Prize Design 1 – Emissions Removal XPRIZE

Prize Overview: This prize aims to discover innovative air pollution removal solutions focusing on particulate matter and the most prevalent gaseous pollutants through a (x) year XPRIZE competition.

Winning Team Will: Remove PM and precursor gases from ambient air from an XXXm^3 area, lowering the AQI to <50 for one week with a net negative pollution footprint.

Prize Criteria:

1) Mandatory Prize Criteria For All Solutions

Total PM removed

- Metric = micrograms of PM removed from ambient air

- Alternatively, or in conjunction, could be measured as a rate (i.e. PM removed per minute or hour)

- What considerations do we need to make when measuring PM removal?

Total Gases removed

- Metric = PPM/PPB reduced from ambient air

- Reduction in PPM/PPB - starting measurement vs ending measurement?

- Alternatively, or in conjunction, could be measured as a rate (i.e. gaseous pollution reduction per minute or hour)

- What considerations do we need to make when measuring gaseous pollutant reduction?

Minimum Length of Time Tested

- Should solutions maintain operation for a set amount of time to validate their effectiveness? 24 Hours? 1 Week? 1 Month?

- Would this timeframe differ between engineered and natural solutions?

● What timeframe should teams be scored on in that operating window? The entirety or a smaller portion?

● Should there be a consideration of intervention, as in how much time spent in that operating window performing maintenance or recalibrating, theory here being winning solutions should probably be as self-maintaining as possible?

2)   Optional Prize Criteria - Solution Specific

Energy usage

● How much power is consumed?

● What emissions are related to its operation?

● Should both of these be included in the assessment of a solution?

Land Use / Footprint

● Horizontal vs Vertical measurement?

● Urban land is highly valued, so land use affects "cost of deployment", how to account for different valuations and use of existing structures?

Waste Disposal

● Is this too ambitious? Does this distract from the core motivation of the prize, which is to remove pollution from the air so people aren't breathing it in?

● What metrics are appropriate here?

● PPM/micrograms - relative reduction? Complete reduction?

● Is this a good area for a bonus prize?

Water Usage

● What metric would be appropriate here?

● Similar to power, water consumption affects OPEX, sustainability, and scalability

○ Should we subdivide water consumption into fresh water/grey water/etc?

3) Bonus Score Prize Criteria - aka the "nice to haves, but not necessary"

Cost - Total Capital Expenditure

- What metric would be appropriate here?

- Cost of deployment - Is this sufficiently captured by the water/power/land metrics, or are we missing an element?

- Should this include R&D?

- Cost of prototype deployment or extrapolate future, scaled up cost?

Monitoring - Reporting - Modeling

- Does this distract from the motivation of the prize?

- How could this be incorporated as a compliment to the above described removal prize?

  - Instant composition analysis?

  - Personal devices?

  - Forecasting improvement?

Waste Conversion Bonus Prize/Points

- Would a business model/monetization bonus prize drive us closer to an impactful solution?

- How might teams pushing the boundaries of what is achievable here be scored/awarded?

Additional Prize Parameters - considered, but rejected internally - for discussion:

Total Airflow

- Is this captured already by the energy requirements?

- Should we cap the amount of energy/generated air flow solutions can utilize?

● Should there be an efficiency component?

Profitability/Economic Potential

● Are economically viable solutions important because they have the best chance to attract investment, be developed, scaled, and deployed in the medium-long term?