

Project: Grow Arctic;

Introduction:

THE INSIDES OF THE GREENHOUSE;

What can we grow?

We can grow indoor grown-food like :

- Salad and greens farm
- strawberry farm
- Potatoes
- Basil

How do we grow it?

Thanks to a local greenhouse. It used by Hydroponic culture and solar energy.

For grow it, we have to used local fertilizer for the vegetables. (be automatic circular economy from bio garbage for compost)

What does a greenhouse need?

A greenhouse need:

- Two-storey building with a ground area
- Built with solar energy, wind power and ocean turbin
- Air conditioning
- seeding room
- control center
- water treatment system
- packing workshop
- ATF Multi-tier growth

The kings of the greenhouse are undoubtedly tomatoes and cucumbers, which also have the same cultivation requirements. Many other species are suitable for growing under cover: eggplant, melon, salad, broccoli, Swiss chard, spinach, carrot, cabbage, radish, chilli, pepper... And even fruit vines, whose development will have to be closely monitored: grapes, kiwi... How many plants are grown? Count 25 large plants for 10m² of greenhouse.

NB: Unless you have several greenhouses, grow vegetables with the same needs in the same greenhouse.

- Prune the various vegetable plants regularly, to control their expansion and not to lose light in the greenhouse.

- Pollinate the flowers by hand.

- Clean your plants of any yellowed or diseased leaves, as well as fruits that cause unnecessary plant fatigue because they will not be consumed.

- Do not squeeze the plants together, place them in staggered rows so that they have as much space as possible. You will avoid the spread of disease

We will try to maintain a temperature in the greenhouse between 25 to 30°C, 20°C at least extreme. For this purpose, shade and ventilation will be essential in summer. However, heating is the main critical point of the installation.

In peppers, a night temperature of between 7 and 10° C (45 and 50° F) during flower development can cause reduced fruit growth or lack of fruit.

Similar products:

On Svalbard there is a Greenhouse that runs on clean energy that we have gathered information about the greenhouse from considering the conditions are the same;

“Polar Permaculture jobber med å dyrke lokal mat her nær Nordpolen. Vi dyrker grønt som vi leverer til restauranter og hoteller, samtidig som vi henter inn matavfall til kompostering. Gjennom dette jobber vi frem en sirkulær, grønn økonomi med mindre avfall og bedre bruk av ressursene. I tillegg til å dyrke mat, tilbyr vi guidede turer, kurs og workshops. På de guidede turene våre besøker vi både laben vår og drivhuset vårt. Kontakt oss i dag og finn ut hvordan man dyrker mat nesten på Nordpolen!”

Info@polarpermaculture.com

<http://polarpermaculture.com/>

In Canada there are multiple greenhouse, but only one or two that can withstand the weather that is such a pressing matter where Vardø is situated.

«There are other greenhouses in the North, but this one combines passive solar design and hydroponics to overcome the harsh conditions on the north shore of Hudson Bay, and is scaled to serve the hamlet of about 1,000 people. Inside, a reflector captures warmth from the sun, which is stored in a large black tub of water that heats the greenhouse. Just three to four hours of sunlight a day are needed to maintain the correct temperature.»


They make mostly Kale:

«The kale chips were even more popular than the other foods on the table. The first harvest was quickly eaten up by enthusiastic residents, most of whom believed this was the first time they had ever eaten anything grown locally.»


Link :

<https://www.cbc.ca/news/canada/north/kale-in-the-arctic-inside-an-igloo-greenhouse-that-could-inspire-fresh-food-production-in-the-north-1.3698004>

Business Model:

		Company Name: <u>Dyrk Varanger</u> Navn på bedrift:		Date: 10.10.19 Dato:		
8 Key Partners <i>Partnere</i> <ul style="list-style-type: none"> Members of the Enthusiasts of Dyrk Varanger Other contacts such as –schools and universities. Vardø Municipality and private investors. Innovation Norway Varanger Kraft Sparebank1 Storebrand 	7 Key Activities <i>Kjerneaktiviteter</i> <ul style="list-style-type: none"> Cultivate edible growths in the Arctic climate zone Documentable ecological way 	2 Value Propositions <i>Verdiløfte</i> <ul style="list-style-type: none"> Provide a module of the greenhouse. Provide a 3D model of the Greenhouse that will be good and appropriate to <u>climat</u> of <u>Vardo</u>. 	4 Customer relationship <i>Kunderelasjon</i> <ul style="list-style-type: none"> Personal <u>contact</u> Website 	1 Customer Segment <i>Kundeselement</i> <ul style="list-style-type: none"> Everyone 	6 Key Resources <i>Ressurser</i> <ul style="list-style-type: none"> Vardø School, / Vardø School, years 1- 10 Pre school. Municipality of Vardø innovation Norway Varanger chef gardeners Others 	3 Channels <i>Kanaler</i> <ul style="list-style-type: none"> The Schools in Vardø «Word of mouth» Social Networks; - Instagram
9 Cost Structure <i>Kostnader</i> <ul style="list-style-type: none"> Warehouse in <u>Skippergata</u> kr. 500000. Work and material towards 1million kr. Other cheaper options are under consideration. Building a new custom greenhouse. 			5 Revenue Streams <i>Inntektsstrøm</i> <ul style="list-style-type: none"> Revenue <u>will be genereratad through</u> Sales <u>regarded to</u> <u>members</u>, <u>local community</u>, restaurants and <u>Educational activities</u>. This <u>will be a</u> <u>touristic attraction</u> (most <u>northern</u> greenhouse) 			

Business-model; Funding

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VP:

Value for Vardø:

- Provide access to high quality organic vegetables goods produced with the purest water and under very special conditions.
- The greenhouse should seek to be operated at the same time to provide zero emissions, circular economy.
- A clean and reliable food source.

Value from us:

- Provide a module of the greenhouse.
- Provide a 3D model of the Greenhouse that will be good and appropriate to climate of Vardø.

Value for Tourism:

- A new touristic experience in the arctic.
- A reliable food source for the tourism industry in Vardø, referring to the accessibility to clean food and a food source that doesn't require an import tax.
- A sustainable label and an ecological label to the city of Vardø.
- A unique experience.

Market:

- This is a product that everyone can benefit from and be interested in. This is also a sustainable and ecological opportunity to work up the brand that is Vardø.

Investors/key partners:

- The key partners are the people of Vardø who want this to happen in the first place, also big companies such as Innovation Norway and Sparebank can help with the financial problem.

SWOT-analysis:

Build:

Strength:

- ❖ Easy growth vegetables
- ❖ Local opportunities / community
- ❖ Less pollution

Weakness:

- ❖ The winter and polar night
- ❖ Intended length of sun exposure
- ❖ Rough winds

Opportunities:

- ❖ No restriction
- ❖ No imported vegetables
- ❖ Helpful in mental health

Threats:

- ❖ Weather

The Value Propositions already cover the strength and the opportunities of what the greenhouse can be, but the biggest problem is the weather that is situated in the Vardø, therefore we have chosen to look upon different greenhouse that are in the arctic.

Business : Tourism

Strength :

- ❖ Unique (does not exist in the arctic, except for Svalbard)
- ❖ Local growth
- ❖ Sustainable and ecological step

Weakness :

- ❖ Almost none, considering Vardø allredy is a visited place, there is no weakness in adding something extra

Opportunities :

- ❖ No restriction
- ❖ Hurtigruta
- ❖ Helpful in mental health (for both visitors and inhabitants)

Threats :

- ❖ Weather
- ❖ Low market, less availability (tourism)

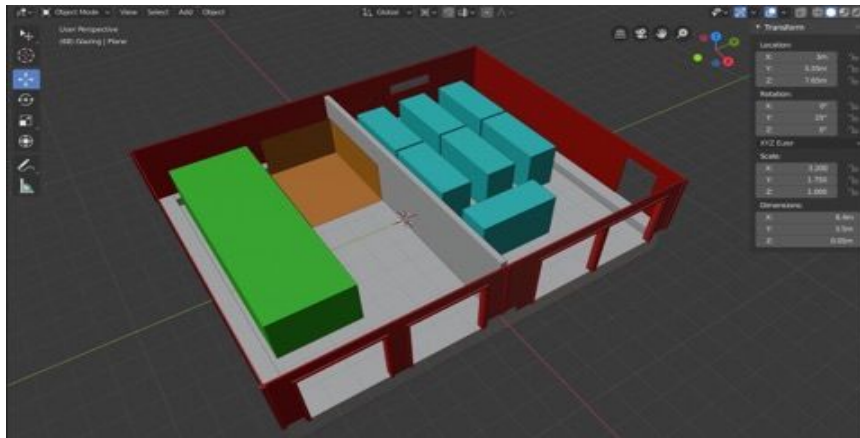
When it comes to tourism this is an opportunity for the entire county that can be exploited, tourists already come to vardø everyday with Hurtigruta and people are in general interested in this product and thereof the business (tourism), will thrive when the product is built.

3D-Module:

House inside and outside (Specs):

The Original house:





First Floor: Hydroponic technology (green) and a supercomputer (orange) that runs all the automatic installations in the greenhouse. Agrotech installations (blue).



Second floor: A greenhouse grow area for the traditional greenhouse setup, this will be modified so that more or less space can be used for the growing of vegetables. This is also not a finished model that can be modified underway.



The Outside: This is the outside of the house and the main staircase up to the second floor, we have separated the two floor considering isolation so that cold air does not ruin the crop in the winter.

Funding:

Innovation norway, sparebank1:

Innovation Norway:

Innovation norway is one of the biggest partners in modern tourism and business investing. With sustainable and ecological projects in general they are more attracted to than others. This makes the greenhouse project or eligible than a lot of other.

Link: <https://www.innovasjon Norge.no/en/start-page/eea-norway-grants/who-are-you/>

Contact;

Odd-Ståle (Miljøteknolog)

tlf: 97706135

Sparebank1:

The local bank, and the main bank in Alta, has a fund that can be applied for and after talking to the mayor of Vardø this sum seemed quite a substantial amount.

Link: <https://www.sparebank1.no/nb/nord-norge/privat/lan.html>

Local help:

Other than these investors the main investors should be the people that live in Vardø itself. In Canada to drag an example, the inhabitants of the town where the greenhouse is pay a small amount each to keep getting energy into the greenhouse in the winter when the solar panels are not usable, also when the temperature is very low. This

could be an idea if there is a problem with energy supply in the winter and the town could come together and pay for a power line, in cooperation with Varanger Kraft for example.

Link: <https://www.varanger-kraft.no/forside/>

Agrotech;

Location; Ekaterinburg, Russian Federation

Agrotech is a company that make automated vertical farms to grow strawberries, vegetables, salads and greens all year round.

Organization of a professional vertical farm in closed premises for the cultivation of strawberries, tomatoes, cucumbers, salads and greens on an industrial scale on a year-round basis.

Schedule of project implementation;

Engineering = 1 month

Setting constructions = 2 months

Time required to organize the farm = 3 months

Start of products sales = 6 months

Total project cost:

50 sq m = 70 000 €

100 sq m = 133 000 €

200 sq m = 266 000 €

Project goal: to organize a modern technological vertical farm for the cultivation of strawberries, tomatoes, cucumbers, salads and greens in a closed room all year round. Within 2-6 months the farm will be opened in the premises, 1 month after the opening - the first harvest will be received. The farm will continuously produce year-round natural products of the highest quality.

Vertical installations are designed by AgroTechFarm and manufactured in-house.

Project functions: year-round production and finished products sales, providing the region with natural

fresh products.

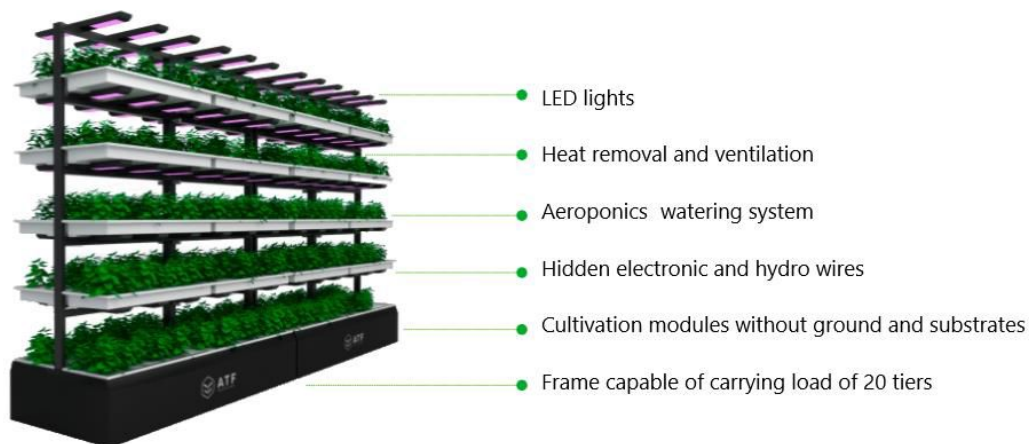


The main advantages of vertical farms AgroTechFarm compared to standard agricultural industries:

1. Compact construction. Small occupied area. Vertical multi-tier installations are 5-10 times more compact than planting a similar amount of seedling into the ground.
2. Year-round cultivation process. Regardless of climatic conditions, cultivation has no seasonality, the growing process takes place all year round.
3. Quick setting up. From start-up to full production anywhere in the world - from 2 to 6 months.
4. For premise. The farm is installed in any (warehouse, production, household) room. The room requires preliminary preparations by the AgroTechFarm team or by the customer according to the technical assignment. There is no need for a large area of land. A vertical farm can be located in the city or close proximity.
5. Automation. A fully automated system: electronics and software control all processes. High technology in the field of high-power LED systems, automatic cultivation, protected control algorithms, remote control of technological processes.

Advantages of products grown in ATF farm:

1. Naturalness. Grown in ideal conditions, without temperature swings and wind gusts. It is not exposed to pests, as it grows not in the ground. Consequently, the absence of pesticides, heavy metals and radionuclides. Aeroponics watering system - spraying of nutrient solution on root system. A sufficient amount of light reduces the nitrate content of the product by tens of times.
2. Taste and freshness. Great rich taste. Absolute ripeness and high vitamin value. Perfect appearance and size of fruit.
3. No transportation time. Collect and deliver within hours. It is grown directly in the region of sale.
4. Year-round cultivation process. Harvest throughout the year. Harvest daily, or any convenient crop cycle that is easy to program.



Professional solution.

Technological installation of AgroTechFarm is a revolutionary and fully automated intelligent farm, working on the basis of patented technology, designed for personal and industrial cultivation of popular and unique types of greens (salads, basil, rucola, spinach, etc.), vegetables (tomatoes, cucumbers, peppers, etc.), berries (strawberries), year-round and regardless of climatic conditions in closed premises.

An industrial installation consists of section with length of 3 meters, depth of 1.2 meters and height of 3 to 10 tiers, where there are modules for growth with automatic watering system, LED modules with simulation of sunlight, controller, which allows to control the process of growth, inflow and outflow communication of nutrient solution.

On an industrial scale production is expanded by increasing the number of sections.

In the final form, AgroTechFarm installations are lines of product growing sections, which engineering communications have been laid to, which are controlled by software in automated mode. The automation system is responsible for the uninterrupted operation of the whole production, all processes are carried out in accordance with the specified program, which nullifies the presence of the human factor, and aims at 100% predicted result.



Important:

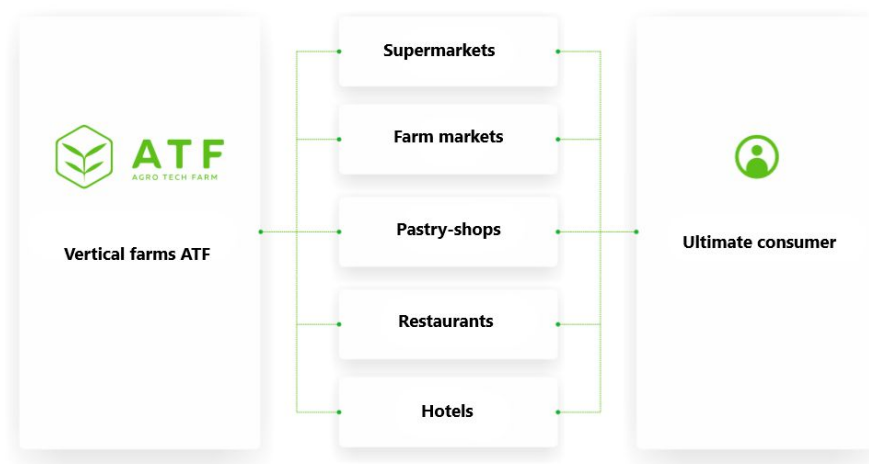
The total cost of investments, installation delivery and setting up is determined based on the results of project preparation and design works.

Guarantees:

For installations and lighting - 3 years.

For the rest of the equipment - from 1 to 3 years under the guarantee from the Manufacturer.

Working with consumers:

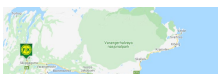


Links:

- https://agrotechfarm.com/en?fbclid=IwAR2DRYhTNfxbbPW72jRQUuN5MPIoi-rEfE6BarXe8han_qeVR-sowwdmn_s
- Mail: info@agrotechfarm.com
- +7 (343) 328-99-44, agrotechfarm.com

Cost Structure:

Greenhouse: "Inside"

Materials;	Company; (provider)	Quantity;	Cost;	Extra;
Soil and Fertilizer;	<p>Plantasjen: https://www.plantasjen.no/jord-gjodsel-og-bark/</p> <p>Felleskjøpet: https://www.felleskjopet.no/sok/?type=Produkt&query=gj%C3%B8dsel</p>	<p>A lot, "good soil is important for the results of your planting, both indoors, in the garden and on the balcony. The soil is the plants pantry, thirst quencher and pharmacy. Our best soil can do wonders with your plants. We also have special soil that is specially adapted to different types of vegetation."</p>	<p>Soil:</p> <p>40 ltr; 1,890 kr</p> <p>Fertilizer;</p> <p>40 ltr; 295 kr 15 ltr; 149 kr</p>	
Seeds;	<p>Potatoes;</p> <p>Felleskjøpet, https://www.felleskjopet.no/plante-produksjon-oversikt/sakorn/</p>  <p>Felleskjøpet; potato fertilizer. https://www.felleskjopet.no/plante-produksjon-oversikt/artikler/bladgjødning-i-potet/</p>	<p>A lot, both knowledge and different types of potato seeds. "Potatoes are grown on light soils with a risk of nutrients being washed out. The root system of the potato plant is shallow and small. Foliar fertilization can keep the rice green longer and help increase crops."</p>	<p>Per vegetables pack;</p> <p>35kr-75kr</p> <p>Depending on the quantity.</p> <p>https://www.gardenliving.no/categories/groingsaksfros</p>	

	Vegetables and fruits; https://www.gardenliving.no/categories/bladgrønnsaker https://www.gardenliving.no/categories/grønnsaksfroe	http://www.smabrukarlaget.no/norsk-bonde-og-smabrukarlag/matnyttig/andelslandbruk/ A lot of different seeds and vegetable. <i>“So far, we have seen that fresh products such as fruits and vegetables fall outside many measures for local initiatives. At the same time, we are seeing increased demand for locally produced vegetables. The Directorate has pointed out that the demand for Norwegian vegetables, especially organic, is greater than today's production.”</i>	Per vegetables pack; 25kr - 85kr Depending on the vegetable. https://www.gardenliving.no/categories/grønnsaksfroe	
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Greenhouse: “Outside”

The measurements for the house are roughly organized and this is a sketch of the main materials that we will be needing for the greenhouse build. Timber would be of the highest requirement list and we have calculated that we would need roughly 950 m². With these roughly numbers does the type of timber not come in since we need different types because of the climate. For glazing we would need approximately 290 m² of material, since we could not use the sun as an advantage.

Materials;	Company; (provider)	Quantity;	Cost;	Extra;
Timber;	Moelven, https://www.moelven.com/no/no/tommer-og-filis/ https://www.moelven.com/no/no/profil/	A lot, provides timber and industrial materials with the knowledge to build apartments. Situated in Norway.	Oak seems to be the best wood to build a greenhouse, due to its robust and insulating aspect. The second wood that can be used is Robinia. An oak plank can cost between 68.9 and 459 all taxes included Norwegian kroner depending on the width in mm and the length. A Robinia board costs between 188.4 and 302.5	

			Norwegian crowns. Knowing that the prices for oak planks are prices for unplanned planks. For the Robinia prices, the boards are planed.																					
Metal;	Norsk Hydro; https://www.hydro.com/en-NO/industries/building--construction/	A lot, they produce a lot of different kind of Aluminium products. <ul style="list-style-type: none">- Doors and windows- Sliding system- Facades- Building profile- Security	<table><thead><tr><th>Length</th><th>Width</th><th>Thickness</th><th>Price</th></tr></thead><tbody><tr><td>2 m</td><td>1 m</td><td>0.5</td><td>89.24nok</td></tr><tr><td>2 m</td><td>1 m</td><td>1</td><td>149.74nok</td></tr><tr><td>2 m</td><td>1 m</td><td>1.5</td><td>244.87nok</td></tr><tr><td>2 m</td><td>1 m</td><td>2</td><td>333.02nok</td></tr></tbody></table>	Length	Width	Thickness	Price	2 m	1 m	0.5	89.24nok	2 m	1 m	1	149.74nok	2 m	1 m	1.5	244.87nok	2 m	1 m	2	333.02nok	
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	Elkem; https://www.elkem.com/silicon-materials/	They have different kind of material like silicon, aluminium...	The aluminum budget was based on about the same amount just above. However, as far as silicone is concerned, it is difficult to establish a "budget", because prices vary greatly depending on how it is used.																					
Fiberglass;	Glassfiber Produkter As; https://www.glassfiber.no/no/portfolio/glassfiber-struktur/	A lot, they make several types of fiberglass products.	On average, it is necessary to plan between €1 and €2 per m² of glass canvas. Obviously, this price per m2 can change depending on the quality and weight of the glass canvas. To this price, it is then necessary to add the cost of the material necessary to successfully install the fiberglass and the paint.																					

The materials used to renovate the greenhouse are wood, metal as well as aluminium, different types of silicone, fibreglass...

These materials are all very important. Indeed, they are essential so that the greenhouse is functional and perfectly insulated.

Wood, metal types and fiberglass may be a little expensive, but it is necessary to invest money in the construction and insulation of the greenhouse so that yields are optimal and there is no need to do any work in the years following its construction.

The same applies to any solar panels. If the goal is to make the panels quickly profitable, it is better to take good or very good quality panels and have them installed by a specialist who will connect them. Because if you decide to install them yourself, the risk of them deteriorating faster and higher and if there is snow or a storm... the panels will hold better if a professional installs them.

In addition, if the structure of the current building is not slightly modified, the greenhouse may not be operated at its maximum potential. Therefore all the materials listed above are important for the greenhouse.

Agriculture:

Companies in Norway with knowledge of the agriculture;

- https://companylist.org/Norway/Agriculture/Agricultural_Greenhouses/
- <https://www.agriculture-xprt.com/companies/location-norway>
- <https://www.geiafood.com/contact/offices/norway.aspx>
- <https://www.foodsofnorway.net/partners>

Energy Supply:

Hydroponic Technology:

Technology which does not utilize soil to grow plants and root vegetables. But instead utilizes nutrient mixtures in water solutions to grow vegetables with only their roots exposed to the mixture. The nutrients in the mixtures can come from natural sources, but special chemical mixtures can also be used.

<https://www.evergreenfarm.eu/>

Aeroponic Technology:

A Finnish company “The Finnish Seed Potato Centre LTD (SPK)” has invented a new system for growing potatoes, that increases the amount of potatoes from one seedling. The system requires warm air, a bit of water with some nutrients and light (LED lights can be utilized) to manage. Further information can be found from the company’s own websites, found below.

<https://www.spk.fi/en/aeroponic-production/>

<https://www.spk.fi/en/home/>

Solar-Energy:

Many interconnected photovoltaic cells convert solar radiation into electrical power.

The panels are usually installed on the roof but they can also be placed on fixed supports on the ground, or on mobile systems moving with the sun. Vertical installation on the facade is also possible without however having an optimized performance.

Power is measured in "kilowatt-peak" (kWp), and the panels generally have a power of 250 Wp. You can use them for own consumption (between 3 kWp and 6 kWp with one or more batteries) and sell the electricity produced (from 3 to 9 kWp).

According to Ademe (French Environment and Energy Management Agency), a surface area of 5 m² of photovoltaic panels can produce in 1 year the consumption of a family of 4 people in electric current (not including the heating system). Roof installation is simple and energy production is efficient. The panels are resistant, with an average lifespan of 30 years and 80% of the production potential preserved.

The manufacture of the panels requires fossil fuels. But be aware that after 3 years of operation, the energy produced by the photovoltaic panel reaches the same level of energy used for its manufacture.

However, at present, it is estimated that the solar energy loss exceeds 85% with photovoltaics, which should decrease with the evolution of technology. As explained above, the manufacture of these panels still depends on fossil fuels, so there is a grey energy.

Some roofing materials can make installation complicated: zinc, shingle, tar tiles, thatch roofs and green roofs. Another obstacle will be the choice to insulate the attic with a multilayer coating.

With a roof installation, you must identify shaded areas, plan for a south orientation and a 30° slope. A certified installer integrates them into the roof of your home, adds an inverter and makes a grid connection, then installs a meter. There are solar kits that are easy to install and in terms of electricity you have the plug and play system to connect the panels to different sockets. If this is not possible, you can connect it to your electricity meter. An electrician will make the connection if it exceeds your skills. The panels are on rails installed on the tiles, all held in place by fastening hooks. These systems have proven their effectiveness in Belgium and Germany.

However, with an approved installer you will avoid making installation errors.

The cost depends on your project, the equipment and the available space.

You can count between 7,000 and 12,000 euros including tax for 3 kilowatt-peak, between 16,000 and 17,000 euros for 6 Kwp and 25,000 to 35,000 euros for 9 Kwp. This includes material, labour and connection.

The price has dropped significantly in recent years. Your investment will be paid for with a good installation and connection to the electricity grid.

Count a total investment of 18 500 euros for your photovoltaic panels for 3 Kwp.

If you think aesthetically, with integrated panels you will be satisfied with the installation. They are flat and very resistant so they last longer (850 euros per m²).

If you want to save money, you can choose the installation of "superimposed" panels, count 10 to 12% cheaper (600 euros per m²).

Be aware that you may have to buy an inverter after 10 years, the price being 2,000 euros and the connection to the electricity grid (1500 euros).

With the option of injecting electricity produced on the grid or laying it on the ground, you will save money on the installation.

As there is only limited window to gather sunlight for the needs of the greenhouse in Vardo, and the sun never reaches high up in the sky at the latitudes of Vardo, it can not provide much energy for the needs of the plants growing inside the facility. Sunlight can be utilized during the summer, as well as during the periods when the sun merely shows itself though, through means of solar oven effect, or solar cooking. By installing special curtains, with highly reflecting surfaces to the proposed second floor of the greenhouse that can be lowered and raised on individual walls, we can capture the low amount of solar energy and trap it inside the building. As the sun moves from east to west and spins around the greenhouse, the side which is facing the sun will be opened and the opposite side closed. This technique lowers the required energy to heat the air inside the structure.

Isolation: (Greenhouse)

Providers; (different types of insulation)

Glasopor; (foam-glass)

Since Glasopor foam glass consists of 80% air, it has excellent insulating properties and is particularly suitable as insulation for a number of different projects. In road construction, Glasopor as a frost protection will contribute to a structure that is less prone to frost damage and thus reduced maintenance needs.

If you choose Glasopor, the depth of digging to achieve satisfactory frost protection will be significantly reduced compared to traditional / local masses.

Link;

https://www.glasopor.no/om-produktet/isolasjon/?gclid=Cj0KCQiAtrnuBRDXARIsABiN-7CW6mPweQnkJVLrBgF3Ybw1LUIYbPhsrKeoGrzeWLAZBNEq-u2VLmYaAk03EALw_wcB

Glava; (Isolation for Piping)

GLAVAFLEX® is an insulating cellular rubber developed for Norwegian conditions. During the development phase, we have worked with plumbers and insulators, among other things, to create the best possible product. GLAVAFLEX® is a complete product line for insulation of pipes and ducts, with everything you need to do the job properly.

Link; <https://www.glava.no/teknisk-isolering/>

Mineral Wool;

Material: Melted stone or glass, spun into threads and glued with phenol-formaldehyde.

Form: Matter and granules.

Use: Almost everywhere.

Advantages: High insulation capacity, easy to customize.

Cons: Requires gloves and mask when handling. Can not emit moisture, especially not behind a vapor barrier.

Tree-fiber:

Material: Coniferous wood, where the fibers are assembled with degradable polyethylene in sheets or finely divided granules (without PE).

Form: Matter and granules.

Application: Ceilings, floor dividers, knee ceilings, roof structures and partitions, as well as in exterior walls in wooden houses.

Pros: 100% degraded in nature. Allows the house to breathe. Loose wool sneaks around pipes and constructions.

Cons: Not suitable for cavity walls and exterior walls of brick houses.

Perlite:

Material: Volcanic material, which heats up to popcorn (but the size of rice grains).

Form: Tiny grains.

Application: In cavity walls.

Advantages: Unable to burn, do not sink and are not attacked by moisture. Easy to handle.

Cons: Energy-intensive manufacturing. Drain out of holes and cracks.

FinnFoam:

Finnfoam is a diverse and reliable thermal insulation, which maintains its insulation characteristics even in demanding conditions. Its special characteristic is a fully homogenous and closed-cell structure, which guarantees excellent and solid insulation characteristics. Finnfoam brings also a new type of ease, speed and quality to building. The structure does not need a separate vapour barrier or wind protection sheeting. Therefore, several work phases can be completed with one installation.

link: <http://www.finnfoam.com/>

The Future:

So this is a project that the team leader (Inga) did a year ago. These solardomes can be something for the future considering that tourism will be the biggest aspect of the revenue. These could be placed around the city where the abandoned houses are for the astethic side of it.

Facility Creation

1. Create a greenhouse to grow traditional plants in.
 - o For example, Solardome Industries produces geodesic dome biospheres in multiple sizes and configurations that can be used for environmental learning and research.



Greenhouses. By Solardome Industries (2019).

1. Create a cultural centre for events and activities.



- o For example, Solardome Industries makes a larger that dome can be used with an office or partition created inside of it if separate spaces are needed.

Outdoor Living Spaces. By Solardome Industries (2019).