

# EFFICIENCY ASSESSMENT REPORT

## FIRMUS GREY WATER RECYCLING SYSTEM

A controlled process for recycling grey water and allowing us to control our drinking water resources.

**Solution ID:** 1751  
**Company:** FGWRS

**Country:** Monaco  
**Export Date:** 23.09.2019

### ASSESSMENT RESULTS



**APPROVED**

#### FEASIBILITY

- Credibility of concept |  YES
- Scalability |  YES

#### ENVIRONMENT

- Environmental benefits |  YES

#### PROFITABILITY

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

### GENERAL COMMENTS FROM THE SOLAR IMPULSE FOUNDATION

The solution ID1751 is declared by the Solar Impulse Foundation as labelled Solar Impulse Efficient Solution after going through the following selection steps:

- It is falling into the eligibility scope in terms of (1) Minimum Maturity and (2) Type of solution. Moreover, the solution is owned and developed by an entity Member of the World Alliance that is operating in accordance with the Solar Impulse Foundation's ethical position.
- The Solution Submission Form was assessed by 2 independent Experts with at least 5 years of Experience in one of the sectors of application of the Solution and valid and coherent answers with justifications were collected enabling the deliberation of a majority opinion on each of the 5 criteria.
- Based on Experts deliverables, both the Solutions and Experts Team concluded that the solution's assessments had been satisfactory and that the solution obtained a majority of YES on all criteria. For the Client's Economic Incentive criterion, Expert 2 chose Statement 3 as argument for his/her answers and comments. Following the label guidelines, the solution was sent to the Internal Deliberation Committee for a session to discuss if the solution has an indirect positive impact for society.
- Further comments made by the Internal Deliberation Committee can be found in the last section of this report.
- During the session, the Internal Deliberation Committee unanimously stated that the case study presented in the innovator's application file was convincing in terms of return on investment of the solution for a hotel which resulted in the awarding of the Solar Impulse Efficient Solution Label.

---

## FEASIBILITY

---

This section captures the ability of the solution to be credible (based on a resilient technology or concept) and captures if the solution is already or has the potential to be scaled up and deployed concretely in the real world (vs. in lab). The Experts were required to answer two questions on (1) credibility of design and (2) scalability of the solution.

---

## EXPERTS REVIEWS

### CREDIBILITY OF DESIGN

**Can the technology behind the solution be constructed and operated as designed?**

---

✓ YES

**Expert justification -** The solution is based on membrane technology that is well established. In order to make this water recycling more attractive, it has been combined with energy saving measures which are also based in some basics engineering. Finally, they developed a software to evaluate the advantages (drinking water consumption and energy savings) depending on the volumes of water used in the different areas.

✓ YES

**Expert justification -** The technology is already in operation at Concordia Research Station in Antarctica since 2005 with a proven benefit to the research station that can be extended and tailored to commercial and domestic establishments. Also the applicant has stated there is one in operation in a Hotel in Monaco which is a pilot study for aiming to sell the solution to Hotels in the future.

---

### SCALABILITY

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

---

✓ YES

**Expert justification -** Absolutely, membranes can be scale up by numbering up and therefore there is no upscaling risk. The solution makes perfect sense in the construction of new buildings (i.e. hotels) where the water distribution net of the gray and black waters have been separated. There are test plants in Antarctica and Monaco and the quality of the resulting water is being currently validated by the Principality's (Monaco's) health services.

✓ YES

**Expert justification -** The solution is easy to install in a new buildings so if its incorporated in the original design of an establishment such as a hotel or domestic homes during the plan stages its absolutely possible-It can provide a different range of service depending what kind of establishments its manufactured for.

---

### Additional feedback / advice for the member

This is very needed technology also for irrigation purposes as some part of the world farmers use contaminated water to irrigate farms as results of scarcity of water-I will advise that you explore this area as well for irrigation purposes.

---

## ENVIRONMENT

---

This section captures the ability of the solution to have a direct positive impact on the environment over its entire lifecycle compared to a reference without any significant negative impact transferred. The Experts were required to answer one question on the environmental benefit of the solution.

---

## EXPERTS REVIEWS

### ENVIRONMENTAL BENEFITS

**Can the solution deliver an incremental environmental benefit versus a reference case, considering the lifecycle (production, use and disposal stages) of its value chain?**

---

✓ YES

**Expert justification -** Nobody will question that it doesn't make any sense to use drinking water for toilets, laundry, gardening, ... is a complete waste. With the recycling of the grey waters, the amount of used drinking water is reduced by half (depending on water usage habits). So, yes, there is a clear environmental benefit with this solution.

✓ YES

**Expert justification -** LCA will be needed to establish and quantify the environmental benefits especially answers to production to disposal stage however the information that has been provided is enough to prove the benefit of this solution to the environment. One key benefit is the technology can reduce the reliance on consumption of drinking water in hotels, public housing etc. especially stopping the use of clean water to flush toilets, laundry, cleaning and even showers. Recycled grey water will perfectly do these jobs and there will be an improvement in the efficiency of the use of water around the world-something that is very much needed because of scarcity of water which will be worse in the future because of climate change.

---

### Additional feedback / advice for the member

I recommend that LCA is carried out on this solution especially those already in operation in Monaco to prove the authenticity of its benefit and also answer specific potential questions that interested parties may ask.

---

## PROFITABILITY

---

This section captures the capacity of a solution to deliver an economic incentive for the client and to generate profits for the seller in a 5-year timeframe, regardless of its marketing strategy, its positioning towards competitors, the novelty of the idea and the resources and experience of the team. The Experts were required to answer 2 questions on (1) Client's economic incentives and (2) Seller's profitability of the solution.

---

## EXPERTS REVIEWS

### CLIENT'S ECONOMIC INCENTIVE

**Can the solution: 1) have the same or lower purchasing price than a reference case? OR 2) create return on investment over the lifetime of the solution despite a higher purchasing price? OR 3) create an economic incentive (value for money) for the client which is not directly related to savings? OR 4) become cheaper than the reference after a change in regulation that is reasonably foreseeable in the next five years in the targeted region(s) and sector(s) of implementation?**

✓ YES

**Expert justification - 2)** It creates a return on investment over the lifetime of the solution despite a higher purchasing price (depending on each specific case it will be shorter or longer but indeed over the lifetime of the equipment). **3)** There is also an economic incentive when implemented in a hotel. The hotel could receive a green label and differentiate from competitors (and also charge a little more for their rooms). **4)** It would become more profitable if water costs increase. In most places, the current prices do not reflect the real costs.

✓ YES

**Selected option - 3 -** The solution creates an indirect economic incentive (value for money) for the client rather than direct monetary savings (e.g. creates public health expense savings by improving air quality /or food quality, creates savings for society by enhancing ecosystems resilience / preventing natural catastrophes etc....).

**Expert justification -** Economic incentive (value for money) for the client or society which is not directly related to savings however it will help them play part in preservation of water resources at the local level. Example recycling 80% of grey water saves more than 40% of the drinking water consumed in a home much more in a hotel. It will also help the client to achieve eco friendly status which indirectly has the potential to provide financial benefits in terms of tendering for contracts; attracting environmental conscious customers.

---

### 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, the people behind it, the competitors and the novelty of the product.**

---

✓ YES

**Expert justification -** This is not a product with a fixed price but a solution that is adapted to the situation of the building and the different water volumes and uses. There is, of course, a profitable business behind it due to the savings in water and energy but the level of benefit for the client and therefore the price that one can ask for it's different case by case.

✓ YES

**Expert justification -** If this solution proves its worth to business owners, property developers and town planner that it will save them water consumption expenses and their eco friendly status it will attract a lot investments and increase sales. Water treatment industry is growing and there will be a market for the solution provided they market the solution well with the support from the right stakeholders.

---

## REPORT FROM THE INTERNAL DELIBERATION COMMITTEE MEETING

---

### REASON FOR PRESENTING THE SOLUTION BEFORE THE INTERNAL DELIBERATION COMMITTEE

---

### OUTCOME OF THE DISCUSSION

---

The Committee had to answer the following questions: do we consider that the economic incentive (value for money) for the client confirmed by the expert is valid in the scope of what we consider economically beneficial for society?

---

**Expert 2 chose Statement 3:** The solution creates an indirect economic incentive (value for money) for the client rather than direct monetary savings (e.g. creates public health expense savings by improving air quality /or food quality, creates savings for society by enhancing ecosystems resilience / preventing natural catastrophes etc....).

---

The solution was discussed with the Chairman of the Foundation to deliberate on whether the economic incentive for the client is linked to tangible money savings.

It was stated that the economic incentive for the clients depends on the existence of a tax on grey water treatment and on the price of drinkable water.

The case study of a 178 rooms hotel consuming 15,000 m<sup>3</sup> of drinkable water per year with a price of drinkable water at 4,5€ per m<sup>3</sup> and an electricity price of 100€ per MWh was discussed. Then the results announced by the innovators was considered valid by the group - a ROI in 8 to 9 years on a hotel looked credible and attractive enough to justify an investment in the grey water recycling system in certain regions where the two constraints on drinkable water price and tax on water treatment cited above are high.

As a result, the committee agreed unanimously in favor of labelling the solution.

---

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 © 2019 **Solar Impulse**. All rights reserved.