



# **The export and scaling concept – “Ecobarge”**

---

Delivery report for the sWASH & grow project. Coordinated by RISE and co-financed by VINNOVA, UDI program (step 3), Sep 2020 – Nov 2022.

Leading author(s) and project partner(s):

<b>Name</b>	<b>Project partner</b>
Victoria Vazhinskaya	Novoheat AB
Mårten Björk	S-Man Solutions AB

<b>Deliverable(s):</b>	<b>Planned</b>	<b>Delivered</b>
5.1.3 New model for WASH including systems export – a feasibility report	Mar 2022	May 2022
5.2.2 Match-making activity UTS for innovation partnership and finance	Apr 2022	May 2022

## Abstract/Executive summary

- The sWASH & grow project has formed a successful platform for developing competences and knowledge sharing between the public and private entities involved. It has also enhanced the opportunities for ECOBARGE, a private concept initiated prior to- and independently from the project, bridging the gaps between innovations, end users and investors internationally.
- ECOBARGE is an inclusive concept any and all stakeholders may form a part of, be a partner in and contribute to. A sustainable platform for making a difference covering the gap between supply of bits and pieces and local needs of services provided. End users dreams and opportunities, technologies and project financing are identified through local feasibilities. Project financed companies are then formed for mutual ownership, operation, maintenance, and education. The concept also allow for final transfer of means of production between shareholders and from project financiers to local communities and entrepreneurs. Based on the Ecobarge provided services, local entrepreneurs are enabled to develop their own businesses. Ecobarge act as shipyard or EPC turning suppliers solutions into supplied services. Continuously developing functions and capacity as per end users needs and new technologies available. If no longer needed, the Ecobarge can be moved to other end users.
- No matter the scale, function or application, if as a temporary or permanent solution, within a modern urbanized area, in a developing country or a disaster zone, the Ecobarge concept represent an attractive, inclusive and sustainable alternative.
- Floating means less bureaucracy, shorter delivery time, no need of using valuable land. Mobile means less risk to investors and ability to adjust to end user needs. Scalable means capacity and functions added when needed. Sustainable means both meeting virtually any and all of

the sustainability goals and being financially sustainable. Innovative means acting as continuous testbed and financed pilot for new technologies during decades to come and ability to scale through organic growth and positive cashflow. Turn-key means delivered already operational at site. Customized means meeting the needs identified by its users at feasibility stage. Modular means less transportation costs and local assembly. On- or off grid means either connected to an electrical network or balancing an electrical grid frequency, storing, and supplying electricity and water itself. Climate resistant means typhoon proof and adjusting to sea levels and climate changes.

- The local end user is the expert on what is needed. Through the ECOBARGE Concept, and as supported, local communities are able to present their needs as visualized valid business cases to investors. Any function meeting end user requirements as defined through mutual feasibilities can be incorporated into an Ecobarge.
- Through the ECOBARGE Concept, governmental agencies for development co-operations are able to dramatically increase the efficiency of their investments and reduce risks.
- The Ecobarge Concept is already proven internationally. The first project, a 200+ MW electricity barge, was delivered and operated in Iraq as connected to the UN “oil for food” program approx. 15 years ago although. Since then, members of the founding team behind Ecobarge have participated in the delivery of another 23 floating electricity barges. In parallel, and as based on the Build Own Operate Transfer business model proposed as part of the Ecobarge Concept, the founders have also delivered 4,5 GW plants for emission free heating and electrical grid frequency balancing. Currently the Ecobarge Concept is introduced for several early-stage projects within Europe, Asia, Africa, and South America.

## Table of Contents

<b><i>Abstract/Executive summary</i></b> .....	<b>1</b>
<b><i>Introduction and background</i></b> .....	<b>4</b>
<b><i>Purpose and background of this delivery</i></b> .....	<b>4</b>
<b><i>Description of this delivery</i></b> .....	<b>4</b>
<b><i>Results/Outputs of this delivery</i></b> .....	<b>5</b>
<b><i>Appendices</i></b> .....	<b>5</b>
<b>Appendix 1: THE ECOBARGE CONCEPT</b> .....	<b>6</b>
<b>Appendix 2: THE SWEDISH EXPORT FINANCING SYSTEM FOR GREEN AND SOCIAL PROJECTS</b> .....	<b>8</b>
<b>Appendix 3: PUBLIC FINANCIAL INSTITUTIONS</b> .....	<b>11</b>
<b>Appendix 4: SHIP-FINANCING</b> .....	<b>15</b>

## Introduction and background

This report is a delivery within the project “sWASH & grow – scaling off-grid WASH innovations”. The project is coordinated by RISE with 40% co-finance from VINNOVA (the Swedish Innovation Agency).

The objective of sWASH & grow is “to develop tools that improve the opportunities for innovators and aid organizations to bring more circular, inclusive and sustainable innovations to those in need”.

The project involves 28 partners from Sweden, Bolivia, Lebanon and South Africa representing private-, public-, academic- and NGO-sectors. The goal is to improve the conditions for innovators (sellers) to be able to meet relief organizations’ (buyers) demands. Through the project, innovative solutions will be tested in real environments, upscaled and exported.

Implementation focuses on:

- Identifying success factors for off-grid solutions.
- Contextualizing methods for testing, demo and validation that respond to buyers’ requirements and meet the needs of the most vulnerable.
- Quality-assured tools for developing and scaling up innovations based on requirements, needs and price.
- Communicating results to stakeholders in the innovation system.

sWASH & grow brings together major global buyers, the innovation system's support functions and the innovation companies, together in a partnership aligned with Agenda 2030 and SDG 17. More specifically, the project contributes to SDG 6 and 9 on clean water and sanitation and will have an impact on SDGs 2, 3, 7, 12 and 13 on zero hunger, health, energy, production, and climate.

## Purpose and background of this delivery

Novoheat AB and S-Man Solutions AB are part of UTS group and WP5. Other contributing members of the UTS Group are TEM (<https://www.tem.se>), Electricity (<https://electricityinnovation.se>), Kapitalguiden (<http://globalcapitalguide.com>) and Urbs (<https://urbs.systems>). WP5 developed methods and models for scaling up, matchmaking and export through organized events, continuous internal meetings to which also ECOBARGE (<https://ecobarge.se>) and Skye Contracts (<http://www.skyecontracts.com>) have been engaged through S-Man Solutions (<https://www.s-man.solutions>) and Novoheat (<https://www.novoheat.com>). ECOBARGE concept was taken as an example to demonstrate the opportunities of innovations scaling-up, business development and export.

## Description of this delivery

1. S-Man Solutions presented Business Model that makes possible to deliver innovations and sustainable system solutions where the end-users are included beneficiaries in the supply chain and the business. The model was successfully tested by the founders of S-Man Solutions within Elpanneteknik Sweden AB (<https://elpanneteknik.com>) for the Chinese market.

2. In parallel with the sWASH & grow project Novoheat AB developed pre-feasibility study “ECOBARGE PILOT PROJECT FOR THE LOCAL COMMUNITY as partially also financed by Smart City Sweden (<https://smartcitysweden.com/success-stories/>) and MTI Investment (<https://www.mti-investment.com>). Off-grid concept development for Zanzibar, Tanzania.” The pre-feasibility provides technical report and project financing based on a combination of ship-financing, build-own-operate agreements, incorporating Swedish export credits and business models providing opportunities for scaling Swedish technologies. More in details please find in Appendix 2, 3 and 4.
3. A technical pre-feasibility explores the technical opportunities for testing the services at the Communities in Micheweni district on Pemba, an island north of Zanzibar. UTS sees the project as a pilot for the local communities and fishermen. But it is equally important in a second step to provide about 200 000 inhabitants with the services such as cooling, electricity, and different grades of water as well as water purification, also to be used as a bunkering station.
4. Based on Zanzibar pre-feasibility study Novoheat together with Ecobarge Sweden AB developed a project case in Baraka, DR Congo. The next stage is the feasibility study development that will be completed next year.
5. Novoheat developed questionnaires that can be used for further project development using different technologies.

## Results/Outputs of this delivery

ECOBARGE concept and developed pre-feasibility study led to the signing of MOU between LM International (Läkarmissionen) & ECOBARGE Sweden AB (<https://ecobarge.se>) to drive innovative change in DR Congo.

## Appendices

Appendix 1 The ECOBARGE Concept

Appendix 2 The Swedish export financing system for green and social projects

\*developed by UTS partner urbs

Appendix 3 Public financial institutions

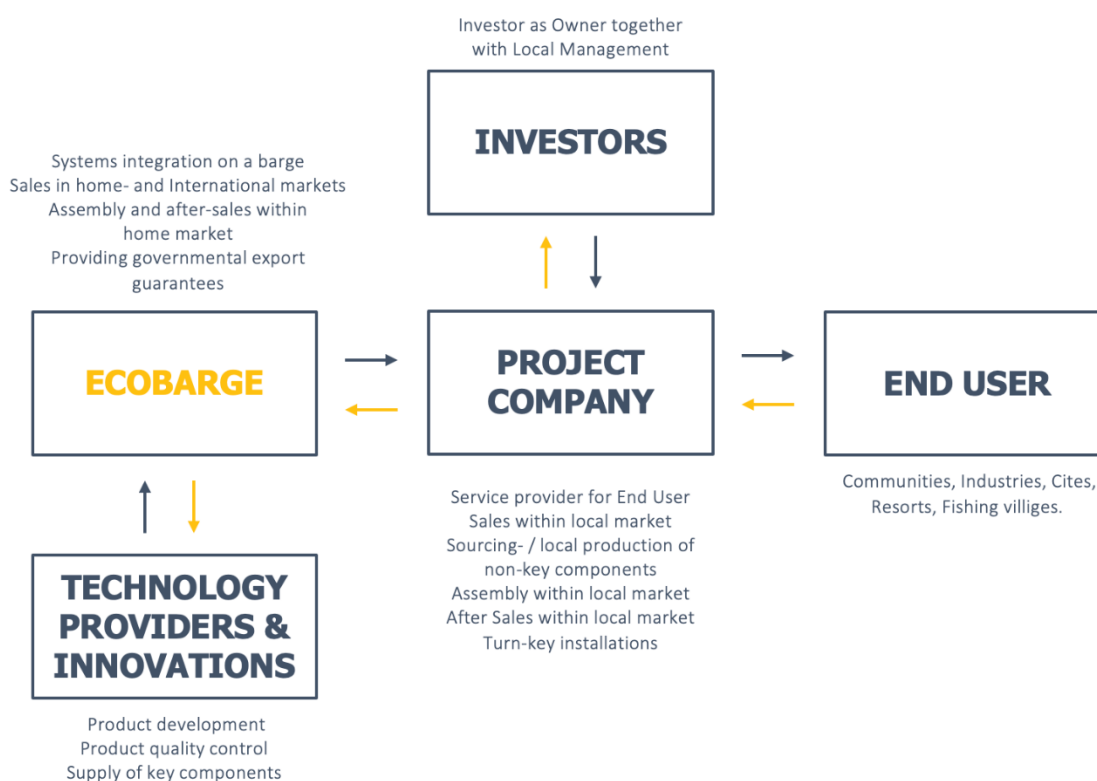
\*developed by Svenska Kapitalguiden AB

Appendix 4 Ship-financing

## Appendix 1: THE ECOBARGE CONCEPT

### TO START WITH PRE-FEASIBILITY DEVELOPMENT

The pre-feasibility provides projects financiers as based on a combination of ship-financing, build-own-operate agreements, incorporating Swedish export credits and business models providing opportunities for scaling of Swedish technologies.



For **local partners end users**, the model ensures sustainable services based on latest available technologies provided on terms commercially competitive with existing non-sustainable solutions, on grid and off grid. Virtually any time of products and services meeting end user needs may be incorporated. At same time the model incorporates potential for meeting the SDG’s in terms of improved governance, education, job creation, development of entrepreneurship, gender equality, poverty reduction etc. locally. This as built on Build Own Operate Transfer mode whereby the educated local community or partners may become owner of the plants providing the services included once investors exit and local entrepreneurs educated on operation and maintenance.

For “bankable” impact **investors, banks, and governmental export credit providers**, as based on ship financing (please see below more information), the model represents unbeatable returns on investment within sustainable solutions at less risk. This as the fully insured Ecobarge themselves, and the revenues from services provided, constitute 70-90% of the collateral. Investors may have the actual investment back as revenues within 1-4 years depending on business case with up to 25 years of economic lifetime. In addition, the Ecobarge can be moved to other customers if services not paid for.

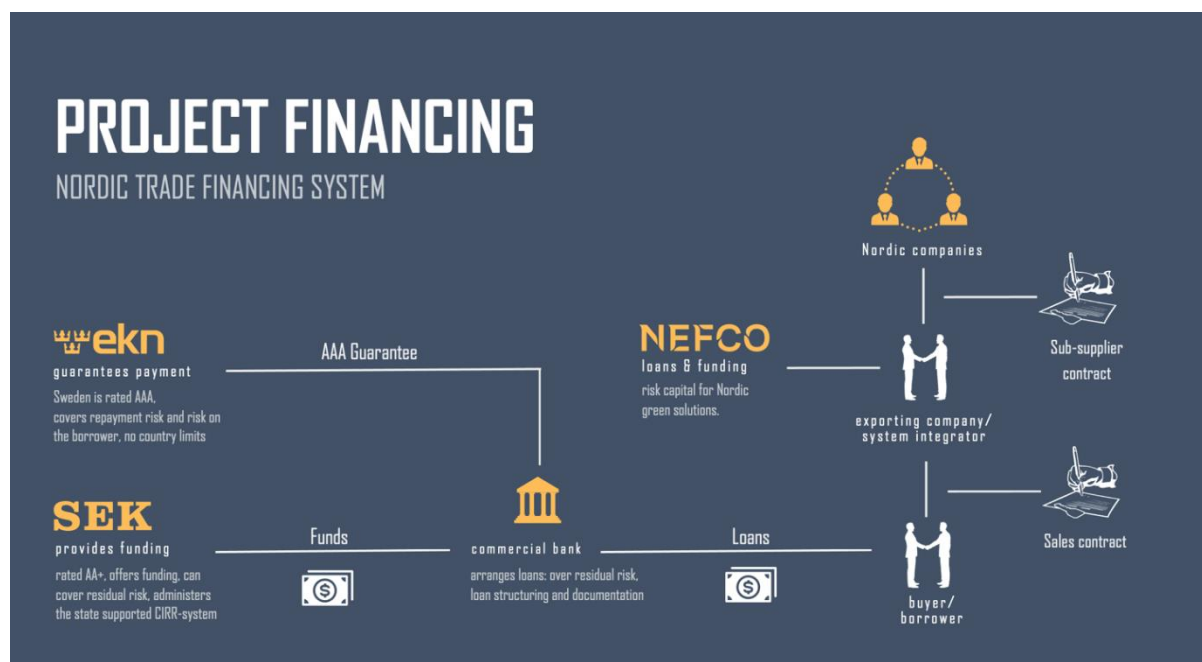
For **suppliers and innovators**, the business model provides scalable business opportunities, secured payments for deliveries performed prior to shipment from works and access to being represented at pilot plants locally. This in co-operation with a Swedish turn-key supplier with ability to integrate solutions for an enhanced offer and at same time scale. And who also take responsibility for operation and maintenance through long term service agreements thereby reducing warranty risks. IPR and commercial terms are secured through shareholder agreements between Ecobarge Sweden AB, local partner companies and investors in local ship owning companies owning the Ecobarge.

In collaboration with partners, Ecobarge evaluate need of end users locally and engage investors and suppliers. Ecobarge calculates, design, provides turn-key engineering, procures components and services, supervises installation, and performs commissioning at site as supplier of complete turn-key Ecobarge meeting end users need locally towards locally started ship owning project companies. Through services contracts, Ecobarge also takes full responsibility for education, operation, and maintenance for as long as deemed required by the local community / entrepreneurs / end users.



## Appendix 2: THE SWEDISH EXPORT FINANCING SYSTEM FOR GREEN AND SOCIAL PROJECTS

In the best-case scenario, the Swedish export financing system, with SEK as a lead financing partner, could finance the whole project, including an EKN guarantee up to 75% of the financing and NEFCO’s financing of the Swedish supply deliverance.



To be able to reach this level of financing there are some requirements for the project to become bankable. As there are no check-lists available for the different organizations the requirements below are based on earlier experiences of export projects and based on the assumption of the most probable requirements for the Ecobarge project at Pemba Island.

### Requirements

**Receiver of project export financing needs to be the buyer of Swedish services and goods.**

The assessment of the project is done through a dialog between the ‘buyers’ commercial bank and the financial organization. SEK and EKN don’t feel comfortable to have a too deep dialog with the Swedish company.

**Swedish content.**

The Swedish content of the project financing must be a minimum 30 % of the total value. Both the value of the services and products could be included in the content calculation. As long as a financial stream goes back to Sweden it is ok if the service or product is delivered by a local company. There is a limitation to the local content due to OECD-regulations.

List of key components from the supply side, including list of largest suppliers should be presented. The list should include how much of the components in the plant (in percentage cost) come from Swedish companies and how much that comes from local companies.

<b>Project costs.</b>	SEK and EKN are interested in projects that have a project cost that exceeds 20 MNSEK but they ‘prefer’ to look into projects that exceed 100 MNSEK and are even more interested in projects with a value over 1 BNSEK. If the project cost exceeds 1 BNSEK it is to be considered as a High-Potential Opportunity and the Team Sweden resources are available for facilitating the project.
<b>The receiver should have an ownership structure that includes a Sponsor with a positive track-record.</b>	SEK and EKN normally ask for a strong sponsor as an owner and do not normally accept individual ownership structures. A strong owner could be an industrial partner, a strong brand or an organization that has a track-record in the sector. SEK/EKN needs a sponsor that could take over the business and the debt if the business goes bankrupt.
<b>The receiver must have a strong financial history.</b>	<p>The buyer must show positive results in the last three years. Even if a negative result is due to investments in R&amp;D, the case will probably not be accepted. An assessment is especially done on the costs to see that the business is financially viable.</p> <p>The buyer must be ready to invest 20% of the total project cost.</p>
<b>The company and the board of the company should have a management team that have the right competence to lead similar businesses</b>	The team leading the business should have experience in similar projects.
<b>Commercial Bank with International experiences and ‘approved’ geographical location.</b>	<p>To get a commercial bank on board is essential for the success of the financing. The bank acts as a custodian for the deal.</p> <p>SEK and EKN prefer a dialog with the bank and not with the end borrower. They require a bank that is international and has been working within the export credit system on a global basis. SEK and EKN have scarce resources and don’t have the capacity to educate the local bank on how to work with international trade. There is a risk involved depending on the country where the project is taking place. Therefore all banks are not accepted from their part.</p> <p>The dialog between SEK/EKN and the commercial bank is a Catch 22.</p> <p>The commercial bank and insurance company will have the same questions as SEK&amp;EKN + green and social framework (See below).</p>
<b>A bank guarantee from owner to the bank</b>	A personal guarantee from the business owner or shareholders for repaying the loan could be issued to secure the financing.

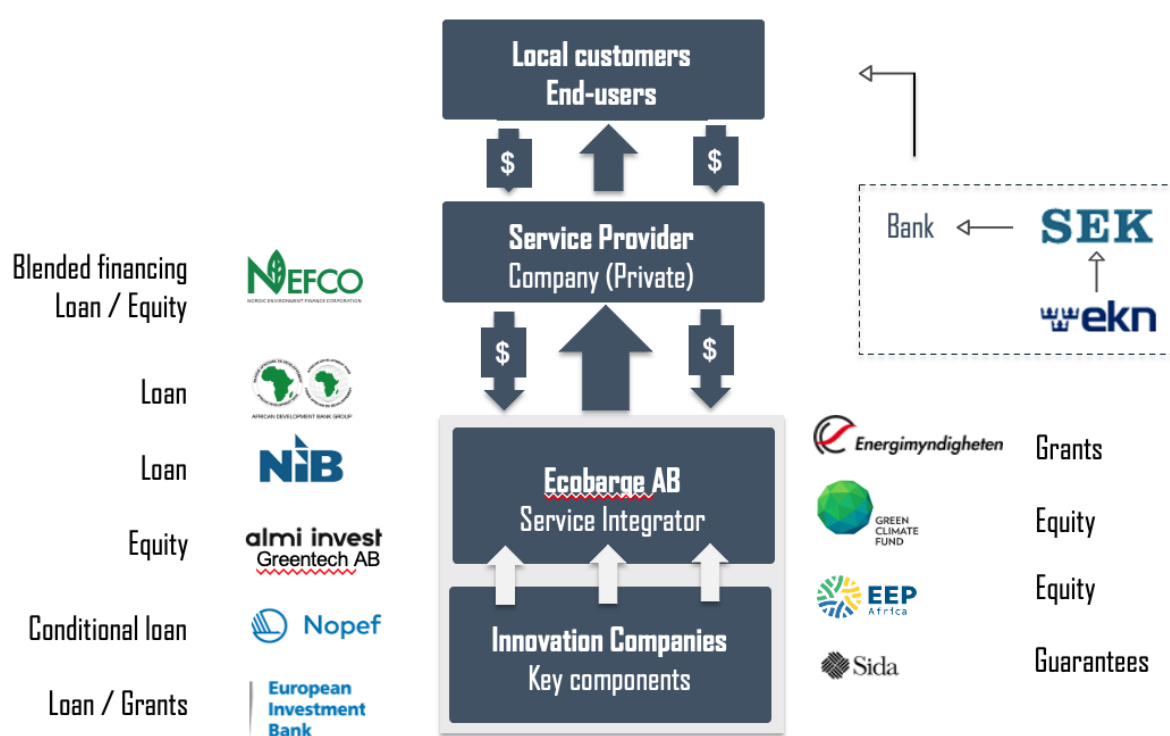
<b>Business Model</b>	<p>A clear business model needs to be presented (how will the company make money).</p> <p>Existing agreements, including the value, with clients need to be attached, an explanation on future agreements (feed-in, take-off).</p> <p>Different scenarios (worse-and best case) should be presented.</p> <p>Expected Income Statement the five coming years: (Total Revenue, Total Cost of Goods Sold, Gross Margin-Total Operating Expenses, Total Expenses, EBITDA).</p>
<b>Loan Structure-Financial Model</b>	<p>A loan structure needs to be presented. Cash-flow to pay the loan, credit period etc.</p>
<b>Green and Social Policy Framework</b>	<p>A framework for the company’s safety, environmental, health, employment processes and policy are integrated in the business.</p>
<b>Performance and Climate Insurance</b>	<p>An insurance company needs to underwrite the risk for the project (guarantee carbon and energy savings).</p>
<b>Suppliers involvement</b>	<p>How much of the plant assembly can be done off-site, provided it is cost effective, percentage cost?</p> <p>What is the predicted total energy (El., Gas &amp; Oil) consumption, what are the largest energy consuming components?</p>
<b>Nordic based company with an ongoing operation.</b>	<p>Regarding Nopef, the receiving grant or loan taker must be a Nordic company with a successful operation in the Nordics. The new operation must be outside EU and NEFTA.</p> <p>For loans or equity proved by Nefco the company must have had successful operations the last three years. Projects outside the Nordics could be financed.</p>

## Appendix 3: PUBLIC FINANCIAL INSTITUTIONS

For the future financial development several other Public Financial Institutions (PFI) than SEK and EKN may have funding options available, see list below for examples. The structure of the assumed project owner will give the project owner itself as well as the subcontracted suppliers opportunities from several PFIs. The different institutions will be able to support the companies chosen, in different stages of the project, from early-stage financing to implementation and start of operation.

The institutions have different objectives and should be individually evaluated by each company during a feasibility study.

From the list of available PFIs, it will be possible to create a financial value chain to support the different stages in the project and the financial impact of the expected BOT structure.



### Almi Invest Green Tech

Almi Invest GreenTech is a venture capital fund. The fund is for innovative small and medium-sized companies whose products and services contribute to the reduction of greenhouse gases. The main purpose of the fund is to bridge the market gap that exists between demand and supply of venture capital investments that exist among small and medium-sized companies in the energy and environmental sector as a result of, among other things, difficult to assess risks and long commercialization processes.

The fund is open to investments in a number of different areas, such as renewable energy, smart grids, biogas, agri-tech, advanced environmentally friendly materials and sensor networks.

	Capital category: Equity
<b>Swedish Energy Agency</b>	Swedish Energy Agency supports business development that allows commercialization of energy related innovations, and ensures that promising clean-tech solutions can be exported. Frequently announce relevant calls.
	Capital category: Grants
<b>Nefco</b>	Nefco finances and implements small and medium-sized green projects outside the Nordic countries through their own investments on market terms, and trust funds with incentives and blending. Aims to finance Nordic private projects that aim to scale up on global markets through Nefco’s own equity (investment fund) blended with private capital and other funding.
	Capital category: Equity and loan
<b>NOPEF</b>	Nordic Project Fund (Nopef) is to facilitate the scale-up of Nordic green solutions on global markets. Nordic small and medium-sized enterprises (SMEs) and mid-cap companies can apply for grant funding for their internationalisation projects aimed at markets outside the EU/EFTA.  Funding provided by Nopef can cover costs for feasibility studies and other preparatory business activities. Supported projects shall contribute to direct or indirect positive impact on the environment or climate, and have a Nordic interest through job creation, export opportunities, technology transfer and the promotion of Nordic values.
	Capital category: Conditional loan
<b>NIB</b>	Nordic Investment Bank offers sustainable long-term financing for projects that generate long-term environmental impact and productivity growth.
	Capital category: Loan
<b>EEP Africa (NDF)</b>	EEP Africa provides early stage grants and catalytic financing to innovative clean energy projects, technologies and business models in 15 countries across Southern and East Africa.  Project that can be funded are: Feasibility Studies or Pilot, Demonstration, Replication, or Scale-up Projects
	Capital category: Grants

### **Green Climate Fund**

GCF seeks to engage across public and private sectors to unlock high impact and paradigm shifting climate investments. GCF offers a range of flexible financial instruments, enabling it to respond to specific investment contexts and market barriers.

In addition, one of the key features of GCF is its ability to partner with the business world to mobilize institutional investors at scale to fund climate action, and to encourage local private sectors in developing countries to deliver climate solutions.

Capital category: Equity

### **African Development Bank Group (AfDB)**

As the continent’s premier development finance institution, the African Development Bank (AfDB) Group borrows from capital markets for on-lending to its regional member countries.

### **African Development Fund (ADF)**

Capital category: Equity

The African Development Fund (ADF) is the concessional financing window of the Bank Group that provides low income Regional Member Countries (RMCs) with funding in support of projects and programs that spur poverty reduction and economic development.

Capital category: Concessional loans, grants and guarantees.

Also technical assistance for studies and capacity building

## **Conclusions**

There has never been a better time to realize small scale off grid solutions for creating social and environmental positive impact locally. The Ecobarge project at Pemba, used as educational example within sWASH & grow, is still in an early stage but do have great potential to be deployed and scaled up in a positive way for the entire island. In the end of December/beginning of 2023, if an initial investment memorandum is in place, Urban Tech Sweden could gather the task force group to present the case and have an instant feed-back on the case. The Task-Force includes Durable Vision Invest, EKN, Infranode, Nopef, Nefco, Polhem Infra, SEK, Swedish Investors for Sustainable Development, Svenska kyrkan and Swedfund.

Considering the early stage of the project we propose a financial roadmap that is divided into two phases. In the first phase an evaluation of the available PFIs could be conducted, a creation of a financial value chain to support the different stages in the project could be built and the financial impact of the expected BOT structure evaluated. The institutions have different objectives and should be individually evaluated by each company during a feasibility study. The first phase should also include that Ecobarge partner up with the selected donor funding organizations and applies for a grant for the Pemba Island project and the business development for scaling up in the next phase. The focus from a business perspective in the first phase should be to find a local end-client that is strong financially to build a long-term partnership with, and also build a strong case working on the requirements above mentioned.

A private investor might be challenging to attract in this first pilot plant phase at the island of Pemba as the concept is not locally tested before and the end-client most probably don't have strong financial books. If a private investor is considered to invest in the project it should be kept in mind for the next step, to select an investor who has an experience realizing similar projects or even better be a Sponsor with a strong brand from the sector.

In the second phase, when Ecobarge concept is tested locally, strong local partnership with the end-client is built, including agreements in place and a commercial bank has assessed the project, SEK and EKN could be approached. Ecobarge could then use the investment needed in debt proceeds either as a senior secured green loan or as a senior secured green bond for the development potentially also as connected with ship-financing.

## Appendix 4: SHIP-FINANCING

### Lenders

Ship financing is an asset-based financing with similar elements as other project financing alternatives. Cost for ship financing through traditional banks, often supported by governmental guarantees, have been favorable to shipowners. A good long term charter contract always provides competitive traditional finance and there has been a gap between finance available and the need of capital also being one of several causes to “overbuilding” of ships during volatile periods where shipowners operating on “spot market” benefit from lack of ships versus need of transport within certain segments. In several countries, financing is also effected by shipbuilding subsidies for supporting local shipbuilding.

Private funds often find it hard to compete due to a higher requirement on return on investments. But there are some areas where private funds differentiate themselves. Even utilizing the ship as collateral, traditional banks rarely accept becoming an owner of a ship as exit option. A fund may offer more flexible structures and higher speed of execution without the internal bank constraints.

### The loan

1. Borrower structure: The shipowner set up special purpose vehicle, SPV, to own a single ship. The assets of the SPV is the ship, contractual rights related to the ship and bank accounts. Certain criteria with reference to completion of a ship need to be met for a ship to become registered in the ship register which in is required for mortgage. There are also certain requirements of interest to suppliers for when goods supplied are considered being part of the ship. This as mortgage is considered as a stronger legal right than for instance retention of title in a procurement contract for products supplied to a shipbuilder.
2. Tenor and amortization; A ship finance is usually a deal specific term loan with amortization during an agreed number of years.
3. Security: The collateral structure is normally a mortgage of the ship, insurance policies covering the ship, earnings and ancillary contract rights relating to the ship and bank accounts. The lender typically loans a percentage of the vessel based on a loan-to-ship value ratio, “LTV”. It is common that the investors into the SPV also provide a guarantee to boost the creditworthiness of the SPV.
4. Financial covenant; As the only real value of the borrower is in the ship itself, a ship finance has an LTV maintenance covenant, and a valuation of the ship is procured on a periodic basis to test the covenant. A lender normally also requires a debt service ratio covenant to ensure that the cashflow generated by the ship is enough to cover the debt service.
5. Ship covenant: For the lender, it is important that the ship remain able to perform as per its purpose, able to generate intended revenues. The borrower therefor needs to commit to a regular reporting on maintenance and management of the ship, seaworthiness, timely payment to suppliers and crew as well as compliance with classification society and flag state requirements.
6. Employment: The “charter contract” or employment contract of the services provided by ship to its customers is of great importance to the lender. A favorable long term documented “charter contract” with a “bankable” end user provide for less interest rate and higher LTV. Depending on the individual case, the loan agreement contains requirements for the charter contract or at least metrics to ensure that the loan can be serviced and paid.

### Default scenarios and mitigating factors



1. Damage to- or loss of ship; As a ship may sink or suffer from a mayor casualty, the lender requires insurance coverage exceeding the loan amount, and in the event of a “total loss” would be entitled to the proceeds from the insurer directly as a loss payee.
2. Insufficient cashflow; If the ship for any reason does not generate enough cashflow for the loan to be serviced and paid, for instance due to suffering from a cancelled charter contract, unexpected repairs, is “arrested” due to unpaid bills, the ship finance loan normally require an agreed amount in cash to be available at bank account providing for debt financing while short-term working out a solution.
3. Decrease in value; A ship has normally an expected economic lifetime of 25 years, thus requiring regular amortization. Depending on fluctuating markets, supply, and demand etc., the value of the ship may fluctuate depending for numerous reasons which is why lenders provide loans based on an agreed LTV. The lender monitors the value of the ship through regular appraisals and the LTV covenant serve as an “early warning” system for the lender.

#### **Further considerations effecting ship value etc.**

1. Technical / operation management; Its common that the investor into a ship do not possess the knowledge to maintain and operate the ship for its purpose and therefor outsource this function. For the lender, its important that the selected technical manager employed is reputable.
2. Regulations, Classification and Survey; A ship need to be approved by the national authorities in its “flag state” or country of origin, sometimes where operated and also classified within a reputable classification society such as BV, LRS, GL etc., each with its own norms and regulations for securing safety and operation. The classification regulations are observed during the construction of the ship as well as components installed in ships. Distinction is made between components for essential use, (normally propulsion, safety etc.), and non-essential. Essential use means more costly class certificate costs added to components installed. Area of trade, for instance North Atlantic or Equator etc., effect selection of products, calculations, and engineering etc. as well as norms to follow. The building cost of a ship able to trade world-wide is higher but also provide for easier exit in case a charter contract is ended. Inspector approval of a ship is required both for insurance and operation. As a mayor operation cost depending on the ship type, the ship undergoes surveys and inspections for maintaining its classification status, which need to be reflected in the cost budget. Depending on type of trade, citizenship of vessel may be required effecting ability to transfer a ship effecting value and even in rare cases impose lender to become an owner.
3. Maritime liens: Maritime liens are confidential and arise by operation of law aa connected to repairs, maintenance, crew costs etc. Normally such are prioritized in opposite to commercial liens in case of disputes.
4. Political and geographical risks, sanctions; The lender may be exposed to political risks such as piracy, corruption etc. also effecting willingness to provide funding and interest rates for. The area of trade and expected ambient conditions effect risk assessments thereby interest rates. Violations of US economic regime or laws within the country of operation etc. may cause effects to the lenders who therefor have compliance programs to be warranted by the borrower.

#### **Swedish ship finance**

Svenska Skeppshypotek AB, <https://www.svenskaskeppshypotek.se/> and below referred to as SSH, support as potential financier and advisor on ship financing. This for Swedish ship owning companies

and / or foreign ship owning companies with a mayor Swedish interest or under Swedish influence and in co-operation with Swedish banks such as SEB, SHB etc.

Loans can be provided for up to 70% of the value of the ship as evaluated by SSHS. For smaller shipowners, a special regulation provided the opportunity to provide loans with up to 90% of the vessels value. The period of loan can be up to 15 years. The loan should have been fully paid by the time the ship is 20 years old as counted from when commissioned.

The loan shall be secured through mortgage in the Swedish or foreign ship or through a guarantee from a bank or from a state. The interest rate is decided for each individual case and can be based on either firm or variable interest rate. The loan can be in either Swedish or foreign currency.

For enabling a ship to meet the criteria within Sweden, and since 2018, the vessel should have a length of minimum 24 meters, (normally a boat is called a ship when exceeding 12-4 meters). Barges are within the definition of ship. Ships are to be registered within IMO register and there are several detail criteria need to be met.

Prior to contacting SSHS, business idea, type of ship, business plan including expected revenue stream is to be developed by the applicant.

#### **Supportive state guarantee´s with Swedish Export Credit guarantees.**

The principle is that exported negotiates with the bank who arrange a loan. EKN provide the guarantee and, if applicable, Swedish Export Credit finance. Depending on the actual business case the exporting company can reduce its risk down to 5% even if providing a long term credit for its customer.

Swedish state guarantee is provided by the Swedish governmental entity Svensk Export Kredit, below referred to as SEK. The entity generates profit to Swedish and foreign shipowners who are to invest in vessels with propelled by liquefied natural gas (LNG), rotor sails, methanol or batteries can receive financing also for conversion of existing ships. Guarantees can also be provided for infrastructure that supports shipping with storage of natural gas or biogas, optimization of freight flows, development of fairways, traffic management in ports or digitalized traffic management etc. SEK has a special focus on supporting sustainable value chains and products as part of its assignment. Applicants should be an export company with a turn-over of more than 500 million SEK active within the marine market and for project value of minimum 20 million SEK.

SEK administrate the government supported Commercial Interest Reference Rate system, providing for low, firm interest rate in line with OECD agreements, CIRR-ränta | Svensk Exportkredit (sek.se). The interest rate is published on OECD webpage and follow OECD guideline, EU and national Swedish regulations. This for ensuring countries not benefitting their own export industries in an unfair manner. Its considered a huge benefit to exporters and shipowners to receive a firm predictable interest rate through the whole loan period as financial costs thereby predictable. If market rates increasing, CIRR rate ensure same rate throughout the loan period. If market rate below the CIRR rate, the customer of the exporter may choose another option but has than been able to have a “free of charge roof” if interest rate throughout the period of negotiation up to a maximum of 4 months. EKN premium and bank margins and costs are added to the CIRR interest rate which is changed on monthly basis. Currently the CIRR rate varies between 1,47% - 2,16% depending on time of the loan.

Guarantees can also be provided for infrastructure that supports shipping with storage of natural gas or biogas, optimization of freight flows, development of fairways, traffic management in ports or digitalized traffic management etc. SEK has a special focus on supporting sustainable value chains and products as part of its assignment. Applicants should be an export company with a turn-over of more than 500 million SEK active within the marine market. As alternative, and through such collaborations, also Green Bond funding may provided, [SEK\\_Green\\_Bond\\_Framework.pdf](#) following the guidelines of Green Bond Principles ([icmagroup.org](http://icmagroup.org))

## Conclusions

A collaboration is with other entities, such as leading shipowners, meeting the requirements for enabling Ecobarge Sweden AB to fully utilize the opportunity of Swedish Export Credits is foreseen and included in its business model. As alternative, and through such collaborations, also Green Bond funding may provided, [SEK\\_Green\\_Bond\\_Framework.pdf](#) following the guidelines of Green Bond Principles ([icmagroup.org](http://icmagroup.org)). The conclusion of the evaluation is that export guarantees remain of great interest for later intended scale up of the Ecobarge concept.

Regardless export credits, ship finance may be incorporated also during the building period of the barge once the vessel meet the criteria of being registered, thereby allowing for mortgage. The loan period is longer versus for instance leasing alternatives thereby competitive.

An option to be evaluated at order stage of pilot plant, considering the short building period of the vessel, is that the supplier of the barge sell the barge to the SPV utilizing traditional financed letter of credit, L/C, thereby securing full payment of the barge for the supplier, and its sub-suppliers, as partial payments under L/C during building may be allowed for paying suppliers. Ship financing is then implemented when the barge is fully assembled and commissioned.