The Climate and Energy Emergencies

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Jim H. Adams – www.jimhadams.com

Chapter I – The Big Picture

Introduction. This eBook, an update with pictures of the 2009 edition, shows in simple language the very dangerous changes to our climate due to burning fossil fuels, which emit the greenhouse gas carbon dioxide, and also where our energy comes from, why it is running out, and what we need to change to solve some of these problems. We look from the general to the particular – to where the author lives in Brighton & Hove.

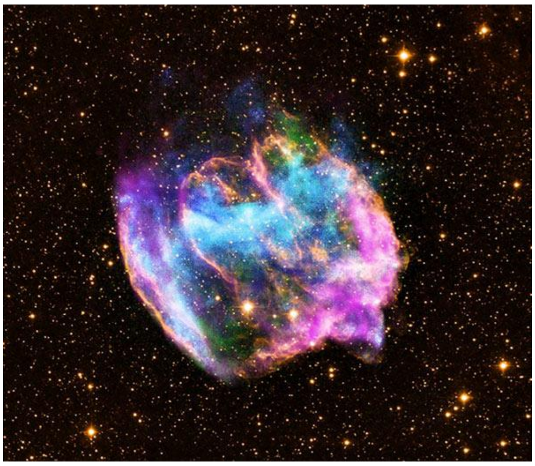
We include in three alarming new chapters the feedback models of climate catastrophe due to David Wasdell (the Apollo-Gaia website is www.apollo-gaia.org) presented by Guy McPherson (http://guymcpherson.com/climate-chaos), overriding the forecasts we have retained here of Doly García on fossil fuel and resource depletion, and sketch ways the world will have to adapt to and reduce the climate emergencies we have brought about – but mankind does not have time. The action needed on climate change is imperative, it requires international agreements, and these agreements must be adequate and enforced. The energy resource depletion and climate models show a large part of humanity faces extinction, together with a vast number of other species unless concerted international action is taken with great urgency.

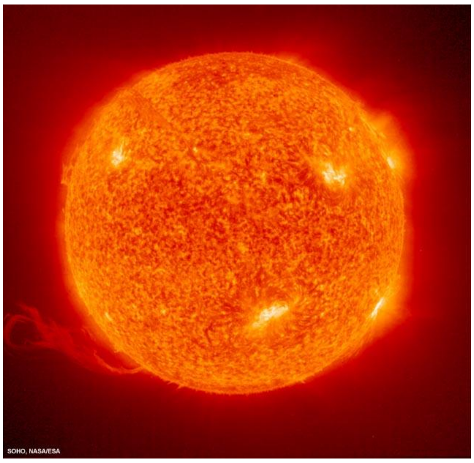
Units. Definition of units: To give an example of what is meant by a watt, which is a unit of power, a labourer over the course of an 8-hour day can sustain an average output of about 75 watts; higher power levels can be achieved for short intervals and by athletes. A kilowatt is a thousand watts, a megawatt a million watts, a gigawatt (giga = giant) is a thousand million watts and a terawatt (tera means monster) is a million million watts. For instance, the coal powered power station below had a capacity of 180 megawatts.

Likewise for years, a megayear is a million years, and a gigayear is a thousand million years.

Energy, the Big Picture. Where do we get our energy from, and why is some of it about to disappear?

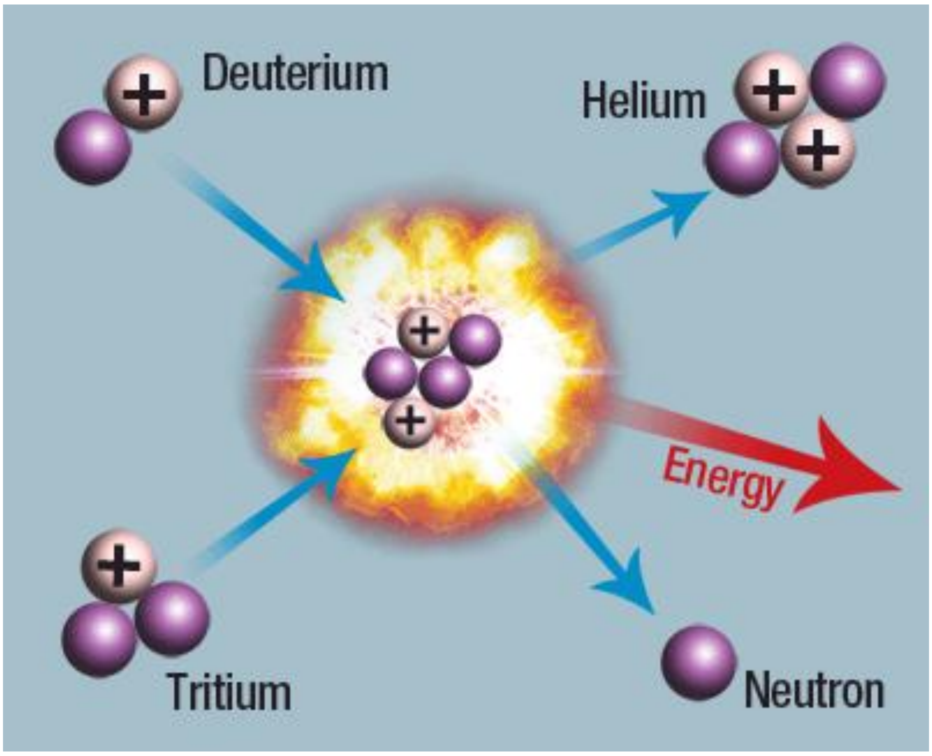
- *The sun, the moon and the Earth.*
    a. The sun, thermonuclear energy.



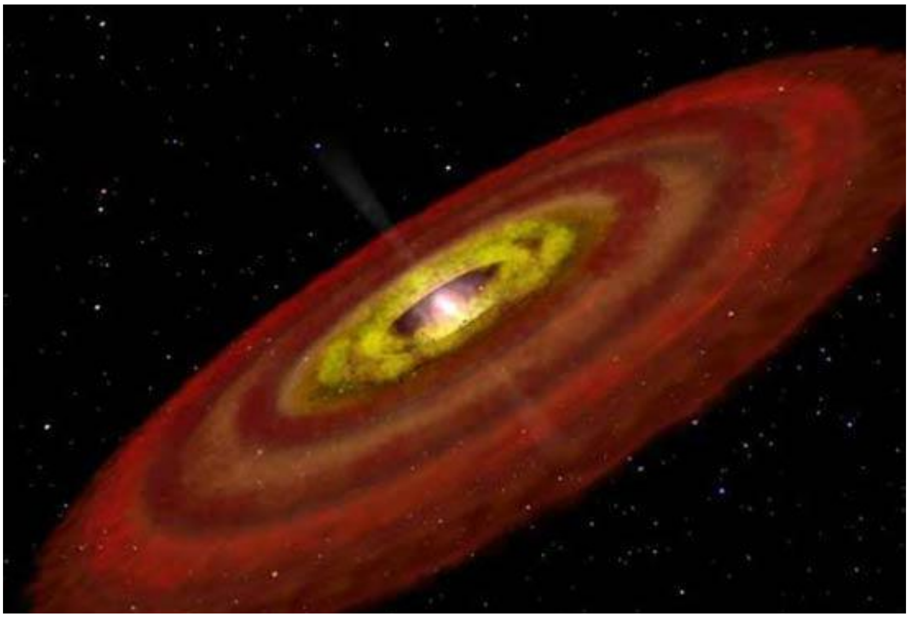


We start, not from the beginning, but from the middle. Our galaxy of stars had formed. One of these stars exploded in a supernova explosion, and the debris of this explosion formed the heavier material for our own star – the sun.

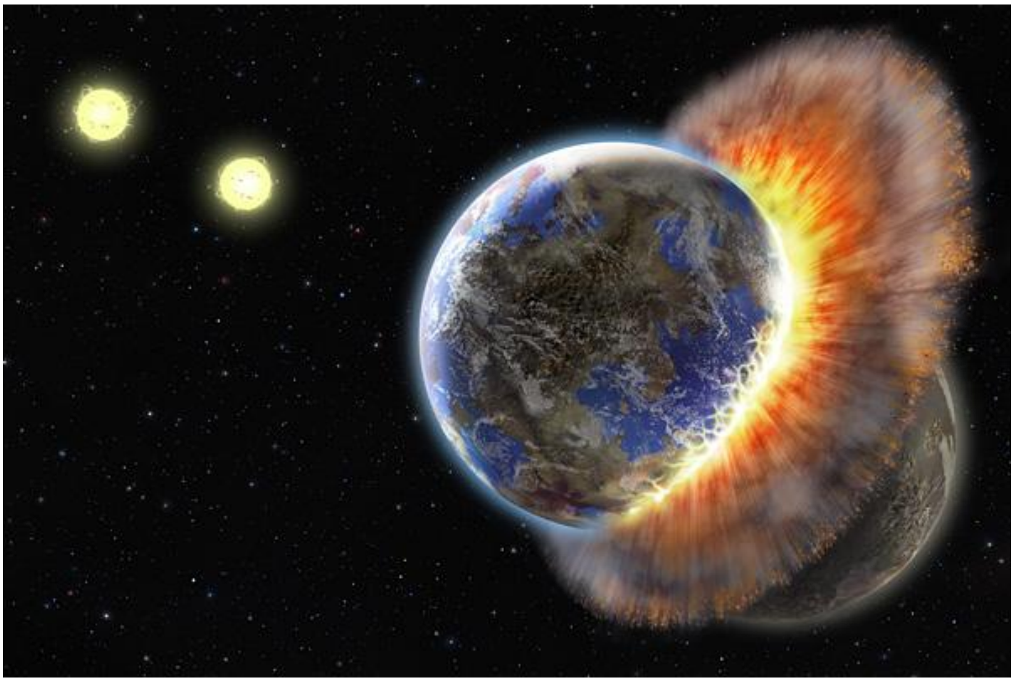
The sun is very dense and very hot. Its main constituents are hydrogen and deuterium. These atoms can collide and fuse to form an element of higher atomic weight – helium, and this gives off energy. This is known as thermonuclear fusion. This is why the sun shines and gives us heat.



b. The creation of the moon and the Earth in a collision.



Computer simulation shows that the heavier material that forms the sun was surrounded by an envelope of gas which condensed into planets.

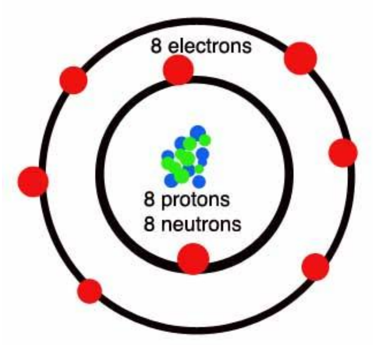


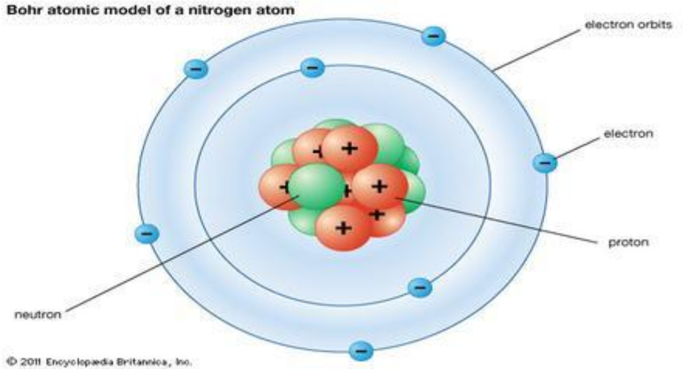
One of these planets was larger than the Earth and was hit by a planetoid or meteor, which split this planet in two and formed what are now the Earth and the moon.

- *Energy resource depletion*. We will describe later in more detail energy coming from the sun, the moon and the Earth, and show how we are consuming finite resources of oil, gas, coal and some other energy sources.

<u>*Climate, the Big Picture*</u>. Why is the climate changing?

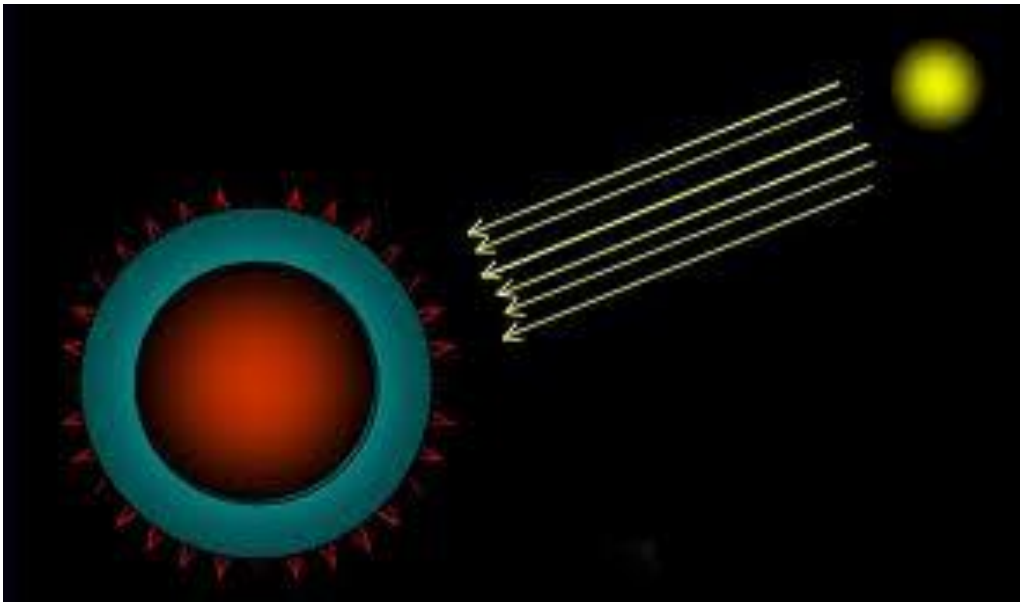
- *Greenhouse gases*. Our atmosphere contains mainly *oxygen* and *nitrogen*, but it also contains a small amount of *carbon dioxide*, which is vital. The carbon dioxide absorbs and scatters radiation from the sun, and so keeps our thin atmosphere and the Earth's surface warmer than it otherwise would be.





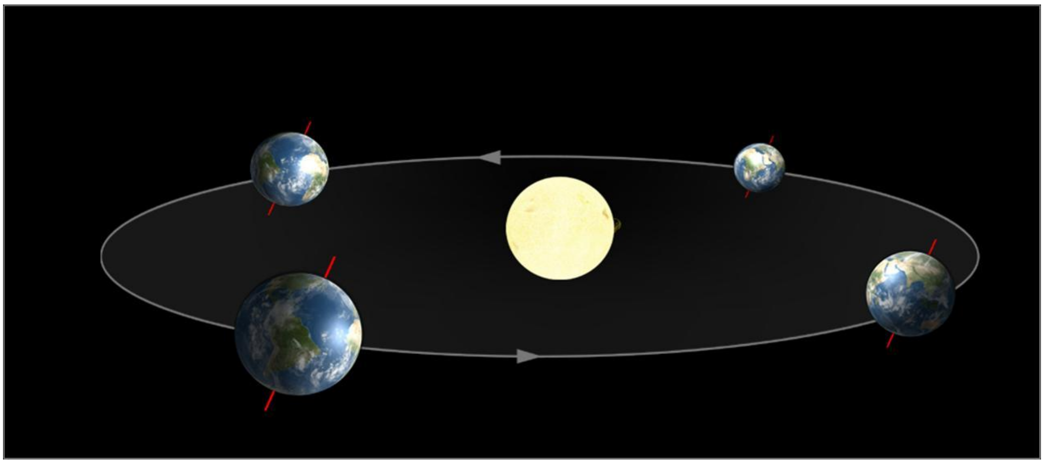
Oxygen

Nitrogen



Our recent civilisation has been burning oil, gas and coal, and so the carbon dioxide emitted is warming the planet.

- *Milankovitch cycles*. The Earth rotates with its axis at an angle to the vertical and around the sun in an ellipse.



What we understand about gravitation tells us this axis wobbles and then comes back again and the ellipse gets squashed and then becomes more circular. There is also a change of the plane of this ellipse with the average for that of other planets. Over Milankovitch cycles of 40,000 and 100,000 years, this changes the angle at which radiation hits the Earth, and so leads to cold glacial periods and warm interglacial periods.