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The Africa Green Hydrogen Alliance

Sustainable fiscal regimes for green hydrogen projects: Financial modelling recommendations and tools

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Race to Resilience

Race to Zero

Executive Summary: Introduction

In the early stages of green hydrogen development, financial incentives will be key to get projects to financial close as new hydrogen technologies are rolled out and scaled up. However, as green hydrogen becomes increasingly competitive, taxes will become of greater importance as a source of revenue, in particular in developing countries.

Host governments will need to analyse and model how fiscal decisions made today impact investments and government revenues from green hydrogen in the future. Each host government will need to identify the optimal mix of fiscal instruments and terms to meet its objectives.

Due to the lack benchmarks and transparency with regards to fit for purpose fiscal terms for green hydrogen projects, it is challenging for many host governments to sign long-term agreements with project developers with confidence that there will be long-term fiscal gains.

The Africa Green Hydrogen Alliance (AGHA), with financial support from the Africa Climate Foundation and technical support from InVhestia Africa has initiated a project to support AGHA member countries to understand, analyse and model the implications of different fiscal terms and adapt them to their country contexts.

This report outlines the importance of financial modelling for the development of sustainable fiscal regimes in developing countries, explains how the financial modelling tools can be used by governments, and offers some early insights on fiscal policy measures African countries can adopt, based on the analysis undertaken with the model.

Executive Summary: Key Findings

The factors with the most significant impact on return on investment in Africa are (1) cost power, (2) capital expenditure, and (3) cost of capital. For example, a decrease in the cost of capital or of capital expenditure of 20% would increase the internal rate of return on a project by 130% (i.e. from the base scenario of an IRR of 5.39% to an IRR of 12.45%).

1. Cost of power: The cost of power has the highest impact on the cost of production of green hydrogen. Some of the measures governments can take to lower the cost of power include:

- **Lowering the taxes charged on renewable energy sources.** Eg in Kenya, approximately 47.25% of the cost of power is tax and other charges.
- **Renewable energy incentives.** Offering subsidies within a limited timeframe to renewable energy producers to lower the price of power.
- **Investment in renewable energy infrastructure.** Increasing investment in renewable energy sources such as solar, wind, and hydroelectric power can lower the overall cost of electricity production.
- **Grid modernisation.** Upgrading and modernising the electrical grid infrastructure can improve efficiency and reliability, reducing transmission and distribution costs associated with delivering electricity to green hydrogen production facilities.

Executive Summary: Key Findings

2. **Capital Expenditure.** Green hydrogen production requires a significant upfront investment in infrastructure, equipment, and construction is undertaken. This means that the substantial initial cash outflow associated with setting up the plant has a disproportionate effect on a project's return on investment. Measures AGHA countries can consider include:

- **Land Incentives:** Industrial zones with competitive land prices with flexible land lease options, including long-term leases with fixed rental rates or lease-to-own arrangements.
- **Land Development Assistance:** Support for land development activities within industrial zones, such as site preparation and infrastructure installation and subsidies or grants for land development costs.
- **Import Duty Reduction:** Zero import duties on electrolyzers and related technologies.
- **VAT Exemption:** Exempting electrolyzers from value-added tax (VAT). Considering standard VAT rate on imports in some AGHA member countries, a VAT exemption on electrolyzers could positively impact investment economics.
- **Investment Deduction and Capital Allowances:** Introducing policies for investment deduction or capital allowances enables businesses to offset taxable income with investment costs. However, it's essential to balance incentives with fiscal responsibility by considering reasonable limits on carrying tax losses forward, ensuring sustainable fiscal management.

Executive Summary: Key Findings

3. Cost of Capital. The high cost of borrowing is a particular challenge for capital-intensive industries in Africa. AGHA countries can implement strategic measures to foster a conducive environment for investors, including:

- **Interest Rate Subsidies**: Introduce government-backed interest rate subsidies or guarantees to reduce borrowing costs for green hydrogen projects.
- **Credit Enhancement Programs:** Establish credit enhancement programs or facilities to mitigate lender risk and improve project creditworthiness.
- **Development Finance:** Collaborate with Development Finance Institutions (DFIs) to offer concessional loans or tailored financing packages for green hydrogen projects.
- **Public-Private Partnerships (PPPs):** By sharing risks and costs between public and private entities, PPPs can attract private capital at lower borrowing rates, facilitating project implementation and maximizing investor returns.

To ensure that governments receive revenues in the long term, it is advisable to limit the timeframe for fiscal incentives and tax exemptions. Host governments can also consider trigger factors that may require a review of the fiscal regime if there are fundamental changes to main variables such as changes in international subsidies or the introduction of new technologies that impact project costs and return on investment.

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Why financial modelling for green hydrogen projects?

Why financial modelling for green hydrogen projects?

To effectively navigate investments in green hydrogen projects, rigorous economic analysis of the industry and project economics is critical. Given the complexity and uncertainties surrounding factors like costs and market dynamics, dedicated economic models must be employed at both project and sector levels.

Decision makers will need to scrutinise the underlying assumptions to assess the financial feasibility of a project, guard against overestimation of production volumes and prices while underestimating costs and timelines. This analysis should underpin the design of a sustainable fiscal regime that balances the immediate interest of project developers to make projects bankable and reach financial close, with the long-term interest of governments to secure a share of the upside once projects are profitable.

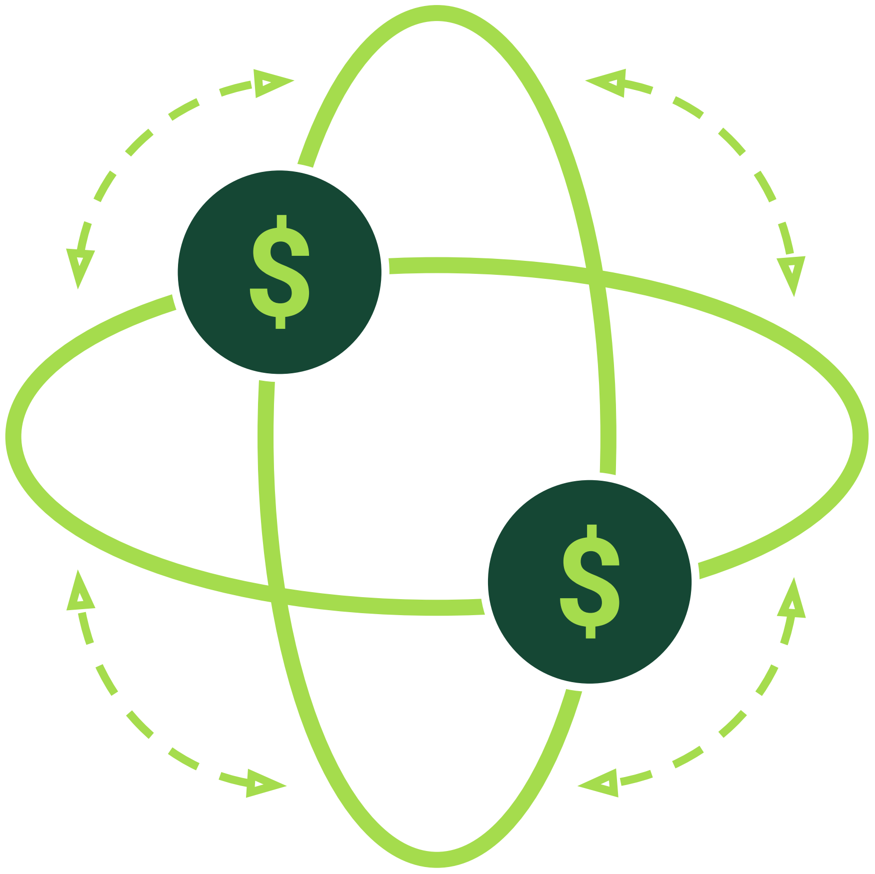
Comprehensive development plans, supported by economic models, should be subject to government review and approval to maintain alignment with technical, commercial, and environmental goals. Project developers should share their financial models with governments for thorough evaluation, and governments should have the capacity to analyse and assess the models.

Financial modelling tool for African governments

The Africa Green Hydrogen Alliance (AGHA) has introduced a **financial modelling tool** tailored for African governments seeking to assess the financial viability of green hydrogen projects. The tool is designed to help guide policymakers as they negotiate and design sustainable fiscal policies for the green hydrogen industry.

By leveraging this tool, African governments can navigate the complexities of green hydrogen initiatives, ensuring that their policies are guided by numbers.

Ultimately, the goal is to facilitate the development of robust policies that drive the adoption of green hydrogen while fostering economic growth and environmental sustainability across the continent.



How the financial modelling tool can be used

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SCENARIO 1: Ministry of Energy or Finance official

Imagine you work in your country's Ministry of Finance or Ministry of Energy as an advisor to either of these ministries; one day, you and your team are requested to provide feedback on the fiscal policies to be applied on a green hydrogen project in your country or the fiscal terms being negotiated for a particular project. The tool can help inform your proposals for the fiscal policy instruments and financial incentives that are necessary to make the project financially viable, but that will also ensure that the government captures a share of the upside when the project becomes profitable.

SCENARIO 2: Local civil society representative

You are a member of a non- governmental or civil society organisation in a certain African country, and the minister of finance invites you for a public participation session to discuss upcoming policies for green hydrogen projects, including fiscal terms and socio-economic benefits of projects. The tool can help understand what long-term impact fiscal policies and financial incentives will have on the government revenues for the project.

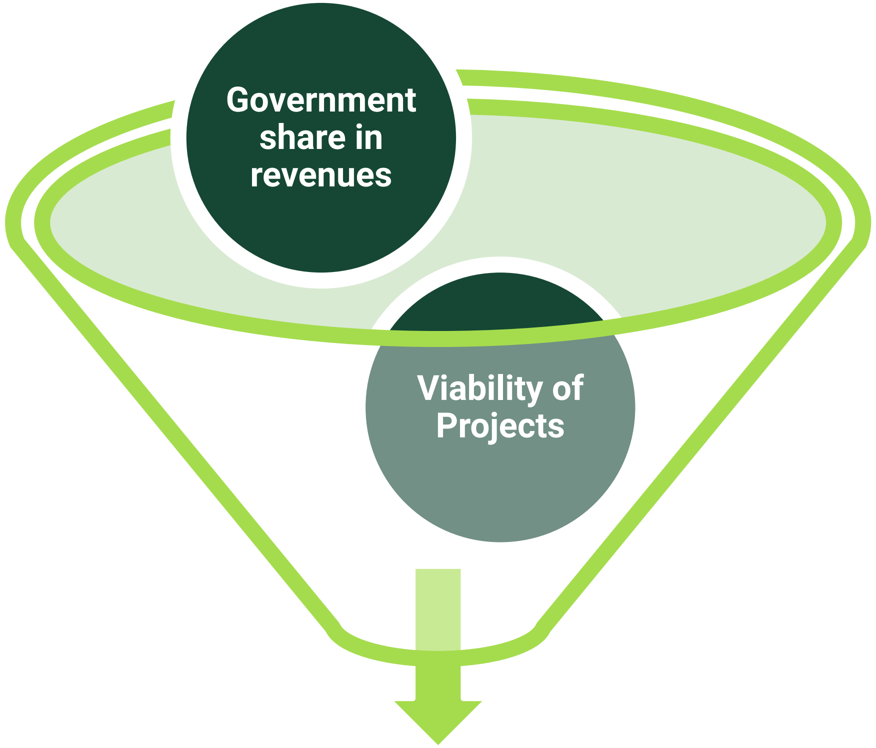
How the Financial Modelling Tool works

How the financial modelling tool works

The financial modelling tool is an Excel-based tool that helps to analyse the project returns and potential government revenues in green hydrogen projects.

The purpose of the tool is to assist in formulating policies that will help in creating a conducive environment for a sustainable green hydrogen economy and foster the growth of green industries across Africa.

It helps to understand the project and investor returns and balance those with the government take in the project. This can inform the design of fiscal regimes that that encourage investment but also generate optimal revenues for the host governments.



The goal is to create a conducive environment for a sustainable green hydrogen economy and foster the growth of green industries across Africa

Countries will need to achieve a fine balance between raising revenue and incentivizing investments.

I. Analysing viability of Green Hydrogen Projects

The tool is built on a set of metrics to the analyse the viability of projects;

1. **Project IRR (Internal Rate of Return):** The rate at which the net present value (NPV) of all cash flows (both positive and negative) from a project equals zero. In other words, it's the discount rate that makes the project's NPV zero. It indicates the project's potential profitability and is commonly used to compare different investment opportunities.
2. **Equity IRR:** Similar to Project IRR, but focuses solely on the return generated for the equity investors in the project. It measures the annualized rate of return earned on the equity investment in a project.
3. **Project NPV (Net Present Value):** The difference between the present value of cash inflows and outflows over a project's life. A positive NPV indicates that the project is expected to generate more cash inflows than outflows and is considered fiscally viable.
4. **Equity NPV:** The net present value of cash flows attributable to equity investors. It accounts for the initial equity investment and any subsequent cash flows to equity investors over the project's life.
5. **Payback Period:** The length of time it takes for an investment to generate cash flows sufficient to recover its initial cost. It is often used as a simple measure of investment risk and liquidity. A shorter payback period is generally preferred as it means quicker recovery of the initial investment.

II. Government take from project cashflows

To evaluate what the government receives as revenues from these projects, the tool analyses;

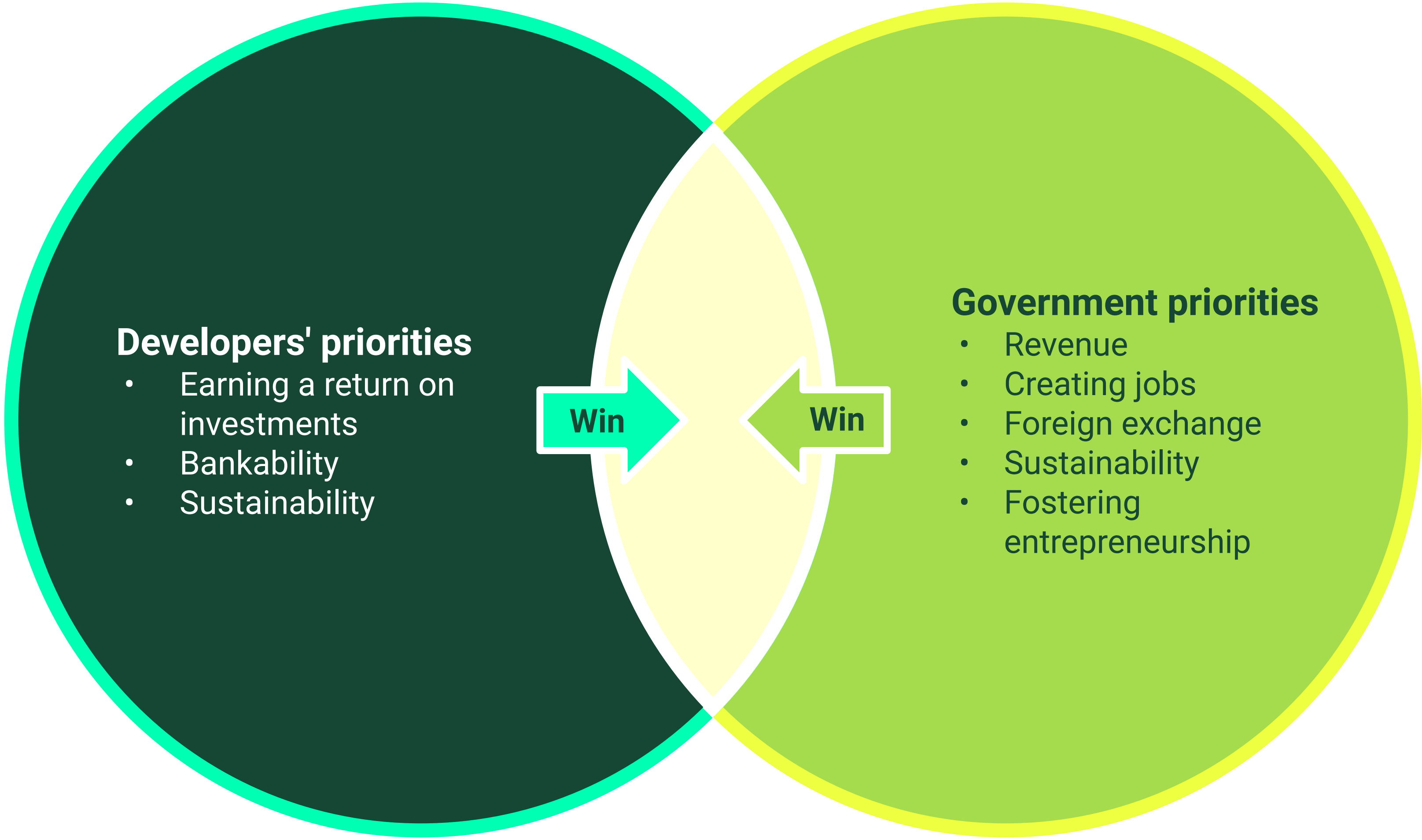
1. **Total tax revenues government stands to gain (in nominal terms):** The total government revenues in dollar terms from the different tax regimes allowable in the project.

2. **Value of government revenues (in real terms)**: The time value of money, cash received in the future is worth less than cash received now, to true value is arrived at by applying a discounting factor.

3. **Percent share of government from the project cash flows**: Evaluate what proportion of the total project cashflows is paid to the government.

4. **The breakdown of the total government revenues by the different taxes applicable**: The total government revenue is composed of different taxes allowed in the project , the tool on the “dashboard sheet” allows real time visibility of how these add up to show the total composition, using colorful visuals.

Intended Outcome :
Win – Win Situation for Host Governments and Project Developers/Investors



How the financial modelling tool works

ABOVE BONNET - USER INTERFACE

Inputs

Output Summary Dashboard

BELOW BONNET - CALCULATION ENGINE

Input Transition

Calculations

Detailed Outputs

Data points required for the model

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Project assumptions

- Project timelines
- Project output(s)
- Project capacity
- Plant efficiency

Cashflow inputs

- Prices of output
- Costs of inputs
- Sensitives of both outputs and inputs

Finance inputs

- How the project is financed
- % of debt and equity
- Interest rate on the debt

Fiscal regimes inputs

- Turn on/off applicable fiscal regimes
- Calibrate the various regimes to fit to your country while evaluating their effect on the viability of the project and government revenues
- Review the outputs to drive the country's fiscal policies

Note: All the assumptions are entered in the places formatted in light yellow only.

Base Case Input Assumptions

Project Assumptions		
Item	**Constant**	**Unit**
Cost of power	0.10	Usd per kWh
Cost of water	2.51	Usd per cubic litre
O & M	15%	of capital costs
Electrolytes cost	6	Usd per tonne of H2
Storage and transportation cost (H2)	1,000	Usd per tonne of H2
Storage and transportation cost (H2)	500	Usd per tonne of Ammonia
Annual admin cost	5%	Of revenue
Cost of converting H2 to NH3	100	Usd per tonne of Ammonia
Selling price of Green Hydrogen	3.18	Usd per Kg

Financing Assumptions		
Item	**Constant**	**Unit**
Finance Costs	9%	6% SOFR rate + 3% Credit Spread
Discount Rate	14.05%	Average of SOFR rate + Country Risk Premium for AGHA

Base Case Input Assumptions

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Fiscal Regimes Assumptions		
Item	**Constant**	**Charged On**
Royalty Rate	Turned off	5.50% charged on the output
Corporate Income Tax	30%	Charged on profits 100% investment deduction Zero years tax holiday
Bonus Tax	Turned off	One off payments that are based on varying levels of outputs
State Participation	0%	Assumed no state equity ownership in the projects
Dividend Withholding Tax	5%	On both Residents and Non- residents No withholding tax holiday 80% foreign ownership in the project
Import Duty	15%	Of the value of machinery set-up/Capex
Export Levy	0%	Zero export levy on Hydrogen exports Zero export levy on Hydrogen derivates exports
Value Added Tax	16%	Charged on Capex and electrolytes feedstock imports

In the base case- the only output of the plant is Green Hydrogen

Initial Set-Up Costs Assumptions

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There is scarcity of data on green hydrogen projects in Africa and globally. We relied on data from several publicly announced project to assume the costs items. We categorised these projects into two costs scenarios;

High-Cost Projects

With a capex cost per tonne of H2 at 9,443 USD

Scenario under analysis

Low-Cost Projects

With a capex cost per tonne of H2 at 6,053 USD

***NB**: This costs does not include the cost of power infrastructure. We have assumed that the project will be buying the electric power from existing sources.*

Key results on the base case scenario

Based on the the base case assumptions listed on the previous slide, these are the derived outputs of the Fiscal tool;

Project Viability Outputs		
Measure	**Assumed Frontloading of taxes**	**Assumed Backloading of taxes**
Equity IRR	0.27%	5.39%
Equity NPV	- $242.4 Mn	-$152.5 Mn
Project Payback Period	15.7 years	14.3 years
LCOH	2.82 usd per Kg of H2	2.68 usd per Kg of H2

- *NB: Please note that these outputs are highly dependent on the inputs assumptions and are subject to change as the assumptions change*
- *Frontloading : taxes are imposed on a project before its operational commencement- Here we have VAT and Import duty on Capex*
- *Backloading : taxes are imposed only after operational commencement- The government foregoes VAT and Import duty on Capex*

NB: *The analysis presented in the following slides assumes backloading of taxes*

Fiscal Policy Instruments Included in the Model

Modelled Fiscal Policies

The model has allowed for different fiscal regimes to evaluate the potential government revenues. These are;

- **Royalty Taxes:** Levies imposed on the extraction of natural resources, Companies pay royalties to the government or the owner of the resource in exchange for the right to exploit it. The model allows for royalty taxes to be applied on the output of Green Hydrogen. Once can be able to choose whether to apply either a Flat Royalty Rate or a Steeped Royalty.
- **Corporate Income Tax:** Paid by corporation on their profits.It's a percentage of the company's earnings, the model allows one to modify;
  - ✔ The tax rate
  - ✔ Any allowances allowed
  - ✔ Any tax holidays applicable
- **Bonus Tax:** This is a one-off tax payment that is based on the attainment of certain output threshold.
- **Withholding Tax on Dividends:** When a company distributes dividends to shareholders, a withholding tax is deducted at the source. Shareholders receive the remaining amount after this tax.
- **Import Duties:** Also known as customs duties or tariffs, these taxes are imposed on goods imported into a country. They serve both as a source of revenue and a means of protecting domestic industries. In the model, they are charged on imported electrolyzer technologies and electrolysis feeder stock.

Modelled Fiscal Policies

- Export Levies: These are taxes or fees applied to goods exported from a country. They can be specific to certain products or industries. In the model they are applied on any exported outputs which is either the green Hydrogen or its derivatives
- Value Added Tax (VAT): A tax charged on both outputs and inputs in the production process.

- Import duties on inputs
- Export levy on outputs
- Output VAT
- Output Royalties

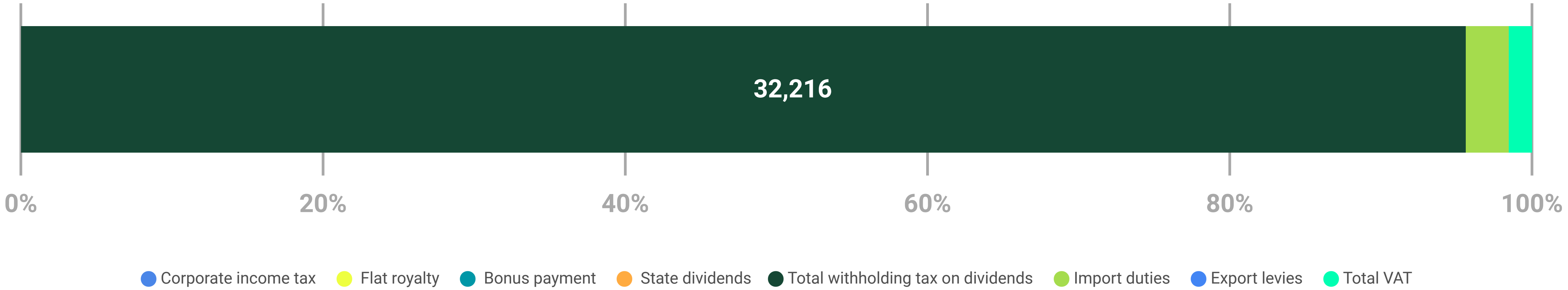
All factors constant, these ones have a more predictable income to the government for each operational period

- Corporate income tax
- State Dividends

All factors constant, these ones have less predictable income to the government for each operational period. This is mainly because firms' income changes as circumstances change.

Modelled Fiscal Policies

Government revenues in $ '000'



- Per the base case assumptions, approximately 95% of government revenues are from withholding taxes on dividends.
- The rest is from import duties and VAT on electrolyzers feedstock

NB: *The appropriate tax rates play are highly dependent on country specific economic conditions*

Key Shortcomings of the Tool

These are the main limitations of the model;

- The model provides a high-level analysis of green hydrogen projects returns, the assumptions used, and outcomes observed are not specific to any particular country in the alliance.
- Most of these assumptions are from publicly available sources. It is hard to authenticate their accuracy and completeness in the tool.
- From the conversations we have had with AGHA representatives during the project meetings and the sensitization workshop, it was clear that different countries, have different priorities and are operating under varying circumstances. These AGHA nations are also in different stages in their policy formalization journeys.
- The policy formulation processes in these countries are taking a multi-disciplinary approach, where there is involvement of both finance and non finance professionals, subject matter experts, lobby groups etc. This can limit the utilisation of the model/tool in achieving its intended goal.

Sensitivity Analysis: Factors with High Impact on Financial Viability

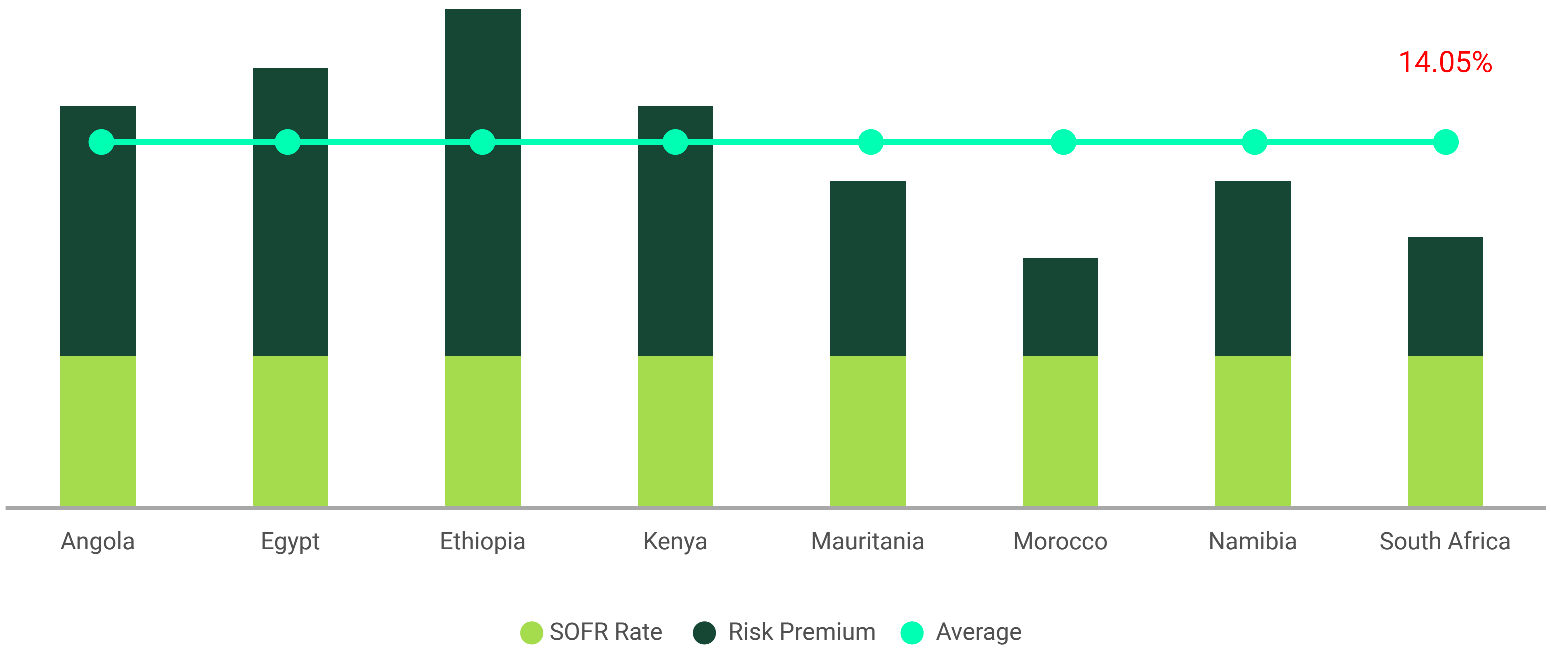
How the financial modelling tool works

The Approximate rate of the Secured Overnight Financing Rate (SOFR) is 6%. An investor expects to earn this risk-free rate plus a risk premium for investing in the continent.

The expected rate of return for an investor in any of the AGHA member nations would be approximately 14.05% - which is an average of the prevailing 6% on the SOFR rate plus individual nations risk premiums.

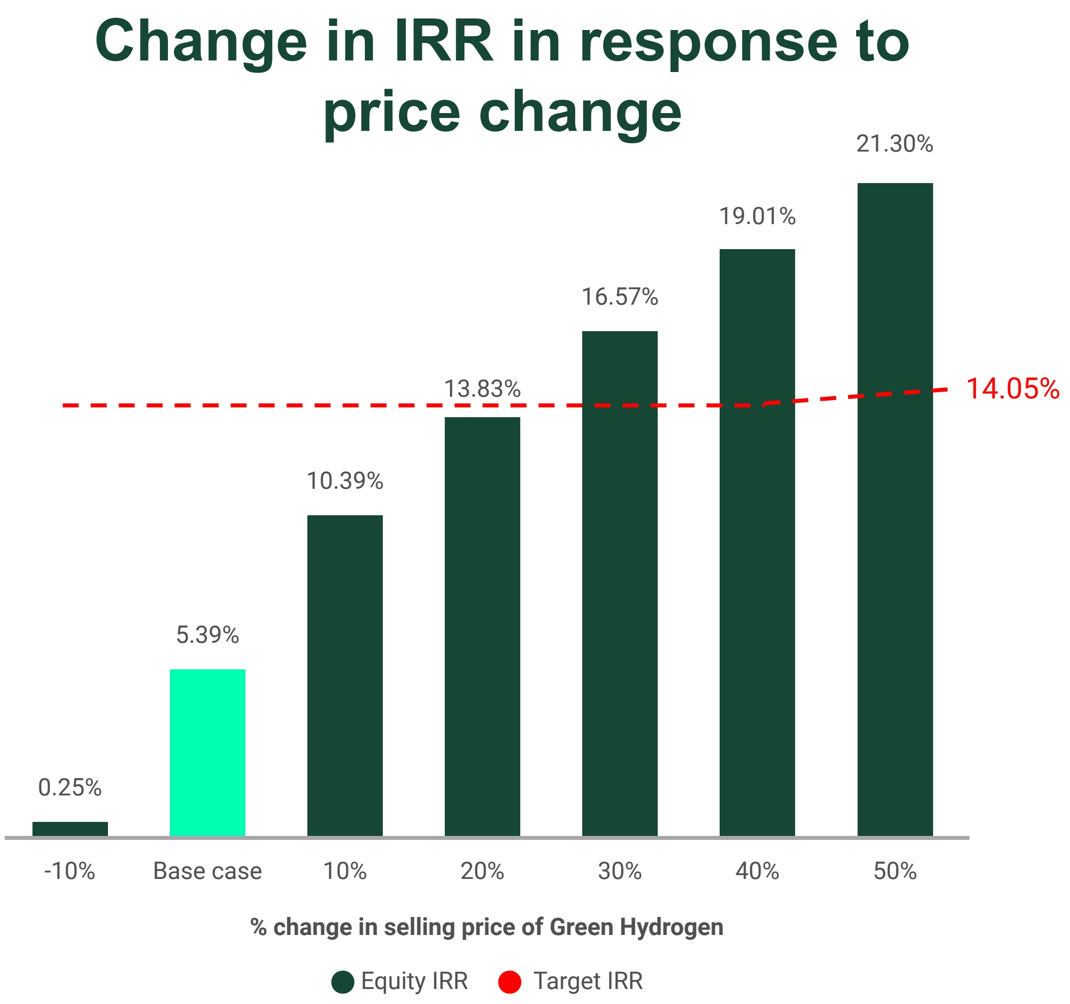
This expected rate of return becomes our target IRR - the benchmark to evaluate the output return under different scenarios.

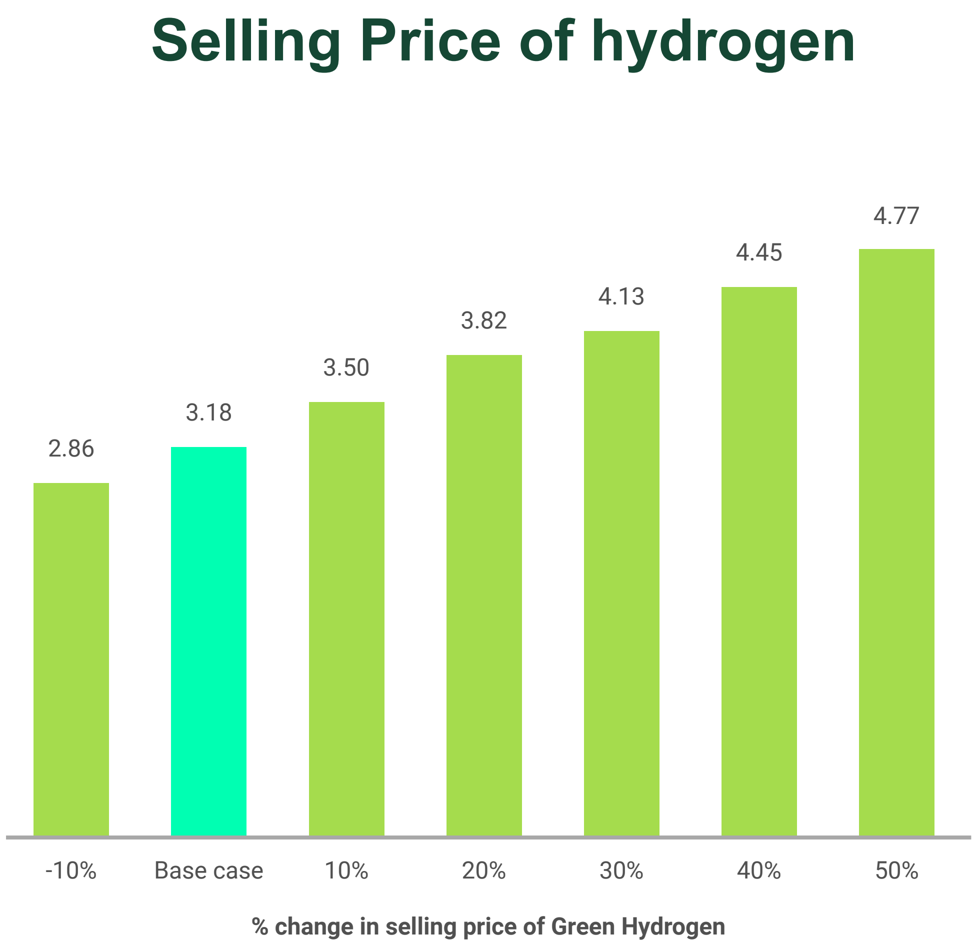
Investor's Required Return



Source: United Nations Conference on Trade and Development. Accessible here
Source: Damodaran, Country Default Spreads and Risk Premiums. Accessible here

Sensitivity of IRR to Price of Hydrogen





Constant change in major inputs : IRR

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Item	Constant	Unit	Change	LCOH(Usd per Kg)	% Change in LCOH
Base case Outputs				**5.39%**	
Cost of power	0.10	Usd per kWh	20%	8.91%	**65.31%**
Cost of water	2.51	Usd per cubic litre	20%	5.41%	0.37%
O & M	15%	of capital costs	20%	6.77%	25.60%
Electrolytes cost	6	Usd per tonne of H2	20%	5.40%	0.19%
Storage and transportation cost (H2)	1,000	Usd per tonne of H2	20%	6.01%	11.50%
Storage and transportation cost (H2)	500	Usd per tonne of Ammonia	20%	5.39%	0.00%
Cost of borrowing	9%.	SOFR + Credit spread of 300Bps	20%	8.53%	**58.26%**
Capex Cost	9,445	Usd per tonne of H2	20%	12.43%	**130.61%**
Annual admin cost	5%	Of revenue	20%	5.50%	2.04%

The assumptions highlighted in red had the most significant impact on the IRR because a 20% change in their values caused a substantial change in the IRR percentage. These are;

1. Capital Expenditure (Capex)
2. Cost of Power
3. Cost of Borrowing

Constant change in major inputs : LCOH

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Item	Constant	Unit	Change	LCOH(Usd per Kg)	% Change in LCOH
Base case Outputs				2.68	
Cost of power	0.10	Usd per kWh	20%	2.44	-8.96%
Cost of water	2.51	Usd per cubic litre	20%	2.68	0.00%
O & M	15%	of capital costs	20%	2.61	-2.61%
Electrolytes cost	6	Usd per tonne of H2	20%	2.68	0.00%
Storage and transportation cost (H2)	1,000	Usd per tonne of H2	20%	2.65	-1.12%
Storage and transportation cost (H2)	500	Usd per tonne of Ammonia	20%	2.68	0.00%
Cost of borrowing	9%.	SOFR + Credit spread of 300Bps	20%	2.67	-0.37%
Capex Cost	9,445	Usd per tonne of H2	20%	2.42	-9.34
Annual admin cost	5%	Of revenue	20%	2.68	0.005

With a 20% reduction across all primary inputs, the Levelised Cost of Hydrogen (LCOH) saw the most notable impact attributed to:

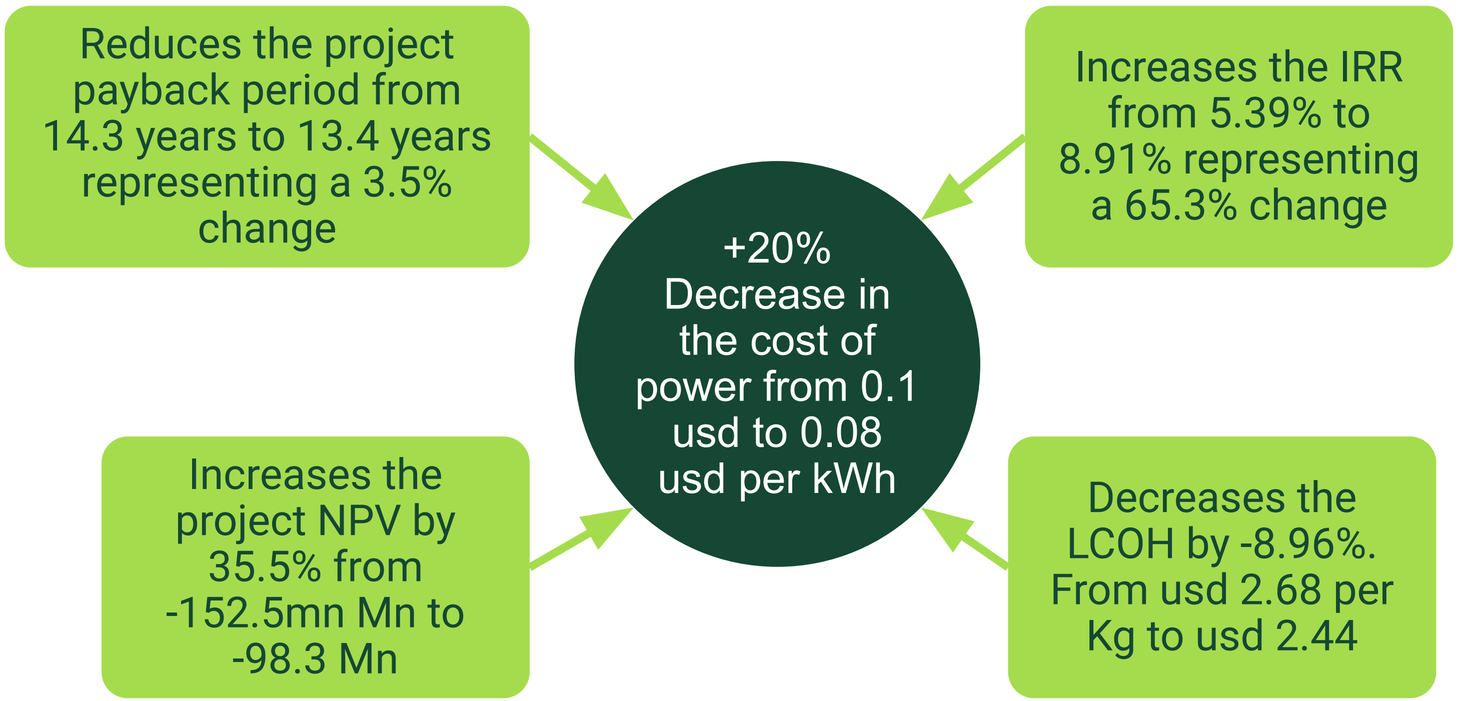
1. Capital Expenditure (Capex)
2. Cost of Power

Key Findings and Recommendations

Key Findings: Cost of Power

1. Cost of power:

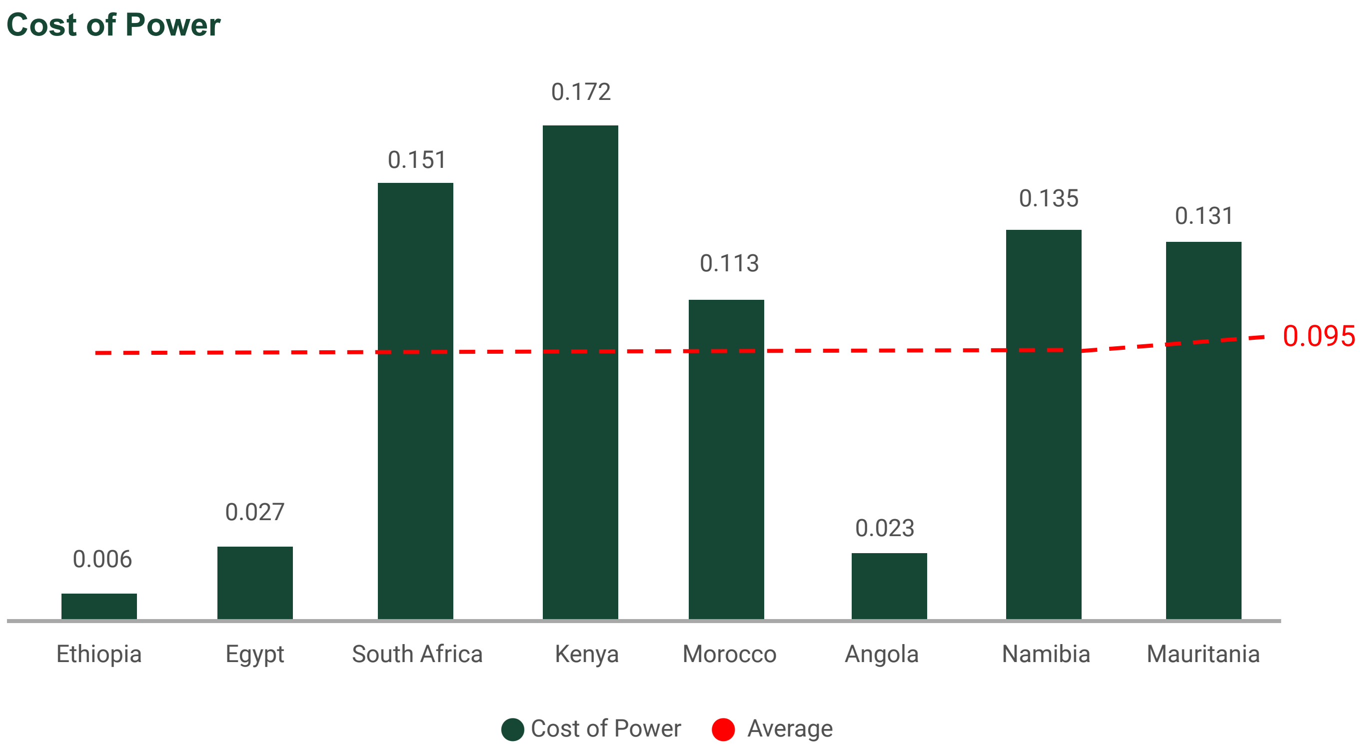
- The cost of power is one of the **main drivers of the cost of production of green hydrogen.**
- Power has the highest impact on the cost of production, a 20% decrease in the cost of power increases the equity IRR of the project, decreases the cost of the hydrogen and causes a decrease the project payback period.



Key Findings: Cost of Power

Comparative Prices of Power in Selected AGHA Countries

Average cost of power Usd/kWh



Source: World Population Review. Accessible here

Lowering the Cost of Power

Some of the measure's governments can take to lower the cost of power include;

- **Lowering the taxes charged on renewable energy sources.** Eg in Kenya, approximately 47.25% of the cost of power is tax and other charges.
- **Renewable energy incentives.** Offering subsidies to renewable energy producers to lower the price of power.
- **Investment in renewable energy infrastructure**. Increasing investment in renewable energy sources such as solar, wind, and hydroelectric power can lower the overall cost of electricity production.
- **Grid modernisation.** Upgrading and modernising the electrical grid infrastructure can improve efficiency and reliability, reducing transmission and distribution costs associated with delivering electricity to green hydrogen production facilities.

Key Findings: Capital Expenditure

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2. Set-up Costs - Capital Expenditure

The initial set up costs for green hydrogen production plants entail:

- **Electrolyser System:** The primary capital cost is the purchase and installation of the electrolyser system. This includes the cost of the electrolyser stack, balance of plant components, and auxiliary systems.
- **Site Preparation:** Expenses related to land acquisition, site development, and infrastructure setup. This covers activities like leveling the ground, constructing foundations, and preparing the site for the plant.
- **Utilities and Infrastructure:** Costs for electrical connections, water supply, and other utilities necessary for the plant’s operation. This includes setting up power lines, water pipelines, and other essential infrastructure.
- **Storage Tanks:** If the plant includes hydrogen storage, the cost of storage tanks or other storage solutions. Proper storage facilities are crucial for maintaining hydrogen reserves.
- **Piping and Distribution:** Costs associated with piping, valves, and distribution networks. Efficient piping systems ensure the smooth flow of hydrogen within the plant.
- **Safety Measures:** Investments in safety systems, alarms, and emergency shutdown mechanisms. Ensuring the safety of personnel and equipment is critical during the setup phase.

Key Findings: Capital Expenditure

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- The initial set up costs of green hydrogen have the highest influence on the project's Internal rate of return.
- A 20% decrease in these costs, increases the IRR by 129.28%, i.e. from the base scenario of an IRR of 5.39% to an IRR of 12.45%
- Green hydrogen projects are capital intensive as they require a significant upfront investment in infrastructure, equipment, and construction. This means that the substantial initial cash outflow associated with setting up the plant has a disproportionate effect on the project's NPV and IRR, as it occurs at the beginning of the investment period, a concept called the time value of money.
- Currently, the majority of African countries need to import the electrolyzer technology needed to produce green hydrogen.
- There are however some early industry efforts to develop green hydrogen technology and manufacturing capacity in Africa:
- South African based **Hydorx Holdings** has developed and patented a new electrolyzer technology. Currently the company is looking for investors as it seeks to commercialise its technology.
- In 2023, **John Cockerill**, the 2021 global leader in electrolyzer sales, announced plans to build a new factory in Morocco for producing electrolyzers by 2025.
- According to a recent **Electrolyser Price Survey 2024** conducted by research house BloombergNEF (BNEF), the cost of producing and installing electrolyzers for green hydrogen production in China, the US, and Europe—three of the world's largest markets—has increased by more than 50% compared to last year. This finding contradicts earlier industry projections that anticipated a gradual reduction in electrolyzer costs due to improved efficiency and optimized operation of the electrolyzers.

Lowering Initial Cost

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Based on these trends, African countries can enhance their competitiveness by formulating fiscal policies that lower this initial cost of setting up green hydrogen projects. These could include;

- **Land Incentives:** Industrial zones with competitive land prices can potentially yield significant cost savings, depending on project location. Flexible land lease options, including long-term leases with fixed rental rates or lease-to-own arrangements, offer businesses financial flexibility and stability.
- **Land Development Assistance:** Providing support for land development activities within industrial zones, such as site preparation and infrastructure installation, can help reduce upfront investment requirements for businesses. Subsidies or grants for land development costs contribute to lowering financial barriers.
- **Import Duty Reduction:** Zero import duties on electrolyzers and related technologies can incentivize investment in green hydrogen production. Lowering landing costs for electrolyzers could result in substantial long-term investment cost reductions, as indicated by research findings.
- **VAT Exemption:** Exempting electrolyzers from value-added tax (VAT) can further enhance the attractiveness of green hydrogen investments. For instance, considering Kenya's standard VAT rate on imports, a VAT exemption on electrolyzers could positively impact investment economics.
- **Investment Deduction and Capital Allowances:** Introducing policies for investment deduction or capital allowances enables businesses to offset taxable income with investment costs. However, it's essential to balance incentives with fiscal responsibility by considering reasonable limits on carrying tax losses forward, ensuring sustainable fiscal management.

These measures can apply not only to electrolyzers but also to renewable power production technologies essential for generating renewable energy used in electrolysis, such as solar panels and hydro power technologies.

Key Findings: Cost of Capital

3. Cost of Borrowing

The cost of borrowing capital is a main driver of the Internal rate of return: A 20% decrease in the cost of borrowing caused a 57.6% increase in the IRR from 5.39% to 8.56%.

African countries can implement strategic measures to foster a conducive environment for investors, including:

- **Interest Rate Subsidies:** Introduce government-backed interest rate subsidies or guarantees to reduce borrowing costs for green hydrogen projects. By offering financial incentives, governments can attract investors seeking lower financing expenses, thus enhancing project feasibility and competitiveness.
- **Credit Enhancement Programs:** Establish credit enhancement programs or facilities to mitigate lender risk and improve project creditworthiness. Guarantees or insurance provided by the government or financial institutions can lower borrowing costs by reducing lenders' perceived risk, making financing more accessible and affordable for investors.
- **Leverage Development Finance:** Collaborate with Development Finance Institutions (DFIs) to offer concessional loans or tailored financing packages for green hydrogen projects. DFIs specialize in providing long-term, low-cost capital for sustainable development initiatives, and their involvement can significantly reduce borrowing costs for investors while promoting environmental sustainability.
- **Public-Private Partnerships (PPPs):** Foster PPPs to leverage public sector resources and expertise in financing green hydrogen infrastructure projects. By sharing risks and costs between public and private entities, PPPs can attract private capital at lower borrowing rates, facilitating project implementation and maximizing investor returns.

By implementing these strategies, African countries can create an enabling environment that effectively lowers the cost of borrowing for green hydrogen projects, thereby enhancing investor confidence and accelerating the transition to a sustainable energy future.

Way forward

This model and analysis is a first step in supporting AGHA members to assess the financial viability of green hydrogen projects. The assumptions will need to be adjusted and refined over time as the industry develops and more data is made publicly available.

Moving forward, further capacity building and tools can be developed to support AGHA countries in developing robust policies that drive the adoption of green hydrogen while fostering sustainable development across the African continent.

This will include country-level analysis and customized models with country specific inputs. These will increase the level of accuracy and help develop tailored recommendations and strategies for each AGHA country.

The financial modelling tool can also be expanded to incorporate modelling of renewable power generation to facilitate a more complex analysis of power influence on the viability of the projects and returns. It can also be extended to cover green hydrogen derivatives such as green fertiliser and other green products.

AGHA will support member countries in considering the findings of this analysis together with partners in the region as policymakers negotiate and design sustainable fiscal policies for the green hydrogen industry in Africa.

Disclaimer

This report has been compiled based on information obtained from various sources on the internet, Green Hydrogen Organisation publications and from discussions with AGHA representatives in the creation of the fiscal modelling tool.

The scope of work encompassed providing guidance and fiscal modeling tools to enable AGHA member countries to understand, analyze, and model the implications of different fiscal terms tailored to their country contexts. The tool provides a high-level analysis of Green Hydrogen projects' returns. The assumptions used, and outcomes observed are not specific to any country or geography but mirror general conditions and estimates that may or may not be an accurate description of the situation in a particular nation.

While every effort has been made to ensure the accuracy and reliability of the information contained herein, the estimates and projections presented in this report involve subjective judgment and analysis, which may be subject to change as underlying assumptions change. It is important to exercise caution and conduct further due diligence before relying on the information and recommendations provided in this report for decision-making purposes.

AGHA
The Africa Green Hydrogen Alliance

Africa's Green Hydrogen Potential

Grasping the opportunities posed by a new African green hydrogen industry will require a concerted effort from diverse stakeholders. These include government ministries, project developers and financiers, financial institutions, civil society and academic institutions.

Visionary private sector partners and other international collaborators can offer expertise, capacity and access to capital. At the same time, they can work with host governments and local institutions to strengthen permitting processes and project structures that deliver on national priorities for sustainable development and economic growth.

While it is important to move fast, it is equally important that African countries and project developers sign durable contracts creating conditions for long-term stable investments. Transparency and stakeholder engagement needs will be essential to build broader trust and capabilities required for rapid, large-scale industry development.