</sub> pipeline to sequester 12 MMTpa of CO<sub>2</sub> in North Dakota</li> </ul>
<b>5</b> Navigator CO <sub>2</sub>	<ul style="list-style-type: none"> <li>Navigator CO<sub>2</sub>, with the financial backing of Blackrock and anchor CO<sub>2</sub> contract service support from Valero, is planning to begin construction of the 1<sup>st</sup> phase of the Heartland Greenway CO<sub>2</sub> pipeline in 2024. The project plans to sequester 15 MMTpa of CO<sub>2</sub> in the Mount Simon saline reservoir in Illinois</li> </ul>
<b>6</b> WOLF CARBON SOLUTIONS	<ul style="list-style-type: none"> <li>Wolf Carbon Solutions is planning to build a 280-mile steel pipeline capable of transporting 12 MMTpa of CO<sub>2</sub>. Wolf Carbon and ADM signed a Letter of Intent allowing CO<sub>2</sub> produced at ADM's Clinton and Cedar Rapid, IA facilities to be transported to a storage site in Illinois</li> </ul>
<b>7</b> Brookfield Renewable	<ul style="list-style-type: none"> <li>In October 2022, Brookfield Renewable committed an initial \$500mm to a CCS JV with oil and gas company California Resource Corporation (CRC). The JV is targeting the injection of 5 MMTpa of CO<sub>2</sub>. The first project designated for development is CRC's 26R reservoir in the Elk Hills Field (San Joaquin Valley)</li> </ul>
<b>8</b> AEMETIS	<ul style="list-style-type: none"> <li>In July 2023, Aemetis was awarded the first CO<sub>2</sub> sequestration characterization well permit issued by the state of CA. The well is designed to be drilled to 8,000 feet to obtain the data required for the issuance of a final EPA Class VI CCS well permit</li> </ul>

Source(s): <sup>1</sup> Carbon sequestration in the Mt. Simon Sandstone saline reservoir (University of Illinois), Company data, Press Releases

## Renewable Fuels | US RNG – Recent Announcements & Transactions
















*The number of contracted end-user offtake agreements for RNG has spiked in the past few months*

Date	Category	Involved Parties	Commentary
Aug '23	Corporate Collaboration	 	Chevron and Cummins announced a MOU to leverage complementary positioning in hydrogen, natural gas, and other low carbon fuel value chains. The announcement expands the two companies' previous strategic collaboration on hydrogen and renewable natural gas and is expected to encompass other liquid renewable fuels, such as renewable gasoline blends, biodiesel, and renewable diesel
Aug '23	Offtake	 	Montauk Renewables signed a 15-year REC agreement with Duke Energy for Montauk's proposed Turkey Creek swine-to-renewable energy facility in Sampson County, NC. The agreement calls for Duke to buy electricity as well as up to 47,000 swine waste RECs per year once the facility is fully commissioned. Montauk is in the process of constructing the facility, and anticipates COD in the first half of 2025
Aug '23	Offtake	 	Montauk Renewables signed a LOI with EE North America to deliver all biogenic CO <sub>2</sub> volumes from all its Texas facilities for production of e-fuels such as e-methanol. The initial delivery period is expected to begin in 2026 and is expected to last for 15 years upon final agreement. EE North America intends to construct a Power-to-X facility in Texas and market the e-methanol to fuel vessels for maritime shipping operations
Aug '23	Investment	 	Synthica, a developer of RNG projects from pre-consumer food, beverage waste, and other organic manufacturing byproducts, announced it closed on an equity investment from the infrastructure business within Goldman Sachs Asset Management. The new capital will accelerate Synthica's development of RNG facilities in Ohio, Texas, Georgia, Kentucky, and Louisiana in the near-term
Jul '23	M&A	 	Dynamic Renewables, a full-service developer, owner, and operator of waste management and anaerobic digestion renewable fuel projects across the U.S., announced Ares has made a strategic investment to acquire the company. Dynamic is currently overseeing construction of six assets, which are expected to reach COD by the end of 2023 and forecasted to generate more than 4,000 MMBtu per day of RNG
Jun '23	Offtake	 	TotalEnergies has signed a 100 GWh biomethane purchase agreement with Saint-Gobain France for a 3-year period starting in 2024. The biomethane will be produced by TotalEnergies at its BioBéarn biomethane plant, which came online at the beginning of 2023 and whose production is certified sustainable by International Sustainability & Carbon Certification
Jun '23	Offtake	 	AstraZeneca announced that from June 2023, the company will begin purchasing RNG produced by Vanguard Renewables for its Newark Campus in Delaware. By 2026, the collaboration will enable up to 650,000 MMBtu or 190,500 MWh per year of RNG to be used across AstraZeneca's U.S. sites

Source(s): Company Press Releases, RNG Coalition, Inframation

## Renewable Fuels | Clean Hydrogen Deal Activity

Clean H<sub>2</sub> investment and partnership announcements accelerated in the U.S. this summer

H <sub>2</sub> Profile	Date	Company	Noteworthy Activity
Green	Aug '23	 	BP led a \$12.5mm Series A funding round for Advanced Ionic, a Wisconsin-based start-up developing a water vapor-based electrolyzer for heavy industry. Advanced Ionic's technology, Symbion, seeks to use heat emitted from a plant's existing operations to drive the electricity use to less than 35 kWh/kg of hydrogen. A pilot program is already underway with Spanish oil and gas company Repsol
	Aug '23		Walmart Chile unveiled an industrial-scale green hydrogen plant in its distribution center in Quilicura, Metropolitan Region. The project involved an investment of \$15mm and the initial phase will focus on replacing the lead-acid batteries of 200 forklifts with hydrogen power cells. By transitioning to green hydrogen-powered forklifts, Walmart is slated to reduce 1,140 tons of CO <sub>2</sub> emissions annually
	Aug '23	 	Baker Hughes and Avports have entered a MOU to develop, implement, and operate on-site microgrids for the airport industry. The agreement provides for using Baker Hughes' portfolio of solutions to develop microgrids customized to the needs of each airport. At its airports, Avports plans to use solutions such as green hydrogen to improve the power resilience of the facilities
	Jul '23	 	Nikola, via its HYLA brand, and BayoTech announced an agreement to advance hydrogen supply for commercial fuel cell EV fleets. BayoTech will purchase up to 50 Nikola Class 8 hydrogen fuel cell EVs for hydrogen transport, while Nikola will purchase hydrogen from BayoTech's Missouri and California hydrogen hubs and up to 10 BayoTech HyFill transports for bulk hydrogen delivery
	Jul '23	 	Ohmium International is partnering with Aquastill to use desalinated seawater as an input in green hydrogen production. The collaboration will allow the integration of Aquastill's desalination capabilities with Ohmium's modular green hydrogen electrolyzers. The partnership will target co-locating electrolyzers with offshore wind farms, to enable at-source hydrogen production
	Jul '23	 	Rio Tinto and Sumitomo will build a pilot plant in Gladstone, Australia, trialing hydrogen as a replacement for natural gas in the refining of alumina. The 2.5 MW electrolyzer will cost \$75mm and is expected to start construction in 2024 and operations in 2025
Blue	Jun '23	 	Mitsui O.S.K. Line (MOL) has been named as a new shareholder of Ascension Clean Energy, a proposed clean hydrogen-ammonia production and export facility in Louisiana expected to produce 7.2 MMtpa of product. Furthermore, the aim of the project is to capture 98% of CO <sub>2</sub> emissions. As a shareholder of the project, MOL joins project lead Clean Hydrogen Works, Denbury, and oil product tanker owner and operator Hafnia
Turquoise	Aug '23	 	Nu:ionic Technologies, a developer of a hydrogen production system that utilizes microwave catalytic reformers, entered a MOU with Liberty Utilities for the development of a 2.4 tonnes per day pilot project. The pilot project marks the first commercial application of Nu:ionic's on-site, on-demand hydrogen production technology

Source(s): Company Press Releases, S&P Market Intelligence, Inframation, Green Hydrogen Coalition



# GreenFront Energy Partners - Overview

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# GreenFront Energy Partners | Founding Partners and Service Offering

*Track record of execution for developers, investors, and corporate clients*

## GreenFront Founding Partners



**Robert Birdsey** – Managing Director

- Head of GFEP renewable fuels
- Head of BB&T Energy IB 2013-2020
- J.P. Morgan Energy IB 2007-2013
- MBA, University of Virginia; BA, Sewanee
- Board Member, Virginia Solar Energy Development & Battery Storage Authority



**Adam Hahn** – Managing Director

- Head of corporate renewable advisory
- Led BB&T's Utility Investment Banking coverage 2015-2020
- Prior to BB&T, worked in the CFO's group at Dominion Energy
- MBA, University of Richmond; BBA, James Madison University



**Whit Wall** – Managing Director

- Head of GFEP traditional renewables
- Led BB&T's Infrastructure Investment Banking coverage 2015-2020
- Environmental consultant for JJ Blake & Associates prior to BB&T
- MBA, University of Virginia; BS, James Madison University

## Service Offering – Exclusively Focused on Renewable Energy



### Capital Formation

Raising capital for projects and platform growth initiatives



### M&A Advisory

Advising on purchase/sale of alternative energy assets + equity



### Corporate Renewable Advisory

Representing corporates in renewable energy procurement efforts

# GreenFront Energy Partners | Coverage Universe

*GreenFront's go-to market strategy enables significant synergies*

## Closely-Linked Coverage Universe



### Traditional Renewables

Solar, Wind, Storage



### Renewable Fuels

Renewable Natural Gas, Carbon Capture, Hydrogen



### Corporate Renewable Advisory

Corporate procurement of renewable energy & products

### GreenFront Differentiation

- **Regional Market Intelligence:** Our experience negotiating PPAs gives us on-the-ground information specific to different RTO/ISOs across the country
- **Corporate Finance:** As solar/wind/storage move from alternatives to incumbent resources, financing structures are evolving. GreenFront's deep experience in traditional corporate finance helps our clients evolve beyond project financing strategies

### GreenFront Differentiation

- **Experience:** Prior O&G background has enabled GreenFront to already transact in very early-stage markets (RNG, CCUS, H<sub>2</sub>, LFG, GTL)
- **Environmental Attributes:** Deep knowledge around revenue pathways for LCFS, 45Q, voluntary CO<sub>2</sub> credits
- **Corporate Network:** PPA advisory assignments keep us in regular dialogue with corporate sustainability decision-makers

### GreenFront Differentiation

- **Risk Management:** GreenFront provides clients with proprietary analytics around correlation/covariance between weather, resource production, and market pricing
- **Negotiating Edge:** GreenFront builds project models to understand seller economics, identifying leverage points that benefit our corporate clients. We know where developers can bend on certain terms and where they can't

# GreenFront Energy Partners | Credentials

Deal execution spanning segments across the Alternative Energy value chain

 <p>Has signed an exclusive solar PPA totaling 250 MW of procurement with</p>  <p>PPA Advisor <b>2023</b></p>	 <p>THE LEADER IN AUTOMATED LANDFILL GAS COLLECTION</p> <p>Has closed on a private placement to advance its biogas monitoring technology</p> <p><b>Undisclosed</b></p> <p>Financial Advisor <b>2022</b></p>	 <p>Has closed an equity investment to support its low-carbon hydrogen production technology</p> <p><b>Undisclosed</b></p> <p>Financial Advisor <b>2022</b></p>	 <p>Has closed on a JV and funding commitment from</p>  <p>Financial Advisor <b>2022</b></p>
 <p>Has been acquired by</p>  <p>Sell-side M&amp;A Advisor <b>2022</b></p>	<p><b>Fortune 500 Corporate</b></p> <p>Has signed an onsite renewable energy procurement agreement from</p>  <p>Renewable Procurement Advisor <b>2022</b></p>	 <p>Has secured a structured equity private placement from</p>  <p>Financial Advisor <b>2021</b></p>	 <p>Has secured a \$50 million equity commitment from</p> <p><b>Hartz Capital</b></p> <p>Financial Advisor <b>2021</b></p>
 <p>Has signed a wind PPA totaling 100 MW of procurement with</p>  <p>PPA Advisor <b>2021</b></p>	 <p>Has secured a private placement for development capital with</p>  <p>Placement Agent <b>2021</b></p>	 <p>Has signed an exclusive solar PPA totaling 250 MW of procurement with</p>  <p>PPA Advisor <b>2020</b></p>	 <p>Was advised on the market entry of SaaS Application into the utility end market</p> <p>Strategic Advisor <b>2020</b></p>