Centurium Prize

ReThink Brine Challenge

# Challenge Background:

As modern methods for desalination become more efficient, cost effective, and commonly utilised, there is an increasing demand to find alternative solutions for the brine discharge created because of the desalination process, which can cause negative effects on the environment if not disposed of properly.

Zero liquid discharge (ZLD) technologies are of considerable interest because they are an environmentally acceptable means for disposal of brine discharge at many desalination sites, particularly those located in inland areas. Traditional brine evaporation steps tend to be very energy intensive and are associated with large carbon footprints.

Currently there are no viable solutions to brine discharge and some commercial solutions are either not feasible or not tested. Discharging into an area that is unaffected by the saline water is one option. Another is finding an offsetting economic value for the dry residue such as using the brine discharge to create construction material. According to the annual economic report 2018, the construction and building activities in the UAE contributed to 8.7 % of the GDP in 2017. The UAE is a fast-growing country taking major tech leaps into the future and this challenge will aim to provide a viable input to the construction sector while protecting the environment.

# Challenge Objective:

The primary objective of this challenge is to develop technologies that produce commercially viable construction material at scale from brine discharge.

Update: As part of the partners’ continued commitment to the research community and support for the fight against COVID-19, we have expanded the challenge objective to include the development of medical products, such as disinfectants, which can help in combating COVID-19 and other pandemics.

# Challenge Requirements:

Participants must consider the following when designing their solution:

* The ability to accommodate and utilise a constant flow of brine discharge.
* The ability to handle at least 3 000-4 000 litres per day of desalinated water and demonstrate the ability to scale the solution to handle 20 000 m3 per day.
* The unit cost of the product created should not exceed the current market price of the raw material. This does not include capex.
* The material produced should pass the testing for construction requirements and safety codes. However, certification of the product at this stage is not required to win this challenge.
* Update: The material produced should pass any ethical approvals or safety requirements, if necessary.
* 40% of the research must be completed locally in the UAE, and at least one UAE national should be part of the team

The following requirements are not mandatory but demonstrating the two criteria within the developed technology will be viewed more favourably:

* The technology should be designed as part of, or to fit into, **an existing desalination plant** in the UAE and not as a stand-alone device.
* The technology can rely on **renewable energy sources.**

**Note:** Viable products that do not fit into existing desalination plants or do not utilise renewable energy will still be considered as **process carries a larger weight** and renewable sources may be incorporated later.

# Impact:

* Protecting the Arabian Gulf ecosystem and marine life.
* Enabling an eco-friendly construction and real estate sector.
* Addressing the UAE’s water scarcity challenges and supporting the UAE’s Water Security Strategy 2036.

# Prize Purse:

* **Total Prize Purse**: AED 3.4 Million
* **Milestone Prize 1**: up to 5 teams will be selected and each winning team will receive AED 25 K
* **Milestone Prize 2**: up to 3 teams will be selected and each winning team will receive AED 250 K
* **Grand Prize**: one winning team will receive AED 2.5 million

# Partners:

The Centurium Prize is brought to you by Sandooq Al Watan. The ***ReThink Brine Challenge*** is part of the Centurium Prize and is launched and sponsored by the Environment Agency - Abu Dhabi, and Aldar.

Partnering Entities:

* Emirates Water and Electricity Authority will provide brine discharge samples and expertise on scalability of proposed solutions.

# Intellectual Property:

The participants of this challenge will be the exclusive owners of all intellectual property created as part of this competition, whether the team successfully completes the competition or not.

# Utilizing Prize money:

The participants can utilize the milestone awards at their discretion as long as it is used to complete the competition.

After being reimbursed for all costs incurred during the competition period the final winner can utilize 50% of the grand prize for personal use while the rest must be used to further develop the final product.

# Judging:

A judging committee will oversee this competition. The committee will include external experts and representatives from the sponsoring and partnering entities.

# Timeline:

| **Round** | **Timeline** | **Milestones** | ***Responsible*** | **Description** | **Prizes** |
| --- | --- | --- | --- | --- | --- |
|  | March 22nd, 2020 | *Challenge Announcement* | *Organisers* | Launch of ***"ReThink Brine Discharge Challenge"*** | - |
| Team Formation & preparation of Proposal Summary | *Teams* | Compilation of teams | - |
| **ONE** | October 11th, 2020 (*Submission Deadline)* | **PROPOSAL SUMMARY** *(Deliverable [A])* | *Teams* | Teams to submit high level PROPOSAL SUMMARY explaining the research approach and the material to be submitted (*see details for Deliverable [A])* | - |
| November 15th, 2020 | *Round Two Short-listed Teams Announced* | *Organisers* | Eligibility of Teams to enter the “*ReThink Brine Discharge*” Challenge will be checked against information provided in their PROPOSAL SUMMARY | - |
| **TWO** | March 1st,  2021 *(Submission Deadline)* | **DETAILED PROPOSAL** *(Deliverable [B])* | *Teams* | Teams to submit a DETAILED PROPOSAL containing conceptual design proposal and including research method, full project description and all required information (*see details for Deliverable [B]*). | - |
| 16-June-2021 | *Round Three Short-listed Teams Announced* | *Judging Panel* | **FIVE** teams will be short-listed to proceed to ROUND THREE - "*Prototype Development*" based upon evaluation of their DETAILED PROPOSAL by Judging Panel | **AED 25K** *(awarded to each of the five short-listed teams)* |
| **THREE** | 28-July-2022 | **PROTOTYPE DEVELOPMENT** *(Deliverable [C])* | *Teams* | Teams to submit a PROTOTYPE able to demonstrate ability to handle 100 - 200 litres of desalinated water. | - |
| 29-September-2022 | *Round Four Short-listed Teams Announced* | *Judging Panel* | **THREE** teams will be short-listed to proceed to ROUND FOUR - "*Proof of Concept*" based upon evaluation of their PROTOTYPE by Judging Panel | **AED 250K** *(awarded to each of the three short-listed teams)* |
| **FOUR** | 28-March-2024 | **FINAL PROOF OF CONCEPT** *(Deliverable [D])* | *Teams* | Teams must demonstrate the ability to handle 3 000-4 000 litres of desalinated water and show the final construction material that has been developed | - |
| 30-May-2024 | Assessment of Final Submission | *Judging Panel* | Final performance testing and ensuring construction requirements are met | - |
| Winner announcement | *Organisers* | Announcing Winner & Grand Prize Award | **AED 2.5 Million** *(awarded to the Winning Team)* |

**\* The timeline is subjected to changes to extend the deadlines, only if needed.**

# Submission Details

* **Deliverable [A] - Summary Proposal**
  + **Introduction**
    - Brief overview of the concept, demonstrating clear understanding of the requirement.
  + **Research design and methods**
    - High-level description of method to be applied for the research.
    - High level estimated resources (equipment, materials, manpower, *etc.*)
  + **Team description**
    - Describe each participant in terms of:
    - Educational background
    - Expertise, if any
    - Nationalities
    - Roles and responsibilities of each team member
  + **Disclosures**
    - Any previous work carried out in fields related to the Competition
    - Any commitment towards or restrictions on or affecting the Participant or its participation in the Competition of any government or government owned, funded or directed body in any field related to the Competition
  + **Contact details**
    - Provide the contact details of all team members including email and phone number
  + **Questions**
    - List any questions or queries regarding the challenge
* **Deliverable [B] - Detailed Proposal**
  + Executive summary
  + Objectives and goals
  + Project personal
  + Project description
    - Background and significance
    - Innovation
    - Research design and method
    - Risk assessment and mitigation plan
  + Key performance indicators
  + Equipment and material
  + Estimated budget
* **Prototype**
  + The first prototype must handle 100 - 200 litres of desalinated water
  + The team should demonstrate the amount of brine discharge being used and the amount of material being produced.
* **Proof of Concept**
  + The proof of concept must demonstrate the ability to handle 3 000 – 4 000 litres of desalinated water
  + The proof of concept must demonstrate the ability to handle at least 3 000-4 000 litres per day of desalinated water and demonstrate the ability to scale the solution to handle 20 000 m3 per day
  + The cost to produce the new material should not exceed 30 % of the cost of the raw material

# Sources

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