**Responding to the Challenges of Climate Change:**

**Exploiting, Harnessing and Enhancing the Opportunities of Clean Energy**

The 2017-Forum Math-For-Industry is returning to Hawaii, and its theme is inspired by the alarming trend of climate change and its effect on the life on Earth along with the associated growing world-wide initiatives in renewable energy, as well as the priority for the State of Hawaii to eliminate its dependence on fossil fuel.

There is almost a unanimous agreement among climate scientists that man-made climate change is a reality. In 2015, for the first time, carbon dioxide levels in the atmosphere reached a symbolic threshold when they were at 400 parts per million (ppm) on average across the year as a whole, and experts suggest it will not dip below the 400ppm mark again for many generations. Renewable energy technologies are vital to reduce the environmental impact and they are sustainable. The last decades have seen a rise in human conscience regarding the negative impact of using fossil oils on the environment as well as the fact that they are finite and will some day be depleted.

It is the harnessing and exploitation of energy that drives the dynamics of human evolution and existence. Either directly or indirectly, the energy that is used comes or has come from the sun. Historically, for example, because of its abundance and energy efficiency, coal was and continues to be burnt to make the steam which drive the turbines which generate the electricity which exploits the ground breaking experimental work of Faraday. Similar scenarios hold for the utilisation of petroleum. Climate change has been and is a continuing negative reaction to such actions.

To ameliorate the consequences, new protocols for generating the required energy are being developed which build on the clean energy opportunities including wind, solar, hydro and storage. The expansion of sustainable alternatives to fossil fuel is one of the grand scientific challenges of the 21st century.

Success will depend heavily on the ingenuity of the science, technology, engineering and mathematics utilised. These challenges are inherently complex and require interdisciplinary approaches to and truly innovative solutions. Consequently, the goal of the Forum is to facilitate a discussion about the role that mathematics-for-industry can play in exploiting, harnessing and enhancing clean energy opportunities and strategies. Bringing mathematicians together with scientists and engineers working on clean energy offers great opportunities to advance the frontiers of mathematical sciences and provide novel mathematical solutions to current challenges, such as the development and management of smart grids.

At the Joint Mathematics Meetings in San Diego in January 2008 Gerald North of the Department of Atmospheric Sciences at Texas A&M said: “The influence of climate change on mathematical research in the twenty-first century could be comparable to physics' a century ago". The final speaker of the symposium was Congressman Jerry McNerney (first member of the US Congress to hold a Ph.D. in mathematics), and he urged mathematicians to become active both professionally and politically in climate change issues. Nine years later this still holds true, and more than ever mathematicians need to play a key role in developing alternative sources of energy and other technological innovations to mitigate and adapt to climate change.