

TreeWell (NBS) sanitation and Internet of Things in Lebanon

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

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4.1 Validated TreeWell nature-based solution for wastewater	Mar 2022	Aug 2022(?)
4.6 IoT platform for management and operations of decentralised systems	Mar 2022	Aug 2022 (?)

Abstract/Executive summary

The purpose and objective of this particular delivery is to report on the validation of the TreeWell tested in Lebanon and as well to report on the development of an Internet of Things platform for management and operations of decentralized sanitation systems in cooperation with RISE.

Our main conclusion from our involvement in the sWASH&grow project has been the great value of being able to continuously test and evaluate our products in the field in cooperation with clients and stakeholders.

Air pumps are now controlled automatically by the system's IOT to deliver the exact amount of required Dissolved Oxygen thus reduce the electricity demand from the system.

Table of Contents

<i>Abstract/Executive summary</i>	1
<i>Introduction and background</i>	3
<i>Purpose and background of this delivery</i>	3
<i>Description of this delivery</i>	3
<i>Results/Outputs of this delivery</i>	4
<i>Conclusions and impact</i>	4
<i>Appendices</i>	5

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

Carex of Sweden has developed a Nature Based Solution (NBS) for waste water called “TreeWell”; which has been tested and validated in Sweden, Lebanon and South Africa as part of the project. Mruna is the local agent for the TreeWell in Lebanon.

The purpose and objective of this particular delivery is to report on the validation of the TreeWell tested in Lebanon and as well to report on the development of an Internet of Things platform for management and operations of decentralized sanitation systems in cooperation with RISE.

Description of this delivery

The following activities have been carried out within the project:

- Treewell pilot project implementation at Maalaka Zahle-bekaa region close to the informal settlement of maalaka 020 and 018 in cooperation with Solidarite International (SI) in Lebanon
- Testing and evaluation of the pilot project as Treewell system performance in informal settlement Wastewater characteristics
- Evaluation of the pilot installed at the Lebanon Agricultural Research Institute (LARI) as residential wastewater characteristics.
- Development of an Internet of Things platform for management and operations of decentralized sanitation systems in cooperation with RISE.

- The platform tested for the decentralized pilot plants at maalaka 209 and barr elias informal settlement in cooperation with Solidarite International (SI) and WorldVision
- Implementation of adapted TreeWell plants - decentralized Nature Based Solutions - with IOT at Miziara Municipality in collaboration with CEWAS
- Updating LARI to the latest IOT development in cooperation with RISE

Results/Outputs of this delivery

The TreeWell product in Lebanon has gone through some major product development including:

- New pumps
- Better off-grid with wind power air pumps
- Better Dosing strategy with help of IOT
- Better overall performance and early alarm system
- Preventive maintenance due to the IOT data availability
- Better data collection on Wastewater usage and outflow quantities
- Centralized solution to monitor de-centralized systems

The products are now on a totally different level delivering on the demands from the Lebanon stakeholders including international requirements.

Conclusions and impact

Our main conclusion from our involvement in the sWASH&grow project has been the great value of being able to continuously test and evaluate our products in the field in cooperation with clients and stakeholders.

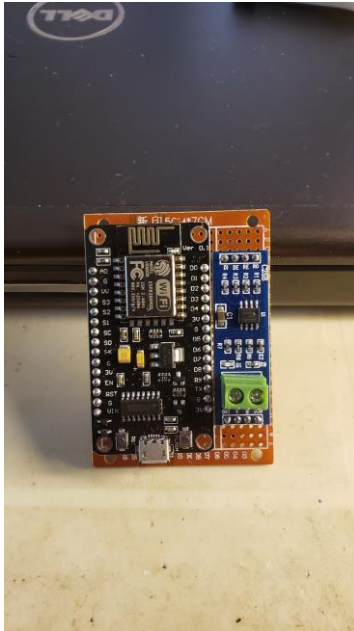
This way we are able to prevent operation errors and maintain the system performance, have good info on the flow and quality of wastewater pumps operation and power consumptions.

Air pumps are now controlled automatically by the system's IOT to deliver the exact amount of required Dissolved Oxygen thus reduce the electricity demand from the system

Appendices

Appendix 1: Images of the IoT system

IOT Wifi Module



BiomPod (IOT Hardware)



Lari System

