Senate Finance and Public Administration Legislation Committee
ANSWER TO QUESTION ON NOTICE
Prime Minister and Cabinet Portfolio
Department of Climate Change
Budget Estimates Hearing–May 2009

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Topic:
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Question: (Senator Fielding**)**

Senator FIELDING—I wonder what, as a general principle, the department believes regarding what percentages of global carbon emissions are man-made, animal-made or made from natural sources. That would not leave out submerged volcanoes. We had Senator Brown in here before saying there were forests burning, and there is some move globally to count even bushfires in the emissions scheme. Does the department have a very firm view of the global proportions? You probably have it somewhere, but you probably do not have it top of mind. Could you table that for us at some stage?
Senator Wong—We can provide that. I do not know if this is helpful to you, but there are some quite good visual graphs which track a range of climate models against temperature and which, I think, really demonstrate how—
Senator FIELDING—I am not interested in that. I am interested in the carbon emissions very specifically

Answer:

The global carbon budget is well understood and closely monitored.

Through respiration and photosynthesis plants on land respire about 60 billion tonnes of carbon and absorb about 61 billion tonnes, hence they are a net sink rather than a source of emissions.

The surfaces of the oceans release about 90 billion tonnes of carbon to the atmosphere and absorb about 92 billion tonnes each year, again the oceans are a net sink for emissions rather than a source. This absorption occurs when carbon dioxide in the air dissolves in the top layer of sea water and through photosynthesis by marine plants.

The burning of fossil fuels and land use change by humans added 10 billion tonnes of carbon in 2007. Around half of this carbon dioxide was absorbed by plants and the oceans while the rest stayed in the atmosphere and is responsible for the observed increase in atmospheric carbon dioxide concentration (383 parts per million in 2007).

Volcanoes emit water vapour and carbon dioxide, but contribute little to global changes in atmospheric greenhouse gas concentrations.

Large volcanic eruptions, however, can blast huge amounts of sulfur dioxide into the upper atmosphere (the stratosphere). There, the sulfur dioxide transforms into tiny particles of sulfate aerosol. These particles reflect energy from the sun back into space, preventing some of the sun's rays from heating the Earth.

Conversion of sulfur dioxide to sulfuric acid aerosol in the stratosphere takes some months, so maximum cooling occurs up to a year after the eruption. It may take several years before the cooling influence of the volcanic aerosol disappears.

When Mt Pinatubo in the Philippines erupted in 1991, it blasted up to 26 million tonnes of sulfur dioxide into the stratosphere. This led to a global surface cooling of 0.5°C one year after the eruption. This cooling offset the warming effects of both El Nino and human-induced greenhouse gases from 1991 to 1993.