

BLOOM ENERGY CORP.

A Bird In Hand Is Worth Two In The Bush; Initiate At Sector Outperform; \$24 PT

Quick Take: We are initiating on BE at Sector Outperform as (1) the company's growth is driven by products and markets where the company already has a strong track record; (2) our preference for stationary power over on-road mobility applications and (3) decent valuation. Our price target is \$24, ~5% above current levels.

Thesis

We are initiating on Bloom Energy (BE) at Sector Outperform and PT of \$24, ~5% above current levels.

- BE's growth is driven by products and markets where the company already has a strong track record including expansion in 1) the U.S. market from lower cost, 2) Korean market driven by country's hydrogen policy and 3) in marine products based on existing agreement with Samsung Heavy Industries. Any green hydrogen market revenues (\$750M by 2025 as per BE) would provide upside to our estimates, however such upside estimates are already accounted for in our current financial estimates for peers.
- We prefer stationary power applications over on-road mobility applications for hydrogen. They have track record, can use grey, blue as well as green hydrogen, do not need extensive infrastructure like hydrogen refueling station and are closer to being competitive even at current costs. BE fits the bill.
- Our BE price target is ~\$24 implying ~5% upside. Essentially, we do not have to give credit for a new product that has not been built yet or tested and a market where the company has never sold much. And still our valuation implies ~5% upside to stock price vs. downside for peers.

Risks to Thesis

- BE could end up being capacity constrained if a facility in addition to a 200 MW facility currently under construction is not announced soon.
- We are giving credit to company for selling products internationally and in the marine product without a strong track record.

Key Catalysts

- Potentially a combined heat & power (CHP) contract in South Korea.
- A commercial carbon capture product sale and a large biogas commercial win.

Valuation

Our BE price target is ~\$24 implying ~5% upside. Our PT is based on DCF through 2040. We model explicitly through 2030, then 10% revenue growth through 2040. We model 8.0% WACC assuming 6.0% market premium and 2.0% risk-free rate. We also model 2.0% perpetuity growth. A 10% WACC implies ~\$16 PT.

How Are We Differentiated

- Detailed Korean stationary power market demand analysis and market share.
- Detailed end-market revenues and units sold analysis.
- DCF methodology for valuation vs. arbitrary EV/EBITDA or EV/Sales multiples.

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Investment Thesis

Bloom Energy, Inc. (BE), was incorporated in Delaware on Jan. 18, 2001, as Ion America Corp. and later renamed in 2006. Bloom Energy manufactures solid oxide fuel-cell based power generation platform called Bloom Energy Servers that provide clean and resilient power to businesses, essential services, and critical infrastructure. Bloom Energy Servers produce nearly 50% less carbon emission vs. average U.S. combustion power generation. BE is in process of expanding to all 50 states in the U.S. from currently 10 as the declining cost of electricity produced by Energy Server makes it more competitive. Korean hydrogen policy too should drive growth where BE has ~35% market share. The company is also in process of commercialization and expansion of five new products (1) carbon capture that can be added to Bloom Server for sequestering carbon for further uses, (2) biogas driven Energy Servers, (2) Energy Servers powered by renewable or green hydrogen fuel, (4) electrolyzers that produce renewable hydrogen and (5) marine product.

We rate Bloom Energy (BE) at Sector Outperform with PT of \$24, ~5% above current levels. We like BE as (1) the company's growth is driven by products and markets where the company already has a strong track record; (2) our preference for stationary power over on-road mobility applications and (3) decent valuations. Our PT is based on DCF through 2040. We model explicitly through 2030, then 10% revenue growth through 2040. We model 8.0% WACC assuming 6.0% market premium and 2.0% risk-free rate. We also model 2.0% perpetuity growth. A 10% WACC implies ~\$16 PT.

As compared to other "pure" hydrogen companies, BE is a simple story based on products and markets where the company already has a strong track record. BE has sold Bloom Energy Server for past 10+ years and expansion in 1) the U.S. market from lower cost, 2) Korean market driven by country's hydrogen policy and 3) in marine products based on existing agreement with Samsung Heavy Industries drives revenues and profitability growth. We do not have to rely on aggressive assumptions such as providing credit for a product that has not been tested yet, assume a market share where the company does not have any track record or assume a significant expansion in margins to arrive at valuation near or above stock price. BE is entering the green hydrogen market where the company expects \$750M revenues by 2025. But, we are not giving BE any credit in our financial model for green hydrogen, carbon capture product and Baker Hughes (BKR, Top Pick) agreement as we do not feel comfortable making aggressive assumptions that we have to make for Ballard Power (BLDP), FuelCell (FCEL) and Plug Power (PLUG). Our lack of credit is not because we have any doubts in BE's capability as the company already has booked orders for electrolyzers and hydrogen power fuel cells in Korea. Any green hydrogen market revenues would provide upside to our estimates, however such estimates are already accounted for in our current financial estimates for BLDP, FCEL and PLUG.

A Bird In Hand Is Worth Two In The Bush

We prefer companies with an established track record "a bird in the hand is worth two in the bush". BE fits the bill as its growth is driven by Bloom Energy Server where the company has strong track record. It starts to become difficult for our comfort level to provide credit to companies that do not have a commercial product or a prototype yet and then assume they will have a successful product and gain some market share and economic margins where they do not have any/long track record.

BE manufactures Energy Servers that convert natural gas and/or biogas into power for stationary purposes. The company has a strong track record with installed base of ~570 MW globally, including ~200 MW in Korea. Their products do not have the risk of "if and when green hydrogen economics work". Their current products already reduce carbon emissions by ~50% compared to traditional power generation. Additionally, the company is in process of commercializing carbon capture add-on that could remove CO₂ from the process to be used for storage or other applications, i.e., power generation can be completely decarbonized. Lastly, the company also has product that can use green hydrogen to produce power.

The company has earned \$700-900M in revenues each year in 2018-20 and expected to generate close to \$1B in 2021 vs. PLUG generating \$185-335M and BLDP about \$100M in 2018-20. However, it compares unfavorably to Chart Industries (GTLS) that earned \$1.2B in revenues and \$135M FCF in 2020. But, at the least this implies BE is closer to gaining scale where margins can begin to improve.

Most importantly to us is the fact that while forecasting financial BE, revenues predominantly are being generated from products and markets where the company has a strong track record, i.e., in the U.S and Korea selling Bloom Energy Server. We do not have to give credit for a new product that has not been built yet or tested and a market where the

company has never sold much. And still our valuation implies ~5% upside to stock price vs. downside for peers. Admittedly, we are giving credit to a new marine product. We model one vessel in 2024 and increasing to five (~250 MW) by 2025. It implies ~10% revenue share by 2024. However, we think there is more credibility around marine product for BE given they have an agreement in place where the customer is ratifying the potential revenue opportunity.

On June 29, 2020, Samsung Heavy Industries, one of the largest ship builder, and BE signed a joint development agreement to design and develop fuel cell powered ships. Samsung's goal is to replace all existing main engines and generator engines with solid oxide fuel cells to align with the International Maritime Organization's 2030 and 2050 environmental targets. Following commercialization, the two companies anticipate that the market for Bloom Energy Servers on SHI ships could grow to 300 MW annually.

We are also giving credit to company for selling products internationally, outside Korea given the company has hired a team of ~10 senior people in April 2021 focusing on Australia, European countries such as UK, German, France, Italy, Spain and Portugal, Southeast Asia including Thailand, Singapore and Malaysia, the Middle East and North Africa. However, such revenues amount to ~5% of total revenues in 2024.

Essentially, for BE we are providing credit for only ~15% of total revenues by 2024 where the company does not have a track record, i.e., international outside Korea vs. ~60% for Fuel Cell (FCEL), ~50% for Plug Power (PLUG) and ~35% for Ballard Power (BLDP) and none for GTLS.

Equally importantly, we are not giving any credit for new potential revenue avenues including selling electrolyzer in Korea, hydrogen fuel cell and upside from carbon capture vs. our model assuming all such credits for peers. Any such revenues should provide upside to our BE estimates.

Existing vs. New Products/Markets Revenues (2024)

2024 Revenues														
BLDP			BE			FCEL			GTLS			PLUG		
Segments	Revenues	Share %	Segments	Revenues	Share %	Segments	Revenues	Share %	Segments	Revenues	Share %	Segments	Revenues	Share %
Weichai MEAs	93	40%	Korea Revenues	319	20%	Korea Revenues	159	43%	Cyro Tanks	540	26%	Fuel Cells	436	29%
NAM Class 6-7	24	10%	US	377	24%	Europe	5	1%	Heat Transfer Sys.	521	25%	Services	83	6%
NAM Class 8	47	20%	Intl. (Ex-Korea)	66	4%	U.S. Generation	86	23%	Specialty Products	749	36%	PPA	83	6%
EU + EFTA LCV	0	0%	Marine	164	10%	Services	28	8%	Repair & Leasing	290	14%	Fuel Net Revenues	147	10%
EU + EFTA MCV	3	1%	Biogas	33	2%	Adv. Tech. Sales	26	7%				Fuel 3rd Party Sales	89	6%
EU + EFTA HCV	9	4%	Installation	249	16%	Solid Oxide	66	18%				Electrolyzers	328	22%
EU + EFTA MH Buses	28	12%	Service	307	19%							SK JV	219	15%
Small Trains	0	0%	Electricity	68	4%							Renault JV	81	5%
Large Trains	2	1%										NAM MDV/HDV	33	2%
Marine Vessels	1	0%												
Material Handling	8	3%												
Back-up Power	4	2%												
Technology Solutions	12	5%												
Total	232	100%		1,581	100%		370	100%		2,099	100%		1,498	100%
New Revenues	86	37%		229	15%		230	62%		0	0%		749	50%

Source: CPI est.; Note: Grey highlighted areas show lack of track record.

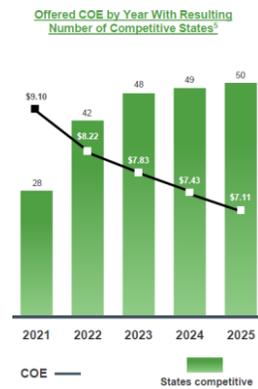
Growing Core Businesses

U.S. Growth

The company has a proven product and track record in the U.S of selling Bloom Energy Server. We estimate BE sold ~60 MW of products in the U.S. each in 2018/19/20 and has about 375 MW installed capacity. BE's Energy Servers are currently installed at customer sites in ten states in the U.S. (California, Connecticut, Delaware, Maryland, Massachusetts, North Carolina, New Jersey, New York, Pennsylvania, Utah and Virginia), however, four states CA, CT, MA and NY form the majority of the installed base in the U.S.

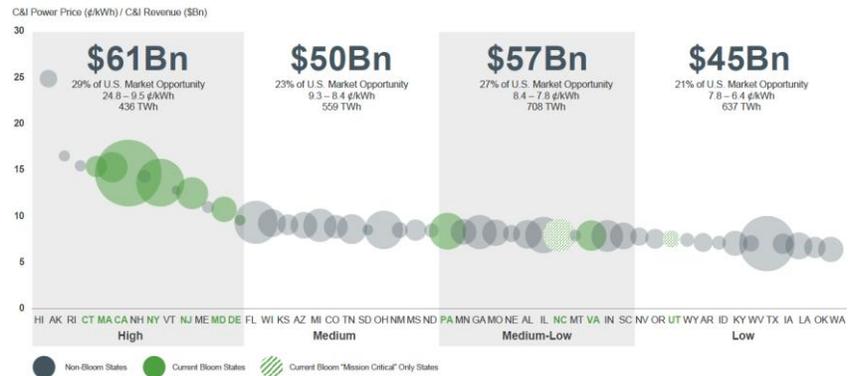
The price of product has declined from \$0.14/kWh to under \$0.10/kWh currently and expected to decline ~\$0.07/kWh. This in turn should enable the company to expand beyond current four core states to all 50 states by 2025. Bloom Energy Server essentially provides power at \$/kWh and as the price declines, matching power rates in low-cost states, BE's market should expand.

Lower Cost Expands US Market



Source: BE

Increasing US TAM From Lower Costs



Source: BE

Korea Hydrogen Policy Driving Visible Growth

For BE, Korea is the largest market outside the U.S. In 2018, BE entered into a Preferred Distributor Agreement with SK Engineering & Construction Co., Ltd. ("SK E&C") to sell directly into the Republic of Korea. In September 2019, BE entered into a JV agreement with SK E&C to establish a light-assembly facility in the Republic of Korea for sales of certain portions of Energy Server for the stationary utility and commercial and industrial market in the Republic of Korea. The JV is majority controlled and managed by BE.

In January 2019, the South Korean government announced the Hydrogen Economy Roadmap through 2040, with ambitious goals, including:

- Hydrogen cars: 100K by 2025 and 6.2M by 2040 including 3.3M exports and 2.9M domestic vs. 177/889 in 2017/18.
- Hydrogen buses: 40K by 2040 vs. two in 2018.
- Hydrogen taxis: 80K by 2040 vs. none at the time.
- Hydrogen trucks: 30K by 2040 vs. none at the time.
- HRS: 310 HRS by 2022 and 1,200 by 2040 vs. 14/86 in 2018/19.
- Power generation: 1.5 GW by 2022 and 15 GW by 2040 including 7 GW export and 8 GW domestic vs. 308 MW in 2018.
- Homes/Buildings fuel cell: 50 MW by 2022 and 2.1 GW by 2040 (940K households) vs. 7 MW (3,167 households) in 2018.
- Green hydrogen demand of 470k tons in 2022, 1.94M tons in 2030 and 5.26M ton sin 2040 vs. 130K tons/year hydrogen in 2018.

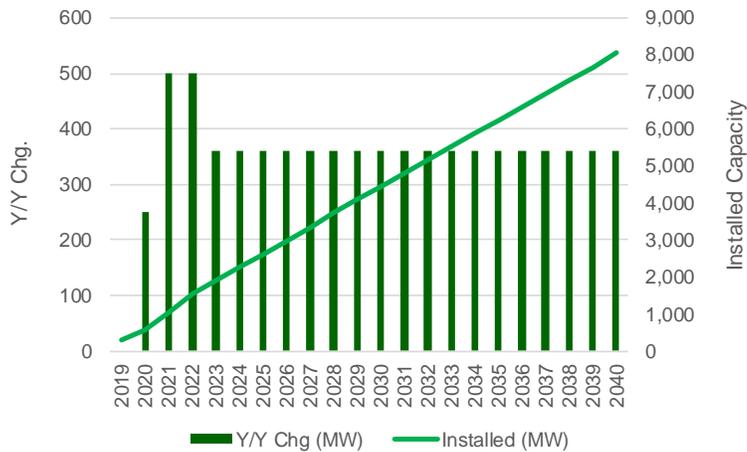
In our opinion, South Korea will likely require 1 GW stationary power ordered in 2021/22 to reach its targeted goal for 2022. From there on, if we simplistically assume equal increase through 2040, i.e., 18 years, to achieve 8 GW targeted for domestic use, it implies ~360 MW demand each year.

Korea currently has three main companies supplying fuel cells with ~30-35% market share each. The country has ~550 MW installed with FuelCell (FCEL) carbonate fuel cell share at ~170 MW, BE sodium oxide at ~200 MW and Doosan phosphoric acid fuel cell accounting for the remaining. With FCEL effectively not been involved in Korea, i.e., no new sales, in almost two years, BE and now PLUG have stepped in.

PLUG expects to sell ~400 MW by 2025. This implies 100 MW /year, which is similar to what we expect for BE as well. Doosan is based in Korea with focus on the U.S. and Korea market as well as the U.K. to a lesser extent. FCEL is trying to re-start its sales in Korea with expectations of some bookings in 2021.

We model BE selling 100/120 MW in 2021/22 which implies 30/28% market share vs. ~35% currently. Our assumptions may prove to be conservative. Additionally, the country plans to have 7 GW capacity sold internationally by 2040. We are unclear if and how the company could benefit hence we are not providing any credit for any potential exports.

Korea Installed Capacity Growth



Source: IEA; CPI est.

Other Growth Avenues

International Growth

The company has hired a team of ~10 senior people in April 2021 focusing on Australia, European countries such as UK, German, France, Italy, Spain and Portugal, Southeast Asia including Thailand, Singapore and Malaysia, the Middle East and North Africa. We estimate 100/200/300 MW product sales in 2023/24/25 from these markets. Admittedly, we have low confidence in this segment given the lack of track record. However, such revenues amount to ~5% of total revenues in 2024.

Five Levers Of Growth

BE has “five levers of growth”: marine, carbon capture, biogas, hydrogen fuel cells and electrolyzers. However, we are only providing credit for Marine product as we do not feel comfortable making aggressive assumptions that we have to make for peers. Our lack of credit is not because we have any doubts in BE’s capability. For example, BE already has order to sell electrolyzers in Korea. Any green hydrogen market revenues (\$750M by 2025 as per BE) would provide upside to our estimates however such estimates are already accounted for in our current financial estimates for BLDP, FCEL and PLUG.

Marine Product

On June 29, 2020, Samsung Heavy Industries, one of the largest ship builder, and BE signed a joint development agreement to design and develop fuel cell powered ships. Samsung’s goal is to replace all existing main engines and generator engines with solid oxide fuel cells to align with the International Maritime Organization’s 2030 and 2050 environmental targets. Each design can open new market from cargo vessels of all sizes to cruise ships. It requires new fuel cell technologies and testing. The company expects to complete testing on land, simulating the ocean environment, and a final testing phase which is an on-water demonstration in 2022. SHI and BE target to present the design to potential customers in 2022. Following commercialization, the two companies anticipate that the market for Bloom Energy Servers on SHI ships could grow to 300 MW annually. It is important to note, SHI has ratified 300 MW per year of potential opportunity for BE products (we model 250 MW). We do give credit to BLDP for marine products as well but BE’s agreement with one of the largest ship builder and stated goal of 300 MW implying about six ships a year provides relatively more certainty. **BE estimates the total addressable market of \$165B.**

Biogas Product

The company has developed Energy Server that can run on a combination of natural gas and biogas or 100% biogas. So far the biogas plants and Energy Server have to be near the waste site owing to lack of infrastructure to pipe the gas. We model only one plant in 2021 and two plants through 2027 each year for 5 MW/plant each representing under 1% of total revenues. However, there could be potentially more growth than our conservative estimates. **The company estimates TAM at \$45B.**

Biogas captured from cow manure contains approximately 65% methane, which has a 25x greater impact on global warming than CO2 emissions and accounts for 10% of U.S. greenhouse gas emissions. There is an estimated 320 MW of economically viable dairy biogas in California. Both small and large dairies deploying the new CalBio-Bloom Energy biogas solution will be eligible to apply for Department of Food and Agriculture (CDFA) grants.

As per American Biogas Council, the U.S. has over 2,200 sites producing biogas in all 50 states: 250 anaerobic digesters on farms, 1,269 water resource recovery facilities using an anaerobic digester (~860 currently use the biogas they produce), 66 stand-alone systems that digest food waste, and 652 landfill gas projects. For comparison, Europe has over 10,000 operating digesters and some communities are essentially fossil fuel free because of them.

The American Biogas Council counts 14,958 new sites ripe for development today: 8,574 dairy, poultry, and swine farms and 3,878 water resource recovery facilities (including ~380 who are making biogas but not using it) that could support new biogas systems, plus 2,036 food scrap-only systems and utilizing the gas at 415 landfills who are flaring their gas. If fully realized, according to an assessment conducted with the USDA, EPA and DOE as part of the Federal Biogas Opportunities Roadmap, plus data from ABC, these new biogas systems could produce 103 trillion kilowatt hours of electricity each year and reduce the emissions equivalent of removing 117 million passenger vehicles from the road. Bottomline, there is strong potential growth from new biogas products.

Carbon Capture

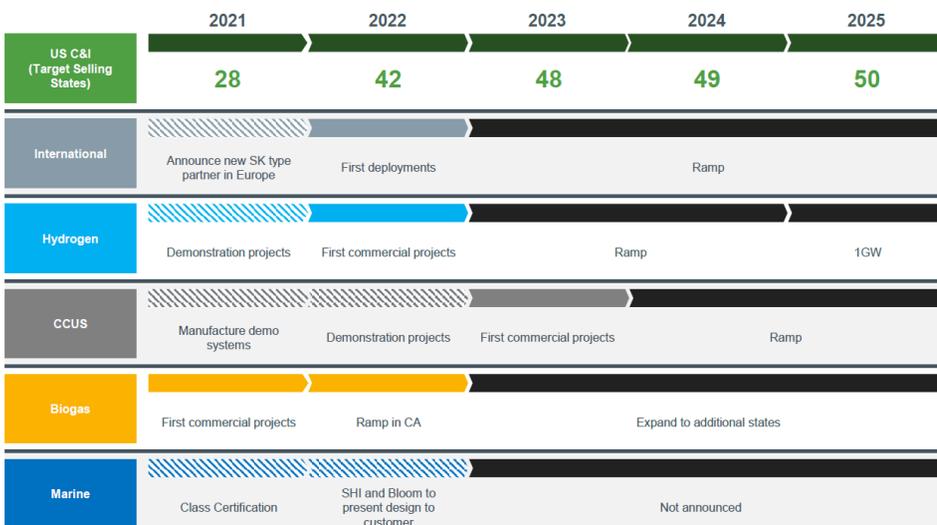
Bloom Energy Servers produce nearly 50% less carbon emission vs. average U.S. combustion power generation. However, the company is in process of commercializing carbon capture that can be added to Bloom Server for sequestering carbon for further uses. This would allow carbon neutral power generation using natural gas or carbon negative using biogas. The company has a prototype testing in its lab. The company expects demonstration projects in 2022 with first commercial projects in 2023. The price increase from carbon capture add-on is not significant and could be only ~10% higher.

Electrolyzers And Green Hydrogen Fuel Cell

In 2020, the company announced its intention to enter the commercial hydrogen market by introducing hydrogen-powered fuel cells and electrolyzers that produce renewable hydrogen. These products would be first introduced to the South Korean market in 2021 and later in the U.S. The company expects \$750M potential revenues by 2025. However, we are not providing any credit for it for now.

BE has a product that can utilize 100% of input as green hydrogen to produce power. The company has already deployed 100 kW of solid-oxide fuel cell powered solely by hydrogen in South Korea. BE will supply 1.8 MW of hydrogen-powered fuel cells through a multi-stage deployment from late 2021 into 2022. Additionally, the company also can sell electrolyzers. BE has already won award to supply its solid oxide electrolyzer cells (SOEC), which will be capable of producing green hydrogen via solar and battery, in Korea in 2022.

BE Growth Avenues



Source: BE

Baker Hughes Agreement

Outside “five levers of growth” BE’s agreement with BKR could be a growth opportunity too. On May 5, 2021, BE and BKR agreed to collaborate on the potential commercialization and deployment of integrated, low carbon power generation and hydrogen solutions. Both will begin collaborating on potential customer engagements immediately, with the objective of launching pilot projects over the next 2-3 years and fully commercializing and scaling applications, products and solutions shortly thereafter. We have not provided any credit in our financial model. The companies will focus efforts in three areas:

- Micro grids with BE’s base fuel cells using natural gas and BKR’s gas turbines with launch expected in few months.
- Utilizing BKR’s compression expertise for compression, transport and delivery of hydrogen via pipeline with BE’s hydrogen production capacity using electrolyzers. This can be used in process industries such as steel refining.
- Mutual collaboration using BKR’s 3-D printing technology, AI to analyze BE’s datapoints provided by Energy Servers to make them more efficient, etc.

We Prefer Stationary Power Over On-Road Mobility Applications

We prefer stationary power applications over on-road mobility applications for hydrogen. One they have track record, two they can use grey, blue as well as green hydrogen, three they do not need extensive infrastructure like hydrogen refueling station (HRS) and four they are closer to being competitive even at current costs. BE fits the bill.

- As opposed to mobility applications where companies are still building prototypes for new category of vehicles in new markets such as BLDP for MDCV in Europe/U.S. with MAHLE and later for HDCV or PLUG with Renault JV, BE/FCEL have installed ~575/250 MW over past five to ten years. Especially, BE has installed the same product in the U.S. and Korea creating a strong track record.
- Stationary power FC can run on natural gas or biogas utilizing existing infrastructure. Stationary power FC generates ~50% lower carbon emission vs. traditional power generation. Companies have developed carbon capture add-on fulfilling the decarbonization goal.
- There is relatively less risk of scaling up with stationary power vs. mobility applications. Stationary power do not need scaling up for HRS, a must if mobility applications were to enjoy higher penetration.
- Lastly, the stationary power produced already competes with electricity provided by grids in many states in the U.S. With costs still expected to decline, stationary power can potentially compete with grid electricity costs in all 50 U.S. states.

Relatively Decent Valuation

Our BE price target is ~\$24 implying ~5% upside. Our PT is based on DCF through 2040. We model explicitly through 2030, then 10% revenue growth through 2040. We model 8.0% WACC assuming 6.0% market premium and 2.0% risk-free rate. We also model 2.0% perpetuity growth. Our growth rate in 2030-2040 for BE is only 10% vs. 7% we use for GTLS and 15% for BLDP and PLUG. Again, lower risk. Additionally, we do not provide any credit to \$750M the company expects from hydrogen by 2025. We typically assume lower EBIT margins in exit year to match WACC as the company cannot be expected to earn above cost of capital into perpetuity, but given the exposure to secularly growing market we have assumed remain unchanged even in exit year which drives cost of capital into perpetuity. A 10% WACC implies ~\$16 PT.

BE DCF (Units and \$ in M)

Shares	172	NPV of FCF	1,905
Cash	366	NPV of Terminal	2,062
Debt	172	Firm Value	3,967
MI/Preferred	58	Other	0
Tax Rate	25%	Firm Equity Value	4,102
		DCF/Sh	\$24
		Upside/Downside	4%

	2018	2019	2020	2021E	2022E	2023E	2024E	2025E	2040E
Revenues	742	882	794	983	1,178	1,338	1,580	2,087	7,122
Growth	97%	19%	-10%	24%	20%	14%	18%	32%	10%
Gross Profit	41	137	166	252	312	366	452	597	1,842
Gross Profit Margins	5%	16%	21%	26%	27%	27%	29%	29%	26%
Corp Exp	(271)	(331)	(247)	(281)	(300)	(326)	(334)	(365)	(876)
Other	-	-	-	-	-	-	-	-	-
EBITDA	(188)	(123)	(29)	25	68	100	180	298	1,092
EBITDA Margins	-25%	-14%	-4%	3%	6%	7%	11%	14%	15%
D&A	(43)	(71)	(52)	(54)	(56)	(60)	(63)	(66)	(126)
Corp EBIT	(230)	(194)	(81)	(29)	12	40	117	232	965
Corp EBIT Margins	-31%	-22%	-10%	-3%	1%	3%	7%	11%	14%
Other	(20)	(7)	(10)	(0)	-	-	-	-	-
Tax Rate	0%	0%	0%	11%	25%	25%	25%	25%	25%
EBIT (1-Tax)	(230)	(194)	(81)	(29)	9	30	88	174	724
Shares	53	115	139	172	175	179	182	187	243
Working Capital	151	92	183	109	138	163	191	230	783
Capex	(15)	(51)	(38)	(65)	(130)	(80)	(80)	(130)	(214)
FCFF	(353)	(116)	(158)	34	(94)	(15)	43	71	565
Discounted FCFF					(87)	(13)	34	52	131
RATIOS									
Capex % of Sales	2%	6%	5%	7%	11%	6%	5%	6%	3%
WC % of Sales	20%	10%	23%	11%	12%	12%	12%	11%	11%
Cash	280	377	417	366	366	366	432	615	7,211
Debt	369	381	168	172	173	87	0	0	0
MI/Preferred	182	92	63	58	58	58	58	58	58
Equity	(92)	(260)	79	62	168	300	499	786	8,426
Capital Employed	179	(165)	(107)	(73)	34	80	125	228	1,274
Fixed Assets	481	607	601	611	685	705	722	786	1,278
Current Assets	673	473	619	505	534	558	653	875	8,024
Current Liabilities	280	574	436	369	369	369	369	369	369
Invested Capital	594	128	366	381	484	528	574	677	1,723
ROCE	-128%	118%	75%	39%	27%	37%	70%	76%	57%
ROIC	-39%	-151%	-22%	-8%	2%	6%	15%	26%	42%

Catalysts

- BE is hoping to win a combined heat & power (CHP) contract in South Korea where they can utilize heat emissions which should improve product efficiency.
- We expect first commercial sale of carbon capture product shortly.
- We also expect a large biogas commercial win with a large technology company.
- We think the company will likely have to expand production capacity in 2022.

Risks To Thesis

Upside Risks

\$750M Green Hydrogen Revenues

In 2020, the company announced its intention to enter the commercial hydrogen market by introducing hydrogen-powered fuel cells and electrolyzers that produce renewable hydrogen. BE has a product that can utilize 100% of input as green hydrogen to produce power. The company has already deployed 100 kW of solid-oxide fuel cell powered solely by hydrogen in South Korea. BE will supply 1.8 MW of hydrogen-powered fuel cells through a multi-stage deployment from late 2021 into 2022. Additionally, the company also can sell electrolyzers. Korea's hydrogen needs could reach 470k tons in 2022, 1.94M tons in 2030 and 5.26M tons in 2040 vs. 130K tons/year hydrogen in 2018. BE has already won award to supply its solid oxide electrolyzer cells (SOEC), which will be capable of producing green hydrogen via solar and battery, in Korea in 2022. The company has ~35% market share in Korea fuel cell market providing a solid base. The company expects \$750M potential revenues by 2025. However, we are not providing any credit for it for now and could provide upside. Carbon capture products and BKR agreement too can provide upside.

Downside Risks

Modeling Assumptions

- We are giving credit to company for selling products internationally, outside Korea given the company has hired a team of ~10 senior people in April 2021 focusing on Australia, European countries such as UK, German, France, Italy, Spain and Portugal, Southeast Asia including Thailand, Singapore and Malaysia, the Middle East and North Africa. However, such revenues amount to ~5% of total revenues in 2024.
- We are assuming installation margins improve to breakeven by 2023, a year after the company expectations, but we have less clarity on the pathway.
- We are assuming Services margins improve to 20% by 2025 vs. (-21%) in 2020. The company has worked hard on improving margins. Services are priced at 20% margins for the last few years. However, product issues were hurting margins. The company has implemented cost savings initiatives. The product reliability has increased as well. Given the replacement cost is already baked into service agreements at the time of sale of the module, any improvement in cost and life extensions should help BE's service margins. Additionally, Services margins already turned positive in 1Q21, a year earlier than original company forecast.
- We have assumed Products margins at ~40% in line with company guidance vs. ~37% currently. Stable margins while reducing pricing to pass on cost benefits is not without risk, albeit we have provided same credit to peers too. Additionally, international margins could be dilutive initially as the company tries to establish a presence.
- Lastly, there is a modest risk from restatements as we have seen for peers and the company itself. Bloom's previously issued consolidated financial statements as of and for the year ended 12M2018, as well as the unaudited interim financial statements for the three-month period ended March 31, 2019, the three- and six-month periods ended June 30, 2019 and 2018 and the three- and nine-month periods ended September 30, 2019 and 2018, were restated due to misstatements related to Managed Services Agreements and similar arrangements. The revenue for the Managed Services Agreements and similar transactions were to be recognized over the duration of the contract instead of upfront. In addition, even though the impact of these misstatements to periods prior to the three months ended June

30, 2018 was not material to warrant restatement of reported figures, however, BE's consolidated financial statements as of and for the year ended December 31, 2017, selected financial data as of and for the year ended December 31, 2016 and the relevant unaudited selected quarterly financial data for the three months period ended March 31, 2018 were revised to correct these misstatements. Essentially, revenues for 2017/2018/9M2019 were reduced by \$10/109/70M as a result.

Potential Manufacturing Capacity Constraints

The company could end up being capacity constrained if a facility in addition to a 200 MW facility currently under construction is not announced soon. The company is building a 200 MW new manufacturing facility for its Bloom 7.5 model. The company will continue to use its current 200 MW manufacturing facility to build Bloom 5.0 and 80 MW of servicing Bloom 5.0. Gradually, the company will use all of current 200 MW facility for servicing Bloom 5.0 as well.

However, we model the company should be able to sell ~210 MW in 2022 increasing to ~425 MW by 2025 and 600 MW+ in 2029. Accordingly, we model the company will spend \$50M each year in 2022/25/29 to expand building capacity by 200 MW each time.

BE has been very deliberate about its manufacturing facility set up where the company can stand up a copy of its existing manufacturing line in a year. This same manufacturing facility can build Bloom Server and future growth products such as electrolyzers, marine power and carbon capture enabled systems.

Stock Based Compensation Dilution

We are not big fans of significant stock-based compensation (SBC). We think of SBC as true cost even if non-cash. The company had \$180/191/74M SBC in 2018/19/20 despite negative EBITDA. Given the technology and company was in nascent stage, we can somewhat understand the reasoning. However, with the company on a significant growth path, our comfort level is low with SBC. We model \$75M SBC in 2021 growing annually by 5%. This implies 3M shares addition each year at current share price. It implies share count could grow to ~205M by 2030 vs. ~170M currently or 17% dilution.

Execution Risk

Execution risk around scaling up from about 130 MW sold in our estimate in 2020 to ~700 GW by 2030. Oil Services industry has witnessed several companies failing at scaling up despite having decent products. Even larger companies have had execution issues.



COKER & PALMER

INVESTMENT SECURITIES

BLOOM ENERGY INITIATION

July 13, 2021

Financial Assumptions & Model

Financial Assumptions & Model

Company Guidance

2021 guide

- Revenues \$950M - \$1B with 180-190 MW shipments; 2H > 1H
- Non-GAAP Gross Margins ~25%
- Non-GAAP Operating Margins ~3%
- CFO Approaching positive
- \$150M Services revenues with positive margins vs. 2022 earlier
- Cash use in 1H21 as build inventories for delivery in 2H21

2025 Guide

- Revs 20-25% CAGR by 2025 vs. \$780M revs in 2020
- Annual cost/kW reduction of 15%
- Non GGAP Gross Margins 30%
- Maintain Product margins at ~40%
- Services margins of 20%
- Installation breakeven by 2022
- Non-GAAP Operating Margins 15%
- R&D 8-9% of revenues
- SG&A 7-8% of revenues

Products Segment

BE's product sales backlog was \$1.0B, equivalent to 1,994 systems, or 199.4 MW as of 2020 end vs. \$1.1B, equivalent to 1,983 systems, or 198.3 MW as of 2019 end. Typically at least 50% of backlog is deployed within the next 12 months. As 2020 end the backlog comprised of direct purchase (including Third Party PPAs) 90% and Managed Services Agreements 10% vs 93/7% at 2019 end respectively.

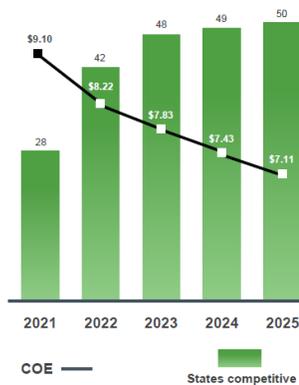
South Korea

The company has ~200 MW capacity of the ~550 MW installed in South Korea. Korea's policy aims to get to 1.5 GW by 2022 and 8 GW domestically by 2040. We assume the country demand to grow 500 MW in 2021/22 and ~375 MW each year thereafter to hit its target. We model BE selling 100/120 MW in 2021/22 which implies 30/28% market share vs. ~35% currently. Our assumptions may prove to be conservative. Beyond 2022, we continue to assume 30% market share implying ~115 MW addition each year. We model \$3,500/kW price in 2021/22 and then declining 10% each year through 2030 to ~\$1,500/kW.

U.S.

We estimate BE sold ~60 MW of products in the U.S. each in 2018/19/20. The price of product has declined from \$0.14/kW to under \$0.10/kWh and expected to decline further to ~\$0.07/kWh. This in turn should enable the company to expand into other states in the country beyond current four core states, CA, CT, MA and NY, where most of BE's products have been sold. Accordingly, we assume ~20% growth in 2021-24 and 15% thereafter through 2030. The company has a proven product and track record in the U.S.

U.S. Geographic Expansion



Source: BE

International (Ex-Korea) Market

The company announced on Apr. 23, 2021 hiring of international leadership team of seven people for global expansion focusing on Australia, European countries such as UK, German, France, Italy, Spain and Portugal, Southeast Asia including Thailand, Singapore and Malaysia, the Middle East and North Africa. We estimate 100/200/300 MW product sales in 2023/24/25 from these markets and 15% growth thereafter through 2030. Admittedly, we have low confidence in this segment given lack of track record.

Marine Market

On June 29, 2020, Samsung Heavy Industries, one of the largest ship builder, and BE signed a joint development agreement to design and develop fuel cell powered ships. Samsung's goal is to replace all existing main engines and generator engines with these highly efficient solid oxide fuel cells to align with the International Maritime Organization's 2030 and 2050 environmental targets. SHI and BE target to present the design to potential customers in 2022. Following commercialization, the two companies anticipate that the market for Bloom Energy Servers on SHI ships could grow to 300 MW annually, implying six vessels/year. We model 1/3/5 vessels in 2024/25/26 for 50 MW each. We do give credit to BLDP for marine product as well but BE's agreement with one of the largest ship builder and stated goal of 300 MW implying about six ships a year provides relatively more certainty.

Biogas Market

BE's Energy Server can utilize 100% biogas. So far the plants and Energy Server have to be near the waste site owing to lack of infrastructure to pipe the gas. We model one plant in 2021, two plants each year through 2027 and 15% growth thereafter after through 2030 for 5 MW/plant.

On October 4, 2019, BE announced plans to install and operate 4 MW of Bloom Energy Servers at the plant in Shirala, Maharashtra, India in the 1H20. On October 10, 2019, BE and California Bioenergy (CalBio) announced a collaboration to deploy BE's solution for the conversion of dairy water into power. Biogas captured from cow manure contains approximately 65% methane, which has a 25x greater impact on global warming than CO2 emissions and accounts for 10% of U.S. greenhouse gas emissions. There is an estimated 320 MW of economically viable dairy biogas in California. Both small and large dairies deploying the new CalBio-Bloom Energy biogas solution will be eligible to apply for Department of Food and Agriculture (CDFA) grants.

Overall, for non-Korea markets, we model 72/91 MW sold in 2021/22. We assume ~5% price decline in 2021/22 and 10% thereafter through 2030 implying ~\$4,250/4,050 per kW in 2021/22 and \$2,950/kW by 2025.

Total MW Sold

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
MW Sold													
Korea	16	58	77	100	120	143	113	113	113	113	113	113	113
U.S.	64	61	55	67	80	96	115	126	139	153	168	185	204
Intl. (Ex-Korea)	0	0	0	0	2	10	20	30	36	40	44	48	53
Marine	0	0	0	0	0	0	50	150	250	250	250	250	250
BioGas	0	0	0	0	10	10	10	10	10	10	10	10	10
Total	81	119	133	167	211	258	307	429	548	565	584	606	629
Growth		48%	11%	26%	27%	22%	19%	40%	28%	3%	3%	4%	4%

Source: BE, CPI est.

We model gross margins ~37% for Product segment in 2021 vs. 36% for 2020 and growing to ~40% by 2024 in line with company guidance.

Installation segment

The company provides installation services for products sold in the U.S., not for products sold in Korea. The company is trying to outsource installation work even within the U.S. given its low margin profile. We model the share of U.S. jobs where the company provides installation to reduce from 100% in 2021 to 80% by 2025 and 50% thereafter. We model \$1,500/kW of installation price implying 5/21% revenues growth in 2021/22 to \$107/130M. More importantly, we model (-10%/-5%) margins in 2021/22 vs. about (-15%) in 2020. Thereafter we model breakeven gross margins. The company expects to be breakeven by 2022.

Service Segment

The company provides one year of warranty on new products and then is covered under long term service agreement. Accordingly, Service revenues should grow driven by installation each year with a year lag. However, given annual installations are a small part of cumulative deployments, we model Services revenues based on cumulative deployments. We model ~\$200/kW of Service revenues on total deployments vs. \$221/211/193 per kW in 2018/19/20. This implies 43/21% revenues growth to ~\$155/190M in 2021/22.

The company has worked hard on improving margins. Services are priced at 20% margins. However, product issues were hurting margins. The company has implemented cost savings initiatives. The product reliability has increased as well. Given the replacement cost is already baked into service agreements at the time of sale of the module, any improvement in cost and life extensions should help BE's service margins. We model 1% margins in 2021 improving to 20% by 2025, giving credit to company's guidance.

Electricity Segment

This is not a core business for the company. We model flat revenues and margins.

Line Items

- We model R&D of \$98/108M in 2021/22. We model R&D as share of sales to decline from 10/9% in 2021/22 to 5% by 2025 and eventually to 2% by 2030.
- We model SG&A of ~\$185/190M in 2021/22. We model SG&A as share of sales to decline from 18/16% in 2021/22 to 12% by 2025 and eventually to 10% by 2030.
- We model \$65/130M capex in 2021/22. We assume BE will have to increase capacity in 2022 and again in 2025/29. Each 200 MW capacity expansion is about \$50M capex. Longer term we model 3% capex to sales.
- We model essentially neutral change in working capital (receivables plus inventory minus payables) in 2021 despite higher revenues as inventory is expected to decline. We assume working capital /sales remain at 11% of ~45 net days.

Company Model (US\$M)

Summary	1Q20	2Q20	3Q20	4Q20	1Q21E	2Q21E	3Q21E	4Q21E	2019	2020	2021E	2022E	2023E	2024E	2025E	2040E
Revenue	157	188	200	249	194	254	262	273	882	794	983	1,178	1,338	1,580	2,087	7,122
Consensus	176	174	235	221	208	233	259	289	786	794	974	1,210	1,529	1,877	2,308	-
EBITDA	(33)	(17)	13	9	(1)	6	8	12	(123)	(29)	25	68	100	180	298	1,092
Consensus	(19)	(4)	11	17	10	14	24	30	97	45	84	140	232	276	375	-
EPS	(\$0.50)	(\$0.34)	(\$0.09)	(\$0.16)	(\$0.14)	(\$0.02)	(\$0.01)	\$0.01	(\$2.16)	(\$1.04)	(\$0.16)	\$0.13	\$0.25	\$0.58	\$1.03	\$3.06
Consensus	(\$0.12)	(\$0.12)	(\$0.12)	\$0.00	(\$0.07)	(\$0.06)	\$0.00	\$0.02	(\$0.30)	(\$0.67)	(\$0.18)	\$0.10	\$0.10	\$0.10	\$0.00	\$0.00
Products																
Korea Market																
Units Sold (100 KW) - Korea	161	156	137	317	0	0	0	0	579	772	1,000	1,200	1,425	1,125	1,125	1,125
Growth %									253%	33%	30%	20%	19%	-21%	0%	0%
Product Revenues/Acceptance (\$/KW)									3,500	3,500	3,500	3,500	3,150	2,835	2,552	1,507
Growth %									0%	0%	0%	0%	-10%	-10%	-10%	0%
Korea Revenue	56	54	48	111	0	0	0	0	203	270	350	420	449	319	287	169
Growth %									253%	33%	30%	20%	7%	-29%	-10%	0%
Units Sold (100 KW) - US									615	554	665	798	958	1,150	1,322	10,758
Growth %									-5%	-10%	20%	20%	20%	20%	15%	15%
Units Sold (100 KW) - Intl. Ex Korea											0	15	100	200	300	2,441
Growth %													567%	100%	50%	15%
Units Sold (100 KW) - Marine														500	1,500	2,500
Vessel														1	3	5
MW / Vessel														0	50	50
Units Sold (100 KW) - Biogas											50	100	100	100	100	708
Plant											1	2	2	2	2	14
MW/Plant											5	5	5	5	5	5
Non Korean Units Sold (100 KW)									615	554	715	913	1,158	1,950	3,222	16,407
Growth %									-5%	-10%	29%	28%	27%	68%	65%	12%
Non-Korea Product Revenues (\$M)									460	249	305	370	422	639	950	2858
Product Revenue / Acceptance (\$/kW)									7,483	4,484	4,259	4,046	3,642	3,278	2,950	1,742
Growth %									6%	-40%	-5%	-5%	-10%	-10%	-10%	0%
Products Revenue	100	116	131	172	138	164	170	179	663	519	651	790	870	957	1,238	3,027
Change %	-37%	17%	13%	31%	-20%	19%	4%	5%	29%	-22%	26%	21%	10%	10%	29%	12%
Product Cost	(72)	(83)	(72)	(105)	(87)	(104)	(108)	(113)	(492)	(333)	(412)	(498)	(540)	(574)	(743)	
Product Gross Margin	27%	28%	45%	39%	37%	37%	37%	37%	26%	36%	37%	37%	38%	40%	40%	

Source: Bloomberg; Company reports; CPI est.

Company Model Contd. (US\$M)

Installation	1Q20	2Q20	3Q20	4Q20	1Q21E	2Q21E	3Q21E	4Q21E	2019	2020	2021E	2022E	2023E	2024E	2025E	2040E
Units Sold (100 KW) - Korea									579	772	1,000	1,200	1,425	1,125	1,125	1,125
Non-Korea Units Sold (100 KW)									615	554	715	913	1,158	1,950	3,222	16,407
Inst. Revenue/ Acceptance (\$/kW)									1,188	1,838	1,500	1,500	1,500	1,500	1,500	1,500
Change %									-16%	55%	-18%	0%	0%	0%	0%	0%
Installation Revenue	17	30	27	29	3	35	35	35	73	102	107	130	156	249	387	1,231
Change %	15%	80%	-11%	8%	-91%	1212%	0%	0%	-20%	40%	5%	21%	20%	59%	56%	12%
Installation Gross Profit	(4)	(8)	(1)	(1)	(2)	(3)	(3)	(3)	(15)	(15)	(11)	(7)	0	0	0	
Installation Gross Margin	-25%	-28%	-5%	-3%	-74%	-8%	-8%	-8%	-21%	-14%	-10%	-5%	0%	0%	0%	
Service																
Cumulative MW deployed	481	512	543	568	604	647	693	740	456	568	740	951	1,209	1,518	1,953	16,742
Service Revenue \$/kW	209	205	192	226	241	236	232	227	211	193	212	200	201	202	202	202
Change %	-7%	-2%	-6%	18%	7%	-2%	-2%	-2%	-5%	-8%	10%	-6%	1%	0%	0%	0%
Service Revenue	25	26	26	32	36	38	40	42	96	110	157	190	243	307	395	3,384
Change %	-2%	4%	0%	23%	13%	5%	5%	5%	17%	14%	43%	21%	28%	26%	29%	12%
Service Gross Profit	(6)	(2)	(7)	(7)	0	0	0	0	(5)	(23)	2	4	12	46	79	
Service Gross Margin	-23%	-9%	-27%	-23%	1%	1%	1%	1%	-5%	-21%	1%	2%	5%	15%	20%	
Electricity																
Electricity revenue	15	16	16	17	17	17	17	17	96	110	157	190	243	307	395	3,384
Change %	0%	2%	6%	1%	2%	0%	0%	0%	17%	14%	43%	21%	28%	26%	29%	12%
Electricity Gross Profit	0	0	0	0	0	0	0	0	(14)	17	23	23	23	23	23	
Electricity Gross Margin	19%	26%	32%	30%	33%	33%	33%	33%	-28%	27%	33%	33%	33%	33%	33%	

Source: Bloomberg; Company reports; CPI est.

Company Model Contd. (US\$M)

Income Statement	1Q20	2Q20	3Q20	4Q20	1Q21E	2Q21E	3Q21E	4Q21E	2019	2020	2021E	2022E	2023E	2024E	2025E	2040E
Total Revenues	157	188	200	249	194	254	262	273	882	794	983	1,178	1,338	1,580	2,087	7,122
Corporate Expenses	(43)	(36)	(37)	(46)	(46)	(46)	(46)	(46)	(227)	(163)	(183)	(192)	(218)	(226)	(257)	(734)
Gross Profit	20	26	56	64	55	63	66	69	137	166	252	312	366	452	597	1,842
Gross Profit Margin	13%	14%	28%	26%	28%	25%	25%	25%	16%	21%	26%	27%	27%	29%	29%	26%
EBIT	(46)	(30)	(0)	(5)	(14)	(7)	(5)	(2)	(194)	(81)	(29)	12	40	0	232	965
EBIT Margin	-29.6%	-15.7%	-0.2%	-1.8%	-7.4%	-2.9%	-1.9%	-0.7%	-22.0%	-10.2%	-2.9%	1.0%	3.0%	7.4%	11.1%	13.6%
Incr EBIT Margin	-20%	54%	234%	-8%	18%	12%	29%	30%	26%	-130%	28%	21%	17%	32%	23%	14%
D&A	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(71)	(52)	(54)	(56)	(60)	(63)	(66)	(126)
EBITDA	(33)	(17)	13	9	(1)	6	8	12	(123)	(29)	25	68	100	180	298	1,092
EBITDA Margin	-21.3%	-8.9%	6.3%	3.6%	-0.5%	2.4%	3.2%	4.2%	-14.0%	-3.6%	2.5%	5.8%	7.5%	11.4%	14.3%	15.3%
Interest Expense	(20)	(14)	(20)	(21)	(15)	(4)	(4)	(3)	(64)	(75)	(25)	(9)	(7)	(2)	0	0
Tax	(0)	(0)	(0)	0	(0)	3	2	1	(1)	(0)	6	(1)	(8)	(29)	(58)	(241)
Tax Rate	0%	0%	0%	0%	0%	25%	25%	25%	0%	0%	11%	25%	25%	25%	25%	25%
Net Income	(62)	(43)	(13)	(27)	(24)	(3)	(2)	1	(249)	(145)	(28)	22	44	106	194	744
Other	(14)	0	1	-	(1)	-	-	-	0	(13)	(1)	-	-	-	-	-
Diluted Shares	124	126	139	166	171	172	172	173	115	139	172	175	179	182	187	243
Clean EPS	(\$0.50)	(\$0.34)	(\$0.09)	(\$0.16)	(\$0.14)	(\$0.02)	(\$0.01)	\$0.01	(\$2.16)	(\$1.04)	(\$0.16)	\$0.13	\$0.25	\$0.58	\$1.03	\$3.06
Cash Flows																
Net Income	(81)	(48)	(18)	(32)	(30)	(3)	(2)	1	(323)	(179)	(34)	22	44	106	194	744
D&A	13	13	13	13	13	13	13	13	79	52	54	56	60	63	66	126
WC Changes	(2)	6	(46)	(31)	(93)	(15)	46	48	97	(73)	(14)	(29)	(25)	(28)	(39)	(71)
Other	19	(1)	(4)	14	3	-	-	-	116	27	3	-	-	-	-	-
CFO	(28)	(12)	(40)	(19)	(89)	13	75	82	158	(99)	81	129	167	233	313	891
Capex	(12)	(7)	(14)	(5)	(13)	(17)	(17)	(17)	(51)	(38)	(65)	(130)	(80)	(80)	(130)	(214)
FCF	(40)	(19)	(53)	(24)	(102)	(5)	58	64	107	(137)	16	(1)	87	153	183	678
Debt Changes	18	(6)	232	(78)	(3)	5	(58)	(64)	(64)	167	(121)	1	(87)	(87)	-	-
Equity Changes	5	0	8	11	58	-	-	-	13	23	58	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(19)
Other	(2)	(3)	(6)	4	-	-	-	-	-	(7)	-	-	-	-	-	-
Cash at Beginning	377	354	324	504	417	366	366	366	280	377	417	366	366	366	432	6,553
Cash at End	354	324	504	417	366	366	366	366	377	417	366	366	366	432	615	7,211
Balance Sheet																
Cash	354	324	504	417	366	366	366	366	377	417	366	366	366	432	615	7,211
Receivables	36	50	50	100	108	123	77	29	38	100	29	58	82	111	149	703
Inventories	107	112	132	142	153	153	153	153	110	142	153	153	153	153	153	153
Payables	60	65	64	58	73	73	73	73	56	58	73	73	73	73	73	73
Total Debt	411	362	343	168	290	295	237	172	381	168	172	173	87	-	-	-
Ratios																
Net Debt/Cap	73%	84%	-50%	-101%	-26%	-22%	-46%	-82%	3%	-101%	-82%	-56%	-72%	-87%	-78%	-86%
Net Debt/EBITDA	-0.6x	-0.5x	2.3x	8.7x	-19.4x	-2.7x	-5.8x	-7.7x	0.0x	8.7x	-7.7x	-2.8x	-2.8x	-2.4x	-3.4x	-6.6x
Capex/Sales	8%	4%	7%	2%	7%	7%	7%	6%	6%	5%	7%	11%	6%	5%	6%	3%
Working Capital/Sales	13%	13%	15%	18%	24%	20%	15%	10%	10%	23%	11%	12%	12%	12%	11%	11%

Source: Bloomberg; Company reports; CPI est.



COKER & PALMER

INVESTMENT SECURITIES

BLOOM ENERGY INITIATION

July 13, 2021

Company Background

Company Overview

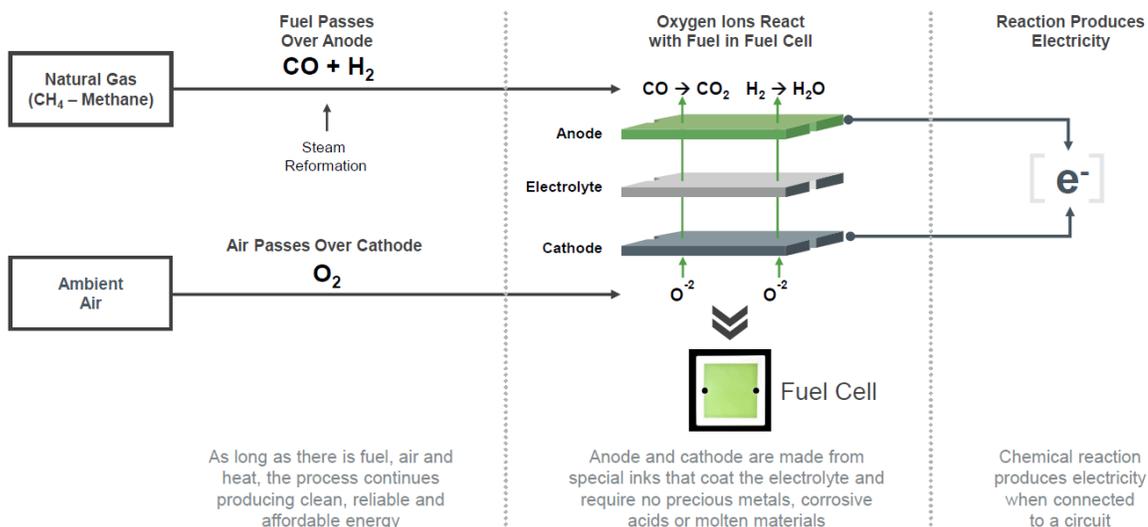
Bloom Energy, Inc. (BE), was incorporated in Delaware on Jan. 18, 2001, as Ion America Corp and later renamed in 2006. BE manufactures solid oxide fuel-cell based power generation platform called Bloom Energy Servers (“Server”) that provides clean and resilient power to businesses, essential services, and critical infrastructure. Bloom Energy Servers produce nearly 50% less carbon emission vs. average U.S. combustion power generation. The company is in process of commercialization and expansion of five new products (1) carbon capture that can be added to Bloom Server for sequestering carbon for further uses, (2) biogas driven Energy Servers, (2) Energy Servers powered by renewable or green hydrogen fuel, (4) electrolyzers to produce renewable hydrogen and (5) marine product.

Bloom Energy Server

The Bloom Energy Server delivers reliable, resilient and cleaner energy through distributed power generation system. It can provide 24X7 baseload power. It can use natural gas, biogas and hydrogen to produce power. Its scalable to work for small and large-scale solutions for power and transportation industry. Essentially the company provides electricity in two ways, one in parallel to grid where the customer can arbitrage electricity from the grid vs fuel cell and second an AlwaysOn option where resiliency is more important. Predominantly, the Server is used as primary source of power.

The Bloom Energy Server, based on solid oxide fuel cell technology, converts fuel (natural gas, biogas or hydrogen) into electricity through an electrochemical process without combustion. Each individual fuel cell is composed of three layers, an electrolyte sandwiched between a cathode and an anode. The electrolyte is a solid ceramic material, and the anode and cathode are made from inks that coat the electrolyte. Multiple fuel cells form stacks and multiple stacks form a 50kW power module. A typical Server includes multiple power modules that can produce up to 300kW of power in a footprint roughly equivalent to that of half a standard 30-foot shipping container. They can be stacked together to form up to tens of MW stack. The Server is modular, i.e., more capacity can be added later to existing server. **Please see our “[Deep Dive Into Mobility TAM – Hydrogen Sector Initiation](#)” report for types of hydrogen fuel and how a fuel cell works.**

Solid Oxide Fuel Cell Schematic



Source: BE

Essentially, the primary input is standard low-pressure natural gas, biogas or hydrogen and out put is electrical power, which can be connected to customer’s main electrical feed avoiding the grid. Natural gas or biogas after treating modestly, if needed, along with some water is used as input with power, water and significantly less carbon dioxide (vs. traditional power) is the output. The Server can utilize existing underground natural gas infrastructure. Nitrogen and carbon are not mixed in the reaction making it feasible and cost-effective to capture CO₂ emissions with carbon capture

module for storage or further use.

The company is focused on scaling use of renewable natural gas (RNG), which is derived from biogas produced from decomposing organic waste from landfills, agricultural waste, and wastewater from treatment facilities. RNG has a methane concentration of 90% or greater.

The Bloom Energy Server provides (1) resiliency by generating power on-site where the electricity is consumed avoiding any interruptions, (2) sustainability by lowering carbon emissions by displacing less-efficient fossil fuel generation on the grid, (3) predictability by providing ability to lock in cost for electric power over the long term and (4) an energy platform that can be customized for customer needs and run on natural gas, biogas and hydrogen.

In a primary power configuration, the Energy Server is interconnected to the customer's electric grid connection. Energy Servers can be upgraded to AlwaysON Microgrid solutions as add-on options at any point in time to enable continuous operation in the event of grid interruption. When in an always-on configuration, the Energy Server continually powers critical loads while the grid serves as a backup.

Each Bloom Energy Server installation must be designed, constructed and operated in compliance with applicable federal, state, international and local regulations. Customers are required to obtain applicable permits and approvals from local authorities for the installation of Bloom Energy Servers and for the interconnection systems with the local electrical utility. In almost all cases, interconnection agreements are standard form agreements that have been pre-approved by the local public utility commission or other regulatory body with jurisdiction over interconnection agreements. As such, no additional regulatory approvals are typically required once interconnection agreements are signed. BE installs the server themselves. However, that business is dilutive to overall margins with aspirations of only breakeven. The company focusing on return on capital is trying to get 3rd parties to do more of the installations.

Expanding Product Portfolio

BE has "five levers of growth": marine, carbon capture, biogas, hydrogen fuel cells and electrolyzers.

- **Marine product:** On June 29, 2020, Samsung Heavy Industries (SHI), one of the largest ship builder, and BE signed a joint development agreement to design and develop fuel cell powered ships. Samsung's goal is to replace all existing main engines and generator engines with solid oxide fuel cells to align with the International Maritime Organization's 2030 and 2050 environmental targets. Following commercialization, the two companies anticipate that the market for Bloom Energy Servers on SHI ships could grow to 300 MW annually.
- **Biogas product:** The company has developed Energy Server that can run on a combination of natural gas and biogas or 100% biogas. Biogas captured from cow manure contains approximately 65% methane, which has a 25x greater impact on global warming than CO₂ emissions and accounts for 10% of U.S. greenhouse gas emissions.
- **Carbon capture:** Bloom Energy Servers produce nearly 50% less carbon emission vs. average U.S. combustion power generation. However, the company is in process of commercializing carbon capture that can be added to Bloom Server for sequestering carbon for further uses. This would allow carbon neutral power generation using natural gas or carbon negative using biogas. The price increase from carbon capture add-on is not significant, may be only ~10%.
- **Electrolyzers and green hydrogen fuel cell:** In 2020, the company announced intention to enter the commercial hydrogen market by introducing hydrogen-powered fuel cells and electrolyzers that produce renewable hydrogen. These products would be first introduced in the South Korean market in 2021 and later in the U.S. The company expects \$750M potential revenues by 2025.
- **BE has a product that can utilize 100% of input as green hydrogen to produce power.** The company has already deployed 100 kW of solid-oxide fuel cell powered solely by hydrogen in South Korea. BE will supply 1.8 MW of hydrogen-powered fuel cells through a multi-stage deployment from late 2021 into 2022. Additionally, the company also can sell electrolyzers. BE has already won award to supply its solid oxide electrolyzer cells (SOEC), which will be capable of producing green hydrogen via solar and battery, in Korea in 2022.

SK E&C JV

The company has earned ~25/35% of revenues from Asia in 2019/2020. Outside the U.S., Korea is the largest market for BE with more than 200MW of Bloom Energy Servers under contract. The country has 550MW of deployed fuel cells

implying ~35% market share for BE. In 2018, Bloom Energy Japan sold Energy Servers (8.5 MW) in The Republic of Korea to a utility company, Korea South-East Power Company. Later, BE entered into a Preferred Distributor Agreement with SK Engineering & Construction Co., Ltd. ("SK E&C") to sell directly into the Republic of Korea. The Preferred Distributor Agreement has an initial term expiring on December 31, 2021, and thereafter will automatically be renewed for three-year renewal terms unless either party terminates this agreement by prior written notice under certain circumstances.

In September 2019, BE entered into a JV agreement with SK E&C to establish a light-assembly facility in the Republic of Korea for sales of certain portions of Energy Server for the stationary utility and commercial and industrial market in the Republic of Korea. The facility became operational in July 2020. The JV is majority controlled and managed by BE, however, it is not consolidated on BE's financial statements. Other than a nominal initial capital contribution by BE, the JV will be funded by SK E&C. SK E&C currently acting as a distributor for Energy Servers for the stationary utility and commercial and industrial market in the Republic of Korea, will be the primary customer for the products assembled by the JV. **The company has sold and could continue to sell products in South Korea through or outside the JV.**

As mentioned earlier, South Korea has a stated policy of reaching 1.5 GW by 2022 and 8 GW domestic power generation from fuel cell by 2040 vs. ~500 MW in 2020. South Korea will likely require 1 GW ordered in 2021/22 to reach its targeted goal for 2022. From there on, if we simplistically assume equal increase through 2040, it implies ~360 MW demand each year.

Additionally, South Korea is targeting 310 hydrogen refueling station (HRS) by 2022 and 1,200 by 2040 vs. 86 in 2019. Additionally, South Korea expects hydrogen demand to increase to 470K TPD by 2022, 1.9M TPD by 2030 and 5.3M TPD by 2040 vs. 130K TPD in 2018. This bodes well for BE's new electrolyzer business.

International Growth

BE is trying to expand internationally beyond Korea, Japan and India. The company has hired a team of ~10 senior people in April 2021 focusing on Australia, European countries such as UK, German, France, Italy, Spain and Portugal, Southeast Asia including Thailand, Singapore and Malaysia, the Middle East and North Africa.

Sales Process

BE's sales cycle is typically 12 to 18 months. BE markets Energy Servers primarily through a single direct sales organization supported by project finance, business development, government affairs, legal and regulatory, and marketing teams. In addition, the company works with multiple partners to generate customer leads and develop projects. BE sells Energy Server primarily through direct sales channels. A large part of company's direct sales force is focused on expansion efforts in the U.S. and internationally.

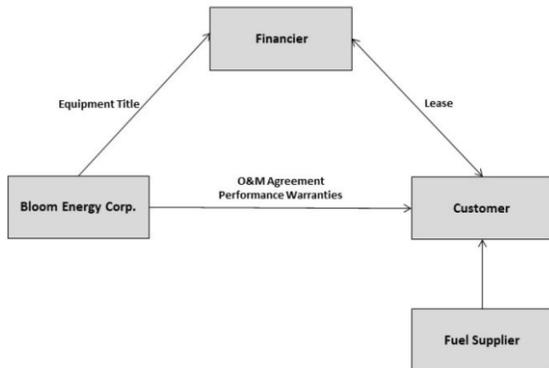
- In India, Bloom Energy (India) Pvt. Ltd., wholly-owned indirect subsidiary, conducts sales; however, the company is currently evaluating the Indian market potentially for channel partners.
- In Japan, sales are conducted under a Japanese joint venture with subsidiaries of SoftBank Corp, called Bloom Energy Japan Limited.
- In Korea, BE entered into a Preferred Distributor Agreement with SK Engineering & Construction Co., Ltd. ("SK E&C") to enable the company to sell directly into the Republic of Korea. The Preferred Distributor Agreement has an initial term expiring on December 31, 2021, and thereafter will automatically be renewed for three-year renewal terms unless either party terminates this agreement by prior written notice under certain circumstances.

The company sells the products via (1) direct sale, (2) traditional lease, (3) managed services and (4) purchase power agreements (PPA). Mostly the customers arrange for natural gas or bio-gas themselves. Most of the sales are done in PPAs where the customer pays \$/kWh.

Traditional Lease: A customer leases the Energy Server from a financial institution that purchases such Servers from

BE once commissioning is completed. The customer enters into a lease directly with a financier. After the standard one-year warranty period, the customer almost always enters into a services agreement with BE for operations and maintenance work for an annual service payment. The price for service agreement is set at the time of lease. The term of a lease in a Traditional Lease option ranges from five to ten years. At the end of lease period if the customer does not renew or purchase Energy Server (s), BE can remarket to a third party. Any proceeds of such a sale are allocated between BE and the financing partner as agreed at the time of such sale.

Traditional Lease Model

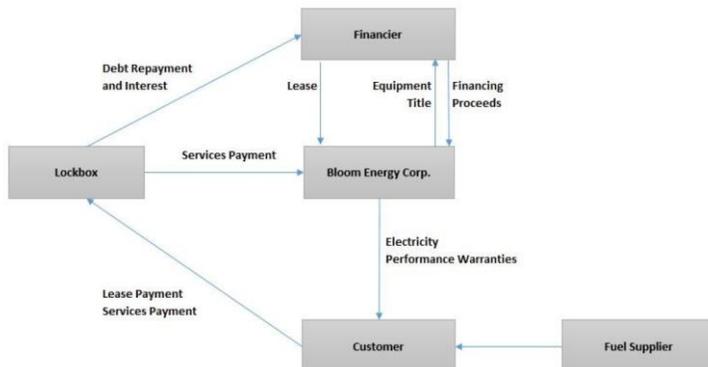


Source: BE 10-K

Managed Services Financing: BE enters into a Managed Services Agreement with a customer. Then a financier is identified. BE sells the Energy Server to financier as lessor and the financier leases it back to BE as lessee under a sale-leaseback transaction. The proceeds from the sale are paid by the financier on or shortly after acceptance. Such payments are recognized as a financing obligation within the consolidated balance sheets. The duration of the master lease in a Managed Services Financing is currently between five and ten years.

The customer makes a monthly payment for the use of the Energy Server and power generated. The monthly payment includes a fixed monthly capacity-based payment and sometimes a performance-based payment based on the performance of the Server. The fixed capacity-based payments are applied toward obligation to pay periodic rent liability. The performance payment is made to BE for operations and maintenance services and recognized as electricity revenue. The Managed Services agreements typically provide only for performance warranties of both the efficiency and output of the Energy Server, all of which are written in favor of the customer. These types of projects typically do not include guaranties above the warranty commitments.

Managed Servicing Financing Model

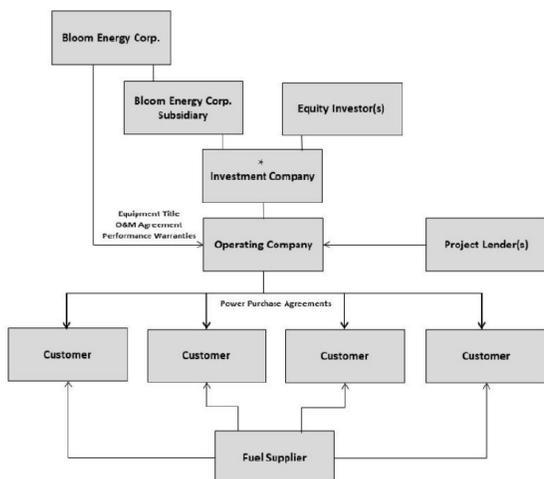


Source: BE 10-K

Portfolio Financings or PPA: A power purchase agreement (PPA) is an agreement when the owner of an Energy Server sells electricity to an end customer on a dollar-per-kilowatt-hour basis. In the past, the company invested in operating companies signing PPAs. BE consolidates those entities and recognize revenue as the electricity is produced. The company does not intend to participate in such transactions in future. Now, the company finances PPAs where BE sells an entire Operating Company to an investor or tax equity partnerships in which BE has no interest. Revenues are recognized on the sale of each Energy Server purchased by the Operating Company on acceptance. Payment of the purchase price is generally broken down into multiple installments, which may include payments prior to shipment, upon shipment or delivery of the Energy Server, and upon acceptance of the Energy Server.

Essentially, BE enters into a sale, engineering, procurement and construction agreement (EPC) and operations and management (O&M) agreement with the Operating Company that both is counter-party to the PPA and that will own the Energy Server. The Operating Company receives all customer payments generated under the PPAs, all investment tax credits, all accelerated tax depreciation benefits, and any other available state or local benefits arising out of the ownership or operation of the Energy Servers. After the expiration of the initial standard one-year warranty, the Operating Company has the option to extend O&M services under the O&M Agreement on an annual basis at a price determined at the time of purchase of Energy Server, which may be renewed annually for each Energy Server for up to 30 years. Both the upfront purchase price for our Energy Servers and the ongoing fees for our operations and maintenance are paid on a fixed dollar-per-kilowatt basis

PPA Model



Source: BE 10-K

Annual Sale Type Breakdown

Acceptances Breakdown			
	2018	2019	2020
Direct Purchases (incl PPA and Intl.)	89%	93%	96%
Traditional Leases	1%	0%	0%
Managed Services	10%	7%	4%

Revenues Breakdown			
	2018	2019	2020
Direct Purchases (incl PPA and Intl.)	79%	85%	88%
Traditional Leases	2%	1%	1%
Managed Services	5%	5%	5%
Portfolio Financings	14%	9%	6%

Source: BE 10-K

In addition to sale of the Energy Server, the company provides performance warrant and guaranty. In most cases, the company includes the first year of performance warranties and guarantees in the sale price of the Energy Server. A “performance warranty” is a commitment where the failure of the Energy Servers to satisfy the stated performance level

obligates BE to repair or replace the Energy Servers as necessary to improve performance or repurchase the Energy Servers from the customer or financier. A “performance guaranty” is a commitment where the failure of the Energy Servers to satisfy the stated performance level obligates the company to make a payment to compensate the customer for the increased cost or decreased benefits. The company’s obligation to make payments under the performance guaranty is always contractually capped.

Service Agreements

The company provides operations and maintenance agreements (O&M agreements) for all Energy Servers, which are renewable at the election of the customer on an annual basis. BE monitors, maintains and operates the Energy Server systems on the customer’s behalf for a fee. Standard O&M agreements include full remote monitoring and 24x7 operation of the systems as well as preventative maintenance, in terms of filter and adsorbents replacements and on-site part and periodic fuel cell module replacements. BE’s two Remote Monitoring and Control Centers (“RMCC”), in the U.S. and India, provide 24x7 coverage of every installed Bloom Energy Server worldwide. BE currently services and maintains every installed Bloom Server worldwide.

Typically, the first year of services after sale of product is under warranty. Beyond that regular maintenance and cleaning up is provided. The major expense comes from replacement of fuel cells at the end of life depending on the generation of fuel cells. Most recent cells average life is over five years. All generations of fuel cells are compatible.

Services are priced at 20% margins. However, product issues have hurt margins. The company has implemented cost savings initiatives. The product reliability has increased as well. Given the replacement cost is already baked into service agreements at the time of sale of the module, any improvement in cost and life extensions should help BE’s service margins.

Manufacturing Operations

BE has two manufacturing facilities, one on the west coast in Sunnyvale, CA where the company manufactures stacks and then those are shipped to the second facility on the east coast in Newark, DE where the balance of plants (BOP) is added to make a module. The cost of a module is roughly split 75% fuel cell stack and 25% BOP.

The facility in Mountain View will be replaced by a new R&D and manufacturing facility in Fremont, CA. The company is building 200 MW new manufacturing facility for its Bloom 7.5 model in Fremont, CA. The company will continue to use its current 200 MW manufacturing facility to build Bloom 5.0 and 80 MW capacity for servicing Bloom 5.0. Gradually, the company will use all of current 200 MW facility used for servicing Bloom 5.0 as well.

BE has been very deliberate about its manufacturing facility set up where the company can stand up a copy of its existing manufacturing line in a year. The same manufacturing facility can build Bloom Server and future growth products such as electrolyzers, marine power and carbon capture enabled system. A 1 GW capacity facility needs \$200M capex and \$50M for this new 200 MW facility.

The Newark facility includes an additional 50 acres available for factory expansion and/or the co-location of supplier plants. The company’s services organization also has a dedicated Repair & Overhaul (“R&O”) facility, based in Delaware, close to product manufacturing facility, which undertakes full refurbishment of returned fuel cell modules with the capability to restore it to full power.

In 2020, the company established a light-assembly facility in the Republic of Korea and is developing a local supplier ecosystem through a new joint venture with SK E&C. Operations began in early July 2020.

Intellectual Property

As of December 31, 2020, BE had 270 issued patents and 69 patent applications pending in the U.S., and an international patent portfolio comprising 129 issued patents and 46 patent applications pending. U.S. patents are expected to expire between 2023 and 2039. As of December 31, 2020, the company had eight registered trademarks in the U.S., 40 registered trademarks in Australia, China, the European Union, India, Japan, Republic of Korea, Taiwan, the U.K., and two pending applications in China.

Competition

BE's Energy Server competes with traditional central grid system, solar power, wind power, traditional co-generation systems that deliver electric power and heat from combustion sources and traditional backup equipment such as diesel generators. The company also competes with fuel cell providers such as PLUG (Proton Exchange Membrane), FCEL (Molten Carbonate) and Doosan (Phosphoric Acid).

Customers

BE's Energy Servers are currently installed at customer sites in ten states in the U.S. (California, Connecticut, Delaware, Maryland, Massachusetts, North Carolina, New Jersey, New York, Pennsylvania, Utah and Virginia), however, four states CA, CT, MA and NY form the majority of the installed base in the U.S. Internationally, the company has products installed in Korea, India, and Japan.

The company's customers are among the largest multi-national corporations and some of the largest utility companies in the U.S. and the Republic of Korea. The U.S. is currently BE's biggest market and installed base of Bloom Energy Servers. Some of the largest customers in the U.S. include AT&T, Caltech, Delmarva Power & Light Company, Equinix, The Home Depot, Kaiser Permanente, and The Wonderful Company. The company also works with a number of U.S. financing partners, such as Southern PowerSecure Holdings, Inc. ("The Southern Company"), Duke Energy One, Inc., Key Equipment Finance, a division of KeyBank National Association, and Assured Guaranty Municipal Corporation, who purchase BE's Energy Servers and deploy the systems at end-customers' facilities in order to provide the electricity as a service. Outside the U.S., Korea is the largest market for BE with more than 200MW of Bloom Energy Servers under contract. S&K has contributed 23/24% of 2019/20 revenues while Duke Energy generated 28% of revenues in 2020.

Company History

■ 2021

- May 18: Announced an agreement with Idaho National Laboratory to independently test the use of nuclear energy to create clean hydrogen through Bloom Energy's solid oxide, high-temperature electrolyzer.
- May 5: Announced collaboration with Baker Hughes on the potential commercialization and deployment of integrated, low carbon power generation and hydrogen solutions.
- Apr. 23: Announced international leadership for expansion targeting Australia, Europe (UK, France, Italy, Spain and Portugal), Southeast Asia, Middle East/North Africa. Also opened an office in Dubai, UAE.
- Feb. 2: Hydrogen Forward coalition formed to advance hydrogen in the U.S. The founding members include Air Liquide, Anglo American, Bloom Energy, CF Industries, Chart Industries, Cummins Inc., Hyundai, Linde, McDermott, Shell and Toyota.

■ 2020

- Nov. 18: Won a competitive Request for Proposal to supply solid-oxide fuel cells (SOFC) powered by 100% hydrogen and electrolyzers to an industrial complex in Changwon, Korea. BE will supply 1.8 MW of hydrogen-powered fuel cells through a multi-stage deployment from late 2021 into 2022.
- Jul. 15: Announced BE is entering the commercial hydrogen market by introducing hydrogen-powered fuel cells and electrolyzers that produce renewable hydrogen. These products will be first introduced to the South Korean market in 2021 through an expanded partnership with SK E&C.
- Mar. 30: Gregory Cameron named CFO.

■ 2019

- Sept. 15: BE and Samsung Heavy Industries Team Up to Build Ships Powered by Solid Oxide Fuel Cells.
- Aug. 19: Introduces 'AlwaysON' Microgrid Solution to Provide Power Resiliency During Grid Outages.
- Jul. 1: Duke Energy to Offer Bloom Energy Distributed Fuel Cell Technology to Customers. Duke will purchase ~37MW of Bloom Energy Servers.
- Feb. 5: BE and SK D&D Announce Distributorship Agreement for fuel cell deployments in South Korea.
- Announced ability to operate Energy Servers on renewable hydrogen

■ 2018:

- First site deployed in South Korea in 4Q18.
- Completed an IPO selling 20.7M shares.

■ 2016: First site deployed in India in 2Q16.

■ 2013:

- Largest utility scale deployment of 30MW in Delaware for Delmarva in Nov. 2013.
- First site deployed in Japan in Jun. 2013.

■ 2012: Largest commercial customer deployment of 12MW for a major consumer technology company's data center in Dec. 2012.

■ 2010:

- First deployment under a PPA financing in Oct. 2010.
- 2010: Public unveiling of Bloom Energy Server and announcement of industry-leading customers including Google, Walmart, eBay, Coca-Cola, Staples, FedEx, Bank of America, and Cox Enterprises.

■ 2008: First commercial deployment of 400 kW for a major internet company in Aug. 2008.

■ 2006: Changed name on Sept. 20, 2006 to Bloom Energy Corp.

■ 2001: Incorporated in Delaware on Jan. 18, 2001, as Ion America Corp.

Executive Officers and Directors

KR Sridhar – Founder, Chairman, Chief Executive Officer, since 2002

- Prior to founding Bloom, served as director of the Space Technologies Laboratory at the University of Arizona where he was also a professor of Aerospace and Mechanical Engineering.
- Has served as an advisor to NASA and has led major consortia of industry, academia and national labs.
- Currently serves as a strategic limited partner at Kleiner Perkins.
- Served on many technical committees, panels and advisory boards and has several publications and patents.

Gregory Cameron - Executive Vice President and Chief Financial Officer, since April 2020

- President & CEO of Global Operations for GE Company, from 2018 through 2019.
- President & CEO of GE Capital's Global Legacy Solutions, from 2016 through 2018.
- Prior to 2016, he served in various senior roles with General Electric, including as Chief Financial Officer, Americas-GE Capital from 2009 through 2016.

Board Members

Mary K. Bush – Independent Director, since 2017

- President of Bush International, LLC, an advisor to U.S. corporations and foreign governments on international capital markets, strategic business, economic and governance matters since 1991.
- Held several Presidential appointments, including the U.S. Government's representative on the International Monetary Fund Board and Director of Sallie Mae Bank.
- Former head of the Federal Home Loan Bank System during the aftermath of the Savings and Loan crisis and was advisor to the Deputy Secretary of the U.S. Treasury Department.
- Earlier in her career, managed global banking and corporate finance relationships at New York money center banks including Citibank, N.A., Banker's Trust Company, and JPMorgan Chase Bank, N.A.
- Director of Briggs & Stratton, Inc. from 2004 to March 2009, of United Continental Holdings, Inc. from 2006 to 2010, of the Pioneer Family of Mutual Funds from 1997 to 2012 and of Marriott International, Inc. from 2008 to 2020.
- Member of Kennedy Center's Community Advisory Board.
- Chairman of the Capital Partners for Education, a not-for-profit organization that mentors young people through high school and college.

Jeffrey Immelt – Independent Director, since 2019

- Venture partner at NEA since January 2018.
- Former Chairman and CEO of General Electric ("GE"), a diversified industrial company, for 16 years from 2001 to 2017 where he revamped the company's strategy, global footprint, workforce and culture.
- Chaired the President's Council on Jobs and Competitiveness under the Obama Administration.
- Member of The American Academy of Arts & Sciences.

Eddy Zervigon - Independent Director, since 2007

- CEO of Quantum Xchange, a cybersecurity company, since September 2020.
- Special Advisor at Riverside Management Group, a boutique merchant bank, since 2012.
- Previously, he was a Managing Director in the Principal Investments Group at Morgan Stanley & Co. LLC, a global financial services firm, from 1997 to 2012.
- Prior to joining Morgan Stanley, Mr. Zervigon was a Certified Public Accountant at Coopers & Lybrand (now PricewaterhouseCoopers LLP), a public accounting firm.
- Served as a director of DigitalGlobe, Inc., a builder and operator of satellites for digital imaging, where he served as a member of the audit and compensation committees from 2004 to 2017.
- Previously served as a board member of MMCinemas, Impsat Fiber Networks, Inc., TVN Entertainment Corporation and Stadium Capital Management, LLC.

John T. Chambers – Independent Director, since 2018

- Founder and Chief Executive Officer at JC2 Ventures, a venture capital firm, since March 2017.
- Executive Chairman of the board of Cisco Systems, Inc. (“Cisco”), a networking and information technology company, from July 2015 to December 2017 and as Chairman of the board of Cisco from November 2006 to July 2015.
- Cisco’s Chief Executive Officer from January 1995 until July 2015 and President from January 1995 to November 2006.
- Employed by Wang Laboratories, Inc., a former computer-based office information processing systems company, from 1982 to 1990, where, in his last role, he was the Senior Vice President of U.S. Operations.
- Chairman of the US-India Strategic Partnership Forum.
- Appointed Global Ambassador of the French Tech by President Emmanuel Macron of France.

L. John Doerr – Independent Director, since 2002

- General Partner of Kleiner Perkins Caufield & Byers, a venture capital firm (together with its affiliates, “Kleiner Perkins”), since August 1980.
- Former director of Amazon.com, Inc., an e-commerce company, from June 1996 to May 2010, and Zynga, Inc., a provider of social game services, from April 2013 to May 2017.

Michael Boskin – Independent Director, since 2019

- Tully M. Friedman Professor of Economics and Wohlford Family Hoover Institution Senior Fellow at Stanford University, where he has been on the faculty since 1971.
- CEO and President of Boskin & Co., Inc. since 1980.
- Chairman of the President’s Council of Economic Advisers from 1989 to 1993.
- Former director of ExxonMobil from 1996 to 2018.

General Colin L. Powell – Director, since 2009

- Served as the 65th U.S. Secretary of State from January 2001 to January 2005.
- Served 35 years in the U.S. Army, rising to the rank of Four-Star General and from 1989 to 1993 as the 12th Chairman of the Joint Chiefs of Staff.
- Chairman of the Board of Visitors of the Colin Powell School at the City College of New York since 1994.
- Founder and Chairman Emeritus of the America’s Promise Alliance, a nonprofit organization advocating for the strength and well-being of America’s children and youth.

Scott Sandell – Independent Director, since 2003

- Currently serves as the Managing General Partner at global venture capital firm New Enterprise Associates, Inc. (“NEA”) since April 2017
 - Joined NEA in January 1996 and as has been a General Partner since September 2000 and served as Co-Managing General Partner from March 2015 to April 2017
 - Served as head of the firm’s technology investing practice for 10 years and has led NEA’s China investing activities for over a decade
- Prior to joining NEA in 1996, worked as a Product Manager for Windows 95 at Microsoft Corporation.
- Started career at Boston Consulting Group, a global management consulting firm, and later joined C-ATS Software, Inc., a software development company.
- Previously served on the boards of, among others, Data Domain, Inc., Fusion-io, Inc., Neoteris, Inc., NetIQ Corporation, Playdom, Inc., Spreadtrum Communications, Inc., Tableau Software Inc., WebEx Communications, Inc. and Workday, Inc.
- Currently serves on the Board of Advisors for the Thayer School of Engineering at Dartmouth.
- Former Chairman of the Board of the National Venture Capital Association, a trade organization for venture capital and private equity firms, from 2014 to 2015.

Shareholders

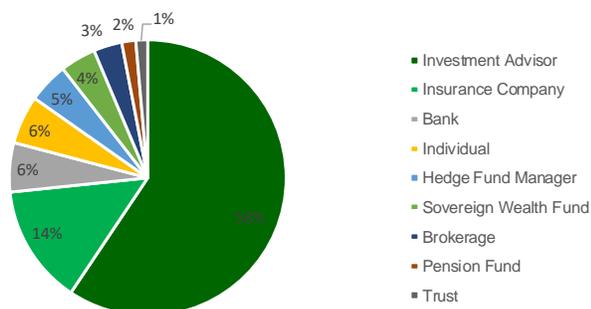
Top 25 shareholders currently hold ~75% of shares. Currently, ~60% of shares are held by investment advisors.

Top 25 Shareholders

(M shares)	2Q20	3Q20	4Q20	1Q21
Ameriprise Financ	11.06	12.81	12.89	17.02
Vanguard Group I	6.51	7.61	10.88	11.62
FMR LLC	0.49	5.81	10.50	10.50
BlackRock Inc	4.76	5.71	6.67	7.49
Alberta Investmen	0.00	0.00	0.00	0.00
Doerr L John	2.50	3.46	3.46	3.46
JPMorgan Chase	0.23	0.23	0.23	3.36
UBS AG	0.36	0.37	2.67	2.48
ClearBridge LLC	1.38	1.38	2.11	2.31
Morgan Stanley	2.21	2.21	2.21	2.21
Wells Fargo & Co	0.38	1.28	2.17	2.11
State Street Corp	1.65	1.81	2.03	1.98
Geode Capital Ma	0.72	1.18	1.52	1.67
Invesco Ltd	1.19	1.40	1.36	1.53
Teachers Insuranc	1.09	1.48	1.65	1.46
First Trust Adviso	0.18	0.34	1.19	1.49
Svenska Handelsl	0.79	1.17	1.79	1.34
NEA Managemen	1.33	1.33	1.33	1.33
Renaissance Tecl	5.54	3.71	0.00	1.19
Northern Trust Co	0.26	1.03	1.14	1.12
Neuberger Berma	1.39	1.34	0.93	0.87
Norges Bank	0.00	0.00	0.87	0.87
Two Sigma Invest	0.05	0.00	0.04	0.81
Citadel Advisors L	0.00	0.25	0.65	0.80
Charles Schwab C	0.19	0.55	0.71	0.80
Top 25 Share	60%	56%	66%	74%

Source: Bloomberg

Ownership Type



Source: Bloomberg

Appendix A – Required Disclosures

Analyst Certification

I, Vaibhav (Vebs) Vaishnav, certify that to the best of my knowledge, the views and opinions in our research reports accurately reflect my personal views about the subject company (companies) and its (their) securities. I have not and will not receive direct or indirect compensation related to the specific recommendations or opinions of this report. Unless otherwise stated, the individuals listed on the cover page of this report are analysts for Coker Palmer Institutional (CPI). Coker Palmer Institutional (CPI) is the brand name used to distinguish Coker & Palmer's institutional only, sell side equity research operations.

Important Disclosures

Conflicts of Interest: You should assume that as of the publication date of any report or letter, CPI (possibly along with or through our members, partners, affiliates, employees, and/or consultants) along with our clients and/or investors has a position in the subject companies or derivatives of subject companies mentioned in this report, and therefore stands to realize gains based on the price movements of stocks covered in this report. Following publication of any report or letter, we intend to continue transacting in the securities covered therein, and we may be long, short, or neutral at any time hereafter regardless of our initial recommendation.

Analyst Compensation

Analysts are not directly compensated based on investment banking fees, but analysts' compensation is based on overall firm profitability, which may or may not include investment-banking fees. CPI has not received investment-banking income from the subject companies in the previous 12 months. Investors should expect that Coker & Palmer may seek and may be seeking compensation for investment banking and non-investment banking related services and production from any or all companies mentioned within this report.

Conflicts

Vaibhav (Vebs) Vaishnav, Oilfield Services & Green Energy Analyst, does not hold any stocks from those sectors in his personally managed accounts.

In the normal course of offering investment and banking products and services to clients, CPI may act in several capacities (including issuer, market maker, underwriter and distributor agent) simultaneously with respect to a product, giving rise to potential conflicts of interest. CPI uses controls such as information barriers to manage conflicts should they arise.

CPI has not been involved with any investment banking/consulting activities in the Oilfield Services and/or Green Energy sector in the past six months.

Rating Methodology

Coker Palmer Institutional (CPI) is restarting formal rating systems. The firm has a three-tiered rating system, with ratings of Sector Outperform, Sector Perform, and Sector Underperform. Each Research Analyst assigns a rating that is relative to his or her coverage universe or an index identified by the Research Analyst that includes, but is not limited to, stocks covered by the Research Analyst.

The rating assigned to each security covered in this report is based on the CPI Research Analyst's 12-month view on the security. Research Analysts may sometimes express in research reports shorter-term views on these securities that may impact the price of the equity security in a manner directly counter to the Research Analyst's 12-month view.

Appendix A – Required Disclosures Contd.

These shorter term views are based upon catalysts or events that may have a shorter-term impact on the market price of the equity securities discussed in research reports, including but not limited to the inherent volatility of the marketplace. Any such shorter-term views expressed in research report are distinct from and do not affect the Research Analyst's 12-month view and are clearly noted as such.

Ratings

Sector Outperform (SO)

The stock is expected to outperform the average 12-month total return of the analyst's coverage universe or an index identified by the analyst that includes, but is not limited to, stocks covered by the analyst.

Sector Perform (SP)

The stock is expected to perform approximately in-line with the average 12-month total return of the analyst's coverage universe or an index identified by the analyst that includes, but is not limited to, stocks covered by the analyst.

Sector Underperform (SU)

The stock is expected to underperform the average 12-month total return of the analyst's coverage universe or an index identified by the analyst that includes, but is not limited to, stocks covered by the analyst.

Coker & Palmer Institutional Ratings Distribution

Category	Count	Percent
Sector Outperform	4	29%
Sector Perform	4	29%
Sector Underperform	6	43%
Total	14	100%

Price Target Methodology:

Coker Palmer Institutional (CPI) price targets are essentially based on DCF methodology.

Valuation/Risk Factors

Oilfield Services (OFS) business is inherently risky. OFS investors should be fully aware of these risks, which include, but are not limited to, volatile natural gas, NGL's and crude oil prices, demand for and competition for a company's product and/or service, asset quality, customer risks, changes in operating costs, company capital structures, operating and working capital needs and ability to raise both debt and equity capital to fund operations. We value OFS equities on many different metrics, including but not limited to, our subjective view as to the quality of management, discounted cash flows, net asset values, enterprise value to EBITDA or cash flow multiples, price to earnings or cash flow multiples, reinvestment risk and full cycle economics. These factors are uncertain and our outlook is subject to change, sometimes quite quickly. Any changes in the above factors can impede achievement of our valuation assessments.

Appendix A – Required Disclosures Contd.

Green Energy businesses are inherently risky. The industry is still at a nascent stage and long-term viability is still not established. Investors should be fully aware of these risks, which include, but are not limited to, viability of new products and markets targeted, volatile commodity prices, demand for and competition for a company's product and/or service, asset quality, customer risks, changes in operating costs, company capital structures, operating and working capital needs and ability to raise both debt and equity capital to fund operations. We value Green Energy equities on many different metrics, including but not limited to, our subjective view as to the quality of management, discounted cash flows, net asset values, enterprise value to EBITDA or cash flow multiples, price to earnings or cash flow multiples, reinvestment risk and full cycle economics. These factors are uncertain and our outlook is subject to change, sometimes quite quickly. Any changes in the above factors can impede achievement of our valuation assessments.

The Exploration and Production (E&P) business is inherently risky. Investors in E&P equities should be fully aware of these risks, which include, but are not limited to, volatile natural gas, NGL's and crude oil prices, regional pricing differences, field and company asset quality, reserve depletion factors, drilling risks, operating costs, company capital structures, operating and working capital needs and ability to raise both debt and equity capital to fund operations. . . E&P Valuation Methods used to determine the Price Target: We value E&P companies on many different metrics, including, but not limited to, our estimate of net asset value (NAV), enterprise value to EBITDA or cash flow multiples, price/earnings or cash flow multiples, discounted cash flow analysis and breakup/acquisition values. All our estimates and valuations are highly and inherently uncertain. They are based on, but not limited to, our outlook for the commodity price, our subjective view as to the quality of management, net asset value, quality of the proven and unproven reserves and resources, ability to develop and produce these reserves/resources, financial strength, cash flow, access to capital, and full cycle economics of investments. These factors are uncertain and our outlook is subject to change, sometimes quite quickly. Any changes in the above factors can impede achievement of our valuation assessments.

Industrials: This category might cover many different types of companies with various business models and various factors affecting the operations and stock prices, some of which include overall economic growth, end market demand, product inventories and competition. Some of these companies might have various energy-related exposure through both sales and/or costs. In general, industrial company risks include, but not limited to, high fixed operating costs, rising input costs, currency and commodity price fluctuations, variable demand, inventory levels, quality of management, competition and obsolescence.

E&P, Oilfield Service, Industrials, Green Energy, as well as investments in the other subsectors we follow are subject to a myriad of external factors, including but not limited to, commodity price risk, geopolitical risk, changes in interest rates, the value of worldwide currencies, especially the U.S. dollar, changing regulations, both domestically and abroad, regulatory enforcement levels, and changes in domestic or global economic fundamentals. Please see specific companies' most recent SEC filings, including 10-Ks, 10-Qs, 8-Ks, and proxy filings for additional risks and considerations. For companies based outside the US, please see country specific regulatory filings for additional risks and considerations.