UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

FOR THE QUARTERLY PERIOD ENDED June 30, 2023

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

FOR THE TRANSITION PERIOD FROM TO

Commission File Number: 1-34392

PLUG POWER INC.
(Exact name of registrant as specified in its charter)

Delaware	**22-3672377**
(State or Other Jurisdiction of Incorporation or Organization)	(I.R.S. Employer Identification Number)

968 ALBANY SHAKER ROAD, LATHAM, NEW YORK 12110
(Address of Principal Executive Offices, including Zip Code)

(518) 782-7700
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, par value $.01 per share	PLUG	The NASDAQ Capital Market

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non- accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

The number of shares of common stock, par value of $0.01 per share, outstanding as of August 4, 2023 was 601,972,277 shares.

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PART 1. FINANCIAL INFORMATION

Item 1 — Interim Financial Statements (Unaudited)

Plug Power Inc. and Subsidiaries
Condensed Consolidated Balance Sheets
(In thousands, except share and per share amounts)
(Unaudited)

	June 30, 2023	December 31, 2022
Assets		
Current assets:		
Cash and cash equivalents	$ 579,418	$ 690,630
Restricted cash	173,449	158,958
Available-for-sale securities, at fair value (amortized cost of $452,814 and allowance for credit losses of $0 at June 30, 2023 and amortized cost of $1,355,614 and allowance for credit losses of $0 at December 31, 2022	437,651	1,332,943
Equity securities	67,753	134,836
Accounts receivable	216,645	129,450
Inventory, net	904,288	645,636
Contract assets	98,502	62,456
Prepaid expenses and other current assets	139,537	150,389
Total current assets	2,617,243	3,305,298
Restricted cash	800,458	699,756
Property, plant, and equipment, net	1,061,810	719,793
Right of use assets related to finance leases, net	56,336	53,742
Right of use assets related to operating leases, net	396,448	360,287
Equipment related to power purchase agreements and fuel delivered to customers, net	104,026	89,293
Contract assets	26,083	41,831
Goodwill	249,965	248,607
Intangible assets, net	199,083	207,725
Investments in non-consolidated entities and non-marketable equity securities	63,457	31,250
Other assets	8,368	6,694
Total assets	$ 5,583,277	$ 5,764,276
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 220,470	$ 191,895
Accrued expenses	166,315	156,430
Deferred revenue and other contract liabilities	165,114	131,813
Operating lease liabilities	57,953	48,861
Finance lease liabilities	8,901	8,149
Finance obligations	75,321	58,925
Current portion of long-term debt	513	5,142
Contingent consideration, loss accrual for service contracts, and other current liabilities	133,231	34,060
Total current liabilities	827,818	635,275
Deferred revenue and other contract liabilities	86,622	98,085
Operating lease liabilities	290,281	271,504
Finance lease liabilities	37,804	37,988
Finance obligations	301,488	270,315
Convertible senior notes, net	194,584	193,919
Long-term debt	3,677	3,925
Contingent consideration, loss accrual for service contracts, and other liabilities	101,918	193,051
Total liabilities	1,844,192	1,704,062
Stockholders' equity:		
Common stock, $0.01 par value per share; 1,500,000,000 shares authorized; Issued (including shares in treasury): 620,087,507 at June 30, 2023 and 608,421,785 at December 31, 2022	6,201	6,084
Additional paid-in capital	7,409,733	7,297,306
Accumulated other comprehensive loss	(13,764)	(26,004)
Accumulated deficit	(3,563,870)	(3,120,911)
Less common stock in treasury: 18,285,263 at June 30, 2023 and 18,076,127 at December 31, 2022	(99,215)	(96,261)
Total stockholders' equity	3,739,085	4,060,214
Total liabilities and stockholders' equity	$ 5,583,277	$ 5,764,276

The accompanying notes are an integral part of these unaudited interim condensed consolidated financial statements.

Plug Power Inc. and Subsidiaries
Condensed Consolidated Statements of Operations
(In thousands, except share and per share amounts)
(Unaudited)

	Three Months Ended June 30		Six Months Ended June 30	
	2023	2022	2023	2022
Net revenue:				
Sales of equipment, related infrastructure and other	$ 216,286	$ 116,233	$ 398,380	$ 225,080
Services performed on fuel cell systems and related infrastructure	8,701	8,822	17,798	17,062
Power purchase agreements	16,130	11,169	24,067	21,206
Fuel delivered to customers and related equipment	17,878	14,472	28,020	27,900
Other	1,187	571	2,203	822
Net revenue	260,182	151,267	470,468	292,070
Cost of revenue:				
Sales of equipment, related infrastructure and other	187,408	94,153	345,728	182,981
Services performed on fuel cell systems and related infrastructure	23,449	11,612	35,670	25,487
Provision for loss contracts related to service	7,331	1,068	14,220	3,116
Power purchase agreements	53,976	34,892	100,792	66,645
Fuel delivered to customers and related equipment	64,450	41,607	118,951	80,879
Other	1,711	400	2,646	777
Total cost of revenue	338,325	183,732	618,007	359,885
Gross loss	(78,143)	(32,465)	(147,539)	(67,815)
Operating expenses:				
Research and development	29,251	23,557	55,786	44,018
Selling, general and administrative	101,154	95,953	205,170	176,842
Impairment	9,986	—	11,069	—
Change in fair value of contingent consideration	15,308	(5,066)	24,077	(2,605)
Total operating expenses	155,699	114,444	296,102	218,255
Operating loss	(233,842)	(146,909)	(443,641)	(286,070)
Interest income	16,391	3,838	34,023	5,892
Interest expense	(11,265)	(11,203)	(21,915)	(19,851)
Other expense, net	(5,082)	(2,456)	(9,853)	(3,765)
Realized gain/(loss) on investments, net	264	(468)	263	(1,315)
Change in fair value of equity securities	3,842	(13,484)	8,917	(18,643)
Loss on equity method investments	(7,623)	(2,191)	(12,940)	(6,024)
Loss before income taxes	$ (237,315)	$ (172,873)	$ (445,146)	$ (329,776)
Income tax (benefit) expense	(917)	423	(2,187)	9
Net loss	$ (236,398)	$ (173,296)	(442,959)	$ (329,785)
Net loss per share:				
Basic and diluted	$ (0.40)	$ (0.30)	(0.75)	$ (0.57)
Weighted average number of common stock outstanding	598,053,390	578,043,278	593,653,720	578,217,636

The accompanying notes are an integral part of these unaudited interim condensed consolidated financial statements.

Plug Power Inc. and Subsidiaries
Condensed Consolidated Statements of Comprehensive Loss
(In thousands)
(Unaudited)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Net loss	$ (236,398)	$ (173,296)	$ (442,959)	$ (329,785)
Other comprehensive (loss)/income:				
Foreign currency translation gain/(loss)	3,073	(7,198)	4,732	(9,048)
Change in net unrealized gain/(loss) on available-for-sale securities	2,197	(3,329)	7,508	(18,409)
Comprehensive loss attributable to the Company, net of tax	$ (231,128)	$ (183,823)	$ (430,719)	$ (357,242)

The accompanying notes are an integral part of these unaudited interim condensed consolidated financial statements.

Plug Power Inc. and Subsidiaries
Condensed Consolidated Statements of Stockholders' Equity
(In thousands, except share amounts)
(Unaudited)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Treasury Stock		Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount			Shares	Amount		
December 31, 2022	**608,421,785**	**$ 6,084**	**$ 7,297,306**	**$ (26,004)**	**18,076,127**	**$ (96,261)**	**$ (3,120,911)**	**$ 4,060,214**
Net loss	—	—	—	—	—	—	(206,561)	(206,561)
Other comprehensive income	—	—	—	6,970	—	—	—	6,970
Stock-based compensation	228,954	2	43,300	—	—	—	—	43,302
Stock option exercises and issuance of common stock upon grant/vesting of restricted stock and restricted stock unit awards	620,250	6	668	—	—	—	—	674
Treasury stock acquired from employees upon exercise of stock options and vesting of restricted stock and restricted stock unit awards	—	—	—	—	169,787	(2,590)	—	(2,590)
Exercise of common stock warrants	2,680,637	28	(28)	—	—	—	—	—
Provision for common stock warrants	—	—	19,641	—	—	—	—	19,641
March 31, 2023	**611,951,626**	**$ 6,120**	**$ 7,360,887**	**$ (19,034)**	**18,245,914**	**$ (98,851)**	**$ (3,327,472)**	**$ 3,921,650**
Net loss	—	—	—	—	—	—	(236,398)	(236,398)
Other comprehensive income	—	—	—	5,270	—	—	—	5,270
Stock-based compensation	338,328	3	39,915	—	—	—	—	39,918
Stock option exercises and issuance of common stock upon grant/vesting of restricted stock and restricted stock unit awards	246,717	3	55	—	—	—	—	58
Treasury stock acquired from employees upon exercise of stock options and vesting of restricted stock and restricted stock unit awards	—	—	—	—	39,349	(364)	—	(364)
Exercise of common stock warrants	6,623,794	66	(66)	—	—	—	—	—
Provision for common stock warrants	—	—	951	—	—	—	—	951
Earnouts from acquisitions paid in stock	927,042	9	7,991	—	—	—	—	8,000
June 30, 2023	**620,087,507**	**$ 6,201**	**$ 7,409,733**	**$ (13,764)**	**18,285,263**	**$ (99,215)**	**$ (3,563,870)**	**$ 3,739,085**
December 31, 2021	**594,729,610**	**$ 5,947**	**$ 7,070,710**	**$ (1,532)**	**17,074,710**	**$ (72,526)**	**$ (2,396,903)**	**$ 4,605,696**
Net loss	—	—	—	—	—	—	(156,489)	(156,489)
Other comprehensive loss	—	—	—	(16,930)	—	—	—	(16,930)
Stock-based compensation	226,221	2	43,384	—	—	—	—	43,386
Stock option exercises and issuance of common stock upon grant/vesting of restricted stock and restricted stock unit awards	253,525	3	288	—	—	—	—	291
Treasury stock acquired from employees upon exercise of stock options and vesting of restricted stock and restricted stock unit awards	—	—	—	—	71,627	(1,465)	—	(1,465)
Provision for common stock warrants	—	—	1,743	—	—	—	—	1,743
March 31, 2022	**595,209,356**	**$ 5,952**	**$ 7,116,125**	**$ (18,462)**	**17,146,337**	**$ (73,991)**	**$ (2,553,392)**	**$ 4,476,232**
Net loss	—	—	—	—	—	—	(173,296)	(173,296)
Other comprehensive loss	—	—	—	(10,527)	—	—	—	(10,527)
Stock-based compensation	108,216	2	44,857	—	—	—	—	44,859
Stock option exercises and issuance of common stock upon grant/vesting of restricted stock and restricted stock unit awards	391,967	4	525	—	—	—	—	529
Treasury stock acquired from employees upon exercise of stock options and vesting of restricted stock and restricted stock unit awards	—	—	—	—	63,712	(1,195)	—	(1,195)
Exercise of common stock warrants	—	—	—	—	—	—	—	—
Provision for common stock warrants	—	—	1,979	—	—	—	—	1,979
June 30, 2022	**595,709,539**	**$ 5,958**	**$ 7,163,486**	**$ (28,989)**	**17,210,049**	**$ (75,186)**	**$ (2,726,688)**	**$ 4,338,581**

The accompanying notes are an integral part of these unaudited interim condensed consolidated financial statements.

Plug Power Inc. and Subsidiaries
Condensed Consolidated Statements of Cash Flows
(In thousands)
(Unaudited)

	Six Months Ended June 30, 2023	Six Months Ended June 30, 2022
Operating activities		
Net loss	$ (442,959)	$ (329,785)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation of long-lived assets	21,266	11,204
Amortization of intangible assets	9,755	10,374
Lower of cost or net realizable value inventory adjustment and provision for excess and obsolete inventory	11,760	—
Payments of contingent consideration	(2,895)	—
Stock-based compensation	83,220	88,245
Provision for losses on accounts receivable	896	—
Amortization of debt issuance costs and discount on convertible senior notes	1,195	1,336
Provision for common stock warrants	14,302	3,942
Deferred income tax (benefit)/expense	1,512	(916)
Impairment	11,069	—
Loss/(benefit) on service contracts	856	(18,131)
Fair value adjustment to contingent consideration	24,077	(2,605)
Net realized loss on investments	(263)	1,315
(Accretion)/amortization of premium on available-for-sale securities	(5,949)	4,560
Lease origination costs	(5,567)	(3,150)
Loss on disposal of assets	—	268
Change in fair value for equity securities	(8,917)	18,643
Loss on equity method investments	12,940	6,024
Changes in operating assets and liabilities that provide (use) cash:		
Accounts receivable	(88,091)	31,990
Inventory	(269,707)	(159,445)
Contract assets	(23,807)	(386)
Prepaid expenses and other assets	9,178	(51,654)
Accounts payable, accrued expenses, and other liabilities	(720)	38,663
Deferred revenue and other contract liabilities	21,838	(55,605)
Net cash used in operating activities	(625,011)	(405,113)
Investing activities		
Purchases of property, plant and equipment	(319,322)	(157,838)
Purchases of equipment related to power purchase agreements and equipment related to fuel delivered to customers	(19,309)	(15,268)
Purchase of available-for-sale securities	—	(143,230)
Proceeds from sales of available-for-sale securities	—	475,676
Proceeds from maturities of available-for-sale securities	908,749	167,629
Purchase of equity securities	—	(4,990)
Proceeds from sales of equity securities	76,263	—
Net cash paid for acquisitions	—	(26,473)
Cash paid for non-consolidated entities and non-marketable equity securities	(40,894)	(30,139)
Net cash provided by investing activities	605,487	265,367
Financing activities		
Payments of contingent consideration	(10,105)	(2,667)
Payments of tax withholding on behalf of employees for net stock settlement of stock-based compensation	(2,954)	(2,660)
Proceeds from exercise of stock options	732	820
Principal payments on long-term debt	(5,407)	(36,089)
Proceeds from finance obligations	77,589	35,048
Principal repayments of finance obligations and finance leases	(34,211)	(25,168)
Net cash provided by (used in) financing activities	25,644	(30,716)
Effect of exchange rate changes on cash	(2,139)	(55)
Decrease in cash and cash equivalents	(111,212)	(225,318)
Increase in restricted cash	115,193	54,801
Cash, cash equivalents, and restricted cash beginning of period	1,549,344	3,132,194
Cash, cash equivalents, and restricted cash end of period	$ 1,553,325	$ 2,961,677
Supplemental disclosure of cash flow information		
Cash paid for interest, net of capitalized interest of $4.0 million	$ 20,101	$ 18,737
Summary of non-cash activity		
Recognition of right of use asset - finance leases	$ 4,818	$ 12,644
Recognition of right of use asset - operating leases	56,328	40,352
Net tangible liabilities assumed in a business combination	—	(5,124)
Intangible assets acquired in a business combination	—	60,522
Net transfers between inventory and long-lived assets	705	916
Earnouts from acquisitions paid in stock	8,000	—
Accrued purchase of fixed assets, cash to be paid in subsequent period	109,490	39,681

The accompanying notes are an integral part of these unaudited interim condensed consolidated financial statements.

1. Nature of Operations

Plug Power Inc. (the "Company," "Plug," "we" or "our") is facilitating the paradigm shift to an increasingly electrified world by innovating cutting-edge hydrogen and fuel cell solutions. While we continue to develop commercially viable hydrogen and fuel cell product solutions, we have expanded our offerings to support a variety of commercial operations that can be powered with green hydrogen. We provide electrolyzers that allow customers — such as refineries, producers of chemicals, steel, fertilizer and commercial refueling stations — to generate hydrogen on-site. We are focusing our efforts on (a) industrial mobility applications, including electric forklifts and electric industrial vehicles, at multi-shift high volume manufacturing and high throughput distribution sites where we believe our products and services provide a unique combination of productivity, flexibility, and environmental benefits; (b) stationary power systems that will support critical operations, such as data centers, microgrids, and generation facilities, in either a backup power or continuous power role and replace batteries, diesel generators or the grid for telecommunication logistics, transportation, and utility customers; and (c) production of hydrogen. Plug expects to support these products and customers with an ecosystem of vertically integrated products that produce, transport, store and handle, dispense, and use hydrogen for mobility and power applications.

2. Summary of Significant Accounting Policies

Principles of Consolidation

The unaudited interim condensed consolidated financial statements include the financial statements of the Company and its wholly-owned subsidiaries. Intercompany balances and transactions have been eliminated in consolidation. In addition, we include our share of the results of our joint venture with Renault SAS ("Renault") named HyVia SAS, a French société par actions simplifiée ("HyVia"), AccionaPlug S.L. ("AccionaPlug"), and SK Plug Hyverse Co., Ltd. ("SK Plug Hyverse"), using the equity method based on our economic ownership interest and our ability to exercise significant influence over the operating and financial decisions of HyVia, AccionaPlug and SK Plug Hyverse. Additionally, we consolidate the results of our joint venture with Niloco Hydrogen Holdings LLC, a wholly-owned subsidiary of Olin Corporation ("Olin"), named "Hidrogenii".

Interim Financial Statements

The accompanying unaudited interim condensed consolidated financial statements have been prepared pursuant to the rules and regulations of the Securities and Exchange Commission ("SEC"). In the opinion of management, all adjustments, which consist solely of normal recurring adjustments, necessary to present fairly, in accordance with U.S. generally accepted accounting principles ("GAAP"), the financial position, results of operations and cash flows for all periods presented, have been made. The results of operations for the interim periods presented are not necessarily indicative of the results that may be expected for the full year.

Certain information and footnote disclosures normally included in annual consolidated financial statements prepared in accordance with GAAP have been condensed or omitted. These unaudited interim condensed consolidated financial statements should be read in conjunction with the Company's audited consolidated financial statements and notes thereto included in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2022 (the "2022 Form 10-K").

The information presented in the accompanying unaudited interim condensed consolidated balance sheets as of December 31, 2022 has been derived from the Company's December 31, 2022 audited consolidated financial statements.

The unaudited interim condensed consolidated financial statements contained herein should be read in conjunction with our 2022 Form 10-K.

Recent Accounting Pronouncements

Recently Adopted Accounting Guidance

Other than the adoption of the accounting guidance mentioned in our 2022 Form 10-K, there have been no other significant changes in our reported financial position or results of operations and cash flows resulting from the adoption of new accounting pronouncements.

Recent Accounting Guidance Not Yet Effective

All issued but not yet effective accounting and reporting standards as of June 30, 2023 are either not applicable to the Company or are not expected to have a material impact on the Company.

3. Acquisitions

Alloy Custom Products, LLC and WesMor Cryogenics, LLC

On December 5, 2022, the Company acquired two subsidiaries of Cryogenic Industrial Solutions, LLC, Alloy Custom Products, LLC and WesMor Cryogenics, LLC (collectively, “CIS”). The CIS acquisition is expected to increase the Company’s production capabilities for stainless steel and aluminum cryogenic transport truck-mounted cryogenic pressure vessels, cryogenic transport trailers, and other mobile storage containers.

The fair value of consideration paid by the Company in connection with the CIS acquisition was as follows (in thousands):

Cash	$ 30,700
Due to Cryogenic Industrial Solutions, LLC	500
Plug Power Inc. Common Stock	6,107
Total consideration	$ 37,307

The following table summarizes the preliminary allocation of the purchase price to the estimated fair value of the net assets acquired, excluding goodwill (in thousands):

Cash	$ 267
Accounts receivable	5,038
Inventory	11,120
Prepaid expenses and other assets	464
Property, plant and equipment	3,887
Right of use asset	1,538
Identifiable intangible assets	13,430
Lease liability	(1,562)
Accounts payable, accrued expenses and other liabilities	(3,826)
Deferred revenue	(6,193)
Total net assets acquired, excluding goodwill	$ 24,163

The preliminary allocation of the purchase price is considered provisional pending the finalization of the valuation for the assets acquired and liabilities assumed and related tax liabilities, if any, in relation to the CIS acquisition. Therefore, the fair values of the assets acquired and liabilities assumed are subject to change as we obtain additional information for valuation assumptions such as market demand for CIS product lines to support forecasted financial data, which will not exceed 12 months from the date of acquisition. During the three and six months ended June 30, 2023, the Company paid out the $0.5 million due to the sellers of CIS in connection with the acquisition. There have been no measurement period adjustments recorded for the three and six months ended June 30, 2023.

The fair value of the tradename totaling $6.2 million was calculated using the relief from royalty approach, which is a variant of the income approach, and was assigned a useful life of fifteen years. The fair value of the customer relationships totaling $7.1 million was calculated using the multi-period excess earnings method ("MPEEM") approach, which is a variant of the income approach, and was assigned a useful life of fifteen years. The basic principle of the MPEEM approach is that a single asset, in isolation, is not capable of generating cash flow for an enterprise. Several assets are brought together and exploited to generate cash flow. The fair value of the non-compete agreements was $0.2 million with a useful life of five years.

The goodwill was primarily attributed to the value of synergies created with the Company's current and future offerings and the value of the assembled workforce. Goodwill and intangible assets are not deductible for income tax purposes. Goodwill associated with the CIS acquisition was calculated as follows (in thousands):

Consideration paid	$ 37,307
Less: net assets acquired	(24,163)
Total goodwill recognized	$ 13,144

The acquisition of CIS contributed $15.0 million and $26.2 million to total consolidated revenue for the three and six months ended June 30, 2023, respectively. The Company determined that the net income for the CIS acquisition for the three and six months ended June 30, 2023 was immaterial.

Joule Processing, LLC

On January 14, 2022, the Company acquired Joule Processing, LLC ("Joule"), an engineered modular equipment, process design and procurement company founded in 2009.

The fair value of consideration paid by the Company in connection with the Joule acquisition was as follows (in thousands):

Cash	$ 28,140
Contingent consideration	41,732
Total consideration	$ 69,872

The contingent consideration represents the estimated fair value associated with earn-out payments of up to $130 million that the sellers are eligible to receive in cash or shares of the Company's common stock (at the Company's election). Of the total earnout consideration, $90 million is related to the achievement of certain financial performance and $40 million is related to the achievement of certain internal operational milestones.

The following table summarizes the final allocation of the purchase price to the estimated fair value of the net assets acquired, excluding goodwill (in thousands):

Current assets	$ 2,672
Property, plant and equipment	493
Right of use asset	182
Identifiable intangible assets	60,522
Lease liability	(374)
Current liabilities	(2,612)
Contract liability	(3,818)
Total net assets acquired, excluding goodwill	$ 57,065

The fair value of the developed technology totaling $59.2 million included in the identifiable intangible assets was calculated using the MPEEM approach. Therefore, to determine cash flow from the developed technology over its useful life of 15 years, one must deduct the related expenses incurred for the exploitation of other assets used for the generation of overall cash flow. The fair value of the tradename totaling $0.8 million was calculated using the relief from royalty approach, which is a variant of the income approach, and was assigned a useful life of four years. The fair value of the non-compete agreements was $0.5 million with a useful life of six years.

In connection with the Joule acquisition, the Company recorded on its consolidated balance sheet a liability of $41.7 million representing the fair value of contingent consideration payable. The fair value of this contingent consideration was $71.2 million and $53.2 million as of June 30, 2023 and December 31, 2022, respectively, and as a result, an increase of $11.3 million and $18.0 million was recorded in change in fair value of contingent consideration in the unaudited interim condensed consolidated statement of operations for the three and six months ended June 30, 2023, respectively.

Included in the purchase price consideration are contingent earn-out payments as described above. Due to the nature of the earn-outs, a scenario-based analysis using the probability of achieving the milestone expectations was used to determine the fair value of the contingent consideration. These fair value measurements were based on unobservable inputs and are considered to be level 3 financial instruments.

The goodwill was primarily attributed to the value of synergies created with the Company's current and future offerings and the value of the assembled workforce. Goodwill and intangible assets are not deductible for income tax purposes. Goodwill associated with the Joule acquisition was calculated as follows (in thousands):

Consideration paid	$	28,140
Contingent consideration		41,732
Less: net assets acquired		(57,065)
Total goodwill recognized	$	12,807

The Joule acquisition contributed $45.2 million and $65.9 million to the Company's total consolidated revenue for the three and six months ended June 30, 2023, respectively, compared to $2.0 million and $3.3 million for the three and six months ended June 30, 2022, respectively. The Company determined that the net loss for the Joule acquisition for the three and six months ended June 30, 2023 was immaterial.

The CIS and Joule acquisitions were not material to our consolidated results of operations or financial position and, therefore, pro forma financial information is not presented.

4. Extended Maintenance Contracts

On a quarterly basis, we evaluate any potential losses related to our extended maintenance contracts for fuel cell systems, related infrastructure and equipment that have been sold. The following table shows the roll forward of balances in the accrual for loss contracts, including changes due to the provision for loss accrual, releases to service cost of sales, releases due to the provision for warrants, and foreign currency translation adjustment (in thousands):

	Six Months Ended June 30, 2023	Year Ended December 31, 2022
Beginning balance	$ 81,066	$ 89,773
Provision for loss accrual	13,721	23,295
Releases to service cost of sales	(13,364)	(35,446)
Increase to loss accrual related to customer warrants	499	3,506
Foreign currency translation adjustment	13	(62)
Ending balance	$ 81,935	$ 81,066

5. Earnings Per Share

Basic earnings per common stock are computed by dividing net loss attributable to common stockholders by the weighted average number of common stock outstanding during the reporting period. In periods when we have net income, the shares of our common stock subject to the convertible notes outstanding during the period will be included in our diluted earnings per share under the if-converted method. Since the Company is in a net loss position, all common stock equivalents would be considered anti-dilutive and are therefore not included in the determination of diluted earnings per share. Accordingly, basic and diluted loss per share are the same.

The potentially dilutive securities are summarized as follows:

	At June 30,	
	2023	2022
Stock options outstanding (1)	33,821,392	24,184,619
Restricted stock and restricted stock units outstanding (2)	5,529,831	5,616,280
Common stock warrants (3)	78,561,263	80,017,181
Convertible Senior Notes (4)	39,170,766	39,170,766
Number of dilutive potential shares of common stock	157,083,252	148,988,846

(1) During the three months ended June 30, 2023 and 2022, the Company granted options for 6,782,043 and 308,351 shares of common stock, respectively. During the six months ended June 30, 2023 and 2022, the Company granted options for 6,876,593 and 759,851 shares of common stock, respectively.

(2) During the three months ended June 30, 2023 and 2022, the Company granted 294,143 and 323,991 shares of restricted stock and restricted stock units, respectively. During the six months ended June 30, 2023 and 2022, the Company granted 388,693 and 1,126,491 shares of restricted stock and restricted stock units, respectively.

(3) In August 2022, the Company issued a warrant to acquire up to 16,000,000 shares of the Company's common stock as part of a transaction agreement with Amazon.com, Inc. ("Amazon"), subject to certain vesting events, as described in Note 12, "Warrant Transaction Agreements." The warrant had not been exercised as of June 30, 2023.

In April 2017, the Company issued a warrant to acquire up to 55,286,696 shares of the Company's common stock as part of a transaction agreement with Amazon, subject to certain vesting events, as described in Note 12, "Warrant Transaction Agreements." The warrant had been exercised with respect to 34,917,912 and 17,461,994 shares of the Company's common stock as of June 30, 2023 and 2022, respectively.

In July 2017, the Company issued a warrant to acquire up to 55,286,696 shares of the Company's common stock as part of a transaction agreement with Walmart, Inc. ("Walmart"), subject to certain vesting events, as described in Note 12, "Warrant Transaction Agreements." The warrant had been exercised with respect to 13,094,217 shares of the Company's common stock as of June 30, 2023 and 2022, respectively.

(4) In March 2018, the Company issued $100.0 million in aggregate principal amount of the 5.5% Convertible Senior Notes due 2023 (the "5.5% Convertible Senior Notes"). In May 2020, the Company repurchased $66.3 million of the 5.5% Convertible Senior Notes and in the fourth quarter of 2020, $33.5 million of the 5.5% Convertible Senior Notes were converted into approximately 14.6 million shares of common stock. The remaining $0.2 million aggregate principal amount of the 5.5% Convertible Senior Notes were converted into 69,808 shares of common stock in January 2021. In May 2020, the Company issued $212.5 million in aggregate principal amount of the 3.75% Convertible Senior Notes due 2025 (the "3.75% Convertible Senior Notes'). There were no conversions for the three and six months ended June 30, 2023 and 2022.

6. Inventory

Inventory as of June 30, 2023 and December 31, 2022 consisted of the following (in thousands):

	June 30, 2023	December 31, 2022
Raw materials and supplies - production locations	$ 562,357	$ 450,432
Raw materials and supplies - customer locations	19,144	18,860
Work-in-process	190,051	112,231
Finished goods	132,736	64,113
Inventory	$ 904,288	$ 645,636

Inventory is primarily comprised of raw materials, work-in-process, and finished goods. As of June 30, 2023 and December 31, 2022, the reserve for excess and obsolete inventory was $11.1 million and $5.4 million, respectively. The increase in inventory is primarily due to a combination of new product offerings as well as increased backlog.

7. Property, Plant and Equipment

Property, plant and equipment at June 30, 2023 and December 31, 2022 consisted of the following (in thousands):

	June 30, 2023	December 31, 2022
Land	$ 6,193	$ 1,772
Construction in progress	821,349	575,141
Building and leasehold improvements	47,193	21,363
Software, machinery, and equipment	247,991	169,633
Property, plant, and equipment	1,122,726	767,909
Less: accumulated depreciation	(60,916)	(48,116)
Property, plant, and equipment, net	$ 1,061,810	$ 719,793

Construction in progress is primarily comprised of construction of four hydrogen production plants and our Gigafactory in Rochester, NY. Completed assets are transferred to their respective asset classes, and depreciation begins when an asset is ready for its intended use. Interest on outstanding debt is capitalized during periods of capital asset construction and amortized over the useful lives of the related assets. During the three months ended June 30, 2023 and 2022, the Company capitalized $2.0 million and $1.5 million of interest, respectively. During the six months ended June 30, 2023 and 2022, the Company capitalized $4.0 million and $5.8 million of interest, respectively.

Depreciation expense related to property, plant and equipment was $7.3 million and $5.5 million for the three months ended June 30, 2023 and 2022, respectively. Depreciation expense related to property, plant and equipment was $12.8 million and $8.1 million for the six months ended June 30, 2023 and 2022, respectively.

8. Intangible Assets and Goodwill

The gross carrying amount and accumulated amortization of the Company's acquired identifiable intangible assets as of June 30, 2023 were as follows (in thousands):

	Weighted Average Amortization Period	Gross Carrying Amount	Accumulated Amortization	Total
Acquired technology	14 years	$ 104,406	(16,675)	$ 87,731
Dry stack electrolyzer technology	10 years	29,000	(3,867)	25,133
Customer relationships, trade name and other	13 years	103,449	(17,230)	86,219
		$ 236,855	$ (37,772)	$ 199,083

The gross carrying amount and accumulated amortization of the Company's acquired identifiable intangible assets as of December 31, 2022 were as follows (in thousands):

	Weighted Average Amortization Period	Gross Carrying Amount	Accumulated Amortization	Total
Acquired technology	14 years	$ 104,221	$ (12,754)	$ 91,467
Dry stack electrolyzer technology	10 years	29,000	(2,417)	26,583
Customer relationships, trade name and other	13 years	102,521	(12,846)	89,675
		$ 235,742	$ (28,017)	$ 207,725

The change in the gross carrying amount of the acquired technology from December 31, 2022 to June 30, 2023 was due to changes in foreign currency translation.

Amortization expense for acquired identifiable intangible assets for the three months ended June 30, 2023 and 2022 was $4.8 million and $5.2 million, respectively. Amortization expense for acquired identifiable intangible assets for the six months ended June 30, 2023 and 2022 was $9.8 million and $10.4 million, respectively.

The estimated amortization expense for subsequent years is as follows (in thousands):

Remainder of 2023	$ 9,569
2024	19,076
2025	18,300
2026	16,707
2027	16,699
2028 and thereafter	118,732
Total	$ 199,083

Goodwill was $250.0 million and $248.6 million as of June 30, 2023 and December 31, 2022, which increased due to foreign currency translation adjustments for goodwill associated with our international subsidiaries.

The change in the carrying amount of goodwill for the six months ended June 30, 2023 was as follows (in thousands):

Beginning balance at December 31, 2022	$ 248,607
Foreign currency translation adjustment	1,358
Ending balance at June 30, 2023	$ 249,965

9. Long-Term Debt

In March 2019, the Company entered into a loan and security agreement, as amended, with Generate Lending, LLC, providing for a secured term loan facility in the amount of $100 million (the "Term Loan Facility"). In December 2022, the Company fully repaid the outstanding balance of the Term Loan Facility.

In June 2020, the Company acquired debt as part of its acquisition of United Hydrogen Group Inc. During the three and six months ended June 30, 2023, the Company repaid $5.1 million and $5.4 million of principal related to this outstanding debt, respectively. The outstanding carrying value of the debt was $4.2 million as of June 30, 2023. The remaining outstanding principal on the debt was $6.1 million and the unamortized debt discount was $1.9 million, bearing varying interest rates ranging from 5.6% to 8.3%. The debt is scheduled to mature in 2026. As of June 30, 2023, the principal balance is due at each of the following dates as follows (in thousands):

December 31, 2023	$	600
December 31, 2024		3,357
December 31, 2025		1,200
December 31, 2026		900
Total outstanding principal	$	6,057

10. Convertible Senior Notes

3.75% Convertible Senior Notes

On May 18, 2020, the Company issued $200.0 million in aggregate principal amount of 3.75% Convertible Senior Notes due June 1, 2025, in a private placement to qualified institutional buyers pursuant to Rule 144A under the Securities Act of 1933, as amended (the "Securities Act"). On May 29, 2020, the Company issued an additional $12.5 million in aggregate principal amount of 3.75% Convertible Senior Notes. During the three and six months ended June 30, 2023, there were no conversions of the 3.75% Convertible Senior Notes.

The 3.75% Convertible Senior Notes consisted of the following (in thousands):

	June 30, 2023	December 31, 2022
Principal amounts:		
Principal	$ 197,278	$ 197,278
Unamortized debt issuance costs (1)	(2,694)	(3,359)
Net carrying amount	$ 194,584	$ 193,919

(1) Included in the unaudited interim condensed consolidated balance sheets within the Convertible Senior Notes, net and amortized over the remaining life of the notes using the effective interest rate method.

The following table summarizes the total interest expense and effective interest rate related to the 3.75% Convertible Senior Notes (in thousands, except for the effective interest rate):

	June 30, 2023	June 30, 2022
Interest expense	$ 1,849	$ 1,849
Amortization of debt issuance costs	334	320
Total	2,183	2,169
Effective interest rate	4.5%	4.5%

Based on the closing price of the Company's common stock of $10.39 on June 30, 2023, the if-converted value of the notes was greater than the principal amount. The estimated fair value of the notes at June 30, 2023 was approximately $407.9 million. The fair value estimation was primarily based on a quoted price in an active market.

Capped Call

In conjunction with the pricing of the 3.75% Convertible Senior Notes, the Company entered into privately negotiated capped call transactions (the "3.75% Notes Capped Call") with certain counterparties at a price of $16.2 million. The 3.75% Notes Capped Call covers, subject to anti-dilution adjustments, the aggregate number of shares of the

Company's common stock that underlie the initial 3.75% Convertible Senior Notes and is generally expected to reduce potential dilution to the Company's common stock upon any conversion of the 3.75% Convertible Senior Notes and/or offset any cash payments the Company is required to make in excess of the principal amount of the converted notes, as the case may be, with such reduction and/or offset subject to a cap based on the cap price. The cap price of the 3.75% Notes Capped Call is initially $6.7560 per share, which represents a premium of approximately 60% over the last then-reported sale price of the Company's common stock of $4.11 per share on the date of the transaction and is subject to certain adjustments under the terms of the 3.75% Notes Capped Call. The 3.75% Notes Capped Call becomes exercisable if the conversion option is exercised.

The net cost incurred in connection with the 3.75% Notes Capped Call was recorded as a reduction to additional paid-in capital in the unaudited interim condensed consolidated balance sheets. The book value of the 3.75% Notes Capped Call is not remeasured.

Common Stock Forward

In March 2018, the Company issued $100.0 million in aggregate principal amount of the 5.5% Convertible Senior Notes due on March 15, 2023, in a private placement to qualified institutional buyers pursuant to Rule 144A under the Securities Act, which have been fully repaid. In connection with the issuance of the 5.5% Convertible Senior Notes, the Company entered into a forward stock purchase transaction (the "Common Stock Forward"), pursuant to which the Company agreed to purchase 14,397,906 shares of its common stock for settlement on or about March 15, 2023. On May 18, 2020, the Company amended and extended the maturity of the Common Stock Forward to June 1, 2025. The number of shares of common stock that the Company will ultimately repurchase under the Common Stock Forward is subject to customary anti-dilution adjustments. The Common Stock Forward is subject to early settlement or settlement with alternative consideration in the event of certain corporate transactions.

The net cost incurred in connection with the Common Stock Forward of $27.5 million was recorded as an increase in treasury stock in the unaudited interim condensed consolidated balance sheets. The related shares were accounted for as a repurchase of common stock. The book value of the Common Stock Forward is not remeasured.

There were no shares of common stock settled in connection with the Common Stock Forward during the three and six months ended June 30, 2023 or during the three and six months ended June 30, 2022.

11. Stockholders' Equity

Common Stock and Warrants

On August 24, 2022, a warrant to purchase up to 16,000,000 shares of common stock was issued in connection with a transaction agreement with Amazon, as discussed in Note 12, "Warrant Transaction Agreements." This warrant is measured at fair value at the time of grant or modification and is classified as an equity instrument on the unaudited interim condensed consolidated balance sheets.

Accumulated Other Comprehensive Income

Accumulated other comprehensive income is comprised of unrealized gains and losses on available-for-sale securities and foreign currency translation gains and losses. Amounts reclassified from accumulated other comprehensive (loss)/income for the three and six months ended June 30, 2023 and June 30, 2022, respectively, were $0.

Net current-period other comprehensive income for the three months ended June 30, 2023 increased due to unrealized gains on available-for-sale securities of $2.2 million and foreign currency translation gains of $3.1 million. Net current-period other comprehensive loss for the three months ended June 30, 2022 increased due to unrealized losses on available-for-sale securities of $3.3 million and foreign currency translation losses of $7.2 million.

Net current period other comprehensive income for the six months ended June 30, 2023 increased due to unrealized gains on available-for-securities of $7.5 million and foreign currency translation gains of $4.7 million. Net current period other comprehensive losses for the six months ended June 30, 2022 increased due to unrealized losses on available-for-sale securities of $18.4 million and foreign currency translation losses of $9.0 million.

12. Warrant Transaction Agreements

Amazon Transaction Agreement in 2022

On August 24, 2022, the Company and Amazon entered into a Transaction Agreement (the “2022 Transaction Agreement”), under which the Company concurrently issued to Amazon.com NV Investment Holdings LLC, a wholly owned subsidiary of Amazon, a warrant (the “Amazon Warrant”) to acquire up to 16,000,000 shares (the “Amazon Warrant Shares”) of the Company’s common stock, subject to certain vesting events described below. The Company and Amazon entered into the 2022 Transaction Agreement in connection with a concurrent commercial arrangement under which Amazon agreed to purchase hydrogen fuel from the Company through August 24, 2029.

1,000,000 of the Amazon Warrant Shares vested immediately upon issuance of the Amazon Warrant. 15,000,000 of the Amazon Warrant Shares will vest in multiple tranches over the 7-year term of the Amazon Warrant based on payments made to the Company directly by Amazon or its affiliates, or indirectly through third parties, with 15,000,000 of the Amazon Warrant Shares fully vesting if Amazon-related payments of $2.1 billion are made in the aggregate. The exercise price for the first 9,000,000 Amazon Warrant Shares is $22.9841 per share and the fair value on the grant date was $20.36. The exercise price for the remaining 7,000,000 Amazon Warrant Shares will be an amount per share equal to 90% of the 30-day volume weighted average share price of the Company’s common stock as of the final vesting event that results in full vesting of the first 9,000,000 Amazon Warrant Shares. The Amazon Warrant is exercisable through August 24, 2029.

Upon the consummation of certain change of control transactions (as defined in the applicable warrant) prior to the vesting of at least 60% of the aggregate Amazon Warrant Shares, the Amazon Warrant will automatically vest and become exercisable with respect to an additional number of Amazon Warrant Shares such that 60% of the aggregate Amazon Warrant Shares shall have vested. If a change of control transaction is consummated after the vesting of at least 60% of the aggregate Amazon Warrant Shares, then no acceleration of vesting will occur with respect to any of the unvested Amazon Warrant Shares as a result of the transaction. The exercise price and the Amazon Warrant Shares issuable upon exercise of the Amazon Warrant are subject to customary antidilution adjustments.

Upon issuance, 1,000,000 of the Amazon Warrant Shares issued pursuant to the 2022 Transaction Agreement vested. The warrant fair value associated with the vested shares of $20.4 million was capitalized to contract assets in our unaudited interim condensed consolidated financial statements based on the grant date fair value and is subsequently amortized ratably as a reduction to revenue based on the Company’s estimate of revenue over the term of the agreement. As of June 30, 2023 the balance of the contract asset related to tranche 1 is $19.7 million which is recorded in contract assets in the Company’s unaudited interim condensed consolidated balance sheet. As of June 30, 2023, an additional 1,000,000 of the Amazon Warrant Shares associated with tranche 2 vested. The warrant fair value associated with the vested shares was $20.4 million. The grant date fair value of tranche 3 will also be amortized ratably as a reduction to revenue based on the Company's estimate of revenue over the term of the agreement. Because the exercise price has yet to be determined, the fair value of tranche 4 will be remeasured at each reporting period end and amortized ratably as a reduction to revenue based on the Company's estimate of revenue over the term of the agreement. The total amount of provision for common stock warrants recorded as a reduction of revenue for the Amazon Warrant during the three months ended June 30, 2023 and 2022 was $1.5 and $0.1 million, respectively. The total amount of provision for common stock warrants recorded as a reduction of revenue for the Amazon Warrant during the six months ended June 30, 2023 and 2022 was $2.6 and $0.2 million, respectively.

The assumptions used to calculate the valuations as of August 24, 2022 and June 30, 2023 are as follows:

	Tranches 1-3 August 24, 2022	Tranche 4 June 30, 2023
Risk-free interest rate	3.15%	3.94%
Volatility	75.00%	75.00%
Expected average term	7 years	4 years
Exercise price	$22.98	$9.35
Stock price	$20.36	$10.39

Amazon Transaction Agreement in 2017

On April 4, 2017, the Company and Amazon entered into a Transaction Agreement (the "2017 Amazon Transaction Agreement"), pursuant to which the Company agreed to issue to Amazon.com NV Investment Holdings LLC, a warrant to acquire up to 55,286,696 Amazon Warrant Shares, subject to certain vesting events described below. The Company and Amazon entered into the 2017 Amazon Transaction Agreement in connection with existing commercial agreements between the Company and Amazon with respect to the deployment of the Company's GenKey fuel cell technology at Amazon distribution centers. The vesting of the Amazon Warrant Shares was conditioned upon payments made by Amazon or its affiliates (directly or indirectly through third parties) pursuant to the existing commercial agreements. At December 31, 2021, all 55,286,696 of the Amazon Warrant Shares had vested.

The warrant had been exercised with respect to 34,917,912 shares and 24,704,450 shares of the Company's common stock as of June 30, 2023 and December 31, 2022, respectively.

Walmart Transaction Agreement

On July 20, 2017, the Company and Walmart entered into a Transaction Agreement (the "Walmart Transaction Agreement"), pursuant to which the Company agreed to issue to Walmart a warrant (the "Walmart Warrant") to acquire up to 55,286,696 shares of the Company's common stock, subject to certain vesting events (the "Walmart Warrant Shares"). The Company and Walmart entered into the Walmart Transaction Agreement in connection with existing commercial agreements between the Company and Walmart with respect to the deployment of the Company's GenKey fuel cell technology across various Walmart distribution centers. The existing commercial agreements contemplate, but do not guarantee, future purchase orders for the Company's fuel cell technology. The vesting of the warrant shares was conditioned upon payments made by Walmart or its affiliates (directly or indirectly through third parties) pursuant to transactions entered into after January 1, 2017 under existing commercial agreements.

The warrant had been exercised with respect to 13,094,217 shares of the Company's common stock as of June 30, 2023 and December 31, 2022.

At June 30, 2023 and December 31, 2022, 27,643,347 of the Walmart Warrant Shares had vested. For the three months ended June 30, 2023, there was a negative provision for common stock warrants recorded as an addition to revenue of $1.5 million as compared to a provision of $2.0 million recorded as a reduction to revenue for the three months ended June 30, 2022. The total amount of provision for common stock warrants recorded as a reduction of revenue for the Walmart Warrant during the six months ended June 30, 2023 and 2022 was $11.5 million and $3.7 million, respectively. During the three and six months ended June 30, 2023 and 2022, there were no exercises with respect to the Walmart Warrant.

The assumptions used to calculate the valuations of the final tranche of the Walmart Warrant as of June 30, 2023 are as follows:

	June 30, 2023
Risk-free interest rate	4.12%
Volatility	75.00%
Expected average term	3.5 years
Exercise price	$9.35
Stock price	$10.39

13. Revenue

Disaggregation of revenue

The following table provides information about disaggregation of revenue (in thousands):

Major products/services lines

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Sales of fuel cell systems	$ 72,181	$ 33,411	$ 101,033	$ 70,940
Sales of hydrogen infrastructure	58,647	32,414	107,515	59,502
Sales of electrolyzers	6,966	3,675	46,998	7,734
Sales of engineered equipment	8,819	28,556	16,572	50,524
Services performed on fuel cell systems and related infrastructure	8,701	8,822	17,798	17,062
Power Purchase Agreements	16,130	11,169	24,067	21,206
Fuel delivered to customers and related equipment	17,878	14,472	28,020	27,900
Sales of cryogenic equipment and other	69,673	18,177	126,262	36,380
Other	1,187	571	2,203	822
Net revenue	$ 260,182	$ 151,267	$ 470,468	$ 292,070

Contract balances

The following table provides information about receivables, contract assets and contract liabilities from contracts with customers (in thousands):

	June 30, 2023	December 31, 2022
Accounts receivable	$ 216,645	$ 129,450
Contract assets	124,585	104,287
Deferred revenue and contract liabilities	251,736	229,898

Contract assets primarily relate to contracts for which revenue is recognized on a straight-line basis; however, billings escalate over the life of a contract. Contract assets also include amounts recognized as revenue in advance of billings to customers, which are dependent upon the satisfaction of another performance obligation. These amounts are included in contract assets on the accompanying unaudited interim condensed consolidated balance sheets.

The contract liabilities relate to the advance consideration received from customers for services that will be recognized over time (primarily fuel cell and related infrastructure services) and advance consideration received from customers prior to delivery of products. These amounts are included within deferred revenue and other contract liabilities on the unaudited interim condensed consolidated balance sheets.

Significant changes in the contract assets and the contract liabilities balances during the period are as follows (in thousands):

Contract assets

	June 30, 2023	December 31, 2022
Transferred to receivables from contract assets recognized at the beginning of the period	$ (34,966)	$ (33,394)
Contract assets related to warrants	6,510	26,455
Impairment	(9,799)	—
Revenue recognized and not billed as of the end of the period	58,553	72,469
Net change in contract assets	$ 20,298	$ 65,530

Deferred revenue and contract liabilities

	June 30, 2023	December 31, 2022
Increases due to cash received, net of amounts recognized as revenue during the period	$ 137,526	$ 200,347
Contract liabilities assumed as part of acquisitions	—	10,011
Revenue recognized that was included in the contract liability balance as of the beginning of the period	(115,688)	(163,550)
Net change in deferred revenue and contract liabilities	$ 21,838	$ 46,808

Estimated future revenue

The following table includes estimated revenue included in the backlog expected to be recognized in the future (sales of fuel cell systems, equipment, and hydrogen installations are expected to be recognized as revenue within one year; sales of electrolyzers are expected to be recognized as revenue within two years; sales of services, Power Purchase Agreements ("PPAs"), and fuel are expected to be recognized as revenue over five to ten years) related to performance obligations that are unsatisfied (or partially unsatisfied) at the end of the reporting period, including provision for common stock warrants (in thousands):

	June 30, 2023
Sales of fuel cell systems	$ 65,210
Sales of hydrogen installations and other infrastructure	19,311
Sales of electrolyzers	224,301
Sales of engineered equipment	19,210
Services performed on fuel cell systems and related infrastructure	124,765
Power Purchase Agreements	402,755
Fuel delivered to customers and related equipment	95,184
Sales of cryogenic equipment	120,701
Total estimated future revenue	$ 1,071,437

Contract costs

Contract costs consist of capitalized commission fees and other expenses related to obtaining or fulfilling a contract. Capitalized contract costs at June 30, 2023 and December 31, 2022 were $0.7 million and $0.6 million, respectively.

14. Income Taxes

The Company recorded $0.9 million of an income tax benefit and $0.4 million of income tax expense for the three months ended June 30, 2023 and 2022, respectively. The Company recorded $2.2 million of income tax benefit and

$9 thousand of income tax expense for the six months ended June 30, 2023 and 2022, respectively. The tax benefit for the six months ended June 30, 2023 was due to foreign income taxes. The Company has not changed its overall conclusion with respect to the need for a valuation allowance against its domestic net deferred tax assets, which remain fully reserved.

The domestic net deferred tax asset generated from the Company's net operating loss has been offset by a full valuation allowance because it is more likely than not that the tax benefits of the net operating loss carryforward will not be realized. The Company recognizes accrued interest and penalties related to unrecognized tax benefits, if any, as a component of income tax expense.

15. Fair Value Measurements

The Company records the fair value of assets and liabilities in accordance with ASC 820, *Fair Value Measurement* (“ASC 820”). ASC 820 defines fair value as the price received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date and in the principal or most advantageous market for that asset or liability. The fair value should be calculated based on assumptions that market participants would use in pricing the asset or liability, not on assumptions specific to the entity.

In addition to defining fair value, ASC 820 expands the disclosure requirements around fair value and establishes a fair value hierarchy for valuation inputs. The hierarchy prioritizes the inputs into three levels based on the extent to which inputs used in measuring fair value are observable in the market. Each fair value measurement is reported in one of the three levels, which is determined by the lowest level input that is significant to the fair value measurement in its entirety.

These levels are:

- Level 1 — quoted prices (unadjusted) in active markets for identical assets or liabilities.
- Level 2 — quoted prices for similar assets and liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument.
- Level 3 — unobservable inputs reflecting management’s own assumptions about the inputs used in pricing the asset or liability at fair value.

Securities reported at fair value utilizing Level 1 inputs represent assets whose fair value is determined based upon observable unadjusted quoted market prices for identical assets in active markets. Level 2 securities represent assets whose fair value is determined using observable market information such as previous day trade prices, quotes from less active markets or quoted prices of securities with similar characteristics. Available-for-sale securities are characterized as Level 2 assets, as their fair values are determined using observable market inputs. Equity securities are characterized as Level 1 assets, as their fair values are determined using active markets for identical assets. There were no transfers between Level 1, Level 2, or Level 3 for the three and six months ended June 30, 2023.

Financial instruments not recorded at fair value on a recurring basis include equity method investments that have not been remeasured or impaired in the current period, such as our investments in HyVia, AccionaPlug, and SK Plug Hyverse. During the three and six months ended June 30, 2023, the Company contributed approximately $0.8 million and $40.9 million, respectively, to HyVia, AccionaPlug and SK Plug Hyverse.

Assets and liabilities measured at fair value on a recurring basis are summarized below (in thousands):

	As of June 30, 2023				
	Carrying Amount	Fair Value	Fair Value Measurements		
			Level 1	Level 2	Level 3
Assets					
Cash equivalents	$ 120,818	$ 120,818	$ 120,818	$ —	$ —
Corporate bonds	149,659	149,659	—	149,659	—
U.S. Treasuries	287,992	287,992	287,992	—	—
Equity securities	67,753	67,753	67,753	—	—
Liabilities					
Contingent consideration	119,841	119,841	—	—	119,841

	As of December 31, 2022				
	Carrying Amount	Fair Value	Fair Value Measurements		
			Level 1	Level 2	Level 3
Assets					
Cash equivalents	$ 212,577	$ 212,577	$ 212,577	$ —	$ —
Corporate bonds	193,633	193,633	—	193,633	—
U.S. Treasuries	1,139,310	1,139,310	1,139,310	—	—
Equity securities	134,836	134,836	134,836	—	—
Liabilities					
Contingent consideration	116,165	116,165	—	—	116,165

The liabilities measured at fair value on a recurring basis that have unobservable inputs and are therefore categorized as level 3 are related to contingent consideration. The fair value as of June 30, 2023 of $119.8 million is comprised of $71.2 million related to the acquisition of Joule, as well as $48.6 million from the Frames Holding B.V. ("Frames") and Applied Cryo Technologies, Inc. ("Applied Cryo") acquisitions in 2021 and the Giner ELX, Inc. and United Hydrogen Group Inc. acquisitions in 2020.

In connection with the Applied Cryo acquisition, the Company recorded on its consolidated balance sheet an initial liability of $14.0 million representing the fair value of contingent consideration payable, and is recorded in the unaudited interim condensed consolidated balance sheet in contingent consideration, loss accrual for service contracts, and other current liabilities. In the second quarter of 2023, the Company paid out the remaining Applied Cryo earn-out, which was fully accrued as of March 31, 2023.

In connection with the Frames acquisition, the Company recorded on its consolidated balance sheet a liability of $29.1 million representing the fair value of contingent consideration payable. The fair value of this contingent consideration was $30.2 million and $31.0 million as of June 30, 2023 and December 31, 2022, respectively. The change in fair value compared to December 31, 2022 was due to a decrease in the fair value of the liability balance, partially offset by a change in the foreign currency translation. The Company recorded an increase of $0.5 million and a decrease of $0.8 million for the three and six months ended June 30, 2023 in change in fair value of contingent consideration in the unaudited interim condensed consolidated statement of operations, respectively.

In connection with the Giner ELX, Inc. acquisition, the Company recorded on its consolidated balance sheet a liability of $16.0 million representing the fair value of contingent consideration payable. The fair value of this contingent consideration was $16.8 million and $14.5 million as of June 30, 2023 and December 31, 2022, respectively, and as a result, an increase of $3.5 million and $2.3 million was recorded in change in fair value of contingent consideration in the unaudited interim condensed consolidated statement of operations for the three and six months ended June 30, 2023, respectively.

In connection with the United Hydrogen Group Inc. acquisition the Company recorded on its consolidated balance sheet a liability of $1.1 million representing the fair value of contingent consideration payable. The fair value of this contingent consideration was $1.7 million and $1.5 million as of June 30, 2023 and December 31, 2022, respectively, and, as a result, an increase of $0.1 million and $0.2 million was recorded in change in fair value of contingent consideration in the unaudited interim condensed consolidated statement of operations for the three and six months ended June 30, 2023, respectively.

In the unaudited interim condensed consolidated balance sheets, contingent consideration is recorded in the contingent consideration, loss accrual for service contracts, and other current liabilities financial statement line item, and was comprised of the following unobservable inputs as of June 30, 2023:

Financial Instrument	Fair Value	Valuation Technique	Unobservable Input	Range (weighted average)
Contingent Consideration	$ 75,700	Scenario based method	Credit spread	14.19% - 14.20%
			Discount rate	18.71% - 19.67%
	10,430	Monte carlo simulation	Credit spread	14.20%
			Discount rate	19.64%
			Revenue volatility	38.64%
	33,711	Monte carlo simulation	Credit spread	14.19%
			Revenue volatility	25.00%
			Gross profit volatility	55.00%
	$ 119,841			

In the unaudited interim condensed consolidated balance sheets, contingent consideration is recorded in the contingent consideration, loss accrual for service contracts, and other current liabilities financial statement line item, and was comprised of the following unobservable inputs as of December 31, 2022:

Financial Instrument	Fair Value	Valuation Technique	Unobservable Input	Range (weighted average)
Contingent Consideration	$ 85,269	Scenario based method	Credit spread	15.73% - 15.74%
			Discount rate	19.85% - 20.68%
	11,310	Monte carlo simulation	Credit spread	15.74%
			Discount rate	20.00%-20.30%
			Revenue volatility	45.29%
	19,586	Monte carlo simulation	Credit spread	15.73%
			Revenue volatility	35.7% - 23.1% (35.0%)
			Gross profit volatility	106.7% - 23.2% (60.0%)
	$ 116,165			

The change in the carrying amount of Level 3 liabilities for the six month period ended June 30, 2023 was as follows (in thousands):

	Six Months Ended June 30, 2023
Beginning balance at December 31, 2022	$ 116,165
Cash payments	(2,000)
Fair value adjustments	8,769
Foreign currency translation adjustment	539
Ending balance at March 31, 2023	123,473
Cash payments	(11,000)
Payment settled in stock	(8,000)
Fair value adjustments	15,308
Foreign currency translation adjustment	60
Ending balance at June 30, 2023	$ 119,841

16. Investments

The fair values of the Company's investments are based upon prices provided by an independent pricing service provider. Management has assessed and concluded that these prices are reasonable and has not adjusted any prices received from the independent pricing service provider.

The amortized cost, gross unrealized gains and losses, fair value of those investments classified as available-for-sale, and allowance for credit losses at June 30, 2023 are summarized as follows (in thousands):

	June 30, 2023				
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value	Allowance for Credit Losses
Corporate bonds	$ 153,969	$ —	$ (4,310)	$ 149,659	—
U.S. Treasuries	298,845	—	(10,853)	287,992	—
Total	$ 452,814	$ —	$ (15,163)	$ 437,651	$ —

The amortized cost, gross unrealized gains and losses, fair value of those investments classified as available-for-sale, and allowance for credit losses at December 31, 2022 are summarized as follows (in thousands):

	December 31, 2022				
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value	Allowance for Credit Losses
Corporate bonds	$ 200,735	$ 7	$ (7,109)	$ 193,633	—
U.S. Treasuries	1,154,879	111	(15,680)	1,139,310	—
Total	$ 1,355,614	$ 118	$ (22,789)	$ 1,332,943	$ —

The following table summarizes the fair value and gross unrealized losses on securities classified as available-for-sale, and length of time that the individual securities have been in a continuous loss position as of June 30, 2023 (in thousands):

	June 30, 2023					
	Less than 12 months		12 months or greater		Total	
	Fair Value of Investments with Unrealized Losses	Gross Unrealized Losses	Fair Value of Investments with Unrealized Losses	Gross Unrealized Losses	Fair Value of Investments with Unrealized Losses	Gross Unrealized Losses
Corporate bonds	$ —	$ —	$ 149,659	$ (4,310)	$ 149,659	$ (4,310)
U.S. Treasuries	—	—	287,992	(10,853)	287,992	(10,853)
Total available-for-sale securities	$ —	$ —	$ 437,651	$ (15,163)	$ 437,651	$ (15,163)

We regularly review available-for-sale securities for declines in fair values that we determine to be credit related. In order to determine whether an allowance for credit losses was required, we considered factors such as whether amounts related to securities have become uncollectible, whether we intend to sell a security, and whether it is more likely than not that we will be required to sell a security prior to recovery. The Company also reviewed the declines in market value related to our available-for-sale securities and determined that these declines were due to fluctuations in interest rates. As of June 30, 2023, the Company did not have an allowance for credit losses related to available-for-sale securities.

The cost, gross unrealized gains and losses, and fair value of those investments classified as equity securities at June 30, 2023 are summarized as follows (in thousands):

	June 30, 2023			
	Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Fixed income mutual funds	$ 70,257	$ —	$ (2,504)	$ 67,753
Total	$ 70,257	$ —	$ (2,504)	$ 67,753

The cost, gross unrealized gains and losses, and fair value of those investments classified as equity securities at December 31, 2022 are summarized as follows (in thousands):

	December 31, 2022			
	Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Fixed income mutual funds	$ 70,257	$ —	$ (2,620)	$ 67,637
Exchange traded mutual funds	75,999	—	(8,800)	67,199
Total	$ 146,256	$ —	$ (11,420)	$ 134,836

A summary of the amortized cost and fair value of investments classified as available-for-sale, by contractual maturity, as of June 30, 2023 and December 31, 2022 was as follows (in thousands):

	June 30, 2023		December 31, 2022	
Maturity:	**Amortized Cost**	**Fair Value**	**Amortized Cost**	**Fair Value**
Less than 12 months	$ 308,430	$ 301,187	$ 1,045,120	$ 1,039,333
12 months or greater	144,384	136,464	310,494	293,610
Total	$ 452,814	$ 437,651	$ 1,355,614	$ 1,332,943

Accrued interest income was $2.4 million and $3.0 million at June 30, 2023 and December 31, 2022, respectively, and included within the balance for prepaid expenses and other current assets in the unaudited interim condensed consolidated balance sheets.

Equity Method Investments

As of June 30, 2023 and December 31, 2022, the Company accounted for the following investments in the investee's common stock under the equity method, which are included in the investments in non-consolidated entities and non-marketable equity securities on the interim unaudited condensed consolidated balance sheets (amounts in thousands):

		As of June 30, 2023		As of December 31, 2022	
Investee	**Formation Date**	**Common Stock Ownership %**	**Carrying Value**	**Common Stock Ownership %**	**Carrying Value**
HyVia	Q2 2021	50%	$ 22,364	50%	$ 11,281
AccionaPlug S.L.	Q4 2021	50%	2,547	50%	2,225
SK Plug Hyverse	Q1 2022	49%	26,480	49%	8,937
			$ 51,391		$ 22,443

17. Operating and Finance Lease Liabilities

As of June 30, 2023, the Company had operating leases, as lessee, primarily associated with sale/leaseback transactions that are partially secured by restricted cash and security deposits (see also Note 19, "Commitments and Contingencies") as summarized below. These leases expire over the next one to nine years. Minimum rent payments under operating leases are recognized on a straight-line basis over the term of the lease.

Leases contain termination clauses with associated penalties, the amount of which cause the likelihood of cancellation to be remote. At the end of the lease term, the leased assets may be returned to the lessor by the Company, the Company may negotiate with the lessor to purchase the assets at fair market value, or the Company may negotiate with the lessor to renew the lease at market rental rates. No residual value guarantees are contained in the leases. No financial covenants are contained within the lease; however, the lease contains customary operational covenants such as the requirement that the Company properly maintain the leased assets and carry appropriate insurance. The leases include credit support in the form of either cash, collateral or letters of credit. See Note 19, "Commitments and Contingencies" for a description of cash held as security associated with the leases.

The Company has finance leases associated with its property and equipment in Latham, New York and at fueling customer locations. The fair value of this finance obligation approximated the carrying value as of June 30, 2023.

Future minimum lease payments under operating and finance leases (with initial or remaining lease terms in excess of one year) as of June 30, 2023 were as follows (in thousands):

	Operating Lease Liability	Finance Lease Liability	Total Lease Liabilities
Remainder of 2023	$ 46,031	$ 5,850	$ 51,881
2024	93,268	11,674	104,942
2025	88,561	14,591	103,152
2026	79,691	11,736	91,427
2027	65,412	8,456	73,868
2028 and thereafter	116,483	1,468	117,951
Total future minimum payments	489,446	53,775	543,221
Less imputed interest	(141,212)	(7,070)	(148,282)
Total	$ 348,234	$ 46,705	$ 394,939

Rental expense for all operating leases was $23.3 million and $15.1 million for the three months ended June 30, 2023 and 2022, respectively. Rental expense for all operating leases was $45.2 million and $29.2 million for the six months ended June 30, 2023 and 2022, respectively.

At June 30, 2023 and December 31, 2022, security deposits associated with sale/leaseback transactions were $7.4 million and $5.8 million, respectively, and were included in other assets in the unaudited interim condensed consolidated balance sheets.

At June 30, 2023 and December 31, 2022, the right of use assets associated with finance leases was $62.7 million and $58.4 million, respectively. The accumulated depreciation for these right of use assets was $6.7 million and $4.7 million at June 30, 2023 and December 31, 2022, respectively.

Other information related to the operating leases are presented in the following table:

	Six Months Ended June 30, 2023	Six Months Ended June 30, 2022
Cash payments (in thousands)	$ 43,304	$ 27,601
Weighted average remaining lease term (years)	6.16	5.28
Weighted average discount rate	11.2%	10.8%

Finance lease costs include amortization of the right of use assets (i.e., depreciation expense) and interest on lease liabilities (i.e., interest and other expense, net in the consolidated statement of operations), and were $1.1 million and $0.8 million for the three months ended June 30, 2023, respectively, and were $2.2 million and $1.5 million for the six months ended June 30, 2023, respectively.

18. Finance Obligation

The Company has sold future services to be performed associated with certain sale/leaseback transactions and recorded the balance as a finance obligation. The outstanding balance of this obligation at June 30, 2023 was $358.7 million, $71.9 million and $286.8 million of which was classified as short-term and long-term, respectively, on the accompanying unaudited interim condensed consolidated balance sheet. The outstanding balance of this obligation at December 31, 2022 was $312.1 million, $55.4 million and $256.6 million of which was classified as short-term and long-term, respectively. The amount is amortized using the effective interest method. Interest expense recorded related to finance obligations for the three months ended June 30, 2023 and 2022 was $9.8 million and $6.9 million, respectively. Interest expense recorded related to finance obligations for the six months ended June 30, 2023 and 2022 was $19.0 million and $13.6 million, respectively. The fair value of this finance obligation approximated the carrying value as of June 30, 2023 and December 31, 2022.

In prior periods, the Company entered into sale/leaseback transactions that were accounted for as financing transactions and reported as part of finance obligations. The outstanding balance of finance obligations related to sale/leaseback transactions at June 30, 2023 was $18.2 million, $14.7 million and $3.5 million of which was classified as short-term and long-term, respectively on the accompanying consolidated balance sheet. The outstanding balance of this obligation at December 31, 2022 was $17.2 million, $3.5 million and $13.7 million of which was classified as short-term and long-term, respectively on the accompanying consolidated balance sheets. The fair value of this finance obligation approximated the carrying value as of June 30, 2023 and December 31, 2022.

Future minimum payments under finance obligations notes above as of June 30, 2023 were as follows (in thousands):

	Sale of future revenue - debt	Sale/leaseback financings	Total Finance Obligations
Remainder of 2023	$ 52,279	$ 2,450	$ 54,729
2024	104,558	10,793	115,351
2025	99,301	1,890	101,191
2026	82,578	1,890	84,468
2027	66,007	1,890	67,897
2028 and thereafter	64,736	2,347	67,083
Total future minimum payments	469,459	21,260	490,719
Less imputed interest	(110,800)	(3,110)	(113,910)
Total	$ 358,659	$ 18,150	$ 376,809

19. Commitments and Contingencies

Restricted Cash

In connection with certain of the above noted sale/leaseback agreements, cash of $479.7 million and $383.7 million was required to be restricted as security as of June 30, 2023 and December 31, 2022, respectively, which restricted cash will be released over the lease term. As of June 30, 2023 and December 31, 2022, the Company also had certain letters of credit backed by security deposits totaling $409.9 million and $379.6 million, respectively, of which $387.4 million and $354.0 million are security for the above noted sale/leaseback agreements, respectively, and $22.5 million and $25.6 million are customs related letters of credit, respectively.

As of both June 30, 2023 and December 31, 2022, the Company had $75.5 million held in escrow related to the construction of certain hydrogen plants.

The Company also had $1.2 million and $1.2 million of consideration held by our paying agent in connection with each of the Joule and CIS acquisitions, respectively, reported as restricted cash as of June 30, 2023, with a corresponding accrued liability on the Company's unaudited interim condensed consolidated balance sheet. Additionally, the Company had $6.4 million and $10.8 million in restricted cash as collateral resulting from the Frames acquisition as of June 30, 2023 and December 31, 2022, respectively.

Litigation

Legal matters are defended and handled in the ordinary course of business. Liabilities for loss contingencies arising from claims, assessments, litigation, fines, and penalties and other sources are recorded when it is probable that a liability has been incurred and the amount can be reasonably estimated. Legal costs incurred in connection with loss contingencies are expensed as incurred. The Company has not recorded any accruals related to any legal matters.

As previously disclosed, several actions were filed in the U.S. District Courts for the Southern District of New York and for the Central District of California asserting claims under the federal securities laws against the Company and two of its senior officers, Mr. Marsh and Mr. Middleton. On July 22, 2021, the court consolidated those actions into In re Plug Power, Inc. Securities Litigation, No. 1:21-cv-2004, pending in the U.S. District Court for the Southern District of New York (the "Securities Action") and appointed a lead plaintiff. On October 6, 2021, lead plaintiff filed a consolidated amended complaint asserting claims on behalf of a putative class composed of all persons who purchased or otherwise acquired the Company's securities between November 9, 2020 and March 16, 2021 (the "Amended Complaint"). The Amended Complaint asserted a claim against all defendants for alleged violations of Section 10(b) of the Securities Exchange Act of 1934 (the "Exchange Act") and Rule 10b5 promulgated thereunder and a claim under Section 20(a) of the Exchange Act against Mr. Marsh and Mr. Middleton as alleged controlling persons. The Amended Complaint alleged that defendants made "materially false" statements concerning (1) adjusted EBITDA; (2) fuel delivery and research and development expenses; (3) costs related to provision for loss contracts; (4) gross losses; and (5) the effectiveness of internal controls and procedures (the "accounting-related statements"), and that these alleged misstatements caused losses and damages for members of the alleged class. On December 6, 2021, defendants filed a motion to dismiss the Amended Complaint. In an opinion and order entered on September 29, 2022, the court granted defendants' motion to dismiss the Amended Complaint in its entirety but permitted the lead plaintiff to further amend the complaint. On November 21, 2022, the lead plaintiff filed a second amended complaint purporting to assert claims under the same provisions against the same defendants on behalf of the same alleged class of purchasers of the Company's securities (the "Second Amended Complaint"). The Second Amended Complaint largely repeated the allegations in the Amended Complaint but, in addition, alleged that various public statements during the alleged class period were false or misleading because they allegedly failed to disclose the status of discussions and considerations relating to warrants to purchase the Company's common stock that were granted to a customer in connection with a commercial agreement. The defendants filed a motion to dismiss the Second Amended Complaint in its entirety on January 12, 2023.

On March 31, 2021, Junwei Liu, an alleged Company stockholder, derivatively and on behalf of nominal defendant Plug, filed a complaint in the U.S. District Court for the Southern District of New York against certain Company directors and officers (the "Derivative Defendants"), captioned Liu v. Marsh et al., Case No. 1:21-cv-02753 (S.D.N.Y.) (the "Liu Derivative Complaint"). The Liu Derivative Complaint alleges that, between November 9, 2020 and March 1, 2021, the Derivative Defendants "made, or caused the Company to make, materially false and misleading statements concerning Plug Power's business, operations, and prospects" by "issu[ing] positive financial information and optimistic guidance, and made assurances that the Company's internal controls were effective," when, "[i]n reality, the Company's internal controls suffered from material deficiencies that rendered them ineffective." The Liu Derivative Complaint asserts claims for (1) breach of fiduciary duties, (2) unjust enrichment, (3) abuse of control, (4) gross mismanagement, (5) waste of corporate assets, and (6) contribution under Sections 10(b) and 21D of the Exchange Act (as to the named officer defendants). The Liu Derivative Complaint seeks a judgment "[d]eclaring that Plaintiff may maintain this action on behalf of Plug"; "[d]eclaring that the [Derivative] Defendants have breached and/or aided and abetted the breach of their fiduciary duties"; "awarding to Plug Power the damages sustained by it as a result of the violations" set forth in the Liu Derivative Complaint, "together with pre-judgment and post-judgment interest thereon"; "[d]irecting Plug Power and the [Derivative] Defendants to take all necessary actions to reform and improve Plug Power's corporate governance and internal procedures to comply with applicable laws"; and "[a]warding Plaintiff the costs and disbursements of this action, including reasonable attorneys' and experts' fees, costs, and expenses"; and "[s]uch other and further relief as the [c]ourt may deem just and proper."

On April 5, 2021, alleged Company stockholders Elias Levy and Camerohn X. Withers, derivatively and on behalf of nominal defendant Plug, filed a complaint in the U.S. District Court for the Southern District of New York against the Derivative Defendants named in the Liu Derivative Complaint, captioned Levy et al. v. McNamee et al., Case No. 1:21-cv-02891 (S.D.N.Y.) (the "Levy Derivative Complaint"). The Levy Derivative Complaint alleges that, from November 9, 2020 to April 5, 2021, the Derivative Defendants "breached their duties of loyalty and good faith" by failing to disclose "(1) that the Company would be unable to timely file its 2020 annual report due to delays related to the review of classification of certain costs and the recoverability of the right to use assets with certain leases; (2) that the Company was reasonably likely to report material weaknesses in its internal control over financial reporting; and (3) that, as a result of the foregoing, Defendants' positive statements about the Company's business, operations, and prospects were materially misleading and/or lacked a reasonable basis." The Levy Derivative Complaint asserts claims for (1) breach of fiduciary duty (as to the named director defendants), (2) unjust enrichment (as to certain named director defendants), (3) waste of corporate assets (as to the named director defendants), and (4) violations of Sections 10(b) and 21D of the Exchange Act (as to the named officer defendants). The Levy Derivative Complaint seeks a judgment "declaring that Plaintiffs may maintain this action on behalf of the Company"; finding the Derivative Defendants "liable for breaching their fiduciary duties owed to the Company"; directing the Derivative Defendants "to take all necessary actions to reform and improve the Company's corporate governance, risk management, and internal operating procedures to comply with applicable laws"; "awarding damages to the Company for the harm the Company suffered as a result of Defendants' wrongful conduct"; "awarding damages to the Company for [the named officer Derivative Defendants'] violations of Sections 10(b) and 21D of the Exchange Act"; "awarding Plaintiffs the costs and disbursements of this action, including attorneys', accountants', and experts' fees"; and "awarding such other and further relief as is just and equitable." The Liu Derivative Complaint and the Levy Derivative Complaint have been consolidated in In re Plug Power Derivative Litigation, Lead Case No. 1:21-cv-02753-ER and, by stipulation approved by the Court, the cases have been stayed pending the resolution of the motion to dismiss in the Securities Class action.

On May 13, 2021, alleged Company stockholder Romario St. Clair, derivatively and on behalf of nominal defendant Plug, filed a complaint in the Supreme Court of the State of New York, County of New York against the derivative defendants named in the Liu derivative Complaint, captioned St. Clair v. Plug Power Inc. et al., Index No. 653167/2021 (N.Y. Sup. Ct., N.Y. Cty.) (the "St. Clair Derivative Complaint"). The St. Clair derivative Complaint alleges that, for approximately two years from March 13, 2019 onwards, the company made a number of improper statements that "failed to disclose and misrepresented the following material, adverse facts, which the [derivative] defendants knew, consciously disregarded, or were reckless in not knowing", including: "(a) that the Company was experiencing known but undisclosed material weaknesses in its internal controls over financial reporting; (b) the Company was overstating the carrying amount of certain right of use assets and finance obligations associated with leases; (c) the Company was understating its loss accrual on certain service contracts; (d) the Company would need to take impairment charges relating to certain long-lived assets; (e) the Company was improperly classifying research and development costs versus costs of goods sold; and (f) the Company would be unable to file its annual Report for the 2020 fiscal year due to these errors." The St. Clair Derivative Complaint asserts claims for (1) breach of fiduciary and (2) unjust enrichment. The St. Clair Derivative Complaint seeks a judgment "for the amount of damages sustained by the Company as a result of the defendants' breaches of fiduciary duties and unjust enrichment"; "[d]irecting Plug Power to take all necessary actions to reform and improve its corporate governance and internal procedures to comply with applicable laws";"[e]xtraordinary equitable and/or injunctive relief as permitted by law, equity, and state statutory provisions"; [a]warding to Plug Power restitution from defendants, and each of them, and ordering disgorgement of all profits, benefits, and other compensation obtained by the defendants"; [a]warding to plaintiff the costs and disbursements of the action, including reasonable attorneys' fees, accountants' and experts' fees, costs, and expenses"; and "[g]ranting such other and further relief as the [c]ourt deems just and proper." By stipulation approved by the Court, the case has been stayed pending the resolution of the motion to dismiss in the Securities Class action.

On June 13, 2022, alleged Company stockholder Donna Max, derivatively on behalf of the Company as nominal defendant, filed a complaint in the United States District Court for the District of Delaware against the derivative defendants named in the Liu Derivative Complaint, captioned Max v. Marsh, et. al., Case No. 1:22-cv-00781 (D. Del.) (the "Max Derivative Complaint"). The Max Derivative Complaint alleges that, for the years 2018, 2019 and 2020, the defendants did not "assure that a reliable system of financial controls was in place and functioning effectively"; "failed to disclose errors in the Company's accounting primarily relating to (i) the reported book value of right of use assets and related finance obligations, (ii) loss accruals for certain service contracts, (iii) the impairment of certain long-lived assets, and (iv) the classification of certain expenses previously included in research and development costs"; and that certain defendants traded Company stock at "artificially inflated stock prices." The Max Derivative Complaint asserts claims for (1) breach of fiduciary against all defendants; (2) breach of fiduciary duty for insider trading against certain defendants; and (3) contribution under Sections 10(b) and 21D of the Exchange Act against certain defendants. The Max Derivative Complaint seeks an award "for the damages sustained by [the Company]" and related relief. By stipulation approved by the Court, the case has been stayed pending the resolution of the motion to dismiss in the Securities Action.

On June 29, 2022, alleged Company stockholder Abbas Khambati, derivatively on behalf of the Company as nominal defendant, filed a complaint in the Court of Chancery in the State of Delaware against the derivative defendants named in the Liu Derivative Complaint and Gerard A. Conway, Jr. and Keith Schmid, captioned Khambati v. McNamee, et. al., C.A. No. 2022-05691 (Del. Ch.) (the "Khambati Derivative Complaint"). The Khambati Derivative Complaint alleges that the defendants “deceive[d] the investing public, including stockholders of Plug Power, regarding the Individual Defendants’ management of Plug Power’s operations and the Company’s compliance with the SEC's accounting rules”; “facilitate[d” certain defendants’ sales of “their personally held shares while in possession of material, nonpublic information”; and “enhance[d] the Individual Defendants’ executive and directorial positions at Plug Power and the profits, power, and prestige that the Individual Defendants enjoyed as a result of holding these positions.” The Khambati Derivative Complaint asserts claims for (1) breach of fiduciary; and (2) disgorgement and unjust enrichment. The Khambati Derivative Complaint seeks an award “for the damages sustained by [the Company] as a result of the breaches” alleged or “disgorgement or restitution”; “disgorgement of insider trading profits” and “all profits, benefits and other compensation obtained by [defendants’] insider trading and further profits flowing therefrom”; an order “[d]irecting the Company to take all necessary actions to reform and improve its corporate governance and internal procedures”; and related relief.

On July 19, 2022, alleged Company stockholder Anne D. Graziano, as Trustee of the Anne D. Graziano Revocable Living Trust, derivatively on behalf of the Company as nominal defendant, filed a complaint in the Court of Chancery in the State of Delaware against the derivative defendants named in the Khambati Derivative Complaint, captioned Graziano v. Marsh, et. al., C.A. No. 2022-0629 (Del. Ch.) (the “Graziano Derivative Complaint”). The Graziano Derivative Complaint alleges that the director defendants (i) “either knowingly or recklessly issued or caused the Company to issue the materially false and misleading statements” concerning “certain critical accounting issues”; (ii) “willfully ignored, or recklessly failed to inform themselves of, the obvious problems with the Company’s internal controls, practices, and procedures, and failed to make a good faith effort to correct the problems or prevent their recurrence”; (iii) the members of the Audit Committee failed “to prevent, correct, or inform the Board of the issuance of material misstatements and omissions regarding critical accounting issues and the adequacy of the Company’s internal controls”; (iv) “received payments, benefits, stock options, and other emoluments by virtue of their membership on the Board and their control of the Company”; (v) violated the Company’s Code of Conduct because they knowingly or recklessly engaged in and participated in making and/or causing the Company to make the materially false and misleading statements; and (vi) certain defendants “sold large amounts of Company stock while it was trading at artificially inflated prices.” The Graziano Derivative Complaint asserts claims for (1) breach of fiduciary; (2) breach of fiduciary duty against certain defendants for insider trading; (3) unjust enrichment; (4) aiding and abetting breach of fiduciary duty; and (5) waste of corporate assets. The Graziano Derivative Complaint seeks an award of “the amount of damages sustained by the Company”; seeks an order “[d]irecting Plug Power to take all necessary actions to reform and improve its corporate governance and internal procedures to comply with applicable laws and to protect Plug Power and its stockholders from a repeat of the damaging events described herein”; and related relief. The parties to the Graziano Derivative Complaint and Khambati Derivative Complaint have been consolidated in In re Plug Power, Inc. Stockholder Derivative Litigation, Consolidated C.A. No. 2022-0569 and, by stipulation approved by the court, the cases have been stayed pending the resolution of the motion to dismiss in the Securities Action.

On April 12, 2023, an action was filed in the U.S. District Court for the District of Delaware asserting claims under the federal securities laws against the Company and four of its senior officers, Mr. Marsh, Mr. Middleton, Mr. Mindnich, and Mr. Hull. The complaint asserts claims on behalf of a putative class composed of all persons who purchased or otherwise acquired the Company’s securities between August 9, 2022 and March 1, 2023. The complaint asserted a claim against all defendants for alleged violations of Section 10(b) of the Exchange Act and Rule 10b5 promulgated thereunder and a claim under Section 20(a) of the Exchange Act against Mr. Marsh, Mr. Middleton, Mr. Mindnich, and Mr. Hull as alleged controlling persons. The complaint alleged that defendants made “materially false and/or misleading statements” about the Company’s business and operations, including that “the Company was unable to effectively manage its supply chain and product manufacturing, resulting in reduced revenues and margins, increased inventory levels, and several large deals being delayed until at least 2023, among other issues.” On May 25, 2023, a second action was filed in the U.S. District Court for the District of Delaware, also asserting claims under the federal securities laws against the Company, Mr. Marsh, Mr. Middleton, Mr. Mindnich, and Mr. Hull. On June 29, 2023, the court consolidated these actions into In re Plug Power, Inc. Securities Litigation, No. 1:23-cv-00576-MN, pending in the U.S. District Court for the District of Delaware and appointed a lead plaintiff. Under a stipulated schedule approved by the court, a consolidated amended complaint shall be filed by September 11, 2023 and the time for all defendants to respond is extended through and including November 13, 2023.

As previously disclosed, two lawsuits were filed against the Company and other companies in the 9th District Court, Rapides Parish, Louisiana, arising from the previously disclosed May 2018 accident involving a forklift powered by the Company's fuel cell at a Procter & Gamble facility in Louisiana. Additional defendants included Structural Composite Industries, Deep South Equipment Company, Air Products and Chemicals Inc., Hyster-Yale Group. Westport Industries and Quality Thermistor, Inc. The first suit, Lott, et al v. Plug Power, et al, was filed by a number of individual plaintiffs alleging personal injury claims. Procter & Gamble intervened in that suit to recover workers compensation benefits paid to or for the employees/dependents. Procter & Gamble filed a separate suit for property damage, business interruption. The Company aggressively defended both lawsuits. The Lott case was settled in April 2022 on terms that were extremely favorable for the company. The separate P&G suit was recently settled and the dismissal has been filed, also on terms that are extremely favorable for the Company. Both settlements are funded by the Company's commercial liability insurer, and the amounts are substantially below the policy limits.

On May 2, 2023, a lawsuit entitled Jacob Thomas and JTurbo Engineering & Technology, LLC v. Joule Processing, LLC and Plug Power Inc., Case No. 4:23-cv-01615, was filed in the United States District Court for the Southern District of Texas against the Company. The complaint alleges misappropriation of trade secrets under both the federal Defend Trade Secrets Act of 2016, 18 U.S.C. § 1836, and the Texas Uniform Trade Secrets Act, three breach of contract claims, and four common law claims under Texas law. On July 28, 2023, Joule Processing, LLC and Plug Power Inc. filed a partial motion to dismiss.

On May 10, 2023, an action entitled Ringling v. Plug Power, Inc., et al, Case No. 1:23-cv-572, was filed in the U.S. District Court for the Northern District of New York asserting claims pursuant to 42 U.S.C. § 1981, Title VII of the Civil Rights Act of 1964, and the New York State Human Rights Law against the Company, Tom Rourke, individually, and/or Tom O'Grady, individually. The complaint asserts that the plaintiff is seeking damages to redress injuries suffered as a result of harassment and discrimination on the basis of his race, together with creating a hostile work environment, failure to promote, retaliation, and constructive discharge. Plug disagrees with plaintiff's representations about his time at Plug and intends to vigorously defend against his allegations.

On June 12, 2023, an action was filed in the U.S. District Court for the Northern District of New York asserting claims under the federal securities laws against the Company and four of its senior officers, Mr. Marsh, Mr. Middleton, Mr. Mindnich, and Mr. Hull. The complaint asserts claims on behalf of a putative class composed of all persons who purchased or otherwise acquired the Company's securities between August 9, 2022 and March 1, 2023. The complaint asserted a claim against all defendants for alleged violations of Section 10(b) of the Exchange Act and Rule 10b5 promulgated thereunder and a claim under Section 20(a) of the Exchange Act against Mr. Marsh, Mr. Middleton, Mr. Mindnich, and Mr. Hull as alleged controlling persons. The complaint alleged that defendants made "materially false and misleading" statements, "and failed to disclose material adverse facts," about the Company's business and operations, including that "the Company was unable to effectively manage its supply chain and product manufacturing, resulting in reduced revenues and margins, increased inventory levels, and several large deals being delayed until at least 2023, among other issues." On June 27, 2023, the plaintiff filed a Notice of Voluntary Dismissal Without Prejudice against all defendants.

On July 24, 2023, an action entitled Felton v. Plug Power, Inc., Case No. 1:23-cv-887, was filed in the U.S. District Court for the Northern District of New York asserting claims against the Company pursuant to the New York State Human Rights Law. The complaint asserts that the plaintiff is seeking damages to redress injuries suffered as a result of harassment and discrimination on the basis of his race, together with creating a hostile work environment, and retaliation. Plug disagrees with plaintiff's representations about his time at Plug and intends to vigorously defend against his allegations.

Concentrations of Credit Risk

Financial instruments that potentially subject the Company to credit risk consist principally of cash, cash equivalents, restricted cash, accounts receivable and marketable securities. Cash and restricted cash are maintained in accounts with financial institutions, which, at times may exceed the Federal depository insurance coverage of $0.3 million. The Company has not experienced losses on these accounts and management believes, based upon the quality of the financial institutions, that the credit risk with regard to these deposits is not significant. The Company's available-for-sale securities consists primarily of investments in U.S. Treasury securities and short-term high credit quality corporate debt securities. Equity securities are comprised of fixed income and equity market index mutual funds.

Concentrations of credit risk with respect to receivables exist due to the limited number of select customers with whom the Company has commercial sales arrangements. To mitigate credit risk, the Company performs appropriate evaluation of a prospective customer's financial condition.

At June 30, 2023, two customers comprised 33.7% of the total accounts receivable balance. At December 31, 2022, one customer comprised approximately 24.9% of the total accounts receivable balance.

For purposes of assigning a customer to a sale/leaseback transaction completed with a financial institution, the Company considers the end user of the assets to be the ultimate customer. For the three and six months ended June 30, 2023, 63.0% and 41.9% of total consolidated revenues were associated with two customers, respectively. For the three and six months ended June 30, 2022, 38.0% and 35.5% of total consolidated revenues were associated with two customers, respectively.

Guarantee

On May 30, 2023, HyVia entered into a government grant agreement with Bpifrance. As part of the agreement, our wholly-owned subsidiary, Plug Power France, was required to issue a guarantee to Bpifrance in the amount of €20 million through the end of January 2027. Plug Power France is liable to the extent of the guarantee for sums due to Bpifrance from HyVia under the agreement based on the difference between the total amount paid by Bpifrance and the final amount certified by HyVia and Bpifrance. As part of the agreement, there are certain milestones that HyVia is required to meet, and the non-performance of these milestones or termination of this agreement could result in this guarantee being called upon. As of June 30, 2023, no payments related to this guarantee have been made by the Company, and Plug Power France did not record a liability for this guarantee as the likelihood of the guarantee being called upon as of June 30, 2023 is remote.

Unconditional purchase obligations

The Company has entered into certain off–balance sheet commitments that require the future purchase of goods or services ("unconditional purchase obligations"). The Company's unconditional purchase obligations primarily consist of supplier arrangements, take or pay contracts and service agreements. For certain vendors, the Company's unconditional obligation to purchase a minimum quantity of raw materials at an agreed upon price is fixed and determinable; while certain other raw material costs will vary due to product forecasting and future economic conditions. Future payments under non-cancelable unconditional purchase obligations with a remaining term in excess of one year as of June 30, 2023, are as follows (in thousands):

Remainder of 2023	$ 26,354
2024	43,811
2025	8,023
2026	8,023
2027	2,638
2028 and thereafter	—
Total	$ 88,849

20. Employee Benefit Plans

2011 and 2021 Stock Option and Incentive Plan

The Company has issued stock-based awards to employees and members of its Board of Directors (the "Board") consisting of stock options and restricted stock and restricted stock unit awards. The Company accounts for all stock-based awards to employees and members of the Board as compensation costs in the consolidated financial statements based on their fair values measured as of the date of grant. These costs are recognized over the requisite service period. Stock-based compensation costs recognized, excluding the Company's matching contributions of $3.0 million to the Plug Power Inc. 401(k) Savings & Retirement Plan and quarterly Board compensation, were $36.9 million and $42.6 million for the three months ended June 30, 2023 and June 30, 2022, respectively. Stock-based compensation costs recognized, excluding the Company's matching contributions of $6.0 million to the Plug Power Inc. 401(k) Savings & Retirement Plan and quarterly Board compensation, were $77.0 million and $83.5 million for the six months ended June 30, 2023 and June 30, 2022, respectively. The methods and assumptions used in the determination of the fair value of stock-based awards are consistent with those described in our 2022 Form 10-K.

The components and classification of stock-based compensation expense, excluding the Company's matching contributions to the Plug Power Inc. 401(k) Savings & Retirement Plan and quarterly Board compensation, were as follows (in thousands):

	Three Months Ended		Six Months Ended	
	June 30, 2023	June 30, 2022	June 30, 2023	June 30, 2022
Cost of sales	$ 2,439	$ 1,268	$ 5,116	$ 3,144
Research and development	1,765	857	4,047	2,579
Selling, general and administrative	32,657	40,428	67,886	77,776
	$ 36,861	$ 42,553	$ 77,049	$ 83,499

Option Awards

The Company issues options that are time and performance-based awards. All option awards are determined to be classified as equity awards.

Service Stock Options Awards

The following table reflects the service stock option activity for the six months ended June 30, 2023:

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Terms	Aggregate Intrinsic Value
Options outstanding at December 31, 2022	$ 12,078,269	$ 14.34	$ 7.57	$ 42,835
Granted	471,593	9.94		
Exercised	(186,437)	3.93		
Forfeited	(467,033)	24.74		
Options outstanding at June 30, 2023	$ 11,896,392	$ 13.92	$ 7.17	$ 33,238
Options exercisable at June 30, 2023	6,963,514	10.09	6.10	32,391
Options unvested at June 30, 2023	$ 4,932,878	$ 19.33	$ 8.66	$ 847

The weighted average grant date fair value of the service stock options granted during the six months ended June 30, 2023 and 2022 was $6.76 and $15.68, respectively. The total intrinsic fair value of service stock options exercised during the six months ended June 30, 2023 and 2022 was $1.8 million and $4.1 million, respectively. The total fair value of the service stock options that vested during the six months ended June 30, 2023 and 2022 was approximately $9.8 million and $6.2 million, respectively.

Compensation cost associated with service stock options represented approximately $6.9 million and $6.5 million of the total share-based payment expense recorded for the three months ended June 30, 2023 and 2022, respectively. Compensation cost associated with service stock options represented approximately $15.2 million and $12.4 million of the total share-based payment expense recorded for the six months ended June 30, 2023 and 2022, respectively. As of June 30, 2023, there was approximately $40.7 million of unrecognized compensation cost related to service stock option awards to be recognized over the weighted average remaining period of 1.84 years.

Performance Stock Option Awards

In May 2023, the Compensation Committee approved the grant of performance stock options to the Company's Chief Executive Officer and certain other executive officers. These performance stock options are subject to both performance based conditions, tied to the achievement of stock price hurdles, and time-based vesting; therefore, a Monte Carlo Simulation was utilized to determine the grant date fair value with the associated expense recognized over the requisite service period. Up to one third (1/3) the performance stock options will vest and become exercisable on each of the first three anniversaries of the grant date, provided that the volume weighted average price of the Company's common stock during any 30 consecutive trading day period in the three year performance period following the grant date of the stock options ("VWAP") equals or exceeds certain levels.

There will be no interpolation for the performance stock option granted on May 18, 2023 if the VWAP falls between any two stock price hurdles, unless in the event of a change in control. For the Chief Executive Officer and executive officers, 33.33% of the performance stock options will be deemed to have satisfied the performance-based condition and will be eligible to be exercised if the VWAP equals $9.84; an additional 33.33% of the options will be deemed to have satisfied the performance-based condition and will be eligible to be exercised if the VWAP equals $11.81; and the remaining 33.34% of the options will be deemed to have satisfied the performance-based condition and will be eligible to be exercised if the VWAP equals or exceeds $13.77.

Failure to achieve any of the stock price hurdles applicable to a performance stock option during the three-year performance period will result in the applicable options not becoming exercisable. The performance-based stock options have a maximum term of seven years from the grant date.

Key inputs and assumptions used to estimate the fair value of performance stock options include the grant price of the awards, the expected option term, VWAP hurdle rates, volatility of the Company's stock, an appropriate risk-free rate, and the Company's dividend yield. Estimates of fair value are not intended to predict actual future events or the value ultimately realized by employees who receive equity awards, and subsequent events are not indicative of the reasonableness of the original estimates of fair value made by the Company.

The following table presents key assumptions used to estimate the fair value of the performance stock option awards granted in 2023:

	Six Months Ended June 30, 2023
Remaining VWAP performance period (years)	3
Risk-free interest rate	3.60%
Expected volatility	75.00%
Closing stock price on grant date	$ 7.87

The following table reflects the performance stock option award activity for the six months ended June 30, 2023. Solely for the purposes of this table, the number of performance options is based on participants earning the maximum number of performance options (i.e. 200% of the target number of performance options):

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Terms	Aggregate Intrinsic Value
Options outstanding at December 31, 2022	15,520,000	$ 26.87	5.81	$ —
Granted	6,405,000	7.87	6.88	—
Options outstanding at June 30, 2023	21,925,000	$ 21.32	5.78	$ —
Options exercisable at June 30, 2023	1,391,000	26.92	5.23	—
Options unvested at June 30, 2023	20,534,000	$ 20.94	5.81	$ —

There were 6,405,000 performance stock options granted during the six months ended June 30, 2023, compared to no performance stock options granted during the six months ended June 30, 2022. There were no performance stock options exercised during the six months ended June 30, 2023 or 2022. There were no performance stock options that vested during the six months ended June 30, 2023 or 2022.

As of June 30, 2023, there were 2,782,000 unvested stock options for which the employee requisite service period had not been rendered but were expected to vest. The aggregate intrinsic value of these unvested stock options was $0 as of June 30, 2023. The weighted average remaining contractual term of these unvested stock options was 5.81 years as of June 30, 2023.

Compensation cost associated with performance stock options represented approximately $17.9 million and $25.3 million of the total share-based payment expense recorded for the three months ended June 30, 2023 and 2022, respectively. Compensation costs associated with performance stock options represented approximately $35.3 million and $50.4 million of the total share-based payment expense recorded for the six months ended June 30, 2023 and 2022, respectively. As of June 30, 2023, there was approximately $62.9 million of unrecognized compensation cost related to performance stock option awards to be recognized over the weighted average remaining period of 1.90 years.

Restricted Common Stock and Restricted Stock Unit Awards

The Company recorded expense associated with its restricted common stock and restricted stock unit awards of approximately $12.0 million and $10.9 million for the three months ended June 30, 2023 and 2022, respectively. The Company recorded expense associated with its restricted common stock and restricted stock unit awards of approximately $26.6 million and $20.7 million for the six months ended June 30, 2023 and 2022, respectively. Additionally, as of June 30, 2023, there was $73.7 million of unrecognized compensation cost related to restricted stock and restricted common stock unit awards to be recognized over the weighted average period of 1.85 years.

A summary of restricted stock and restricted stock unit activity for the six months ended June 30, 2023 is as follows (in thousands except share amounts):

	Shares	Weighted Average Grant Date Fair Value	Aggregate Intrinsic Value
Unvested restricted common stock and restricted stock units at December 31, 2022	6,276,376	$ 21.56	$ 77,639
Granted	388,693	10.42	—
Vested	(561,915)	29.96	—
Forfeited	(573,323)	24.43	—
Unvested restricted common stock and restricted stock units at June 30, 2023	5,529,831	$ 19.62	$ 57,455

The weighted average grant-date fair value of the restricted common stock and restricted stock unit awards granted during the six months ended June 30, 2023 and 2022 was $10.42 and $24.30, respectively. The total fair value of restricted shares of common stock and restricted stock unit awards that vested for the six months ended June 30, 2023 and 2022 was $16.8 million and $8.9 million, respectively.

401(k) Savings & Retirement Plan

The Company issued 547,174 shares of common stock and 201,180 shares of common stock pursuant to the Plug Power Inc. 401(k) Savings & Retirement Plan during the six months ended June 30, 2023 and 2022, respectively.

The Company's expense for this plan was approximately $3.0 million and $2.0 million for the three months ended June 30, 2023 and 2022, respectively. The Company's expense for this plan was approximately $6.0 million and $4.3 million for the six months ended June 30, 2023 and 2022, respectively.

Non-Employee Director Compensation

The Company granted 11,466 shares of common stock and 6,650 shares of common stock to non-employee directors as compensation for the three months ended June 30, 2023 and 2022, respectively. The Company granted 21,782 shares of common stock and 9,940 shares of common stock to non-employee directors as compensation for the six months ended June 30, 2023 and 2022, respectively. All common stock issued is fully vested at the time of issuance and is valued at fair value on the date of issuance. The Company's share-based compensation expense in connection with non-employee director compensation was approximately $0.1 million and $0.1 million for the three months ended June 30, 2023 and 2022, respectively. The Company's share-based compensation expense in connection with non-employee director compensation was approximately $0.2 million for each of the six months ended June 30, 2023 and 2022, respectively.

21. Accrued Expenses

Accrued expenses at June 30, 2023 and December 31, 2022 consisted of (in thousands):

	June 30, 2023	December 31, 2022
Accrued payroll and compensation related costs	$ 25,396	$ 18,231
Accrual for capital expenditures	63,815	53,089
Accrued accounts payable	61,451	53,899
Accrued sales and other taxes	11,744	15,112
Accrued interest	414	421
Accrued other	3,495	15,678
Total	$ 166,315	$ 156,430

22. Segment Reporting

Our organization is managed from a sales perspective on the basis of "go-to-market" sales channels, emphasizing shared learning across end user applications and common supplier/vendor relationships. These sales channels are structured to serve a range of customers for our products and services. As a result of this structure, we concluded that we have one operating and reportable segment — the design, development and sale of fuel cells and hydrogen producing equipment. Our chief executive officer was identified as the chief operating decision maker (CODM). All significant operating decisions made by management are largely based upon the analysis of Plug Power Inc. on a total company basis.

The revenue and long-lived assets based on geographic location are as follows:

	Revenues Three Months Ended		Revenues Six Months Ended		Long-Lived Assets as of Six Months Ended	
	June 30, 2023	June 30, 2022	June 30, 2023	June 30, 2022	June 30, 2023	December 31, 2022
North America	$ 235,521	$ 115,213	$ 397,327	$ 228,194	$ 1,591,074	$ 1,209,900
Europe	12,143	15,404	52,259	30,326	27,546	13,215
Asia	5,998	17,115	9,280	27,288	—	—
Other	6,520	3,535	11,602	6,262	—	—
Total	$ 260,182	$ 151,267	$ 470,468	$ 292,070	$ 1,618,620	$ 1,223,115

23. Subsequent Events

We have evaluated events as of August 9, 2023 and have not identified any subsequent events.

Item 2 — Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion should be read in conjunction with our accompanying unaudited interim condensed consolidated financial statements and notes thereto included within this Quarterly Report on Form 10-Q, and our audited and notes thereto included in our 2022 Form 10-K. In addition to historical information, this Quarterly Report on Form 10-Q and the following discussion contain statements that are not historical facts and are considered forward-looking within the meaning of Section 27A of the Securities Act, and Section 21E of the Exchange Act. These forward-looking statements contain projections of our future results of operations or of our financial position or state other forward-looking information. In some cases, you can identify these statements by forward-looking words such as "believe," "could," "continue," "estimate," "expect," "forecast," "intend," "may," "should," "will," "would," "plan," "project" or the negative of such words or other similar words or phrases. We believe that it is important to communicate our future expectations to our investors. However, there may be events in the future that we are not able to accurately predict or control and that may cause our actual results to differ materially from the expectations we describe in our forward-looking statements. Investors are cautioned not to unduly rely on forward-looking statements because they involve risks and uncertainties, and actual results may differ materially from those discussed as a result of various factors, including, but not limited to:

- the risk that we continue to incur losses and might never achieve or maintain profitability;
- the risk that we will need to raise additional capital to fund our operations and such capital may not be available to us;
- the risks associated with global economic uncertainty, including inflationary pressures, fluctuating interest rates, currency fluctuations, bank failure, and supply chain disruptions;
- the risk that we may not be able to expand our business or manage our future growth effectively;
- the risk that delays in or not completing our product development and hydrogen plant construction goals may adversely affect our revenue and profitability;
- the risk with regards to the impact of the Inflation Reduction Act on our business;
- the risk that we may be unable to successfully pursue, integrate, or execute upon our new business ventures;
- the risk of dilution to our stockholders and/or stock price should we need to raise additional capital;
- the risk that our lack of extensive experience in manufacturing and marketing of certain of our products may impact our ability to manufacture and market said products on a profitable and large-scale commercial basis;
- the risk that unit orders may not ship, be installed and/or converted to revenue, in whole or in part;
- the risk that a loss of one or more of our major customers could result in a material adverse effect on our financial condition, or if one of our major customers delays payment of or is unable to pay its receivables, a material adverse effect could result on our financial condition;
- the risk that a sale or issuance of a significant number of shares of stock could depress the market price of our common stock;
- the risk that our convertible senior notes, if settled in cash, could have a material adverse effect on our financial results;
- the risk that our convertible note hedges may affect the value of our convertible senior notes and our common stock;
- the risk that negative publicity related to our business or stock could result in a negative impact on our stock value and profitability;
- the risk of potential losses related to any product liability claims or contract disputes;
- the risk of loss related to an inability to remediate the material weaknesses identified in internal control over financial reporting as of December 31, 2022 and 2021, or inability to otherwise maintain an effective system of internal control over financial reporting;
- our ability to attract and retain key personnel;
- the risks related to the use of flammable fuels in our products;
- the risk that pending orders may not convert to purchase orders, in whole or in part;
- the cost and timing of developing, marketing, and selling our products;
- the risks involved with participating in joint ventures, including our ability or inability to execute our strategic growth plan through joint ventures;

- our ability to obtain financing arrangements to support the sale or leasing of our products and services to customers;
- our ability to achieve the forecasted revenue and costs on the sale of our products;
- the cost and availability of fuel and fueling infrastructures for our products;
- the risks, liabilities, and costs related to environmental, health, and safety matters;
- the risk of elimination or reduction of government subsidies and economic incentives for alternative energy products;
- market acceptance of our products and services;
- our ability to establish and maintain relationships with third parties with respect to product development, manufacturing, distribution, and servicing, and the supply of key product components;
- the cost and availability of components and parts for our products;
- the risk that possible new tariffs could have a material adverse effect on our business;
- our ability to develop commercially viable products;
- our ability to reduce product and manufacturing costs;
- our ability to successfully market, distribute and service our products and services internationally;
- our ability to improve system reliability for our products;
- competitive factors, such as price competition and competition from other traditional and alternative energy companies;
- our ability to protect our intellectual property;
- our operational dependency on information technology and the risk of the failure of such technology, including failure to effectively prevent, detect, and recover from security compromises or breaches, including cyber-attacks;
- the cost of complying with current and future federal, state and international governmental regulations;
- the expense and resources associated with being subject to legal proceedings and legal compliance;
- the risks associated with past and potential future acquisitions;
- the risks associated with geopolitical instability, including the conflict between Russia and Ukraine and growing tensions between U.S. and China and neighboring regions; and
- the volatility of our stock price.

The risks included here are not exhaustive, and additional factors could adversely affect our business and financial performance, including factors and risks discussed in the section titled “Risk Factors” included under Part I, Item 1A, in our 2022 Form 10-K and supplemented by Part II, Item 1A of the Quarterly Report on Form 10-Q for the quarter ended March 31, 2023 and Part II, Item 1A of this Quarterly Report on Form 10-Q. Moreover, we operate in a very competitive and rapidly changing environment. New risk factors emerge from time to time, and it is not possible for management to predict all such risk factors, nor can we assess the impact of all such risk factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from these contained in any forward-looking statements. While forward-looking statements reflect our good faith beliefs, they are not guarantees of future performance. These forward-looking statements speak only as of the date on which the statements were made. Except as may be required by applicable law, we do not undertake or intend to update any forward-looking statements after the date of this Quarterly Report on Form 10-Q.

References in this Quarterly Report on Form 10-Q to “Plug,” the “Company,” “we,” “our” or “us” refer to Plug Power Inc., including as the context requires, its subsidiaries.

Overview

Plug is facilitating the paradigm shift to an increasingly electrified world by innovating cutting-edge hydrogen and fuel cell solutions. While we continue to develop commercially viable hydrogen and fuel cell product solutions, we have expanded our offerings to support a variety of commercial operations that can be powered with green hydrogen. We provide electrolyzers that allow customers — such as refineries, producers of chemicals, steel, fertilizer and commercial refueling stations — to generate hydrogen on-site. We are focusing our efforts on (a) industrial mobility applications, including electric forklifts and electric industrial vehicles, at multi-shift high volume manufacturing and high throughput distribution sites where we believe our products and services provide a unique combination of productivity, flexibility, and environmental benefits; (b) stationary power systems that will support critical operations, such as data centers, microgrids, and generation facilities, in either a backup power or continuous power role and replace batteries, diesel generators or the grid for telecommunication logistics, transportation, and utility customers; and (c) production of hydrogen. Plug expects to support these products and customers with an ecosystem of vertically integrated products that produce, transport, store and handle, dispense, and use hydrogen for mobility and power applications.

Our current products and services include:

GenDrive: GenDrive is our hydrogen fueled Proton Exchange Membrane ("PEM") fuel cell system, providing power to material handling electric vehicles, including Class 1, 2, 3 and 6 electric forklifts, Automated Guided Vehicles, and ground support equipment.

GenFuel: GenFuel is our liquid hydrogen fueling delivery, generation, storage, and dispensing system.

GenCare: GenCare is our ongoing "Internet of Things"-based maintenance and on-site service program for GenDrive fuel cell systems, GenSure fuel cell systems, GenFuel hydrogen storage and dispensing products and ProGen fuel cell engines.

GenSure: GenSure is our stationary fuel cell solution providing scalable, modular PEM fuel cell power to support the backup and grid-support power requirements of the telecommunications, transportation, and utility sectors; GenSure High Power Fuel Cell Platform will support large scale stationary power and data center markets.

GenKey: GenKey is our vertically integrated "turn-key" solution combining either GenDrive or GenSure fuel cell power with GenFuel fuel and GenCare aftermarket service, offering complete simplicity to customers transitioning to fuel cell power.

ProGen: ProGen is our fuel cell stack and engine technology currently used globally in mobility and stationary fuel cell systems, and as engines in electric delivery vans. This includes Plug's membrane electrode assembly, a critical component of the fuel cell stack used in zero-emission fuel cell electric vehicle engines.

Electrolyzers: The design and implementation of 5 and 10MW electrolyzer systems that are modular, scalable hydrogen generators optimized for clean hydrogen production. Electrolyzers generate hydrogen from water using electricity and a special membrane and "green" hydrogen is generated by using renewable energy inputs, such as solar or wind power.

Liquefaction Systems: Plug's 15 ton-per-day and 30 ton-per-day liquefiers are engineered for high efficiency, reliability, and operational flexibility — providing consistent liquid hydrogen to customers. This design increases plant reliability and availability while minimizing parasitic losses like heat leak and seal gas losses.

Cryogenic Equipment: Engineered equipment including trailers and mobile storage equipment for the distribution of liquified hydrogen, oxygen, argon, nitrogen and other cryogenic gases.

We provide our products and solutions worldwide through our direct sales force, and by leveraging relationships with original equipment manufacturers ("OEMs") and their dealer networks. We are currently targeting Asia, Australia, Europe, Middle East and North America for expansion in adoption. The European Union (the "EU") has rolled out ambitious targets for the hydrogen economy as part of the EU strategy for energy integration and we are seeking to execute on our strategy to become one of the European leaders in the hydrogen economy. This includes a targeted account strategy for material handling, securing strategic partnerships with European OEMs, energy companies, utility leaders and accelerating our electrolyzer business. Our global strategy includes leveraging a network of integrators or contract manufacturers. Additionally, we have a joint venture with Niloco Hydrogen Holdings LLC, a wholly-owned subsidiary of

Olin named “Hidrogenii”. Plug has been successful with acquisitions, strategic partnerships and joint ventures, and we plan to continue this mix.

Part of our long-term plan includes Plug penetrating the European and Asian hydrogen market, on-road vehicle market, and large-scale stationary market. Plug’s formation of joint ventures with HyVia and AccionaPlug in Europe and SK Plug Hyverse in Asia not only support this goal but are expected to provide us with a more global footprint.

We manufacture our commercially viable products in Latham, New York, Rochester, New York, Slingerlands, New York, Houston, Texas, Lafayette, Indiana, and Spokane, Washington, and support liquid hydrogen production and logistics in Charleston, Tennessee and Kingsland, Georgia.

Recent Developments

Cybersecurity Update

In or around March 2023, an unauthorized actor accessed our computer network and executed a ransomware attack, resulting in the encryption of certain of our computer systems, including systems used to store proprietary and confidential data, and exfiltration of limited data sets. Upon detection, we took immediate steps to contain, assess and remediate the incident, including engaging outside legal counsel and external forensic investigators. Necessarily, the Company has incurred costs in addressing the incident, including related to investigation, containment, restoration, and remediation. As a result of the unauthorized access, the Company’s employees experienced interruption of access to the internal network, which created temporary disruption of certain internal operations and automated processes. As of the date of the filing for the Form 10-Q for the quarter ended March 31, 2023, the Company had restored the affected systems and throughout this restoration period the Company’s business remained fully operational with no material disruption. Based on information available to date, we do not believe the ransomware event has had a material impact on our business as of and for the six-month period ended June 30, 2023.

COVID-19 Update

While we no longer enforce our prior COVID-19 policies with respect to weekly COVID-19 testing, face coverings, or daily COVID-19 questionnaires, we continue to monitor the COVID-19 pandemic and emerging variants and remain prepared to adjust our policies and safety protocols in line with guidance from state and federal agencies. Employees are still expected to remain home if they are not feeling well and should contact our COVID team for guidance. Furthermore, we have resumed all commercial air travel and all other non-critical travel, while also allowing employees to resume their personal travel. We have enabled third-party access to our facilities and are continuing our normal janitorial and sanitary procedures. We are no longer requiring staggered shifts in our manufacturing facilities and are offering hybrid work schedules to certain employees depending on business needs and job requirements.

Inflation, Material Availability and Labor Shortages

Most components essential to our business are generally available from multiple sources; however, we believe there are some component suppliers and manufacturing vendors, particularly those suppliers and vendors that supply materials in very limited supply worldwide or supply commodities that have high degree of volatility, whose loss to us or general unavailability could have a material adverse effect upon our business and financial condition. Furthermore, global commodity pricing is very volatile and influenced by political events and worldwide economic trends, which may impact our sourcing strategies resulting in adverse impacts on our business and financial condition. We are mitigating these potential risks by introducing alternate system architectures that we expect will allow us to diversify our supply chain with multiple fuel cell, electrolyzer stack and air supply component vendors. In addition, we continue to invest in our supply chain to improve its resilience with a focus on automation, dual sourcing of critical components and localized manufacturing when feasible. We are also working closely with these vendors and other key suppliers on coordinated product introduction plans, product and sales forecasting, strategic inventories, and internal and external manufacturing schedules and levels; however, changes to our products designs, new product serviceability trends, or incorrect forecasting could present challenges to those strategies despite best efforts in leveraging supplier relationship and capabilities. Recent cost pressures from global energy prices and inflation have negatively impacted access to our key raw materials. Additionally, our regionally diverse supply chain could result in price shifts from one region to another region that may affect our costs and strategic initiatives. In cases where we have single sourced suppliers (typically due to new technology and products or worldwide shortages due to global demand), we work to engineer alternatives in our product design or develop new supply sources while covering short- and medium-term risks with supply contracts, building up inventory, and development partnerships. However, if we, or the industry or economy at large, were to experience a recession, then we may have a large stock of pre-purchased inventory that could be unused and aging for a period of time. We continue to take proactive steps through our supply chain team to limit the impact of suppliers challenges generally and we continue to work closely with our suppliers and transportation vendors to ensure availability of products and implement other cost savings initiatives.

In January 2023, the Company entered into a strategic partnership with Johnson Matthey Hydrogen Technologies Limited, a subsidiary of Johnson Matthey PLC and a global leader in sustainable technologies (“JM”), pursuant to which JM will supply the Company catalyst coated membrane for use in the production of fuel cells as well as catalysts and membranes for use in the production of electrolyzers. In addition, the Company and JM intend to develop their existing and new technology and commercial products and co-invest in a manufacturing facility in the United States.

Additionally, we, as well as our suppliers and vendors, have observed an increasingly competitive labor market. Tight labor markets have resulted in labor inflation and longer times to fill open positions for us and our suppliers and vendors. Increased employee turnover, changes in the availability of our workers as well as labor shortages in our supply chain have resulted in, and could continue to result in, increased costs which could negatively affect our component or raw material purchasing abilities, and in turn, our financial condition, results of operations, or cash flows.

Results of Operations

Our primary sources of revenue are from sales of fuel cell systems, related infrastructure and equipment, services performed on fuel cell systems and related infrastructure, Power Purchase Agreements (PPAs), and fuel delivered to customers. A certain portion of our sales result from acquisitions in legacy markets, which we are working to transition to renewable solutions. Revenue from sales of fuel cell systems, related infrastructure and equipment represents sales of our GenDrive units, GenSure stationary backup power units, cryogenic stationary and on road storage, electrolyzers and hydrogen fueling infrastructure. Revenue from services performed on fuel cell systems and related infrastructure represents revenue earned on our service and maintenance contracts and sales of spare parts. Revenue from PPAs primarily represents payments received from customers who make monthly payments to access the Company’s GenKey solution. Revenue associated with fuel delivered to customers represents the sale of hydrogen to customers that has been purchased by the Company from a third party or generated on site.

Provision for Common Stock Warrants

On August 24, 2022, the Company and Amazon entered into the 2022 Transaction Agreement, under which the Company concurrently issued to Amazon.com NV Investment Holdings LLC, a wholly owned subsidiary of Amazon, the Amazon Warrant, to acquire the Amazon Warrant Shares, subject to certain vesting events described below. The Company and Amazon entered into the 2022 Transaction Agreement in connection with a concurrent commercial arrangement under which Amazon agreed to purchase hydrogen fuel from the Company through August 24, 2029.

In 2017, in separate transactions, the Company issued to each of Amazon.com NV Investment Holdings LLC and Walmart warrants to purchase shares of the Company’s common stock. The Company recorded a portion of the estimated fair value of the warrants as a reduction of revenue based upon the projected number of shares of common stock expected to vest under the warrants, the proportion of purchases by Amazon, Walmart and their affiliates within the period relative to the aggregate purchase levels required for vesting of the respective warrants, and the then-current fair value of the warrants. For the third tranche of the shares under Walmart’s warrant, the exercise price will be determined once the second tranche vests. For the third tranche of the Amazon Warrant Shares, see below for the exercise price and measurement dates used.

The amount of provision for common stock warrants recorded as a reduction of revenue for the three and six months ended June 30, 2023 and 2022, respectively, is shown in the table below (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Sales of equipment, related infrastructure and other	$ (692)	$ (102)	$ (1,126)	$ (119)
Services performed on fuel cell systems and related infrastructure	(311)	(181)	(685)	(331)
Power purchase agreements	783	(1,035)	(6,402)	(2,009)
Fuel delivered to customers	93	(772)	(6,089)	(1,483)
Total	$ (127)	$ (2,090)	$ (14,302)	$ (3,942)

Net revenue, cost of revenue, gross profit (loss) and gross margin (loss) percentage for the three and six months ended June 30, 2023 and 2022 were as follows (in thousands):

	Three Months Ended June 30,				Six Months Ended June 30,			
	Net Revenue	Cost of Revenue	Gross Profit/(Loss)	Gross Margin/(Loss)	Net Revenue	Cost of Revenue	Gross Profit/(Loss)	Gross Margin/(Loss)
For the period ended June 30, 2023:								
Sales of equipment, related infrastructure and other	$ 216,286	187,408	$ 28,878	13.4 %	$ 398,380	345,728	$ 52,652	13.2 %
Services performed on fuel cell systems and related infrastructure	8,701	23,449	(14,748)	(169.5)%	17,798	35,670	(17,872)	(100.4)%
Provision for loss contracts related to service	—	7,331	(7,331)	N/A	—	14,220	(14,220)	N/A
Power purchase agreements	16,130	53,976	(37,846)	(234.6)%	24,067	100,792	(76,725)	(318.8)%
Fuel delivered to customers and related equipment	17,878	64,450	(46,572)	(260.5)%	28,020	118,951	(90,931)	(324.5)%
Other	1,187	1,711	(524)	(44.1)%	2,203	2,646	(443)	(20.1)%
Total	$ 260,182	$ 338,325	$ (78,143)	(30.0)%	$ 470,468	$ 618,007	$ (147,539)	(31.4)%
For the period ended June 30, 2022:								
Sales of equipment, related infrastructure and other	$ 116,233	$ 94,153	$ 22,080	19.0 %	$ 225,080	$ 182,981	$ 42,099	18.7 %
Services performed on fuel cell systems and related infrastructure	8,822	11,612	(2,790)	(31.6)%	17,062	25,487	(8,425)	(49.4)%
Provision for loss contracts related to service	—	1,068	(1,068)	N/A	—	3,116	(3,116)	N/A
Power purchase agreements	11,169	34,892	(23,723)	(212.4)%	21,206	66,645	(45,439)	(214.3)%
Fuel delivered to customers and related equipment	14,472	41,607	(27,135)	(187.5)%	27,900	80,879	(52,979)	(189.9)%
Other	571	400	171	29.9 %	822	777	45	5.5 %
Total	$ 151,267	$ 183,732	$ (32,465)	(21.5)%	$ 292,070	$ 359,885	$ (67,815)	(23.2)%

Net Revenue

Revenue – sales of equipment, related infrastructure and other. Revenue from sales of equipment, related infrastructure and other represents revenue from the sale of our fuel cells, such as GenDrive units and GenSure stationary backup power units, as well as hydrogen fueling infrastructure referred to at the site level as hydrogen installations, electrolyzer stacks and systems, and other equipment such as liquefiers and cryogenic storage equipment. Revenue from sales of equipment, related infrastructure and other for the three months ended June 30, 2023 increased $100.1 million, or 86.1%, to $216.3 million over $116.2 million for the three months ended June 30, 2022 primarily due to increases in revenue related to hydrogen site installations, liquefiers, cryogenic equipment, and electrolyzer stacks and systems. The increase in hydrogen infrastructure revenue of $26.2 million was due to 17 hydrogen site installations for the three months ended June 30, 2023 compared to 10 for the three months ended June 30, 2022. The increase in the revenue related to cryogenic storage equipment and liquefiers of $51.5 million was due to an increase in sales of liquefiers, as well as an increase in revenue of $15.0 million due to the acquisition of CIS in which there was no revenue recognized in the three months ended June 2022. Revenue related to electrolyzers increased $3.3 million, which was due to 4 one megawatt equivalent units sold for the three months ended June 30, 2023 compared to 3 one megawatt equivalent units sold for the three months ended June 30, 2022. The increase in the revenue related to GenDrives of $39.4 million was due to an increase in the volume of units sold, 2,680 units sold for the three months ended June 30, 2023 compared to 1,258 units sold for the three months ended June 30, 2022. Partially offsetting these increases was a decrease in revenue of $19.7 million related to the sales of engineered oil and gas equipment from the Frames acquisition that are not expected to continue beyond current commitments. Additionally, there was a provision for common stock warrants of $0.7 million and $0.1 million for the three months ended June 30, 2023 and 2022, respectively.

Revenue from sales of equipment, related infrastructure and other for the six months ended June 30, 2023 increased $173.3 million, or 77.0%, to $398.4 million over $225.1 million for the six months ended June 30, 2022 primarily due to increases in revenue related to hydrogen site installations, liquefiers, cryogenic equipment, and electrolyzer stacks and systems. The increase in hydrogen infrastructure revenue of $48.0 million was due to 31 hydrogen site installations for the six months ended June 30, 2023 compared to 17 for the six months ended June 30, 2022. The increase in the revenue related to cryogenic storage equipment and liquefiers of $89.9 million was due to an increase in sales of liquefiers, as well as an increase in revenue of $26.2 million due to the acquisition of CIS in which there was no revenue recognized in the second quarter of 2022. Revenue related to electrolyzers increased $39.3 million, which was due to 66 one megawatt equivalent units sold for the six months ended June 30, 2023 compared to 5 one megawatt equivalent units sold for the six months ended June 30, 2022. The increase in the revenue related to GenDrives of $31.1 million was due to an increase in the volume of units sold, 3,715 units sold for the six months ended June 30, 2023 compared to 2,487 units sold for the six months ended June 30, 2022. Partially offsetting these increases was a decrease of $34.0 million related to the sales of engineered oil and gas equipment from the Frames acquisition that are not expected to continue beyond current commitments. Additionally, there was a provision for common stock warrants of $1.1 million and $0.1 million for the six months ended June 30, 2023 and 2022, respectively.

Revenue – services performed on fuel cell systems and related infrastructure. Revenue from services performed on fuel cell systems and related infrastructure represents revenue earned primarily on our service and maintenance contracts, as well as sales of spare parts. At June 30, 2023, there were 20,019 fuel cell units and 100 hydrogen installations under extended maintenance contracts, an increase from 19,038 fuel cell units and 84 hydrogen installations at June 30, 2022. Revenue from services performed on fuel cell systems and related infrastructure for the three months ended June 30, 2023 decreased $0.1 million, or 1.4%, to $8.7 million as compared to $8.8 million for the three months ended June 30, 2022. The decrease in revenue from services performed on fuel cell systems and related infrastructure for the three months ended June 30, 2023 compared to the three months ended June 30, 2022 was primarily related to the reduction of sales of spare parts, rental and incidental billings, partially offset by an increase in revenue due to the increase in number of units in service.

Revenue from services performed on fuel cell systems and related infrastructure for the six months ended June 30, 2023 increased $0.7 million, or 4.3%, to $17.8 million over $17.1 million for the six months ended June 30, 2022. The increase in revenue from services performed on fuel cell systems and related infrastructure for the six months ended June 30, 2023 compared to the six months ended 2022 was primarily related to our expanding customer base and growth within our current customer base.

Revenue – Power Purchase Agreements. Revenue from PPAs represents payments received from customers for power generated through the provision of equipment and service. At June 30, 2023, there were 129 GenKey sites associated with PPAs, as compared to 82 at June 30, 2022. Revenue from PPAs for the three months ended June 30, 2023 increased $5.0 million, or 44.4%, to $16.1 million over $11.2 million for the three months ended June 30, 2022. The increase in revenue was primarily due to an increase in the number of units under PPA arrangements, as well as the decrease in the provision for common stock warrants, which went from $1.0 million for the three months ended June 30, 2022 to a negative provision of $0.8 million for the three months ended June 30, 2023. All of the new PPA sites in the second quarter of 2023 were not deployed until late in the quarter; therefore, the full impact on revenue has yet to be realized.

Revenue from PPAs for the six months ended June 30, 2023 increased $2.9 million, or 13.5%, to $24.1 million over $21.2 million for the six months ended June 30, 2022. The increase in revenue was primarily due to an increase in deployed units. Partially offsetting the increase in revenue was an increase in the provision for common stock warrants, which went from $2.0 million for the six months ended June 30, 2022 to $6.4 million for the six months ended June 30, 2023. Additionally, all of the new PPA sites in the second quarter of 2023 were not deployed until late in the quarter; therefore, the full impact on revenue has yet to be realized.

Revenue – fuel delivered to customers and related equipment. Revenue associated with fuel delivered to customers and related equipment represents the sale of hydrogen to customers that has been purchased by the Company from a third party or generated on site. Revenue associated with fuel delivered to customers for the three months ended June 30, 2023 increased $3.4 million, or 23.5%, to $17.9 million over $14.5 million for the three months ended June 30,

2022. The increase in revenue was primarily due to an increase in the number of sites with fuel contracts, which increased from 169 sites as of June 30, 2022 to 229 sites as of June 30, 2023. Additionally, contributing to the increase in revenue was a change in the provision for common stock warrants, which went from $0.8 million for the three months ended June 30, 2022 to a negative provision of $0.1 million for the three months ended June 30, 2023. All of the new fuel sites in the second quarter of 2023 were not deployed until late in the quarter; therefore, the full impact on revenue has yet to be realized.

Revenue associated with fuel delivered to customers for the six months ended June 30, 2023 increased $0.1 million, or 0.4%, to $28.0 million over $27.9 million for the six months ended June 30, 2022. The increase in revenue was primarily due to an increase in the number of sites with fuel contracts, which increased from 169 sites as of June 30, 2022 to 229 sites as of June 30, 2023. Offsetting these increases was an increase in provision for common stock warrants, which went from $1.5 million for the six months ended June 30, 2022 to $6.1 million for the six months ended June 30, 2023. All of the new fuel sites in the second quarter of 2023 were not deployed until late in the quarter; therefore, the full impact on revenue has yet to be realized.

Cost of Revenue

Cost of revenue – sales of equipment, related infrastructure and other. Cost of revenue from sales of equipment, related infrastructure and other includes direct materials, labor costs, and allocated overhead costs related to the manufacture of our fuel cells such as GenDrive units and GenSure stationary backup power units, as well as hydrogen fueling infrastructure referred to at the site level as hydrogen installations, electrolyzer stacks and systems, and other equipment such as cryogenic storage equipment and liquefiers. Cost of revenue from sales of fuel cell systems, related infrastructure and equipment for the three months ended June 30, 2023 increased 99.0%, or $93.3 million, to $187.4 million over $94.2 million for the three months ended June 30, 2022. The increase in hydrogen infrastructure cost of revenue of $23.0 million was due to the increase in the number of hydrogen site installations. There were 17 hydrogen site installations for the three months ended June 30, 2023 compared to 10 for the three months ended June 30, 2022. The increase in cryogenic storage equipment and liquefiers of $43.5 million was due to an increase in costs related to the sales of liquefiers, as well as an increase in the cost of revenue of $13.0 million due to the acquisition of CIS in which there were no costs of revenue recognized in the second quarter of 2022. The cost of revenue related to electrolyzer stacks and systems increased $9.0 million, which was due to 4 one megawatt equivalent units sold for the three months ended June 30, 2023 compared to 3 one megawatt equivalent units sold for the three months ended June 30, 2022 and ramp up costs associated with the electrolyzer gigafactory. The increase in the cost of revenue related to GenDrives of $31.7 million was due to an increase in the volume of the units sold, 2,680 units sold for the three months ended June 30, 2023 compared to 1,258 units sold for the three months ended June 30, 2022. Partially offsetting these increases was a decrease of $14.0 million related to legacy oil and gas contracts from the Frames acquisition that are not expected to continue beyond current commitments. Gross margin decreased to 13.1% for the three months ended June 30, 2023, compared to 19.0% for the three months ended June 30, 2022. The decrease in gross margin was primarily due to ramp up of costs on new product offerings for high power stationary units and electrolyzers as well as an increase in the provision for common stock warrants. The provision for common stock warrants was $0.7 million and $0.1 million for the three months ended June 30, 2023 and 2022, respectively.

Cost of revenue from sales of fuel cell systems, related infrastructure and equipment for the six months ended June 30, 2023 increased 88.9%, or $162.7 million, to $345.7 million over $183.0 million for the six months ended June 30, 2022. The increase in hydrogen infrastructure cost of revenue of $36.7 million was due to 31 hydrogen site installations for the six months ended June 30, 2023 compared to 17 for the six months ended June 30, 2022. The increase in cryogenic storage equipment and liquefiers of $74.4 million was due to an increase in costs related to the sales of liquefiers, as well as an increase in the cost of revenue of $23.0 million due to the acquisition of CIS in which there were no costs of revenue recognized in the second quarter of 2022. The cost of revenue related to electrolyzer stacks and systems increased $41.8 million, which was due to 66 one megawatt equivalent units sold for the six months ended June 30, 2023 compared to 5 one megawatt equivalent units sold for the six months ended June 30, 2022. The increase in the cost of revenue related to GenDrives of $36.7 million was due to an increase in the volume of units sold, 3,715 units sold for the six months ended June 30, 2023 compared to 2,487 units sold for the six months ended June 30, 2022. Partially offsetting these increases was a decrease of $26.9 million related to legacy oil and gas contracts from the Frames acquisition that are not expected to continue beyond current commitments. Gross margin decreased to 13.2% for the six months ended June 30, 2023, compared to 18.7% for the six months ended June 30, 2022. The decrease in gross margin was primarily due to ramp up of costs on new product offerings for high power stationary units and electrolyzers as well as an increase in the provision for common stock warrants. The provision for common stock warrants was $1.1 million and $0.1 million for the three months ended June 30, 2023 and 2022, respectively.

Cost of revenue – services performed on fuel cell systems and related infrastructure. Cost of revenue from services performed on fuel cell systems and related infrastructure includes the labor, material costs and allocated overhead costs incurred for our product service and hydrogen site maintenance contracts and spare parts. At June 30, 2023, there were 20,019 fuel cell units and 100 hydrogen installations under extended maintenance contracts, an increase from 19,038 fuel cell units and 84 hydrogen installations at June 30, 2022, respectively. Cost of revenue from services performed on fuel cell systems and related infrastructure for the three months ended June 30, 2023 increased 101.9%, or $11.8 million, to $23.5 million, compared to $11.6 million for the three months ended June 30, 2022. Gross loss increased to (169.5%) for the three months ended June 30, 2023, compared to (31.6%) for the three months ended June 30, 2022. The increase in cost of revenue and in gross loss were both primarily due to the increase in number of units and sites in service and higher cost of parts experienced during the quarter ended June 30, 2023. At June 30, 2023, there were 20,019 fuel cell units and 100 hydrogen installations under extended maintenance contracts, an increase from 19,038 fuel cell units and 84 hydrogen installations at June 30, 2022.

Cost of revenue from services performed on fuel cell systems and related infrastructure for the six months ended June 30, 2023 increased 40.0%, or $10.2 million, to $35.7 million, compared to $25.5 million for the six months ended June 30, 2022. Gross loss increased to (100.4%) for the six months ended June 30, 2023, compared to (49.4%) for the six months ended June 30, 2022. The increase in cost of revenue and gross loss are both primarily due to the number of units and sites in service and higher cost of parts experienced during the quarter ended June 30, 2023.

Cost of revenue – provision for loss contracts related to service. The Company also recorded a provision for loss contracts related to service of $7.3 million for the three months ended June 30, 2023, compared to $1.1 million for the three months ended June 30, 2022, primarily due to service contract extensions and new unit sales.

The Company also recorded a provision for loss contracts related to service of $14.2 million for the six months ended June 30, 2023, compared to $3.1 million for the six months ended June 30, 2022, primarily due to service contract extensions and unit sales.

Cost of revenue – Power Purchase Agreements. Cost of revenue from PPAs includes depreciation of assets utilized and service costs to fulfill PPA obligations and interest costs associated with certain financial institutions for leased equipment. At June 30, 2023, there were 129 GenKey sites associated with PPAs, as compared to 82 at June 30, 2022. Cost of revenue from PPAs for the three months ended June 30, 2023 increased 54.7%, or $19.1 million, to $54.0 million over $34.9 million for the three months ended June 30, 2022 due to the increase in units and sites under PPA contract as well as the higher cost of parts experienced in the quarter ended June 30, 2023. Gross loss increased to (234.6%) for the three months ended June 30, 2023, as compared to (212.4%) for the three months ended June 30, 2022 primarily due to the timing of unit deployments and higher cost of parts. Partially offsetting this increase in cost of revenue was a negative provision for common stock warrants of $0.8 million for the three months ended June 30, 2023 compared to $1.0 million for the three months ended June 30, 2022.

Cost of revenue from PPAs for the six months ended June 30, 2023 increased 51.2%, or $34.1 million, to $100.8 million from $66.6 million for the six months ended June 30, 2022 due to the increase in units and sites under PPA contract as well as higher cost of parts. Gross loss increased to (318.8%) for the six months ended June 30, 2023, as compared to (214.3%) for the six months ended June 30, 2022 primarily due to the provision for common stock warrants of $6.4 million for the six months ended June 30, 2023 compared to $2.0 million for the six months ended June 30, 2022.

Cost of revenue – fuel delivered to customers and related equipment. Cost of revenue from fuel delivered to customers and related equipment represents the purchase of hydrogen from suppliers that ultimately is sold to customers and costs for onsite generation. Cost of revenue from fuel delivered to customers for the three months ended June 30, 2023 increased 54.9%, or $22.8 million, to $64.5 million over $41.6 million for the three months ended June 30, 2022. The increase was primarily due to higher volume of hydrogen delivered to customer sites as a result of an increase in the number of hydrogen installations completed under GenKey agreements, inefficiencies in fueling systems and higher fuel costs. The gross loss increased to (260.5%) during the three months ended June 30, 2023, compared to (187.5%) during the three months ended June 30, 2022, primarily due to the increase in cost of revenue described above. Partially offsetting this increase in cost of revenue was a reduction to the provision for common stock warrants of $0.1 million and $0.8 million for the three months ended June 30, 2023 and 2022, respectively.

Cost of revenue from fuel delivered to customers for the six months ended June 30, 2023 increased 47.1%, or $38.1 million, to $119.0 million over $80.9 million for the six months ended June 30, 2022. The increase was primarily due to higher volume of hydrogen delivered to customer sites as a result of an increase in the number of hydrogen installations completed under GenKey agreements, inefficiencies in fueling systems and higher fuel costs. The gross loss increased to (324.5%) during the six months ended June 30, 2023, compared to (189.9%) during the six months ended June 30, 2022, primarily due to the increase in cost of revenue described above, as well as a reduction of revenue resulting from an increase in the provision for common stock warrants of $6.1 million and $1.5 million for the six months ended June 30, 2023 and 2022, respectively.

Expenses

Research and development expense. Research and development (“R&D”) expense includes: materials to build development and prototype units, cash and non-cash stock-based compensation and benefits for the engineering and related staff, expenses for contract engineers, fees paid to consultants for services provided, materials and supplies consumed, facility related costs such as computer and network services, and other general overhead costs associated with our research and development activities.

Research and development expense for the three months ended June 30, 2023 increased $5.7 million, or 24.2%, to $29.3 million, from $23.6 million for the three months ended June 30, 2022. The overall growth in R&D investment is commensurate with the Company’s future expansion into new markets, new product lines, acquisitions and varied vertical integrations.

Research and development expense for the six months ended June 30, 2023 increased $11.8 million, or 26.7%, to $55.8 million, from $44.0 million for the six months ended June 30, 2022. The overall growth in R&D investment is commensurate with the Company’s future expansion into new markets, new product lines, acquisitions and varied vertical integrations.

Selling, general and administrative expenses. Selling, general and administrative expenses includes cash and non-cash stock-based compensation, benefits, amortization of intangible assets and related costs in support of our general corporate functions, including general management, finance and accounting, human resources, selling and marketing, information technology and legal services.

Selling, general and administrative expenses for the three months ended June 30, 2023 increased $5.2 million, or 5.4%, to $101.2 million from $96.0 million for the three months ended June 30, 2022. This increase was primarily related to information technology and acquisition related costs.

Selling, general and administrative expenses for the six months ended June 30, 2023, increased $28.3 million, or 16.0%, to $205.2 million from $176.8 million for the six months ended June 30, 2022. This increase was primarily related to information technology, professional fees and acquisition related costs.

Impairment. Impairment for the three months ended June 30, 2023 increased to $10.0 million from $0 for the three months ended June 30, 2022. This increase was primarily related to a one-time contract expense of $9.8 million. Impairment for the six months ended June 30, 2023, increased to $11.1 million from $0 for the six months ended June 30, 2022. This increase was primarily related to a one-time contract expense of $9.8 million.

Contingent consideration. The fair value of the contingent consideration is related to earnouts for the Giner ELX, Inc., United Hydrogen Group Inc., Frames, Applied Cryo, and Joule acquisitions. The change in fair value for the three and six months ended June 30, 2023 was $20.4 million and $26.7 million, respectively, primarily due to the passage of time and changes in assumptions related to future earnout payments.

Interest income. Interest income primarily consists of income generated by our investment holdings, restricted cash escrow accounts, and money market accounts. Interest income for the three and six months ended June 30, 2023 increased $12.6 million and $28.1 million, respectively, as compared to the three and six months ended June 30, 2022. The increase was primarily related to the increase in interest rates during 2023.

Interest expense. Interest expense consists of interest expense related to our long-term debt, convertible senior notes, obligations under finance leases and our finance obligations. Interest expense for the three months ended June 30, 2023 increased $0.1 million compared to the three months ended June 30, 2022, primarily related to a decrease in outstanding debt and capitalized interest, offset by an increase in finance obligations. Interest expense for the six months ended June 30, 2023 increased $2.1 million compared to the six months ended June 30, 2022, primarily related to a decrease in capitalized interest, offset by an increase in finance obligations.

Other expense, net. Other expense primarily consists of foreign currency translation and gains and losses related to energy contracts. Other expense for the three and six months ended June 30, 2023 increased $2.6 million and $6.1 million, respectively, as compared to the three and six months ended June 30, 2022. The increase was primarily related to losses on energy contracts, partially offset by foreign currency translation gains.

Realized gain/(loss) on investments, net. Realized gain/(loss) on investments, net consists of the sales related to available-for-sale debt securities. For the three and six months ended June 30, 2023, the Company had a realized gain on investments of $0.3 million and $0.3 million, respectively, compared to a net realized loss on investments of $0.5 million and $1.3 million, respectively, for the three and six months ended June 30, 2022.

Change in fair value of equity securities. The change in fair value of equity securities resulted in a gain of $3.8 million and $8.9 million for the three and six months ended June 30, 2023, respectively, compared to a loss of $13.5 million and $18.6 million, respectively, for the three and six months ended June 30, 2022.

Loss on equity method investments. Loss on equity method investments consists of our interest in HyVia, which is our 50/50 joint venture with Renault, AccionaPlug S.L., which is our 50/50 joint venture with Acciona, and SK Plug Hyverse, which is our 49/51 joint venture with SK E&S. For the three and six months ended June 30, 2023, the Company recorded a loss of $7.6 million and $12.9 million, respectively, on equity method investments. These losses are driven from the start-up activities for commercial and production operations.

Income Taxes

The Company recorded $0.9 million of an income tax benefit and $0.4 million of income tax expense for the three months ended June 30, 2023 and 2022, respectively. The Company recorded $2.2 million of income tax benefit and $9 thousand of income tax expense for the six months ended June 30, 2023 and 2022, respectively. The tax benefit for the six months ended June 30, 2023 was due to foreign income taxes. The Company has not changed its overall conclusion with respect to the need for a valuation allowance against its domestic net deferred tax assets, which remain fully reserved.

The domestic net deferred tax asset generated from the Company's net operating loss has been offset by a full valuation allowance because it is more likely than not that the tax benefits of the net operating loss carryforward will not be realized. The Company recognizes accrued interest and penalties related to unrecognized tax benefits, if any, as a component of income tax expense.

Liquidity and Capital Resources

Liquidity

As of June 30, 2023 and December 31, 2022, the Company had $579.4 million and $690.6 million, respectively, of cash and cash equivalents and $973.9 million and $858.7 million of restricted cash, respectively. Additionally, the Company had $437.7 million and $1.3 billion of available-for-sale securities as of June 30, 2023 and December 31, 2022, respectively.

The Company has continued to experience negative cash flows from operations and net losses. The Company incurred net losses of $443.0 million and $329.8 million for the six months ended June 30, 2023 and 2022, respectively, and had an accumulated deficit of $3.6 billion at June 30, 2023.

The net cash used in operating activities for the six months ended June 30, 2023 and 2022 was $625.0 million and $405.1 million, respectively. This increase was primarily due to an increase in spend related to inventory as well as other working capital changes. The Company's working capital was $1.8 billion as of June 30, 2023, which included unrestricted cash and cash equivalents of $579.4 million. The net cash provided by investing activities for the six months ended June 30, 2023 and 2022 was $605.5 million and $265.4 million, respectively. This increase was due to an increase in proceeds from sales and maturities of available-for-sale securities compared to the prior year, partially offset by an increase of capital spending. Included in purchases of property, plant and equipment and outflows associated with materials, labor, and overhead are costs necessary to construct new leased property. Cash outflows related to equipment that we lease directly to customers are included in net cash used in investing activities. The net cash provided by (used in) financing activities for the six months ended June 30, 2023 and 2022 was $25.6 million and $(30.7) million, respectively. The change was primarily driven by an increase in proceeds from finance obligations, partially offset by an increase in payments of contingent consideration.

The Company plans to invest a portion of its available cash to expand its current production and manufacturing capacity, construct hydrogen plants and fund strategic acquisitions and partnerships and capital projects. Future use of the Company's funds for these purposes is discretionary. Given the Company's focus on continuing to invest in growth and our green hydrogen platform, the Company is actively soliciting debt capital solutions from varied parties with particular focus on corporate level debt solutions, large scale hydrogen generation infrastructure project financing, and/or investment tax credit ("ITC") related project financings. The Company targets closing on the most prudent solution in the near term. The Company's ability to continue investing in growth and its green hydrogen platform will depend on its ability to obtain additional financing. The Company believes that its working capital and cash position will be sufficient to fund its operations for at least one year after the date the financial statements are issued.

The Company's significant obligations consisted of the following as of June 30, 2023:

(i) Operating and finance leases totaling $348.2 million and $46.7 million, respectively, of which $58.0 million and $8.9 million, respectively, are due within the next 12 months. These leases are primarily related to sale/leaseback agreements entered into with various financial institutions to facilitate the Company's commercial transactions with key customers.

(ii) Finance obligations totaling $376.8 million, of which approximately $75.3 million is due within the next 12 months. Finance obligations consist primarily of debt associated with the sale of future revenues and failed sale/leaseback transactions.

(iii) Convertible senior notes totaling $194.6 million at June 30, 2023.

Public and Private Offerings of Equity and Debt

Common Stock Issuances

In February 2021, the Company sold 54,966,188 shares of its common stock to a subsidiary of SK Holdings at a purchase price of $29.2893 per share, or an aggregate purchase price of approximately $1.6 billion.

In January and February 2021, the Company issued and sold in a registered equity offering an aggregate of 32,200,000 million shares of its common stock at a purchase price of $65.00 per share for net proceeds of approximately $2.0 billion.

Convertible Senior Notes

In May 2020, the Company issued $212.5 million in aggregate principal amount of 3.75% Convertible Senior Notes. The total net proceeds from this offering, after deducting costs of the issuance, were $205.1 million. The Company used $90.2 million of the net proceeds from the offering of the 3.75% Convertible Senior Notes to repurchase $66.3 million of the $100 million in aggregate principal amount of the 5.5% Convertible Senior Notes. In addition, the Company used approximately $16.3 million of the net proceeds from the offering of the 3.75% Convertible Senior Notes to enter into privately negotiated capped called transactions. In the fourth quarter of 2020, $33.5 million of the remaining 5.5% Convertible Senior Notes were converted into 14.6 million shares of common stock, resulting in a gain of approximately $4.5 million which was recorded on the consolidated statement of operations on the gain (loss) on extinguishment of debt line. As of December 31, 2020, approximately $0.2 million aggregate principal amount of the 5.5% Convertible Senior Notes remained outstanding, all of which were converted to common stock in January 2021.

Secured Debt

In March 2019, the Company entered into a loan and security agreement, as amended, with Generate Lending, LLC, providing for a secured term loan facility in the amount of $100 million (the “Term Loan Facility”). In December 2022, the Company fully repaid the outstanding balance of the Term Loan Facility.

In June 2020, the Company acquired debt as part of its acquisition of United Hydrogen Group Inc. During the three and six months ended June 30, 2023, the Company repaid $5.1 million and $5.4 million of principal related to this outstanding debt, respectively. The outstanding carrying value of the debt was $4.2 million as of June 30, 2023. The remaining outstanding principal on the debt was $6.1 million and the unamortized debt discount was $1.9 million, bearing varying interest rates ranging from 5.6% to 8.3%. The debt is scheduled to mature in 2026. As of June 30, 2023, the principal balance is due at each of the following dates as follows (in thousands):

December 31, 2023	$	600
December 31, 2024		3,357
December 31, 2025		1,200
December 31, 2026		900
	$	6,057

3.75% Convertible Senior Notes

On May 18, 2020, the Company issued $200.0 million in aggregate principal amount of 3.75% Convertible Senior Notes due June 1, 2025, in a private placement to qualified institutional buyers pursuant to Rule 144A under the Securities Act. On May 29, 2020, the Company issued an additional $12.5 million in aggregate principal amount of 3.75% Convertible Senior Notes. During the three and six months ended June 30, 2023, there were no conversions of the 3.75% Convertible Senior Notes.

The 3.75% Convertible Senior Notes consisted of the following (in thousands):

	June 30, 2023	December 31, 2022
Principal amounts:		
Principal	$ 197,278	$ 197,278
Unamortized debt issuance costs (1)	(2,694)	(3,359)
Net carrying amount	$ 194,584	$ 193,919

(1) Included in the unaudited interim condensed consolidated balance sheets within the 3.75% Convertible Senior Notes, net and amortized over the remaining life of the notes using the effective interest rate method.

The following table summarizes the total interest expense, the amortization of debt issuance costs and the effective interest rate related to the 3.75% Convertible Senior Notes (in thousands, except for the effective interest rate):

	June 30, 2023	June 30, 2022
Interest expense	$ 1,849	$ 1,849
Amortization of debt issuance costs	334	320
Total	2,183	2,169
Effective interest rate	4.5%	4.5%

Based on the closing price of the Company's common stock of $10.39 on June 30, 2023, the if-converted value of the notes was greater than the principal amount. The estimated fair value of the notes at June 30, 2023 was approximately $407.9 million. The fair value estimation was primarily based on a quoted price in an active market.

Capped Call

In conjunction with the pricing of the 3.75% Convertible Senior Notes, the Company entered into privately negotiated capped call transactions (the "3.75% Notes Capped Call") with certain counterparties at a price of $16.2 million. The 3.75% Notes Capped Call covers, subject to anti-dilution adjustments, the aggregate number of shares of the Company's common stock that underlie the initial 3.75% Convertible Senior Notes and is generally expected to reduce potential dilution to the Company's common stock upon any conversion of the 3.75% Convertible Senior Notes and/or offset any cash payments the Company is required to make in excess of the principal amount of the converted notes, as the case may be, with such reduction and/or offset subject to a cap based on the cap price. The cap price of the 3.75% Notes Capped Call is initially $6.7560 per share, which represents a premium of approximately 60% over the last then-reported sale price of the Company's common stock of $4.11 per share on the date of the transaction and is subject to certain adjustments under the terms of the 3.75% Notes Capped Call. The 3.75% Notes Capped Call becomes exercisable if the conversion option is exercised.

The net cost incurred in connection with the 3.75% Notes Capped Call was recorded as a reduction to additional paid-in capital in the unaudited interim condensed consolidated balance sheets. The book value of the 3.75% Notes Capped Call is not remeasured.

Common Stock Forward

In March 2018, the Company issued $100.0 million in aggregate principal amount of the 5.5% Convertible Senior Notes due on March 15, 2023, in a private placement to qualified institutional buyers pursuant to Rule 144A under the Securities Act, which have been fully repaid. In connection with the issuance of the 5.5% Convertible Senior Notes, the Company entered into a forward stock purchase transaction (the "Common Stock Forward"), pursuant to which the Company agreed to purchase 14,397,906 shares of its common stock for settlement on or about March 15, 2023. On May 18, 2020, the Company amended and extended the maturity of the Common Stock Forward to June 1, 2025. The number of shares of common stock that the Company will ultimately repurchase under the Common Stock Forward is subject to customary anti-dilution adjustments. The Common Stock Forward is subject to early settlement or settlement with alternative consideration in the event of certain corporate transactions.

The net cost incurred in connection with the Common Stock Forward of $27.5 million was recorded as an increase in treasury stock in the unaudited interim condensed consolidated balance sheets. The related shares were accounted for as a repurchase of common stock. The book value of the Common Stock Forward is not remeasured.

There were no shares of common stock settled in connection with the Common Stock Forward during the three and six months ended June 30, 2023 or during the three and six months ended June 30, 2022.

Amazon Transaction Agreement in 2022

On August 24, 2022, the Company and Amazon entered into a Transaction Agreement (the "2022 Transaction Agreement"), under which the Company concurrently issued to Amazon.com NV Investment Holdings LLC, a wholly owned subsidiary of Amazon, a warrant (the "Amazon Warrant") to acquire up to 16,000,000 shares (the "Amazon Warrant Shares") of the Company's common stock, subject to certain vesting events described below. The Company and Amazon entered into the 2022 Transaction Agreement in connection with a concurrent commercial arrangement under which Amazon agreed to purchase hydrogen fuel from the Company through August 24, 2029.

1,000,000 of the Amazon Warrant Shares vested immediately upon issuance of the Amazon Warrant. 15,000,000 of the Amazon Warrant Shares will vest in multiple tranches over the 7-year term of the Amazon Warrant based on payments made to the Company directly by Amazon or its affiliates, or indirectly through third parties, with 15,000,000 of the Amazon Warrant Shares fully vesting if Amazon-related payments of $2.1 billion are made in the aggregate. The exercise price for the first 9,000,000 Amazon Warrant Shares is $22.9841 per share and the fair value on the grant date was $20.36. The exercise price for the remaining 7,000,000 Amazon Warrant Shares will be an amount per share equal to 90% of the 30-day volume weighted average share price of the Company's common stock as of the final vesting event that results in full vesting of the first 9,000,000 Amazon Warrant Shares. The Amazon Warrant is exercisable through August 24, 2029.

Upon the consummation of certain change of control transactions (as defined in the applicable warrant) prior to the vesting of at least 60% of the aggregate Amazon Warrant Shares, the Amazon Warrant will automatically vest and become exercisable with respect to an additional number of Amazon Warrant Shares such that 60% of the aggregate Amazon Warrant Shares shall have vested. If a change of control transaction is consummated after the vesting of at least 60% of the aggregate Amazon Warrant Shares, then no acceleration of vesting will occur with respect to any of the unvested Amazon Warrant Shares as a result of the transaction. The exercise price and the Amazon Warrant Shares issuable upon exercise of the Amazon Warrant are subject to customary antidilution adjustments.

Upon issuance, 1,000,000 of the Amazon Warrant Shares issued pursuant to the 2022 Transaction Agreement vested. The warrant fair value associated with the vested shares of $20.4 million was capitalized to contract assets in our unaudited interim condensed consolidated financial statements based on the grant date fair value and is subsequently amortized ratably as a reduction to revenue based on the Company's estimate of revenue over the term of the agreement. As of June 30, 2023 the balance of the contract asset related to tranche 1 is $19.7 million which is recorded in contract assets in the Company's unaudited interim condensed consolidated balance sheet. As of June 30, 2023, an additional 1,000,000 of the Amazon Warrant Shares associated with tranche 2 vested. The warrant fair value associated with the vested shares was $20.4 million. The grant date fair value of tranche 3 will also be amortized ratably as a reduction to revenue based on the Company's estimate of revenue over the term of the agreement. Because the exercise price has yet to be determined, the fair value of tranche 4 will be remeasured at each reporting period end and amortized ratably as a reduction to revenue based on the Company's estimate of revenue over the term of the agreement. The total amount of provision for common stock warrants recorded as a reduction of revenue for the Amazon Warrant during the three months ended June 30, 2023 and 2022 was $1.5 and $0.1 million, respectively. The total amount of provision for common stock warrants recorded as a reduction of revenue for the Amazon Warrant during the six months ended June 30, 2023 and 2022 was $2.6 and $0.2 million, respectively.

The assumptions used to calculate the valuations as of August 24, 2022 and June 30, 2023 are as follows:

	Tranches 1-3 August 24, 2022	Tranche 4 June 30, 2023
Risk-free interest rate	3.15%	3.94%
Volatility	75.00%	75.00%
Expected average term	7 years	4 years
Exercise price	$22.98	$9.35
Stock price	$20.36	$10.39

Amazon Transaction Agreement in 2017

On April 4, 2017, the Company and Amazon entered into a Transaction Agreement (the “2017 Amazon Transaction Agreement”), pursuant to which the Company agreed to issue to Amazon.com NV Investment Holdings LLC, a warrant to acquire up to 55,286,696 Amazon Warrant Shares, subject to certain vesting events described below. The Company and Amazon entered into the 2017 Amazon Transaction Agreement in connection with existing commercial agreements between the Company and Amazon with respect to the deployment of the Company’s GenKey fuel cell technology at Amazon distribution centers. The vesting of the Amazon Warrant Shares was conditioned upon payments made by Amazon or its affiliates (directly or indirectly through third parties) pursuant to the existing commercial agreements. At December 31, 2021, all 55,286,696 of the Amazon Warrant Shares had vested.

The warrant had been exercised with respect to 34,917,912 shares and 24,704,450 shares of the Company’s common stock as of June 30, 2023 and December 31, 2022, respectively.

Walmart Transaction Agreement

On July 20, 2017, the Company and Walmart entered into a Transaction Agreement (the “Walmart Transaction Agreement”), pursuant to which the Company agreed to issue to Walmart a warrant (the “Walmart Warrant”) to acquire up to 55,286,696 shares of the Company’s common stock, subject to certain vesting events (the “Walmart Warrant Shares”). The Company and Walmart entered into the Walmart Transaction Agreement in connection with existing commercial agreements between the Company and Walmart with respect to the deployment of the Company’s GenKey fuel cell technology across various Walmart distribution centers. The existing commercial agreements contemplate, but do not guarantee, future purchase orders for the Company’s fuel cell technology. The vesting of the warrant shares was conditioned upon payments made by Walmart or its affiliates (directly or indirectly through third parties) pursuant to transactions entered into after January 1, 2017 under existing commercial agreements.

The warrant had been exercised with respect to 13,094,217 shares of the Company’s common stock as of June 30, 2023 and December 31, 2022.

At June 30, 2023 and December 31, 2022, 27,643,347 of the Walmart Warrant Shares had vested. For the three months ended June 30, 2023, there was a negative provision for common stock warrants recorded as an addition to revenue of $1.5 million as compared to a provision of $2.0 million recorded as a reduction to revenue for the three months ended June 30, 2022. The total amount of provision for common stock warrants recorded as a reduction of revenue for the Walmart Warrant during the six months ended June 30, 2023 and 2022 was $11.5 million and $3.7 million, respectively. During the three and six months ended June 30, 2023 and 2022, there were no exercises with respect to the Walmart Warrant.

The assumptions used to calculate the valuations of the final tranche of the Walmart Warrant as of June 30, 2023 are as follows:

	June 30, 2023
Risk-free interest rate	4.12%
Volatility	75.00%
Expected average term	3.5 years
Exercise price	$9.35
Stock price	$10.39

Operating and Finance Lease Liabilities

As of June 30, 2023, the Company had operating leases, as lessee, primarily associated with sale/leaseback transactions that are partially secured by restricted cash and security deposits (see also Note 19, "Commitments and Contingencies") as summarized below. These leases expire over the next one to nine years. Minimum rent payments under operating leases are recognized on a straight line basis over the term of the lease.

Leases contain termination clauses with associated penalties, the amount of which cause the likelihood of cancellation to be remote. At the end of the lease term, the leased assets may be returned to the lessor by the Company, the Company may negotiate with the lessor to purchase the assets at fair market value, or the Company may negotiate with the lessor to renew the lease at market rental rates. No residual value guarantees are contained in the leases. No financial covenants are contained within the lease; however, the lease contains customary operational covenants such as the requirement that the Company properly maintain the leased assets and carry appropriate insurance. The leases include credit support in the form of either cash, collateral or letters of credit. See Note 19, "Commitments and Contingencies" for a description of cash held as security associated with the leases.

The Company has finance leases associated with its property and equipment in Latham, New York and at fueling customer locations. The fair value of this finance obligation approximated the carrying value as of June 30, 2023.

Finance Obligation

The Company has sold future services to be performed associated with certain sale/leaseback transactions and recorded the balance as a finance obligation. The outstanding balance of this obligation at June 30, 2023 was $358.7 million, $71.9 million and $286.8 million of which was classified as short-term and long-term, respectively, on the accompanying unaudited interim condensed consolidated balance sheet. The outstanding balance of this obligation at December 31, 2022 was $312.1 million, $55.4 million and $256.6 million of which was classified as short-term and long-term, respectively. The amount is amortized using the effective interest method. Interest expense recorded related to finance obligations for the three months ended June 30, 2023 and 2022 was $9.8 million and $6.9 million, respectively. Interest expense recorded related to finance obligations for the six months ended June 30, 2023 and 2022 was $19.0 million and $13.6 million, respectively. The fair value of this finance obligation approximated the carrying value as of June 30, 2023 and December 31, 2022.

In prior periods, the Company entered into sale/leaseback transactions that were accounted for as financing transactions and reported as part of finance obligations. The outstanding balance of finance obligations related to sale/leaseback transactions at June 30, 2023 was $18.2 million, $14.7 million and $3.5 million of which was classified as short-term and long-term, respectively on the accompanying consolidated balance sheet. The outstanding balance of this obligation at December 31, 2022 was $17.2 million, $3.5 million and $13.7 million of which was classified as short-term and long-term, respectively on the accompanying consolidated balance sheets. The fair value of this finance obligation approximated the carrying value as of June 30, 2023 and December 31, 2022.

Restricted Cash

In connection with certain of the above noted sale/leaseback agreements, cash of $479.7 million and $383.7 million was required to be restricted as security as of June 30, 2023 and December 31, 2022, respectively, which restricted cash will be released over the lease term. As of June 30, 2023 and December 31, 2022, the Company also had certain letters of credit backed by security deposits totaling $409.9 million and $379.6 million, respectively, of which $387.4 million and $354.0 million are security for the above noted sale/leaseback agreements, respectively, and $22.5 million and $25.6 million are customs related letters of credit, respectively.

As of both June 30, 2023 and December 31, 2022, the Company had $75.5 million held in escrow related to the construction of certain hydrogen plants.

The Company also had $1.2 million and $1.2 million of consideration held by our paying agent in connection with each of the Joule and CIS acquisitions, respectively, reported as restricted cash as of June 30, 2023, with a corresponding accrued liability on the Company's unaudited interim condensed consolidated balance sheet. Additionally, the Company had $6.4 million and $10.8 million in restricted cash as collateral resulting from the Frames acquisition as of June 30, 2023 and December 31, 2022, respectively.

Guarantee

On May 30, 2023, HyVia entered into a government grant agreement with Bpifrance. As part of the agreement, our wholly-owned subsidiary, Plug Power France, was required to issue a guarantee to Bpifrance in the amount of €20 million through the end of January 2027. Plug Power France is liable to the extent of the guarantee for sums due to Bpifrance from HyVia under the agreement based on the difference between the total amount paid by Bpifrance and the final amount certified by HyVia and Bpifrance. As part of the agreement, there are certain milestones that HyVia is required to meet, and the non-performance of these milestones or termination of this agreement could result in this guarantee being called upon. As of June 30, 2023, no payments related to this guarantee have been made by the Company, and Plug Power France did not record a liability for this guarantee as the likelihood of the guarantee being called upon as of June 30, 2023 is remote.

Unconditional purchase obligations

The Company has entered into certain off–balance sheet commitments that require the future purchase of goods or services ("unconditional purchase obligations"). The Company's unconditional purchase obligations primarily consist of supplier arrangements, take or pay contracts and service agreements. For certain vendors, the Company's unconditional obligation to purchase a minimum quantity of raw materials at an agreed upon price is fixed and determinable; while certain other raw material costs will vary due to product forecasting and future economic conditions. Future payments under non-cancelable unconditional purchase obligations with a remaining term in excess of one year as of June 30, 2023, are as follows (in thousands):

Remainder of 2023	$ 26,354
2024	43,811
2025	8,023
2026	8,023
2027	2,638
2028 and thereafter	—
Total	$ 88,849

Investments

Our investment portfolio, including cash and cash equivalents, totaled $1.1 billion at June 30, 2023. Purchases of fixed maturity securities are classified as available-for-sale at the time of purchase based on individual security.

The composition of our investment portfolio, including cash and cash equivalents, as of June 30, 2023, is shown in the following table (in thousands):

	Carrying Amount	Percentage of Portfolio
Fixed maturity securities - available-for-sale		
U.S. Treasuries	$ 287,992	26.5%
Corporate bonds	149,659	13.8%
Total fixed maturity securities - available-for-sale	$ 437,651	40.3%
Equity securities	67,753	6.2%
Cash and cash equivalents	579,418	53.5%
Total investments, including cash and cash equivalents	$ 1,084,822	100.0%

Extended Maintenance Contracts

On a quarterly basis, we evaluate any potential losses related to our extended maintenance contracts for fuel cell systems, related infrastructure and equipment that have been sold. The following table shows the roll forward of balances in the accrual for loss contracts, including changes due to the provision for loss accrual, releases to service cost of sales, releases due to the provision for warrants, and foreign currency translation adjustment (in thousands):

	Six Months Ended June 30, 2023	Year Ended December 31, 2022
Beginning balance	$ 81,066	$ 89,773
Provision for loss accrual	13,721	23,295
Releases to service cost of sales	(13,364)	(35,446)
Increase to loss accrual related to customer warrants	499	3,506
Foreign currency translation adjustment	13	(62)
Ending balance	$ 81,935	$ 81,066

Critical Accounting Estimates

Management's discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with GAAP. The preparation of these consolidated financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses, and related disclosure of contingent assets and liabilities at the date of and during the reporting period. On an on-going basis, we evaluate our estimates and judgments, including those related to revenue recognition, valuation of long-lived assets, accrual for service loss contracts and common stock warrants. We base our estimates and judgments on historical experience and on various other factors and assumptions that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about (1) the carrying values of assets and liabilities and (2) the amount of revenue and expenses realized that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

There have been no changes in our critical accounting estimates from those reported in our 2022 Form 10-K.

Recent Accounting Pronouncements

Recently Adopted Accounting Guidance

Other than the adoption of the accounting guidance mentioned in our 2022 Form 10-K, there have been no other significant changes in our reported financial position or results of operations and cash flows resulting from the adoption of new accounting pronouncements.

Recent Accounting Guidance Not Yet Effective

All issued but not yet effective accounting and reporting standards as of June 30, 2023 are either not applicable to the Company or are not expected to have a material impact on the Company.

Item 3 — Quantitative and Qualitative Disclosures about Market Risk

There has been no material change from the information provided in the Company's 2022 Form 10-K under the section titled "Item 7A: Quantitative and Qualitative Disclosures About Market Risk."

Item 4 — Controls and Procedures

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in our reports that we file or submit under the Exchange Act, are recorded, processed, summarized and reported within the time periods specified in SEC rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer (our principal executive officer) and Chief Financial Officer (our principal financial officer) as appropriate, to allow for timely decisions regarding required disclosure.

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act), as of June 30, 2023. Based on such evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that as of June 30, 2023, our disclosure controls and procedures were not effective because of material weaknesses in internal control over financial reporting described in Part II, Item 9A "Controls and Procedures" of our 2022 Form 10-K. The material weaknesses have not been remediated as of June 30, 2023.

Changes in Internal Control over Financial Reporting

There were no changes during the quarter ended June 30, 2023 in our internal control over financial reporting that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Part II. OTHER INFORMATION

Item 1 – Legal Proceedings

See “Note 19: Commitments and Contingencies” within Item 1 of this Form 10-Q for a discussion regarding material legal proceedings.

Except as otherwise noted, there have been no material developments in legal proceedings. For previously reported information about legal proceedings, refer to Part I, Item 3, “Legal Proceedings,” of the Company’s 2022 Form 10-K.

Item 1A – Risk Factors

In addition to the other information set forth in this Quarterly Report on Form 10-Q, you should carefully consider the risk factors that could materially affect the Company’s business, financial condition or future results discussed in the Company’s 2022 Form 10-K in Part I, Item 1A. “Risk Factors” and the Company’s Form 10-Q for the quarter ended March 31, 2023 in Part II, Item 1A “Risk Factors.” The risks described in the 2022 Form 10-K and the Form 10-Q for the quarter ended March 31, 2023 are not the only risks that could affect the Company. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also materially adversely affect our business, financial condition and/or operating results in the future. As a supplement to the risk factors identified in the 2022 Form 10-K and the Form 10-Q for the quarter ended March 31, 2023, below we have set forth updated risk factors. Other than as provided below, there have been no material changes to our risk factors.

The Inflation Reduction Act of 2022 (“IRA”) contains tax credits and incentives for clean hydrogen, fuel cells, and other clean energy technologies. The Company’s ability to benefit from these incentives, in particular the Section 45V Credit for the Production of Clean Hydrogen, is not guaranteed and is dependent upon the federal government’s forthcoming and ongoing implementation, guidance, regulations, and/or rulemakings that have been the subject of substantial public interest and debate.

In August 2022, President Biden signed the IRA into law. The IRA contains hundreds of billions in credits and incentives for the development of renewable energy, clean hydrogen, clean fuels, electric vehicles and supporting infrastructure and carbon capture and sequestration, among other provisions. The IRA contains numerous credits and tax incentives that may be relevant to us, including: (i) an extension and amendment of the Section 48 Investment Tax Credit for Qualified Fuel Cell Properties, which provides a tax credit based on capital investment in a variety of renewable and conventional energy technologies to incentive investment in new energy resources and more efficient use of fuel, including fuel cell technology; (ii) a new Section 48 Investment Tax Credit for Energy Storage Technologies, which expands the applicability of the investment tax credit to include standalone energy storage projects, among other things; (iii) a new Section 45V Credit for the Production of Clean Hydrogen, which provides a production tax credit of up to $3 per kg of qualified clean hydrogen over a 10-year credit period for the production of qualified clean hydrogen at a qualified facility in the United States; (iv) an amended Section 48C Qualified Advanced Energy Project Credit, which provides an investment tax credit through a competitive application process administered through the Department of Energy equal to 6% or 30% of the investment with respect to advanced energy projects; (v) a new Section 45X Advanced Manufacturing Production Credit, which provides varying credit amounts with respect to the production of certain components manufactured in the United States; and (vi) a new Section 48E Clean Electricity Investment Tax Credit, which provides a tax credit for investment in facilities that generate clean electricity, among other provisions.

There is uncertainty as to how the provisions under the IRA will be interpreted and implemented. The Company’s ability to ultimately benefit from IRA tax credits and incentives, including the aforementioned, is not guaranteed and is dependent upon the outcome of forthcoming implementation, guidance, rulemakings, and/or regulations from the federal government. Several of these credits and tax incentives, in particular the new Section 45V Credit for the Production of Clean Hydrogen, have received substantial public interest and have been subject to debate, and divergent views on potential implementation, guidance, rules, and regulatory principles by a diverse group of interested parties – some of whom are advocating for limitations to Section 45V that would be materially adverse to the Company and its near term hydrogen generation projects. Specifically, guidance, rules, or regulations limiting a hydrogen production facility's use of renewable energy credits, environmental attributes, and grid electricity could limit the Company's ability to benefit from the Section 45V Credit for the Production of Clean Hydrogen. As the Company has endeavored numerous hydrogen generation projects prior to the promulgation of Section 45V's guidance, there is no guarantee that the Company's projects will comply with the final eligibility requirements of Section 45V. As a result, the final interpretation and implementation of the provisions in the IRA could have a material adverse impact on the Company – both in our ability to leverage Section 45V and compete with other hydrogen generation projects more closely aligned with potential IRA requirements. Furthermore, future legislative enactments or administrative actions could limit, amend, repeal, or terminate IRA policies or other incentives that the Company currently hopes to leverage. Any reduction, elimination, or discriminatory application or expiration of the IRA may result in the Company's diminished economic competitiveness and could materially and adversely affect the Company's future operating results and liquidity.

Item 2 - Unregistered Sales of Equity Securities and Use of Proceeds

(a) Not applicable.

(b) Not applicable.

(c) None.

Item 3 — Defaults Upon Senior Securities

None.

Item 4 — Mine Safety Disclosures

None.

Item 5 — Other Information

(c) Director and Officer Trading Arrangements

During the three months ended June 30, 2023, none of the Company's directors or officers (as defined in Rule 16a-1(f) of the Securities Exchange Act) adopted, terminated or modified a Rule 10b5-1 trading arrangement or non-Rule 10b5-1 trading arrangement (as such terms are defined in Item 408 of Regulation S-K).

Item 6 — Exhibits

3.1	Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.1 to Plug Power Inc.'s Annual Report on Form 10-K for the year ended December 31, 2008 and incorporated by reference herein).
3.2	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.3 to Plug Power Inc.'s Annual Report on Form 10-K for the year ended December 31, 2008 and incorporated by reference herein).
3.3	Second Certificate of Amendment of Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.1 to Plug Power Inc.'s Current Report on Form 8-K filed on May 19, 2011 and incorporated by reference herein).
3.4	Third Certificate of Amendment of Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.1 to Plug Power Inc.'s Current Report on Form 8-K filed on July 25, 2014 and incorporated by reference herein).
3.5	Certificate of Correction to Third Certificate of Amendment of Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.9 to Plug Power Inc.'s Annual Report on Form 10-K for the year ended December 31, 2016 and incorporated by reference herein).
3.6	Fourth Certificate of Amendment of Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.1 to Plug Power Inc.'s Current Report on Form 8-K filed on June 30, 2017 and incorporated by reference herein).
3.7	Fifth Certificate of Amendment of Amended and Restated Certificate of Incorporation of Plug Power Inc. (filed as Exhibit 3.7 to Plug Power Inc.'s Quarterly Report on Form 10-Q filed on August 5, 2021 and incorporated by reference herein).
3.8	Certificate of Designations, Preferences and Rights of a Series of Preferred Stock of Plug Power Inc. classifying and designating the Series A Junior Participating Cumulative Preferred Stock. (filed as Exhibit 3.1 to Plug Power Inc.'s Registration Statement on Form 8-A filed on June 24, 2009 and incorporated by reference herein).
3.9	Fifth Amended and Restated By-laws of Plug Power Inc. (filed as Exhibit 3.9 to Plug Power Inc.'s Annual Report on Form 10-K for the year ended December 31, 2022 and incorporated by reference herein).
10.1	Amendment No. 2 to the Plug Power Inc. 2021 Stock Option and Incentive Plan (filed as Appendix A with Plug Power Inc.'s Schedule 14A Proxy Statement filed May 16, 2023 and incorporated herein by reference).
10.2	Plug Power Inc. 2023 Employee Stock Purchase Plan (filed as Appendix B with Plug Power Inc.'s Schedule 14A Proxy Statement filed May 16, 2023 and incorporated herein by reference).
31.1*	Certification pursuant to 18 U.S.C. Section 1350, adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification pursuant to 18 U.S.C. Section 1350, adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certification pursuant to 18 U.S.C. Section 1350, adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2**	Certification pursuant to 18 U.S.C. Section 1350, adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS*	Inline XBRL Instance Document
101.SCH*	Inline XBRL Taxonomy Extension Schema Document
101.CAL*	Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF*	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB*	Inline XBRL Taxonomy Extension Labels Linkbase Document
101.PRE*	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104*	Cover Page Interactive Data File (embedded within the Inline XBRL document)

* Submitted electronically herewith.

** Pursuant to Item 601(b)(32)(ii) of Regulation S-K, this certification is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934, as amended.

Signatures

Pursuant to requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

	PLUG POWER INC.
Date: August 9, 2023	By: /s/ Andrew Marsh Andrew Marsh President, Chief Executive Officer and Director (Principal Executive Officer)
Date: August 9, 2023	By: /s/ Paul B. Middleton Paul B. Middleton Chief Financial Officer (Principal Financial Officer)

Exhibit 31.1

I, Andrew Marsh, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Plug Power Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 9, 2023

by: /s/ Andrew Marsh
Andrew Marsh
Chief Executive Officer

Exhibit 31.2

I, Paul B. Middleton, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Plug Power Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 9, 2023

by: /s/ Paul B. Middleton
Paul B. Middleton
Chief Financial Officer

Exhibit 32.1

CERTIFICATION PURSUANT TO

18 U.S.C. SECTION 1350,

AS ADOPTED PURSUANT TO

SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Plug Power Inc. (the “Company”) on Form 10-Q for the period ending June 30, 2023 as filed with the Securities and Exchange Commission (the “SEC”) on the date hereof (the “Report”), I, Andrew Marsh, Chief Executive Officer of the Company, certify, solely pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

This certification is being furnished and not filed, and shall not be incorporated into any documents for any other purpose, under the Securities Exchange Act of 1934, as amended or the Securities Act of 1933, as amended. A signed original of this written statement required by § 906 has been provided to the Company and will be retained by the Company and furnished to the SEC or its staff upon request.

/s/ Andrew Marsh
Andrew Marsh
Chief Executive Officer

August 9, 2023

Exhibit 32.2

CERTIFICATION PURSUANT TO

18 U.S.C. SECTION 1350,

AS ADOPTED PURSUANT TO

SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Plug Power Inc. (the "Company") on Form 10-Q for the period ending June 30, 2023 as filed with the Securities and Exchange Commission (the "SEC") on the date hereof (the "Report"), I, Paul B. Middleton, Chief Financial Officer of the Company, certify, solely pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

This certification is being furnished and not filed, and shall not be incorporated into any documents for any other purpose, under the Securities Exchange Act of 1934, as amended or the Securities Act of 1933, as amended. A signed original of this written statement required by § 906 has been provided to the Company and will be retained by the Company and furnished to the SEC or its staff upon request.

/s/ Paul B. Middleton
Paul B. Middleton
Chief Financial Officer

August 9, 2023