

Skytree - CO₂ for everyday life

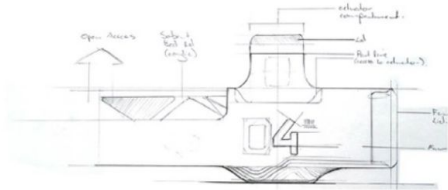
Business Opportunities in CCU, London
18/11/2016





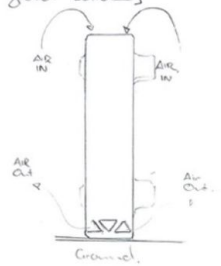
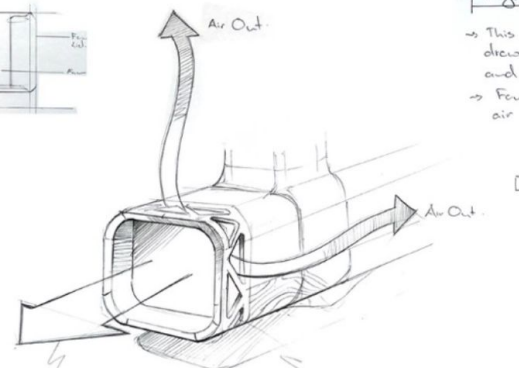
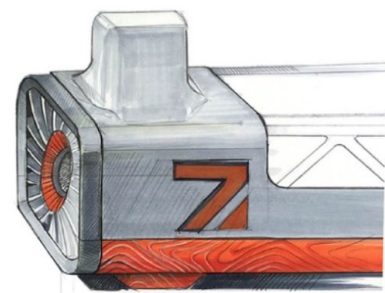
Company history -

- Founded in 2010 as “Giaura”
- Funded by ESA Incubator
- Proof of principle (& 1st patent)
- Joined Climate-KIC in 2013
- Private investors 2014
- Seed fund (InvestInFuture) 2015
- Proof of concept (500g/day) - January 2017

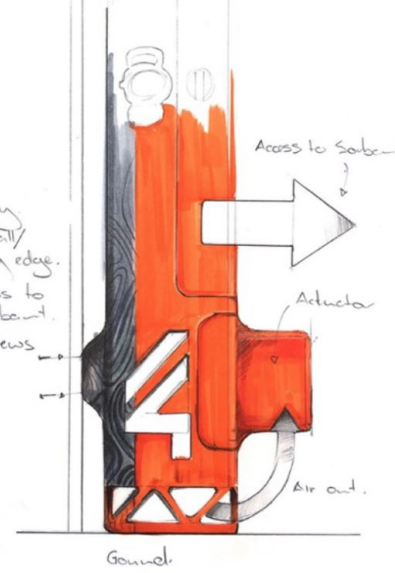
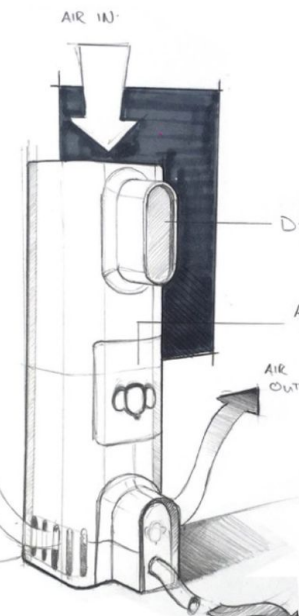
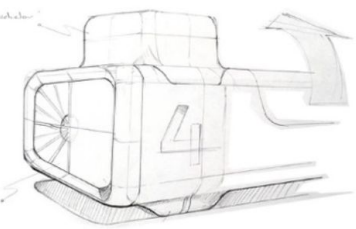
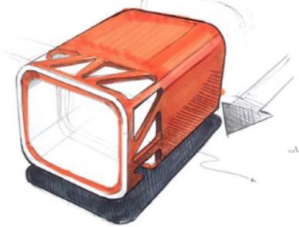
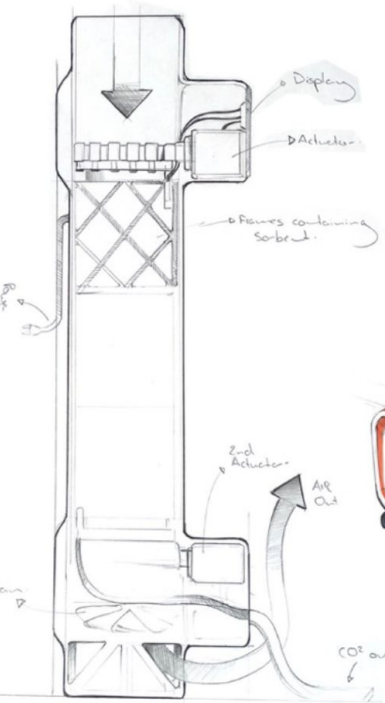


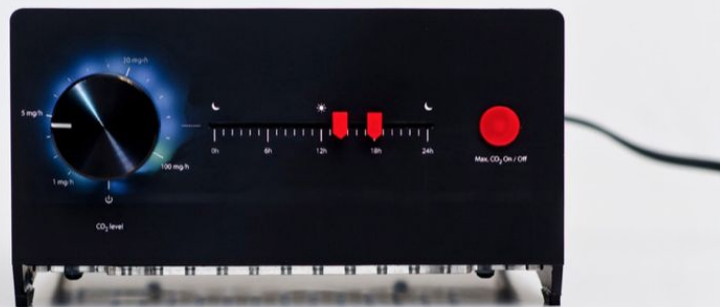
Airflow Redirection

→ This solution has air being drawn through the top and disposed at the bottom
 → Fan needs to draw air over sortant
 ∴ Fan needs to be at bottom
 [unless air is drawn from bottom]



→ These cut outs allow Air to flow out when module is standing vertically.



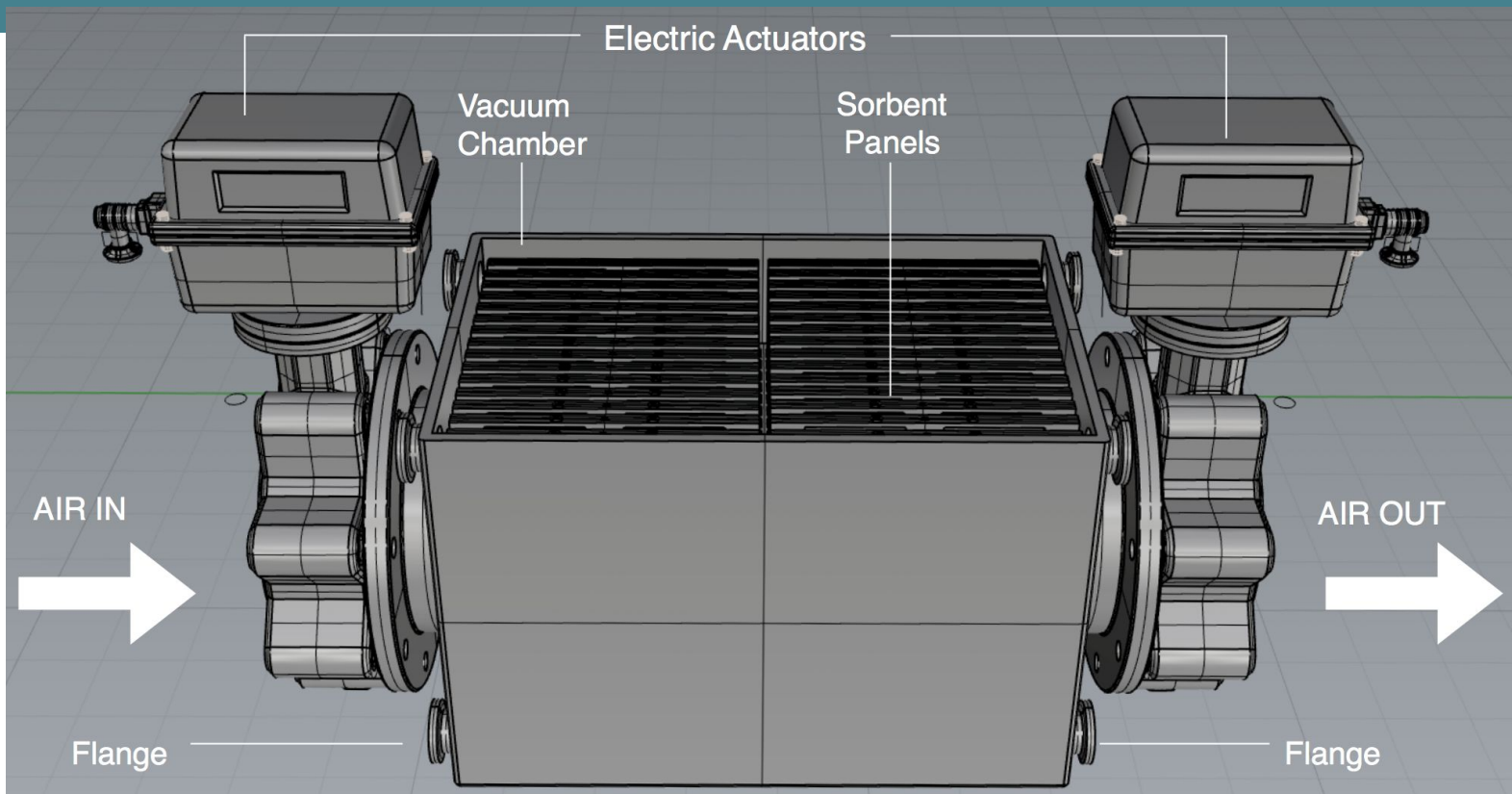


Skytree unit



- Location Independent
- Plug & Play design
- Continuous source of CO₂

Process Overview



ESA 'Advanced Closed Loop System' (ACLS)



The Advanced Closed-Loop System (ACLS), accommodated in an ISS rack, can be used for CO₂ concentration, CO₂ reduction and O₂ generation.

ALCS system converts CO₂ into 'O₂' and injects it back into the cabin. 'CH₄' is a by-product and is exhausted to space. Production of O₂ reduces launch needs. Due to launch in 2017.

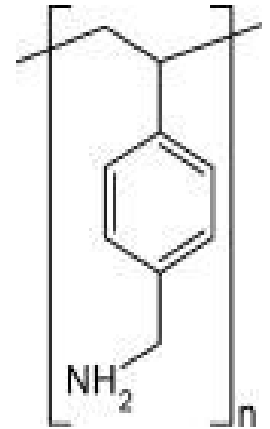
- Evaluated over 50 sorbents for CO₂-capture component
- **Skytree's sorbent selected as sorbent for ACLS in early 2000's**



**business
incubation
centre**
Noordwijk

Skytree sorbent

- One of the highest performing solid sorbents available (up to 8% wrt. weight)
- Stable with long life-time (3-5 years)
- Light (high surface area) >2 litres per kilo
- Benign
- Relatively inexpensive (€8-16/litre)

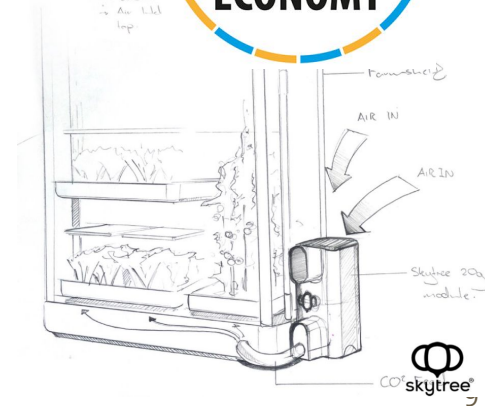
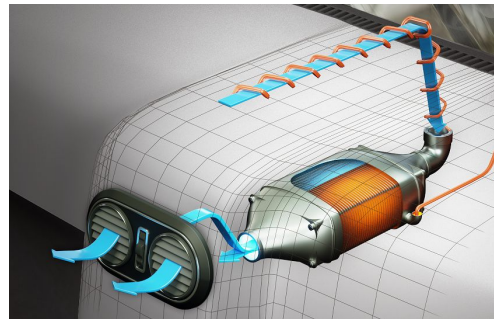


Business traction



- Skytree as consortium partner in €2.2M SME2 instrument with partners Gensoric
- Heads of agreement signed for CO2 extraction unit with international automotive manufacturer
- Skytree selected as project in regional development programme Roadmap Next Economy based in the Netherlands
- First products on market expected next year in urban farming sector

willpower



Skytree Team



Market Overview

Aquariums



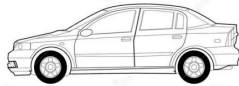
1 g/day

Office/Vehicle Ventilation



1 kg/day

Water Treatment



1 tonne/day



Greenhouses

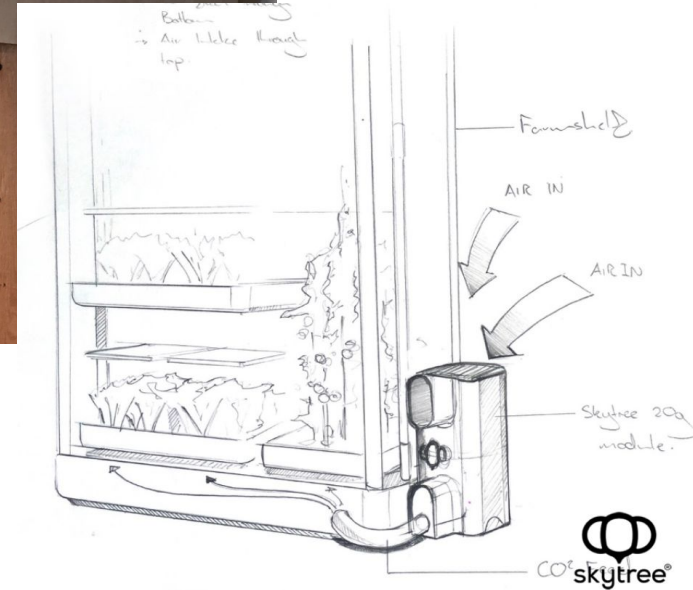
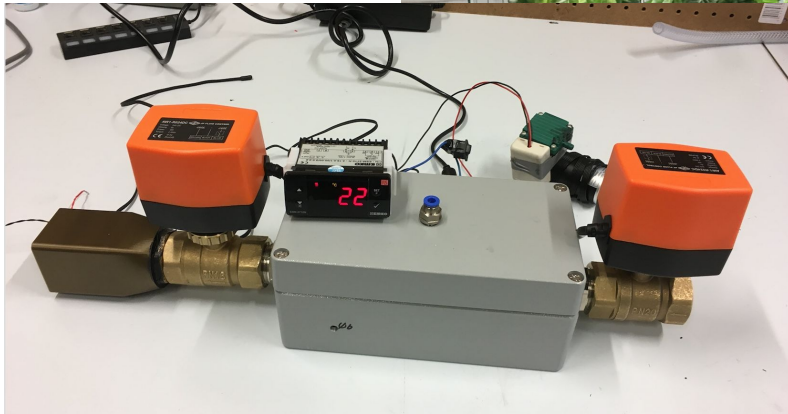


1000 tonne/day

Synthetic fuel



Indoor farming



DAC vs CCS/CCU

Pros:

- Modular / mass manufacturing
- Location independent CO2 supply
- User independence
- Circular in the long-run

Cons:

- x2-3 energy for CO2 capture process
- Large size for equivalent CO2 capacity
- Currently too expensive for industrial CO2 supply (tons/day)



Complementary technologies !

Technical Risks



- System design
 - Weight
 - Safety of high pressure CO2 extraction circuit
 - Short (<12 hour) charging cycles
- Sorbent degradation and lifetime
 - Amine off-gassing
 - NOx emissions
 - Cigarette smoke
 - Long-term attrition of sorbent beads
- Bead leakage & consumer contamination

Commercial Risks



- Can cost come low enough for market adoption?
 - BOM cost (fans, pumps, heaters, enclosure, control, casing)
 - Energy cost at large scale
 - Sorbent cost on large scale!
- Logistics of unit maintenance, sorbent distribution and cartridge replacement
- Can the team execute market entry (eg. manufacturing) or sensible licensing collaborations?
- Can R&D time and adoption rate be short enough for 4-7 year exit point?

Thank you...
Questions?

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