Non-Party Stakeholders' Inputs for the Talanoa Dialogue
Jupiter Oxygen Corporation, U.S.A. Submission

1) Where are we?

The commitment(planned and/or announced) as well as the actions taken so far that are in line with aims of Paris Agreement, the 1.5/2 degrees' goal and the transition towards a net-zero emission society by this mid-century

The International Energy Agency (IEA) has determined that carbon capture and storage (CCS) is vital for reducing emissions across the energy system and for achieving the 2° C target of the Paris Agreement. Indeed, the International Energy Agency concluded in 2016, "There is no other energy solution that can significantly reduce emissions from the coal and gas power generation capacity that will remain a feature of the electricity mix for the foreseeable future."IEA further argues that the potential for CCS to generate negative emissions -- when coupled with renewable energy technologies (such as bioenergy) -- is integral to energy use becoming CO_2 emissions-neutral by 2060. (Accessed at https://www.iea.org/topics/carbon-capture-and-storage/).

A broad, growing consensus has emerged in parallel in the scientific and environmental community. For example, Alan Miller, writing in the *The Environmental Forum,* a publication of the Environmental Law Institute, concludes that "Achieving an energy economy based entirely on renewables is unrealistic" for reaching the Paris 2 degree target, and that "removing carbon dioxide from emissions waste streams and burying it is necessary…."

Without doubt, carbon capture and storage technology strategies are essential in mitigating the risks of future climate change, especially for limiting the impact on climate change from coal-fired power plants that will continue to be built and used by emerging economies to ensure energy security and for economic growth.

Moreover, variations of this technology can play a major role in decarbonizing worldwide production of steel, cement, fertilizer, petrochemical products, as well as pulp and paper. In addition, integrated carbon capture, utilization, and storage (CCUS) projects can capture up to 95% of carbon emissions, recover substantial amounts of process water and eliminate key air pollutants from coal and natural gas-fired power plants. The carbon captured can be used for enhanced oil recovery (EOR), reducing significantly the carbon footprint of oil production, while storing the CO_2 safely underground. Furthermore, developments to commercialize Enhanced Coal Bed Methane (ECBM) recovery are expected to lead to increased natural gas resources, which will be another utilization option at scale for CO_2, as well as even further decreasing CO_2 emissions by reducing the need to use coal.

The capture and reuse of CO_2 (referred to as Carbon Capture, and Utilization, or CCU) facilitates manufacturing of carbon-based products such as washing soda, mattresses, upholstered furniture, bricks, stone, and cement, while curtailing the carbon footprint of those products significantly.

Clearly, it is imperative that CCS, CCUS, and CCU technologies play a major role in reducing atmospheric CO_2 emissions and meeting the goals of the Paris Agreement. The International Energy Agency (IEA) projects in its 'Energy Perspectives 2017' that the 2-degree target embedded in the Paris Agreement requires an inclusive approach combining energy efficiency (40 per cent), renewables (35 per cent), CCS (14 per cent), nuclear (6 per cent), and fuel switching (5 per cent). Concerning even more ambitious climate protection goals, for example, the 'Beyond 2-degrees scenario', the IEA projects that CCS would need to provide 32 per cent of global CO_2 emission reductions.

2) Where do we want to go?

Vision of the future for your organization and/or sector in terms of its possible role in achieving the 1.5/2 degrees' goal and a net-zero emission world by this mid-century

If we are going to limit the risk of disruptive future climate change, we must meet and even exceed the Paris Agreement target of limiting future temperature increases to 2° C. We need to go beyond relying upon the use of renewable energy and energy efficiency as the primary mitigation method. We must commercialize and deploy cost-effective strategies for CCS, CCUS and CCU *[Carbon Capture and Storage, Carbon Capture Utilization and Storage, Carbon Capture Utilization/Reuse]*as an additional mitigation strategy, especially in countries that will continue to rely on coal for electricity generation over the next several decades. To achieve the scale of carbon capture technology deployment that will be needed, we must expand the understanding that the goals of the Paris Agreement cannot be achieved without widespread use of these technologies.

In fast-growing emerging economies, which will continue to depend on coal for decades to come, we must move to demonstrate that cleaner fossil energy strategies, based on CCS, CCUS, and CCU, have multiple benefits for them. These strategies can advance national development priorities, avoid dangerous levels of local air pollution, and help to protect the global environment. Providing capacity building and Know-How for cleaner fossil energy technologies can be accomplished by providing financial support from multilateral development banks (MDB's) and the Green Climate Fund (GCF) for commercial-scale demonstration projects, in particular by underwriting the licensing fees that can recover the development costs of these technologies.

3) How do we get there?

Ways in which the UN Climate Change process can help you achieve your vision and goals, and how your actions can help in expediting sustainable transitions to climate neutral societies

We can reach the Paris goals by accelerating the deployment of carbon capture technologies, in concert with a broad suite of other technologies, such as renewable energy and energy efficiency.

The US took an important step in this direction earlier this year with the passage of the reform to Section 45Q of the US Tax Code. This legislation provides tax credits for CO_2 capture and storage and is expected to stimulate development of new carbon capture projects in the US that will help to lower the cost of these technologies worldwide.

To reduce the rate of growth in greenhouse gas (GHG) emissions in emerging economies, these countries will need to rapidly commercialize the cleaner fossil energy strategies that are now being developed mainly by industrial nations.It is critically important that these efforts be supported financially by industrial country governments as well as by MDBs, GCF and others.

Another important part of the solution involves the capture of CO_2 from industrial sources with reuse and/or storage of the captured CO_2. Utilizing / reusing CO_2, instead of simply disposing of it as a waste and a pollutant, generates a secondary revenue stream from the original activity and helps to improve the economic competitiveness of carbon capture, utilization, and storage technologies.

Furthermore, the United States has significantly reduced its aggregate CO_2 emissions in recent years by

exploiting shale gas, reducing substantially the cost of natural gas, with a significant drop in CO_2 emissions[1]. Similarly, by exploring unconventional domestic fossil energy resources, such as 'shale gas' and enhanced coal-bed methane recovery, emerging economies that are greatly dependent on coal for growth will be able to substantially reduce CO_2 emissions by substituting domestic natural gas for coal.

Concrete solutions that have been realized while implementing your commitments, including lessons learnt from success stories and challenges, and case studies that are in line with the 1.5/2 degrees' goal and can supportthe Parties in achieving their NDC goals, enable higher ambition and inspire engagement of other non-state actors

There are a number of efforts that can be undertaken to accelerate the use of CCS, CCUS,CCU*[Carbon Capture and Storage, Carbon Capture Utilization and Storage, Carbon Capture Utilization/Reuse]*. Examples include: (1) establishing a price for carbon in national economies, (2) setting ambitious CO_2 reduction targets at national level, (3) providing incentives for CO_2 capture and storage, (4) development of the legal and regulatory regimes needed for safe deployment of CCS and CCUS technologies, and (5) expansion of research and development on carbon capture technologies through Public Private Partnerships:

- Joint R&D between public and private sector - Over the last the last two decades, carbon capture, utilization and storage (CCUS) technology has been developed and brought to readiness for commercial-scale CCUS demonstration by Jupiter Oxygen Corporation, USA. This company uses an oxy-combustion process to achieve high flame-temperature conditions in power plant boilers, which enables cost effective carbon capture from existing natural gas and coal-fired power plants.
- The U.S. Department of Energy's National Energy Technology Laboratory (NETL) worked over 10 years with Jupiter Oxygen to perfect the carbon capture train and integrated air pollutant control system.

Lessons learned based on the experience and progress so far

These CCUS technologies are among the most pragmatic solutions to realistically tackle climate change and should receive the necessary financial support for accelerated development and deployment, especially in emerging economies that are much reliant on coal for economic growth.

In summary, carbon capture, utilization, and storage or reuse technologies are essential to addressing the challenge of global climate change effectively.

[1] **A**ccording to the U.S. Energy Information Administration (EIA, October 2017), in the year 2000, U.S. electric energy was produced more than 50% by coal compared to only 16% by natural gas, and by 2015 reached an equal proportion of 32% each for coal and natural gas within only 15 years!