



CITY FACILITATORS

Positioning the Maldives as Global Blue Economy Leader Phase 2: Blueprint 2: Deep Dives

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Introduction

Setting the scene

Since early 2021, the Government of the Maldives, the Waitt Institute, and City Facilitators have collaborated on defining the "One Big Narrative" that will enable the Maldives to spur sustainable economic growth while cultivating local talent and nurturing, protecting, and leveraging its natural capital.

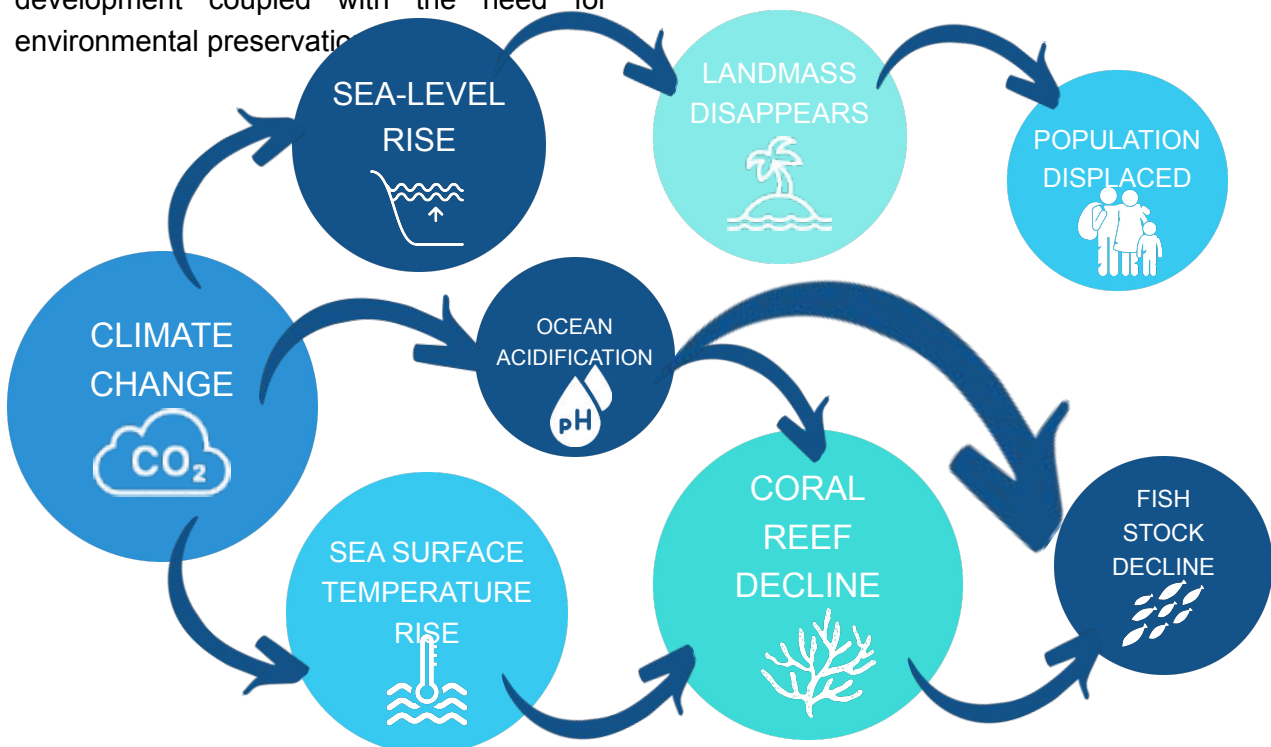
This narrative will enable the Maldives to engage global stakeholders and meet the immediate environmental challenges and constraints imposed by climate change.

As illustrated below, the Maldives is dealing with multiple conflicting demands, such as the dwindling of landmass coupled with a growing population, and the need for development coupled with the need for environmental preservation.

It has been our challenge to strike the right balance between these demands, while identifying opportunities to advance the economy of the Maldives in a meaningful and sustainable manner.

In this report, Blueprint 2, we explore ways of leveraging pension funds and social housing as tools for sustainable economic development.

We also present the business cases of some of the solutions that can help address the challenges the Maldives is facing. The business cases are based on the best available data. Yet, final projections will be based on the specific project proposals.



COVID highlights the need for diversification

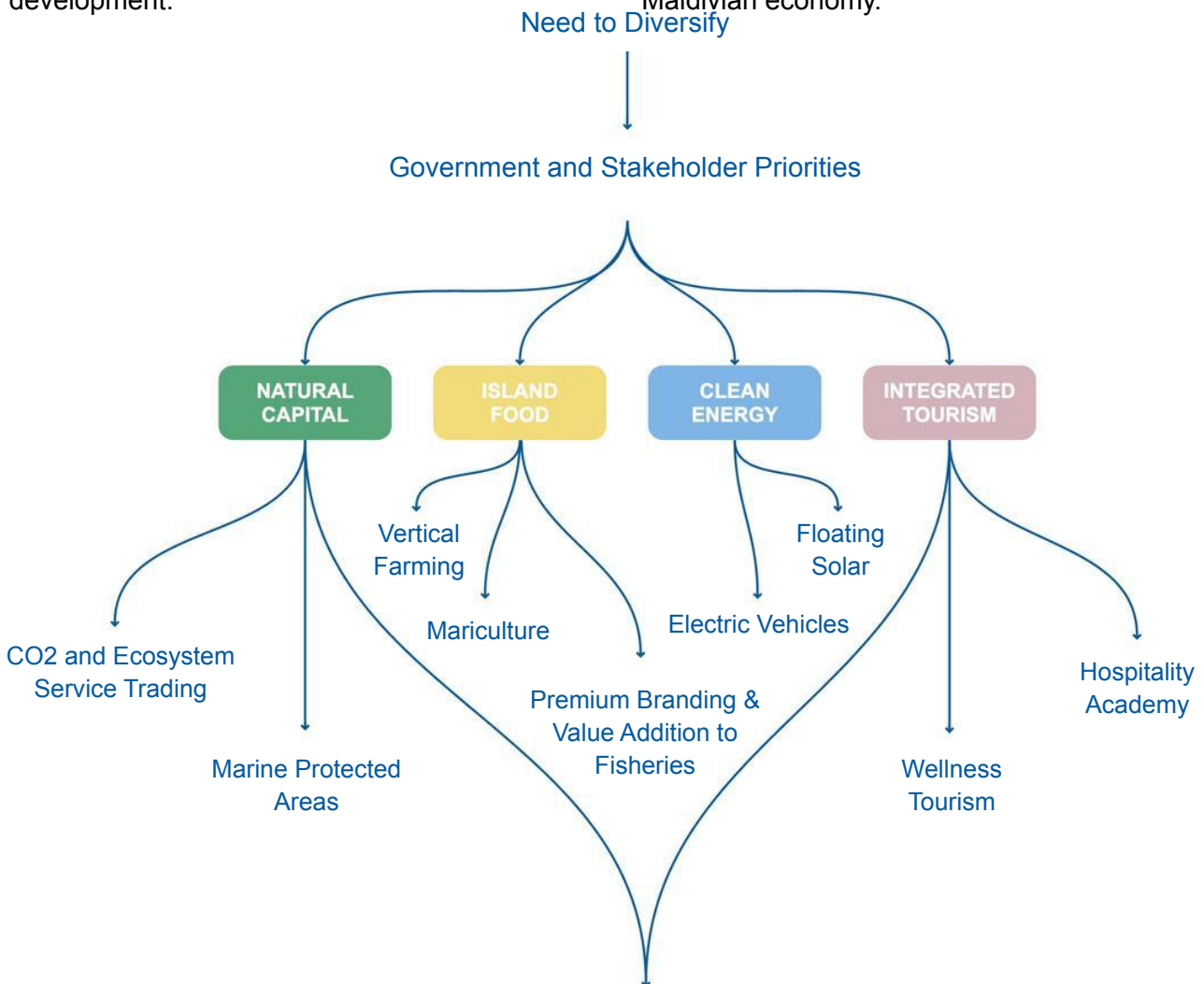
With the onset of COVID-19, the need for diversification of the Maldivian economy became more pronounced. COVID had severe consequences on the tourism sector and hence on the Maldivian economy.

The Maldives needs an economy that is less dependent on a single industry, on imports, and on foreign talent. At the same time, the tourism sector and the excellent Maldivian brand can be leveraged to spur growth and innovation in other sectors of the economy.

The visual below illustrates the recommended path of economic development.

This report contains business cases on natural capital, island food, clean energy, and sustainable tourism. These sectors were identified as government priorities through workshops with ministers, government officials, and other key public, private and civic stakeholders in the Maldivian society. Prior to the identification, an assessment of Maldivian blue economy strengths and weaknesses was carried out by Waitt Institute and City Facilitators.

This report presents a case for each of those sectors as well as recommendations for structural changes that will help lift the entire Maldivian economy.



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Pension Fund Models

How Pension Systems drive Economic
and Urban Development

Deep Dives: Pension Funds

Pension Systems drive Economic Development

Across the world, there are numerous examples of relatively small countries that have established large pension funds by global standards and that are playing a critical role in building 'good' societies. Such examples count, Denmark, The Netherlands and Singapore. In this section, we will present the Danish model of pension funds and distill key learnings from their role in 'good' society building.

There are several key messages concerning Danish pension funds:

Membership organizations. Danish pension funds are membership owned by the pension savers. As such, they are cooperatives, where profits are accumulated and paid to the pension savers upon their retirement. This type of ownership structure contributes to generating widely distributed wealth.

Invest in "the future". Increasingly pension funds invest in "the future" in reflection of the long-term orientation of their savings that commonly take many decades to accumulate before they are paid to the pension savers. Hence, they invest in a sustainable future.

Real estate. For the large majority of Danish pension funds, real estate is the largest single asset class that they invest in. Thus, the pension funds invest in environmentally sustainable rental housing and commercial real estate of high quality. Investing in sustainable real estate carries a higher initial investment, but the long-term maintenance and operational costs are lower. Additionally, the quality of living is higher.

Copenhagen City & Port. In creating a 'good' society, Danish pension funds collaborate with Copenhagen City & Port Development Corporation, which is a publicly owned organization at the helm of 50% of all urban development in Copenhagen over the past three decades.

For further reading please visit:

https://www.brookings.edu/wp-content/uploads/2017/05/csi_20170601_copenhagen_port_paper.pdf

<https://www.sciencedirect.com/science/article/pii/S0264275117312817>

<https://www.lincolninst.edu/publications/working-papers/vision-value>

<https://drexel.edu/nowak-lab/publications/case-studies/cincinnati-city-case/>

<https://journals.sagepub.com/doi/abs/10.1177/0042098020951438?journalCode=usja>

<https://www.lafabriquedelacite.com/wp-content/uploads/E319A0886B422A4AC125821E0033932C/innoveng.pdf>

Deep Dives: Pension Funds

Partnering with a Development Corporation

Land Value Capture

In the mid- to late 1980s, Copenhagen was experiencing a 17.5% unemployment rate, a loss of taxing capacity, and an annual budget deficit of \$750 million. Prior government policies that subsidized outmigration to the surrounding suburbs of Copenhagen left the city overrepresented by pensioners and college students, neither of whom contributed greatly to the city's tax revenue. The city government had to do something radical to spur economic growth and attract a strong tax base.

To revive their city, a coalition of national and local officials agreed to catalyze investment in housing and state-of-the-art infrastructure to attract new citizens and strengthen the city's tax base. To avoid increasing local taxes, the decision was made to leverage and develop public land and use the proceeds for further investments.

The city and national governments created a publicly owned, privately run corporation – today coined the Copenhagen City & Port Development Corporation – with the explicit goal of regenerating large districts in the city's core, maximizing the value of underutilized public land, and using the revenues generated by smart zoning and asset management to finance transit and other infrastructure. The aspiration was to combine the efficiency of market discipline and mechanisms with the benefits of public direction, legitimacy, and low-cost finance.

Over the past decades, City & Port Development transformed various areas of Copenhagen. Their process for redevelopment follows a simple path in which:

- 1) assets are transferred to the corporation;
- 2) the land is rezoned for residential and commercial use and thus increases in value;
- 3) the corporation borrows based on this value and either transfers capital to the transit construction company or pays for local infrastructure that facilitates the development of the land;
- 4) land sales or lease agreements occur to spur development and service debt.

Below, we assess how this vehicle can be deployed in the Maldives:

Key Take-Aways that can be applied in the Maldives:

Small land territory and population. Even though, the Maldives has relatively little land at its disposal, this land is of prime value and carries a considerable price tag even by global standards. Also, the population – albeit growing – is relatively speaking small matching the land territory.

Purpose-driven public entity. Through fully or partial public ownership of a development corporation, the Maldivian government can harvest the economic yield of development, including housing, commercial, hotels and resorts.

Moving down the value chain. The further down the value chain (e.g., the closer to end-use sales) the development corporation operates, the larger the potential risks and rewards. This means that by selling undeveloped land, the potential risks and rewards will be lower than if the corporation also develops the land and sells land and buildings. However, since the state also does planning and permission, the risks of developing land are reduced and limited to market demand.

Investing the yield of Land Value Capture. The yield generated through Land Value Capture can be invested in any type of infrastructure, including a new intra-island public transit boating service running on hydrogen, floating solar panels. It can also be invested in economic development measures, such as a start-up incubator, seed capital targeting locally owned and run start-ups, etc. Nevertheless, commonly, a percentage of the yield is reinvested into further development.

Deep Dives: Pension Funds

Pension Systems drive Economic Development

Collaboration with Copenhagen City & Port Development Corporation

Large Danish pension funds are important collaborators of CPH City & Port Development. Danish pension funds and CPH City & Port Development share the long-term investment horizon and emphasis on low-risk investments.

The joint venture between CPH City & Port Development and the pension fund ATP, which was established by national law in 1964 to supplement the retirement income of senior citizens, is emblematic of how the collaboration between the development corporation and pension funds works. ATP is the fourth largest pension fund in Europe with 5 million members, and it is mandatory for all working Danes to contribute to ATP.



ATP's commercial property investment branch, ATP Real Estate, has \$5.2 billion USD invested in Denmark in 1.4 million square meters of office space. In addition, ATP Real Estate has invested almost \$2 billion USD in real estate abroad, including in the United States. To secure future obligations and minimize risk, ATP Real Estate is very conservative in its investment strategy, typically entering investment propositions late in the value chain—after properties have been developed or, at the earliest, after local building plans have been approved.

ATP Real Estate is involved in several of City & Port Development's projects, including the Langelinie ("Long Line"), the Marble Pier, North Harbor and Ørestad. Already in the late 1990s, ATP invested in Langelinie, which is part of the Copenhagen harbor front. ATP has several large office buildings along Langelinie, which is adjacent to North Harbor.

ATP owned the tip of Langelinie, while CPH City & Port Development owned the tip of the Marble Pier, which is across the waters. ATP Real Estate and CPH City & Port Development merged the two land areas into Copenhagen Gate and in the process created a joint venture of the name Harbor PS. Harbor PS operates as a separate entity and has its own board of directors. Harbor PS hosted a design competition for the best building on the site. In 2008, the U.S. architect Steven Holl won the competition with his proposal to build two towers connected by a bridge across the sea. In total, 60,000 square meters of commercial space will be built. However, in line with its conservative strategy, ATP will not commence construction before tenants have been found for the premises.

Source: <https://www.stevenholl.com/project/copenhagen-gate/>

Deep Dives: Pension Funds

Pension Systems drive Economic Development

A prerequisite is patience, as local government must think long-term, *“You have to plan for good and bad times. The owners of City & Port Development had to accept that there were no profits for long periods of time, when the market was in recession (2008-2013)”*, says former Lord Mayor of Copenhagen and CEO of CPH City & Port Development, Jens Kramer. In fact, nobody knows, when the last building is built in North Harbor, as that depends on the economic currents. Thus, finishing the North Harbor could take 20, 30, or 50 years depending on market demand.

In 2012, City & Port Development began construction of the UN City. ATP recognized the long-term value of owning the UN City building, which had a secure tenant in the City of Copenhagen on a long-term lease. Given the considerable scale of the investment, another Danish pension fund (PensionDanmark) was invited to the partnership. PensionDanmark and APT Pension both have 45.75 percent stakes each in Harbor PS that now also owns UN City.

City & Port Development earned almost \$37.5 million USD from the development of UN City, when it sold 91.5 percent of the shares to the two large pension funds.

City & Port Development retained an 8.5 percent ownership stake in the property at the insistence of the pension funds, which view City & Port Development as a credible partner that can secure the financial future of joint operations.

The UN City building is the most sustainable building in Scandinavia and was awarded the European Commission’s Green Building Award in 2012. The green certification does not only specify standards for energy consumption, it also ensures that materials are sourced locally, building insulation is adequate, the construction process is conducted properly in terms of reduced accidents and suitable working conditions (lighting, temperature, etc.), and employee satisfaction is high. *“Investing in green buildings is good business for us”*, said Torben Möger Pedersen, CEO of Pension Danmark. He feels that tenants that are willing and able to pay extra for gold- or platinum-certified office buildings or housing making these investments financially solid. In addition, Torben Möger Pedersen says that running a green building can be less expensive than operating a regular building. *“We want tenants who think about the long-term costs and environmental impact of running the building, including the working environment of their employees and the environmental footprint”*.



Source: <https://www.df-perforatedsheets.com/en/architecture/references/un-building-in-copenhagen-denmark>

Deep Dives: Pension Funds

Pension Systems drive Economic Development

U.S. versus European Pension Funds

Peter Damgaard Jensen, CEO of the Danish pension fund PKA, explains that part of the reason why U.S. pension funds are struggling to meet their obligations is that they are liable to 'defined benefits'. This basically means that members of the pension fund receive a certain pension payment regardless of how much they have contributed to the pension savings over their lifetime. *"This system is designed to fail"*, says Peter Damgaard Jensen. In order to meet their future unfunded obligations, U.S. pension funds partake high-risk investments, such as stocks and shares and investments in emerging markets, where 7-8 percentage returns are potentially attainable. *"In some years, you will be able to pay the pensions, but in other years, you might lose everything, for instance during the last global recession"*, Peter Damgaard Jensen concludes.

Peter Damgaard Jensen engages with the boards of several U.S. pensions funds, *"Until recently, all we discussed was how to make the right investment. Today, the U.S. pension funds want to understand how to meet their pension payment obligations"*. The problem with the unfunded pensions is difficult to correct, because the Trade Unions representing the public employees are indifferent to why the U.S. pension funds are unable to meet their obligations, as they argue that this is the problem of the employer (e.g., local municipalities). The Trade Unions contend that the employers have to pay the pensions of the public employees despite the fact that not sufficient pension contributions have been made over the years by the employees.

Putting pressure on the municipalities does not address the issue accordingly, as many U.S. cities cannot afford to compensate for the gap between the contributions and the pension payments. In addition, the municipalities are obliged to cover the losses of the pension funds' high-risk investments. Exercising pressure on the cities, cities have no choice but to declare bankruptcy, if they cannot pay the defined benefits pensions and compensate for the losses of the pension funds' high-risk investments.

In contrast, the European Union introduced EU regulations 20 years ago that require European pension fund payments to be 100% funded. However, Peter Damgaard Jensen says that most Danish pension funds have been operating with 100% pension coverage for more than 20 years. In this way, PKA and other Danish pension funds can always pay all the pensions, they are obliged to, including if the number of pensioners grows. This is helped by the fact that Denmark has the highest percentage of private pension savers per capita in the world which compensates for the Danish state pension that is not very high. This is further aided by the fact that voluntary pension contributions are exempt of the otherwise high Danish income tax. Hence, 90% of all Danish employees have a private pension scheme. In total, \$500 billion USD are held in capital by fifteen Danish pension funds making the size and the amount invested by each pension fund considerable and enabling Danish pension funds ample bargaining power on the global financial markets.

Deep Dives: Pension Funds

Pension Systems drive Economic Development

Alternative Investments

Danish pension funds align closely with the national government's economic development strategy. In total, Danish pension funds manage pension savings of \$557 billion USD on behalf of total population of 5.8 million people. Thus, they play a critical role in the financial stability of the country.

Danish pension funds have the strategic target of reaching \$73 billion USD in alternative investments by 2030. The alternative investments class is largely defined as 'other than' real estate, bonds and stocks. These investments center on energy and infrastructure projects. A part of alternative investments is dedicated private equity funds, including Vækstfonden (red. The Growth Fond) that annually invests \$35 million USD in 800 Danish start-up companies.

Increasingly, Danish pension funds are investing in renewable energy and the large and growing Danish windmill industry. These investments are both within national borders and in aid of exporting the Danish windmill industry, where pension funds serve as the financial backers of several US-based offshore windmill farms. They also invest in transportation and healthcare, primarily abroad, as alternative investments.

As an example, PensionDanmark, one of the largest European pension funds, has invested 3.7 billion USD in domestic real estate and plan to invest another ½ billion USD annually till it reaches 10% of all investments in real estate. In comparison, PensionDanmark has 4.1 billion USD in infrastructure investments, which includes asset classes: renewable energy, traditional energy, transportation and logistics.

PensionDanmark has, together with Mærsk, also established Copenhagen Infrastructure Partners, which invests in infrastructure projects. Some of these investments count infrastructure projects in support of Mærsk's global operations. CIP also invests in greenfield projects for renewable energy.

Deep Dives: Pension Funds

Pension Systems drive Economic Development

Concluding comments

The benefits of Danish pension fund investments count:

Financial Stability

The presence of pension fund investors offers financial stability and security for large-scale developments, including infrastructure and housing investments. Pension funds can become important institutional investors with well consolidated finances that can withstand nearly all market fluctuations.

Pension fund investors enable the realization of landmark projects in support of a long-term vision.

Long-term Investment Horizon

Pension funds invest with a 30- to 40-year horizon, which means that they are willing to invest in environmentally sustainable quality developments that can withstand the passage of time. Investing in high quality real estate reduces maintenance and operational costs over time.

Large Funds and Large-scale Investments

Accumulating pension savings at scale is an important feature. The large-scale of Danish pension funds (even by global standards) means that modest returns on investments of 6-7 percentage translate into large profits. Secure investments usually yield lower returns than high risk investments. Yet, making secure investments help solidify the pension funds enabling them to grow over time.

Leverage private investors

Pension fund investors can help leverage other investors. Once pension funds are investing in an area, other private investors are encouraged to also invest in the area. Danish pension funds are known for their conservative investment strategies, high-quality quality standards, and long-term engagement, features that serve as a guarantee for other private investors and developers that follow in their wake.

Investments in Urban Development

Pension funds, both Danish and foreign, are becoming increasingly important investors in urban redevelopment. Pension funds have traditionally invested in stocks and bonds, but as bond yields decline, pension funds are looking to invest in property as solid and stable long-term investments. With Danish mortgage providers offering low interests on 30-year mortgages, investments in Danish property development have become a suitable substitute for bonds. Today, real estate is the largest single asset class most Danish pension funds invest in.

Alternative Investments

Albeit, Danish pension funds invest heavily in real estate, they also invest in renewable energy in support of the government's national energy strategy and the Danish windmill industry.

Affordable and Social Housing

Housing as Public Financial Assets



Social Housing as Public Financial Assets

Affordable and Social Housing

Cities across the world often struggle to either attract private market investments or provide sufficient affordable and social housing for diverse segments of the population. Different localities take different approaches to delivering affordable and social housing, including rent-controlled housing, public housing, cooperative housing, subsidized housing and multiple combinations hereof. In this section, we explore four different models for delivering affordable and social housing.

Key features of the Danish pension funds 'model':

Non-Profit. Profits are not withdrawn to serve the owners; rather, profits are translated into price reductions for a population segment that is highly price sensitive.

Revolving Funds. The accumulation of collective savings within each affordable and social housing estate, cooperative and across the industry provides the basis for self-financing.

Public-Private-Civic Partnerships. Oftentimes, the social state of affairs of a city becomes the concern of local private companies. It impacts the companies' ability to attract skilled employees. These partnerships help governments provide housing as a combined universal welfare service and a market commodity.

Cooperatives. Through the cooperative model, it is possible to set up housing ownership and make tenants take responsibility through decision-making and co-ownership capacity.

Long-term investments. Critical to many of the affordable and social housing programs is that they have an infinite time horizon of investments, where the accumulation of assets and funds bolsters the housing providers and enable them to invest in further housing and the maintenance of existing housing. This contradicts the free-market tenets of some of the more liberal economies who strive to provide rent-to-ownership housing, which oftentimes depletes the social housing stock, as the selling off of housing stock is not matched by the replenishment of new housing.

Early starters. In declining markets, local authorities may purchase land and building assets inexpensively that can provide the foundation for the future development of the city and its housing needs. However, it is necessary to contemplate early on what the broader market ramifications are of providing inexpensive housing that may compete with more expensive market delivered housing. Widely available inexpensive public housing can distort private market investments.

Social Housing as Public Financial Assets

Affordable and Social Housing

For further reading please visit:

<https://iclei-europe.org/publications-tools/?c=search&uid=gDCrxJk2>

<https://www.tandfonline.com/doi/abs/10.1080/17535069.2020.1798495?journalCode=rurp20>

Please consult for the upcoming publication:

Noring, L. et al. (2022). A comparative case study approach to identifying and assessing institutional and finance tools for delivering and financing affordable and social housing. *The International Journal of Housing Policy* (awaiting online publication link)

Social Housing as Public Financial Assets

The Vienna model – The Revolving Funds Model

Background

Vienna's social housing model traces its roots back to the period known as the "Red Vienna", roughly corresponding to the years between the two World Wars. In the face of intensifying housing shortage, the ruling Social Democratic Party rolled out an ambitious social housing program, mainly financed by taxation on luxury goods and services. During this time, 64,000 municipal dwellings were built throughout the city, making the municipality the biggest property owner in Vienna.

In 1934, the civil war ended with defeat of Red Vienna, and the period thereafter was characterized by Austrofascism and the Nazi-regime, with only marginal social housing activities continuing during this period. However, as the Social Democrats regained power in Vienna in 1945, the city government recommenced the expansion of social housing with private limited profit housing associations (LPHAs) accessing public subsidies.

This continuous state participation in housing provision has resulted in consistent policies which today provide affordable dwellings to a majority of Vienna's population. The following section dissects the institutional arrangement and the finance mechanisms underpinning the Vienna Model.

The institutional arrangements and finance mechanisms

Today, 43.1% of the housing stock in Vienna constitutes social housing. Of this permanently rent-controlled housing stock, 23% is owned by the municipality while 20.1% is owned by LPHAs. While the number of municipal dwellings has been steady since the beginning of the 1990s, the share of housing owned by the LPHAs is increasing, and today they are an indispensable component of Vienna's social housing model. The LPHAs benefit from company income tax relief and preferred access to housing subsidies. However, in exchange, profits must be reinvested in new construction, refurbishment, or land purchase; although a limited part (max 2% of registered capital) can be divided as profits to owners and shareholders.

This is an important aspect of the long-term success of the LPHAs, ensuring continuous construction of new housing stock and maintenance of existing housing stock.

Altogether, some 80% of all new construction in Austria is co-financed by the public. Public long-term loans are applied as the fundamental subsidy instrument, and these loans, along with other forms of subsidies, are financed by a combination of state-level "housing tax" collected as a 1% income tax, returns of outstanding loans, and the regional budgets. Vienna's annual housing budget, which is designated for refurbishing older dwellings as well as for the construction of new social housing projects, amounts to €600 million, of which €450 million is coming from the federal government, and the remaining €150 million stems from the municipal budget (2010). Building loans are granted all private developers building rent-controlled affordable and social housing and are irrespective of the building costs, which serves as an incentive for developers to act in a cost-efficient manner. The LPHAs are the owner operators of their buildings, which encourages the construction of buildings that stand the passage of time.

Furthermore, new social housing construction relies heavily on the developer's own assets. Some LPHAs that have delivered rental housing for a long time today hold very strong equity. This is due to regulation outlined in the Limited Profit Housing Act, allowing the LPHAs to continue to collect rent for dwellings in the matured housing stock after the repayment of the mortgage loans (usually after 35 years). However, the rent is limited to 3.13 €/m² (nominal value in 2010) and must be invested in new construction, refurbishment, or land purchase. Finally, another aspect of social housing financing in Vienna is the tenant contribution, which has become a common part of LPHA funding. The tenant contribution works as a quasi-loan, meaning that the tenant pays the LPHA a lump sum upon moving in, and when moving out, the tenant gets back the initial payment depreciated by 1% each year. This enables LPHAs to raise investment capital up-front.

Social Housing as Public Financial Assets

The Lombardy model – The Public-Private-Civic Partnership Model

Background

The Italian housing market is peculiar, being homeownership substantial (79%). The reason is twofold. First, governments have historically fostered the “Right to the house” rhetoric, viewing the construction industry as a valve for unemployment absorption. Second, a crucial role has been played by the family in supporting homeownership and intergenerational transfer of wealth. Therefore, the Italian social housing sector - Edilizia Residenziale Pubblica (ERP) - has traditionally fallen under a residuality model that has led to widespread social marginalization in Italian suburbs.

Nevertheless, social housing has regained centrality as one of the answers to complex social problems arising from changing demographics and economic distress in the wake of the 2008 global financial crisis. Thus, 3.1 million Italian households were living in relative poverty in 2018. Moreover, the Italian thinktank Cresme projected a 1.7 million demand for new dwellings till 2030.

Specifically, Lombardy played a pivotal role in relaunching the new Italian housing system, where local experiments in the late 1990s inspired a national reform in 2008. The central government introduced a new legislative definition of social housing, coined as Edilizia Residenziale Sociale (ERS), which identifies private-public partnership as one key factor to boost the sector. In 2009, the central government also established an innovative financial system to underpin the housing model, the Sistema Integrato di Fondi Immobiliari per l’housing sociale (SIF). This system pools local non-profit funds into one national social housing fund named Fondo Investimenti per l’Abitare (FIA).

The institutional arrangements and finance mechanisms

Year 1998 marked the ending of a twenty-year-long regional devolution on housing legislation without, however, fiscal decentralization. The lack of public funds prompted Lombardy to pursue a market approach, mainly obtained through a new planning law to re-commodify

land use. This law introduced a more spatially flexible and less bureaucratic approach to land governance, while also acknowledging social housing as one of the planning standards for future urban development. Thus, private developers obtained more flexibility and less bureaucracy in return of providing minimal quotas of social housing in their projects.

Within this new legislative framework, the provision of social housing became increasingly attractive for Fondazione Cariplo, a charitable non-profit banking foundation and controlling shareholder of the biggest Italian bank Intesa-San Paolo. In 2004, the banking foundation established its own arm-length delivery branch, the foundation Fondazione Housing Sociale (FHS), together with public entities: the Lombardy Region and ANCI Lombardy; the latter is an association that represents over 1,400 municipalities. Besides the board members appointed by Fondazione Cariplo, the regional government and ANCI appoint one member each to Fondazione Housing Sociale.

In 2005, Fondazione Housing Sociale (FHS) entered an agreement with Milano municipality to deliver local social housing through an ad-hoc real banking foundation, Fondo Abitare Sociale. The banking foundation raised €85 million euros, subscribed by Fondazione Cariplo, Cassa Depositi e Prestiti, the Lombardy region, and private investors: Intesa San Paolo, BPM, Generali, Cassa Italiana Geometri, Prelios SGR e Telecom. At the regional level, this experience gave impetus to the creation of the expanded Fondo Immobiliare di Lombardia (FIL) in 2011, subscribed by the same actors, which raised another €400 million in capital.

Social Housing as Public Financial Assets

Affordable and Social Housing

In addition to the public subsidy plans of the regions, capital market instruments are of major significance to the financing of social housing in Vienna. Along with the commercial banks, special housing banks are essential to the financing of social housing. The special housing banks issue housing construction convertible bonds (HCCBs) that benefit from preferential tax treatment. In return, funds raised through HCCBs must be invested in national housing projects within a period of max three years.

To date, there are five non-profit banking foundations actively operating in Lombardy. These banking foundations refer directly in all legislative matters to the same main shareholder, the national fund Fondo Investimenti per l'Abitare (FIA), which has a capital endowment of euro €2.2 billion. Its main investor is Cassa Depositi e Prestiti (CDP), a financial institution whose main shareholder is the Italian Ministry of Finance. CDP can subscribe between 20% and 80% of any local banking foundation engaged in social housing. Other subscribers span municipalities, regions, banks, insurance companies, pension funds, housing cooperatives, private investors and developers, and other for-profit companies. These are all actors strongly rooted in the region and with a particular interest in the region's economic development.

The banking foundations collaborate closely with three asset management companies (Società di Gestione del Risparmio - SGR). Each asset management company is tasked with the financial assessment and delivery of the specific social housing projects that the banking foundations invest in. The asset management company resorts to an external technical and social advisor across the various stages of the project. In Lombardy, Fondazione Housing Sociale (FHS) is the leader in providing such advisory services.

The municipality envisions and promotes the development of these intricate public-private-civic partnerships, defines the legal requirements, and oversees the delivery of the social housing projects. Private engagement is also encouraged via several negotiation-based planning tools that capture greater land value while increasing the appeal for private investors. Notable is the equalisation tool, which allows assigning building rights to all landowners proportionally to the size of the land regardless of whether the area is buildable or not. Thus, development rights become tradable commodity that can be monetized. They help ensure that owners of non-buildable land areas also attain financial wins from private developments.

Social Housing as Public Financial Assets

The Singapore model – The Publicly Delivered and Financed Model

Background Information

Singapore's social housing market is highly regulated. The model is constituted along three interwoven pillars: public landownership, state-controlled social dwelling supply, and the concession of pension funds withdrawals for financing the purchase of public housing units by its citizens. Based on this model, 80% of Singapore's residents live in publicly provided housing, while 87.9% of the residents are homeowners, though 'ownership' represents the purchase of a 99-year lease instead of an infinite transmission of property rights to the acquiring party.

The model has been in use since the Singapore's establishment (1960s-1970s). It was created in response to the lack of private investments, inhumane living standards, and an overall housing shortage at that time. Today, it aims to protect citizens from soaring private housing market prices triggered by economic prosperity, and geographic land scarcity coupled with Singapore being the third most densely populated country in the world.

The institutional arrangements and finance mechanisms

Based on the 'land acquisition act', the national government possesses most of the land in Singapore. National government conducts planning and tenders, grants subsidies, and provides mortgages. The government also determines the sales price of public dwellings and selects the residents legible to acquire such housing based multiple factors e.g., income, age, marital status. All of these tasks fall to the Housing Development Board (HDB), which is nested at state level with the Ministry of National Development and concerned with housing development across its five regions and 17 city councils.

The Central Provident Fund (CPF) is a social security savings fund that stems from employment-based pension savings to which both the employees and employers contribute at rates adapted to the economic situation of the nation.

Citizens are eligible to withdrawals from the pension fund to make down payments of HDB apartments only. The withdrawn pension savings represent the down payment and mortgage totaling 80% of the purchasing price repayable over a 25-year period. The CPF pays the 80% directly to HDB. Thus, the buyer pays mandatory pension savings to the CPF, while the CPF pays the 80% down payment and mortgage directly to the HDB. The mortgage is set at a rate of '0.5% above inflation' interest rate. The HDB apartment becomes the asset that holds the lease owner's pension savings. In this way, the public housing authority and government together now bear the responsibility of ensuring both steady increases in HDB property values and establishing regulations for monetizing the properties. To ensure that HDB apartments retain their value, the government regularly upgrades older estates using grants from CPF.

HDB lease owners are allowed to resell their lease on the market after a minimum of five years' occupancy. The resell market enables sellers to make profits, thus introducing free market prices. By purchasing a HDB resell apartment, buyers can bypass the long HDB waiting list. Resell prices tend to be above inflation pushing properties steady upwards.

Prices of resell apartments are kept at a 20% market discount market, which means that the resell market of HDB apartments is linked to market prices as opposed to pension savings. The challenge is that as leases expire, they inevitably decline in price. Singapore aims to solve this through the demolition of older estates that do not fulfil the densification requirements. The government grants a new 99-year lease to families living in these newly built or refurbished HDB estates, counting from zero all over.

Social Housing as Public Financial Assets

The Shenzhen model – The Public-Private-Citizens Model

Background

Since the reform started in 1978, Shenzhen has become one of the biggest Chinese cities through the arrival of numerous migrants from across China. In the urbanization process, rural indigenous villages were absorbed into the metropolis giving rise to the phenomenon coined 'urban villages'. These urban villages provide more than 70% of the rental housing in Shenzhen. In 2017, the Chinese government announced that it would encourage multiple entities and financial instruments for providing affordable and social housing, including non-market approaches.

The case explored in Shenzhen concerns the city's challenge to attract and retain young talents for driving economic growth and maintaining its leading position in high value industries such as IT and engineering. Losing young people with high educational backgrounds is a major concern for the local authorities. Therefore, the Shenzhen government directed its attention to urban village, Shuiwei Village, to provide affordable housing of good standard to young people.

The institutional arrangements and finance mechanisms

Theoretically, all villages in China were nationalized in 2004 and should now be under the direct control of the local authorities. However, this transfer of ownership remains incomplete in many Chinese cities, as local authorities did not have the means to purchase the nationalized villages from the indigenous villagers. As Shuiwei Village was absorbed by Shenzhen through urban expansion, the village became an integral part of the Futian District of Shenzhen. In 2015, over 8,000 people lived in Shuiwei Village, of which local villagers represented less than 10%. Albeit the indigenous villagers still own Shuiwei Village.

In 2016, the Bureau of Housing and Construction in the Futian District launched Ningmeng Youth Apartments in Shuiwei Village. The Ningmeng apartments are owned by a cooperative consisting of the indigenous villagers, who remain the owners also after the refurbishment of Shuiwei Village. The Shenzhen Young Talent

Affordable Housing Program allows local authorities to target young talents by offering a rent of 75 CNY/m² per month, lower than the current market price of 100–120 CNY/m² per month. Bureau of Housing and Construction coordinates activities and flows of funding across the two private partners crucial to the enduring success of the Ningmeng apartments:

Shenzhen Shuiwei Industrial Corporation Limited (SSICL) is the cooperative of the indigenous villagers established in 1992. It represents the villagers' economic interests. Specifically, SSICL is responsible of 1) negotiating with the individual villagers to obtain 10-year usage rights from the villagers of their properties; 2) fire safety system and property management; 3) subletting the buildings to private developer SYLCL and managing the contractual and operational details as a representative of individual villagers; and 4) managing the ground floor stores, such as shops, clubs, and restaurants, to ensure the commercial value and return of the entire area.

Private developer Shum Yip Land Company Limited (SYLCL) was established in 2011 and is the project operator. SYLCL negotiates with SSICL and acts as the developer that renovates the old village properties. Upon completion, SYLCL sublets the apartments to the Housing and Construction Bureau, and in the process, it transfers the private village apartments into a public good. Lastly, SYLCL manages the apartments including provides and maintains equipped facilities and operational services. While the Futian District government invested 100 million CNY, SYLCL invested 40 million CNY in the apartments with a modest return on investment of 0.12% over an 8-year period. After completion, SYLCL receives 150 CNY/m² per month from the Bureau of Housing and Construction, while the bureau only collects 75 CNY/m² in rent per month. SSICL pays individual villagers 73 CNY/m² per month that stem from the private developer SYLCL.

In sum, relatively inexpensively, the Ningmeng apartments enabled the Futian District government to subsidize the Shenzhen Young Talent Affordable Housing Program.

Social Housing as Public Financial Assets

Concluding Comments

Fostering enduring institutional arrangements is critical to the success of affordable and social housing. Both the housing models of Vienna and Singapore are emblematic of models that have evolved over decades and are shaped by history. In Vienna and Singapore, governments were able to purchase inexpensive land and buildings that helped governments develop the city and housing that they envisaged for the future. In comparison, the Lombardy and Shenzhen models are newly emerged models that draw on public, private and civic collaboration.

Vienna

The Vienna model counts on limited profit housing associations (LPHAs) accessing revolving funds for the maintenance and expansion rent-controlled housing in Vienna. In Vienna, LPHAs are incentivised through various tax breaks and legislative measures to reinvest into further housing and the maintenance of existing housing. The government owns much of the old housing. This publicly owned housing is rent-controlled and offered below market rate to tenants. However, this distorts free market pricing and impedes the ability of private investors and developers to compete with the publicly owned rent-controlled housing. For the new built developments, government obliges private and non-private developers to include affordable and social housing in their developments.

Key learning

The revolving funds model of the LPHAs, which proscribes that profit withdrawal is limited at 2% of overall profits, means that the yield generated through rental social housing is reinvested back into the industry for either the expansion of further housing or the renovation of existing stock.

Lombardy

Lombardy is setting the norm for non-profit banking foundations with accumulated funds from national, regional, and local private investors coupled with a public non-profit executive entities for the delivery of affordable and social housing. It is a multi-levelled system of integrated funds. In Lombardy, building rights are also commodified and traded rendering new sources of revenue that are dispersed more broadly across society. Specifically, the Italian model represents a paradigm shift in the financialization that has seen social housing transformed from a publicly subsidised sector to attracting private capital from financial markets.

Key learning

Non-profit banking foundations are established to provide local social housing. These non-profit banking foundations pool public, private and civic capital. In practice, local and regional private and civic capital investors commit non-profit investment capital to local social housing construction and maintenance. National public sources of funding from the Fondo Investimenti per l'Abitare (FIA) undergirds these investments by partnering with local and regional private and civic capital investors in the local non-profit banking foundations. It is a multi-levelled system of non-profit banking foundations.

Social Housing as Public Financial Assets

Concluding Comments

Singapore

In Singapore, the government allows the withdrawal of pension savings to purchase a 99-year lease on an apartment. The HDB-CPF nexus ensures both the delivery and financing of affordable housing for a city-state with land scarcity and a growing economy and population. However, as pension savings are used for mortgage payments, a decline in housing prices equates shrinking pension savings. To prevent this, policy measures intercept market prices to make sure that HDB housing does not decline in price.

Key learning

Pension savings are used to finance the purchase of publicly delivered and owned apartments in Singapore. In this way, once a HDB apartment has been purchased, when a citizen makes his monthly pension contributions, he is in fact also paying off the mortgage on the long-term lease of his HDB apartment. At a national level, accumulated pension savings are reinvested into new housing and the upkeep of existing housing stock.

Shenzhen

In upswing, or in highly attractive cities, where government does not own the land for development, such as Shenzhen, city governments must find new public-private-civic collaborative ways of delivering and financing affordable housing for diverse population segments. In Shenzhen, Futian district government worked with an ownership cooperative and a private developer. In Shenzhen, the province and district governments are operating within a national legislative framework that calls for greater flexibility and experimentation paving the way for new types of public-private partnerships that seek to encompass the needs of urban, indigenous and migrant populations in the city's economic development. In Shenzhen, rent is maintained low through targeted subsidies, and affordable and social housing is provided by acknowledging the indigenous villagers' right of ownership.

Key learning

By closely collaborating in a public-private-civic nexus, Shenzhen's Futian district government was able to access and optimize the usage of largely underutilized land in Shuiwei Village. Legally, the urban villagers were prevented from financially benefitting from selling or renting their land and buildings. Over time, this meant that an unregulated rental market grew, while investments in the housing stock were discouraged. The government changed the legislative framework allowing the urban villagers to profit from their assets if they were willing to contribute those assets to Ningteng Youth Apartments. At a practical level, the government, a cooperative representing all the villagers and a private developer set up collaboration, which enabled the Ningteng Youth Apartments.

Natural Capital

The BioRock™ business case to restore
and protect Maldivian reefs and beaches

Introduction to Natural Capital

The Maldivians show great awareness and appreciation of their pristine nature. Several of the stakeholder interviewees mentioned that they do not have a tourist-economy, but a coral reef economy. The coral reefs are one of the main attractions to the tourists, but the reefs also provide local fishermen with fish and tuna bait, and they protect the land from

erosion by the sea. Efforts to maintain the natural environment have increased steadily since Maldivians started realizing the economic benefits they can draw from the pristine environment. In the following, we focus on the business case for restoring and protecting coral reefs and beaches in the Maldives.

The below 1-4 lists some of the main characteristics of this narrative that impact the strategy and its implementation:

1

The Maldives is host to some of the most complex reef systems which host more than a 1000 different species of fish.

2

Without drastic action to restore and protect habitats, climate change will likely cause a 50% reduction in catch in the Economic Exclusive Zone

3

In almost all projections of the IPCC, the coral reefs experience massive bleaching with most scenarios pointing to coral reef bleaching of more than 99%.

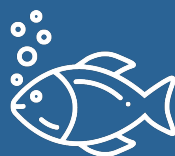
4

The Maldives has huge potential as a living lab; being at the forefront of climate change is a huge challenge, but also an opportunity to do cutting edge

The below list provides an overview over some of the potential future key developments that the Maldives can explore and exploit for its Natural Capital strategy:



In the future, natural resources, biodiversity and dying species will become highly valuable and a tradable currency across multiple industries, such as medicine, pharmaceuticals, energy and so on. We do not yet know which species is the next penicillin.



Being rare and increasingly extinct, people will travel to see, feel, and experience *real* nature and pay premium prices to eat *real and natural* food from its natural sources. This is both an attraction and a potential export.



The skill and expertise to preserve and grow natural resources, biodiversity, and rare species will become highly valued. Countries from across the world will want to grow, restore, and protect their nature for climate resilience and human health.

Business Case

Coral Reef Restoration with BioRock™

The coral reefs is a central pillar of Maldivian economy. According to interviewed stakeholders, the Maldivian coral reefs form the basis of 70% - 90% of the Maldivian economy. The Strategic Action Plan estimates that coral reefs are the basis of 71% of employment, 89% of the GDP, and 98% of exports. This is reflected in how the biggest revenue driver, tourism, and the biggest job creator, fisheries, are both extremely coral reef dependent.

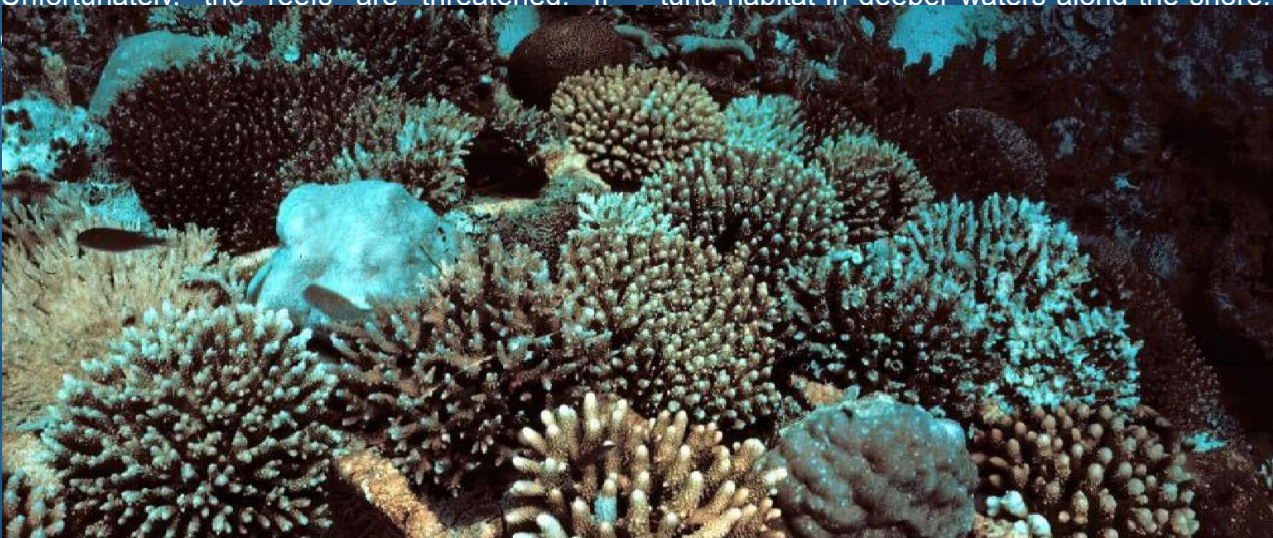
Coral reef protection, conservation, and protection hence go far beyond the direct economic and financial output of the reefs. The reefs also represent a global treasure. The Maldivian coral reef cover is the world's 7th largest and represent 3% of the global coral reef cover. The reefs are home to countless of marine species and with many lifeforms yet to be fully classified and understood, the complex interactions between the reefs and global marine health could go further than we imagine. It is paramount to do the utmost to ensure that present and future generations can enjoy and benefit from the coral reefs.

Unfortunately, the reefs are threatened. If

At a rise of 2°C above pre-industrial level, nearly all coral reefs will be wiped out, according to the United Nations Intergovernmental Panel on Climate Change. If the global emissions patterns do not change drastically, we are on course for a temperature rise of 3.7°C above pre-industrial level with the 1.5°C projected to be reached already next decade.

The following business case focuses on a BioRock™-pilot project. The very first BioRock™ installation was developed in the Maldives and back then, the installation proved that BioRock™-enhanced coral reef had a 15x-50x better survival rate during bleaching events. BioRock™ coral reefs can also replace grey coastal protection infrastructure and do so while cutting costs with +30% and enhancing biodiversity manyfold.

The project presented here will build a 5-kilometer BioRock™ shore protection reef along the East Coast of Hulhumale. An initial estimate is that around 20-40 million USD will be needed for the pilot project which includes protection for inshore reefs, offshore reefs, and tuna habitat in deeper waters along the shore.



“Transplanted corals grew and rapidly filled in the [BioRock™]-structure.”

– Global Reef Alliance. Photo 1997 by Wolf Hilbertz

Business Case for BioRock™

Coral Reef Restoration with BioRock™

The business case for BioRock™ and Coral Reef Restoration is both quite simple and a lot more complex than most business cases.

At the simple end of the spectrum, BioRock™ costs 3-120x less than grey infrastructure equivalents[1]. In this way, whatever comparable grey infrastructure is considered, decision-makers should explore BioRock™, including its lower cost and higher biodiversity benefits.

At the complex end of the spectrum, BioRock™ confers a wide variety of benefits that make it harder to compare to solutions only offering one measurable benefit. To capture the broader benefits of BioRock™, in this business case, we have included estimates for the tourist, fishing, and broader biodiversity value of one square meter of coral reef.

We have calculated the business case with the 40M USD investment resulting in the deployment of 17,500 grids that each cover 0.29 meter of coast, with 30 meters of positive

Presumptions used in the business case

Yearly value of preserved coral reefs for fishing industry per grid: **15 USD**

This is based on numbers from a study from Bonaire of 20-50 cents per sqm reef. We used the higher end due to the higher prices in Maldives vis-à-vis Bonaire.[2]

Yearly value of preserved coral reefs for tourism per grid [3]: **217 USD**

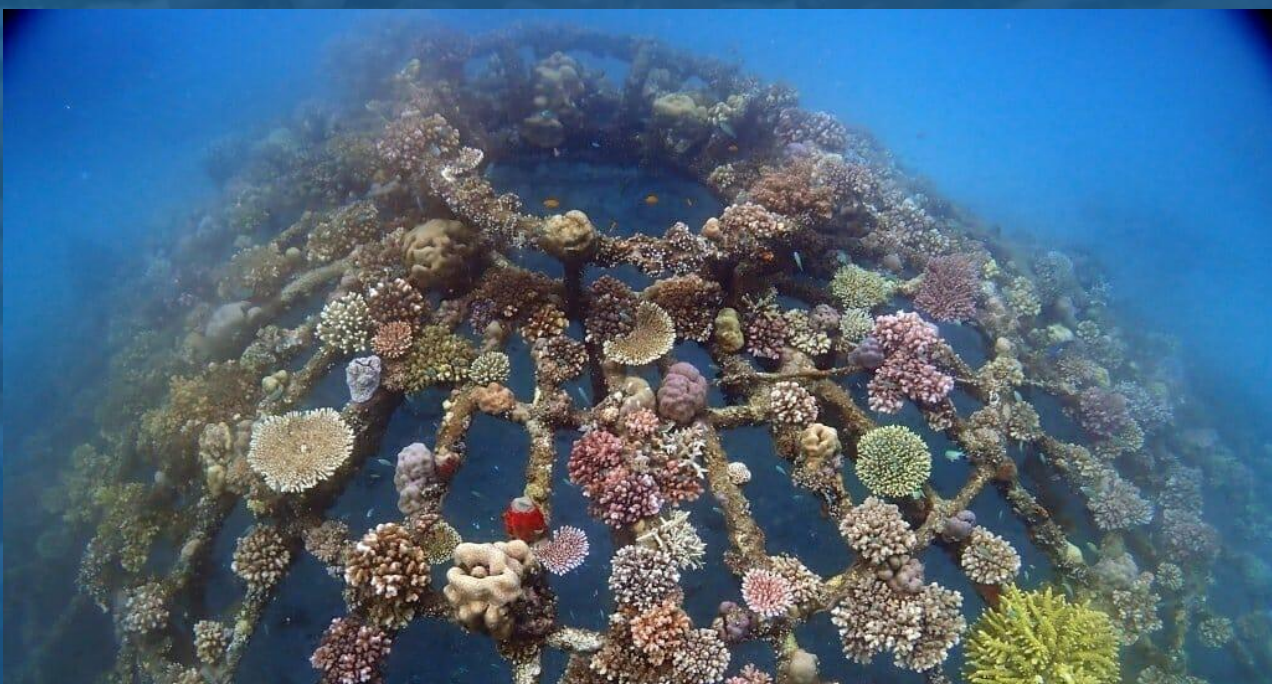
High value reefs are estimated at 7,248,000 USD per km² per year. With the Maldives charging a higher premium on tourism than Hawaii, the high value for reefs was used.

Yearly value of climate mitigation per grid: **79 USD**

We used the 2011-price of tetrapods which have been used in Hulhumale and which protect less than BioRock™ would.

Yearly value of biodiversity per grid: **100 USD**

This was the hardest value to estimate. We ended up using something higher than the



BioRock™ Arks save corals from bleaching when fragmented corals die of heat-stroke - Global Coral Reef Alliance

[1] Goreau & Prong (2017)

[2] The Economics of Ecosystems and Biodiversity on Bonaire: Fishery value of coral reefs in Bonaire (2015)

[3] Spalding et al (2017): Mapping the global value and distribution of coral reef tourism

Discounted Cash Flow Analysis of BioRock™

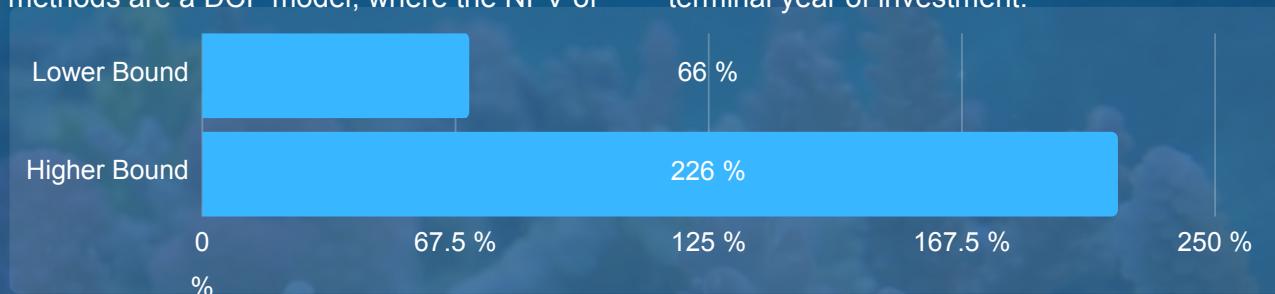
In the subsequent, we present the business case for a 5-kilometer BioRock™ shore protection project in Hulhumale. We presume an initial investment of 40M USD with a 15-year time horizon. The business case for the

BioRock™ project is positive with an expected rate of return (yearly return) ranging between 3.43 % and 8.19 % and break-even after 9 years. The returns come from fishery, tourism, and biodiversity. EBIDTA multiple is set at 5.

Return on Investment

Below the return on investment for the whole period of 15 years is shown. The lower and higher bounds are found using two methods to estimate the enterprise's value. The two methods are a DCF model, where the NPV of

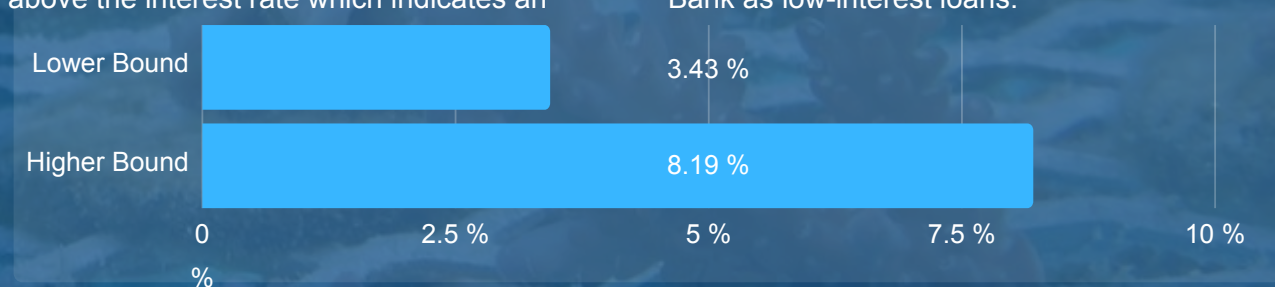
the recurring cash flows sums to the value of the firm. The second method uses the EBITDA (earnings before interest, tax, depreciation, and amortization) multiplier (set to 5) in the terminal year of investment.



Rate of Return

The below graph shows the rate of return (equaling the average annual return in percentage). The higher bound rate of return is above the interest rate which indicates an

investment worth pursuing. The total interest rate is presumed at 3.16% with an expected 80% of the financing coming from the World Bank as low-interest loans.



Break even

With the current set of assumptions, investing in a 5-kilometer BioRock™ shore protection project in Hulhumale would break even in 9 years or less.

Job creation

The direct job creation effects are low, since we expect a combination of volunteers and low-maintenance to result in few fulltime positions related to the pilot project. The fulltime positions would on average be 2 (1.8) highly skilled employees and 9 (9.1) unskilled employees on average. Installation will require more hands and so will specific maintenance periods, while day-to-day operations will require no human interference.

Environmental Impact of BioRock™

The project requires a safe and extremely low voltage (ELV) which represents most of the CO₂ used. The ELV can come from renewable sources. We have used current power sources relying on 90% from fossil fuels. Compared

to tetra pods more than 116,000 t CO₂ is saved – and that is without counting any sequestration from marine life. The big win is in biodiversity, where thousands of marine species are provided a habitat and ecosystem.

CO₂

18 t CO₂ is estimated to be spent on the power needed for the BioRock™ installations. In comparison, almost 135 thousand tons of CO₂ would be spent on tetrapods to protect

the same length of shoreline. Due to lack of data, neither the CO₂ cost of the upcycled materials for the BioRock™ arks nor the sequestered CO₂ has been calculated.



Water

There is no significant amount of water used or saved in the project. Water usage derives from the staff. It is worth noting that rich

marine ecosystems lead to cleaner waters. This water, however, is not drinking water, but it is easier to desalinate and clean.

Biodiversity

In comparison to grey infrastructure counterparts, BioRock™ excels regarding biodiversity. Grey infrastructure, i.e. tetrapods, destroy any seagrass or reef it is placed on. BioRock™ restores that very same life and also protects reefs against bleaching events. Thousands of marine species are potentially provided a home this way. Which species and their number depend on the placement and the design of the given BioRock™ structure. The BioRock™ structures can also be designed to attract commercially attractive marine life species.

community that filtered polluted waters. BioRock™ floating reefs and islands can be moored to BioRock™ anchor mooring reefs on the sea floor, which regenerate bottom fish and shellfish populations. Floating BioRock™ reefs can function as Fish Aggregation Devices (FADs) that both provide shade for tuna to aggregate under, and also shelter the smaller fishes they eat. Such devices can be placed in Maldivian waters to retain and maintain Maldivian tuna populations that are now intensively overfished by foreign fishing fleets waiting just outside the Maldives Exclusive Economic Zone to seize all tuna leaving Maldivian waters.

BioRock™ reefs in Mexico and Jamaica had dozens to hundreds of lobsters in a few square meters. BioRock™ nurseries have been successfully used to grow millions of sea cucumbers in Micronesian atolls. Floating BioRock™ reefs in the Bahamas grew a marine

In conclusion, the biodiversity impact of BioRock™ is positive, and design determines what kind of positive impact the installations impart. The kind of impact can be decided by national or local decision-makers.

Potential Revenue and Earnings

The business case for BioRock™ is markedly different than for other cases, as the value generated (increased/retained tourism, fish, and biodiversity) is not captured by the BioRock™ project, but by actors in adjacent

sectors. In this case, we have used a yearly growth of value of 8.5% as that is weighted average of the cumulative annual growth rate of the luxury tourism, the adventure tourism, and the sustainable seafood sectors.[1][2][3]

Net Income

Net income (NI), is calculated as sales minus cost of goods sold, selling, general and administrative expenses, operating

expenses, depreciation, interest, taxes, and other expenses. All prices in USD.

YEAR	2023	2024	2025	2026	2027	2028
Net Income	-845,408	-565,270	-261,321	68,646	424,281	814,513
Minus: Chg in Net-Working Capital	8,500	9,223	10,006	10,857	11,780	12,781
Minus: CAPEX	400,000	400,000	400,000	400,000	400,000	400,000

EBITDA

Earnings before interest, taxes, depreciation, and amortization, are a measure of a company's overall financial performance

before the effects of various tax regimes and accounting practices. Below are the EBITDA of the first 6 years. All prices in USD.

YEAR	2023	2024	2025	2026	2027	2028
EBITDA	3,512,832	3,811,422	4,135,393	4,486,902	4,868,288	5,282,093
Minus: Depreciation	400,000	400,000	400,000	400,000	400,000	400,000
Minus: Amortization	2,666,667	2,666,667	2,666,667	2,666,667	2,666,667	2,666,667

EBIT

Earnings before interest and taxes (EBIT) is an indicator of a company's earnings without the effects of depreciation (decreased value of

equipment) and amortization (annualized costs). As in the other earnings for BioRock™, income accrue to other actors.

YEAR	2023	2024	2025	2026	2027	2028
EBIT	446,165	744,756	1,068,727	1,420,235	1,801,622	2,215,426
Minus: Taxes	27,573	46,026	66,047	87,771	111,340	136,913
Minus: Interest	1,264,000	1,264,000	1,264,000	1,264,000	1,264,000	1,264,000

[1] <https://www.pri.newswire.com/news-releases/luxury-travel-market-size-to-reach-usd-39300-million-by-2028-at-cagr-8.4---valuates-reports-301488491.html>
 [2] <https://www.alliedmarketresearch.com/adventure-tourism-market>
 [3] <https://www.coherentmarketinsights.com/market-insight/sustainable-seafood-market-1668>

Discounted Cash Flow 2023-2028

The central pillars of the DCF-models are the expected cash-flows deriving from the business. Below presents the Unlevered Free Cash Flows (so indifferent of which type of financing is used) and the NPV Cash Flows

which are used for the two total project value estimations of undertaking the BioRock™ project. We show the different estimations of the BioRock™ project below the cash-flow estimates.

Unlevered Free Cash Flow

The unlevered free cash flow is a measure of the free-cash flow derived from the BioRock™ project without considering expenses that do

not impact cash-flows but are used for accounting such as amortization and depreciation.

YEAR	2023	2024	2025	2026	2027	2028
Unlevered Free Cash Flow	3,076,759	3,356,174	3,659,339	3,988,274	4,345,168	4,732,398

NPV Cash Flows

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the

of the income. In this case, the discount rate is the weighted average cost of capital (WACC) of 8%.

YEAR	2023	2024	2025	2026	2027	2028
NPV Cash Flows	3,076,759	3,107,568	3,137,294	3,166,021	3,193,828	3,220,791

Enterprise Value

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the year of the income. In this case, the discount rate is the weighted average cost of capital

While the model is built to show the enterprise value without considering the financing, we have included enterprise value with the interest (3.16%) payments subtracted (after discounting) as well. All prices are in USD

Enterprise value using accumulated cash flow (NPV) before debt (WACC)	Before Debt: 130,341,160	- Debt: 40,000,000	=	Project NPV: 90,341,160	- Interest NPV: 11,684,716	=	EV Post interest: 78,656,444
Enterprise value using an EBITDA multiple (5)	Before Debt: 66,342,838	- Debt: 40,000,000	=	Project NPV: 26,342,838	- Interest NPV: 11,684,716	=	EV Post interest: 14,658,122
Low Estimation of project value	26,342,838						
High Estimation of project value	90,341,160						
Low Estimation post interest	14,658,122						
High Estimation post interest	78,656,444						

Alternative Solutions to Explore

Coral Vita

The Bahamas-based Coral Vita uses cutting-edge methods developed at marine institutes around the world - growing corals up to 50x faster than in nature while boosting their resilience against climate change - to restore reefs in the most effective way possible.[1]

Their focus involves moving away from ocean-based farms to land facilities that allow for improved yield and a higher survival rate through advanced techniques that help speed up the growth of the corals. One of these techniques includes coral micro-fragmenting, where corals are broken up into small pieces so that they can grow approximately 50 times faster. By having this process on land, they can have greater control over the coral's features.

The reef restoration is like an underwater garden near the shore, with floating ropes and structures on which coral fragments are grown. They are harvested occasionally and transported to regions that need young, healthy corals.

The restoration model has tanks with clean seawater pumping through which allows for controlled conditions. The controlled conditions make it possible to simulate future environments and harden the coral against those conditions.

"Upfront, an ocean-based nursery is much cheaper, but when you start thinking about the need to grow millions or billions of corals around the world, land-based facilities start to look a lot more realistic. The cost goes down with scale, too — ocean-based nurseries go to about US\$30-\$40 per coral; we can get it down to US\$10 as we get up to a hundred or a thousand tanks." - Sam Teicher, Co-founder, and Chief Reef Officer.

Coral Vita craft reef restoration plans tailor-made for clients' needs and local conditions.

Restoration Process

- **Assess** - Study reef's health and water quality conditions to identify restoration site.
- **Create** - Develop a restoration plan, determining which coral species should be grown, how many, and where they will be planted to revive the reef.
- **Raise** - Rear corals using accelerated growth and improved resiliency methods in our land-based farms.
- **Install** - Outplant coral into reefs once they are sufficiently mature.
- **Monitor** - Evaluate restoration progress and local marine health after installation [1]

Benefits

- Land-based facilities and coral nurseries provide economy of scale and allow climate adaptation, so grown corals can be resilient to warmer and more acidic waters.
- Advanced techniques, such as micro fragmentations, enable faster growth of healthy corals.
- Restoration plan are tailor-made to local conditions.
- Resort and eco-tourism operations allow guests to learn about coral farming and threatened reefs.
- Coral Vita has a Sponsorship-model that enables coral adaption and on-site volunteering by guests to plant corals and restore reefs alongside experts.

[1] <https://www.coralvita.co>
 [2] <https://www.greenqueen.com.hk/coral-vita-raises-us2m-to-expand-its-coral-reef-restoration-technology/>

Alternative Solutions to Explore

Living Seawalls Project

Living Seawalls aims to improve the ecological sustainability of new and existing foreshore developments and ensure that no new development proceeds without first considering how it can benefit both humans and nature. Living Seawalls is committed to developing adaptable and affordable mechanisms to bring life back into marine developments across the world by combining ecological and engineering knowledge. [1]

The 'habitat tiles' are designed to help make seawalls more ecologically sustainable by creating a more natural environment for marine life. This follows a 20-year partnership between North Sydney Council and Sydney-based universities on making seawalls more ecologically sustainable. Sydney universities have successfully trialed several approaches - including artificial rock-pools and flowerpots - on North Sydney's seawalls over the years. But the 'habitat tiles', developed by the Sydney Institute of Marine Sciences (SIMS) and Reef Design Lab, proved so promising after a small-scale trial in Sawmillers Reserve; where even Swedish engineers' interest was piqued with Volvo signing up to the project in 2018.[2]

The aim of the living seawalls project is to develop research-based techniques for designing marine infrastructure in the future. We explore how digital fabrication techniques such as 3D printing can be utilized to minimize cost and increase habitat complexity.[3]

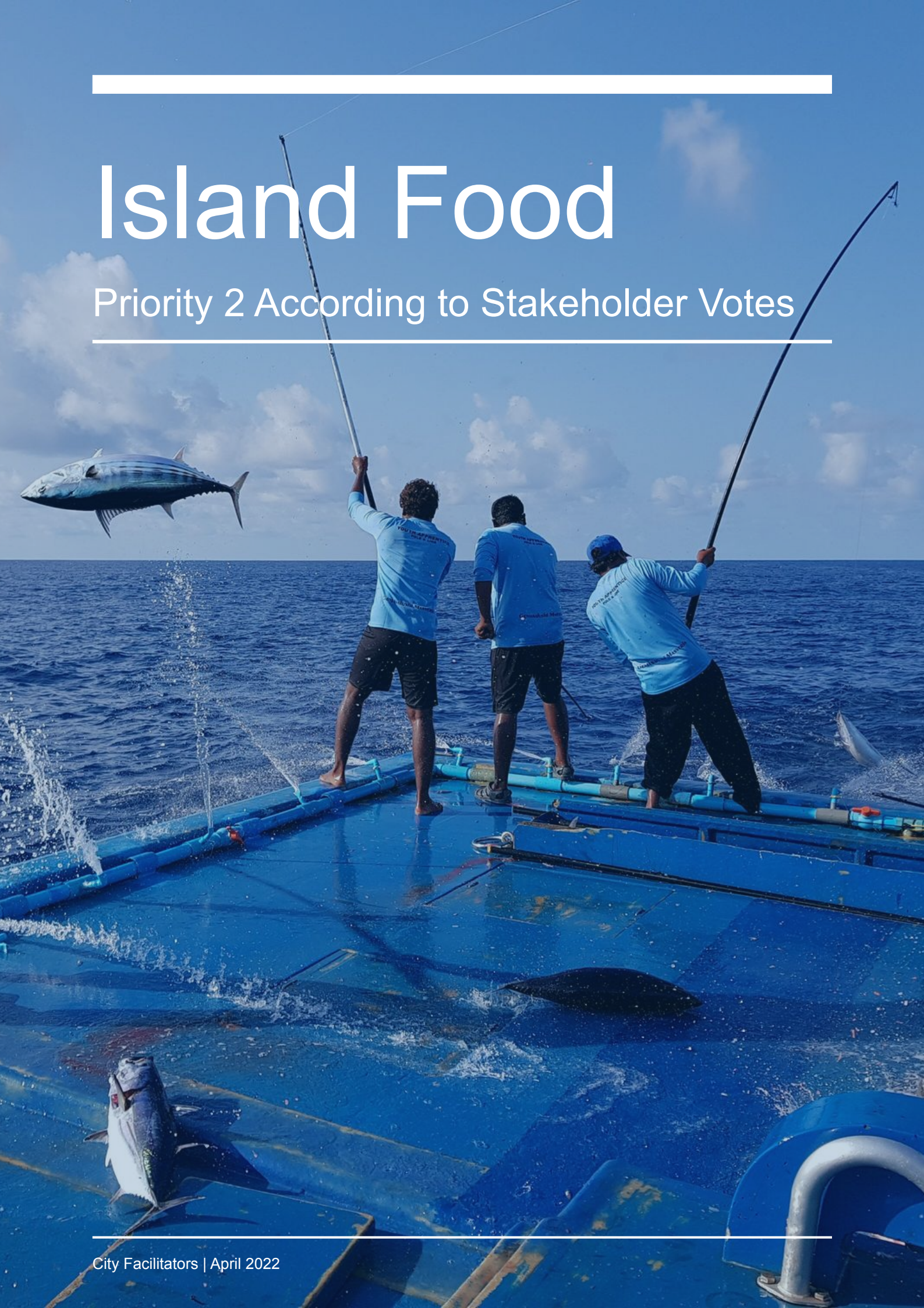
Best Practices to be Implemented in the Maldives

- **Customization of eco-engineering designs and choosing the habitat tile that is designed to enhance a particular type of marine structure.**
- **A research team that monitors the habitat panels, ecological evaluation of the success of Living Seawalls installations, to document the return on investment, and to optimize any future installations.**
- **A local production facility of the habitat panels?**
- **Educational seminars for primary and high schoolers that give hands-on activities on the ecological aims of Living Seawalls.**
- **Seminars and information sessions for the local communities to improve the health of the shorelines.**

[1] <https://www.livingseawalls.com.au/mission>
 [2] https://www.northsydney.nsw.gov.au/Environment/Waste/Sustainability/What_Living_Seawalls_Project
 [3] <https://www.reefdesignlab.com/living-seawalls>

Island Food

Priority 2 According to Stakeholder Votes



Introduction to Island Food

Today, the Maldives imports most of their food. In 2019, the Maldives imported around 300 million USD worth of vegetable products and foodstuffs. Importing food makes food more expensive, while the impacts of imports lead to more pollution. At the same time, increasingly volatile food prices are a security concern to food-importing nations.

The food sector is a viable job creator for both the skilled and unskilled labor market since the presented business case (Vertical Farming) will require both highly-skilled and unskilled labor.

The below 1-4 lists some of the main characteristics of the Island Food implementation track and how they interact with the Blue Economy Strategy:

- ## 1

Fishing and replenishment of fish stock. Research-based approaches can replenish reef fish and wild tuna stock.
- ## 2

Maldivian agriculture substitutes imports with both low-tech vertical farming (permaculture) and high-tech, automated, vertical farming (case in the following pages)
- ## 3

The low-tech solutions are cheap to implement, provide climate resilience, jobs and food to remote islands.
- ## 4

Tech-heavy vertical farming uses renewable energy to produce food (inc. non-native produce) in large quantities close to consumers while using a minimum of space

The below list provides an overview of some of the potential future key developments that the Maldives can explore and exploit for its Island Food strategy:

- 

In the future, most nations will have lost large territories to rising sea levels. Ocean mass replaces land mass. In this context, developing solutions that require little land-mass is key to sustainable production.
- 

In the future, food and food security become increasingly precious as extreme weather phenomena increasingly wreak havoc on food supply chains.
- 

Floating structures, zero-emissions fuel and transportation, sustainable fishing and food harvesting are critical aspects of the smart ocean state.

Business Case: Vertical Farming

2,700 ft² Vertical Farm in Hulhumale

As an island nation with very limited arable land, the Maldives is currently forced to import large quantities of food, including staples such as rice and grains. Cereal imports alone represented a 38 million USD import in 2018. This reliance on imports increases the cost of living and exposes the Maldives to food security issues.

Foods represent 17% of all imports to Maldives. In 2018, gross value of agricultural production for Maldives was 4,288 million US dollars. The total value of food import in 2019 was \$393 Million USD.

It is estimated that the Maldives produces less than a tenth of its overall food requirements. Research has shown that this could be slashed by growing i.e., tomatoes, beans, eggplants, and chicken feed in the Maldives. Increasing the amount of local produce vis-à-vis imported foodstuffs also decreases the carbon footprint of food, increases food security, and makes food prices less volatile.

Controlled environment vertical farming is a new form of agri-technology that can tackle:

- the low level of home-grown food
- the high food import bill
- limited agricultural space
- congested urban space.

This business case is an example of a controlled environment vertical farm with production numbers provided by an industry insider. A controlled environment means that sensors are used in combination with growing plants in several vertical layers (stacks) in monitored and closed in-door environments. The result is 50x the output per square-meter, and in this case an extremely attractive investment proposal.

Presumptions used in this business case:

- World Bank or Asian Development Bank finances 0% of the project, so the interest rate used is 7.8%
- The project's lifetime is set to 6 years.
- The exit EBITDA multiple is set at 15 following industry standards.
- Electricity and water prices are the commercial prices in Hulhumale.
- The discount rate/WACC is set at 8% - slightly above the bond yields of the Maldivian treasury bond.
- Inflation and terminal growth rates are set at 4%. Yearly sales increase is set at 10% and wastage, seeds, fertilizer, and soil to 40% of the gross product.
- On a yearly average, 3 skilled employee and 10 unskilled laborers are engaged.

Results overview

Low estimation of the project's NPV:

2,011,774,224 USD

High estimation of the project's NPV:

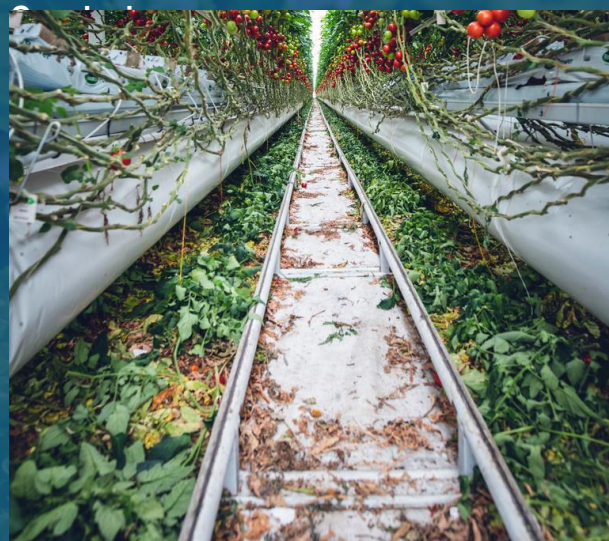
2,912,029,973 USD

Break-even: 6 years (at exit)

Return on Investment: 40,235 %- 58,241 %

Rate of return (annualized returns):

171.8 %- 189.1 %.



A vertical farm in Hulhumalé is within 10 minutes of 60% of the Maldivian population. It is also possible to have a vertical farm on a

Discounted Cash Flow Analysis of Vertical Farming

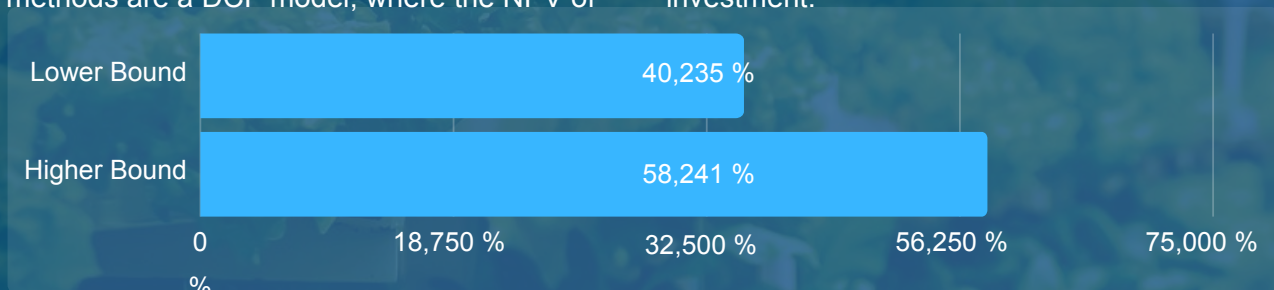
In the following, we present the business case for a 2,700 ft² Vertical Farm in Hulhumale. We presume an initial investment of 5M USD (of which 2M are safety margin) with a 6-year time horizon for the investment.

The case uses an EBIDTA multiple of 15. The Vertical Farm-case extremely good with a rate of return (yearly return) ranging between 171.8% and 189.1% and break-even at exit after 6 years.

Return on Investment

Below is shown the return on investment for the whole period of 6 years. The lower and higher bounds are found using two methods to estimate the enterprise's value. The two methods are a DCF model, where the NPV of

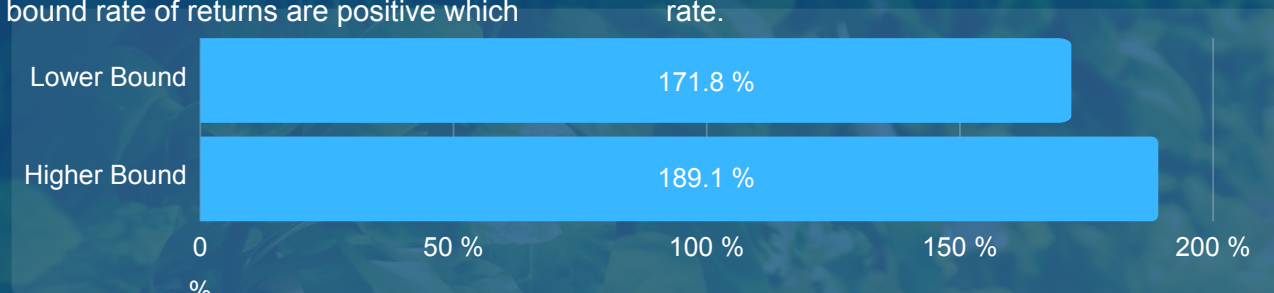
the recurring cash flows sums to the value of the firm, and secondly the EBITDA (earnings before interest, tax, depreciation, and amortization) multiplier in the terminal year of investment.



Rate of Return

The below graph shows the rate of return, meaning the average annual return in percentage. Both the lower bound and higher bound rate of returns are positive which

indicate an investment worth pursuing. The total interest rate is presumed to be 7.80% with the interest set at the current Maldivian bond rate.



Break even

With the current set of assumptions, investing in a 2,700 ft² Vertical Farm in Hulhumale would break even in 6 years or less.

Job creation

Current assumptions point to 3 highly-skilled jobs and 10 unskilled jobs being created directly by the project. This is an average of jobs over the life-time of the project. In reality, more hands will probably be used in the beginning occasionally for maintenance. Lowering the cost of food has tremendous positive social benefits as food and rent consume disproportionate amounts of the income of low-income groups.

Environmental Impact of Vertical Farming

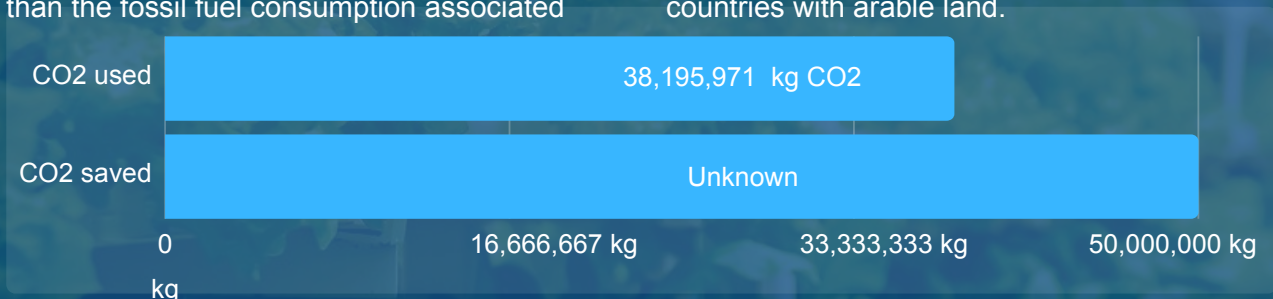
Vertical farming requires electricity in order to produce the controlled environment central to the production of produce. Hence, in these estimations 38,195,971 kg CO₂ is released by using the electricity that is currently commercially available in Hulhumale. The CO₂ outlet is reduced as the energy source

becomes less fossil-fuel reliant in Hulhumale. This potential reduction is not included in present calculations. Exact numbers on the CO₂ saved are not available due to the huge variations in food supply chains in the Maldives that require specific project-by-project numbers.

CO₂

38,195,971 kg CO₂ is estimated to be spent as part of the electricity consumption of the vertical farm. This is likely to be much less than the fossil fuel consumption associated

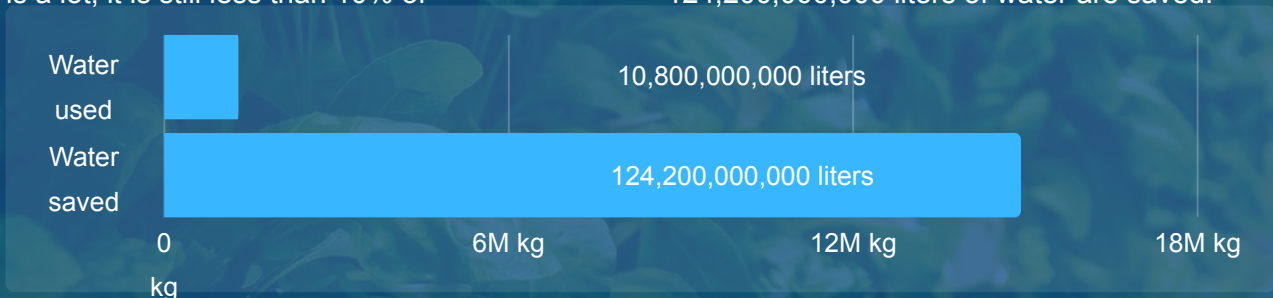
with production, storage, and transport of imported food. Normally, vertical farming is seen as very energy intensive, but that is for countries with arable land.



Water

The vertical farm will use 10,800,000,000 liters of water through the project lifetime. While that is a lot, it is still less than 10% of

the water used by traditional agriculture to cultivate the same amount of produce. Hence, 124,200,000,000 liters of water are saved.



Biodiversity

Vertical farming does not affect biodiversity in the Maldives in any significant way. There is slight risk of contaminating local ecosystems with foreign seeds, but most of the crops grown in the vertical farm are prone to be the crops that would otherwise not be suitable for the Maldivian climate.

The contamination risk is hence minimal. To further reduce the risk, it is advised to keep the vertical farms in a closed system and carefully cleanse any waste water of seeds and the like.

Potential Revenue and Earnings

With selling prices set slightly lower than current market prices, we expect the vertical farm to have little problems selling its goods. The vertical farm will also have an advantage since it will be both local and organic. The case is built with 40% OPEX of the gross product and includes seeds, fertilizer, soil,

wastage, and marketing.

Yearly sales increase is set at 10% and it includes increased sales, reduced need for marketing, reduced waste, and increased prices. Produce prices are high in the Maldives, hence the business case for vertical farming is remarkably good.

Net Income

Net income (NI) is calculated as sales minus **cost of goods sold, selling costs, general and administrative expenses, operating**

expenses, depreciation, interest, taxes, and other expenses. All prices are in USD.

YEAR	2023	2024	2025	2026	2027	2028
Net Income	87,860,331	96,833,912	106,704,851	117,562,885	129,506,722	142,644,942
Minus: Chg in Net-Working Capital	1,000	1,100	1,210	1,331	1,464	1,611
Minus: CAPEX	750,000	750,000	750,000	750,000	750,000	750,000

EBITDA

Earnings before interest, taxes, depreciation, and amortization are a measure of a company's overall financial performance

before the effects of various tax regimes and accounting practices. Below are the EBITDA of the first 6 years. **All prices are in USD.**

YEAR	2023	2024	2025	2026	2027	2028
EBITDA	95,646,785	105,211,464	115,732,610	127,305,871	140,036,458	154,040,104
Minus: Depreciation	750,000	750,000	750,000	750,000	750,000	750,000
Minus: Amortization	833,333	833,333	833,333	833,333	833,333	833,333

EBIT

Earnings before interest and taxes (EBIT) is an indicator of a company's profitability without the effects of depreciation (the loss of value

of equipment) and amortization (annualized costs).

YEAR	2023	2024	2025	2026	2027	2028
EBIT	94,063,452	103,628,130	114,149,277	125,722,538	138,453,125	152,456,771
Minus: Taxes	5,813,121	6,404,218	7,054,425	7,769,653	8,556,403	9,421,828
Minus: Interest	390,000	390,000	390,000	390,000	390,000	390,000

Discounted Cash Flow 2023-2028

The central pillars of the DCF-models are the expected cash-flows deriving from the business. Below figures present the Unlevered Free Cash Flows (indifferent of which type of financing is used) and the NPV Cash Flows

which are used for the two estimations of implementing the floating solar project. Below the cash flows, we show the different projections of enterprise values for the vertical farm-project.

Unlevered Free Cash Flow

The unlevered free cash flow is a measure of the free-cash flow derived from the floating solar project after servicing debts and without

considering expenses that do not impact cash-flows but are used for accounting such as amortization and depreciation.

YEAR	2023	2024	2025	2026	2027	2028
Unlevered Free Cash Flow	89,082,664	98,056,145	107,926,975	118,784,887	130,728,591	143,866,665

NPV Cash Flows

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the

of the income. In this case, the discount rate is the weighted average cost of capital, WACC).

YEAR	2023	2024	2025	2026	2027	2028
NPV Cash Flows	89,082,664	90,792,727	92,529,985	94,295,273	96,089,417	97,913,235

Enterprise Value

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the year of the income. In this case, the discount rate is the weighted average cost of capital

While the model is built to show the enterprise value without considering the financing, we have included enterprise value with the interest (7.8%) payments subtracted (after discounting) as well. All prices are in USD.

Enterprise value using accumulated cash flow (NPV) before debt (WACC)	Before Debt: 2,016,774,224	- Debt: 5,000,000	= Project NPV: 2,011,774,224	- Interest NPV: 1,947,157	= EV Post interest: 2,009,827,067
Enterprise value using an EBITDA multiple (13.2)	Before Debt: 2,917,029,973	- Debt: 5,000,000	= Project NPV: 2,912,029,973	- Interest NPV: 1,947,157	= EV Post interest: 2,910,082,816
Low Estimation of project value	2,011,774,224				
High Estimation of project value	2,912,029,973				
Low Estimation post interest	2,009,827,067				
High Estimation post interest	2,910,082,816				

Clean Energy

Priority 3 According to Stakeholder Votes

Introduction to Clean Energy

The Maldives has an ambitious commitment of reaching net-zero by 2030. This means that a huge transformation of the Maldivian infrastructure and energy systems are underway. Through the Preparing Outer Islands for Sustainable Energy Development (POISED) Project, the Government of Maldives and ADB have been working closely to replace inefficient diesel-based power generation grids with hybrid renewable systems. This work is expected to benefit more than 160 islands, generate at least 21 megawatts of solar power, substantially cut carbon dioxide emissions, and reduce the subsidy burden on the government.[1] The World Bank has also

invested in renewables in the Maldives through its ASPIRE and ARISE programs. The World Bank approved a 107.4 million USD project to help the Maldives accelerate its transition to renewable energy. The "Accelerating Renewable Energy Integration and Sustainable Energy" (ARISE) project expands the efforts of the existing World Bank-funded program "Accelerating Sustainable Private Investments in Renewable Energy" (ASPIRE) initiative by introducing private investments for increasing renewable energy capacity in the Maldives.[2] Other sources for clean energy financing such as crowd investment have also emerged.

1

The biggest obstacle to a faster deployment of renewable energy is government subsidies of fuel and the current human capacity gap.

2

Floating solar is now converging with ground-based PV regarding lifetime costs and is probably already cheaper in the Maldives due to the scarcity of land.

3

The topology makes it hard to do wave energy (or used to make it hard), but the same topology makes it easier to maintain floating solar.

4

Waste to energy has successfully been implemented on some resorts and the government has built and is building incinerators as well.

The below list provides an overview over some of the potential future key developments that the Maldives can explore and exploit for its strategy:



Energy is the #1 cost driver in the Maldives when looking at direct and indirect effects combined. Transitioning to solar panels offers a kWh cost reduction of between 0.15 USD and 0.60 USD when including the current transportation and maintenance cost of diesel generators.



The World Bank and the Asian Development Bank have both showed a willingness to invest in the renewable energy transformation in the Maldives.

New for-profit and for-purpose investment platforms are also a potential avenue for raising funds for renewable energy in the Maldives.



IRENA estimates that each \$1M invested in renewables creates at least 25 jobs, while each million invested in energy efficiency creates about 10 jobs. Both renewables and energy efficiency jobs range from requiring unskilled to highly skilled labor.

[1] <https://www.adb.org/sites/default/files/publication/65402/1/renewables-roadmap-energy-sector-maldives.pdf>
[2] <https://mercomindia.com/world-bank-renewable-energy-transition/>

Business Case for 10MW Floating Solar

Floating Solar in the Maldives

Floating solar is a technology so fit for purpose, one would think it was developed especially for the Maldives. Fact is that the world's first marine solar project was developed and completed in the Maldives by Swimsol. Floating solar is particularly advantageous where prices of land and energy are high – both of which are true for the Maldives.

With recent technological developments, the lifetime cost of floating solar is now estimated to be close to reaching parity with traditional grounded solar. The installation cost is 10-20% higher, but operations and maintenance are lower partly due to the water cooling effect .

The floating solar project is sponsored by the Ministry of Environment, Climate Change and Technology. This business case is built on estimates from Swimsol who has a seasoned management team and has proven capable of both small and large scale floating solar installations. Swimsol estimated in January that \$22M USD would be needed for a 10 MW floating solar installation in Hulhumale. The calculations in this case have been done with \$25M USD in financing to precipitate any unforeseen price hikes. Even with this margin

Presumptions used in this business case:

- 1) World Bank or Asian Development Bank finances 80% of the project bringing the total interest rate of the financing down to 3.16%.
- 2) The project's lifetime is set to 15 years.
- 3) The exit EBITDA multiple is set at 11.32 following industry standards.
- 4) All electricity produced is sold at current market prices (around 0.32 USD).
- 5) The discount rate/WACC is set at 8% - slightly above the bond yields of the Maldivian treasury bond.
- 6) Inflation and terminal growth rates are set at 4% (historical energy price increases).
- 7) On a yearly average, 1 skilled employee and 3 unskilled laborers are engaged.

Results overview

Low estimation of the project's NPV:

51,444,206 USD

High estimation of the project's NPV:

62,804,891 USD

Break-even: 8 years

Return on Investment: 177 % - 251 %

Rate of return (annualized returns):

7.03 % - 8.74 %.

Conclusion



Discounted Cash Flow Analysis of Floating Solar

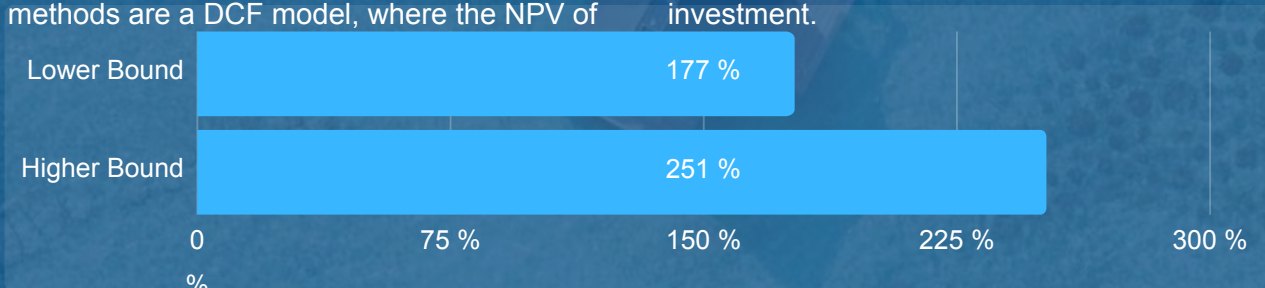
In the following, we present the business case for a 10 MW Floating Solar project close to Hulhumale. We presume an initial investment of 25M USD with a 15-year time horizon for the investment, and an EBIDTA multiple of

11.32. The business case for floating solar is positive with an expected rate of return (yearly return) ranging between 7.74% and 8.74% and break-even after 8 years.

Return on Investment

Below is shown the return on investment for the whole period of 15 years. The lower and higher bounds are found using two methods to estimate the enterprise's value. The two methods are a DCF model, where the NPV of

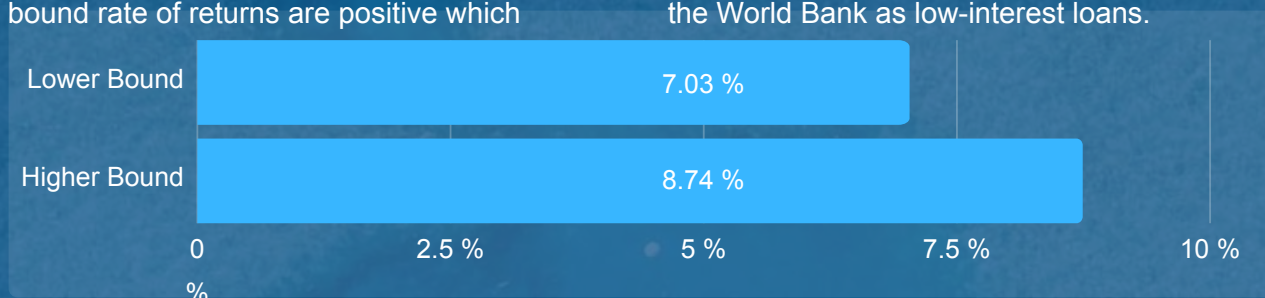
the recurring cash flows sums to the value of the firm, and secondly the EBITDA (earnings before interest, tax, depreciation, and amortization) multiplier in the terminal year of investment.



Rate of Return

The below graph shows the rate of return, meaning the average annual return in percentage. Both the lower bound and higher bound rate of returns are positive which

indicate an investment worth pursuing. The total interest rate is presumed to be 3.16% with an expected 80% of the financing coming from the World Bank as low-interest loans.



Break even

With the current set of assumptions, investing in a 10MW floating solar project for Hulhumale would break even in 8 years or less.

Job creation

Current assumptions point to 1 highly-skilled jobs and 3 unskilled jobs being created directly by the project. This is an average of jobs over the life-time of the project. In reality, more hands will probably be used in the beginning and during limited maintenance intervals. Lowering energy costs indirectly creates more jobs as more businesses can operate and compete when the price of energy is reduced.

Environmental Impact

The project requires diesel-powered boats to install the floating solar power plant. The diesel used by the boats represent most of the CO₂ used in the project. The 10MW power-plant replaces the use of 245.7 gallons diesel per hour (648.42 kg CO₂). With effective

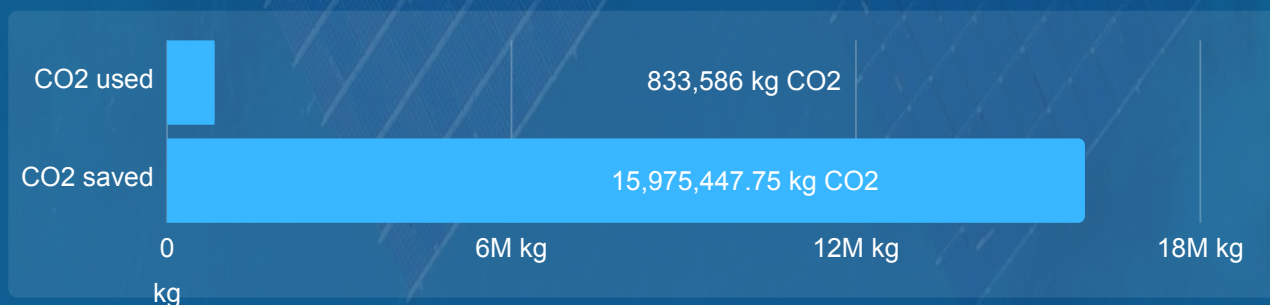
sunshine hours being measured to 4.5 hours in the Maldives, this equals 2,917.89 kg CO₂ per day or 1,065,029.85 kg CO₂ per year.

Over the project's presumed lifetime of min. 15 years, almost 16 million kg CO₂ are saved.

CO₂

833,586 kg CO₂ is estimated to be spent on fuel for boats in the installation phase and for maintenance of the floating solar installation.

In comparison over 15 years, 15,975,447.75 kg CO₂, almost 16 million kg CO₂, are saved when compared to diesel generated electricity.



Water

There is no significant amount of water used or saved in the project. Water use is in this case for the staff and perhaps for cleaning of

of the floating solar cells. It is worth noting that excess energy in peak periods could be used for desalination of water.

Biodiversity

Floating solar installations are still a relatively new phenomenon; both in the Maldives and on a global scale. Hence, long-term effects of floating solar installations on marine life are yet to be determined in full. It is a major benefit to get rid of diesel generators. Hooper, Armstrong, and Vlaswinkel (2021) argue that the impact of marine floatovoltaics (floating solar) depend to a large extent on the design of the individual project. They note:

a) "A first study modelling the effects of large-scale marine floatovoltaics in a temperate, shallow coastal sea illustrates negligible effects on net primary production and also reduced turbidity, which is beneficial for light availability underneath the platforms" - Hooper, Armstrong, and Vlaswinkel (2021)

b) "Negative environmental effects include anchoring and cable impacts on the substrate, disturbance during installation including sediment resuspension, blocking sunlight penetration, and electromagnetic field effects. These risks also apply in the marine environment. Shading and sediment resuspension are of particular concern for coral reefs and seagrass, which require sunlight for growth. Furthermore, tidal changes in water depths may result in extended periods during which slack mooring cables interact with the seabed." - Hooper, Armstrong, and Vlaswinkel (2021)

There are other benefits such as providing new substrate for species to settle on, and negative impacts can be reduced through proper planning.

Potential Revenue and Earnings

The business case for floating solar is largely defined by the need to purchase electricity. Hence, the increase in the sales number is not emblematic of an increase in the amount of electricity sold.

Rather it is due to an increase in the price of electricity. In this case, we have taken a conservative estimate of 4% - simulating the likely increase from inflation.

Net Income

Net income (NI) is calculated as sales minus **cost of goods sold, selling, general and administrative expenses, operating**

expenses, depreciation, interest, taxes, and other expenses. All prices are in USD.

YEAR	2023	2024	2025	2026	2027	2028
Net Income	145,510	348,987	561,009	781,937	1,012,143	1,252,018
Minus: Chg in Net-Working Capital	4,200	4,376	4,560	4,752	4,951	5,159
Minus: CAPEX	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000

EBITDA

Earnings before interest, taxes, depreciation, and amortization are a measure of a company's overall financial performance

before the effects of various tax regimes and accounting practices. Below are the EBITDA of the first 6 years. **All prices are in USD.**

YEAR	2023	2024	2025	2026	2027	2028
EBITDA	5,163,800	5,380,680	5,606,668	5,842,148	6,087,518	6,343,194
Minus: Depreciation	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Minus: Amortization	1,666,667	1,666,667	1,666,667	1,666,667	1,666,667	1,666,667

EBIT

Earnings before interest and taxes (EBIT) is an indicator of a company's profitability without

the effects of depreciation (the loss of value of equipment) and amortization (annualized costs).

YEAR	2023	2024	2025	2026	2027	2028
EBIT	997,133	1,214,013	1,440,001	1,675,482	1,920,852	2,176,528
Minus: Taxes	61,623	75,026	88,992	103,545	118,709	134,509
Minus: Interest	790,000	790,000	790,000	790,000	790,000	790,000

Discounted Cash Flow 2023-2028

The central pillars of the DCF-models are the expected cash-flows deriving from the business. Below are represented the Unlevered Free Cash Flows (so indifferent of which type of financing is used) and the NPV

Cash Flows which are used for the two estimations of undertaking the floating solar project. Below the cash flows, we show the different estimations of the 10MW floating solar project.

Unlevered Free Cash Flow

The unlevered free cash flow is a measure of the free-cash flow derived from the floating solar project after servicing debts and without

considering expenses that do not impact cash-flows but are used for accounting such as amortization and depreciation.

YEAR	2023	2024	2025	2026	2027	2028
Unlevered Free Cash Flow	2,597,977	2,801,277	3,013,116	3,233,852	3,463,858	3,703,526

NPV Cash Flows

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the

of the income. In this case, the discount rate is the weighted average cost of capital (WACC).

YEAR	2023	2024	2025	2026	2027	2028
NPV Cash Flows	2.579.666	2.579.666	2.579.666	2.579.666	2.579.666	2.579.666

Enterprise Value

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the year of the income. In this case, the discount rate is the weighted average cost of capital

While the model is built to show the enterprise value without considering the financing, we have included enterprise value with the interest (3.16%) payments subtracted (after discounting) as well. All prices are in USD

Enterprise value using accumulated cash flow (NPV) before debt (WACC)	Before Debt: 69,233,787	- Debt: 25,000,000	=	Project NPV: 51,444,206	- Interest NPV: 7,302,947	=	EV Post interest: 44,141,259
Enterprise value using an EBITDA multiple (13.2)	Before Debt: 87,804,891	- Debt: 25,000,000	=	Project NPV: 62,804,891	- Interest NPV: 7,302,947	=	EV Post interest: 55,501,944
Low Estimation of project value	44,233,787						
High Estimation of project value	62,804,891						
Low Estimation post interest	36,930,840						
High Estimation post interest	55,501,944						

Sustainable Tourism

Priority 4 According to Stakeholder Votes

Introduction to Sustainable Tourism

Sustainable Tourism plays to the Maldivian economy's greatest strength and helps diversify the tourism sector. The goal is to include both more sustainable tourism and different kinds of tourism that have positive spillovers to other parts of the economy; particularly in health, education, and ICT. Currently, the first signs of diversification within the tourism sector look promising with guesthouses proving a success amongst customers. It provides more Maldivian jobs in tourism, especially jobs as owners and managers. New jobs have also emerged in safaris, diving, beach restaurants, arts and craft to name a few. The below list shows some of the main characteristics of this narrative that impact the strategy and its implementation:

The Blue Economy Strategy suggests expanding to wellness and health tourism. The world is seeing a surge in mental and physical age- and lifestyle related illnesses. This has allowed the Maldives to decentralize and diversify its economy with wellness and medical treatment facilities spread out across the country. Long-stay visitors represent one of the biggest opportunities to the Maldives and can be attracted by investing in digital infrastructure and university exchange programs. Remote work and education are pivotal to the growth of the Maldivian economy.

- 1 Globally, tourism is only expected to grow 1.9% after the bounce back from COVID
- 2 Surf, Diving and Adventure Tourism bucks the trend with an expected CAGR of 13.9% until 2026
- 3 Wellness tourism seems a good candidate for the diversification of the tourism sector of the Maldives, but it is not mentioned in the SAP
- 4 There is an inherent tension between the valorization of nature that tourism brings, and the added strain on nature that comes from having more tourists

The below list provides an overview over some of the potential future key developments that the Maldives can explore and exploit for its strategy:

- 

In the future, more and more people are either not working but living off citizen salary or working remotely from "anywhere" living off immaterial wealth, such as knowledge and expertise. A higher emphasis is placed on working from places that inspire.



The world has become entirely globalized, and a certain class of global citizens move around the world like migrating species. They seek out locations with warm weather during the winter and cooler places during the summer. The high-earning global citizens request a variety of high-end services and experiences.



At the same time, mental and physical lifestyle illnesses have reached new heights in the western world, as people spend infinite time soul searching and being bored. The Maldives caters to a new market of age- and lifestyle related illnesses which will require further development of human capacity in the tourism sector.

Business Case for Hospitality Academy

An Academy to Make Maldivian Leaders

The goal of the Hospitality Academy is to attract top talent from across the globe as both teachers and students. Part of the raison d'être for the Hospitality Academy is that there is a massive underrepresentation of Maldivians in higher-level management positions in resorts. By having a world-class hospitality academy, the Maldives can both attract long-stay educational tourists and enable its own youth to pursue well-paid positions in the highest-grossing industry in the country. Placing the Hospitality Academy in the Blue Innovation Hub increases cross-fertilization between tourism and environmental protection. This could lead to a higher level of environmental awareness amongst future leaders in the tourism sector.

A Hospitality Academy in Hulhumalé will have three main objectives to attain, namely to:

- 1) increase the human resource capacity of the Maldivians so they can attain the highest positions in the tourism sector
- 2) leapfrog the usual time necessary to build a reputable educational facility by

- 3) use 2) to attract affluent students across the globe looking to acquire the highest level of skills possible in the service sector
- 4) ensure that the tourism sector develops sustainably and has positive spill-over to the rest of the Maldivian society.

The Hospitality Academy leverages the prime branding of the Maldives as one of the world's leading tourist destinations. Using this market position, the academy will be able to attract students willing to pay a premium for their education. This strategy is bolstered by the fact that tourism and service educations are most often private, even in countries where higher education is public (and free). Besides the Maldivian tourism sector being famous for its high standards, the quality of life possible for students in the Maldives is a selling point by itself. Enrolment revenue is expected to grow quickly after initial marketing pushes to create awareness amongst key student groups, especially in the US and Europe.

The starting number of students is 200.



Resort Butler Training at Jumeirah Vittaveli Maldives - Saba | International Butler Academy & Training School

Discounted Cash Flow Analysis: Hospitality Academy

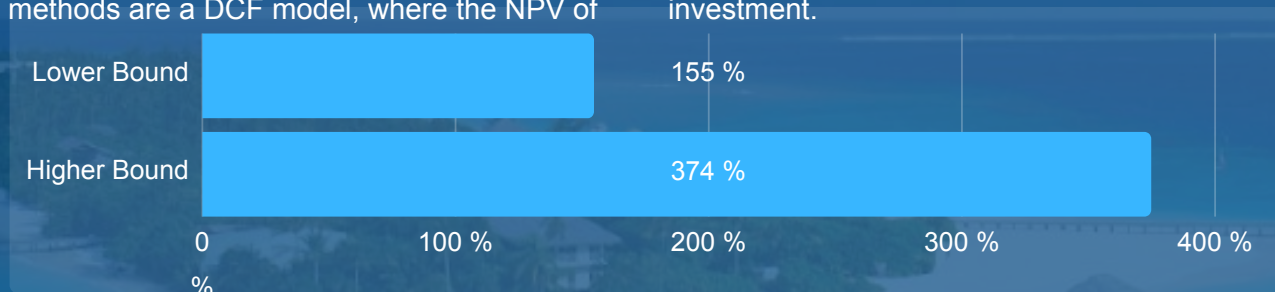
In the following, we present the business case for a Hospitality Academy in the Maldives. The case is built on an assumption of successful marketing the first couple of years, which combined with international

Partnerships, allow the number of students and hence revenue to climb up quickly. The result is a positive business case. Yet, the case hinges on early success.

Return on Investment

Below is shown the return on investment for the whole period of 15 years. The lower and higher bounds are found using two methods to estimate the enterprise's value. The two methods are a DCF model, where the NPV of

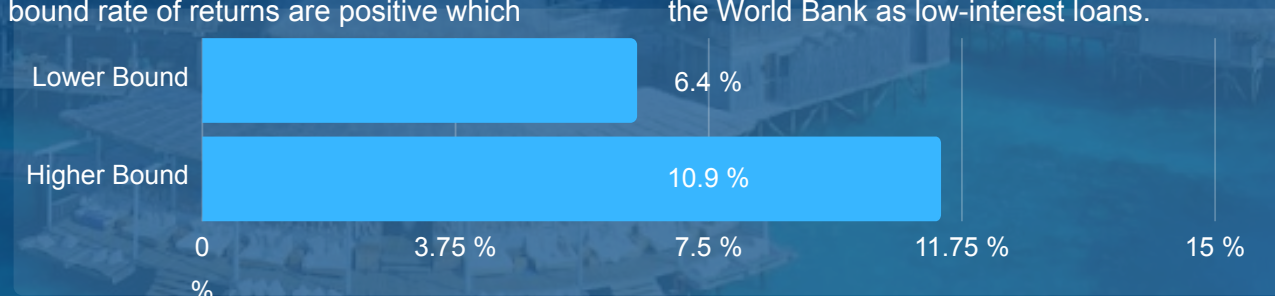
the recurring cash flows sums to the value of the firm, and secondly the EBITDA (earnings before interest, tax, depreciation, and amortization) multiplier in the terminal year of investment.



Rate of Return

The below graph shows the rate of return, meaning the average annual return in percentage. Both the lower bound and higher bound rate of returns are positive which

indicate an investment worth pursuing. The total interest rate is presumed to be 3.16% with an expected 80% of the financing coming from the World Bank as low-interest loans.



Break even

With the current set of assumptions, investing in a Hospitality Academy would break after 12 years without needing an exit to do so.

Job creation

Current assumptions point to 10 highly-skilled jobs and 10 unskilled jobs being created directly by the project and growing to around 225 of each type. This is an effect of how an increased number of students will require an increased number of professors, admin staff, etc.

Environmental Impact

The Hospitality Academy requires a mix of different services. There is a strong reliance on water and power. Average consumption numbers have been used to calculate the use of both water and power for the Hospitality Academy. For power, an average of 18.9 kWh

per year per square feet was used, while each student is presumed to require 18 liters of water per day (including for gardening, cooking, etc.). The water usage of the students also covers the water used by staff.

CO2

16,530,506,901 kg CO2 is estimated to be spent on the Hulhumale Academy, but this number can vary greatly depending on

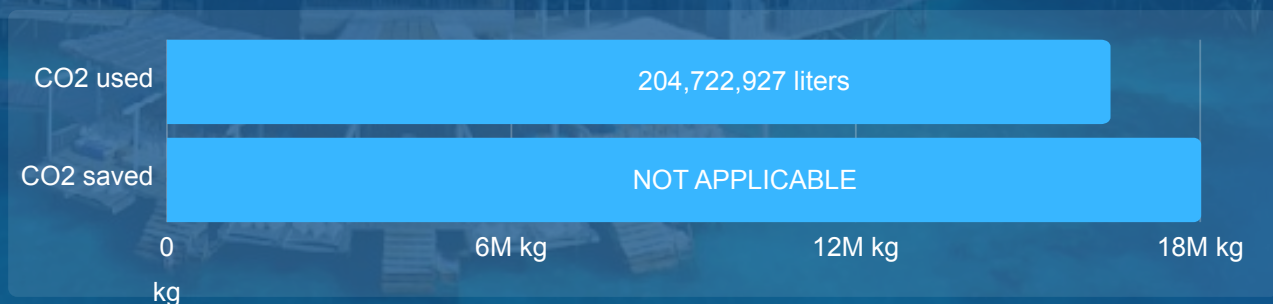
developments in heating, ventilation, and air-conditioning. Extensive use of on-site training will reduce the CO2 used by the academy.



Water

On average, and including attending staff, water used for teaching exercises, building maintenance and gardening, each student is

presumed to require 18 liters of water per day. As the number of students grow, so does the water consumption.



Biodiversity

The direct impact on biodiversity is unknown. On one hand, the gathering of a lot of people tend to damage natural ecosystems. On the

other hand, training tourism management in sustainable practices ought to have positive long-term effects.

Potential Revenue and Earnings

The business case for the Hospitality Academy depends on the ability to attract an ever-increasing number of students (or to increase enrollment fees if the number of students does not increase). The first 3 years,

the number of students is set to double every year. After that, growth starts to taper off at 25% for the subsequent 3 years. For the remaining years, growth of enrollment revenue is set to 12.5%.

Net Income

Net income (NI) is calculated as sales minus **cost of goods sold, selling, general and administrative expenses, operating**

expenses, depreciation, interest, taxes, and other expenses. All prices are in USD.

YEAR	2023	2024	2025	2026	2027	2028
Net Income	-2,445,721	-2,071,943	-1,698,164	-1,137,498	-716,995	-191,369
Minus: Chg in Net-Working Capital	10,000	20,000	30,000	45,000	56,250	70,313
Minus: CAPEX	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000

EBITDA

Earnings before interest, taxes, depreciation, and amortization, are a measure of a company's overall financial performance

before the effects of various tax regimes and accounting practices. Below are the EBITDA of the first 6 years. **All prices are in USD.**

YEAR	2023	2024	2025	2026	2027	2028
EBITDA	398,400	796,800	1,195,199	1,792,799	2,240,999	2,801,248
Minus: Depreciation	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Minus: Amortization	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000

EBIT

Earnings before interest and taxes (EBIT) is an indicator of a company's profitability without

the effects of depreciation (the loss of value of equipment) and amortization (annualized costs).

YEAR	2023	2024	2025	2026	2027	2028
EBIT	-2,101,600	-1,703,201	-1,304,801	-707,201	-259,001	301,248
Minus: Taxes	-129,879	-105,258	-80,637	43,705	-16,008	18,617
Minus: Interest	474,000	474,000	474,000	474,000	474,000	474,000

Discounted Cash Flow 2023-2028

The central pillars of the DCF-models are the expected cash-flows deriving from the investment. Below presents the Unlevered Free Cash Flows (indifferent of which type of financing is used) and the NPV Cash Flows

which are used for the two estimations of the floating solar projects. Below the cash flows, we show the different estimations of the 10MW floating solar project.

Unlevered Free Cash Flow

The unlevered free cash flow is a measure of the free-cash flow derived from the floating solar project after servicing debts and without

considering expenses that do not impact cash-flows but are used for accounting such as amortization and depreciation.

YEAR	2023	2024	2025	2026	2027	2028
Unlevered Free Cash Flow	-981,721	-617,943	-254,164	291,504	700,755	1,212,319

NPV Cash Flows

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the

of the income. In this case, the discount rate is the weighted average cost of capital (WACC).

YEAR	2023	2024	2025	2026	2027	2028
NPV Cash Flows	-981,721	-572,169	-217,905	231,405	515,076	825,084

Enterprise Value

Net-Present Value Cash Flows translate the Unlevered Cash Flows into present day value by applying the discount rate according to the year of the income. In this case, the discount rate is the weighted average cost of capital

While the model is built to show the enterprise value without considering the financing, we have included enterprise value with the interest (3.16%) payments subtracted (after discounting) as well. All prices are in USD

Enterprise value using accumulated cash flow (NPV) before debt (WACC)	Before Debt: 38,197,126	- Debt: 15,000,000	=	Project NPV: 23,197,126	- Interest NPV: 4,381,768	=	EV Post interest: 18,815,358
Enterprise value using an EBITDA multiple (13.2)	Before Debt: 71,037,780	- Debt: 15,000,000	=	Project NPV: 56,037,780	- Interest NPV: 4,381,768	=	EV Post interest: 51,656,011
Low Estimation of project value	23,197,126						
High Estimation of project value	56,037,780						
Low Estimation post interest	18,815,358						
High Estimation post interest	51,656,011						

Alternative Solutions to Explore

Digital Nomad Village in Madeira

Digital Nomads are remote workers that take advantage of the flexibility to travel while working. They tend to choose countries with beautiful places in the world, good weather, great food, safety, activities in nature and most importantly, good internet connection.

The Regional Government of Madeira, through Startup Madeira, has developed the structure for a pilot project – Digital Nomads Madeira Islands (DNMI). This initiative aims to attract digital nomads to Madeira and Porto Santo. Madeira attracts digital nomads with its natural beauty, activities in nature, culture, and great climatic conditions throughout the year.

This initiative gathered the conditions to create a Digital Nomad Village at Ponta do Sol. A pilot project that aims to blend digital nomads with the local businesses and Ponta do Sol inhabitants, turning it into a community of people that have a strong positive impact in the village, both socially and economically.

They adapted products and services to the needs of digital nomads, involving the community and private entities (hotels, restaurants, local accommodation, consultants, lawyers, rent-a-cars, creatives, and entrepreneurs from different areas).

DNMI is facilitating the moving of the nomads and the community managers are organizing different start-up and gate-away events for the digital nomads. They also partner with Flatio, an international accommodation market for midterm rents to provide fully furnished flats for short and mid-term stays.

According to DNMI, the digital nomads are aged between 18 - 80 and their usual stay is between 1 to 3 months. The most common job titles are:

- Entrepreneurs
- Developers
- Graphic Designers
- Project Managers
- Lawyers
- NGO's
- Writers
- Consultants

After the pilot project showed great success, it will continue, at least, for 3 more years (2024), and the Nomad Village for 1 more year (2022).

[1]

Points to Implement

- A comprehensive platform to connect all the necessary services, products, and activities.
- Community management helps remote workers with moving, accommodation, working spaces, and non-working activities.
- Establishment of partnerships with local and international businesses to create services and products that fit the digital nomad lifestyle.
- I.T. and tech infrastructure to provide a great, stable, and affordable internet connection.

[1] <https://digitalnomads.startupmadeira.eu/about-us/>
[2]

APPENDIX

Implementation Team Composition



Potential Revenue and Earnings

To implement the many solutions found in Blueprint 1 and Blueprint 2, we suggest a compact, agile, transdisciplinary team. The team should have a wide mandate to operate with clear constraints and a fixed budget. The clear constraint serve to make the team fast, since clear constraints also enables the team to operate within those constraints without having to ask for permission to carry out its **Leader and Manager**

The leader of the implementation team should have a business background, and preferably experience in either running and growing an early stage business successfully, or experience in investing in growth-businesses. International experience and connections to different types of finance is a definite plus. With the team being relatively small, it is preferable if the manager can execute tasks as well. The execution skills can be in PR, Marketing, Finance, or Business Development. **Environmental Engineer and Quantitative Analytics Expert**

The implementation team will have to choose between many similar projects, hence an environmental engineer with a strong analytical skillset can help ease the decision-making process, while also ensuring objectivity and fairness in the selection process.

It is important that the environmental engineer is good at translating numbers into laymen's terms to support the other team-members in their day-to-day work.

Public Relations Expert and Political Liaison

The Blue Economy Implementation team needs a person who can communicate to public and government stakeholders. There will be many successes to share and many stories to tell. An important part of the Blue Economy Strategy is to inspire the younger Maldivian generations to find scalable solutions to the climate crisis challenges facing the Maldives. The Public Relations expert preferably has experience in marketing

mission. The budget should have elements of an ever-green fund: if the team finds way of raising money, those funds should be made available to more Blue Economy projects.

The team described here is designed to make the Blue Economy Hub a success and to facilitate virtuous cycle where one successful Blue Economy project feeds the next project.

In terms of personality traits, the leader needs to be an inspiring presence who leads by example. The strategy is already in place, so the leader of the implementation team needs to be a doer. With a small team and many stakeholders, it is important that the leader has empathy, resilience, and a good eye for managing multiple projects at a time. Quick decision-making will be paramount to keep the project going, and the decision-making ought to be supported by a strong analytical foundation.

The environmental engineer needs to be meticulous and structured, yet creative enough to build frameworks that allow for comparison of solutions that are not quite alike. In the Blue Economy Hub, it will be necessary to compare oranges to apples.

It is an advantage, but not a must, that the Environmental Engineer has worked in both research and commercialization of research.

or the media world, and is adapt at using all digital channels to share strong narratives with the right audience. Ideally, the PR-expert and Political Liaison also has a well-developed sensibility in regards to Maldivian politics and knows which stakeholders to engage and when to engage them. The Public Relations Expert is extroverted, good at quick designs and social media, and has a sense of humor that unites rather than divides.



CITY FACILITATORS

April 2022