

EFFICIENCY ASSESSMENT REPORT

ASSESSMENT RESULTS

GENERAL COMMENTS FROM THE SOLAR IMPULSE FOUNDATION

PLANTSHUB- SOIL-LESS AEROPONIC GROWING SYSTEM

An aeroponic system for the production of leafy plants to be used in the food retail industry.

Solution ID: 11711

Company: Solar Impulse Foundation

Country: Suisse

Export Date: 21.12.2022

DECLINED

FEASIBILITY

- Credibility of concept	YES
- Scalability	YES

ENVIRONMENT

- Environmental benefits	YES
--------------------------	-----

PROFITABILITY

- Client's economic incentive	YES
- Seller's profitability	YES

While the Solution has successfully passed the first few steps of the submission process (steps 1 - 5), it has not been awarded the Solar Impulse Efficient Solution Label as it was formally rejected by the three Independent Experts during the evaluation process (steps 6 - 7).

- **It is fully satisfying the Eligibility Criteria** in terms of: (1) Nature of the Solution namely, physical/financial product, technology, industrial process, or service; (2) Ownership by a

Member of the World Alliance for Efficient Solutions; (3) Contribution to at least one of the Sustainable Development Goals (SDGs), namely SDG 6, SDG 7, SDG 9, SDG 11, SDG 12; (4) Minimum maturity level, namely “prototype testing 1:1 in lab” (TRL 6 -7);

- **It is operating in accordance with the Solar Impulse Foundation's ethical position** as expressed by the Membership Agreement;
- **It is compliant with the conditions expressed in the “Liability Waiver Declaration”** signed by the Member in the framework of the labeling process and external reputational check;
- **It has been reviewed and pre-validated** by the Solar Impulse Foundation's team during the pre-screening stage, to ensure minimum standard of quality, in terms of relevance and completeness of the information provided in the application form;
- **It has been assigned and evaluated** according to the official “Label Standards” by three independent Experts with at least five years of Experience in one of the sectors of application of the Solution;
- **It has been assessed and formally rejected** by three External independent Experts based on the five criteria (credibility of concept, scalability, environmental benefits, client's economic incentive, seller's profitability). In particular, the three independent Experts performed valid assessments, thus provided complete and coherent answers in accordance to the official “Label Standards” and “Assessment Guidelines”.
- **It received two “NO” answers** from two different Experts on the same criterion, meaning that at least one criterion (or more) obtained a majority of “NO”. The Solution does not fully satisfy all the five criteria. As a result, at this time, the Solution does not meet the requirements for being awarded the Solar Impulse Efficient Solution Label.

To be noted that this outcome will not impact the status of Member of the World Alliance for Efficient Solutions.

FEASIBILITY

The Feasibility section is aimed at determining the technical viability of the idea behind the Solution, such as ensuring a Solution is feasible in the real world. This section is composed of two criteria and it considers: the technical requirements of the proposed Solution and captures its ability to be credible based on a resilient technology or concept (**Criterion 1**) and its potential to be technically scaled up and deployed in the real world (vs. in a laboratory environment) without additional constraints (**Criterion 2**).

EXPERTS REVIEWS

CRITERION 1 - CREDIBILITY OF CONCEPT

Can the technology behind the Solution be constructed and operated as designed?

YES

First Expert justification - Aeroponic technology has been a proven system from small to large installations. Coupled with monitoring, IOT and AI technology the efficiency of such systems is very much operable as designed. The technology behind such systems is a credible and improving rapidly.

YES

Second Expert justification - The concept is credible and in fact not new as such. The solution claims to be different to existing products on the market through its AI optimised control of the pumps/lights etc... Surely, other manufacturers will also claim to have an optimized control so it remains to be checked to what extend this solution is different to what already exists out there on the market.

YES

Third Expert justification - The technology behind this product can be constructed and operated as being described. The concept of vertical farming makes good use of space and deliver a very interesting yield compared to traditional farming. The fact that it can be made-to-measure makes it even more operable, depending on the customers' needs.

CRITERION 2 – SCALABILITY

Is the manufacturing (if a product) or distribution (if a service) of the Solution at scale technically feasible?

YES

First Expert justification - Aeroponic systems are highly modular and are made of many sub systems. Pumping, Spraying, Sensors, IoT and Dosers etc., All these can have multiple suppliers and can be designed for various size and yield configurations. Most large products can be sourced locally while few small items yet critical like spray nozzles can be controlled

from focussed sources. This type of system design is highly scalable. Monitoring by cloud based remote IoT gives edge to manage and provide service to wide geographies.

YES

Second Expert justification - There is no problem in scalability. Since the system uses a lot more energy than traditional cropping on ground based systems, the availability of the energy will be crucial. For sustainability reasons, it makes sense to use renewable and thus intermittent electricity (PV and Wind) so some kind of back-up system will be needed to supply also electricity at night.

YES

Third Expert justification - Given the fact that the product is modular and adaptable to the needs of the customer (retail in this case), the scalability is just finding the assembly and installation capacity in each region. With the right connections that should not be a problem to find the people to do this.

Additional feedback / advice for the member

Third Expert - I like the fact that you go for the retailers and improve the carbon footprint of vegetables. Nice to see that you have identified biopharmaceuticals as a secondary market. More and more farmers are selling their vegetables directly. Or in combination with meat. They are potentially also interested in vertical farming? That way you have a higher yield, close to cities and the carbon footprint is also reduced.

ENVIRONMENTAL IMPACT

The **Environmental Impact section** is aimed at determining the impact of the Solution at the different phases of its lifetime: production, transportation and distribution, as well as use and disposal phase.

This section is composed of one criterion and it considers: the potential to enable a direct positive impact (**Criterion 3**) on the environment compared to the mainstream alternative identified – referring to the scope of the following elements: Energy use, CO2 emissions, Water use/materials use, Air quality, Ecosystem preservation.

EXPERTS REVIEWS

CRITERION 3 - ENVIRONMENTAL BENEFITS

Can the Solution deliver an incremental environmental benefit versus a mainstream alternative, considering the lifecycle (production, use and disposal stages) of its value chain?

YES

First Expert justification - Aeroponic system has multiple direct and indirect environmental benefits. Consumption of water is 10 times lesser than conventional farming. Higher yield per sq. mtr means growing in urban locations possible which directly reduces the logistics and supply chain costs. Third and most important is no harmful sprays and pesticides are put to use. All these are very positive environmental benefits.

YES

Second Expert justification - if the mainstream alternative considered is soil based systems, there are environmental benefits such as less water consumption, much better controlled fertilizer use, no pesticide use, However again, crucial here will be the origin of the electricity! This must be renewable electricity in order for the system to be sustainable. It is a pity the inventors do no mentions this issue.

YES

Third Expert justification - I think the environmental benefit is multiple - you have the

advantage that you can produce more on a smaller space, can control/reduce the use of chemicals, can reduce the carbon footprint of the deliveries drastically, can control pests better, because you have confined spaces that can be closed if needed.

Additional feedback / advice for the member

First Expert - The aeroponic produce has higher nutritional value because of controlled environment process of seed to harvest. You may also measure this and highlight facts in your product and presentations.

Third Expert - I am curious how you recycle your "waste" water, at least the recuperation of nutrients in the water, NPK. Are you able to dose that easily? Would love to discuss after this process.

PROFITABILITY

The Profitability section is aimed at determining the capacity of a Solution to deliver an economic incentive for the client, as well as to generate profits for the seller in a short term. This section is composed of two criteria and it considers: The capacity of a Solution to deliver an economic incentive (direct, indirect, or hidden economic savings) for the client (**Criterion 4**) compared to the mainstream alternative and the capacity of the Solution to generate profits for the seller (**Criterion 5**) in the short term, regardless of the marketing strategy and the novelty of the product.

EXPERTS REVIEWS

CRITERION 4 - CLIENT'S ECONOMIC INCENTIVE

Is the total cost of ownership of the Solution lower (or same) compared to the mainstream alternative? Please evaluate this considering potential hidden benefits for society, and foreseeable regulatory changes within 5 years.

YES

First Expert justification - Client has a direct advantage on multiple fronts: - Can produce near to point of consumption and less or no wastage. - No logistics cost - No storing and refrigerator costs. All these are very positive aspects of this technology and product. Secondly, an ROI of 20% is very good by industry standards. Intangible value of nutritious and healthy produce can demand better price from end customers as a further value addition for better returns.

YES

Second Expert justification - The developers stat that today the product is not commercially profitable but expect to be in 2021. Although difficult to verify, this seems credible. the TCO compared to soil based systems will be very much dependent on the type of crop. Higher value crops will be easier to compete with since they can be grown under much better controlled conditions than in ground based systems.

YES

Third Expert justification - The total cost of ownership for the retailer is giving them a potential interesting return on investment - due to the fact that there is a big saving on inbound freight on the one hand, and on the other hand, a very interesting selling proposition to the consumer who gets/eats a sustainable product. There is more and more drive of the consumer to look at the impact of their purchases.

CRITERION 5 - SELLER'S PROFITABILITY

Could the Solution itself be profitable for the seller within 5 years, with a sale's price at which clients would buy it? Please evaluate this regardless of the marketing strategy and the novelty of the product.

YES

First Expert justification - Seller also can have better margins by one time sale and further by subscription service. This has larger market and scalable. 10 units per year as a basis for break even by the innovator is profitable to seller. Product modularity and small tp large size will increase sales and thus profitability.

YES

Second Expert justification - Again, the calculations show this is feasible. Of course, the concurrency with hydroponic and even aquaponic systems will be important. Again, probably higher value crops like herbs, micro-vegetables, ... are easier to be competitive than lettuce for example. Last question that will determine the vast breakthrough of this technology is also the effect of the absence of soil on the taste of the vegetables, which may at least for some customers be a blovking point, whether true or not,

YES

Third Expert justification - Once the volume is there, this can certainly be a profitable business. The advantage of the concept is that there are a few key elements that can be sourced from the main suppliers, and all the other components could potentially be sourced

locally where the installation is done, unless you look at a centralised installation place. The subscription fee per month is also interesting as a steady-state income stream

Additional feedback / advice for the member

Third Expert - for you subscription fee you are talking about 15/50 Euro per month, is that per sensor or for a complete unit? If you can make this a learning and sharing of best practice software, you can potentially increase the subscription fee without hesitation

The information set out above, is solely for the purposes of information and the Solar Impulse Foundation does not provide any guarantee as to its authenticity, completeness or accuracy. This information is the direct outcome of the assessment performed by external non-remunerated experts that volunteered to review your solution submission form following the application of the Efficiency Assessment Process of the Solar Impulse Efficient Solution Label Standards. This information is shared to you as it might be of value for you to get the feedback provided on your application – regardless of the outcome of the general selection process.

Copyright © 2022 **Solar Impulse**. All rights reserved.

