Twinkle, Twinkle Little Star

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Twinkle, twinkle, little star,
How I wonder what you are!
Up above the world so high,
Like a diamond in the sky!

This is one of the most popular English lyrics first published as a poem, 'The Star' in 1806 by sisters Ann and Jane Taylor. It ends with

Though I know not what you are,
Twinkle, twinkle, little star.

For millennia, amongst the Greeks, the Incas, the Egyptians, the Indians, and the Chinese, there has been a fascination for these starry messengers in the night, and what they might mean to the unfolding of the human destiny here on earth. But it was less than a hundred years ago, in 1920, a year after he had found astronomical proof for Albert Einstein's General Theory of Relativity, that Sir Arthur Eddington, famous astrophysicist, asked a serious question: 'Why do the stars shine?'

In his address to the British Association for the Advancement of Science, he raised a question that was to engage the attention of many brilliant minds over the next several decades:

"A star is drawing on some vast reservoir of energy by means unknown to us. This reservoir can scarcely be other than subatomic energy which, it is known, exists abundantly in all matter; we sometimes dream that man will one day learn how to release it and use it for his service. The store is well-nigh inexhaustible, if only it could be tapped. There is sufficient in the sun to maintain its output of heat for 15 billion years...."

Eddington concluded his address with a dramatic sentence:

"If, indeed, the subatomic energy in stars is being freely used to maintain their great furnaces, it seems to bring a little nearer to fulfillment our dream of controlling this latent power for the well-being of the human race - or for its suicide."

It will be another 25 years, in the making of the Atom bombs that were exploded over Hiroshima and Nagasaki in August 1945, that the new age of atomic energy can be said to have begun.

In these 70 years since then, human race has lurked precariously at the edge of suicide on several occasions, and it has dreamed of new possibilities and adventures in the farthest reaches of space, or in the depths of the oceans.

This is the story that accompanies the discovery or the invention of every new source of energy. "Energy is an Eternal delight," poet William Blake declared. Indeed, without energy nothing is possible: stars do not twinkle; far off lands and mountains are inaccessible to humans; no kites or planes fly; no food is cooked; no messages are delivered or received; no ideas are thought; no games are played; no leaves change colour; no flowers blossom; no butterfly migrates thousands of miles; no egg is hatched. In short, without energy, the universe will come to a stand-still.

How does the universe generate energy, transform it from one form into another: heat into photosynthesis, kinetic energy into electricity, and use it and re-use it, conserve it, and use it with greater efficiency, are all great lessons to be learnt from nature.

Much before life appeared on earth, and much before humans appeared, the drama of energy in our own solar system played on abundantly: the fusion on the sun for billions of years, wind currents on earth, currents in the oceans, photosynthesis essential for plant life, respiration by all consumers on earth; oil, coal and gas deposits developed, all precede the coming of man by hundreds of millions of years.

Like all other animals, man has been at the mercy of the forces of nature till his discovery of fire some 500,000 years ago. It can be said that fire set man apart from all other creatures; he acquired a new and unique force not to accept the world around him as it is, but how it might be.

Some 5,000 years ago, through the use of wheel, ramps, livers and pulleys, and through the domestication of animals, and human ingenuity and organizational power, the human energy multiplied a hundred, a thousand fold; the distance between him and other animals began to increase beyond recognition.

Human civilization slowly but surely began to take man out of nature into a world of his own, into the world of culture.

Humans have used the solar power for warmth and for drying even before the discovery of fire, but the use of wind power for sailing, for separating chaff from rice and grain; using water and wind mills, all have been necessary steps in settled life for humans.

A turning point in these civilizing steps was the harnessing of steam power to create kinetic energy, through locomotion of trains, ships and foe generating electrical energy.

When Columbus sailed for the New World in 1492, he used wind power to sail his ship. When the Titanic sailed for America in 1912, and sank, it was powered by the burning of coal.

Yet, no automobile or aeroplane could be powered by coal; they needed a different source of energy, and a different kind of engine. That came from the discovery of oil in 1850s.

Today we can't imagine a city without automobiles; a world without electricity; wars are fought over oil; flow of natural gas across countries and continents is leading to new tensions and treaties. We search for new, cleaner, sustainable, renewable and reliable sources of energy, for all our life, and our prosperity hinges on the availability of energy. There is solar energy, and wind energy, and possibly hydrogen as source of new, clean and infinite energy.

In the past few decades, however, a new hope is being placed on biotechnology, and its power to breed new varieties of animals and plants; plants such as the herbicide-resistant varieties of maize and soybean that allow weeds to be controlled without ploughing and greatly reduce the erosion of topsoil by wind and rain.

New science has led to new technology and new sources of energy, and to new organization of people, cities and life styles, as well as to new consumptions and wastes. Can these be sustained for 7 billion people, and rising? Are we at the cusp of a new revolution?

Could it be that our fate is linked to the light that burns in the stars?