

ALFIE

ALgae Facade Integrated Envelope
Challenge: MISE, Water Scarcity in Smart Cities
Proposed by: Team 8

Problem Statement and Solution proposed (max 300 words - suggested):

According to FAO studies, by 2050 the world's population will reach **10 billion** (34% higher than today) and more than **70%** will live in urban areas. In order to feed all these people, the production of cereals will have to increase by **40%** (reaching around 3 billion tons), meaning that water will become the "**blue gold**". If this demographic trend continues, finding new sustainable sources for food, water and energy production in urban cities will be extremely important. One of these possible sources are **Micro-algae**, which can be used for **water purification**, to enhance the **nutritional value of animal feed** as well as to produce **biomass and biodiesel**.

Nowadays Micro-algae cultivation is not very widespread, as it requires a great amount of space and land. What would happen if there was the possibility of cultivating algae in urban areas without the consumption of horizontal space?

This possibility already exists and has a name: **ALFIE**. It's a modular water filtration system, based on micro-algae technology, that can be installed in buildings façades. The technology was studied and patented by Politecnico di Torino. With ALFIE a single medium-size building can save **up to 40%** of water waste, simply by recycling rain and grey water, and, at the same time, in just one day, the system can cultivate enough algae to produce **40 Kg** of animal feed or **5 liters** of biodiesel.



Purification of
grey & rain-water



Animal Feeder



Biofuel production

ALFIE can be installed in both new and old buildings (during normal activities for façade maintenance) and its output efficiency depends directly on weather and climate conditions.

ALFIE: Microalgae modular walls for self-sustainable cities.

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