PLUG POWER, INC.

COMPANY REPORT

INDUSTRIALS

4 JANUARY 2022

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Upside Potential amidst Net-Zero

Plug as a major player in hydrogen

- We issue a **BUY** rating on Plug Power's common shares with a **price target of $37.04**, which suggests a further upside potential of 24.9% relative to the current price.
- Paris Agreement taken seriously: the world's economy finally transitions to a Net-Zero scenario and Plug Power is set to highly benefit from it as the **hydrogen market** is **expected to grow at a double-digits CAGR** for an extended period.
- Higher share of green hydrogen in the new economy: Plug Power's focus on **green hydrogen** is set to pay off as this fuel is expected to **grow from 4% of the hydrogen market**, currently, **to over 60% to 80% by 2050.**
- **Public policies and carbon credits**: with governments **subsidizing green fuels, taxing fossils and developing carbon markets**, hydrogen-based solutions are expected to become increasingly competitive going forward.
- **Improving margins:** Plug Power is set to develop **stronger financial metrics**, as economies of scale, network effects and **public policies drive** the matureness and **mass adoption of hydrogen-based solutions.**

Company description

Plug Power is an American-based, major producer of hydrogen-based solutions serving the American and European Markets, across three main business lines: mobile power applications, material handling solutions and stationary power equipment.

Recommendation:	**BUY**
Price Target FY22:	**37.04 $**
Price (as of 17-Dec-21)	**29.65 $**

Reuters: PLUG.OQ, Bloomberg: PLUG:US

52-week range ($)	18.47 – 75.49
Market Cap ($m)	17.089
Outstanding Shares (m)	576.36

Source: Bloomberg

(Values in $ millions)	2020	2021E	2022F
Revenues	331.8	498.1	821.5
EBITDA	-538.7	-175.6	-5.1
Net Profit	-604.2	-313.0	-163.2
EPS	-1.70	-0.56	-0.26
P/E	N.A.	N.A.	N.A.

Source: Bloomberg & Analyst Estimates

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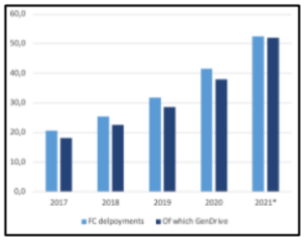
A. COMPANY OVERVIEW:

Plug Power Inc. (PLUG) was created in 1997 as a joint venture between *DTE Energy* and *Mechanical Technology*. Both American companies had an interest in energy development and storage to power industrial solutions. Together they formed a pioneer in fuel cells applications.

A1. PRODUCTS AND SERVICES

In order, *GenDrive* or *GD*, is designed to power different sorts of material handling equipment. The segment is divided in subparts to cover all transport solutions that can be found in a warehouse. As the name suggests, *GD 1000* targets type I forklifts such as sit-down lift trucks. *GD 2000* on the other hand is designed for type II forklifts or reach trucks. Finally, *GD 3000* is used on rider pallet trucks. The main difference between *GenDrive* units is the energy capacity of the fuel cells system, as different vehicles have different needs. Historically, PLUG has heavily relied on the division to generate sales. Total deployments are made at 90% of *GD* units for each of the last 5 years.

Graph. 1: *GenDrive as the main division*



Source: Plug Power

Secondly, *GenSure*, represents a stationary power solution. As of today, it is mostly used as backup power generators by telecommunication operators. Clients praise the reliability of the power source. Thirdly, *ProGen*, is comparable to an engine because it provides the necessary force to turn wheels of a vehicle. Immediately the mobility solution is not designed for passenger cars, but rather commercial vehicles.

Fourthly, *GenFuel*, refers to the trade of hydrogen (chemical symbol H). It is complementary to the products presented above. Indeed, fuel cell systems require inputs of hydrogen and oxygen to produce energy. While the latter can be found in the air, hydrogen must be supplied to the power unit. PLUG uses a proton-exchange membrane for the chemical reaction to take place. The only products of the operation are energy and liquid water.

PEM equation:

$2\,H_2 + O_2 \rightarrow 2\,H_2O$

To dispense *GenFuel* into hydrogen applications, the company does also sell the equipment needed for a refueling station. Indeed, *Plug Power* can build a hydrogen pad upon customers' request. The pad consists of a liquid hydrogen tanker, compressions pumps and storage tubes. Note that this organization is better suited for customers with a large fleet of hydrogen systems.

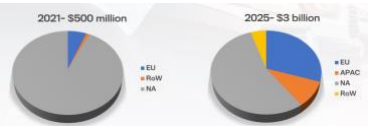
A2. A NEED TO DIVERSIFY

Long-term partners of PLUG are *Amazon* and *Walmart*. These companies

operate in different industries but, they both rely on an effective inventory management. Hence, they operate important fleets of material handling equipment, which was a pre-condition to overcome the important early price of hydrogen equipment. Therefore, they are referred to pedestal customer in company accounts. More recently *Home Depot* was added to the list. In 2020, *Amazon* represented 26% of gross billings, while the other two accounted for 54% of the total. While pedestal clients explain past success, the reliance of PLUG on a shortlist of customers present an operational risk. Potential threats are delays in payments or reduction of orders. The first example can lead to liquidity troubles and the second to unsold inventory. In either case they would have an adverse impact on financial results. The situation prompts the innovator to find more commercial partners. Management is aware of that and successfully added *General Motors* to its pedestal clients in 2021. The corporate target is to add one more by the end of 2024 to bolster sales and, weaken the influence of one player on its financial statements. Base on the fact that anchor customers represented ¾ of total sales in 2020 and that they were close of being equally weighted, each of these clients could be worth 15% of revenues in 2024. A 10% decrease from 2020 levels for individual customers.

Another key to diversification is to expand activities abroad. *Plug Power* started to operate in its home country before expanding regionally. Anchor customers presented above have all contracted PLUG for distribution centers in North America. The innovator entered the European market in 2000 but, it struggled to find customers early on. The picture is different today, as it can be seen in the graphic below, a minor part of gross billings is already derived from Europe. Furthermore, management expects sales to growth in that area in the next years.

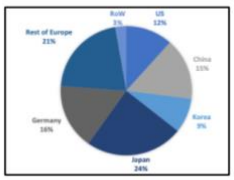
Graph 2: *The future global footprint of PLUG POWER*



Source: Company

Internally the plan is to generate $1.3 billion gross billings from overseas operations. 67% of which are expected to come from Europe alone. Key elements to penetrate the market are, the creation of local facilities and successful partnerships. The first element is in process. PLUG plans to triple its workforce in the region, notably through the opening of German headquarters in 2022. The recent joint venture between the hydrogen expert and *Renault*, is supposed to be a big part of the second point. *Hyvia* aims to capitalize on the European decarbonization trend of transports.

Graph. 3: *HRS around the world*



Source: IEA (2021)

Asia also makes its apparition by 2025 in *Graphic 2*. It is predicted to be 10% of revenues per the company. The region is already a market force in the industry as nearly half of the worldwide Hydrogen Refueling Stations are based on the continent. Historically, Japan is a big consumer of hydrogen. Due to its

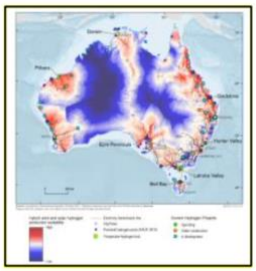
geographical conditions, the country needs an energy source with high density, to limit imports. Eventually it created an incentive for local *Toyota* to investigate fuel cell technologies. The presence of such a dominant car and forklift producer works as a barrier for *Plug Power* to access the domestic market shortly.

The other main regional player is China, which is a promising market for any companies with transport solutions. The country earned the tag of the world's factory in parts because of the success of export processing zones. These zones command a high utilization of forklifts and commercial vehicles. *Plug Power* seems out of the equation, however. The current political climate is unfavorable to conduct business in China. The ongoing political dispute between its home the United States and China is an issue. Tensions are at its apex as President Biden declared a diplomatic boycott [(1)] of the upcoming Beijing Winter Olympics Games. As it has been seen in the past, the communist party is not afraid to enter in a trade war with its American rival.

Under these circumstances, where can *Plug Power* progress in the region? The short to mid-term answer is South Korea. The local administration has set an ambitious hydrogen roadmap. Not unlike its European strategy, PLUG intends to pair geographic diversification with product development. In 2021, the hydrogen innovator has sealed a strategic partnership with *SK Group* to capitalize on the 2040 state plan.

Finally, the growth plan of *Plug Power* in the pacific is centered around Australia. The firm intends to use local weather conditions to its advantage, to produce green hydrogen. The country has abundant resources (i.e., solar and wind) that favor the production of renewable energies. PLUG can use this energy to separate water into H_2 and O_2 in the reverted equation of the PEM electrolysis (refer to A1). The gas can then be used to fuel other products of the company. In turn, instead of buying from third parties, *Plug Power* will generate the required hydrogen itself. Therefore, future sales of electrolyzers are intertwined with the performance of *GenFuel*. This can be expected in a not-so-distant future as the firm signed an agreement with *Fortescue Future Industries* to build a gigafactory in Queensland. 250 megawatts of *GenFuel* electrolyzers will be delivered onsite by the end of 2022.

Image. 1: *Australia as a growing market for green hydrogen*



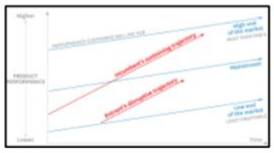
Source: IEA (2021)

A3. COMPETITION

As mentioned previously, the product offering is centered around transport solutions. Albeit *GenDrive* (GD) is growing, diesel motors have been the privileged power source for decades of vehicles in any shape and format. PLUG

is thus in indirect competition with traditional producers of engines. Nevertheless, prospects are likely willing to embark the energy transition, hence battery manufacturers are a bigger threat to operations. As they represent the other carbon free alternative to petrol. Due the recent hype around electric vehicles, battery models are a step ahead in their development. These vehicles have limitations, however. Critics of battery cars have highlighted the short range and long refueling times, which explains the fewer electric solutions among commercial vehicles. In this niche market, fuel cell vehicles represent a better option to petrol than batteries. *Plug Power* can efficiently capitalize on this opportunity if it finds more partners. The company has no interest in manufacturing car part and so, it needs agreements with traditional automobile manufacturers, such as *Renault*, to showcase the potential of *ProGen* and hydrogen vans.

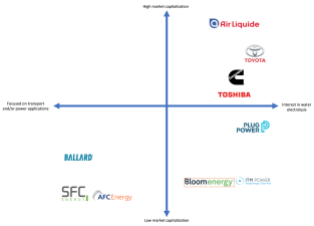
Diagram. 1: *Incumbents versus new entrants*



Source: HBR (2015)

Although it is an introduction stage, several players already compete directly in the fuel cell market. Among the players presented in *Graph 4*, PLUG has a regional challenger in *Ballard*. The Canadian company also offers transport solutions based on hydrogen. The differentiation point is gas deliveries. Through *GenFuel*, the company supplies the need of its own products and thus ensures continuous revenues. Currently, *Plug Power* buys from a middleman to supply the demand of customers with *GenKey* contracts. Nonetheless, it is bound to change with the introduction of the PEM water electrolyzers as discussed in A2.

Graphic. 4: *Can PLUG compete with larger player in the market?*



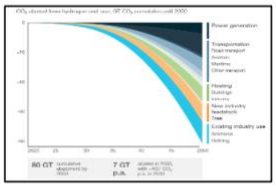
Source: Analyst estimates

The main risk for the firm is represented by incumbents (above x-axis), which also explore the opportunity of creating green hydrogen from water electrolysis. They have more structures in place to create quality products. They have the short-term advantage but, *Plug Power* could be the winner in the long run. Incumbents are expected to become mainstream quicker, and so innovators will be forced to create better products to stay in the market. As they close the technological gap, their lower prices will attract more customers and they will eventually will growth at a superior rate. Lastly, technological progress is always a threat and is best represented by *Bloom Energy* in this case. The fellow American company offers solid oxide fuel cell solutions. As of today, it is better suited for stationary power but, improvements of a perfect substitute are always a threat for operations.

B. The ESG Revolution

B1. Legal Framework: The Paris Agreement & Shift to Net-Zero

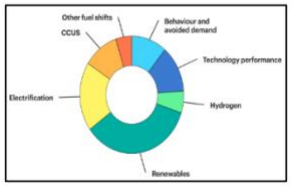
Exhibit 1: *Carbon Abatement Cumulative Forecasts*



Source: McKinsey

The public debate on climate change and sustainability, one of the hottest topics in the social scene in the last couple years, is in fact anything but new. Yet, the United Nations Framework Convention on Climate Change (1992), followed by the Protocol of Kyoto (1997) led to an almost inexistent implementation of climate policies. In the last few years, though, sustainability- focused policies have acquired a broad public support from multiple sectors of the society, especially the younger generations. The **signature of the Paris Agreement** (2015) – and the following commitments from most countries to live up to its legal framework – **signaled the world's new stance towards climate change**. In particular over the last couple years, the global economy seems to be finally addressing its *Net-Zero* (NZE) pledge outlined in Paris. Under this, **global warming should be contained below 1.5oC by 2050**. To achieve this goal **under a *Net-Zero* state**, existing carbon emissions should be severely reduced, with the remaining ones being offset by initiatives such as carbon-capturing and storage processes - which retrieve carbon from the atmosphere and store it underground (CCS) – ultimately yielding neutral net carbon emissions. As such, within this scenario of a carbon-less planet by 2050, **the global energetic transition has been accelerating**. In November 2021, at the United Nations' COP 26, two of the biggest world economies – **China and India – finally made pledges to join the global *Net-Zero* strategy**, adding to the number of countries with published national plans to go carbon-neutral. In the next years, the **focus of the global economy will gradually shift towards the utmost importance of the abatement of carbon emissions**. Here, **hydrogen** is **expected to assume a pivotal role in the carbon abatement dynamics** – across power generation, transportation, heating and industrial activities - going into 2050.

Exhibit 2: *Cumulative Emissions Reduction by Mitigation Measure*



Source: IEA [1]

Then, to understand the potential of Plug Power within the new green economy, is fundamental to understand what will be driving the company's development. One of these factors is the ongoing mass promotion of hydrogen-based projects. From over 93 countries having committed to a *Net*-Zero target, 39 of them have already published national strategies for the mass adoption of hydrogen. More than 550 large-scale projects have now been deployed globally (+100% YoY). From those, 70% are expected to be fully or almost deployed before 2030, signaling the commitment from its sponsors to the urgency of climate change.

Some of. Within this framework, a successful worldwide reduction of carbon emissions will be directly dependent on the adoption, on a large-scale, of relevant measures to promote the use of clean sources of energy such as renewable electricity and green hydrogen (see Exhibit 2). In the transition to *Net-Zero*, two main types of hydrogen will be targeted – blue/grey and green hydrogen. As the hydrogen is expected to progressively own a higher market share. Renewable (green) hydrogen is produced through electrolysis, having electricity as an input. Low-carbon (grey) hydrogen is produced through natural gas reforming, using the same commodity as an input. For the production of both, economies of scale are heavily starting to be targeted, signaling the acknowledge from investors of the importance of addressing cost-saving initiatives for hydrogen to really emerge as a competitive option in the global energy markets by 2050: the number of giga-scale projects (>1 Gigawatt in electrolysis capacity) is now at 43, up from 17 in early 2021; the average scale of the projects is also leveling up, with already 9 projects on renewable hydrogen having an individual installed capacity of over 10 GW (the same as the largest renewables projects) and 16 low-carbon hydrogen projects owning an individual installed capacity of over 0.2 MT (million tonnes) per year.

Major players have already announced a total production capacity of over 18 MT of clean hydrogen to be installed until 2030, an increase of over 12 MT in 2021 only and an eight-times jump from 2019 figures. After 2030, a further 13 MT are expected to be deployed, yielding a total installed capacity, by then, of over 30 MT globally.

To supply 30 MT of clean hydrogen, it will be needed an installed capacity of 200 to 250 GW of electrolysis capacity, up from over 90 GW cumulative capacity already announced today and annual installations of 45 GW of electrolyser capacity by 2030. To achieve this, electrolyser manufacturers – including Plug Power - will need to quickly scale up production lines in order to meet this level of demand. A growing demand will, at the same time, going to be felt across the whole value chain of renewable hydrogen, from stationary power storage equipment too fuel-cells engines and clean fueling solutions, largely benefiting, as a whole, Plug Power's revenues across its various business units.

B2. An Untapped Share of the Global Energy Demand

In the next decades, due to the global economic growth and socioeconomic environment, the world's total energy demand is expected to continually grow. Within these higher absolute figures, the share of renewables is also expected to grow progressively bigger as the world transitions into a *Net-Zero* state (1).

Hydrogen, in particular, is forecasted to assume a pivotal role in the *Net-Zero* transition, with the potential to abate emissions of up to 80 giga-tonnes (GT) of CO2 to the atmosphere until 2050 and an additional 7 GT per year onwards (2).

Therefore, the total demand of hydrogen-based solutions is expected to raise, fuelled by two dynamics: a higher total demand of energy - McKinsey (2) estimates a demand of 12.000 mega tonnes of oil equivalent (a unit of energy) by 2050, against 9.000 in 2020; a higher market share of hydrogen supplying that demand - around 10% by 2050 versus less than 1% in 2020 (2). Plug Power, as a leading player in the hydrogen industry, is then very well-positioned to benefit from the expected higher market share of hydrogen in the energy markets, experiencing significant revenue growth across its multiple business lines (stationary power equipment, material handling equipment and mobile power applications).

B3. Green Hydrogen leading the Energetic Transition

Exhibit 3: *Forecasted global energy consumption*

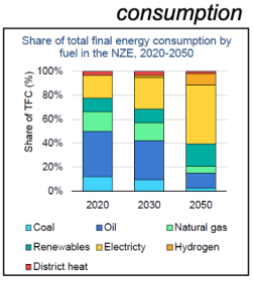
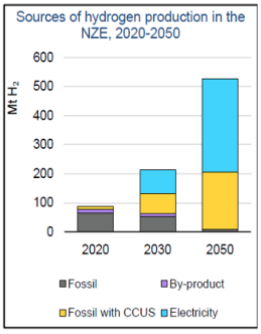


Exhibit 4: *Forecasted hydrogen production by supply*



Source= IEA (1)

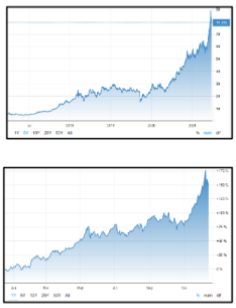
Besides a growing total energy demand and a higher share of clean fuels feeding that demand, there is also an important trend breeding inside the own hydrogen market. **Green hydrogen**, **currently responsible for** solely **4% of the total hydrogen production**, is **forecasted to capture over 60% of the** hydrogen **market by 2050**, according to the International Energy Agency (1) and under a *Net-Zero* scenario. Then, with the **total demand for clean hydrogen growing more than seven-fold from now (90 MT) until 2050 (660 MT)**, it will simultaneously grow, at a high compounded annual growth rate (CAGR), the demand for one of Plug Power's main business segments: hydrogen-based solutions exclusively targeted at the green hydrogen market - such as electrolysers, fueling solutions and stationary power equipment used to produce green hydrogen within solar, hydro and energy parks. Indeed, **by 2050 renewable hydrogen is expected to account for 60 to 80% of the total hydrogen supply** (400 – 550 MT), which will **require 3 to 4 TW of electrolysis capacity fully dedicated to hydrogen** capacity and 4.5 to 6.5 TW of renewables exclusively directed to hydrogen production.

C. Macro Scenario

C1. Carbon Pricing

Pioneered a few years ago, the **trading of carbon credits in capital markets** is **a growing tendency**. Initially, this pricing was applied to a select group of industries such as chemicals and automotive. Currently, this **mechanism** is

Exhibit 5&6: *Time series of carbon markets in Europe*



Source: Trading Economics

progressively being targeted at every relevant economic agent. In Europe, for example, there is an ongoing phasing-out of free carbon allowances for the steel sector, which are currently responsible for around 10% of the global carbon emissions (4). At the same time, the European Carbon Trading Schemes have been hitting records, with the **price of a ton of carbon in the European markets reaching at the end of 2021 more than 90 €/ton, up from around 30€/ton in early 2021**. At the moment, it sits at around 80€/ton, still posting an **impressive YoY appreciation of around 150%.**

We support that, with carbon credits schemes being directed at a growing number of multiple sectors in the economy, public behaviour will start to be severely shaped through higher prices of products based on fossil fuels. Thus, such type of policies is likely going to be used on a growing basis by public regulators over the coming years, especially in Europe and in the United States, geographies where we see carbon markets further solidifying in the near future, with increasingly higher prices and industries being targeted by carbon credits.

C2. Competing Energies

The world's transition into a carbon-less society implies the adoption of alternative, clean fuels while fossil fuels are simultaneously discontinued. Being this our base case scenario, there are obvious threats to its full realization. Amidst Plug Power's aspirations as a leader of the green hydrogen market, this mostly translates into severe competition over market share against non-renewable types of hydrogen production and also versus solutions powered by electricity.

The first major threat to the affirmation of hydrogen-based solutions on the future green economy is the competitiveness of electric-based options. In Plug Power's case, this relates to both to its mobile and stationary power applications.

Concerning the first, due to a higher infrastructure network, lower investment needs and prices of the own fuel, current customers' preference, when buying sustainable vehicles, goes almost exclusively to electric-powered electric vehicles (BEVs) over fuel-cell vehicles (FCVs). This reflects itself in the revenues of Plug's mobile power applications, namely sales of fuel-cells (FCs) for engines (ProGen) integrated in commercial vans, plus fuelling (GenFuel) and combined solutions (GenCare) for FCVs. It also reduces the expected sales of its ProGen units under development targeting the trucking and passenger vehicles. Regarding stationary power, electric-based solutions are commonly preferred to a more established infrastructure network from producers to final consumers,

alongside lower investment needs (CAPEX and OPEX). In terms of these last two, CAPEX associated with hydrogen-based solutions is expected to quickly decrease as production volumes escalate, with OPEX following a similar way as infrastructure and operational networks get further developed, in the global economy, to support the hydrogen industry.

Henceforth, we support that, going forward, there will be a significant convergence between the competitiveness of green hydrogen against electricity. Electricity prices are now trading at historical records and expected to aggravate in coming years. Thus, green hydrogen-based solutions – fuelled by bigger investments and economies of scale - are expected to become progressively more competitive against electricity from now on as both green hydrogen gets cheaper and electricity more expensive. It can be, however, argued that higher electricity prices are going to drive higher green hydrogen prices, as its main input. Yet, this scenario is not likely to happen as lower CAPEX and OPEX costs around the production of green hydrogen, namely on investments in electrolysers, are forecasted to offset rising input costs of electricity in green hydrogen production.

The second major threat to Plug Power's operations is the potential underdevelopment of the green hydrogen's competitiveness against blue, grey and brown hydrogen, which currently are responsible for the major share (96%) of the hydrogen's market. While it is expected that green hydrogen will be the most competitive option in the future, owning a market share of 60% to 80% of the hydrogen market by 2050 (3), alternative types of hydrogen are certainly trying to capture a relevant market share. Brown hydrogen is likely the least one to be concerned about, as the world's global tendency, except for China, has been to shut down coal plants. This is likely to accelerate and will lead to increasingly higher costs of oal and brown hydrogen. Also, the carbon emission process embedded in brown hydrogen's production (through coal-reforming) is becoming cumulatively more costly, as higher carbon prices – a recent trend which is expected to further aggravate in the coming years – will lead to even higher prices of coal and a lower competitiveness of brown hydrogen against green.

Regarding **grey hydrogen**, it is **expected to be equally competitive as green hydrogen (cost-parity) already by 2026**, with liquified green hydrogen being cheaper than grey by that year. Until 2050, two main drivers will be responsible for this convergence.

Firstly, several public several **public and private investments**, such as RED III in Europe and LCFS in California (United States) are growingly **being made to financially incentivise the conversion of grey to green hydrogen**. Secondly, **grey hydrogen is expected to become relatively less competitive over time as one of its cost drivers, carbon prices, are expected to raise over time**. Indeed, McKinsey (2) estimates that **with CO2 priced between 50 to 100 USD/ton**, around **30% of grey hydrogen would be converted to green**, **while** with CO2 **at over 100 USD/ton** this figure would raise to **more than 50%.** Thus, this two-sided approach is expected to converge the relative prices of green and grey hydrogen going forward.

On green versus blue hydrogen, while the carbon pricing mechanism does not apply itself here as it does for grey hydrogen, the **high investment costs associated with carbon capture and storage (CCS) facilities are expected to remain to maintain production costs of blue hydrogen relatively flat in the medium-term**, except if any major technological breakthrough takes place. Therefore, this type of hydrogen production is likely to not achieve significant economies of scale going forward, being expected to be surpassed by green hydrogen as the latter achieves better economies of scale and investment volumes going forward through 2050.

C3. Investment Risks

In our valuation process, we assume as the base case the *Net-*Zero scenario, expected to continue to be rolled out in the coming years. However, while there is the possibility of an upside case (*Unconstrained Net-Zero*) against our base model to materialize, we believe there is a much higher chance of being an opposite downside case to take place. Indeed, this lower scenario can more easily be triggered by the certain combination of factors at the global level. **The two major** ones, which we therefore understand as **risks to Plug Power's** operations and **business model, are issues around hydrogen's infrastructure network as well as supply chain disruptions across the whole value chain of hydrogen**. Nonetheless, if both of these challenges are successfully tackled, the hydrogen industry and thus the company's business are still expected to develop in a positive manner as forecasted. ▪ Infrastructure Network

Commonly the **biggest concern addressed by most customers** considering to acquire hydrogen-based solutions **is the lack of a broad, complex network of infrastructure that supports the whole value chain** around the production, transportation, storage, commercialization and consumption **of hydrogen**. Except for Japan, this is largely the case for the whole globe for the main markets

of Plug Power, the United States and Europe. This issue is especially relevant for mobile power applications that run on hydrogen, such as fuel-cell vehicles (FCVs). Except for a few cases, where the vehicles have a short radius of travel and can be charged within a fixed location, **a large share of the FCVs need to have, at the local level, a complex network of charging stations to support vehicle refueling.** In Plug Power's case, this concern reflects itself in a downsize of the potential number of customers (and revenues) of two of its power transportation segment business units: its ProGen line, which implements fuel-cell systems as an engine in commercial distribution vans; and its GenFuel line, which provides fueling solutions to mobile vehicles that run on hydrogen fuel-cell systems.

Concerning the stationary power equipment business lines, this is less of an issue, as installations on the customer's location are a one-off process that is there onwards relatively independent of local infrastructure networks, as it happens with mobile power applications. Given **this current scenario**, we acknowledge that it **presently reduces the potential customer base of Plug Power, mostly within the mobile solutions segment, in its two major markets: the United States and Europe**. However, we forecast that this layout is rapidly going to change, as aggressive public and private investments in green infrastructure start to be rolled out and strengthen the complexity of infrastructure networks. Once this process begins, a **snowball effect** will take place: **as larger infrastructure gets developed, more customers join the market, which further motivates investments in infrastructure**, fueling network effects and economies of scale.

The emerging of the pandemic has driven supply chain disruptions at the global level, with supply bottlenecks not being able to match a still relatively high demand across multiple economic sectors. This has been felt through various indicators, being energy prices one of the main ones. On a turmoil since the beginning of the pandemic, energy markets quotations for electricity, crude oil or natural gas currently trade at historically highs, driven by supply chain disruptions, high uncertainty in the markets and concerted efforts by the OPEC producers (in oil/natural gas' case) to cut the output. This trend is predicted to be further sustained in the next couple years. On the other side, fueled by supply and demand imbalances and highly aggravated by the monetary policies reinforced through the pandemic, inflation metrics have been hitting historical highs, especially in the United States, where accelerated inflation is expected to only stabilize by early 2024. All these factors pose both a threat and an opportunity to the affirmation of hydrogen under a *Net-Zero* storyline. On one

side, natural gas, electricity or coal serve as inputs for hydrogen production. As such, inflated prices of those will reflect on a higher price of hydrogen on the end-side. On the other side, the investments being rolled out under *Net-Zero* will lead to economies of scale, larger network effects and thus a higher competitiveness of hydrogen against incumbent fuels, accelerating the achievement of cost-parity between competing fuels. Therefore, for the hydrogen market to benefit from this scenario, the economies of scale on a larger E4. Public Policies

Presently, there is a huge gap between production volumes of green-based fuels and fossil fuels. Therefore, clean fuels generally cannot compete with the incumbents benefiting from higher economies of scale. As such, customers acquiring green solutions commonly have to pay relatively high prices against non-green alternatives, which is known as the 'green premium'. For the energetic transition to fully take place, this spread must be addressed by public and private institutions in order to bridge the costs' gap and allow for clean alternatives, such as hydrogen, to become competitive in the global energy markets. Three different types of policies are expected to be adopted by governments to tackle this issue.

Public funding attributed as subsidies to fund R&D, support production costs or provide tax breaks, are expected to grow several times in the green sector. If targeted successfully, this will reduce average production costs, enabling economies of scale and network effects for clean technologies. In Plug's case, this can come through various ways in the coming years. The most recent one, simultaneously the most relevant in the company's history, was a partnership between Plug Power and the state of New York for the installation of Plug Power in a new green industrial park. Besides tax breaks conceded by the state, electricity costs were also agreed to be lower. Public subsidies such as these are key to the green hydrogen industry, and namely for Plug Power's full competitiveness development.

Fiscal policy is, perhaps, the most powerful tool that national governments will use to tackle climate-change. Besides tax breaks and other fiscal incentives for the green industry as referred above, governments are expected to inversely continue to raise the taxation of fossil fuels on the end-users, progressively raising their final prices through different fiscal add-ons, ultimately discouraging its consumption over clean fuels. To this direct fiscal policy joins the carbon pricing mechanism, which will act as further – increasingly expensive – tax on products derived from fossil fuels. Then, those items will suffer double-sided taxation.

On the other side, the allowance of tax breaks and subsidies to green investments and infrastructure will increase the competitiveness of solutions operating sustainably. Thus, convergence between the market competitiveness of clean solutions over incumbents will rapidly happen as both disincentives and incentives are provided by regulators.

On a regional point of view, different regions will have slightly alternative approaches to climate policies. Australia, as a major exporter of renewable electricity (mainly through solar and wind parks), is positioning itself to be a major supplier renewable electricity to fuel green hydrogen, investing in large infrastructure and R&D projects around green hydrogen.

Japan and Germany, as major importers, are focusing on investments in supply chain and infrastructure development, talent and expertise development, alongside target setting (around emissions) for heavy industries, namely transportation.

South Korea, one of Plug's main untapped markets, is now actively designing solid Public and Private Partnerships (PPP) and a new regulatory framework aimed at supporting heavy investments in the hydrogen industry. South Korea and Japan are also heavily dependent on imports from the Middle East and Australia, needed to fuel both countries' ambitions to become the global leaders in fuel-cell vehicles usage. Still, both have plans to fuel this, in the short-term, by blending coal and ammonia for power generation.

D. VALUE DRIVERS:

After 20 years of innovation, *Plug Power* is still in the hunt for operating profit. While it might be a red flag for creditors, the company remains popular among investors. Excluding incumbents, as of the 17th of December 2021, PLUG market capitalization of $17 Bn surpassed all fuel cells manufactures (cf. *Graph 4*). The market seems to value more the future of the company.

D1. NEW PRODUCTS&VERTICAL INTEGRATION

The company has consistently increased production levels throughout the last decade, which led to a 26% year to year increase in 2021 deployments. For products, revenue is recognized based on unit price and quantity sold. As *GenDrive* (*GD)* units are sold in batches to power forklift fleets, customers often require hydrogen (H_2) installations to be onsite to ensure continuous operations. Hence, PLUG also counts on refueling stations as an income line. The company either recognizes a one-time sale or it charges rental fees to customers via

GenKey. The sales figure for *GenCare* services is determined by the number of units under maintenance and the annual maintenance fee. Finally, the company derives revenue from the supply of H_2. *GenFuel* is thus assessed on the number of operating refueling stations, amount of gas dispatched and, price charged. All divisions are thus interconnected, which highlights the strategic decision made by management to create an integrated business.

Looking more closely at individual captions, prices are determined by demand, which management believes to be contingent on the performance of its Fuel Cells (FC) systems. The products are at different stages, however. *GD* is already an establish product that performs better than battery alternatives among Material Handling Equipment (MHE). Forklifts using *GD* can operate for 8 straight hours before refueling. Furthermore, the latter is done under 3 minutes and so these items can very well be used 20+ hours daily. In comparison, battery forklifts have at best an 8-hour autonomy and, they need another 8 hours to charge. Given the facts, how can the current and projected market share of electric models dominate the global supply of forklifts? In the graphic below, hydrogen powertrains represent less than 5% while lead-acid and lithium-ion batteries take over 60% of production.

Graph. 5: *Decomposition of world forklift sales by powertrain*

Source: Interact Analysis

The answer lies in the fact that the total cost of ownership of hydrogen solutions still is superior to other options. As explained by the *Hydrogen Council*, in its 2020 industry report about cost competitiveness, FC-forklift are only competitive in optimal conditions. The conditions mentioned earlier in the chapter with anchor customers. To growth *GenDrive sales*, the company must therefore reduce the capital expenditure linked to refueling stations.

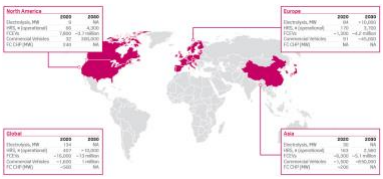
As *Plug Power* offers complementary H_2 equipment and installations, it is in a prime spot to affect the need of cheaper fueling stations and develop *GD* revenues. During the 2021 PLUG symposium, the corporate announced its mid-term objective of cost parity with lead acid batteries within medium sized fleets of motive applications (60 to 200 units). The long-term goal is to attain parity with small fleets, which can potentially unlock $4 Bn of revenues by 2030.

Furthermore, an increase level of *GD* deployments, goes hand to hand with more demand of H_2 or *GenFuel* products. A self-sustainable growth from the gas unit that can be further magnified by new FC-applications. Indeed, Plug Power introduced the *GenSure High Power* (HP) solutions in 2021. The stationary power source has a maximum electrical output of 1MW and can supply the energy needed for small grids. Another possible use is as backup power for data centers. In that sense, the proven reliability of GS low is a good selling point for

the system.

The last declination of FC-system, *ProGen*, is also a new segment as it started to appear on company fillings last year. As mentioned previously the target population are commercial vehicles rather than individual cars. This market has a significant upside as it could go from approximately 1,600 to 1 Mn units of output in 10 years according to another report of the *Hydrogen Council*. The industry trend is put on a map for the following result.

Graph. 6: *H_2 future transport applications*



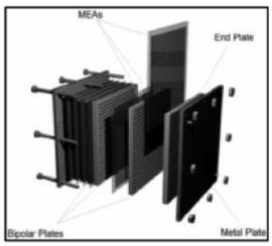
Source: S&P 500

As it is can be seen in the map below, 30% of the commercial vehicle fleet are expected to come from North America where *Plug Power* has most of its operation. Pricewise, *ProGen* is still a product under development. Based on the last DHL order, the chief executive officer (i.e., Andy Marsh) mentioned a price oscillating between $20,000 to $30,000 for ProGen units. The price is set to evolve however as the company find other applications for the product line. Whether it is high duty vehicles or drones, *Plug Power* must offer a price per kilowatt hour close to $100/kWh in real terms to be an efficient subsidy to battery electronic and diesel vehicles. According *BloombergNEF* that is the tipping point for carbon-free alternatives to enter mass production.

Finally, as explained in the diversification chapter, water electrolysis is the vector for *Plug Power* to supply internal H_2 needs. The technology is so efficient that it sparked interest by outsiders. Eventually, *GenFuel* electrolyzers will be a standalone source of income. The subdivision will recognize its first revenues in 2022 as 50 Megawatts are to be delivered. Internally, management expects exponential growth as the volume of transactions are predicted to double the following year. To concur, the whole market is expected to experience fast growth. Under the *International Energy Agency* (IEA) Net Zero Scenario, it goes from close to null values to approximately 60% of the H_2 supply method by 2030.

D2. THE ROAD TO PROFITABILITY

Image. 2: **PEM Stack**

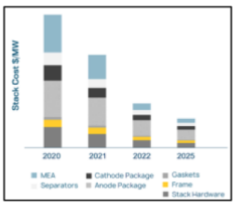


Source: ResearchGate (2021)

The main reason behind *Plug Power* not being profitable is that production expenses are exceeding revenues. The company reported negative gross margins for every quarters last year, which displays an incapacity to control costs. Nevertheless, management is confident that the situation will change rapidly. The corporate target is to reach 30% of gross margin by 2025, which would also place the hydrogen (H_2) company on track for operating profits. PLUG has targeted the "heart" of its Fuel Cell (FC) systems to resolve the problem. Essentially, the system is a stack of different plates, as shown in *image 2*. And the electrochemical reaction producing energy happens at its center. The stack of

layers is also referred to as a Membrane Electrode Assembly (MEA). PLUG embarked in a project, back in 2019, to reduce the width and durability of plates. The result is a new generation of *GenDrive (GD)* units with a doubled lifetime, from 1 to 2 years. As *GenCare* contracts usually cover 5 years, it has the potential to cut service costs by half in the future.

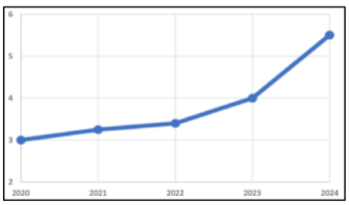
***Graph. 7:* Plan to decrease stack costs**



(Source: Plug Power)

PLUG also works towards a lighter and simpler design of its power systems. The H_2 innovator has created a modular structure where, products differ on energy capacity but, the same FC-stack technology is used. Hence improvements are applicable to all product sectors. The cost driver for these items is the energy density of the system compared to its weight. As it can be seen on *Graph 8*, PLUG is developing energy capacities of its *GenDrive, GenSure* and *ProGen* units. The outcome are lighter FC-systems with the same rated power. Ultimately, less weight implies less materials used for production, which is expected to result in important cost savings for the company. Indeed, one key element of the catalyst layer (cathode and anode in *Graph 7*) is platinum, which is an expensive raw material. At the end of 2021, the spot price of the commodity was close to $30 per gram (g). *Reuters* base on an industry survey that 30 to 60g are contained within FC-car systems. Hence, even the slightest reduction in the use of the precious metal can have a sizeable positive impact on the cost structure of the company.

***Graph. 8:* Increase in power density**



(Source: Plug Power)

Going back to services, another determinant factor is the reliability of FC-systems. As H_2 powered vehicles are rather new on the market, it is common to include a product warranty in the sale contract. In the past, some deployments have failed to compile with quality standards. Thus, the related maintenance contracts became unprofitable. To counter unexpected defects the company recognizes a provision in the cost of goods sold from *GenCare*. Increased reliability would reduce the risk of having defects and *Plug Power* could see the reverse of provisions putting less pressure on services.

Refueling stations have historically been a profitable business unit for *Plug Power*. Nevertheless, gross margins are expected to be challenged as the company intends to gain market share within smaller forklift fleets. PLUG standardized solution for H_2 pads, include tankers with a capacity of at least 15 thousand gallons, which is simply too big for fleets of 60 forklifts. Reversely, progress in the gas storage solutions is expected to depressurize costs.

Finally, as society moves away from carbon energy sources, renewable energies are predicted to scale up. The development of such facilities whether it is based on solar, wind or hydraulic power are bound to decrease costs associated to

green energies. This element is of paramount importance for PLUG as water electrolysis requires an important energy input. Indeed, the future of *GenFuel* is tied to the company supplying its own green H_2. If costs associated to renewables remain high, blue and, grey H_2 would remain the most economical viable solution. The risk becomes that *Plug Power* must use a price close to market value to retain customers, which does not cover its cost of producing the gas. In that scenario, the firm gas deliveries would remain an unprofitable activity.

D3. EXPANDING BALANCE SHEET

Plug Power future path relies on increasing output levels and so, the company must increase its number of production facilities to do so. As of today, the firm has 3 manufacturing facilities and 1 hydrogen (H_2) production plant, which are all in the United States. The expansion plan is based on the opening of 12 extra centers by the year-end of 2025. The corporate goal is to create a pipeline network that goes coast to coast (cf. *Graph 9*), which can meet the domestic H_2 demand of Fuel Cells (FC) deployments. The expansion process has already started and, the company should open the doors of 2 locations by the year end. The plant in Georgia will supply demand for the gas in the southeast. The mid-Atlantic is to be covered by a site in Pennsylvania. Electrolyzers on these green H_2 production will come from the gigafactory in Rochester, which finally opened in December 2021. The New York based site was the first piece of the puzzle as it is expected to supply 60 thousand FC-stacks in 2025 to support sales of FC-applications. The gigafactory also has equipment to generate green H_2 and management counts on it to supply the demanding New York area.

***Graph. 9:* PLUG growth plan**

Source: Plug Power

The growth plan is also supported by ambitious mergers and acquisitions. As PLUG continues to centralize production and capture more of the value chain, it must continue to build on its H_2 expertise. Some of the industry knowledge is developed inhouse via research and develop but the process is accelerated with sensible acquisitions. The latter is supported by the fact that *Plug Power* went from historically one or less acquisitions, to two per annum. To corroborate, *GenFuel Electrolyzers* are derived from state-of-the-art technology developed by one of the 2020 target companies. *Giner ELX* was acquired on the 23rd of June 2020 and, the synergies between the two H_2 innovators resulted in a new product line within a year only.

It marks a shift in strategy as *Plug Power* was light on the asset side in prior years. As an example, total assets value doubled in the last calendar year. The company went from a business plan where tangibles were essentially made of inventory and leased properties, to a company targeting production sites across

the globe. Previously, *Plug Power* turned inventory in less than 6 months and, it used capital assets to derive revenues. Under leaseback agreements, the firm typically sold hydrogen refueling sites to a bank, which then leased it back directly to PLUG. At the end, the company operates the equipment on the behalf of a *GenKey customer*. The limit of this strategy however is that the enterprise loses ownership of the underlying asset.

Management was not concerned by the transfer of ownership in the past but, the situation is different in the current growth plan. PLUG previously used original equipment manufacturers to setup refueling sites. As the firm captures more of the value chain, it is less keen on losing capital assets at the maturity of the lease. The market for green H_2 is so important going forward that the company plans to keep electrolyzers in their accounts. Eventually the shift in strategy will test if *Plug Power* can use the new resources efficiently. The firm fixed asset turnover ratio was consistently over 1 in the past but, more risk is embedded in operating a network of factories. Moreover, the H_2 innovator has a limited experience in managing a large workforce. All the above tends to indicate that the ratio will decrease to industry standards in the future. As an indication of future trend, the asset turnover ratio for the energy and transportation sectors according to *CSIMarket* [1], are 73% and 62% respectively.

One relevant question to understand the functioning of the company, is how did they finance the new growth plan? Current operations are unprofitable, so it must be from external funding. Nevertheless, with its poor margins and previous light asset model, borrowers are likely not lending on good terms. Instead, the hydrogen (H_2) innovator has opened capital through equity. In 2020, the firm raised $1.3 Bn via capital markets and another $1.6 Bn was injected by *SK Group* in 2021. The important cash flow impacted liquidity ratios as per reported in the table.

The green values represent ratios that are over the 10-year average for the H_2 innovator. As it can be seen the last two years appear as outliers. At the time of writing, note that year figures are not released. Hence, unrestricted cash reserves are estimated by adjusting values from Q3 2021. The adjustment is made from the cash payments related to the acquisition of two private company (cf. margin) and a forecasted capital expenditures (CAPEX) for the last quarter. No positive cash flow from investing activities are expected either. Effectively, *Plug Power* has over $3 Bn in cash to spend on green H_2 production sites. In comparison, current debt levels are not significant ($500 Mn). Hence, PLUG has the resources to implement its growth plan and the time considering the cash

***Tab. 2:* PLUG latest acquisitions (Q4 2021)**

Target(s):	Frames Group	ACT
(in $Mn)		
Activity	Electrolyzer	LH2 and CHG storage
Deal structure:		
Cash PMT	€ 120	$ 70
Earnout	€ 30	$ 30
Share PMT	€ -	$ 40
Total Purchase price*	€ 150	$ 140
*Bloomberg data		
Cash impact Frames acquisition:	$ 98,5	
Earnout Frames impact liabilities	$ 26,0	
*Based on EUR/USD on Oct. 12, 2021		

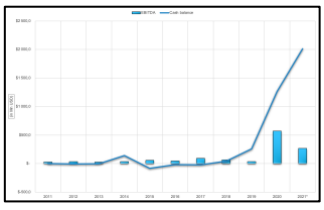
Source: Bloomberg

Tab. 1:* *Evolution of PLUG liquidity ratios

Fiscal years ending in December: (in USD Mn)	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021*
Current Assets	$ 110,9	$ 119,6	$ 155,5	$ 313,6	$ 1 603,2	$ 4 579,4
Current Liabilities	$ 66,5	$ 115,8	$ 146,4	$ 134,0	$ 222,4	$ 269,9
Current Ratio	1,7	1,0	1,1	2,3	7,2	17,0
Inventory	$ 29,9	$ 48,8	$ 47,9	$ 72,4	$ 139,4	$ 225,8
Quick Ratio	1,2	0,6	0,7	1,8	6,6	16,1
Unrestricted Cash and Equivalents	$ 46,0	$ 24,8	$ 38,6	$ 139,5	$ 1 312,4	$ 3 163,4
Cash Ratio	0,7	0,2	0,3	1,0	5,9	11,7
Net Working Capital	$ 44,4	$ 3,8	$ 9,1	$ 179,6	$ 1 380,8	$ 4 309,5

Source: Analyst estimate

Graph. 10:* *An improved cash runway

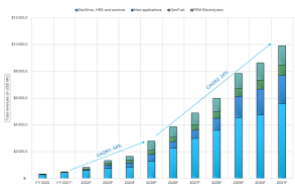


Source: Analyst estimate

burn ratio. If the company keep spending at 2021 levels, it has 7.6 years to become profitable.

E. FORECAST:

Graph. 11: *Forecasted revenues for PLUG*



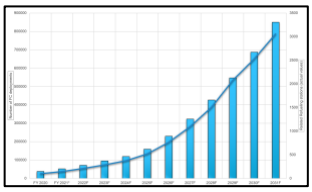
Source: Analyst estimates

The consensus is that the hydrogen market will growth significantly in the next years. It is supposed to be one of the catalysts to decarbonize our societies. As of today, few industrial applications are established in the market. Material handling equipment and small size generators are the closest to breakeven with more traditional solutions. Nevertheless, the potential to implement the gas into different types of vehicles represent a huge opportunity. The forecast displays the central part *Plug Power* can play in that ecosystem.

E1. A $9 Bn BUSINESS BY 2031

In 2031, analysts expect PLUG to record near to double digits in billions of revenues. As is it can be seen on the *Graphic 11* the company is set to go through two growth cycles. Until 2025, analysts predict the hydrogen (H_2) expert to enter a phase of rapid expansion, supported by the opening of its gigafactory. Revenues are to set to increase to nearly $2.8 Bn, which is on par with the corporate goal. The high Compound Annual Growth Rate (CAGR) is maintained for a few years as the company completes its green H_2 pipeline. The second phase of high growth is characterized by a 24% CAGR from 2025 to 2031. In that time span PLUG is expected to further diversify its product offering resulting in new opportunities. By the end of the forecasted period, green H_2 as a power source is expected to have more industrial use.

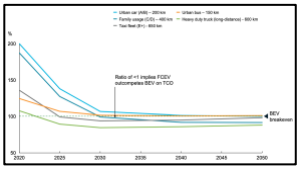
Graph. 12: *Projected output levels*



Source: Analyst estimates

GenDrive (GD), is expected to grow continuously as it become a perfect substitute to battery forklifts. The volume of future sales depends on closing the gap in the total cost of ownership with the latter. As explained in the strategy outlook of the report, *Plug Power* is working towards that goal. It intends to penetrate the European and American electrification trend. Considering that it is in advance on its 2024 target and that external reports (1) suggest parity between battery and FC-forklifts in 2023, analysts forecast PLUG to reach its corporate goal. The company is expected to dispatch 200,000 systems by the end of that period leading to $1 Bn in revenues. In the long run (2030), the H_2 expert wants to enter the market for low-utilization forklifts and deploy more than 1.5 Mn units. By 2030, H_2 motive solutions are the most competitive[1] and so, we expect *Plug Power* to attain 28.7% market share among these vehicles. The unit price is not expected to change much. It went from $16,750 in 2018 to $16,940 in the following year before hitting $17,140 in 2020. Adjusted for inflation the price

Graph. 13: *Timeline for FC- systems on road applications*



Source: McKinsey

growth rates are close to null values. It appears that *Plug Power* already has a robust pricing strategy in place.

GenSure (GS), is supposed to evolve hand to hand with the increase in sales of *high*-power solutions. According to the same cost report about the industry, H_2 is already the privileged low-carbon solution among backup generators. Analysts used reported market prices to estimate *GS HP* unit price to be worth close to $2.5 Bn. Further down the line, the capacity-weighted cost of units must fall to $2,000/kW, to secure more contracts. Quantify the opportunity is more complex, however. Management expects at least one unit to be sold in 2022 and to scale up significantly in the future. PLUG can fill a pressing need for digital companies that have committed to reduce carbon footprint. Based on the green H_2 production it has set up for future years, analysts believe it can integrate the American market at a 5% rate. Furthermore, the firm is in an ideal position to enter the market as it has close ties with Amazon. The latter operate 94 sites in the United States today, which are in the reach of the company.

The last product division, *ProGen*, is also expected to growth at fast pace as H_2 solutions start to breakeven with its battery rivals. First sales are likely to happen in Europe, through *Hyvia*, but the America economy is also expected gain interest rapidly. The market is not ready as total cost of ownership remains higher (*cf. Graph 13*) for end user but, *Plug Power* is already positioning itself for the midterm. Most research targets 2026 as the entry point for vehicles with

high usage. The company is asserting itself as one of the first mover in the market with an already available light-truck option. As it can be seen in the margin, PLUG can tap into a potential market of 825,000 units by 2025 thanks to its partnership with *Renault*. Eventually, the fast-growing segment will overcome sales of *GenSure* due to its high growth potential. Moreover, the American company is working on a truck pilot with *Baier* to be the early beneficiary of cost parity with electric heavy-duty vehicles by 2025.

Considering the lower end reported by Forbes (see B1), *ProGen* units have a price of $167/kWh. In the future, PLUG intends to tighten the gap with other powertrains as they are the main competition. As reported per *BloombergNEF*[1] it must achieve a price of $137/kWh to successfully integrate the market. At that point the segment will enter a new growth phase. Analyst expects the total addressable market to be at $352.4Mn by 2026, which is considered conservative for some reports. It underlines the size of the opportunity. Eventually, the internal demand for green H_2 is supposed to be 349 ton per day by the end of the growth plan. Hence, analysts forecast a multiplier effect not as

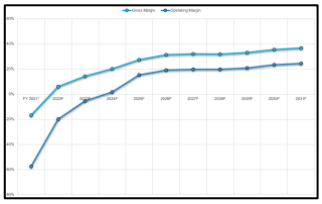
important as PLUG would have hoped but, it is still forecasted to drive green H_2 prices down.

Finally, the company PEM Electrolyzers are so performant early on that it will capture much of the market share. Plug Power has already secured numerous contracts with its state-of-the-art product, and it is expected to remain a predominant supplier in the long-term.

E2. FIRST NET PROFIT IN 2024

Regarding variable costs, PLUG is expected to streamline the process and generate gross margin by the end of its growth plan. First, the active retrofitting of new generation of *GenDrive* at customer sites will release pressure on the service division. The technology has a proven improved lifetime and management expect to complete the retrofitting by 2022. Moreover, better reliability and its top to bottom approach on production will further improve its position. Indeed, the acquisition of *Applied Cryo Technologies* is expected to create several cost savings. PLUG power will not rely on suppliers to furnish adequate storage and transport solutions in the future, which is of paramount importance to operate a large gas pipeline. Moreover, it can improve the conversion factor from LH_2 to CHG on the company H_2 pads. To put it in a nutshell, more of the liquid available in tankers will result in dispensable gas.

Graph. 14: *Positive margins as soon as 2024*



Source: Analyst estimates

Long-term the company plans to significantly improve its cost structure by removing platinum from production its fuel cell stacks. Indeed, the firm is currently researching an alternative to the precious material. Due to material cost and its proportion of costs, analysts believe gross margins for all FC-systems can improve to 45%. Another element that can have a material impact on PLUG variable costs is the market price of gas. Customers will only be in *GenFuel* if it is in line with market prices. Hence, the company do not have much room to implement a pricing strategy. Per *BloombergNEF* [(1)], the real price of green H_2 is expected to be just under $2 in the United States. Hence, the company must deliver rapidly on low producing cost green H_2. Also, due to the low cost of natural gas in the country, analysts expect PLUG to lose some GenFuel contracts to gray hydrogen.

Eventually, the company will also benefit from the economy of scale. Expanding production will dilute fixed costs among more unit of output. In the next years, staff costs are expected to raise due to the opening of several production site. Moreover, recent acquisitions and geographical expansion has seen the workforce to grow to over a thousand employee. Additionally, trained staff will be

needed on production sites. We expect PLUG to successfully manage the challenge however, as it has hired renowned professionals at executive positions. Therefore SG&A is forecasted as an industry standard. Finally, R&D are expected to stay at the current level of sales (8%) as the company is continuing to look at new applications for its FC. It keeps a close eye on the aviation sector.

E3. RETURN ON INVESTED CAPITAL

Regarding the balance sheet, as PLUG scale up and complete its green hydrogen (H_2) pipeline, it will need more investing. Analysts thus expect capital expenditure to remain important in the midterm. It is expected to be worth $1.2 Bn in 2026, more than the double of 2021 levels. Later, it evolves a fixed rate closer to industry standards. The second item subject to important changes among core capital is acquired technology (and in-process R&D). Analysts expects PLUG to continue growth via bold acquisitions and so, it is growing at 8% during the forecast.

Graph. 15: *A better cash management in years to come*

Fiscal years ending in December:	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F	2031F
In USD Mn										
Inventories	$ 396,7	$ 655,9	$ 904,1	$ 774,4	$ 1 016,3	$ 1 270,2	$ 1 558,3	$ 2 011,2	$ 2 183,1	$ 2 404,7
COGS	$ 772,1	$ 1 138,1	$ 1 316,2	$ 2 022,0	$ 2 650,8	$ 3 326,6	$ 4 084,5	$ 5 251,8	$ 5 570,1	$ 6 283,1
AVG Holding period	140	140	140	140	140	140	140	140	140	140
Receivables	$ 396,4	$ 285,9	$ 319,0	$ 484,9	$ 604,2	$ 687,4	$ 756,9	$ 891,8	$ 883,4	$ 912,4
Sales	$ 815,1	$ 1 328,1	$ 1 649,8	$ 2 784,1	$ 3 961,1	$ 4 885,8	$ 5 579,3	$ 7 019,9	$ 8 035,4	$ 9 333,4
AVG Collection period	87	78	71	63	57	51	48	42	37	34
Payables	$ 703	$ 134,0	$ 154,9	$ 238,0	$ 312,3	$ 391,2	$ 479,9	$ 618,0	$ 691,6	$ 739,5
AVG Payable period	45	45	45	45	45	45	45	45	45	45
Cash Conversion Cycle	184	175	167	168	154	148	142	136	134	130

Source: Analyst estimates

The potential synergies are one reason for the group asset turnover to remain high, while the expanding of production sites is expected to have an adverse effect on the latter. Regarding short-term assets, the company is going to use an important part of its cash on hand to fuel its investment needs. Changes in working capital are expected to be close to last two years figures and remain at 7%. Liquidity ratios are supposed to evaluate as follows.

Due to its reliance on anchor customers to generate sales, the average holding period is supposed to stay at 140 days throughout the forecast. Receivables are on the other hand, are continuing its downwards trend as management continue to apply pressure to collect sale from clients. Finally, the payable period is high compared to historical standards but, PLUG has limited room to change the ratios as the whole material segment is in crisis [(1)]. Market experts believe, prolonged waiting period to be the new norm and so, it is kept as constant. Eventually, the net trade cycle is decreasing to 130 days, which can release pressure on the need for external funding. On a last note, as PLUG is on the verge of profitability, the company could use more of the debt market in the future. For the forecast, analysts kept a shareholder ratio at 10%. PLUG is not expected to distribute dividends but, due to the high number of remaining share options, dilutive transactions remain a risk.

To conclude, regardless of where capital is coming from, the combine effects of operating margins and the continuous high efficiency in the use of resources

yield value to shareholder. As a proof, driven by the development of core activities, the return on invested capital of *Plug Power* is stabilizing around 12% from 2026 to the end of the forecast.

F. Valuation

F1. DCF Analysis

In order to derive a price target for Plug Power's common shares, we computed the company's **valuation through a Discounted Cash Flow (DCF) model**. Given that we expect the company's capital structure to remain constant, over the forecasted period, a DCF model was chosen over an Adjusted Present Value (APV) model.

Exhibit 7: *Valuation Output*

(in USD Mn except BVPS)

Core Value	$	24 167,3
Non-Core IC	$	1 263,0
Enterprise Value	$	25 430,3
Net Debt (-)	$	-4 080,6
Equity Value	**$**	**21 349,8**
Number of shares		576,36
Book Value per Share	**$**	**37,0**

Source: Analyst Estimate

The company's future **free cash flows** were **forecasted from 2022 until 2031**. A 10-year forecasting period was chosen due to the nature of the company's growth profile and of the own market where it operates. This mandated a forecasting period sufficiently large so that the company's FCFs could mature and allow for more precise estimations of its terminal value.

As we are valuing the company as of the end of 2022, the same year's cash flow (2022) will not be discounted but will still enter the DCF calculation. From 2023 until 2031, every FCF will be discounted to the valuation's target date (end of 2022). Also, no dividends or share buybacks are expected during the year. On the dividends side, they are not part of the company's historical, especially given its ongoing path towards profitability. Share buybacks are also not expected to be conducted over the year, as the company's cash reserves are rather needed to fuel current expansion and operational plans.

From 2031 until 2040, we forecast the company to grow at an annual growth rate of 5%, given its positioning as an expanding player in the market. After that, we expect the company's growth to stabilize around the long-term average of the economy, set at 2%. Therefore, in our valuation calculations, we compute Plug's terminal value in two phases. Firstly, we compute a growing annuity where the company's free cash flows grow at 5% from 2031 until 2040. This part is discounted by 10 years. The second part is a regular terminal value calculation, although it only starts with Plug's estimated FCF by 2040. Then, this terminal value will be discounted from 2040 until the present and adding both parcels, we retrieve the total terminal value.

Concerning the weighted average cost of capital, we started by performing an assumption on the effective tax rate going forward, where the American future

corporate tax rate would match Biden's administration plans in matters of fiscal policy, through which the corporate tax rate is expected to evolve, in the near-term, towards 26.5% against the current 21%. **For the risk-free interest rate, we used as a proxy the 10-Yr Yield of the U.S.** Treasury Bonds, **currently sitting at 1.43%.** Since Plug Power's operations are based in the United States and most of its investors use the U.S. dollar as their main investment currency, having this rate as the proxy for our risk- free interest rate seemed the most plausible option. For the **Market Risk Premium (MRP)**, we chose one of the most commonly used figures in financial literature (5), which sets the long-term MRP of the U.S. stock market **at 5.5%.**

Exhibit 8: *Releveled Beta*

Industry's Unlevered Beta	0,28
Plug Power Tax Rate	26,5%
Plug Power D/E ratio	4%
Relevered Beta	0,29

Source: Analyst Estimates

Concerning Plug Power's estimated cost of debt, we performed an extensive analysis given the company's non-traditional financing structure. As the **company does not have any outstanding bonds trading in the markets**, we could not derive its cost of debt from the bond's credit rating. Therefore, the **most suitable option was computing a synthetic credit rating (SCR)** for the company's cost of debt. Through its calculation, we then derived a proxy for the company's credit rating, replicating what would be done by rating agencies.

Given Plug Power's current interest coverage ratio (ICR) of -6.53, its estimated bond rating is equal to a D, yielding an estimated **default spread of 10%**. Adding to the default spread the current long-term government bond rate (U.S. Treasury 10-Year Yield) at 1.43%, the **estimated cost of debt of Plug Power** is then set at 11.43%.

To calculate the company's levered beta, we computed two different approaches. Firstly, we **regressed Plug's monthly returns, over the last five years, over the returns of the MSCI World Index** within that same timeframe. This index was chosen as the reference benchmark given the nature of Plug Power's global operations and exposure to risks around different geographies. Here, we retrieved a levered beta for Plug Power of 1,39. Additionally, we performed an alternative beta estimation. After selecting our group of comparables for Plug Power, we ran individual regressions on each one of the comparable companies' returns (5-years, monthly data), retrieving their levered betas. Then, we unlevered the individual betas giving each company effective tax rate and capital structure (debt/equity ratio). Afterwards, we **computed the industry's unlevered beta** by calculating the median of the comparables' unlevered betas and relevered it with Plug's effective tax rate and capital structure, yielding a **relevered beta for Plug Power of 0.29**. This result, while very different from an expectable beta for the company, may be explained by the disproportionately

high debt-to-equity ratios along the peer group, which the market cannot then fully account for through their betas. Hence, this industry-based, relevered beta for Plug Power does not seem a sufficiently robust figure and therefore we chose to use, in our valuation, the regression beta of Plug Power against the benchmark index (MSCI World) as a much more reasonable output in face of the peer group's characteristics. Then, we computed the company's cost of equity using the risk-free interest rate currently sitting at 1.43%, the market risk premium of 5.5% and the levered beta for Plug Power of 1.39, yielding a cost of equity equal to 9.10%. Given the company's costs of debt and equity, we can compute its weighted average cost of capital (WACC). As Plug Power's D/EV is equal to less than 4%, the company's WACC is significantly tilted towards its cost of equity, with the WACC being then equal to 9.07%.

Within our valuation, the terminal value accounts for 61% of the equity value, a value relatively in line with common valuation frameworks and which is logically explained, in Plug's case, by the current path of the firm towards higher profitability and positive cash flows at a later stage.

Discounting the forecasted FCFs of Plug Power, plus its Terminal Value, we retrieve the company's Core Value equal to $Bn 24.17, to which we add the Non-Core Invested Capital – valued at Book Value and equal to $Bn 1.26 - yielding an Enterprise Value of $Bn 25.43. Then, we must subtract the Net Debt – also valued at Book Value and equal to $Bn 4.08, yielding a final Equity Value of $Bn 21.35.

Given the company's current 576.36 million shares outstanding and **assuming the going concern principle over the company's future business**, our valuation yields a **fair value of $ 37.04 per each common share** of Plug Power, which yields a BUY rating taking into account ▪ Value Creation

In terms of value creation**, Plug Power is expected to create solid value for its shareholders in the long-run**. **With** an expected Return on Invested Capital **(ROIC) of 13.9%** throughout the forecasting period**, against the** company's Weighted Average Cost of Capital **(WACC) of 9.07%, the company is able to extract value from its operations to be delivered to its shareholders**. **Also**, with a spread of around 4.8% between the ROIC and the WACC, **the value creation potential is relatively safe from small changes in both variables in the long-term.**

The evolution of the Free Cash Flow Map provides a good insight on the expected evolution, going forward, of the company's capacity to generate available cash to its investors. The **Free FCF (englobing both Core and Non-**

Core Values) turns positive only by 2030, which acutely **reflects** the **company's general growth perspective and need to mature** in the market. The **Core FCF is the major driver**, across all forecasted years, **of the evolution of the FCF and** similarly **becomes positive by 2030**, mostly as changes in total invested capital offset the core result until that date. The **Non-Core FCF has little materiality in the company's operations**, being nevertheless negative in every single year as changes in invested capital offset the non-core results. It is, however, not a concern in terms of the company's path to profitability as the associated items mainly serve as support to the core operations and are not expected to generate cash by themselves. Regarding the Net Debt cash flows, those are forecasted to be continually positive until 2030, as the company gradually increases its debt levels, with a resulting positive effect on the net debt cash flows. **From 2030 onwards**, the **previously expanding debt is expected to start being paid**, so the net debt cash flows inverse and turn negative by that date. The effect from the financing result is, in comparison, minor. The **Net Equity cash flows** turn **increasingly negative from 2025 onwards**, driven by a growing positive total comprehensive income that offsets equally but less positive changes in equity.

Exhibit 9: *Sensitivity Analysis*

Book Value per Share (in USD)	Weighted Average Cost of Capital						
$ 37,0	7,57%	8,07%	8,57%	9,07%	9,57%	10,07%	10,57%
4,25%	$ 47,5	$ 42,9	$ 39,1	$ 35,8	$ 33,0	$ 30,5	$ 28,3
4,50%	$ 48,1	$ 43,5	$ 39,6	$ 36,2	$ 33,3	$ 30,8	$ 28,6
4,75%	$ 48,7	$ 44,0	$ 40,0	$ 36,6	$ 33,7	$ 31,1	$ 28,8
5,00%	$ 49,4	$ 44,6	$ 40,5	$ 37,0	$ 34,0	$ 31,4	$ 29,1
5,25%	$ 50,0	$ 45,1	$ 41,0	$ 37,5	$ 34,4	$ 31,8	$ 29,4
5,50%	$ 50,7	$ 45,7	$ 41,5	$ 37,9	$ 34,8	$ 32,1	$ 29,7
5,75%	$ 51,4	$ 46,3	$ 42,0	$ 38,4	$ 35,2	$ 32,4	$ 30,0

Growth Rate

Exhibit 10&11*: Multiple analysis*

Peer Group			Margins			Price Ratios	
Company	Country	Mkt Cap (USD Bn)	Gross Profit	EBITDA	Net Income	Price/Book	Price/Sales
Plug Power, Inc.	US	18,07	-16,7%	-35,3%	-66,3%	4,35	41,65
Bloom Energy Corp.	US	3,86	21,9%	2,3%	-11,6%	22,30	4,81
Fuel Cell Energy, Inc.	US	2,39	-8,5%	-49,3%	-120,4%	11,62	36,59
Ballard Power Systems	US	1,79	14,5%	-81,8%	-96,5%	3,16	43,43
Hyster-Yale, Inc.	US	0,71	14,2%	0,5%	-1,9%	1,35	0,21
PowerCell AB	Sweden	1,09	30,3%	-51,3%	-49,6%	27,49	79,04
ITM Power	UK	3,05	6,5%	-84,9%	-103,4%	14,71	103,59
Doosan Fuel Cell Co.	SK	2,67	11,5%	7,7%	3,4%	7,29	6,73
Industry's Median:		2,67	14,2%	-49,3%	-49,6%	11,62	36,59

Peer Group			Sales		EBIT	
Company	Country	Mkt Cap (USD Bn)	Sales (USD Mn)	EV/Sales	EBIT (USD Mn)	EV/EBIT
Plug Power, Inc.	US	18,07	498,1	29,1x	-285,9	-50,9x
Bloom Energy Corp.	US	3,86	947,8	4,6x	-100,4	-43,7x
Fuel Cell Energy, Inc.	US	2,39	77,0	27,0x	-54,4	-38,3x
Ballard Power Systems	US	3,79	97,8	26,4x	-81,8	-31,5x
Hyster-Yale, Inc.	US	0,71	2965,0	0,37x	-31,6	23,2x
PowerCell AB	Sweden	1,09	15,6	68,2x	6,8	156,4x
ITM Power	UK	3,05	7,00	93,3x	-28,4	-77,5x
Doosan Fuel Cell Co.	SK	2,67	400	6,3x	23,0	111,4x
Industry's Median:		2,67	97,80	26,4x	-31,60	-31,5x

Source: Analyst Estimates

F2. Sensitivity Analysis

After computing our estimation for Plug Power's book value per share, based on our assumptions for the company's weighted average cost of capital (WACC) and for its terminal growth rate (g) on the annuity phase (the first nine years until 2040, from there onwards the company grows at the economy's long-term growth rate of 2%), we conducted an analysis on the valuation's output sensitivity to changes in these two variables. In the WACC side, marginal increments of 0.5% were made, while on the growth rate these stayed at 0.25%. Thus, our sensitivity analysis on the WACC and on the annuity's growth rate yields a range of target values for Plug's stock of $28.3 (-23.5% against our price target) to $51.4 (+38,4% versus our price target). Thus, we observe that the upside potential for the company's equity is much more pronounced than the downside, suggesting a higher sensibility to upwards moves (given lower WACC and/or higher g) than downwards moves (given higher WACC and/or lower g).

F3. Comparables and Multiples

To benchmark Plug Power against its peers, we chose a custom set of metrics given the fact that the peer group and also Plug Power generally do not already have positive EBITDAs. Thus, a multiples analysis centrally focused on ratios

such as EV/EBITDA, EV/EBIT or P/E as key metrics do not seem to us as much appropriate. Therefore, while we maintained EV/EBIT as a reference point of the path towards profitability, we also added financial metrics around Price, Sales and Margins Ratios.

We compared figures for Margins, Sales, EBIT and Price Ratios across the peer group. Concerning margins, **Plug Power** currently **underperforms** the industry's median **in its gross margin** (-16.7% vs 14.2%) **and net income margin** (-66.3% vs -49.6%), **while outperforming at the EBITDA margin** level (-35.3% vs -49.3%). On sales, **Plug Power has revenues five times bigger than the peers' group** ($Mn 498.1 vs $Mn 97.8). Parallelly, Plug's **EBIT is also** still **significantly more negative** than the industry's median ($Mn -285.9 vs $Mn -31.6). Given that both Plug and the industry generally have negative results, this gap between Sales and EBIT of Plug against the median is justified by the own size gap in terms of market capitalization, with Plug Power trading at $18.1 Bn, while the industry's median is set at $2.7 Bn. From a multiples perspective**, Plug Power** currently **trades at a much more interesting Price/Book ratio than the industry** (4.35 vs 11.62), **while its Price/Sales is set slightly above the peer group** (41.65 vs 36.59). Also**, Plug Power trades at less attractive ratios than the industry concerning its EV/EBIT** (-50.9x vs -31.5x) **and EV/Sales** (29.1x vs 26.4x). Given Plug Power and fellow comparables' generally negative financial results (EBITDA, EBIT, Net Income), and the fact that this type of companies is commonly priced, on a relative basis, through their EV/EBIT or EV/Sales, we chose these ratios to conclude on the relative valuation of Plug Power against the peer group. Thus, our **results suggest that Plug Power currently trades at a slightly pricy valuation against its peers, suggesting potential downside risk for the company's shares on a relative basis**.

G. Scenario Analysis

G1. Different Scenarios

The present forecast of Plug Power's business development, financial results and consequent target valuation is subject to our own forecasted base case scenario for the actual embracing of hydrogen-based solutions across the world's economy. Then, different scenarios can be modelled. Within each one, a set level of cooperation between economic agents, public institutions and the civil society is achieved concerning the ways through which we fuel our processes around mobility, industrial production and heating is completely redesigned. As such, a transformation of this caliber – which aims to a carbon-less society by 2050 – can

ultimately be achieved within different magnitudes of success and therefore we forecast three possible scenarios for the future role of hydrogen on the ongoing energetic transition.

The *Net-Zero* scenario is the **base case of our valuation process**. It assumes that **hydrogen assumes a pivotal role in the energetic transition**, in a realistic manner that is **aligned with the goals contained within the Paris Agreements**. In this scenario, the Paris Agreement is widely respected at the global stage, with **economies transitioning into a *Net-Zero* scenario and maintaining global warming under 1.5oC by 2050**. Here, Plug Power's growth would happen as we forecast in our model.

The **downside scenario assumes** technologies, public policies and consumers' behavior to evolve at a similar pace as they did in the last few years. A then **fairly insufficient set of efforts**, leading to global **emissions expected to remain, by 2050, at only 10% below 2018 levels** (4). Even though a few initiatives on clean fuels are effectively undertaken, fossil fuels do not really lose their dominant role in the global economy, with **alternatives such as hydrogen not fully emerging in the global scene**. **Investment, production and consumption levels stay well below current forecasts** within the *Net-Zero* scenario. Network effects and economies of scale associated with a massive implementation of hydrogen in the world's economy would then not be realized in such a significant manner, leading to a lower competitiveness of hydrogen solutions against *Net-Zero* levels. **Plug Power's growth would follow the own hydrogen market and be much less impressive**. Also, the **company's margins would be far less interesting due to lower realized cost-cutting initiatives and economies of scale**, with a generally lower competitiveness against incumbent fossil fuels.

The **upside case** of our scenarios' analysis is known as Unconstrained *Net-Zero (2)* and **assumes** an even more optimistic prospect than the one realized under *Net-Zero.* It forecasts an **even stronger policy framework** than the one being currently designed, a **larger pool of invested capital (both public and private)** and the **relative lack of supply chain disruptions across the value chain of hydrogen**. In this case, the **global economy would adopt hydrogen at an even faster pace** than what is forecasted to happen under the base case (*Net-Zero),* leading to increased production and investment volumes, network of effects and economies of scale.

G2. Assumptions for each Scenario's Development

We have computed a scenario analysis on the two alternative cases for the development of hydrogen markets and associated growth of Plug Power's business. The **target variables of this analysis were the absolute growth of revenues and the free cash flow margins**. Also, we left **both cases equal to the base level until 2025**, as we believe that the company's well- defined expansion plan to be implemented until that date will drive the most part of the company's revenues and profitability. Hence, we believe that these variable conditions will only be able to affect from 2026 onwards.

For the downside case, we assume revenues to grow at a lower rate than our base case, while the free cash flow margins will shrink (in percentage), driven by lower realized economies of scale and network effects due to revenues growing less fast. For the upside case, we assume the inverse: revenues growing at a faster rhythm than in our base scenario, with higher free cash flow margins driven by better efficiencies in the production process. Also, we ran several different sub-scenarios within each case, changing both revenues growth and FCFs margin.

G3. Sensitivity Analysis on Book Value

In the upside case, revenues are forecasted to grow at 4% to 10% above the case assumptions, in absolute terms, while the free cash flow margins are also expected to raise (from 0.5% up to 2%), leading to an overall appreciation of the company's free cash flows. Then, within this scenario the price target of Plug Power would be between $40.20 and $45.15 per share, with an average price target of $42.65, a upside potential of 15.1% in relation to the base case which would further reinforce our BUY rating.

Exhibit 14: *Upside scenario*

		Premium on Revenues			
	BV per shr.	+4%	+6%	+8%	+10%
Premium on FCF Margins	+0,5%	$ 40,20	$ 40,95	$ 41,69	$ 42,44
	+1%	$ 41,07	$ 41,83	$ 42,59	$ 43,35
	+1,5%	$ 41,94	$ 42,71	$ 43,48	$ 44,25
	+2%	$ 42,81	$ 43,59	$ 44,37	$ 45,15

In the downside case, revenues are forecasted to, while still having a positive growth, remain 4% to 10% below the initial growth assumptions, in absolute terms. The free cash flows are effectively expected to deteriorate, leading to an overall lowering of the company's free cash flows. Within this scenario, Plug Power would be fairly priced between $31.02 to $35.56, embedding an average price target of $33.27, reflecting a downside potential of 10.2% versus the base case and which would maintain our rating as a BUY, although in its very limit.

Exhibit 15: *Downside case*

		Premium on Revenues			
	BV per shr.	-4%	-6%	-8%	-10%
Premium on FCF Margins	-0,5%	$ 35,56	$ 34,84	$ 34,11	$ 33,39
	-1%	$ 34,74	$ 34,03	$ 33,31	$ 32,60
	-1,5%	$ 33,92	$ 33,21	$ 32,51	$ 31,81
	-2%	$ 33,09	$ 32,40	$ 31,71	$ 31,02

Source: Analyst Estimates

Bearing in mind the computed scenario analysis, we issue a BUY rating under every possible figure of both scenarios ($33.1 to $45.2) against the security's last closing price. This confirms and solidifies our BUY rating for the security under the base case scenario, as even under a pessimistic outlook (Downside Case) the BUY rating is able to hold.

Appendix

Financial Statements

FY ending in december: *(In Mn of USD)*	FY 2018	FY 2019	FY 2020	FY 2021*	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F	2031F
Core Result														
GenDrive	$ 74,1	$ 102,6	$ 161,4	$ 246,6	$ 363,8	$ 436,7	$ 472,8	$ 764,1	$ 1 399,5	$ 1 810,8	$ 2 044,8	$ 2 377,9	$ 2 764,1	$ 3 203,8
H2 equipement	$ 37,9	$ 41,3	$ 67,4	$ 135,9	$ 154,2	$ 189,6	$ 216,7	$ 358,7	$ 612,8	$ 824,5	$ 1 125,8	$ 1 591,6	$ 1 285,4	$ 1 524,1
Total MHE& Equipment	$ 112,0	$ 143,9	$ 228,8	$ 382,5	$ 518,0	$ 626,4	$ 689,5	$ 1 122,8	$ 2 012,3	$ 2 635,3	$ 3 170,7	$ 3 969,5	$ 4 049,5	$ 4 727,9
GenSure	$ -	$ 8,0	$ 8,0	$ 8,0	$ 10,7	$ 220,4	$ 305,3	$ 471,0	$ 417,9	$ 437,3	$ 459,6	$ 482,5	$ 505,7	$ 531,3
FC systems for FCEVs (in Mn):				$ 2,0	$ 5,1	$ 11,2	$ 25,3	$ 29,4	$ 70,5	$ 173,0	$ 433,2	$ 1 102,9	$ 1 420,3	$ 1 577,2
Total GS and ProGen	$ -	$ 8,0	$ 8,0	$ 10,0	$ 15,8	$ 231,5	$ 330,6	$ 500,4	$ 488,4	$ 610,3	$ 892,8	$ 1 585,4	$ 1 926,0	$ 2 108,5
TOTAL FC-systems& installations	**$ 112,0**	**$ 151,9**	**$ 236,8**	**$ 392,5**	**$ 533,8**	**$ 857,9**	**$ 1 020,1**	**$ 1 623,2**	**$ 2 500,7**	**$ 3 245,6**	**$ 4 063,5**	**$ 5 554,9**	**$ 5 975,4**	**$ 6 836,4**
GenCare	23,9	26	26,2	25,3	$ 45,7	$ 54,7	$ 62,1	$ 73,4	$ 97,1	$ 125,0	$ 154,4	$ 188,6	$ 222,8	$ 255,6
PPA	22,9	27,1	29,4	34,8	$ 45,4	$ 64,2	$ 85,0	$ 105,6	$ 159,1	$ 233,0	$ 281,1	$ 395,9	$ 493,0	$ 608,3
GenFuel	25,6	31,3	39,1	45,5	$ 66,9	$ 164,1	$ 212,9	$ 301,7	$ 335,1	$ 408,7	$ 488,9	$ 576,8	$ 672,0	$ 775,6
External electrolyzer sales	$ -	$ -	$ -	$ -	$ 129,8	$ 187,2	$ 269,6	$ 680,4	$ 770,2	$ 873,4	$ 988,8	$ 1 119,7	$ 1 267,1	$ 1 434,6
Other	$ -	$ 0,2	$ 0,3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Accelerated vesting of customer warrants (in Mn)	$ -10,2	$ -6,5	$ -425,0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenues as disclosed:	**$ 174,2**	**$ 230,0**	**$ -93,2**	**$ 498,1**	**$ 821,5**	**$ 1 328,1**	**$ 1 649,8**	**$ 2 784,3**	**$ 3 862,1**	**$ 4 885,8**	**$ 5 976,6**	**$ 7 835,9**	**$ 8 630,4**	**$ 9 910,4**
COGS:														
FC systems (in Mn):	$ 50,2	$ 59,7	$ 78,1	$ 145,1	$ 213,5	$ 370,0	$ 437,8	$ 691,8	$ 1 036,8	$ 1 334,8	$ 1 625,9	$ 2 202,0	$ 2 615,9	$ 2 981,8
Related Infrastructure (in Mn):	$ 35,0	$ 38,2	$ 62,3	$ 125,7	$ 142,6	$ 173,5	$ 195,8	$ 319,4	$ 536,7	$ 708,4	$ 946,0	$ 1 303,2	$ 1 021,2	$ 1 168,8
GenCare	$ 32,3	$ 34,6	$ 42,5	$ 66,0	$ 87,3	$ 91,3	$ 90,2	$ 93,3	$ 94,0	$ 119,2	$ 144,6	$ 173,2	$ 200,1	$ 202,3
Provision for loss on service contract (in Mn):	$ 5,3	$ -0,3	$ 35,6	$ 23,1	$ 25,5	$ 35,2	$ 44,8	$ 58,5	$ 87,4	$ 127,1	$ 173,7	$ 236,8	$ 231,3	$ 276,0
PPAs (in Mn):	$ 41,4	$ 41,8	$ 64,6	$ 102,9	$ 87,3	$ 91,3	$ 90,2	$ 93,3	$ 94,0	$ 119,2	$ 144,6	$ 173,2	$ 200,1	$ 202,3
Fuel delivered (in Mn):	$ 36,0	$ 45,2	$ 61,8	$ 118,4	$ 103,6	$ 228,9	$ 261,9	$ 254,5	$ 276,3	$ 329,5	$ 385,3	$ 444,4	$ 506,2	$ 571,1
External electrolyzer sales	$ -	$ -	$ -	$ -	$ 112,3	$ 148,2	$ 195,4	$ 511,2	$ 528,6	$ 586,3	$ 649,1	$ 718,9	$ 795,6	$ 881,0
Other	$ -	$ 0,2	$ 0,3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
COGS excl charges:	**$ 200,2**	**$ 219,4**	**$ 345,2**	**$ 581,2**	**$ 772,1**	**$ 1 138,3**	**$ 1 316,2**	**$ 2 022,0**	**$ 2 653,8**	**$ 3 324,4**	**$ 4 069,1**	**$ 5 251,6**	**$ 5 570,5**	**$ 6 283,3**
Accelerated vesting of customer warrants (in Mn)	$ -	$ -	$ 31,0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gross profit=	**$ -26,0**	**$ 10,6**	**$ -469,4**	**$ -83,1**	**$ 49,4**	**$ 189,7**	**$ 333,6**	**$ 762,3**	**$ 1 208,3**	**$ 1 561,3**	**$ 1 907,5**	**$ 2 584,3**	**$ 3 060,0**	**$ 3 627,1**
Gross margin	*-14,9%*	*4,6%*	*-503,6%*	*-16,7%*	*6,0%*	*14,3%*	*20,2%*	*27,4%*	*31,3%*	*32,0%*	*31,9%*	*33,0%*	*35,5%*	*36,6%*
Operating expenses/ income:														
SG&A:	$ 37,7	$ 43,2	$ 79,3	$ 142,4	$ 145,8	$ 149,5	$ 165,0	$ 194,9	$ 270,3	$ 342,0	$ 418,4	$ 548,5	$ 604,1	$ 693,7
Percentage of total revenues	*20,4%*	*18,3%*	*23,9%*	*28,6%*	*10,0%*	*10,0%*	*10,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*
R&D	$ 12,7	$ 15,0	$ 27,8	$ 51,6	$ 65,6	$ 109,8	$ 144,3	$ 139,2	$ 193,1	$ 244,3	$ 298,8	$ 391,8	$ 431,5	$ 495,5
RD/ Sales	*6,9%*	*6,3%*	*8,4%*	*10,4%*	*8,0%*	*8,3%*	*8,7%*	*5,0%*	*5,0%*	*5,0%*	*5,0%*	*5,0%*	*5,0%*	*5,0%*
Impairment of long-lived assets	$ -	$ -	$ 6,5	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other operating expenses (income)	$ -	$ -	$ 1,2	$ 8,8	$ 1,0	$ 1,6	$ 2,0	$ 3,3	$ 4,6	$ 5,9	$ 7,2	$ 9,4	$ 10,3	$ 11,9
Percentage of total revenues	*0,0%*	*0,0%*	*-1,3%*	*1,8%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	0,1%
Core result before taxes:	**$ -76,4**	**$ -47,6**	**$ -584,2**	**$ -285,9**	**$ -163,1**	**$ -71,1**	**$ 22,3**	**$ 424,8**	**$ 740,2**	**$ 969,2**	**$ 1 183,2**	**$ 1 634,6**	**$ 2 014,0**	**$ 2 426,0**
Statutory Taxes	$ 16,0	$ 10,0	$ 122,7	$ 60,0	$ 43,2	$ 18,9	$ -5,9	$ -112,6	$ -196,2	$ -256,8	$ -313,5	$ -433,2	$ -533,7	$ -642,9
CORE RESULT:	**$ -61,0**	**$ -37,9**	**$ -460,2**	**$ -226,6**	**$ -124,0**	**$ -59,0**	**$ 8,1**	**$ 298,3**	**$ 524,7**	**$ 687,8**	**$ 839,6**	**$ 1 162,1**	**$ 1 436,9**	**$ 1 733,3**
Non Core Result:														
Interest Income	$ -	$ -	$ -	$ 3,3	$ 1,4	$ 2,2	$ 2,7	$ 4,6	$ 6,4	$ 8,1	$ 9,9	$ 12,9	$ 14,3	$ 16,4
Percentage of total revenues	*0,0%*	*0,0%*	*0,0%*	*0,7%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*	*0,2%*
Non Core Result before taxes:	**$ -**	**$ -**	**$ -**	**$ 3,3**	**$ 1,4**	**$ 2,2**	**$ 2,7**	**$ 4,6**	**$ 6,4**	**$ 8,1**	**$ 9,9**	**$ 12,9**	**$ 14,3**	**$ 16,4**
Statutory Taxes	$ -	$ -	$ -	$ -0,7	$ -0,4	$ -0,6	$ -0,7	$ -1,2	$ -1,7	$ -2,1	$ -2,6	$ -3,4	$ -3,8	$ -4,3
Unrealised gain on available for sale securities, net	$ -	$ -	$ -	$ -4,1	$ -1,03	$ -1,03	$ -1,03	$ -1,03	$ -1,03	$ -1,03	$ -1,03	$ -1,03	$ -1,03	$ -1,03
Tax adjustment	$ -10,6	$ -17,6	$ -100,9	$ -65,6	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
NON CORE RESULT:	**$ -10,6**	**$ -17,6**	**$ -100,9**	**$ -67,1**	**$ -0,0**	**$ 0,6**	**$ 1,0**	**$ 2,4**	**$ 3,7**	**$ 4,9**	**$ 6,2**	**$ 8,5**	**$ 9,4**	**$ 11,0**
Financing Result:														
Interest expense (or net interest for 2016 onwards)	$ -22,8	$ -35,7	$ -60,5	$ -43,8	$ -57,0	$ -	$ -	$ -	$ -	$ -95,7	$ -168,3	$ -249,1	$ -409,1	$ -319,7
Percentage of Debt previous yr		*34,4%*	*22,2%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*	*7,8%*
Change in FV of common stock warrant liability	$ 4,3	$ 0,1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Gain (loss) on extinguishment of Dt	$ -	$ -0,5	$ 17,7	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6	$ -2,6
Financing result before taxes:	**$ -18,5**	**$ -36,1**	**$ -42,8**	**$ -46,4**	**$ -59,6**	**$ -2,6**	**$ -2,6**	**$ -2,6**	**$ -2,6**	**$ -98,3**	**$ -170,9**	**$ -251,7**	**$ -411,7**	**$ -322,3**
Statutory Taxes	$ 3,9	$ 7,6	$ 9,0	$ 9,7	$ 15,8	$ 0,7	$ 0,7	$ 0,7	$ 0,7	$ 26,1	$ 45,3	$ 66,7	$ 109,1	$ 85,4
Preferred stock DVDs declared, deemed DVDs and accret	$ -0,1	$ -1,8	$ -0,1	$ -	$ -0,5	$ -0,5	$ -0,5	$ -0,5	$ -0,5	$ -0,5	$ -0,5	$ -0,5	$ -0,5	$ -0,5
FINANCING RESULT:	**$ -14,7**	**$ -30,3**	**$ -33,9**	**$ -36,6**	**$ -44,3**	**$ -2,4**	**$ -2,4**	**$ -2,4**	**$ -2,4**	**$ -72,8**	**$ -126,1**	**$ -185,5**	**$ -303,1**	**$ -237,4**
TOTAL COMPREHENSIVE INCOME (LOSS)	**$ -86,3**	**$ -85,8**	**$ -595,0**	**$ -330,3**	**$ -168,3**	**$ -60,8**	**$ 6,7**	**$ 298,2**	**$ 525,9**	**$ 619,9**	**$ 719,7**	**$ 985,1**	**$ 1 143,3**	**$ 1 506,9**

FY ending in december: (In Mn of USD)	FY 2018	FY 2019	FY 2020	FY 2021*	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F	2031F
Core Invested Capital														
Operating cash	$ 4,0	$ 9,6	$ 24,7	$ 52,0	$ 56,1	$ 90,7	$ 112,7	$ 190,2	$ 263,9	$ 333,8	$ 408,4	$ 535,4	$ 589,7	$ 677,2
Percentage of total revenues	*2,2%*	*4,1%*	*7,4%*	*10,4%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*	*6,8%*
AR	$ 37,3	$ 25,8	$ 43,0	$ 132,4	$ 196,4	$ 285,6	$ 319,0	$ 484,3	$ 604,2	$ 687,4	$ 756,3	$ 891,8	$ 883,4	$ 912,4
Average collection period	*78*	*41*	*66*	*97*	*87*	*78*	*71*	*63*	*57*	*51*	*46*	*42*	*37*	*34*
Inventories:	$ 47,9	$ 72,4	$ 139,4	$ 229,8	$ 295,7	$ 435,9	$ 504,1	$ 774,4	$ 1 016,3	$ 1 273,2	$ 1 558,3	$ 2 011,2	$ 2 133,3	$ 2 406,3
Average holding period	*87*	*120*	*135*	*144*	*140*	*140*	*140*	*140*	*140*	*140*	*140*	*140*	*140*	*140*
AP	$ -34,8	$ -40,4	$ -50,2	$ -68,4	$ -90,9	$ -134,0	$ -154,9	$ -238,0	$ -312,3	$ -391,2	$ -478,9	$ -618,0	$ -655,6	$ -739,5
Average payable period	*63*	*67*	*49*	*43*	*43*	*43*	*43*	*43*	*43*	*43*	*43*	*43*	*43*	*43*
Accrued payroll & compensation related costs	**$ -2,1**	**$ -2,9**	**$ -29,2**	**$ -40,3**	**$ -57,0**	**$ -80,6**	**$ -114,0**	**$ -161,3**	**$ -197,0**	**$ -278,6**	**$ -394,0**	**$ -557,3**	**$ -788,1**	**$ -1 114,5**
Other current assets (liabilities)	$ 9,6	$ 5,3	$ -1,4	$ 23,7	$ 24,2	$ 39,1	$ 48,6	$ 82,0	$ 113,7	$ 143,8	$ 175,9	$ 230,6	$ 254,0	$ 291,7
Percentage of total revenues	*5,2%*	*2,2%*	*-0,4%*	*4,7%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*
Tangible assets	**$ 159,7**	**$ 147,8**	**$ 273,0**	**$ 646,8**	**$ 984,5**	**$ 1 482,8**	**$ 1 728,3**	**$ 2 735,4**	**$ 4 251,7**	**$ 5 498,2**	**$ 6 950,1**	**$ 9 481,9**	**$ 9 412,8**	**$ 10 725,3**
Other equipement	$ 12,9	$ 15,0	$ 74,5	$ 378,2	$ 548,4	$ 946,4	$ 1 115,3	$ 1 720,8	$ 2 518,4	$ 3 166,1	$ 3 765,7	$ 4 980,2	$ 5 777,1	$ 6 414,3
FC-systems turnover ratio	*5,75*	*7,37*	*2,27*	*68%*	*69%*	*71%*	*72%*	*73%*	*75%*	*76%*	*78%*	*80%*	*81%*	*83%*
Equipement under Leaseback agreement	$ 146,8	$ 132,8	$ 198,5	$ 268,6	$ 436,1	$ 536,4	$ 613,0	$ 1 014,6	$ 1 733,2	$ 2 332,1	$ 3 184,4	$ 4 501,8	$ 3 635,7	$ 4 311,0
HRS turnover ratio	*25,8%*	*31,1%*	*33,9%*	*50,6%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*	*35,4%*
Acquired technology	**$ 3,7**	**$ 5,4**	**$ 9,7**	**$ 8,2**	**$ 11,4**	**$ 15,0**	**$ 19,2**	**$ 23,9**	**$ 29,3**	**$ 35,3**	**$ 42,2**	**$ 49,9**	**$ 58,5**	**$ 68,3**
Customer relationships, Backlog & Trademarks	**$ 0,2**	**$ 0,1**	**$ 0,6**	**$ 0,5**	**$ 0,6**	**$ 0,9**	**$ 1,2**	**$ 1,6**	**$ 2,0**	**$ 2,4**	**$ 2,9**	**$ 3,4**	**$ 4,0**	**$ 4,6**
In process R&D	$ -	$ -	$ 29,0	$ 29,0	$ 33,4	$ 38,4	$ 44,1	$ 50,7	$ 54,8	$ 59,2	$ 63,9	$ 69,0	$ 74,5	$ 80,5
Deferred Revenue	$ -40,1	$ -34,9	$ -56,2	$ -98,9	$ -141,2	$ -209,9	$ -239,9	$ -372,6	$ -475,4	$ -553,3	$ -622,7	$ -751,1	$ -761,1	$ -804,1
Percentage of total revenues	*-21,7%*	*-14,8%*	*-16,9%*	*-19,9%*	*-17,2%*	*-15,8%*	*-14,5%*	*-13,4%*	*-12,3%*	*-11,3%*	*-10,4%*	*-9,6%*	*-8,8%*	*-8,1%*
INVESTED CAPITAL CORE BUSINESS	**$ 185,4**	**$ 188,2**	**$ 382,4**	**$ 914,7**	**$ 1 313,2**	**$ 1 963,8**	**$ 2 268,3**	**$ 3 570,7**	**$ 5 351,0**	**$ 6 810,0**	**$ 8 462,3**	**$ 11 346,8**	**$ 11 205,5**	**$ 12 508,3**
Goodwill	$ 9,0	$ 8,8	$ 72,4	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9	$ 71,9
Other LT Assets (Liabilities)	$ 8,0	$ 5,8	$ -35,0	$ 14,6	$ 24,1	$ 39,0	$ 48,4	$ 81,7	$ 113,3	$ 143,3	$ 175,3	$ 229,8	$ 253,1	$ 290,7
Percentage of total revenues	*4,3%*	*2,5%*	*-10,5%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*	*2,9%*
Other investments& securities	$ -	$ -	$ -	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4	$ 900,4
INVESTED CAPITAL NON CORE BUSINESS	**$ 17,0**	**$ 14,6**	**$ 37,4**	**$ 986,9**	**$ 996,4**	**$ 1 011,3**	**$ 1 020,7**	**$ 1 054,0**	**$ 1 085,6**	**$ 1 115,6**	**$ 1 147,6**	**$ 1 202,1**	**$ 1 225,4**	**$ 1 263,0**
TOTAL IC	**$ 202,4**	**$ 202,8**	**$ 419,8**	**$ 1 901,6**	**$ 2 309,6**	**$ 2 975,1**	**$ 3 289,0**	**$ 4 624,6**	**$ 6 436,6**	**$ 7 925,6**	**$ 9 609,9**	**$ 12 549,0**	**$ 12 431,0**	**$ 13 771,3**
Excess cash	$ -106,2	$ -359,9	$ -1 609,5	$ -3 496,6	$ -2 205,8	$ -1 485,6	$ -1 177,8	$ -110,5	$ -	$ -	$ -	$ -	$ -	$ -
Debt, Leases & other debt instruments	$ 325,9	$ 432,8	$ 562,4	$ 731,3	$ -	$ -	$ -	$ -	$ 1 228,2	$ 2 159,3	$ 3 195,9	$ 5 248,3	$ 4 101,4	$ 4 085,5
NET DEBT (FINANCIAL ASSETS)	**$ 219,7**	**$ 72,9**	**$ -1 047,1**	**$ -2 765,3**	**$ -2 205,8**	**$ -1 485,6**	**$ -1 177,8**	**$ -110,5**	**$ 1 228,2**	**$ 2 159,3**	**$ 3 195,9**	**$ 5 248,3**	**$ 4 101,4**	**$ 4 085,5**
Common Equity	$ -17,3	$ 129,9	$ 1 466,9	$ 4 666,9	$ 4 515,4	$ 4 460,7	$ 4 466,7	$ 4 735,1	$ 5 208,4	$ 5 766,3	$ 6 414,1	$ 7 300,6	$ 8 329,6	$ 9 685,8
FINANCING	**$ 202,4**	**$ 202,8**	**$ 419,8**	**$ 1 901,6**	**$ 2 309,6**	**$ 2 975,1**	**$ 3 289,0**	**$ 4 624,6**	**$ 6 436,6**	**$ 7 925,6**	**$ 9 609,9**	**$ 12 549,0**	**$ 12 431,0**	**$ 13 771,3**
TOTAL IC= FINANCING	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Additional information:														
Net-debt-to-Equity ratio	*-13*	*56,1%*	*-71,4%*	*-59,3%*	*-48,9%*	*-33,3%*	*-26,4%*	*-2,3%*	*23,6%*	*37,4%*	*49,8%*	*71,9%*	*49,2%*	*42,2%*
Net payout with shareholders		$ 233,0	$ 1 932,0	$ 3 530,3	$ 16,8	$ 6,1	$ -0,7	$ -29,8	$ -52,6	$ -62,0	$ -72,0	$ -98,5	$ -114,3	$ -150,7
Total payout ratio		*2,72*	*3,25*	*10,69*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*	*10%*

Fiscal years ending in December:	FY 2018	FY 2019	FY 2020	FY 2021*	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F	2031F
Core Result	$ -61,0	$ -37,9	$ -460,2	$ -226,6	$ -124,0	$ -59,0	$ 8,1	$ 298,3	$ 524,7	$ 687,8	$ 839,6	$ 1 162,1	$ 1 436,9	$ 1 733,3
Core Invested Capital	$ 185,4	$ 188,2	$ 382,4	$ 914,7	$ 1 313,2	$ 1 963,8	$ 2 268,3	$ 3 570,7	$ 5 351,0	$ 6 810,0	$ 8 462,3	$ 11 346,8	$ 11 205,5	$ 12 508,3
Change in Core Invested Capital		$ 2,8	$ 194,2	$ 532,3	$ 398,5	$ 650,7	$ 304,4	$ 1 302,4	$ 1 780,3	$ 1 459,0	$ 1 652,3	$ 2 884,5	$ -141,3	$ 1 302,7
Core FCF	**$ -61,0**	**$ -40,7**	**$ -654,4**	**$ -758,9**	**$ -522,5**	**$ -709,6**	**$ -296,3**	**$ -1 004,1**	**$ -1 255,7**	**$ -771,3**	**$ -812,7**	**$ -1 722,4**	**$ 1 578,2**	**$ 430,6**
Non-Core Result	$ -10,6	$ -17,6	$ -100,9	$ -67,1	$ -0,0	$ 0,6	$ 1,0	$ 2,4	$ 3,7	$ 4,9	$ 6,2	$ 8,5	$ 9,4	$ 11,0
Non-Core Invested Capital	$ 17,0	$ 14,6	$ 37,4	$ 986,9	$ 996,4	$ 1 011,3	$ 1 020,7	$ 1 054,0	$ 1 085,6	$ 1 115,6	$ 1 147,6	$ 1 202,1	$ 1 225,4	$ 1 263,0
Change in Non-Core Invested Capital		$ -2,4	$ 22,8	$ 949,5	$ 9,5	$ 14,9	$ 9,4	$ 33,3	$ 31,6	$ 30,0	$ 32,0	$ 54,5	$ 23,3	$ 37,5
Non-Core FCF	**$ -10,6**	**$ -15,2**	**$ -123,7**	**$ -1 016,6**	**$ -9,5**	**$ -14,3**	**$ -8,5**	**$ -30,9**	**$ -27,9**	**$ -25,1**	**$ -25,8**	**$ -46,1**	**$ -13,9**	**$ -26,5**
FREE CASH FLOW	**$ -71,6**	**$ -55,9**	**$ -778,1**	**$ -1 775,5**	**$ -532,0**	**$ -723,9**	**$ -304,8**	**$ -1 035,1**	**$ -1 283,6**	**$ -796,4**	**$ -838,5**	**$ -1 768,5**	**$ 1 564,3**	**$ 404,0**
Financing result:	$ -14,7	$ -30,3	$ -33,9	$ -36,6	$ -44,3	$ -2,4	$ -2,4	$ -2,4	$ -2,4	$ -72,8	$ -126,1	$ -185,5	$ -303,1	$ -237,4
Net Debt (Financial Assets)	$ 219,7	$ 72,9	$ -1 047,1	$ -2 765,3	$ -2 205,8	$ -1 485,6	$ -1 177,8	$ -110,5	$ 1 228,2	$ 2 159,3	$ 3 195,9	$ 5 248,3	$ 4 101,4	$ 4 085,5
Change in Net Debt		$ -146,8	$ -1 120,0	$ -1 718,2	$ 559,5	$ 720,2	$ 307,9	$ 1 067,3	$ 1 338,6	$ 931,1	$ 1 036,6	$ 2 052,5	$ -1 146,9	$ -15,9
Net Debt CF	**$ -14,7**	**$ -177,1**	**$ -1 153,9**	**$ -1 754,8**	**$ 515,1**	**$ 717,8**	**$ 305,4**	**$ 1 064,9**	**$ 1 336,2**	**$ 858,4**	**$ 910,4**	**$ 1 867,0**	**$ -1 450,0**	**$ -253,3**
Total comprehensive income (loss)	$ -86,3	$ -85,8	$ -595,0	$ -330,3	$ -168,3	$ -60,8	$ 6,7	$ 298,2	$ 525,9	$ 619,9	$ 719,7	$ 985,1	$ 1 143,3	$ 1 506,9
Equity	$ -17,3	$ 129,9	$ 1 466,9	$ 4 666,9	$ 4 515,4	$ 4 460,7	$ 4 466,7	$ 4 735,1	$ 5 208,4	$ 5 766,3	$ 6 414,1	$ 7 300,6	$ 8 329,6	$ 9 685,8
Change in Equity		$ 147,2	$ 1 337,0	$ 3 200,0	$ -151,5	$ -54,7	$ 6,0	$ 268,4	$ 473,3	$ 557,9	$ 647,7	$ 886,5	$ 1 028,9	$ 1 356,2
Net Equity CF	**$ 86,3**	**$ 233,0**	**$ 1 932,0**	**$ 3 530,3**	**$ 16,8**	**$ 6,1**	**$ -0,7**	**$ -29,8**	**$ -52,6**	**$ -62,0**	**$ -72,0**	**$ -98,5**	**$ -114,3**	**$ -150,7**
FINANCING CASH FLOW	**$ 71,6**	**$ 55,9**	**$ 778,1**	**$ 1 775,5**	**$ 532,0**	**$ 723,9**	**$ 304,8**	**$ 1 035,1**	**$ 1 283,6**	**$ 796,4**	**$ 838,5**	**$ 1 768,5**	**$ -1 564,3**	**$ -404,0**
Check	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*

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Report Recommendations

Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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Sources:

(1) “Global Hydrogen Review 2021”, International Energy Agency, last accessed December 13 2021, https://www.iea.org/reports/global-hydrogen-review-2021

(2) “Hydrogen for Net-Zero”, Hydrogen Council & McKinsey, last accessed December 10 2021, https://hydrogencouncil.com/en/hydrogen-for-net-zero/

(3) EnerData (2021), “EnerOutlook 2050”, EnerData, last accessed December 11 2021, https://eneroutlook.enerdata.net/forecast-world-final-energy-consumption.html

(4) Global Energy Monitor, last accessed 13 December 2021, https://globalenergymonitor.org/

(5) Fernandez, Pablo and Bañuls, Sofia and Fernandez Acin, Pablo, “Survey: Market Risk Premium and Risk-Free Rate used for 88 countries in 2021”, 2021, IESE Business School Working Paper, available at SSRN: https://ssrn.com/abstract=3861152

(6) Collins, K. C. (2021, December 6). Beijing Olympics: Biden admin expected to announce diplomatic boycott this week - CNNPolitics. CNN. https://edition.cnn.com/2021/12/05/politics/biden-beijing-olympics-boycott/index.html

(7) Ohnsman, A. (2019, May 30). Hauling With Hydrogen: DHL Adding Fuel-Cell Vans To Its Delivery Fleet. Forbes. https://www.forbes.com/sites/alanohnsman/2019/05/29/hauling-with-hydrogen-dhl-adding-fuel-cell-vans-to-its-delivery-fleet/

(8) Asset Turnover Ratio Screening, Rankings of best performing Companies, Sectors, Industries. (n.d.). CSIMarkets. https://csimarket.com/screening/index.php?s=at

(9) Hydrogen Council. (2021). Path to hydrogen competitiveness: A cost perspective. https://hydrogencouncil.com/wp-content/uploads/2020/01/Path-to-Hydrogen-Competitiveness_Full-Study-1.pdf

(10) Bloomberg. (2020, December 14). Battery Pack Prices Cited Below $100/kWh for the First Time in 2020, While Market Average Sits at $137/kWh. BloombergNEF. https://about.bnef.com/blog/battery-pack-prices-cited-below-100-kwh-for-the-first-time-in-2020-while-market-average-sits-at-137-kwh/

(11) Bloomberg. (2021, May 5). Hydrogen to Outcompete Blue Everywhere by 2030. BloombergNEF. https://about.bnef.com/blog/green-hydrogen-to-outcompete-blue-everywhere-by-2030/

(12) McDonald, J. (2020, January 24). S&P Global Platts. S&P500 Global. https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/012420-fuel-cell-evs-set-to-top-13-million-by-2030-as-hydrogen-scales-up-hydrogen-council

(13) Interact Analysis. (2021, June 22). The Forklift Truck Market Now and Moving Forward |. https://www.interactanalysis.com/the-forklift-truck-market-now-and-moving-forward/