
MARCELLUS CAPITAL GROUP
Semarak
renewable energy
Investing into Green Hydrogen

# Important notice

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# Table of contents

# Section 1

## Transaction opportunity and key investment highlights

# Project SeRenE – the future of green hydrogen in Kampung Gajah, Perak

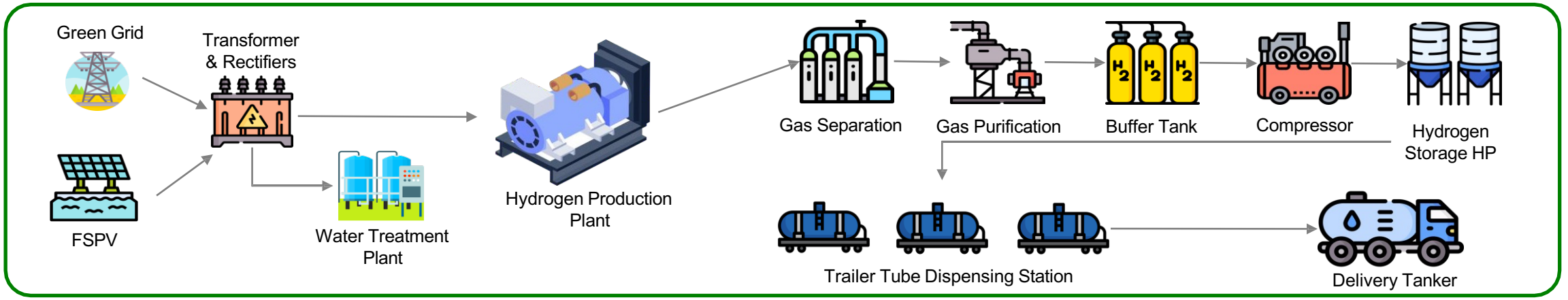
> The project will help lead the way for Malaysia to become a player within the green hydrogen industry and support an ambitious, **green transition** of conventional industries

- SPSB through SRESB is desirous of undertaking the design, construction and operation of an integrated complex for the production of green hydrogen via large scale electrolysis from renewable energy ("the Project") as illustrated below.

- SRESB, the joint venture company, was incorporated on 20 June 2022 to undertake the Project. SRESB is currently wholly owned by Ocean Thermal Energy Services Sdn. Bhd.

- On 1 June 2022, Perak Industrial Resources Sdn Bhd, a wholly owned subsidiary of the Perak State Development Corporation granted the approval in-principle to SPSB to undertake the Project with conditions (further elaborated in Section 3).

- SRESB had in November 2022 commissioned a technical study conducted by a technical consultant, i.e. Transerve Pte Ltd ("Transerve") outlining the front-end conceptual design of the Project (further elaborated in Section 4).

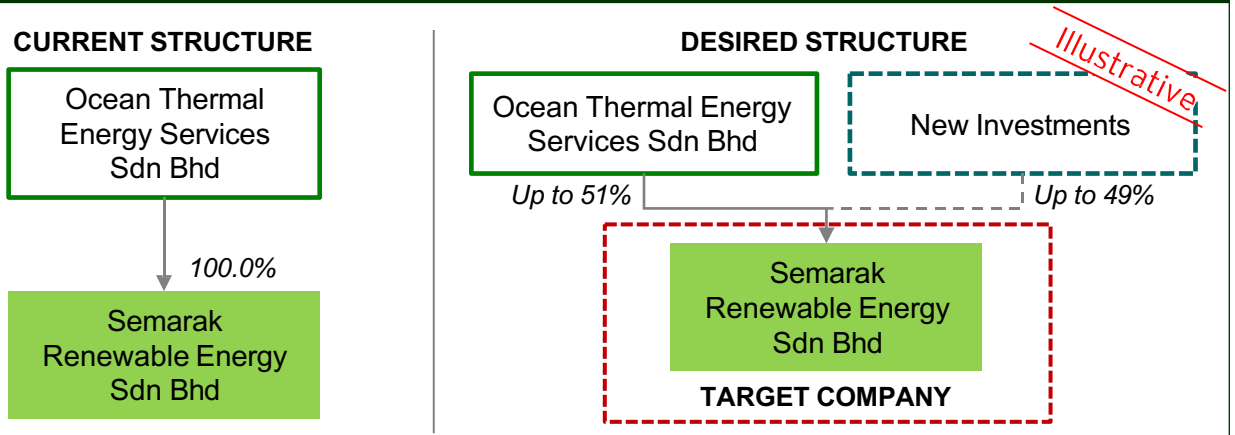


# Project SeRenE is the opportunity to acquire equity interest in SRESB and fund the remaining costs of the Project via debt financing

## Key Project Highlights

- The Project is located in the District of Kampung Gajah which is anticipated to utilise the water body and land situated on Plot 9 comprising approximately seventy (70) per cent of tin mining lake and thirty (30) per cent of flat land made available by the Perak State Government.
- Out of the four (4) available plots of land, i.e. Plot 6, Plot 7, Plot 8 and Plot 9, Plot 9 was identified and selected having the largest water body area of approximately 1,439 acres.
- The floating solar photovoltaic ("PV") farm for phase 1 will be built in two (2) sections with a total installed capacity aggregating 130MW (i.e. installed capacity of 65MW in each section).
- Based on the power output from the floating solar PV farm and the purchase of renewable energy from the national grid during non-peak power output hours, daily production of hydrogen is estimated at 20 to 22 tonnes per day.
- The first production of green hydrogen is scheduled in 2025.
- Plot 9 comprise sufficient land for the potential phase 2 expansion involving ammonia production wherein the project planning is scheduled to commence in 2026.

## Target Company




- As highlighted in the approval in-principal issued by Perak Industrial Resources Sdn Bhd ("PIRSB") to SRSB, the following salient terms and conditions to be incorporated in the Development Agreement and/or Water Rights Agreement, amongst others, must be observed:
  i. SRESB is incorporated with a paid-up capital of RM10 mil; and
  ii. The paid-up capital aggregating RM10 mil is required to be raised within six (6) months from the date of the Development Agreement.
- Project SeRenE is the opportunity to acquire equity interest in SRESB. The management intends to structure the partnership as a jointly owned private company with a view of symmetrical and fair partnership, i.e. on equal terms.
- The remaining costs of the Project is anticipated to be funded via debt financing.
- The structure of the equity and debt proportions remain open for negotiation.

# Finding the right, responsible and technical savvy partner(s)

## General expectations

- Due to the long-term and expectedly close partnership, identifying the right private partner is of paramount importance.
- Considering the scope, size and complexity of the Project, it is expected that the private partner is required to possess financial, commercial, technical and organisational resources to undertake the Project.
- The private partner is expected to be an active long-term strategic partner that will play a significant role in developing, maturing and realising the Project's business case and commercial potential.
- The partnership will be symmetrical (according to ownership share) and fair.
- A guiding principle for the Project and its conduct will be to ensure compliance with the latest ESG agenda and clear commitment to sustainability.

## The right partnership will contribute…

Financing

Technical expertise

Strategic vision

Innovation

Business acumen

Project management expertise

…and the ability to scale the hydrogen concept to other states

## Expected steps and mechanisms that over the lifetime of the Project will ensure responsible partners

| Tender phase | Award of construction contract | Construction phase | Establishing common ownership | Operation phase |
|---|---|---|---|---|
| ▸ Prequalification demands such as technical and financial capabilities are met.<br>▸ Competitive dialogues held to refine tender materials. | ▸ Screening will be based on pre-determined evaluation criteria before construction contracts are awarded. | ▸ Change of control and partners may require prior consent from the State.<br>▸ Change of control or partners can initiate new investment screening. | ▸ Screening of investment will be based on pre-determined evaluation criteria. | ▸ Change of control and partners may require prior consent from the State. |

# Key investment highlights

## First mover

Ability to leverage first-mover advantage for future green hydrogen projects gaining know-how

## Early Entry

Early entry into Malaysia's new "green power plant" with opportunities to shape design

## Long-term investment

Green investment with attractive long-term cash flow profile

**Green hydrogen production via large scale electrolysis from renewable energy**

**20 - 22 tonnes per day**

**First production in 2025**

## Growth Potential

Potential phase 2 expansion involving ammonia production

## Strong Fundamentals

Strong national and international support and attractive location for hydrogen power plant

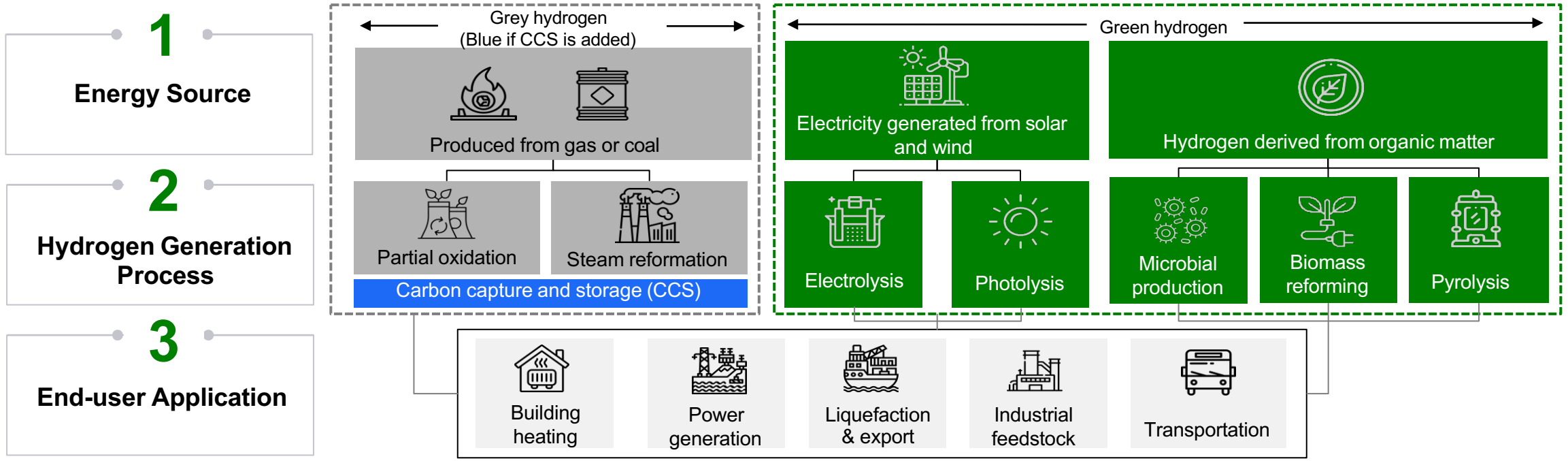
## Active Partnership

An active partnership to optimise business opportunities

# Section 2

## Market outlook

# Ways to produce hydrogen and overview of the hydrogen value chain



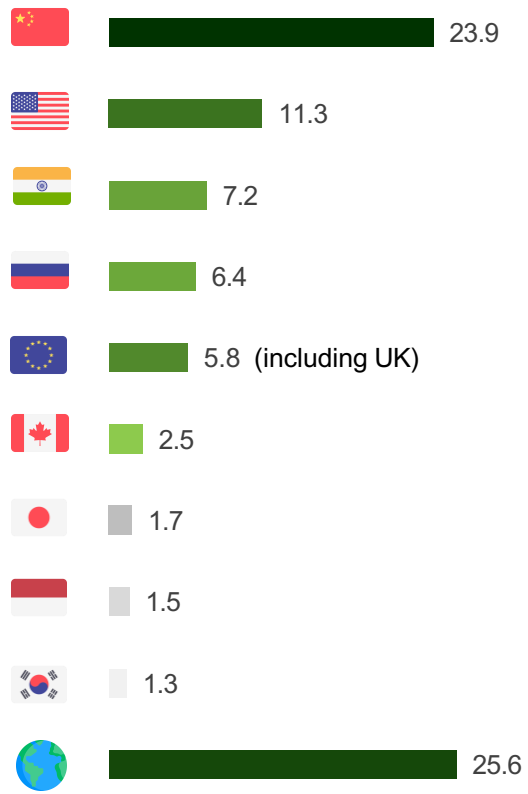

**Hydrogen Value Chain**

| Generation | Conditioning | Storage/ distribution | Application | End User |
|---|---|---|---|---|
| Grey, Blue, Green | Liquefaction<br>Compression | ▸ Pipeline<br>▸ Road/ rail transportation<br>▸ Physical storage<br>▸ Refueling stations | ▸ Power generation<br>▸ Industrial feedstock and energy<br>▸ Fuel for transportation<br>▸ Building heating | Corporates<br>Consumers |

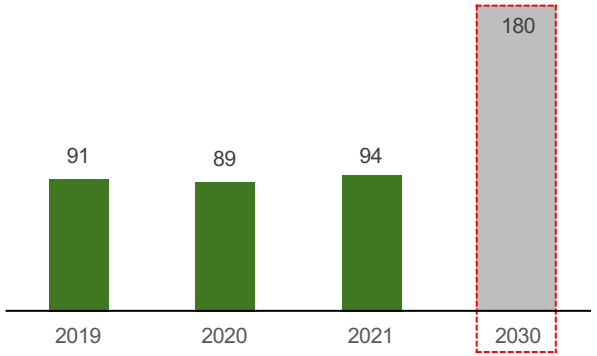
Source: EY-Parthenon Analysis

# Global hydrogen market is picking up speed and hydrogen demand is set to reach 180 mil tonnes by 2030

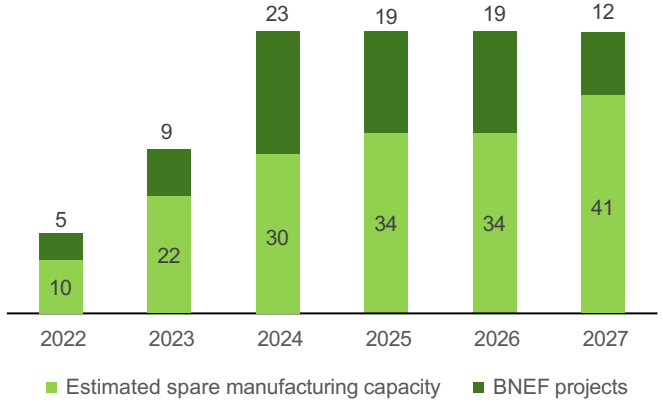
**Global hydrogen consumption in 2020, by country (in mil tonnes)**




**Global hydrogen demand 2019-2021 and forecast for 2030 (in mil tonnes)**




**Projected global electrolyser manufacturing capacity 2022 – 2027 (in gigawatts)**




Source: Statista, IEA and United Nations Press Release

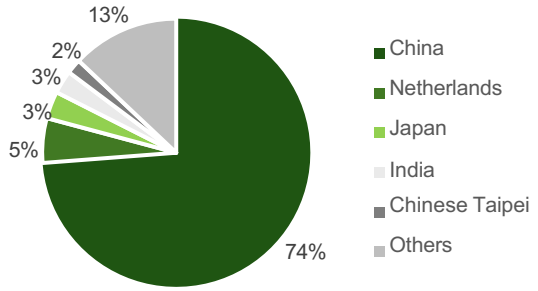
## Key highlights

- With more than 110 countries pledging to carbon neutrality by 2050, hydrogen is gaining more traction in recent years as policymakers find alternative solutions to decarbonise their economies.
- Hydrogen is seen as one of the important pillars of a net zero economy and a critical enabler for global transition to cleaner energy.
- The overall global hydrogen demand recorded a 5% increase from 2020 and exceeded previous annual high of 91 mil tonnes in 2019, reaching 94 mil tonnes in 2021 with China being the world's top consumer of hydrogen followed by the United States.
- However, most of the demand were met by hydrogen produced from unabated fossil fuels.
- Presently, hydrogen is primarily used in industries including oil refining and production of ammonia, methanol and steel. The growth of hydrogen demand is expected to be driven by downstream products, i.e. refined fuels for transport, fertilisers for food production and construction materials for buildings.
- Following the increase in demand for hydrogen, it is estimated that the global manufacturing capacity of electrolysers would grow steadily, which could better support the clean energy transition and facilitate the production of low-emissions hydrogen from renewable energy.
- Through cross sector and multilateral collaborations, news alliances are being formed to develop hydrogen projects and ensure continuous growth of its demand which will help economies achieve greenhouse gas reduction targets.

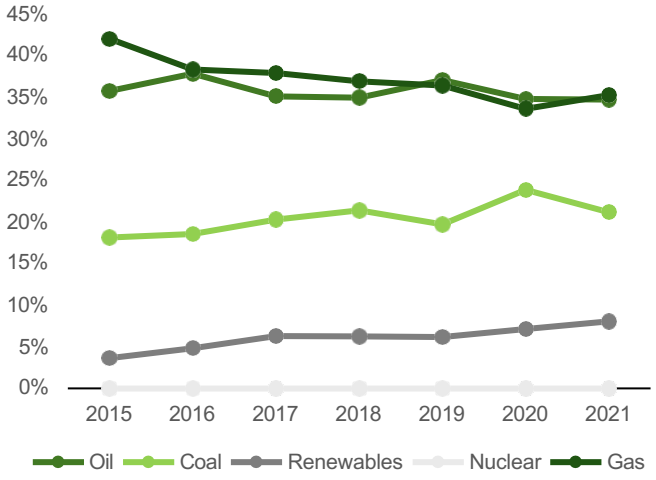
# Market overview: Malaysia

**4th** largest exporter of hydrogen in the world, exported **$802 mil** hydrogen in 2021

**Hydrogen export destination countries**




**Share of primary energy consumption in Malaysia, by source**




## Key players in the hydrogen industry

PETRONAS

sarawak energy

SEDC ENERGY

TENAGA NASIONAL

## Key highlights

- Under the Malaysia Renewable Energy Roadmap launched on 30 December 2021, Malaysia aims to increase the renewable energy share in the national installed capacity mix to 31% by 2025 and 40% by 2035.
- Malaysia as a signatory of the Paris Climate Agreement in 2015 sees huge potential of transitioning towards, amongst others, the hydrogen economy to reduce 45% of economy-wide carbon intensity [i.e. greenhouse gas ("GHG") from seven GHGs] by 2030.
- The availability of resources, i.e. natural gas and renewables such as hydroelectric, solar and bioenergy positions Malaysia effectively for the competitive production of blue and green hydrogen.
- However, gas and oil continue to account for more than 50% of Malaysia's primary energy consumption with renewables share growing at a slower pace.
- To date, hydrogen is primarily used for heavy industries such as oil refinery process and the production of methanol, ammonia, iron and steel.
- Sarawak is already leading Malaysia's hydrogen sector by tapping into its rich renewable energy potential which can be harnessed to produce low carbon hydrogen and position the state to become a significant player in the global hydrogen value chain.

Source: Observatory of Economic Complexity, Our World In Data, SEDA, The Edge, National Energy Policy 2022 – 2040 and IRENA

# Market overview: Malaysia

## Government policies and initiatives

The Malaysian government has outlined several key initiatives for the development of the emerging hydrogen economy under the National Energy Policy 2022 – 2040:

- Establish a long-term hydrogen roadmap which optimises hydrogen production pathways across green, blue and grey hydrogen
- Build a domestic hydrogen ecosystem supported by research and development, technology deployment and commercialisation capabilities across targeted areas across the hydrogen value chain
- Develop regulation and legislative framework governing the roll-out of hydrogen production, transport and end-use applications
- Form partnerships with industry players to build nationwide hydrogen supply chain capabilities, capacity and infrastructure

MITI estimated that the hydrogen demand in Malaysia could reach **3 mil** tonnes by 2050

> *"Technology partnerships and technology transfer from international players will be critical on a range of topics including electrolyser technologies, export terminal technologies, and hydrogen transport technologies between production sites and export terminals.*
>
> *Sub-focus areas will also be identified in hydrogen technologies such as reducing electrolyser capital costs, increasing electrolyser conversion efficiency and utilisation potential."*
>
> **National Energy Policy 2022 - 2040**

By 2050, **70%** of the country's electricity supply is targeted to be sourced from renewable energy

## Key projects in the public / private sector

1. Petroliam Nasional Berhad ("PETRONAS") and Sarawak Energy Berhad signed a Memorandum of Understanding ("MoU") on 10 November 2020 to strategise a collaboration to explore the commercial production of green hydrogen and its supply chain in Asia
2. Sarawak Energy Berhad in collaboration with Linde EOX Sdn Bhd launched its first integrated hydrogen production plant and refueling station in Southeast Asia in 2019
3. SEDC Energy Sdn Bhd, inked a tripartite MoU with Japan's Sumitomo Corporation and ENEOS in October 2020 to build a hydrogen plant in Bintulu

## Target sector

**Energy**

The initiatives observed in the Malaysian market is currently focused on power generation:

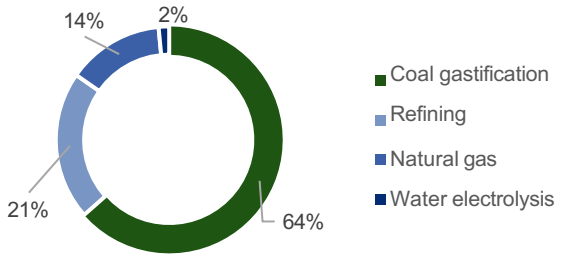
- In August 2022, TNB and Petronas announced a joint collaboration to conduct feasibility studies on hydrogen and carbon capture
- TNB also aspires to co-fire natural gas with green hydrogen in a re-powered project at the Sultan Ismail Power Station in Terengganu for cleaner electricity generation

Source: National Energy Policy 2022 – 2040, MIDA, and various news articles

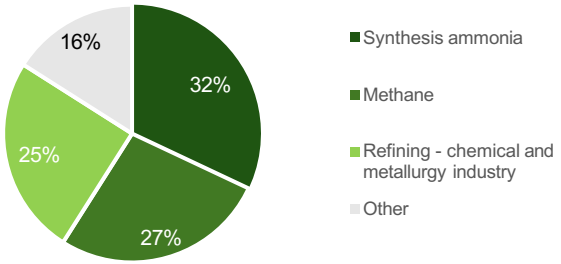
# Market overview: China

China is the world's largest producer of hydrogen, **33 mil** tonnes in 2020

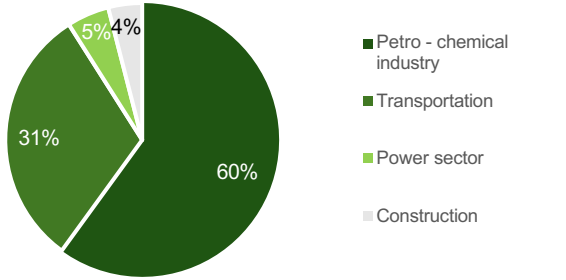
**China's hydrogen supply in 2020 by energy source/ generation process**




**Current hydrogen application**




**Hydrogen application anticipated in 2060**




## Key players in the hydrogen industry

SINOPEC · Beijing Jingneng Power Co.,Ltd. (BEIH) · SUNGROW Clean power for all · SPIC · 中国华能集团公司 CHINA HUANENG GROUP · 国家能源集团 CHN ENERGY

Source: IEA, Hydrogen Council, China Hydrogen Alliance

## Key highlights

- China has set an ambitious goal to reach peak carbon emissions before 2030 and to achieve carbon neutrality by 2060, a major step to address climate change.
- Low-emission hydrogen and carbon capture, utilisation and storage ("CCUS") technologies have both been identified as key priorities in China's carbon neutrality guidelines.
- In 2020, hydrogen production in China reached approximately 33 mil tonnes, which amounted to 30% of the world's total production.
- Although China tops other countries in hydrogen production, about two-thirds of China's hydrogen is produced using coal-fired energy, which generated approximately 360 mil tonnes of carbon dioxide emissions in 2020.
- Efforts have been made to explore and develop green hydrogen production to help meet industry demand while also address climate concerns.
- The China Hydrogen Alliance estimates that hydrogen demand in China could reach 35 mil tonnes in 2030 and 60 mil tonnes in 2050. Meanwhile, the organisation also projects that renewable-based hydrogen production could reach 100 mil tonnes by 2060, accounting for 20 percent of the country's final energy consumption.
- As of July 2021, 53 hydrogen projects have been publicly announced in China, of which 50% are linked to transport applications.

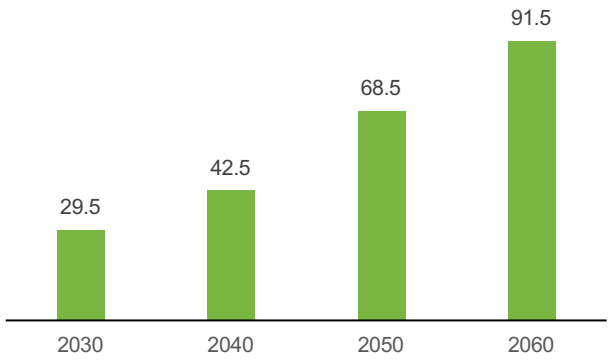
# Market overview: China

## Government policies and initiatives

- China's national policy on green hydrogen remains conservative. The aim is to first develop hydrogen capabilities and build capacities more generally, and greening it second
- Since 2016, the Chinese government announced 66 National Key Research and Development Programs ("NKP") focusing on hydrogen technologies, with a total estimated value between RMB1.8 bil and RMB5.0 bil
- 14 NKPs have an explicit focus on green hydrogen, with a combined estimated value between RMB0.4 bil and RMB1.3 bil
- Towards the end of the 13th Five-Year Plan (2016–2020), China's hydrogen technology research and development ("R&D") spending increased sixfold, to over USD0.6 bil in 2019
- Local governments are acting more progressively than the national government, driving the growth of hydrogen industries
- Approximately 30 local governments mentioned hydrogen in their 14th Five-Year Plans and over 50 cities have issued policies to grow their local hydrogen industry

Plans to produce up to **0.2 mil** tonnes of renewable - based hydrogen annually by 2025

**Forecasted hydrogen consumption in China, 2030-2060 (in mil tonnes)**




Hydrogen to account for **20%** of final energy consumption by 2060

## Key projects in the public / private sector

1. Sinopec earmarked USD2.8 bil for the integrated wind-power and green hydrogen project to be built in Ulanqab, Inner Mongolia
2. Meijin Energy and Jiaxing Transportation Investment Group formed a joint venture in August 2019 for the construction of hydrogen energy infrastructure in Jiaxing, Zhejiang Province
3. Shanghai Re-fire Energy Technology Co., Ltd. partnered with the People's Government of Nanhai District to invest in the construction of a hydrogen energy industry base project in Danzao Town focusing on R&D in hydrogen fuel cells, hydrogen-powered fuel-cell vehicles ("FCV") and the related industries

## Target sector

**Transportation**

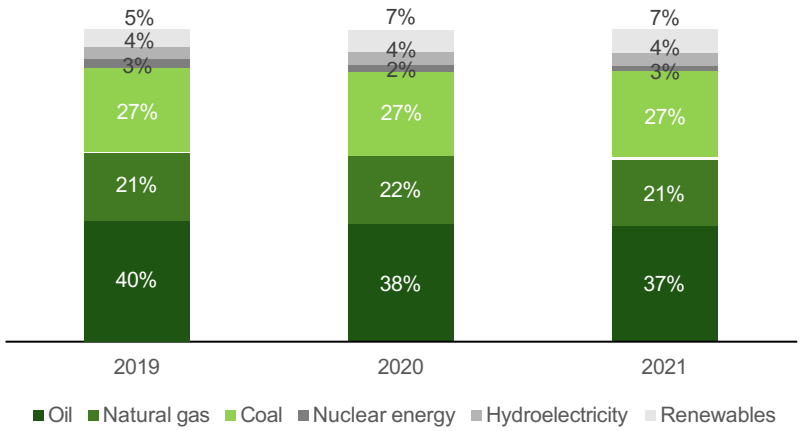
Majority of China's industrial policy in the hydrogen industry is focused on developing and demonstrating FCVs. Under the Hydrogen FCV Technology Roadmap and New Energy Vehicle Industry Development Plan published in 2016 and 2020 respectively, China projects to reach a national fleet of over 1 million FCVs by 2030 and grow hydrogen refueling stations from 72 units as of mid-2020 to 2,000 units by 2035.

Source: CSIS, China Hydrogen Alliance, Statista, MERICS, Hydrogen Insight and various news articles

# Market overview: Japan

Japan still largely depend on oil and gas as their primary source of energy. Japan's green growth strategy includes, amongst others, developing the hydrogen sector to help achieve carbon neutrality by 2050.

**Primary energy consumption in Japan, by fuel 2019-2021**




Hydrogen demand in Japan, **2MT** in 2021

Target to boost demand to **3MT** per annum by 2030

And **20MT** per annum by 2050

## Key players in the hydrogen industry

TOYOTA
Panasonic
Sumitomo
idemitsu
Fuji Electric
TOSHIBA
ENEOS
丸紅株式会社 Marubeni

## Key highlights

- Japan is a highly industrialised country with a severe lack of hydrocarbon resources that sees multiple values in using hydrogen and is actively securing access to hydrogen feedstocks.
- The nation aims to expand its hydrogen market from 2 mil tonnes per year in 2021 to 3 mil tonnes per year by 2030 and 20 mil tonnes per year by 2050 while also seeks to reduce the cost of hydrogen from USD1 per cubic meter (Nm3) in 2017 to 30 cents/Nm3 by 2030 and about or below 20 cents/Nm3 by 2050.
- Japan's Basic Hydrogen Strategy and Strategic Roadmap for Hydrogen and Fuel Cell issued by the Ministry of Economy, Trade and Industry of Japan sets out the following aims:
  - Establish an integrated international hydrogen supply chain by 2030 encompassing upstream, midstream and downstream;
  - Reduce hydrogen production costs;
  - Improve the efficiency of hydrogen liquification process technology;
  - Enhance the capacity of above ground liquefied hydrogen storage tanks; and
  - Expand industrial and consumer use of hydrogen and ammonia.
- Under the 6th Strategic Energy Plan, the Japanese government targets for hydrogen or ammonia to comprise 1% of Japan's overall power generation mix by 2030.

Source: Ministry of Economy, Trade and Industry of Japan, East Analytics, Clifford Chance, Statista and CSIS

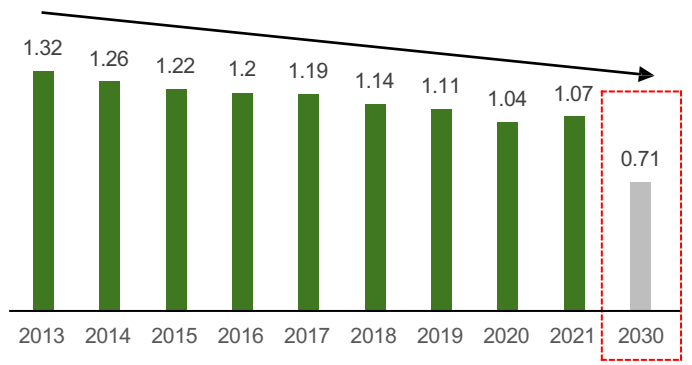
# Market overview: Japan

## Government policies and initiatives

- The Japanese government's policy initiatives are focused on:
  - Developing hydrogen supply chain and expanding demand for hydrogen and ammonia; and
  - Substantially reducing the delivered cost of hydrogen (JPY30/Nm3 by 2030).
- The total government budgetary support for hydrogen of JPY98.9 bil for FY2022 includes:
  - Subsidies for FCVs;
  - R&D on fuel cell technologies and hydrogen supply infrastructure;
  - International research collaboration projects for innovative technologies in clean energy (e.g. CCS);
  - Technology development to produce, store and utilise hydrogen; and
  - Pilot projects to develop the hydrogen supply chain.
- Strong public-private partnership is established in major areas of decarbonising activities

**Hydrogen to make up 1% of Japan's overall power generation mix by 2030**

**Japan's annual $CO_2$ emissions and target for 2030 (in bil tonnes)**




**USD2.7 bil allocated for the development of large-scale hydrogen supply chain project**

## Key projects in the public / private sector

**1 Brunei Project – Organic Hydrides Technology**
World's first international hydrogen supply chain project, developed by a consortium of Japanese companies with the support of the Japanese and Brunei governments receiving financial support from NEDO

**2 Australia Project – Hydrogen from Brown Coal**
An international supply chain between Australia and Japan involving:
- Brown coal gasification and hydrogen production;
- Hydrogen liquefaction and storage;
- Marine transportation of liquefied hydrogen; and
- Unloading and storage of liquefied hydrogen.

## Target sector

**Industrial**
Beyond its use in the electricity generation and transportation sectors, hydrogen is seen as key for decarbonising industrial sectors, such as steelmaking and petrochemical production

**Transportation**
Japan's Hydrogen Roadmap 2019 has an ambitious goal of:
- 200,000 FCVs by 2025 and 800,000 by 2030
- 320 locations of hydrogen refueling stations by 2025 and 900 by 2030

Source: Ministry of Economy, Trade and Industry of Japan, East Analytics, Clifford Chance and CSIS

# Market overview: Republic of Korea

**1.3 mil tonnes of hydrogen was consumed in 2020**

Korea's hydrogen industry to double in size:

**KRW14.1 tril** in 2020

**KRW26.8 tril** in 2030

Imported **92.8%** of energy and natural resources

<1% of hydrogen is sourced through water electrolysis

Spending on hydrogen project reached **USD0.7 bil** in 2021, 40% increase from 2020

## Key players in the hydrogen industry

주식회사 덕양 DEOKYANG CO.,LTD.
SAMSUNG
SAMSUNG SDI
Air Liquide
LOTTE CHEMICAL
THE LINDE GROUP

## Key highlights

- In September 2021, the Republic of Korea became the 14th country to legislate its commitment to become carbon neutral by 2050.
- Under the Carbon Neutrality Act, the emissions reduction goal stands at 40 percent from 2018 levels by 2030.
- The Republic of Korea plans to source a third of its energy from hydrogen by 2050, making the gas the largest single source of energy nationally.
- As part of its efforts to cut greenhouse gases, the Korean government is planning to increase hydrogen production from about 0.45 mil tonnes per year in 2021 to 1.9 mil tonnes per year by 2030 while importing 1.96 mil tonnes per year of clean hydrogen from abroad.
- South Korea has the third largest public investment in hydrogen after Germany and Japan.
- The spending on hydrogen projects by the South Korean government aggregated USD0.7 bil in 2021, with a further USD2.3 bil committed to establishing a public-private hydrogen-powered fuel-cell electric vehicle market by the end of 2022.
- South Korea is actively exploring various projects with potential hydrogen resource suppliers.

Source: Statista, Ministry of Foreign Affairs of Republic of Korea, Ministry of Environment of Korea, Austrade Report, CSIS and Macquarie

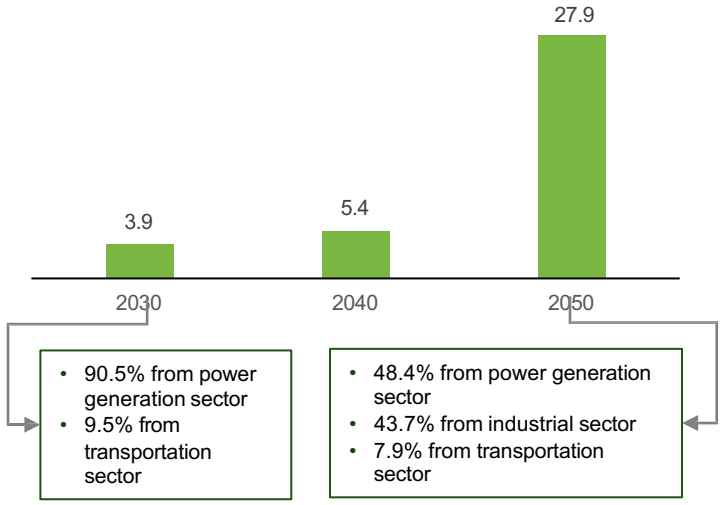
# Market overview: Republic of Korea

## Government policies and initiatives

- Passed the Hydrogen Economy Promotion And Hydrogen Safety Management Act ("Hydrogen Act") in February 2020:
  - Provide an overarching legal framework that outlines the requirements and expectations in areas including subsidies, loans, tax exemptions, and health and safety matters
- Announced the Korean Green New Deal in July 2020 with the aim of creating 1.9m jobs by 2025:
  - Out of KRW74 tril of total capital investment under the Green New Deal, KRW20 tril is allocated to green mobility, particularly hydrogen projects
- To increase R&D on liquefied hydrogen storage technology and the reduction of transportation costs
- To plan and build a specialised hydrogen pipeline network across the country
- To support the development of hydrogen cars, ships, trains and machineries

Aims to **produce 3 mil** tonnes and **import 23 mil** tonnes of green hydrogen by 2050

**Forecasted hydrogen consumption in South Korea, 2030-2060 (in mil tonnes)**




Hydrogen to account for **33%** of total energy consumption by 2050

## Key projects in the public / private sector

1. Hyundai, SK, POSCO, Hanwha, and Hyosung announced KRW42 tril investment commitment in the hydrogen economy by 2030
2. Samsung Heavy Industries in partnership with KOGAS, Korea's main natural gas importer, has committed to allocate KRW18 tril to build special terminals in Busan and Yeosu ports by 2024 for the import of green hydrogen
3. POSCO announced plans to import ammonia and to roll out large-scale ammonia-based hydrogen production hubs in four locations (Incheon, Daejeon, Yeosu and Ulsan) by 2025
4. Air Liquide partnered with KOHYGEN to build hydrogen stations for buses and trucks

## Target sector

### Transportation

Under the Hydrogen Economy Roadmap 2019, the Korean government outlines the goal of:

- Producing 6.2 mil fuel cell electric vehicles and rolling out at least 1,200 refilling stations by 2040
- Introducing 40,000 hydrogen-fueled buses, 80,000 taxis and 30,000 trucks as well as nurturing the domestic manufacture of appropriate auto parts by 2040

Source: IEA, IRENA, Austrade Report, CSIS, S&P Global and Macquarie and various news articles

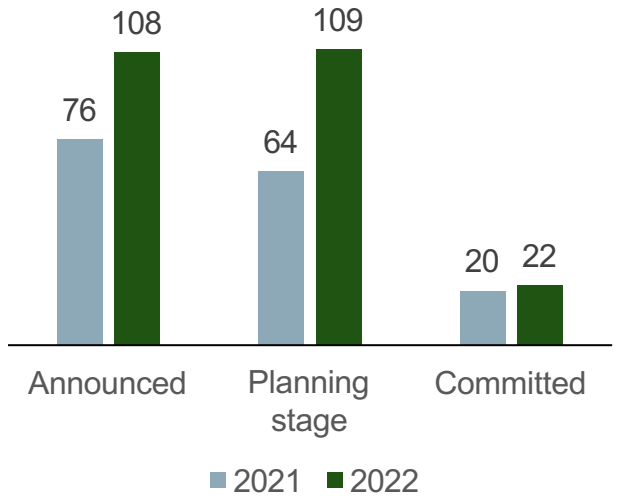
# Less than 10% of the hydrogen projects have reached final investment decision ("FID") stage despite a record high number of project proposals submitted

534 large-scale projects worth **$240 bil** aim to fully or partially commission through 2030

One third of those projects worth **$109 bil** are undergoing feasibility and FEED studies

Only **$22 bil** have reached FID, under construction or are operational

**Total announced investment of USD240 bil until 2030 by maturity**




- Europe dominates the proposed hydrogen investments globally, with nearly 314 project proposals worth USD76 bil in total out of which 268 projects are aiming for full or partial commissioning through 2030. This is then followed by North America and Latin America wherein each announced approximately 20% of the total proposed investments globally.
- Approximately 65% of the total announced investments aggregating USD240 bil focus on clean hydrogen supply, 25% on end-use while transmission and distribution make up the rest of the 10%.
- One third of the projects with total announced investments of USD109 bil are undergoing feasibility and front-end engineering design ("FEED") studies.
- When compared to 2021, total committed projects only grew slightly by 10% or USD2 bil to USD22 bil in 2022, suggesting that there is a lack of demand from the market as many remain skeptical or await further policies and framework from the government as well as funding to incentivize off-takers to enter into long-term hydrogen supply contracts.
- North America makes up the largest share of the total volume of committed investments representing 35% or USD8 bil. This is followed by Europe which has a more comprehensive and clearer decarbonisation targets and regulatory framework on clean energy and Asia, each representing approximately 25% or USD6 bil.

Source: Hydrogen Insights Report September 2022 published by the Hydrogen Council

# Key challenges in the pursuit of green hydrogen economy

Despite strong factors driving the global uptake of green hydrogen, there are some major barriers that may deter or slowdown the development of green hydrogen at scale.

| | |
|---|---|
|  **High production, storage and transportation costs** | ▶ Green hydrogen project requires huge upfront investment and the production cost greatly depends on electrolyser system cost, electricity price and operating hours.<br>▶ The cost of storing compressed hydrogen is at least 50% higher than storing methane and is reliant on the cycling of the storage facility.<br>▶ High conversion and transportation costs make transporting hydrogen for export not economically sustainable. The cost would be even higher if reconversion is required. |
|  **Low future demand visibility** | ▶ The green hydrogen sector is still in its infancy stage and the current demand and production are driven mainly by climate ambition rather than immediate economic gain.<br>▶ While the interest in using green hydrogen is growing, there is little value recognition and demand remains low for products made using green hydrogen including green steel and green ammonia.<br>▶ As hydrogen is not a publicly traded commodity like oil and most of the trading of hydrogen today are through bilateral agreement between countries or companies, visibility of consumption remains unclear for investments in infrastructure development. |
|  **Bankability and funding issues** | ▶ Adequate returns from revenue to service operating costs and debt as well as return on investment remain critical to the bankability of large-scale hydrogen projects.<br>▶ Financial institutions remain cautious in shifting their investments from conventional wind and solar projects to novel technologies such as green hydrogen due to challenges associated with commercialising green hydrogen including regulatory constraints and technology risks.<br>▶ Relying solely on equity to finance the capital-intensive hydrogen project is not sufficient to achieve the scale needed to realise the full potential of the green hydrogen sector. |

Source: Hydrogen Council, IRENA, Refinitiv

# Key challenges in pursuit of green hydrogen economy (cont'd)

| | |
|---|---|
|  **Limited infrastructure and facilities** | ► Transporting hydrogen for industrial use across different countries and region remains challenging as there are only about 5,000km of hydrogen transmission pipelines worldwide. More efforts are required in establishing infrastructure including terminals, large-scale storage, carriers, refueling station networks and etc. to enable cross-border trade.<br>► Storing hydrogen on construction sites require adequate space for large tanks. Regular maintenance is needed to prevent leakage and maximise the lifetime of the containers which would increase the production cost.<br>► Countries without existing natural gas networks which can be re-purposed for hydrogen are reluctant to invest in new infrastructure due to the high upfront cost. |
|  **Lack of technical and commercial standards** | ► To date, there is no clear internationally agreed codes and standards regarding safe construction, maintenance and operation of hydrogen facilities as well as the proper handling and transportation of hydrogen along the entire supply chain.<br>► While some countries are drafting their own regulations or guidelines as part of their effort to develop the hydrogen sector, different standards could potentially lead to carbon leakage especially at jurisdictions with laxer emission constraints and indirectly hamper the country's decarbonisation effort.<br>► Uncertainties will remain and users may remain skeptical of the use of green hydrogen in the absence of a well-established certification system as they are unable to accurately verify the origin or production method of hydrogen. |
|  **Overall sustainability** | ► Power supply to the electrolyser can be connected through a renewable energy plant, grid or a mix of both. Electrolytic hydrogen is considered to have lower overall emissions than grey hydrogen only when grid-powered electrolysis has an emission factor below 190 grams of $CO_2$ /kWh.<br>► The reduction of carbon emissions resulting from the use of hydrogen should be weighted against the additional emissions during the liquefaction and transportation process. Transporting hydrogen using trucks will most likely continue to use fossil fuels in the short term which can easily erode the carbon emissions reduction benefits. |

Source: Hydrogen Council, IRENA, Refinitiv

# Some of the hydrogen projects in other regions



| Project Name | Brunei Project – Organic Hydrides Technology | Daesan Hydrogen-Fuel-Cell Power Generation | Sinopec Xinjiang Kuqa Green Hydrogen Pilot Project | Bécancour Green Hydrogen Plant |
|---|---|---|---|---|
| **Project Promoters** | • Advanced Hydrogen Energy Chain Association for Technology Development (Japan alliances)<br>• Brunei Darussalam | • Hanwha Energy<br>• Korea East-West Energy<br>• Doosan Corporation<br>• Financial investors | • Sinopec | • Air Liquide Canada |
| **District/ Country** | Brunei Darussalam | Seosan, Korea | Xinjiang, China | Becancour, Canada |
| **Completion Date** | May 2020 | June 2020 | June 2023 | January 2021 |
| **Goal & milestone** | • Realised the first international hydrogen supply chain using liquid organic hydrogen carrier<br>• Successfully shipped hydrogen for more than 4,000km inside containerised tanks to Japan | • Largest industrial hydrogen fuel cell power plant globally<br>• Hydrogen recycled from petrochemical manufacturing<br>• Annual production capacity of 50MW | • Powered by 300MW photovoltaic plant<br>• Annual green hydrogen output of 20,000 tonnes<br>• To reduce $CO_2$ emissions by 485,000 tons per annum | • Completed the first large-scale use of novel PEM technology<br>• Produce 8.2 tonnes of low-carbon hydrogen per day<br>• Reduction of 27,000 tons of carbon emissions per annum |

Source: Various news articles

# What can Malaysia learn from the other countries in hydrogen industry development?

## Establish strong public-private and cross-border partnerships

- The full potential of hydrogen will not be realised without effective partnerships, between all those who can fund initiatives, implement regulation and provide technical know-how.
- For instance, Japan collaborated with Australia in developing a liquefied hydrogen supply chain with the first shipment of hydrogen by sea arriving at Kobe, Japan on 25 February 2022, paving the way for commercialisation.
- Forming multilateral partnerships with countries like Japan and Korea will allow Malaysian companies to build experience from the exchange of technical knowledge and accelerate technology deployment.

## Identify highest value applications

- Policymakers should weigh carefully the current level of Malaysia's economic competitiveness when setting priorities for hydrogen applications given that many of the hydrogen technology would take years to reach commercial stage.
- One of the fastest way to increase hydrogen demand is to accelerate the shift to green hydrogen in industrial applications where hydrogen is already used, such as refining and the production of ammonia.
- By ramping up demand in existing industries which utilise hydrogen, it will enable economies of scale in production and lead to a wider deployment in other sectors, making the shift to green hydrogen more cost-effective.

**Key factors driving the success**

## Scale-up electrolyser capacity

- Expanding electrolyser capacity is key to enabling green hydrogen to meet a significant share of energy demand in the future.
- Setting a realistic electrolyser capacity target will inform the private sector of the country's commitments and help attract investment.
- The cost of producing green hydrogen could be lowered by reducing the taxes on the electricity used by electroysers which will help improve revenues and rate of return on hydrogen projects.
- More resources need to be allocated for research on electrolysis technology to improve electrolyser efficiencies and standardise designs for large-scale electrolysers to reduce electrolyser cost.

## Clear industrial policy and regulation

- Unlike the European Union and Japan who have clearly defined hydrogen targets, Malaysia is still in the phase of designing its own hydrogen roadmap with many of the initiatives so far focused on research and development of the hydrogen technology.
- The government must establish a framework that will support early-stage projects, both in the areas of production and consumption as well as identification of hydrogen business models which will enable the highest decarbonisation possible at the lowest cost.
- It is also important that policymakers, where possible harmonise local standards with neighbouring countries and international standards to better reflect the environmental risk associated with hydrogen production, transport and use.

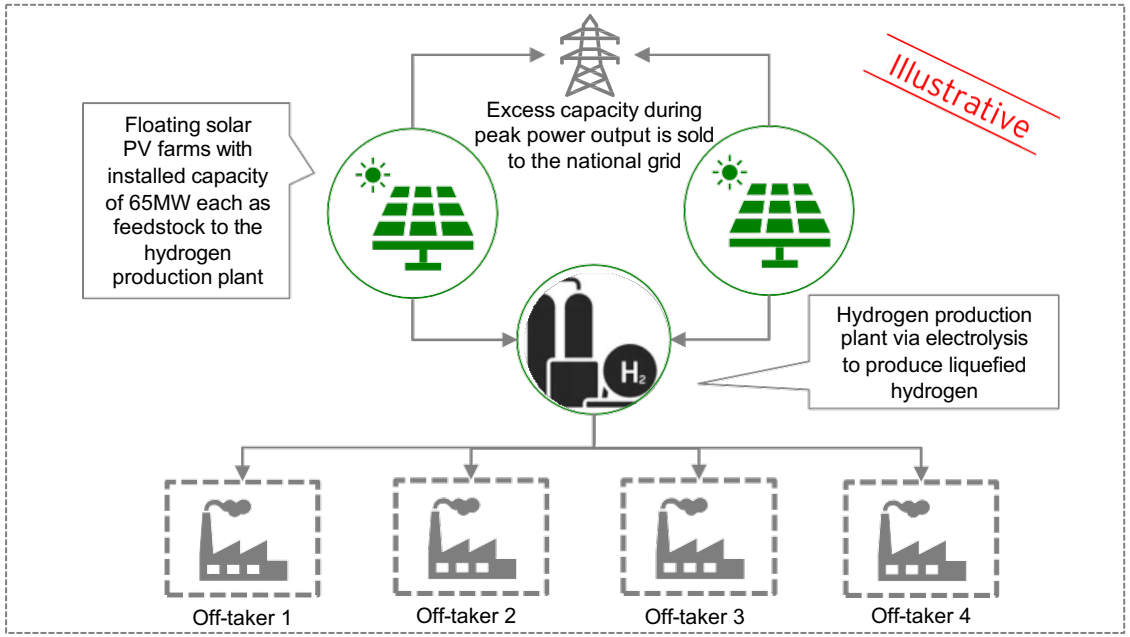
# Section 3

## Project and company overview

# Green hydrogen ($H^2$) production via large scale electrolysis from renewable energy

## What does the Project entail?

- The design, build and operation of an integrated complex comprising two (2) main facilities i.e. the green hydrogen production plant through the process of electrolysis from renewable energy and the floating solar PV farm.
- It serves as a hub in the District of Kampung Gajah, Perak for the production and distribution of green hydrogen to potential surrounding off-takers. The excess solar energy generated during peak power output is distributed to the national grid.




## Where will Malaysia's first large scale green $H^2$ plant be located?

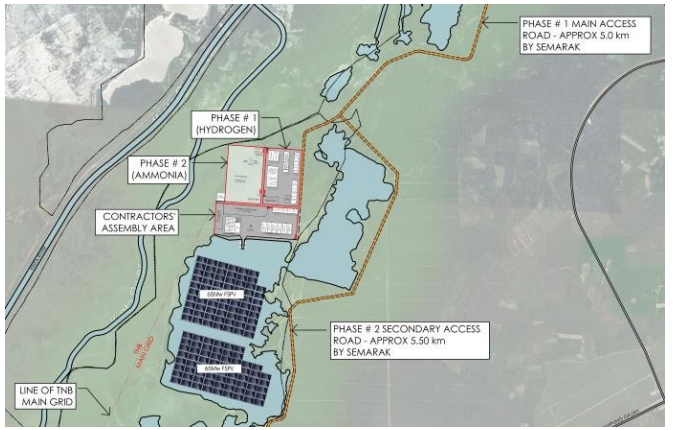

- Located on Plot 9, District of Kampung Gajah, Perak
- Plot size totaling 2,056 acres comprising 70% water body and 30% flat land area
- Business activities in the surrounding area include palm oil plantations and fish farms
- Former tin mine site wherein operations had ceased approximately 4 decades ago

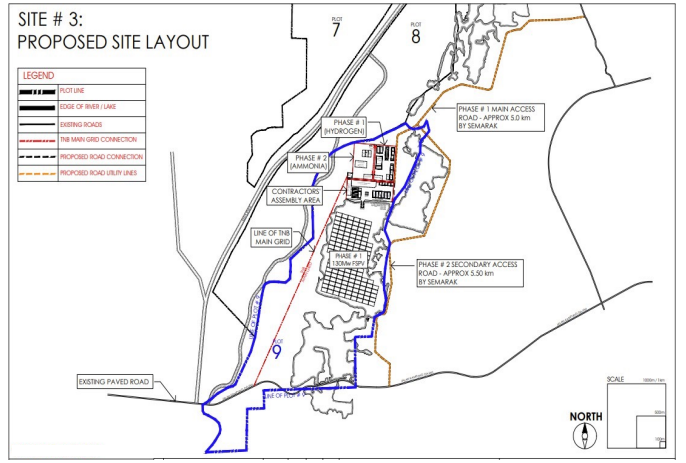
# The Project location site and highlights

## Location Highlights

- The targeted project site, i.e. Plot 9 is approximately 10km away from the Ipoh-Lumut Highway, located adjacent to the Kinta River.
- The existing infrastructure in place within the proximity of the targeted project site includes a PMU power sub-station just outside of Kampung Gajah and a railway station approximately 9km and 23km from the project site respectively.
- Paved road access to Plot 9 is available. However, new access roads of approximately 10km will be required to be constructed for direct access to the production site.
- The management and Transerve had jointly evaluated four (4) potential production site options within Plot 9 to construct the production facility using a multi-criteria assessment which is elaborated further in Section 4.
- Production site option no. 3 which is situated within Plot 9 is at the north of the South Lake ("SL") having an estimated surface area of 1.6 mil $m^2$. The solar PVs will be installed at the SL area with total installed capacity of 130MW.
- The built-up area at production site no.3 is estimated to occupy 50 hectares or 124 acres to accommodate two major facilities:
  i. Hydrogen production facility; and
  ii. Construction, staging and maintenance of solar PVs.

**Project Site Plot No.9**


*Note: The above diagrams are further appended in Appendix A of this BIP*

# Strong project fundamentals and ideal location

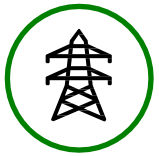
## The case for building a production facility in Kampung Gajah

1 **Buy-in from the Perak State Government**

The state of Perak believes that the hydrogen facility will be a **game-changing concept** that will represent a new source of clean energy.

2 **Proximity to potential off-takers**

Apart from TNB and Petronas, there are various mix of power plants in the immediate area of the Project site in Perak Tengah representing **potential off-take opportunities**.



3 **Convenient grid connection**

There is an **existing PMU main sub-station** located within 10km from the production site for grid connectivity.

4 **Robust access via land-based logistics**

The **current access allows for heavy vehicles** transporting 4 tons of $H^2$ at 200 bar. New connector roads of approximately 10km will be constructed to meet such requirements to link existing roads to the production site.

5 **Located in industrial area away from residential area**

Based on preliminary assessment of the production site area, management found no residential villages, indigenous or informal residents. As such, **no resettlement procedures** are required.

## Ideal environmental condition, with large water body surface

Based on the management's and Transerve's preliminary analyses, the production site is ideal pursuant to the following conditions:

- Strong solar irradiation throughout the year averaging at 152.6 $W/M^2$ rendering the site ideal for solar power generation.
- The general project site on Plot 9 which is situated adjacent to the Kinta River may be susceptible to flood risk. However, the selected production site facility (i.e. site option no.3) is most resilient wherein flood risk is only imminent in the event of water level surge by 3.3m. A LIDAR site survey is critical to fully assess the impact of flood in this area.
- Large water body surface area of approximately 1.6 mil $m^2$ is present at the SL to contain the floating solar PV farm. The water source from the SL will be required as feedstock to produce green $H^2$. Based on initial testing results, the management and their technical advisor estimates that the expected water demand on a daily basis is 0.06% of the total available volume of water (i.e. 5.0 mil $m^3$) at the SL. This will be further verified at a later stage via a detailed bathymetric survey during the hydrography survey.
- Water source from the lake is acceptable for use in the electrolysis process. Hydrogen production is moderately sensitive to the quality of water input considering two (2) main criteria:
  - i. **Iron content <1.0 mG/L** – The initial test samples had average values of 0.1005 mG/L and 0.0730 mG/L well within the required parameter; and
  - ii. **Total suspended solids <1.0 mG/L** – Whilst the initial test samples had average values of 5 mG/L and 17.5 mG/L which are larger than the required parameter, this is not unusual for freshwater lake. This can be mitigated with water treatment facilities to meet the required value.

*Note: Detailed and extensive tests of the site will be conducted during the detailed site survey study.*

# Pioneering Malaysia's green $H^2$ production plant and contributing to Malaysia's green energy transition

## The production plant will serve Malaysia's consumers and excess, if any, will serve external markets

- The production facility will become Perak's first green $H^2$ production plant as an alternative clean energy source.
- The production facility is estimated to produce 20 to 22 tonnes of green $H^2$ per day at full capacity as part of Phase 1 with the potential for further development:

| Development Plan | Target $H^2$ Production | Installed Capacity | Off-taker Strategy |
|---|---|---|---|
| Phase 1 (2025) | 22 tonnes per day or 7,200 tonnes per year | 130MW | Gas fired power station |
| Phase 2 (2027) | 22 tonnes per day or 7,200 tonnes per year | 130MW (on land if required) | Chemical, industrial or fertilizer plant |
| **Total** | **14,400 tonnes per year** | **260MW** | **n/a** |

- In the event local demand from power plants in the immediate area is lower than the production volume as set out in the table above, surplus capacity, if any, will be considered for exports to other external markets such as China, Japan, South Korea and etc.

## Large scale $H^2$ production and ongoing negotiations with potential off-takers

- SRESB is in active negotiations with TNB and Petronas as potential local off-take partners. The management and Petronas has further identified initial potential off-takers as summarised below:

| Potential off-takers | Estimated demand |
|---|---|
| Natural gas power station - three (3) units, within 60km from production site | 12 tonnes delivery daily |
| Chemical fertilizer plant – one (1) unit, within 100km from production site | 8 tonnes delivery daily |
| **Total** | **20 tonnes delivery daily** |

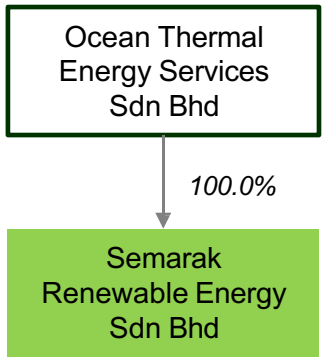
- Other potential off-takers identified in the immediate area of the Project in Perak Tengah include a gas district cooling plant and other biomass plants.
- The management is still in active negotiations with various parties, amongst others, TNB and Petronas, to collate a list of committed off-takers as required by PIRSB.

# SRESB will be undertaking the Project based on the salient terms and conditions of the approval in-principle by PIRSB

## Overview of SRESB

- SRESB, incorporated in June 2022 is a wholly-owned company by Ocean Thermal Energy Services Sdn. Bhd. with a paid-up capital of RM1.00 only.
- SRESB is principally involved in the installation of non-electric solar energy collectors.
- Omei Ayuni Binti Zakaria which is the shareholder and director of Ocean Thermal Energy Services Sdn. Bhd. is also appointed as the director of SRESB.

**CURRENT GROUP STRUCTURE**




*Source: SSM and Experian*

## Salient terms and conditions of approval in-principle by PIRSB

- SRESB is required to increase its paid-up capital to RM10,000,000 within six (6) months from the date of the executed Development Agreement supported by the detailed and comprehensive funding mechanism.
- SRESB is required to enter into an agreement with Marubeni Corporation and Thyssenkrupp AG which act as the technology providers or any other equivalent technology providers to implement the Project within six (6) months from the date of the executed Development Agreement.
- SRESB is required to commence the production of green $H^2$ within twenty-four (24) months from the date of the executed Development Agreement and to provide a list of committed off-takers for the Project.
- SRESB is required to provide PKNPk and PIRSB with the performance bond in respect of Phase 1 of the Project which is forfeitable in the event the terms and conditions are not met.
- 4% of the revenue generated annually is payable to PKNPk or the Perak State Government.
- 1.5% of management fees is payable annually to PIRSB.
- Lease payments amounting to RM250,000 per annum for the land is payable to PIRSB upon the approval of lease being obtained from the Pejabat Tanah dan Galian (PTG) Negeri Perak.

# As hands-on leaders, En. Mohd Shahil and En. Sufahmi Hadi oversees the Project and are supported by a passionate and experienced management team

**Mohd Shahil bin Ishak**
**Managing Director – Semarak Group**

- Bachelor's Degree in Engineering (Mechanical) from Universiti Teknologi Malaysia.
- Managing Semarak Group of Companies since 2013.

**Zakaria bin Hassan**
**Project Director – Semarak Group**

- Appointed as Project Director for Ocean Thermal Energy Services Sdn. Bhd. in 2017.
- More than 22 years of experience in the oil and gas industry in various regions.

**Sufahmi Hadi bin Sjafii**
**CEO – OTES**

- Appointed as Chief Executive Officer for Ocean Thermal Energy Services Sdn. Bhd. in January 2021.
- Previously appointed as CEO for Workboat International DMCCO (UAE) from 2015 as well as Chief Strategic Business and Planning and Chief Operating Officer for joint venture companies of Alam Maritim Group.

**Nik Aznuddeen bin Husain**
**Project Director – OTES**

- Appointed as Project Director for Ocean Thermal Energy Services Sdn. Bhd. in January 2021.
- Previously appointed as COO for Offshore Vessel Business Operations (OSVBO) in 2018.
- More than 27 years of experience in OSV contracts and operations, servicing major oil and gas client in the region.

**Captain Maghzan Pin**
**COO - OTES**

- Qualified Master Mariner (Unlimited) with more than 10 years in command experience on board MISC Berhad's vessels.
- More than 21 years of experience as a seafarer and in the oil and gas industry.

**Qamaruzzaman bin Sairi**
**Managing Director – KMZ**

- Bachelor's Degree in Electrical Engineering from Southern Illinois University USA.
- More than 15 years of experience in various industries, including manufacturing, oil and gas as well as telecommunication.

# Section 4

## Preliminary technical assessment overview

# Production site options assessment

## Preliminary production site selection assessment

- As highlighted in the previous section, four (4) possible production site options were identified for the management's consideration. To shortlist the production site selection, the management together with Transerve had conducted a preliminary assessment on a high-level basis using the Prioritisation Matrix methodology.
- The high-level assessment considered the following primary criteria:
  i. Exposure to flood hazard risk;
  ii. Distance of production site to the nearest existing paved road;
  iii. Inclusion of production site within the parameters of Plot 9;
  iv. Complexity of the design to construct new access road; and
  v. Physical access to water body feature of the larger SL and smaller north lake.
- The summary of the scoring results based on the assessment is as set out below:

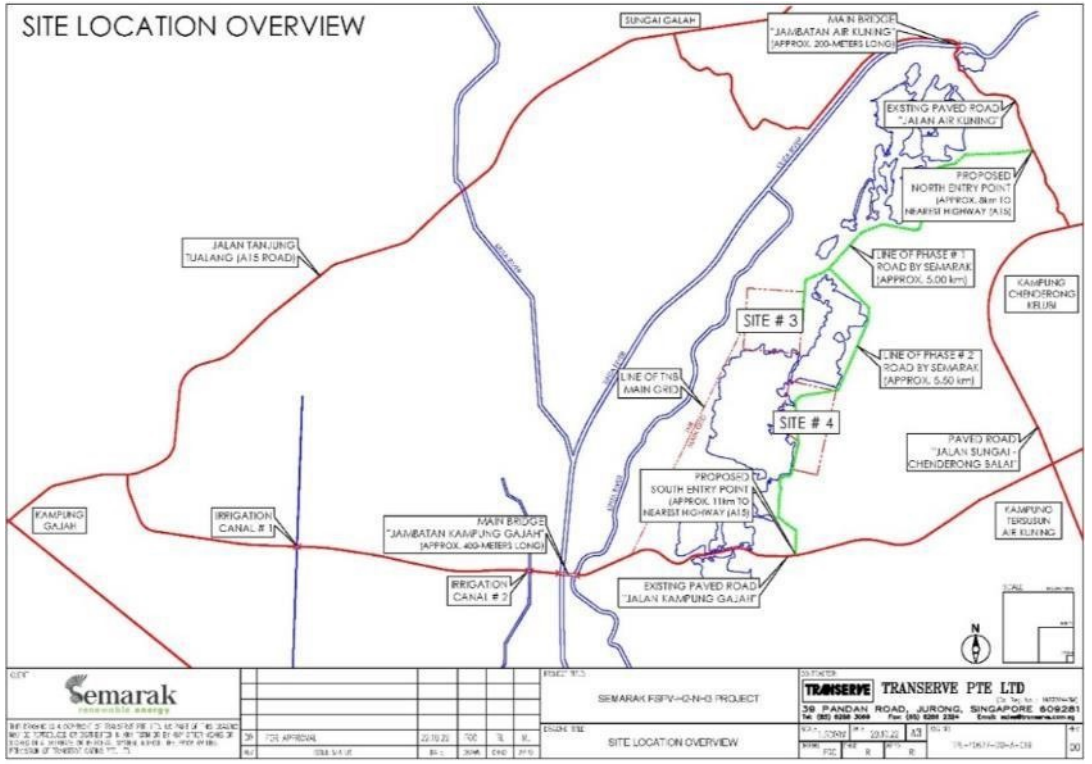
| Option | Flood | Road | Plot 9 | Design | Access | Total | Rating |
|---|---|---|---|---|---|---|---|
| Site 1 | 0.40 | 2.52 | 1.20 | 1.02 | 0.28 | 5.41 | 11% |
| Site 2 | 0.40 | 0.88 | 1.20 | 1.02 | 0.28 | 3.78 | 8% |
| Site 3 | 6.67 | 0.07 | 1.20 | 0.08 | 5.83 | 13.85 | 29% |
| Site 4 | 8.25 | 5.00 | 0.03 | 5.00 | 5.83 | 24.11 | 51% |

*Note: Detailed site survey which includes land survey, geodesic surveys, hydrologic surveys, hydrologic chemical analysis and etc. will be required to be conducted to confirm the above assessment.*

- Whilst production site no. 4 yields the highest score, it is located out of Plot no. 9 and hence the next best option being considered is production site no. 3.

## Site location overview

- Based on the scoring results, the management had shortlisted production site no. 3 (i.e. north of the SL and west of the north lake) as depicted in the diagram below.




*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

# Environmental assessment of geophysical hazard (1/2)

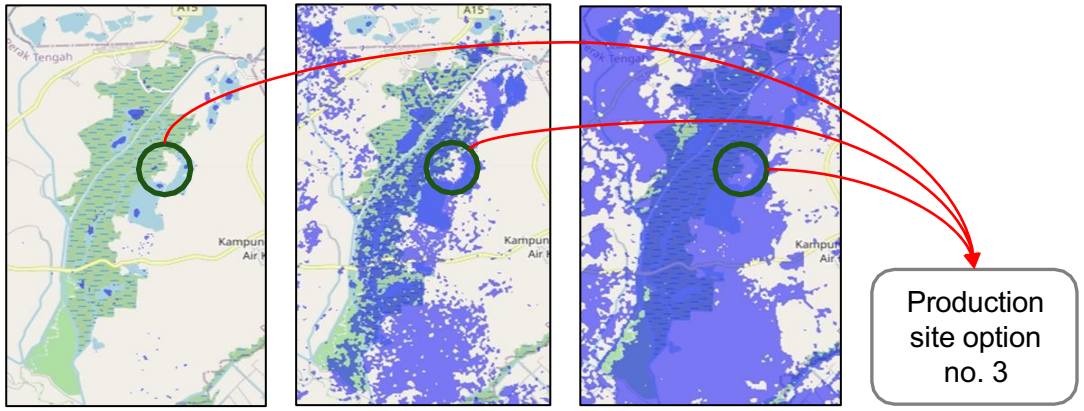
The management and Transerve had further performed a high-level assessment of some environmental factors affecting the production site such as climate change impact, flood risk, solar radiance and geological considerations.

## Climate Change Impact

- In general, the weather in Kampung Gajah shows little variability in temperature and precipitation:
  i. Annual maximum temperature between 31 and 33 degrees Celsius and minimum temperature between 23 and 24 degrees Celsius during the northeast monsoon season between October and December; and
  ii. Annual precipitation averages at 864.8 mm in total but varies during the northeast monsoon season between October and December averaging at 125.5 mm per month.
- Located at the west of Peninsula Malaysia, the production site is protected from the worst typhoons travelling from the east coast towards the west. However, extreme weather events has become more common as a result of climate change which includes heavy rainfall.
- Malaysia is susceptible to natural hazards such as flood, landslide, haze, earthquake, drought, forest fire and tsunami. Flood events account for the most frequent and significant damage. The most recent flood event in December 2021 which normally affects the east coast has also affected the west coast. The Special Report on Impact of Floods in Malaysia 2021 published by the Department of Statistics Malaysia in January 2022 reported that the total value of flood losses suffered by Malaysia during the said period amounted to RM6 bil.
- Global mean sea-level rise is expected in the range of 0.4 m to 0.7 m by 2100 based on the Malaysia Climate Risk Country Profile published by the World Bank Group and Asian Development Bank in 2021.
- The management is of the view that, given that the general ground elevation is 6 m to 8 m, sea level-rise is not expected to impact the production site significantly.

## Flood Risk

- Whilst Plot 9 was found to be susceptible to flooding as it is located adjacent to the Kinta River, production site option no. 3 is most resilient towards flood risk due to the absorptive nature of the lakes as potential buffers, unless water levels surge to 3.3 m as depicted in the diagrams below:




*Water surge level of 1.0m* *Water surge level of 2.0m* *Water surge level of 3.3m*

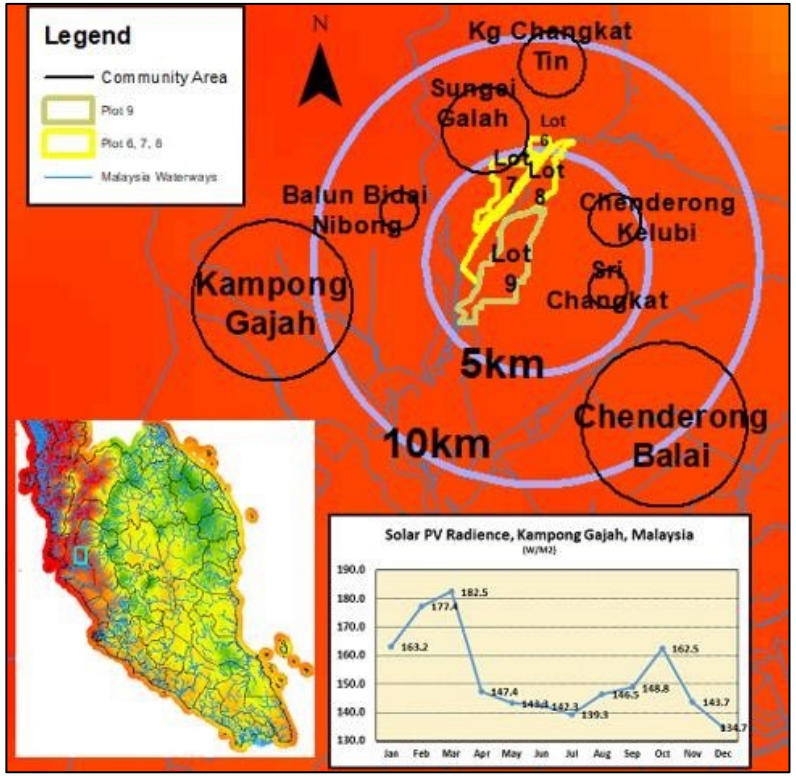
*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

- To further evaluate flood risk impact, a detailed site survey will be conducted. Management's plans to mitigate the risks of flood impact include the following:
  i. $H^2$ plant and power substation will be raised 1.0 m above present ground level;
  ii. Access roads will be raised 1.0 m above the present level; and
  iii. Embankment to be built at areas of production site susceptible to flood risk.

# Environmental assessment of geophysical hazard (2/2)

## Solar Radiance

- As shown in the diagram below, the management and Transerve observed that the location site demonstrates some of the strongest solar irradiation in Peninsular Malaysia. The annual average solar irradiation is 152.6 W/M² which is suitable for the generation of power from solar PVs.

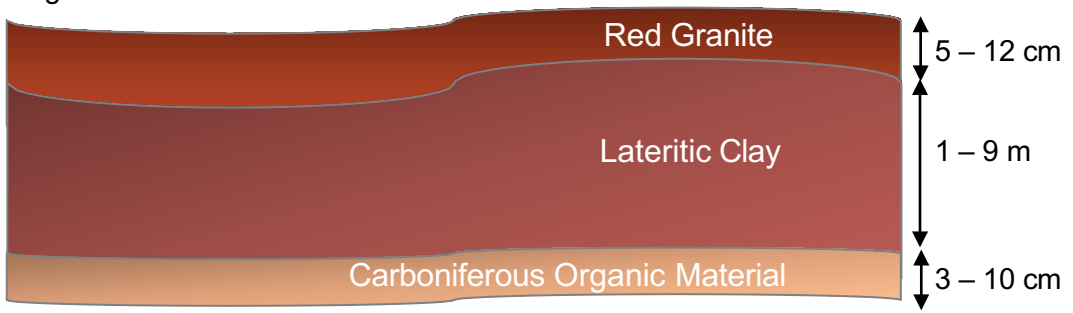



*Source:*

*Front-end project outline (Volume 1) conducted by the management and Transerve. The analysis performed include baseline data from the global database of the National Renewable Energy Laboratory, US Department of Energy which is then mapped via the ArcGIS software.*

## Geological Considerations

- The management and Transerve has also considered the geological condition of the site area. A detailed geotechnical survey will need to be conducted to assess the specific site condition in anticipation of the design and construct of the integrated complex.
- Based on preliminary studies and findings, the land surface contains a thin red cover layer containing different sizes of granite rocks and minerals with thickness of about 5.0 cm to 12.0 cm.
- The thin red cover is found over a layer of lateritic clay with different thickness between 1.0 m to 1.25 m, 2.0 m to 5.0 m and 6.0 m to 9.0 m.
- Another thin layer of carboniferous organic material is found beneath the lateritic clay with different thickness between 3.0 cm to 5.0 cm and 8.0 cm to 10.0 cm.
- The abovementioned materials contained at the production site is depicted in the diagram below:

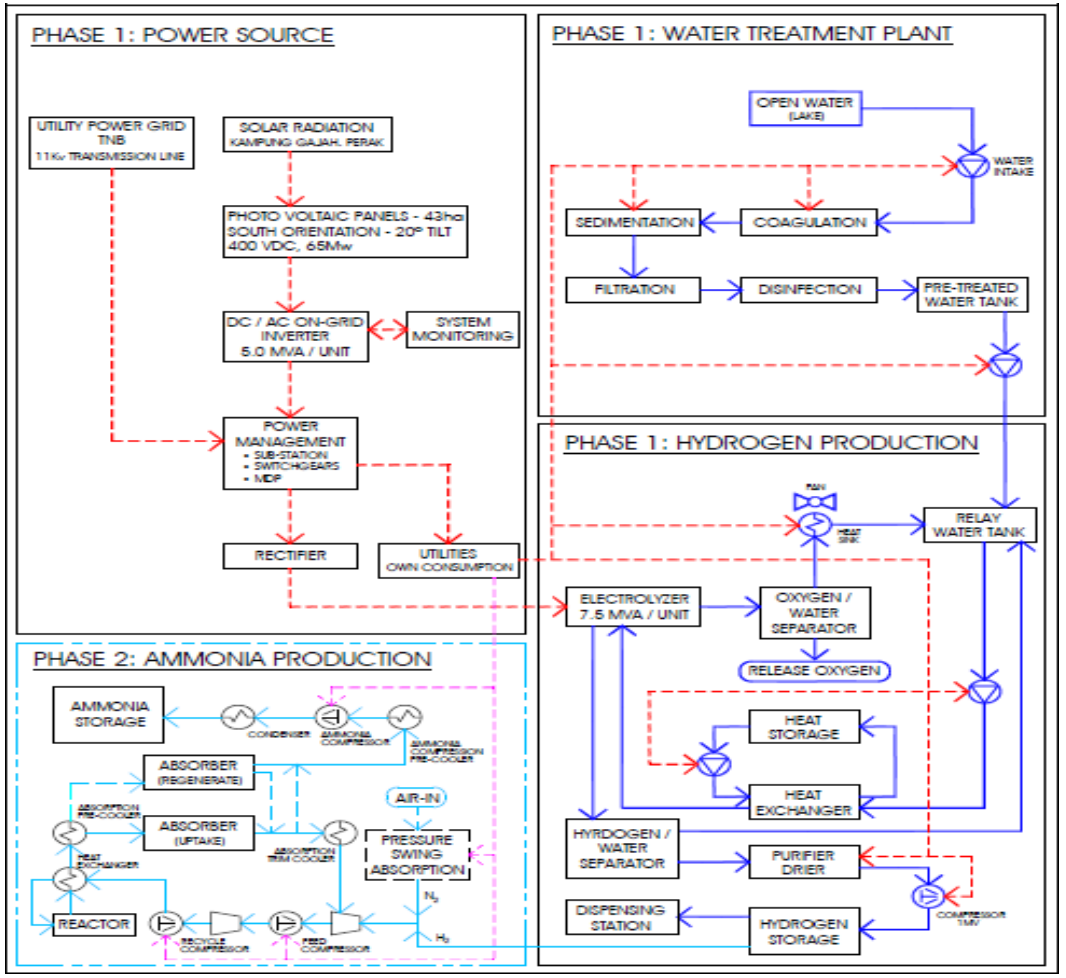



- The management and Transerve do not anticipate major issues in respect of the geological condition of the production site.

# Production facility process flow and diagram

## $H^2$ production plant process

- The green $H^2$ production plant requires input from the following two (2) main sources:
  i. Power generation source via renewable energy from the national grid between 4pm and 8am as well as the 130MW floating solar PV farm between 8am and 4pm; and
  ii. Water source from the lake which has been treated as feedstock for the electrolysis process.
- The management has shortlisted the technology to produce green $H^2$ based on Longi's Lhy-A1000 Alkaline Electrolyser module which is capable of producing 1,000$Nm^3$/h or 89.5kg of green $H^2$.
- 12 units of the abovementioned alkaline electrolysers will be installed together with three (3) units of gas-separators (LGS-4000), three (3) units of gas purifiers, and ancillary equipment to meet the production requirement of 22 tonnes per day.
- The production of green $H^2$ is expected to be delivered to the off-taker's location via land access using $H^2$ tube trailer trucks, each transporting four (4) tonnes of green $H^2$ at 200 bar.
- Additionally, storage vessel on site will be constructed to store at least two (2) days worth of green $H^2$ stock to ensure smooth and regular supply to the potential off-takers.
- The power generation and $H^2$ production process flow is shown in the adjacent block diagram.

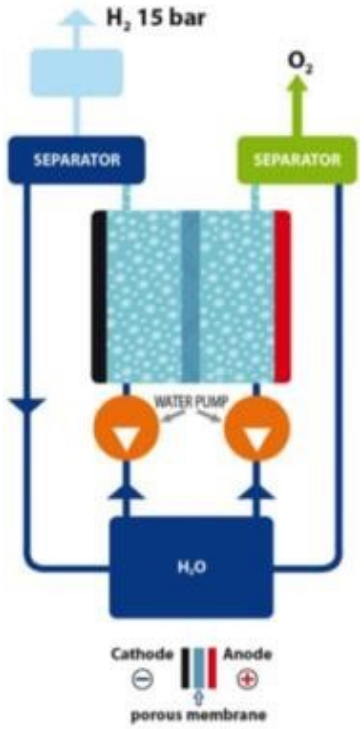



*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

# Hydrogen production technologies available today

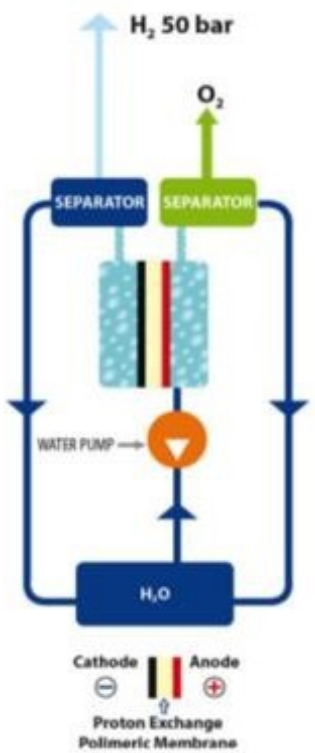
- The technologies available today to produce green $H^2$ via water electrolysis at the scale required by the Project include the following:

**Alkaline Electrolyser**



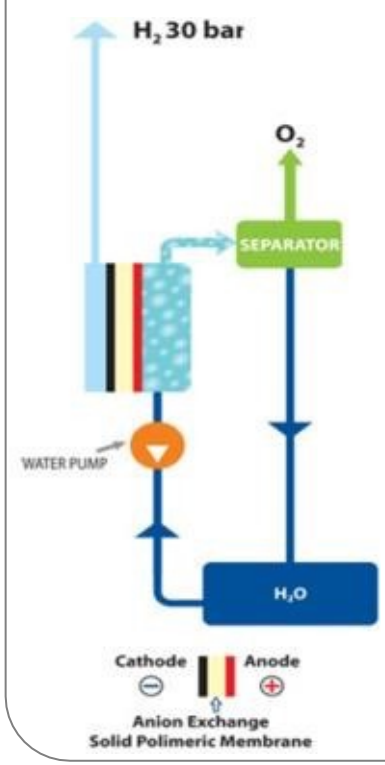

**Key Features:**
- Constant power needed
- KOH H20 contamination

**Polymer Electrolyte Membrane ("PEM") Electrolyser**




**Key Features:**
- Platinum electrodes
- Ultra pure water
- H20 contamination

**Anion Exchange Membrane ("AEM") Electrolyser**



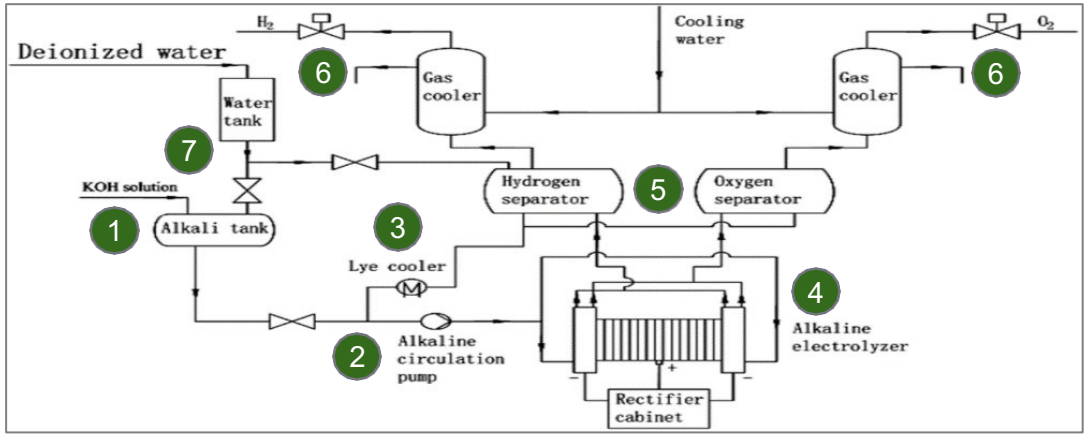

**Key Features:**
- Non noble metals
- Demineralised/ rain water
- Intermittent power
- No water on $H^2$ electrode

*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

# Alkaline water electrolysis is the most viable option today

## How does alkaline water electrolysis work?

- The alkaline water hydrogen production device comprise three (3) parts as shown in the diagram below, i.e. alkaline water hydrogen production system, control cabinet and rectifier cabinet. The startup period is 5 to 30 minutes for a cold start.




*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

1. Once the equipment is started, the electrolyte is evenly mixed in the alkali tank
2. Electrolyte is pressurized into the electrolytic tank via the pump to enter the entire $H^2$ production system
3. Once the liquid in the separator reaches the specified level, the lye inlet valve is closed, and power is turned on
4. Alkali solution is electrolysed in the alkaline electrolyser
5. $H^2$ and oxygen separator are respectively introduced from both the $H^2$ and oxygen side respectively in a gas-liquid mixed state
6. Gas is cooled from upper part of separator and discharged. Liquid merges into the bottom of the separator and circulates
7. Water is replenished into hydrogen separator and alkali solution into the alkali tank as the electrolysis process continue

## The case for alkaline electrolyser

Technology has reached maturity and is readily available in the market

Manufacturing cost is comparatively lower than the other alternatives i.e. PEM and AEM electrolysers

Accommodate large-scale $H^2$ production-hydrogenation station required by the Project

However, the alkaline electrolyser technology has a slow start-up period, susceptible to corrosion, requires complex maintenance as there are multiple components. The management is identifying measures to mitigate these risks.

# Power supply via renewable energy sources available to operate the hydrogen production plant

- The management has considered power supply via two (2) sources of renewable energy to ensure continuous production of green $H^2$ as set out below:
  i. On-site floating solar PV located at the SL; and
  ii. National grid supply of green electricity from TNB.
- To achieve the daily production target of 22 tonnes per day and ensure the continuous operation of the production plant, the energy supply of 66MW to 70MW per hour to the production plant is required and planned as follows:

| Energy Sources | Hours per day | Total supply (MW) | Production per day (tonnes) |
|---|---|---|---|
| Floating Solar PV | 8 hours (8am - 4pm) | 530 | 9.5 |
| National Grid | 16 hours (4pm onwards) | 700 | 12.5 |
| **Total** | **24 hours** | **1,230** | **22.0** |

## Floating solar PV

- As highlighted in the previous page, solar irradiation at the production site is suitable for solar energy generation with PV panels set at an 85 degrees angle. The solar isolation figures at the production site for each month is as follows:

| Description | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|
| Solar Isolation Figures | 5.65 | 5.85 | 5.57 | 5.38 | 5.17 | 5.29 |
| **Description** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** |
| Solar Isolation Figures | 5.15 | 4.83 | 4.69 | 4.66 | 4.80 | 5.05 |

*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

- Based on the preliminary analysis conducted by the management and Transerve, the total installed capacity of 130MW will provide energy supply of 530MW per day over eight (8) hours. This is summarised below:

| Description | 8am | 9am | 10am | 11am | 12am | 1pm | 2pm | 3pm |
|---|---|---|---|---|---|---|---|---|
| Energy supply required (Mw) | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 | 66.0 |
| Power output via FSPV (Mw) | 13.0 | 24.7 | 97.5 | 130.0 | 130.0 | 97.5 | 24.7 | 13.0 |
| Excess/ (Shortfall) (Mw) | (53.0) | (41.3) | 31.5 | 64.0 | 64.0 | 31.5 | (41.3) | (53.0) |
| FSPV Usage | 10% | 19% | 75% | 100% | 100% | 75% | 19% | 10% |

- To smooth out the floating solar PV production curve, the management plans to supplement the shortfall of power output through the purchase of green electricity from the national grid whilst excess energy generated during peak power output will be sold to the national grid.

## National grid supply

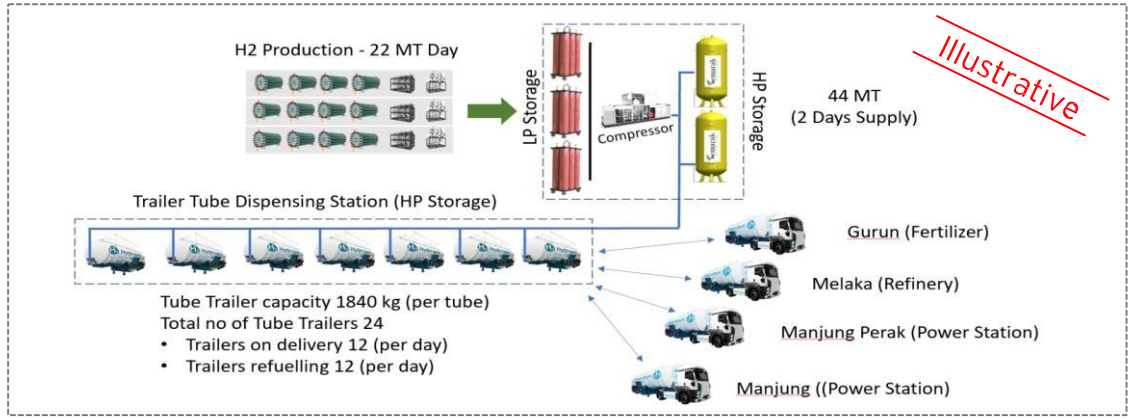
- The supply of green electricity from the national grid may be required during the shortfall of power output as highlighted above and from 4 pm onwards.

| Description | TNB Green Energy Tariff Rate |
|---|---|
| Peak hours (8.00 am to 9.59 pm) | RM0.78 per kWh |
| Off-peak hours (10.00 pm to 7.59 am) | RM0.65 per kWh |

# The approach on hydrogen transportation and storage

## Compression, storage and distribution

- The $H^2$ gas output from the hydrogen production system will be in the range of 16 to 30 bar pressure and temporarily stored in a low pressure buffer tank ("LP Storage").
- To manage longer term storage and distribution of $H^2$ in the form of gas, the same has to be further compressed to 200 bar pressure and stored in high pressure vessels ("HP Storage"). To ensure uninterrupted supply and sufficient buffer, two (2) days of reserve $H^2$ aggregating 44 tonnes will be stored in the HP Storage.
- 40 feet flatbed trailers with HP hydrogen tube tanks will be used and refilled at a dispensing station which is connected by the same system to the HP Storage. When full, each trailer has a capacity to carry 1,840kg of $H^2$. The potential off-takers are located between 30km and 100km from the production site.




*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

## Trailer and hydrogen storage tank specification

- Approximately six (6) deliveries will be required each day to complete the delivery of 22 tonnes of $H^2$ daily. To optimise the process of parallel refilling and distributing $H^2$ to the off-takers' site, a total of 12 $H^2$ tube trailers is estimated to be required.
- Each 40 feet trailer specification is summarised below:

| Description | Specification |
|---|---|
| Dimension (L x W x H)/ Weight | 12,500 x 2,500 x 1,550 mm/ 5,600kg |
| Main Beam | "I" Section 500mm height Q345/T700 material |
| Twist Lock | 4/8 set ISO Standard |
| Suspension | Mechanical/ Air/ Bogie |
| Axle | 40's BPW/FUWA/PDME etc. |
| Rim/Tire | 8/12 pieces 9.0-22.5 steel/aluminium – 12R22.5 |
| Brake Valve/ Kingpin | WABCO/2'(50mm)/3.5'(90mm) JOST bolting type |

- Each hydrogen storage tank specification is summarised below:

| Description | Specification |
|---|---|
| Manufacturer/ Model | Sino Cleansky/ SCS 12-2450-H2-20 |
| No. of tube/ H2 @ 50 or 200 bar | 12/ 460kg or 1,840kg |
| Dimension (L x W x H)/ Nett Weight | 4/8 set ISO Standard |
| Road transport compatibility | Construction Industry Development Board Malaysia |

# Risk management processes for successful and safe project delivery

- The management of SRESB is committed to identify, minimise and manage the risks in compliance with the Malaysia Department of Occupational Safety and Health ("DOSH") regulations.
- Hydrogen is a 2.1.1a class substance, i.e. it is a high-hazard flammable gas with the following key characteristics:
  i. 14 times lighter than air and as such disperses upwards rapidly if released;
  ii. Odourless;
  iii. Non-toxic;
  iv. Colourless flame when ignited; and
  v. Produce minimal radiative heat when burnt.
- The management recognises that it is critical for sufficient controls to be put in place at the on set during the design phase to ensure risks associated with the Project are eliminated or reduced to as low as reasonably practicable ("ALARP").
- As such, SRESB will adopt the risk management process as depicted in the adjacent diagram no. 1. A detailed study prior to the construction will be conducted based on SRESB's risk management process.
- Per management, the risk management assessment will be focused on the production and storage of $H^2$ liquefied gas as the risk assessment for the floating solar PV will be provided by the vendor and reviewed by the management.
- The adjacent diagram no. 2 presents the hierarchy of controls commonly used by DOSH and has been adopted by SRESB. The approach sets out the requirements during the operations phase for inspection, testing and maintenance to ensure safeguards in place remain effective.

*Source: Front-end project outline (Volume 1) conducted by the management and Transerve*

*Diagram 1*

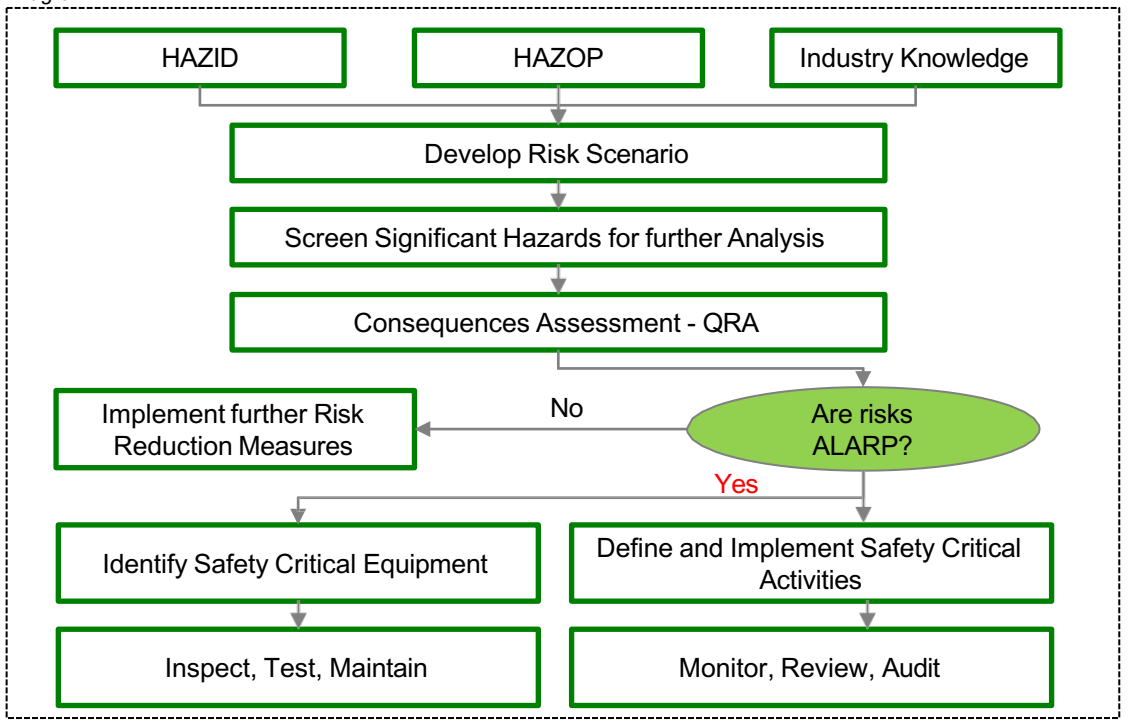
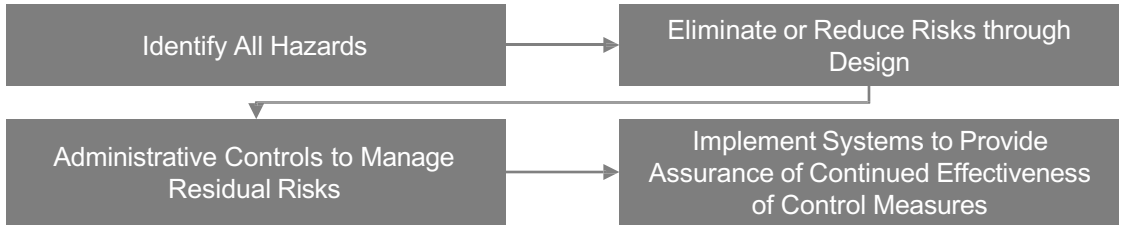



*Diagram 2*



# Next steps in the Project execution plan towards completion of construction in 2025 (1/2)

- The management has successfully completed the design and commercial FEED which serves as a conceptual validation of the Project and high-level feasibility study of the Project.
- A detailed and final FEED will be conducted to assess various technical aspects and will be the basis upon which bidding for the engineering, procurement and construction of the Project commence.

**Next steps forward…**

Legal Permits

- The Project team will coordinate and seek all legal permits and/or clearances from the relevant authorities prior to commencing the procurement and construction to ensure compliance with regulatory requirements.

Investor and Off-taker

- The management is in negotiation with TNB which has expressed interest in funding the Project in full. The management is procuring the letter of interest or intent from TNB.
- The management is also in discussion with TNB being the potential off-taker for the hydrogen produced.

Final FEED

- The final FEED includes the detailed assessment and study of the various technical aspects of the Project to determine, amongst others, the approach, basis of design, risk mitigation plan, duration and schedule of the Project and etc.

Procurement

- The procurement stage includes the purchase of electrolysers, floating solar PVs and other equipment which covers the logistic process from the approved vendor until delivered, received and inspected on site.

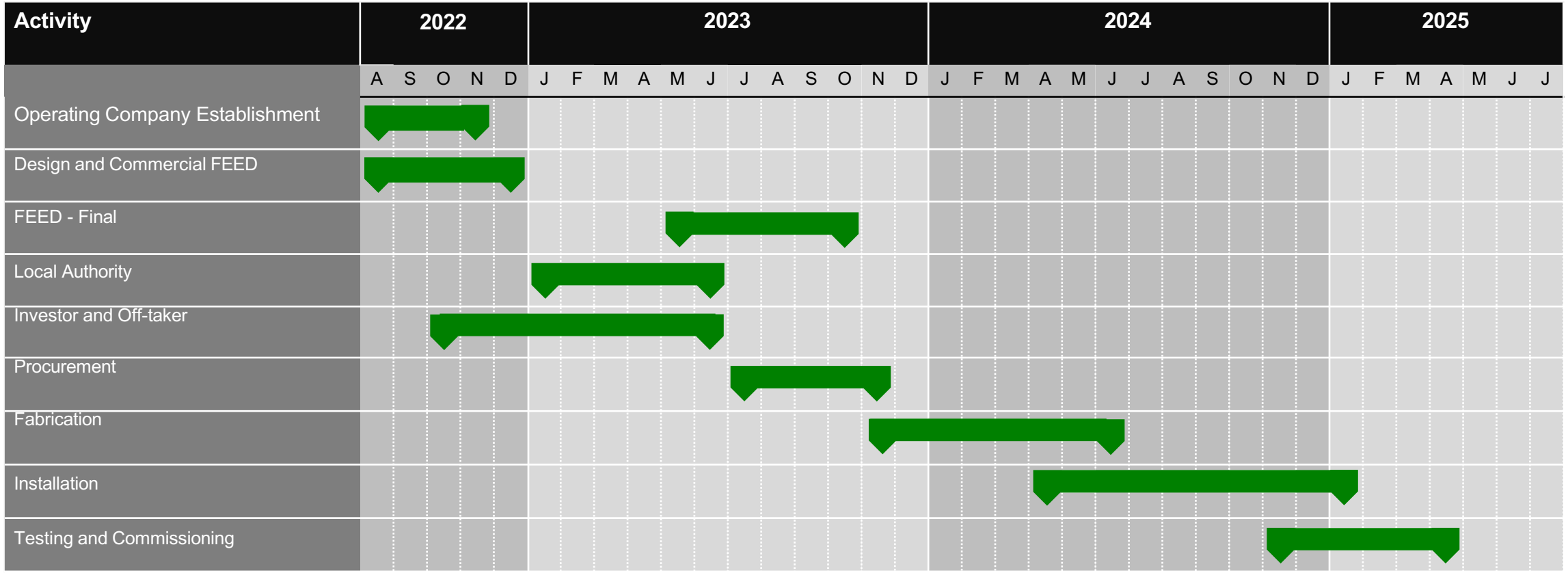
Fabrication

- The fabrication stage includes the site clearing process and also the construction of the plant including the access roads

Installation, Testing and Commissioning

- Upon completion of all civil works, the Project team will proceed with the facility equipment installation and pre-commissioning inspection will be performed.

# Next steps in the Project execution plan towards completion of construction in 2025 (2/2)



# The engineering, procurement, construction and commissioning contractors as well as other service providers envisaged to be engaged by the management (1/2)

| No. | Item Description | Service Providers/ Suppliers | Total Amount (USD) | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| **1.0** | **Preliminaries** | | | | | |
| 1.1 | Pre-operating expenses | SRESB | 1,473,684 | 1,473,684 | - | - |
| 1.2 | Pre-FEED (3 months) | Green Palm, Transerve, SRESB | 624,006 | 624,006 | - | - |
| **Subtotal** | | | **2,097,690** | **2,097,690** | - | - |
| **2.0** | **Engineering, Local Authority, Project Management, 3rd Party Services** | | | | | |
| 2.1 | Front-End Engineering Design | DNA, Transerve, BV, SRESB | 2,874,168 | 977,217 | 948,476 | 948,475 |
| 2.2 | Local Authorities/Government Permits/Licensure | SRESB | 294,735 | 100,210 | 97,262 | 97,263 |
| 2.3 | Project Management | Green Palm, Transerve, BV, SRESB | 1,620,875 | 551,097 | 534,889 | 534,889 |
| **Subtotal** | | | **4,789,778** | **1,628,524** | **1,580,627** | **1,580,627** |
| **3.0** | **Procurement** | | | | | |
| 3.1 | Floating Solar PV | Longi, Transerve | 83,728,238 | 23,044,458 | 54,202,350 | 6,481,430 |
| 3.2 | Electrolyser | Longi | 22,705,850 | 12,953,255 | 4,541,170 | 5,211,425 |
| 3.3 | Ammonia Plant | - | - | - | - | - |
| 3.4 | Other Equipment | Sino Hydro, Transerve | 49,011,140 | 34,307,798 | 9,802,228 | 4,901,114 |
| **Subtotal** | | | **155,445,228** | **70,305,511** | **68,545,748** | **16,593,969** |

# The engineering, procurement, construction and commissioning contractors as well as other service providers envisaged to be engaged by the management (2/2)

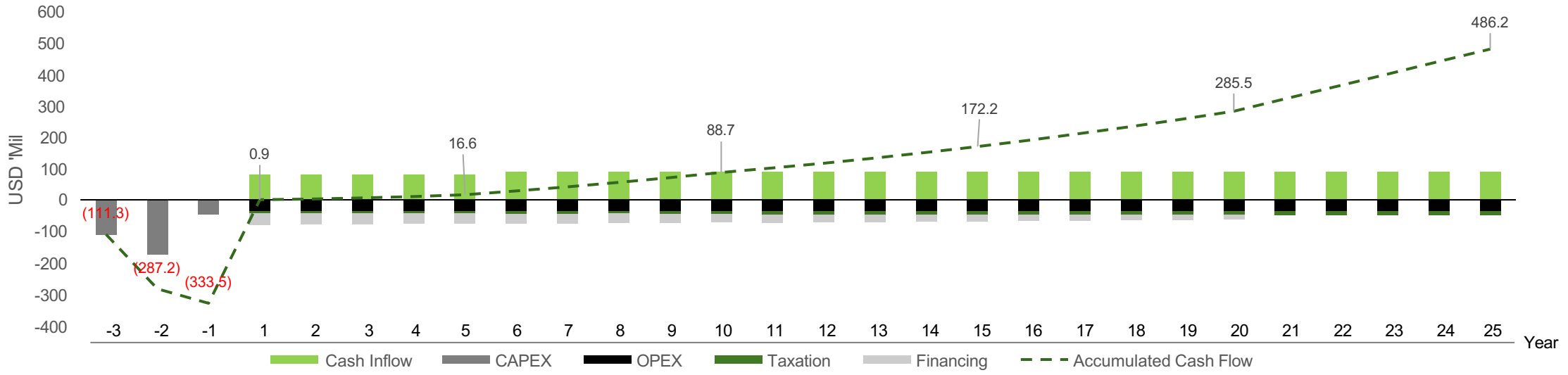
| No. | Item Description | Service Providers/ Suppliers | Total Amount (USD) | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| 4.0 | Logistics | Sino Hydro, Transerve, SRESB | 34,449,047 | 8,612,262 | 19,556,202 | 6,280,583 |
| **Subtotal** | | | **34,449,047** | **8,612,262** | **19,556,202** | **6,280,583** |
| 5.0 | Site Construction Team | Transerve, SRESB | 4,698,948 | 1,174,737 | 2,042,527 | 1,481,684 |
| **Subtotal** | | | **4,698,948** | **1,174,737** | **2,042,527** | **1,481,684** |
| 6.0 | Site Facilities | Sino Hydro, Transerve, SRESB | 15,000,000 | 4,500,000 | 9,750,000 | 750,000 |
| **Subtotal** | | | **15,000,000** | **4,500,000** | **9,750,000** | **750,000** |
| 7.0 | Site Construction | Transerve | 25,000,000 | 7,500,000 | 16,250,000 | 1,250,000 |
| **Subtotal** | | | **25,000,000** | **7,500,000** | **16,250,000** | **1,250,000** |
| 8.0 | Equipment Installation | Transerve | 51,604,900 | 15,483,470 | 28,370,840 | 7,750,590 |
| **Subtotal** | | | **51,604,900** | **15,483,470** | **28,370,840** | **7,750,590** |
| 9.0 | Testing & Commissioning | Transerve | 4,663,357 | - | - | 4,663,357 |
| **Subtotal** | | | **4,663,357** | - | **-** | **4,663,357** |
| 10.0 | Other Items | SRESB | 35,729,875 | - | 29,774,895 | 5,954,979 |
| **Subtotal** | | | **35,729,874** | **-** | **29,774,895** | **5,954,979** |
| **Grand Total** | | | **333,478,822** | **111,302,194** | **175,870,839** | **46,305,789** |

# Section 5

## Financial overview

# Attractive, long-term cash flow profile

**Cash Flow Projection: Positive annual cash flow from year 1 of operation**




## Cash Outflows

1. CAPEX to construct the integrated complex
2. OPEX which includes all direct and indirect costs of construction and operation
3. Taxation payable for the year
4. Financing costs (i.e. principal and interest payments)

## Cash Inflows

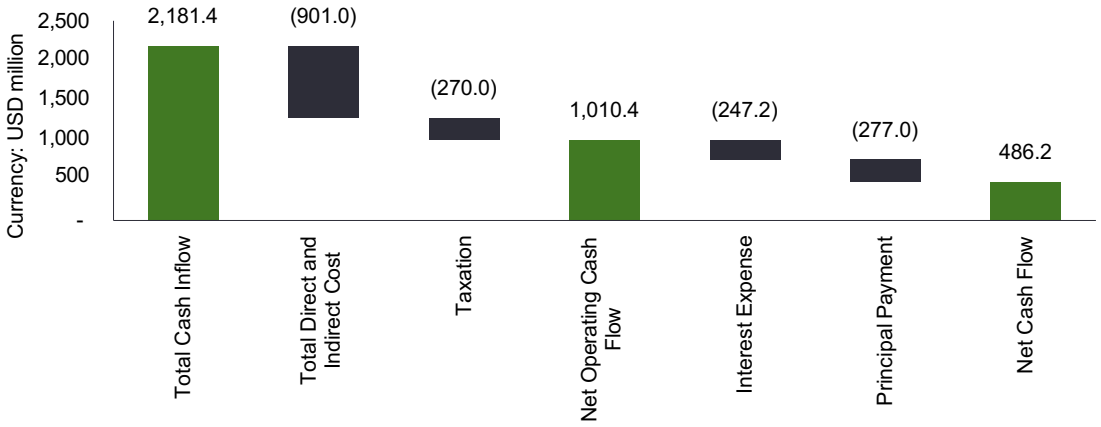
1. Revenue from the sale of hydrogen to off-takers
2. Revenue from the sale of excess solar power generated to the national grid

# Basis of assumptions and the cash flow projection prepared by the management

| Description | Basis of Assumption |
|---|---|
| Revenue from the sale of hydrogen | Revenue is generated from production and sale of hydrogen based on selling price of USD11/kg for the first five (5) years of production and USD12/kg for the remaining years (i.e. year 6 to year 25) |
| Revenue from the sale of excess solar power | Revenue is generated from excess solar power generated during peak power output and is sold through the feed-in electricity to the national grid during peak hours (i.e. daily from 10am to 2pm). |
| Staff salaries, manpower cost and administration cost | Assumed at a growth rate of 2% year-on-year |
| Maintenance cost | Assumed at 5% of the value of the assets to be maintained |
| Electricity charges and green energy tariff | Electricity charges are computed using the fixed rate from TNB under the E3s-Special Industrial Tariff category |
| Tariff to the State | The tariff payable to the Perak State Government is 4% of SPSB's annual revenue based on the letter dated 1 June 2022 issued by PIRSB to SPSB |
| Project consultancy fee | The management fees payable to PIRSB is 1.5% of SPSB's annual revenue based on the letter dated 1 June 2022 issued by PIRSB to SPSB |
| Lease of land/water | Annual lease payment of RM250,000 is payable to the Perak State Government based on letter dated 1 June 2022 issued by PIRSB to SPSB |
| Insurance premium | Insurance premium is estimated at 1% of the value of asset on a 4% depreciated value per annum |
| Director & advisors' fee | Assumed on a straight-line basis with no growth rate year-on-year |

| Description | Basis of Assumption |
|---|---|
| Financing costs | Interest is assumed at 8.5% with a repayment tenure of 20 years. Interest incurred during the construction phase is on cumulative principal sum drawn over 3 years during the construction period and is capitalised |
| Taxation | It is assumed that there are no tax exemptions applicable to SRESB throughout the entire operation period of 25 years |

- The total cash inflow expected from the revenue generated via the sale of hydrogen and excess solar power sold through the feed-in-electricity to the national grid aggregate to USD2,181.4 mil over the operation period of 25 years.
- With the total direct and indirect costs aggregating USD901.0 mil, the net operating cash flow is estimated at USD1,010.4 mil representing 46% of the total cash inflow.
- The total net cash flow generated throughout the operation period of 25 years after financing costs amount to USD486.2 mil representing 22% of the total cash inflow.



# Annual revenue is estimated at USD81.6 mil from year 1 to year 5 and USD88.7 mil from year 6 onwards

**Table 1: Sale of Hydrogen**

| Sale of Hydrogen | Year 1-5 | Year 6-25 |
|---|---|---|
| Production Capacity | 20,292 kg/day | |
| No. of Working Days | 350 days | |
| Total Production | 7,102,200 kg/year | |
| Hydrogen Price | USD11.00 | USD12.00 |
| **Annual revenue from sale of $H^2$** | **USD78.1 mil** | **USD85.2 mil** |

**Table 2: Excess Power from Solar**

| Excess Power from Solar | |
|---|---|
| Hours of Excess Solar per day | 4 hours |
| Excess Capacity of Solar Power | 61 MW |
| Total Excess Solar Power | 244 MWh |
| Transmission Lost | 5% |
| Total Excess Power for Sale | 232 MWh |
| Feed-in Rate for Solar Power | USD42.53/MWh |
| Revenue from Solar Power/day | USD9,858 |
| Number of Working Days | 350 |
| **Annual Revenue from Solar Power** | **USD3.5 mil** |

- The revenue of SRESB comprise the sale of green hydrogen and sale of excess solar energy generated contributing an estimate of 96% and 4% of the total revenue projected respectively. This is illustrated in the adjacent tables.
- The sale of hydrogen is expected to contribute USD78.1 mil from year 1 to year 5 and USD85.2 mil from year 6 to year 25 based on the following assumptions:
  i. Full production capacity of 20,292 kg per day (equivalent to 20 tonnes) over 25 years of operation; and
  ii. Selling price of hydrogen is estimated at USD11 per kg from year 1 to year 5 and USD12 per kg from year 6 to year 25. Selling price is expected to increase by USD1 per kg as the management is of the view that selling price is on an uptrend due to the increasing global demand for green hydrogen.
- The sale of excess power from solar generation is expected to contribute USD3.5 mil per annum based on the following assumptions:
  i. Excess solar power generated is 61 MW per hour during peak power output hours between 10am and 2pm;
  ii. Total excess solar power for sale to the national grid is estimated at 232 MWh upon considering transmission loss at 5%. The detailed technical study and final FEED will be conducted to determine the actual excess solar power generated; and
  iii. Based on discussion with the management, excess solar power generated is expected to be sold to the national grid based on the same rate of electricity charges by TNB which is assumed at USD42.53/MWh.
- The aggregate revenue over 25 years of operation is USD2,181.4 mil out of which USD2,095.1 mil or 96% is contributed by the sale of hydrogen while USD86.2 mil of 4% is contributed by the sale of excess power from the solar energy generated.

# Annual direct costs are estimated between USD32.8 mil and USD33.5 mil

**Table 3: Total Direct Costs**

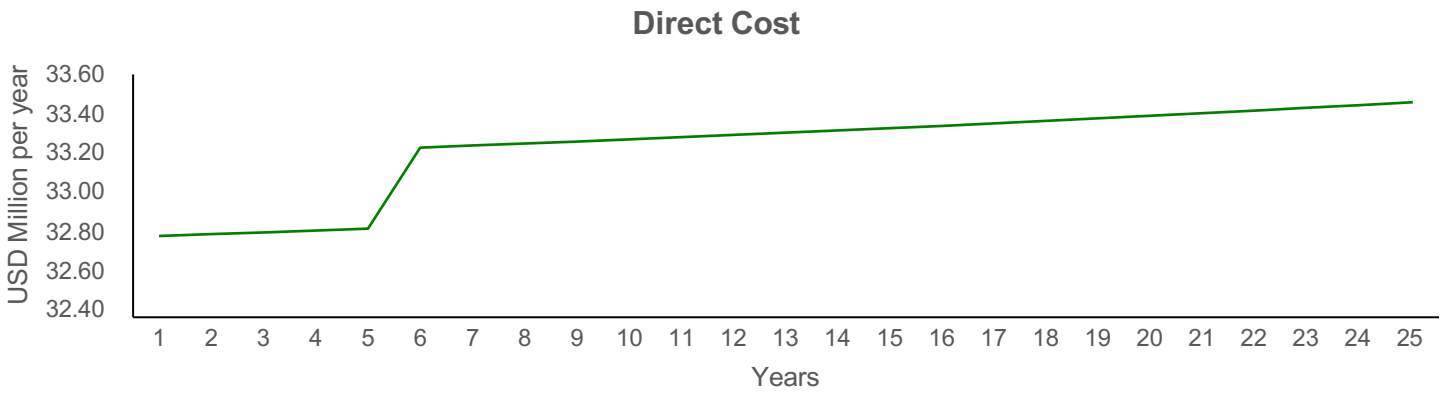
| Description | Proportion (%) | USD' mil | USD' mil |
|---|---|---|---|
| Electricity charges | 61 to 62 | 20.3 | 20.3 |
| Maintenance cost | 23 to 24 | 7.8 | 7.8 |
| Tariff to the State | 9 to 10 | 3.1 | 3.4 |
| Project consultancy fee | 4 | 1.2 | 1.3 |
| Manpower cost | 1 to 2 | 0.4 | 0.7 |
| Total Direct Costs | 100 | 32.8 | 33.5 |

**Table 4: Electricity Charges**

| Description | USD'mil |
|---|---|
| Electricity charges per day | 0.05 |
| Number of working days | 350 |
| Total Electricity Charge | 17.5 |

**Table 5: Maintenance Cost**

| Description | USD'mil |
|---|---|
| Plant and equipment to be maintained | 155.4 |
| Percentage of maintenance cost | 5% |
| Maintenance Cost | 7.8 |

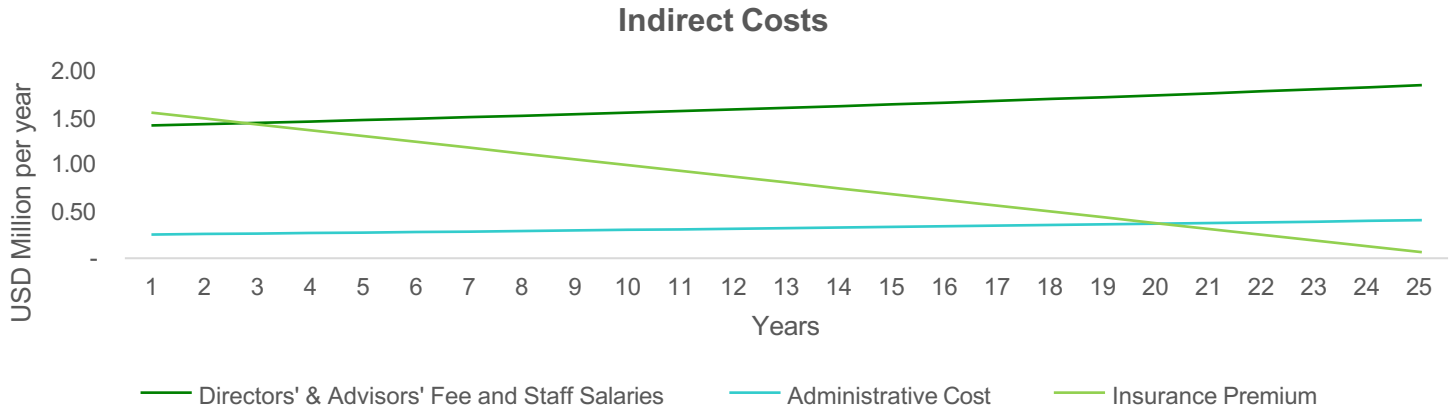



- The annual direct costs for the Project are estimated between USD32.8 mil and USD33.5 mil as summarised in the adjacent table.
- The direct costs for the Project are driven by the following costs which represent 84% to 86% of the annual direct costs:
  i. Electricity charges (as shown in the adjacent table) amounting to RM20.3 mil annually representing 61% to 62% of the annual total direct costs. The electricity charges payable to TNB include electricity usage, green energy tariff and maximum demand charges; and
  ii. Maintenance cost for the plant and equipment amounting to USD7.8 mil annually representing 23% to 24% of the annual total direct costs. The maintenance cost is estimated at 5% of the total value of the plant and equipment required to be serviced and maintained.
- As shown in the graph above, the increase in the projected direct costs from year 6 onwards was mainly due to the increase in the annual revenue from the sale of hydrogen as a result of increase in price of hydrogen per kg from USD11 per kg to USD12 per kg. In particular, the direct costs which are driven by the Project revenue are tariff payable to the State and project consultancy fee payable to PIRSB based on the letter dated 1 June 2022 issued by PIRSB to SPSB.

# Annual indirect costs (including taxation) are estimated between USD10.3 mil and USD15.5 mil

**Table 6: Total Indirect Costs**

| Description | USD'mil | USD'mil |
|---|---|---|
| Directors' and advisors' fee | 0.7 | 0.7 |
| Staff salaries | 0.7 | 0.9 |
| Administrative cost | 0.3 | 0.3 |
| Lease of land/water | 0.1 | 0.1 |
| Insurance premium | 1.3 | 0.9 |
| Taxation | 7.2 | 12.6 |
| Total Indirect Costs | 10.3 | 15.5 |

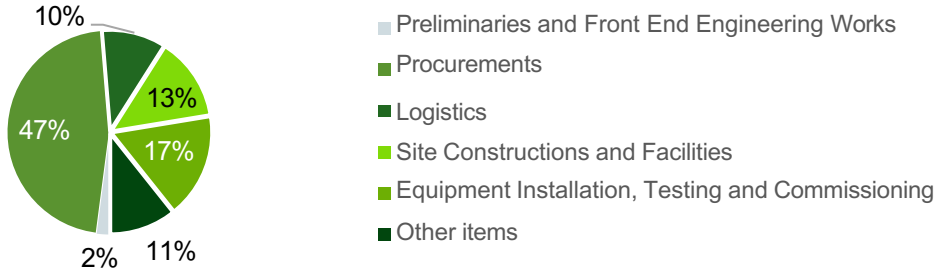



- The annual indirect costs (including taxation) for the Project are estimated between USD10.3 mil and USD15.5 mil as summarised in the adjacent table.
- The indirect costs for the Project are driven by the following costs which represent 82% to 87% of the annual direct costs:
  i. Taxation payable to the Inland Revenue Board of Malaysia amounting between RM7.2 mil and RM12.6 mil which were estimated at 24% of taxable income based on the assumption that there are no tax exemptions applicable to SRESB; and
  ii. Insurance premium amounting between RM0.9 mil and RM1.3 mil based on 1% of the book value of the plant and equipment after accounting for depreciation of 4% per annum using a straight-line depreciation method over 25 years.

# The total capital expenditure for the Project is estimated at USD333.5 mil

**Table 7: Total CAPEX**

| Description | Proportion (%) | Total (USD'mil) |
|---|---|---|
| Preliminaries | 1% | 2.1 |
| Front-End Engineering Works | 1% | 4.8 |
| Procurement of Floating Solar | 25% | 83.7 |
| Procurement of Electrolysers | 7% | 22.7 |
| Other Equipments | 15% | 49.0 |
| Logistics | 10% | 34.5 |
| Site Constructions and Facilities | 13% | 44.7 |
| Equipment Installation | 16% | 51.6 |
| Testing and Commissioning | 1% | 4.7 |
| Other items | 11% | 35.7 |
| Total CAPEX | 100% | 333.5 |




- The total capital expenditure for the Project is estimated at USD333.5 mil as summarised in the adjacent table.
- The capital expenditure for the Project is driven by the following costs which represent c.87% of the total capital expenditure:
  i. Procurement of the plant and equipment aggregating USD155.4 mil or 47% of the total capital expenditure which comprise the floating solar PV plant, electrolysers, electrical substation, networks and etc.;
  ii. Equipment installation, testing and commissioning aggregating USD56.3 mil or 17% of the total capital expenditure;
  iii. Site construction and facilities amounting to USD44.7 mil or 13% of the total capital expenditure. This is based on management's estimate. No quotation has been obtained given that the Project is at a preliminary stage.
  iv. Logistics amounting to USD34.5 mil or 10% of the total capital expenditure which comprise the costs of the 40 feet trailers, freight costs, insurance costs, packing costs and etc..
- Please refer to Appendix B for further details.

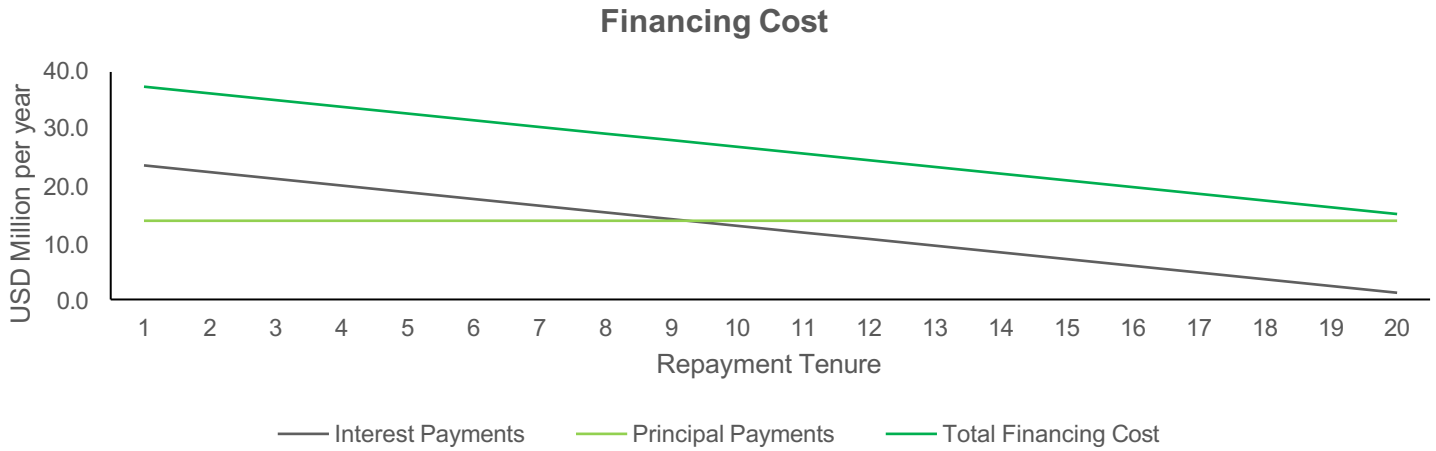
# The management anticipates to finance the costs of the Project which is estimated at a value of USD333.5 mil via 70% debt financing and 30% equity contribution

**Table 8: Total Project Value**

| Description | Total |
|---|---|
| Total project value | USD333.5 mil |
| Equity % | 30% |
| Equity Amount | USD100.0 mil |
| Financing % | 70% |
| Financing Amount | USD233.5 mil |

**Table 9: Principal and Interest Payments**

| Description | Year 1 – 25 (USD'mil) |
|---|---|
| Cumulative Principal Over Construction Period | 277.0 |
| Interest Payments | 247.2 |
| Total Financing Cost | 524.2 |



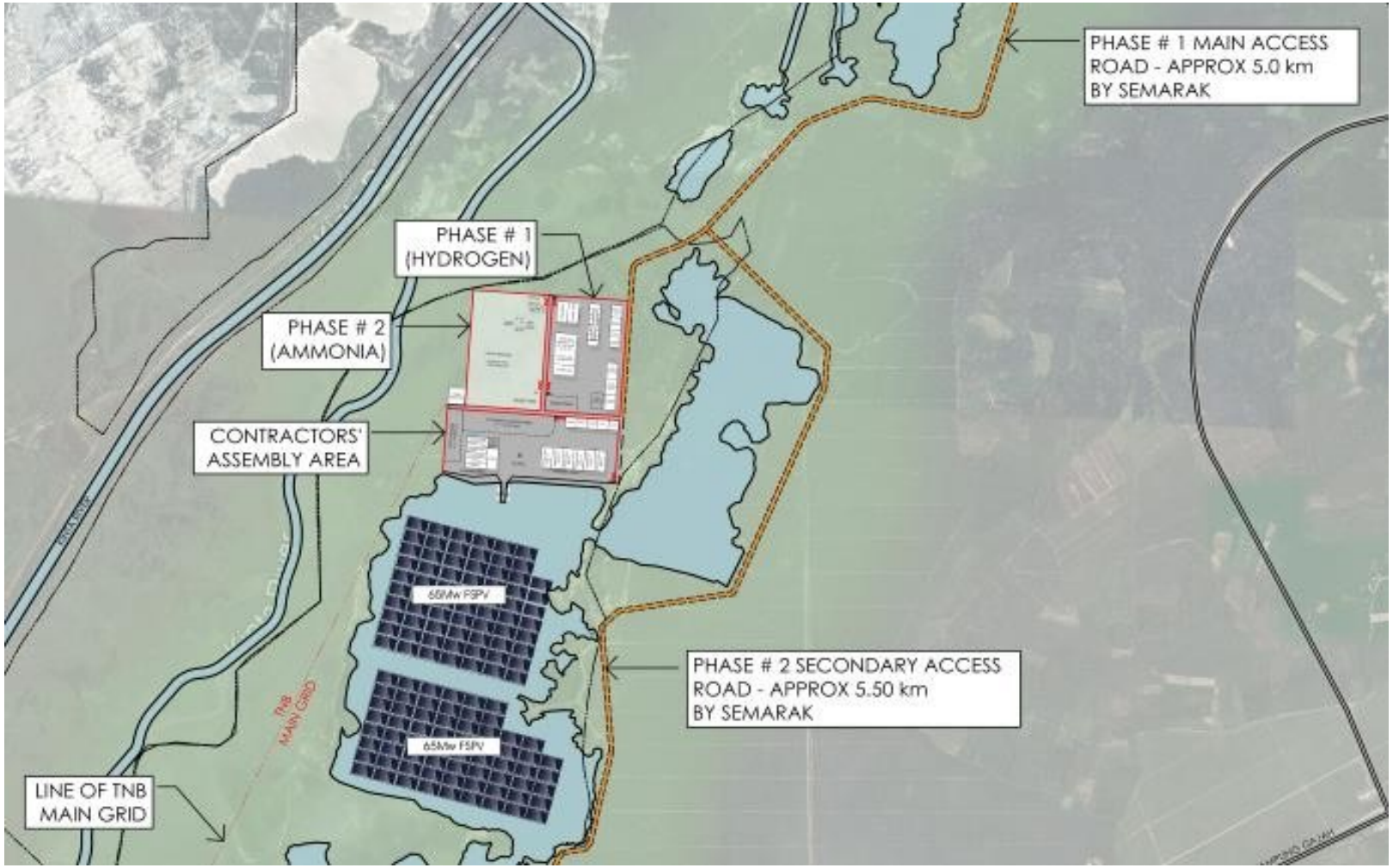

- The total project value is estimated at USD333.5 mil as summarised in the adjacent table which includes the procurement of plant and equipment, site construction, logistic costs as well as installation and commissioning of the integrated complex.
- Out of the estimated total project value of USD333.5 mil, USD100.0 mil or 30% will be financed via equity whilst USD233.5 mil or 70% will be financed via debt.
- The repayment tenure of the debt financing is estimated at 20 years bearing interest of 8.5% per annum. Interest incurred during the construction phase is capitalised in the principal amount and is based on cumulative principal sum drawn over the three (3) years during the construction period.
- The project is estimated to generate positive cash flow from year 1 onwards after including the financing cost (i.e., principal and interest payment). Please refer to Appendix C for the detailed cash flow projection.

# Section 6

## Appendices

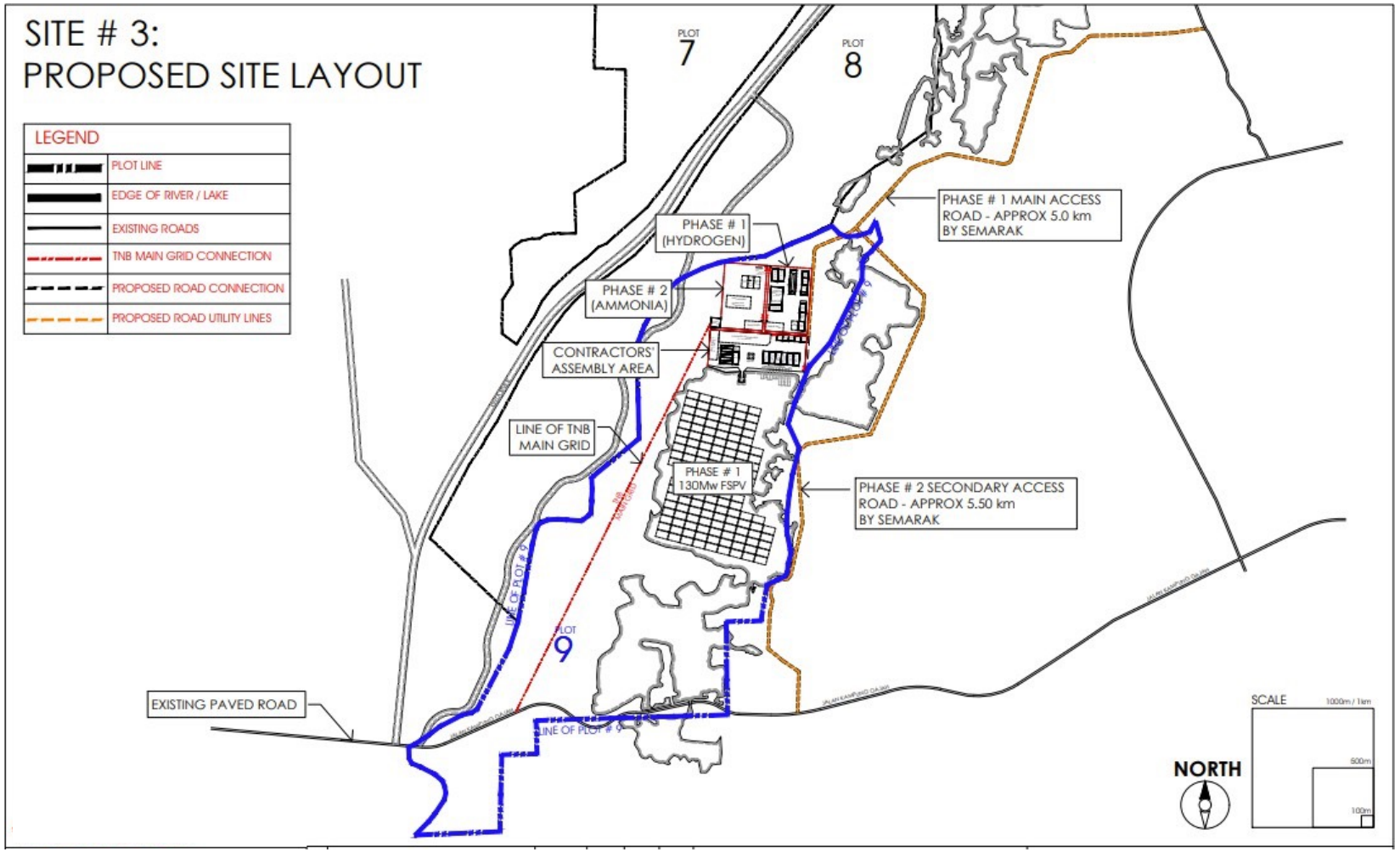
# Appendix A: Project Site Overview (1/4)

# Appendix A: Project Site Overview (2/4)



# Appendix A: Project Site Overview (3/4)

# Appendix A: Project Site Overview (4/4)



# Appendix B: Engineering, procurement, construction and commissioning contractors (1/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| **1.0** | **Preliminaries** | | | | | |
| **1.1** | **Semarak Renewable Energy** | | | | | |
| | Company Management | 210,526 | Internal | 210,526 | - | - |
| | Operating Cost | 1,263,158 | Internal | 1,263,158 | - | - |
| **1.2** | **Pre-FEED (3 months)** | | | | | |
| | **Project Management Team (Green Palm)** | | | | | |
| | Project Manager | 31,579 | Green Palm | 31,579 | - | - |
| | Project Engineer | 15,789 | Green Palm | 15,789 | - | - |
| | Project Planner | 9,474 | Green Palm | 9,474 | - | - |
| | QHSE | | | | | |
| | QA/QC Manager | 7,579 | Green Palm | 7,579 | - | - |
| | Process Safety | 11,368 | Green Palm | 11,368 | - | - |
| | Document Controller | 6,316 | Green Palm | 6,316 | - | - |
| | Admin | | | | | |
| | Finance | 28,421 | Internal | 28,421 | - | - |
| | Engineering Support | 513,480 | Transerve | 513,480 | - | - |
| | **Subtotal** | **2,097,690** | | **2,097,690** | **-** | **-** |

# Appendix B: Engineering, procurement, construction and commissioning contractors (2/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| 2.0 | **Engineering, Local Authority, Project Management, 3rd Party Services** | | | | | |
| 2.1 | **Front-End Engineering Design** | | | | | |
| | **Project Management Team (Green Palm)** | | | | | |
| | Project Manager | 63,158 | Internal | 21,474 | 20,842 | 20,842 |
| | Project Engineer | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Project Planner | 18,947 | Internal | 6,442 | 6,252 | 6,253 |
| | QHSE | | | | | |
| | QA/QC Manager | 15,158 | Internal | 5,154 | 5,002 | 5,002 |
| | Process Safety | 22,737 | Internal | 7,731 | 7,503 | 7,503 |
| | Document Controller | 12,632 | Internal | 4,295 | 4,169 | 4,168 |
| | Admin | | | | | |
| | Finance | 56,842 | Internal | 19,326 | 18,758 | 18,758 |
| | Process | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Electrical | 31,579 | Internal | 10,737 | 10,421 | 10,421 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (3/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Instrumentation | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Mechanical & Piping | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Naval | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Civil | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Structural | 31,579 | Internal | 10,737 | 10,421 | 10,421 |
| | Transerve Team | | | | | |
| | Engineering Support | 1,244,800 | Transerve | 423,232 | 410,784 | 410,784 |
| | Third Party Services | | | | | |
| | Local Authority Liaison | 37,895 | Transerve | 12,884 | 12,506 | 12,505 |
| | Third Party Review (BV) | 526,316 | BV | 178,947 | 173,685 | 173,684 |
| | Social & Economic Impact Assessment | 315,789 | Transerve | 107,368 | 104,211 | 104,210 |
| | Data Acquisition | | | | | |
| | Boundary Site Survey | 7,368 | DNA | 2,505 | 2,431 | 2,432 |
| | Environmental Analysis | 7,789 | DNA | 2,648 | 2,570 | 2,571 |
| | Weather Station | | | | | |
| | Topography Survey (2D/3D Drone/LIDAR) | 206,316 | DNA | 70,147 | 68,084 | 68,085 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (4/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Lake Bathymetric | 78,947 | DNA | 26,842 | 26,053 | 26,052 |
| | Environmental Report | 6,842 | DNA | 2,326 | 2,258 | 2,258 |
| | **Subtotal** | **2,874,168** | | **977,217** | **948,476** | **948,475** |
| **2.2** | **Local Authorities/Government Permits/Licensure** | | | | | |
| | Suruhanjaya Tenaga | 42,105 | Internal | 14,316 | 13,895 | 13,894 |
| | SEDA | 42,105 | Internal | 14,316 | 13,895 | 13,894 |
| | TNB | 42,105 | Internal | 14,316 | 13,895 | 13,894 |
| | DOSH | 42,105 | Internal | 14,316 | 13,895 | 13,894 |
| | Lembaga Air Perak | 42,105 | Internal | 14,316 | 13,894 | 13,895 |
| | Majlis Daerah Batu Gajah | 42,105 | Internal | 14,315 | 13,894 | 13,896 |
| | Others | 42,105 | Internal | 14,315 | 13,894 | 13,896 |
| | **Subtotal** | **294,735** | | **100,210** | **97,262** | **97,263** |
| **2.3** | **Project Management** | | | | | |
| | **Project Management Team (Green Palm)** | | | | | |
| | Project Manager | 189,474 | Green Palm | 64,421 | 62,526 | 62,527 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (5/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Project Engineer | 94,737 | Internal | 32,211 | 31,263 | 31,263 |
| | Project Planner | 56,842 | Internal | 19,326 | 18,758 | 18,758 |
| | QHSE | | | | | |
| | QA/QC Manager | 45,474 | Internal | 15,461 | 15,006 | 15,007 |
| | Process Safety | 68,211 | Internal | 23,192 | 22,509 | 22,510 |
| | Document Controller | 37,895 | Internal | 12,885 | 12,505 | 12,505 |
| | Admin | | | | | |
| | Finance | 85,263 | Internal | 28,989 | 28,137 | 28,137 |
| | Procurement Officer | 45,474 | Internal | 15,461 | 15,006 | 15,007 |
| | Expeditor | 25,263 | Internal | 8,589 | 8,337 | 8,337 |
| | Logistic Officer | 25,263 | Internal | 8,589 | 8,337 | 8,337 |
| | Engineering Team | | | | | |
| | Process | 94,737 | Transerve | 32,210 | 31,264 | 31,263 |
| | Electrical | 94,737 | Transerve | 32,210 | 31,264 | 31,263 |
| | Instrumentation | 94,737 | Transerve | 32,210 | 31,264 | 31,263 |
| | Mechanical & Piping | 94,737 | Transerve | 32,211 | 31,264 | 31,262 |
| | Naval | 94,737 | Transerve | 32,211 | 31,263 | 31,263 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (6/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Civil | 94,737 | Transerve | 32,211 | 31,263 | 31,263 |
| | Structural | 94,737 | Transerve | 32,211 | 31,263 | 31,263 |
| | Transerve Team | | | | | |
| | Engineering Support | 35,399 | Transerve | 12,035 | 11,682 | 11,682 |
| | Third Party Services | | | | | |
| | Local Authority Liason | 37,895 | Transerve | 12,885 | 12,505 | 12,505 |
| | Third Party Review (BV) | 210,526 | BV | 71,579 | 69,473 | 69,474 |
| | **Subtotal** | **1,620,875** | | **551,097** | **534,889** | **534,889** |
| **3.0** | **Procurement** | | | | | |
| **3.1** | **Floating Solar PV** | | | | | |
| | PV Module | 36,495,550 | Longi | 8,393,976 | 26,276,796 | 1,824,777 |
| | Floater | 22,205,300 | Longi | 5,107,219 | 14,944,167 | 2,153,914 |
| | Inverter & Box Transformer | 6,912,100 | Longi | 1,589,783 | 4,631,107 | 691,210 |
| | Cable & Accessories | 4,658,550 | Longi | 1,071,467 | 3,121,229 | 465,855 |
| | Other Equipment for Plant | 3,539,250 | Not provided | 814,027 | 2,371,298 | 353,925 |
| | Substation Equipment | 5,000,000 | Not provided | 2,625,744 | 1,874,256 | 500,000 |
| | Batteries | - | | - | - | - |

# Appendix B: Engineering, procurement, construction and commissioning contractors (7/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Anchoring System | 737,100 | Transerve | 515,970 | 147,420 | 73,710 |
| | Concrete Deadweight, used for anchoring & mooring system | 1,816,100 | Transerve | 1,271,270 | 363,220 | 181,610 |
| | Feeder Cables, Earthing and Mounting accessories | 2,364,288 | Not provided | 1,655,002 | 472,857 | 236,429 |
| | **Subtotal** | **83,728,238** | | **23,044,458** | **54,202,350** | **6,481,430** |
| **3.2** | **Electrolyser** | | | | | |
| | Electrolyser – LA-1000 | 14,004,000 | Longi | 6,861,960 | 2,800,800 | 4,341,240 |
| | Gas-liquid separation unit LGS-4000 | 2,660,100 | Longi | 1,862,070 | 532,020 | 266,010 |
| | Gas Purification unit – LGPU-4000 | 2,069,000 | Longi | 1,448,300 | 413,800 | 206,900 |
| | Electrical Equipment – supplied by Longi | 2,034,000 | Longi | 1,423,800 | 406,800 | 203,400 |
| | Process Auxiliary Equipment – supplied by Longi | 1,938,750 | Longi | 1,357,125 | 387,750 | 193,875 |
| | **Subtotal** | **22,705,850** | | **12,953,255** | **4,541,170** | **5,211,425** |
| **3.3** | **Ammonia Plant** | | | | | |
| | Ammonia Systhesis Plant | - | | - | - | - |

# Appendix B: Engineering, procurement, construction and commissioning contractors (8/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| 3.4 | **Other Equipment** | | | | | |
| | Water Treatment Plant | 600,000 | Transerve | 420,000 | 120,000 | 60,000 |
| | E&I | | | | | |
| | 33kV TNB Transformation & Substation (OFFSITE) | 10,000,000 | Transerve | 7,000,000 | 2,000,000 | 1,000,000 |
| | Hydrogen Plant 33/11kV to 11kV/0.400-0.23kV Receiving Substation (ONSITE) | 13,116,850 | Transerve | 9,181,795 | 2,623,370 | 1,311,685 |
| | LV Distribution System | 968,181 | Transerve | 677,727 | 193,636 | 96,818 |
| | Fire Fighting/Safety Equipment | 31,481 | Transerve | 22,037 | 6,296 | 3,148 |
| | Perimeter Lighting | 3,529,000 | Transerve | 2,470,300 | 705,800 | 352,900 |
| | Lightning Protection System | 1,102,812 | Transerve | 771,967 | 220,562 | 110,281 |
| | Earthing System | 4,411,250 | Transerve | 3,087,875 | 882,250 | 441,125 |
| | Security/CCTV/FLIR & Alarm | 1,840,426 | Transerve | 1,288,299 | 368,086 | 184,043 |
| | Other Items | | | | | |
| | Hydrogen Compressors, Meters, Dispenser | 9,411,140 | Transerve | 6,587,798 | 1,882,228 | 941,114 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (9/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Buffer tank & High pressure storage | 4,000,000 | Sino Hydro | 2,800,000 | 800,000 | 400,000 |
| | **Subtotal** | **49,011,140** | | **34,307,798** | **9,802,228** | **4,901,114** |
| **4.0** | **Logistics** | | | | | |
| | 40' Container, 8 tube @20MPa | 3,360,000 | Sino Hydro | 840,000 | 1,680,000 | 840,000 |
| | Packing & Tagging | 3,886,131 | Transerve | 971,533 | 1,943,066 | 971,532 |
| | Ocean Freight Cost | 3,886,131 | Internal | 971,533 | 1,943,066 | 971,532 |
| | Freight Insurance | 3,886,131 | Internal | 971,533 | 1,943,065 | 971,533 |
| | Import Tax/Sales tax | 15,544,523 | Internal | 3,886,131 | 10,103,940 | 1,554,452 |
| | Port Clearance & Local Transport to Site | 3,886,131 | Internal | 971,532 | 1,943,065 | 971,533 |
| | **Subtotal** | **34,449,047** | | **8,612,262** | **19,556,202** | **6,280,583** |
| **5.0** | **Site Construction Team** | | | | | |
| | Site Management Team | 1,136,842 | Transerve | 284,211 | 397,895 | 454,736 |
| | Supervisors | 454,737 | Internal | 113,684 | 159,158 | 181,895 |
| | Technicians | 454,737 | Internal | 113,684 | 159,158 | 181,895 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (10/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Workers | 2,652,632 | Internal | 663,158 | 1,326,316 | 663,158 |
| | **Subtotal** | **4,698,948** | | **1,174,737** | **2,042,527** | **1,481,684** |
| **6.0** | **Site Facilities** | | | | | |
| | Site Offices, Security, HSE, First Aid | No breakdown provided | Internal | - | - | - |
| | Workers Camp c/w shower and toilet | No breakdown provided | Internal | - | - | - |
| | Excavator, Loaders, Tipper Trucks | No breakdown provided | Internal | - | - | - |
| | Welders, Air Compressor, Pumps | No breakdown provided | Sino Hydro | - | - | - |
| | Ready mix concrete, pumps | No breakdown provided | Transerve | - | - | - |
| | Crawler Cranes (various) | No breakdown provided | Transerve | - | - | - |
| | Vibro-piling Hammers | No breakdown provided | Transerve | - | - | - |
| | Scaffolding, NDT Lab | No breakdown provided | Transerve | - | - | - |
| | Workboat, Pontoons, Jetty, Launch Way | No breakdown provided | Transerve | - | - | - |

# Appendix B: Engineering, procurement, construction and commissioning contractors (11/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Utilities: Power, Water, Communication | No breakdown provided | Transerve | - | - | - |
| | **Subtotal** | **15,000,000** | | **4,500,000** | **9,750,000** | **750,000** |
| **7.0** | **Site Construction** | | | | | |
| | Resettlement, Site Clearing | No breakdown provided | Transerve | - | - | - |
| | Temporary Access, Disposal, Earthwork | No breakdown provided | Transerve | - | - | - |
| | Perimeter Fence, Gate, Guardhouse | No breakdown provided | Transerve | - | - | - |
| | Roads, Drains (5km) | No breakdown provided | Transerve | - | - | - |
| | Foundation (Trailer Park, Loading Bay, Carpark) | No breakdown provided | Transerve | - | - | - |
| | Building (Office, Warehouse, Sheds, Loading Bay) | No breakdown provided | Transerve | - | - | - |
| | **Subtotal** | **25,000,000** | | **7,500,000** | **16,250,000** | **1,250,000** |
| **8.0** | **Equipment Installation** | | | | | |
| | Specialist Vendor | | | | | |
| | FSPV System | 13,974,900 | Transerve | 4,194,470 | 4,577,840 | 5,202,590 |

# Appendix B: Engineering, procurement, construction and commissioning contractors (12/12)

| No. | Item Description | Total Amount (USD) | Suppliers | Year -3 (USD) | Year -2 (USD) | Year -1 (USD) |
|---|---|---|---|---|---|---|
| | Electrolyser | 750,000 | Transerve | 225,000 | 450,000 | 75,000 |
| | Other Items | | | | | |
| | Electrical Substation | 10,500,000 | Transerve | 3,150,000 | 6,615,000 | 735,000 |
| | Network (Pipe Rack & Cable tray) | 18,000,000 | Transerve | 5,400,000 | 11,700,000 | 900,000 |
| | Water Treatment | 180,000 | Transerve | 54,000 | 108,000 | 18,000 |
| | Electrolyser | 8,200,000 | Transerve | 2,460,000 | 4,920,000 | 820,000 |
| | **Subtotal** | **51,604,900** | | **15,483,470** | **28,370,840** | **7,750,590** |
| **9.0** | **Testing & Commissioning** | | | | | |
| | Testing & Commissioning | 4,663,357 | Transerve | - | - | 4,663,357 |
| | **Subtotal** | **4,663,357** | | **-** | **-** | **4,663,357** |
| **10.0** | **Other Items** | | | | | |
| | Insurance | 5,954,979 | Internal | - | 3,572,987 | 2,381,992 |
| | Contingencies | 29,774,895 | Internal | - | 26,201,908 | 3,572,987 |
| | **Subtotal** | **35,729,874** | | **-** | **29,774,895** | **5,954,979** |
| | **Total** | **333,478,822** | | **111,302,194** | **175,870,839** | **46,305,789** |

# Appendix C: Detailed Cash Flow Projection Until Year 25 (1/3)

| Item Description / USD mil' | Year -3 | Year -2 | Year -1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|---|---|---|---|---|---|---|---|---|
| Revenue from Hydrogen | - | - | - | 78.1 | 78.1 | 78.1 | 78.1 | 78.1 |
| Revenue from Solar | - | - | - | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| **Total Revenue** | - | - | - | **81.6** | **81.6** | **81.6** | **81.6** | **81.6** |
| Maintenance Cost | - | - | - | (7.7) | (7.7) | (7.7) | (7.7) | (7.7) |
| Manpower Cost | - | - | - | (0.5) | (0.5) | (0.5) | (0.5) | (0.5) |
| Tariff to State | - | - | - | (3.1) | (3.1) | (3.1) | (3.1) | (3.1) |
| Project Consultancy Fee | - | - | - | (1.2) | (1.2) | (1.2) | (1.2) | (1.3) |
| Electricity and Green Energy Charges | - | - | - | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) |
| **Total Direct Cost** | - | - | - | **(32.8)** | **(32.8)** | **(32.8)** | **(32.8)** | **(32.9)** |
| Director's & Advisors' Fee and Staff Salaries | - | - | - | (1.4) | (1.4) | (1.4) | (1.5) | (1.5) |
| Administrative Cost | - | - | - | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) |
| Insurance Premium | - | - | - | (1.5) | (1.5) | (1.4) | (1.4) | (1.3) |
| Lease of Land/Water | - | - | - | (0.1) | (0.1) | (0.1) | (0.1) | (0.1) |
| Taxation | - | - | - | (7.2) | (7.2) | (7.2) | (7.2) | (7.2) |
| **Total Indirect Cost** | - | - | - | **(10.5)** | **(10.5)** | **(10.4)** | **(10.5)** | **(10.4)** |
| **Net Cash Flow from Operating Activities** | - | - | - | **38.3** | **38.3** | **38.4** | **38.3** | **38.3** |
| Principal Repayments | - | - | - | (13.8) | (13.8) | (13.8) | (13.8) | (13.8) |
| Interest Payments | - | - | - | (23.6) | (22.4) | (21.2) | (20.0) | (18.8) |
| **Net Cash Flow from Financing Activities** | - | - | - | **(37.4)** | **(36.2)** | **(35.0)** | **(33.8)** | **(32.6)** |
| **Capital Expenditure** | **(111.3)** | **(175.9)** | **(46.3)** | **-** | **-** | **-** | **-** | **-** |
| **Net Cash Flow** | **(111.3)** | **(175.9)** | **(46.3)** | **0.9** | **2.1** | **3.4** | **4.5** | **5.7** |

# Appendix C: Detailed Cash Flow Projection Until Year 25 (2/3)

| Item Description / USD mil' | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15 |
|---|---|---|---|---|---|---|---|---|---|---|
| Revenue from Hydrogen | 85.2 | 85.2 | 85.2 | 85.2 | 85.2 | 85.2 | 85.2 | 85.2 | 85.2 | 85.2 |
| Revenue from Solar | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.4 | 3.4 |
| **Total Revenue** | **88.7** | **88.7** | **88.7** | **88.7** | **88.7** | **88.7** | **88.7** | **88.7** | **88.6** | **88.6** |
| Maintenance Cost | (7.8) | (7.8) | (7.8) | (7.7) | (7.8) | (7.8) | (7.8) | (7.8) | (7.8) | (7.8) |
| Manpower Cost | (0.5) | (0.5) | (0.5) | (0.5) | (0.5) | (0.5) | (0.5) | (0.6) | (0.6) | (0.6) |
| Tariff to State | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) |
| Project Consultancy Fee | (1.3) | (1.3) | (1.3) | (1.3) | (1.3) | (1.3) | (1.3) | (1.3) | (1.2) | (1.2) |
| Electricity and Green Energy Charges | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) |
| **Total Direct Cost** | **(33.3)** | **(33.3)** | **(33.3)** | **(33.2)** | **(33.3)** | **(33.3)** | **(33.3)** | **(33.4)** | **(33.3)** | **(33.3)** |
| Director's & Advisors' Fee and Staff Salaries | (1.5) | (1.5) | (1.6) | (1.6) | (1.6) | (1.6) | (1.6) | (1.6) | (1.6) | (1.6) |
| Administrative Cost | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) | (0.3) |
| Insurance Premium | (1.3) | (1.2) | (1.1) | (1.1) | (1.0) | (0.9) | (0.9) | (0.8) | (0.7) | (0.7) |
| Lease of Land/Water | 0.0 | 0.0 | 0.0 | (0.1) | (0.1) | 0.0 | 0.0 | 0.0 | (0.1) | 0.0 |
| Taxation | (8.8) | (8.9) | (8.9) | (8.9) | (8.9) | (12.6) | (12.6) | (12.6) | (12.6) | (12.6) |
| **Total Indirect Cost** | **(11.9)** | **(11.9)** | **(11.9)** | **(12.0)** | **(11.9)** | **(15.4)** | **(15.4)** | **(15.3)** | **(15.3)** | **(15.2)** |
| **Net Cash Flow from Operating Activities** | **43.5** | **43.5** | **43.5** | **43.5** | **43.5** | **40.0** | **40.0** | **40.0** | **40.0** | **40.1** |
| Principal Repayments | (13.8) | (13.8) | (13.8) | (13.8) | (13.8) | (13.9) | (13.9) | (13.9) | (13.9) | (13.9) |
| Interest Payments | (17.7) | (16.5) | (15.3) | (14.1) | (12.9) | (11.8) | (10.6) | (9.4) | (8.2) | (7.1) |
| **Net Cash Flow from Financing Activities** | **(31.5)** | **(30.3)** | **(29.1)** | **(27.9)** | **(26.7)** | **(25.7)** | **(24.5)** | **(23.3)** | **(22.1)** | **(21.0)** |
| **Capital Expenditure** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Net Cash Flow** | **12.0** | **13.2** | **14.4** | **15.6** | **16.8** | **14.3** | **15.5** | **16.7** | **17.9** | **19.1** |

# Appendix C: Detailed Cash Flow Projection Until Year 25 (3/3)

| Item Description / USD mil' | Year 16 | Year 17 | Year 18 | Year 19 | Year 20 | Year 21 | Year 22 | Year 23 | Year 24 | Year 25 | Total * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue from Hydrogen | 85.2 | 85.2 | 85.2 | 85.2 | 85.3 | 85.3 | 85.3 | 85.3 | 85.3 | 85.3 | 2,095.1 |
| Revenue from Solar | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 86.3 |
| **Total Revenue** | **88.6** | **88.6** | **88.6** | **88.6** | **88.7** | **88.7** | **88.7** | **88.7** | **88.7** | **88.7** | **2,181.4** |
| Maintenance Cost | (7.8) | (7.8) | (7.7) | (7.8) | (7.8) | (7.8) | (7.8) | (7.8) | (7.8) | (7.8) | (194.3) |
| Manpower Cost | (0.6) | (0.6) | (0.6) | (0.6) | (0.6) | (0.6) | (0.7) | (0.7) | (0.7) | (0.7) | (14.2) |
| Tariff to State | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.4) | (3.5) | (3.5) | (3.5) | (83.8) |
| Project Consultancy Fee | (1.2) | (1.2) | (1.3) | (1.2) | (1.3) | (1.3) | (1.3) | (1.3) | (1.3) | (1.2) | (31.4) |
| Electricity and Green Energy Charges | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.3) | (20.2) | (20.2) | (20.2) | (507.2) |
| **Total Direct Cost** | **(33.3)** | **(33.3)** | **(33.3)** | **(33.3)** | **(33.4)** | **(33.4)** | **(33.5)** | **(33.5)** | **(33.5)** | **(33.4)** | **(831.0)** |
| Director's & Advisors' Fee and Staff Salaries | (1.6) | (1.7) | (1.7) | (1.7) | (1.7) | (1.8) | (1.8) | (1.8) | (1.8) | (1.8) | (40.4) |
| Administrative Cost | (0.3) | (0.3) | (0.3) | (0.3) | (0.4) | (0.4) | (0.4) | (0.4) | (0.4) | (0.4) | (8.1) |
| Insurance Premium | (0.7) | (0.5) | (0.5) | (0.4) | (0.4) | (0.2) | (0.2) | (0.2) | (0.2) | (0.1) | (20.2) |
| Lease of Land/Water | 0.0 | (0.1) | 0.0 | 0.0 | (0.1) | (0.1) | (0.1) | 0.0 | 0.0 | (0.1) | (1.3) |
| Taxation | (12.6) | (12.6) | (12.7) | (12.7) | (12.6) | (12.7) | (12.6) | (12.7) | (12.7) | (12.7) | (270.0) |
| **Total Indirect Cost** | **(15.2)** | **(15.2)** | **(15.2)** | **(15.1)** | **(15.2)** | **(15.2)** | **(15.1)** | **(15.1)** | **(15.1)** | **(15.1)** | **(340.0)** |
| **Net Cash Flow from Operating Activities** | **40.1** | **40.1** | **40.1** | **40.2** | **40.1** | **40.1** | **40.1** | **40.1** | **40.1** | **40.2** | **1,010.4** |
| Principal Repayments | (13.9) | (13.9) | (13.9) | (13.9) | (13.9) | - | - | - | - | - | (277.0) |
| Interest Payments | (5.9) | (4.7) | (3.5) | (2.4) | (1.1) | - | - | - | - | - | (247.2) |
| **Net Cash Flow from Financing Activities** | **(19.8)** | **(18.6)** | **(17.4)** | **(16.3)** | **(15.0)** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **(524.2)** |
| **Capital Expenditure** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Net Cash Flow** | **20.3** | **21.5** | **22.7** | **23.9** | **25.1** | **40.1** | **40.1** | **40.1** | **40.1** | **40.2** | **486.2** |

* Note: The variance in the total amount is due to rounding difference.