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Towards Sustainable Consumption: a joint statement by the Royal Society and the United States National Academy of Sciences

1. The Councils of the Royal Society of London and the United States National Academy of Sciences see an urgent need for better understanding of human consumption and related behaviors and technologies, so that effective action may be taken to expedite the transition to a sustainable, desirable life for the world's people in the coming century. It has often been assumed that population growth is the dominant problem we face. But what matters is not only the present and future number of people in the world, but also how poor or affluent they are, how much natural resource they utilize, and how much pollution and waste they generate. We must tackle population and consumption together.

2. In developing our thoughts on this matter, we are concerned primarily with the long-term quality of life of all peoples. For the poorer countries of the world, improved quality of life requires increased consumption of at least some essential resources. For this to be possible in the long run, the consumption patterns of the richer countries may have to change; and for global patterns of consumption to be sustainable, they must change. Science and technology are needed to devise and implement effective policies.

Background

3. In 1992 the Officers of the Royal Society and the National Academy of Sciences issued a joint statement Population Growth, Resource Consumption and a Sustainable World. It focused on world population and highlighted the consequences of continuing population growth, the urgency of the problem and the contributions that scientific research could make to its mitigation. This statement led, in 1993, to a conference of the world's Science Academies in New Delhi. Fifty-eight Academies agreed a further statement on population, which emphasized that:

Resource use, waste production and environmental degradation are accelerated by population growth. They are further exacerbated by consumption habits, certain technological developments and particular patterns of social organization and resource management.... Scientists, engineers and health professionals should study and provide advice on...transitions to economies that provide increased human welfare with less consumption of energy and materials.

4. The United Nations has just completed a series of five conferences on major issues of long-term global significance. The conferences concerned environment and development (Rio, 1992), population growth (Cairo, 1993), social factors including poverty (Copenhagen, 1994), women (Beijing, 1995), and the future of cities

(Istanbul, 1996). But none of these conferences adequately addressed the issue of resource consumption.

5. An informal network of the Science Academies of the world, the InterAcademy Panel on International Issues (IAP), was formed after the New Delhi meeting to facilitate further collaboration. IAP is now launching a major initiative on the science and technology aspects of moving to a globally sustainable way of life. This will culminate in a conference in the year 2000 and publication of an agreed statement. The conference, and supporting activities developed at regional level throughout the world in preparation for it, should include extensive work on consumption and related issues.

Consumption: defining and understanding the issue

6. Consumption can be defined in the terms of several different disciplines, such as economics, physics, ecology or sociology. The physical concept of transformation of materials and energy provides the basis for a definition of practical value.

Consumption is the human transformation of materials and energy. Consumption is of concern to the extent that it makes the transformed materials or energy less available for future use, or negatively impacts biophysical systems in such a way as to threaten human health, welfare or other things people value.

7. This definition implies that understanding consumption and making decisions will involve technological and economic choices and processes, such as choosing energy options that involve least direct and indirect cost. It will also require value judgements that are not readily expressed in monetary terms, such as the importance to a society of old-growth forests or other natural areas, or choices of how to meet non-material human needs. Consumption involves producers and distributors as well as "consumers": for example, the amount of energy and materials transformed in making a car and the quantity of fuel needed to propel it a given distance are as important as the number of cars bought and total miles driven.

Consumption and Sustainability

8. We need to understand consumption in the context of sustainability--that is, whether our present actions sacrifice the ability of future generations to meet their needs. The rate of transformation of energy and materials that is sustainable depends on:

- the rate of natural regeneration of resources;
- the capacity of the environment to assimilate effluents without substantial negative impact on human health and the biosphere; and
- the rate at which more abundant alternatives or substitutes can replace energy sources and materials of limited availability.

9. We draw two major conclusions.

- First, in many cases research is needed to assess what consumption rates are sustainable. For example, the rate of regeneration of renewable resources must be understood, alternative resources must be identified, and pollutants and their effects must be analyzed further. We need to know the indicators of

sustainability, and whether unambiguous signals can be expected before it is too late to preserve a resource base in economically feasible ways.

- Second, we do now know about many pollutants and their effects. The present rate of consumption and reasonable projections of future rates already indicate that many renewable and non-renewable resources are being drawn down. Also apparent, whatever parameter of consumption is used, is the fact that a relatively small fraction of the world's population consumes a disproportionate amount. The consumption of the most affluent part of the population is of great importance in itself and influences the consumption patterns and aspirations of others worldwide. The poor peoples are rightly seeking to improve their standard of living, and will continue to do so.

Consumption, population growth and technology

10. Some examples illustrate that the phenomenon of consumption concerns more than simple population growth.

- The population of Bangladesh is increasing by about 2.4 million per year, while that of Britain is increasing by about 100,000 per year. Yet, because carbon dioxide emissions per person in Britain are 50 times higher than in Bangladesh, the 100,000 people in Britain cause more than double the carbon dioxide emissions of the 2.4 million people in Bangladesh.

- Since 1950, the richest 20% of the world's population has increased its per capita consumption of meat and timber two-fold, its car ownership four-fold and its use of plastics five-fold. The poorest 20% has increased its consumption hardly at all.

- The impact of increased consumption varies from one commodity to another. Because iron-ore is abundant, and steel can be recycled, their consumption by rich countries need not be at the expense of poor countries. But this may not be the case for commodities that are relatively scarce or cannot be recycled.

11. Moreover, aggregated national data of this sort understate the differences between rich and poor in each country. These divergences are growing in countries at all stages of development.

12. Historically, the pattern has been for consumption of energy and materials per unit of GDP (the energy and materials intensity) to rise quickly as a country develops, and then to decline. For example, the energy intensity of industrialized countries has been declining since the mid-1970s. These trends raise important issues.

- How can such increases in energy and materials efficiency be accelerated to achieve dramatic improvements?

- Can developing countries skip over the historical maxima of consumption per unit GDP to achieve improved quality of life more quickly and efficiently?

- Can concepts of industrial ecology and clean production be implemented in developing countries as well as in industrialized countries?

13. Per capita use of petroleum feedstocks in the US is seven times the world average. Gasoline in the United States is cheaper now than at any time in the last sixty years. That price does not reflect even the more immediate indirect costs such as

local pollution. And the developing countries are following the example of rapid adoption of the automobile: last year, more new cars were sold in Asia than in Western Europe and North America together. How can technology and investment be mobilised to provide the world with less consumptive and polluting transportation, unless the industrialised countries lead the way? Some useful progress has been made in increased fuel efficiency (miles per gallon) and in reduced emissions, but can these and further improvements be implemented globally?

14. Such examples demonstrate that consumption depends on a range of interacting factors: population, economic activity, technology choices, social values, institutions, policies. The question remains whether, even if consumption per unit GDP decreases, a global GDP adequate for a decent life for the world's rapidly increasing population can be achieved at consumption levels that are sustainable. And it forces us all to consider what constitutes a "decent life".

The way forward on consumption: science and society

15. The research and action agenda implied by these considerations is urgent and ambitious. That agenda requires identifying the critical factors and setting priorities among many efforts. These efforts include:

- vigorous research on sustainable energy sources and on energy efficiency in all its forms, and vigorous promotion of those technologies for energy efficiency that already exist;
- development and diffusion of environmental technologies;
- research on ways of defining and determining environmental costs, and on incorporating them into pricing and taxation policies;
- improvement of energy- and land-efficiency of food production;
- management, protection and regeneration of natural systems;
- minimization, recycling of materials and of components, and re-use of waste streams; and
- development of new and replacement materials.

There are increasing numbers of successful cases where products made with less transformation of materials and energy and less environmental impact have at the same time made firms more profitable. The same is true of waste streams: for example, Minnesota Mining & Manufacturing mounted a pollution prevention program that has to date eliminated more than half a million tons of pollutants, with savings of $750 million. Such cases must be understood and multiplied.

16. At the same time, societies need to examine their values and consider how goals can be met with the least damaging consumption. Scientists can help to understand the causes and dynamics of consumptive behavior. They can also develop indicators that track environmental impacts and link them to consumption activities, build understanding of how environmental and social systems respond to stress, and analyze the effectiveness of different strategies for making and implementing policy choices in the presence of uncertainty.

17. These are exciting challenges. Social and natural scientists can and must work with private firms and public officials to produce innovations and the incentives to implement them, locally and globally. As scientists but also as citizens of the world, we must strive to see that its riches are used in such a way that our descendants throughout the world can continue to enjoy them. We hereby emphasise our intention to help stimulate these important efforts by the international community of scientists.

The Royal Society is the UK national academy of science, founded in 1660 and self-governing under Royal Charter. It is dedicated to recognising excellence in science, encouraging research and its application, furthering the role of science, engineering and technology in society and promoting the public understanding of science.

The US National Academy of Sciences[1] is a private, non-profit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress of the United States in 1863, the Academy has a mandate that requires it to advise the U.S. federal government on scientific and technical matters.

This statement was prepared by, and is issued in the name of, the Councils of the Royal Society and the National Academy of Sciences. Together with other members of the InterAcademy Panel on International Issues, the Society and Academy are working towards a major conference in the year 2000 on the science and technology aspects of the transition to a globally sustainable way of life.

[1] Http://www.nas.edu