Erich Farber (1921–2017)

Dr Erich Farber a US-based solar energy pioneer died on 9 April 2017. He was an Emeritus Distinguished Service Professor of Mechanical Engineering at the University of Florida (UF), Gainesville, USA.

Farber did pioneering work in many fields. He was the inventor of pool boiling curve which is the bedrock of two-phase flow in heat transfer. For this, he received American Society of Mechanical Engineers (ASME) major award – the Worcester Reed Warner Medal. He made major contributions to the design of Saturn 5 rocket that sent man to the moon. In the field of solar energy, he pioneered the development of various technologies for the conversion of solar thermal energy into heat (solar water and swimming pool heating) and mechanical energy (via hot air Stirling engines), but mostly in the development of solar refrigeration and air-conditioning systems. He was a Fellow of ASME and charter member of the Solar Hall of Fame, and received many awards from various universities and solar energy societies around the world.

Farber was born in Austria in 1921 and came to the US during the Second World War. He joined the US Army and was sent to Europe to fight the Nazis. For his valour, he earned Silver Star and Purple Heart as decorations.

He obtained his undergraduate degree in mechanical engineering from the University of Missouri and Ph D degree in 1949 from the University of Iowa, USA. After briefly teaching at the University of Wisconsin, he joined the faculty of Mechanical Engineering at UF in 1954 and retired in 1990.

Farber authored more than 400 publications and co-authored 6 books including major chapters on solar energy in the *Standard Handbook for Mechanical Engineers*. In the 1960s and 70s, he set up at UF one of the largest solar energy programmes in any US university. At the height of the programme, there were close to 25 graduate students and faculty working under his supervision in almost every area of solar thermal energy utilization.

I also had the opportunity of working under him for seven years, first as his graduate student and then as a colleague at UF.

He was a leading light in solar energy utilization, especially for solar thermal application in power generation and refrigeration. He set up a Solar House in late 1960s, which was completely air-conditioned by solar energy. The 3-tonne ammonia–water refrigeration system for cooling the house was for many years the largest such facility anywhere in the world. Similarly, his work in developing an electric car in 1971 was a pioneering effort, as was his work on developing 1–2 HP solar stirling engines.

Farber's group in UF was the major contributor to the testing standards for solar water heating systems and helped in developing ASHRAE standards which are used world over for testing solar collectors.

Farber was an engineers' engineer with the ability to go to the heart of a problem and apply basic engineering fundamentals to find a solution.

His mathematical knowledge was weak, but he more than made up for it by his practical approach. He believed in doing excellent experimental work rather than modelling or theoretical research.

An instance of his technical capability was shown in finding the volume of a complicated geometry of Saturn 5 rocket cone. Quite a number of his colleagues at UF developed sophisticated computer models (and in those days getting a FORTRAN program to run in huge computers was a nightmare), yet even after 3–4 months they did not solve the problem. Farber asked a master craftsman to make him a wooden model of the rocket engine which he dipped in a bucket of water and from its displacement found the volume!

His pioneering work on Saturn 5 rocket design helped man go to the moon. His concept of developing 'critical mass' for mixing liquid oxygen and hydrogen was one of the important contributions to the success of the Saturn 5 space programme. He showed through sophisticated experimental work that only a 'critical mass' of these fluids can be mixed safely. Above that, surface charge in the mixing liquids will lead to explosion of the fuel. With a child's glee, Farber once explained how he analysed reams of thermal data collected from the explosions to develop the critical mass concept.

Success of the Saturn mission also brought together Farber and Von Braun – father of the US space programme as great friends.

Farber was a teacher at heart and gave excellent lectures about solar energy with insights on practical usage. It is a loss to the solar energy community that he never converted those lecture notes into a book. A crowning achievement of his teaching ability was the funding of multimillion-dollar TAET Center at UF. This 5-year project was funded by USAID to teach scientists, engineers and energy planners from developing countries about renewable energy. It was to Farber's credit that the center came to UF, as there was tough competition from major universities like Cornell, Berkeley, etc. TAET was the first such Center anywhere in the world.

As an energy man, Farber lived frugally. He drove a non-AC old VW Van and lived in a house which had no air-conditioning.

In 1976, Farber came to India as the head of a US delegation on solar energy to explore the possibility of establishing an Indo-US programme.

In the 1980s, he helped design the air-conditioning system for Gainesville Airport, which became the largest building in the world to be air-conditioned by solar energy. No wonder the city of Gainesville was then called the solar capital of the US.

Farber's legacy continues through his innumerable students world over. His archives are housed in the Solar House situated in Energy Park on the UF Campus. This House which was the first one in the US to be completely air-conditioned by solar energy, was declared an ASME landmark in 2003.

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