scientists and I have criticized this conclusion for a variety of reasons that are well summarized in last month's Federal Court decision concerning EPA's report on ETS (*1*); the decision notes how the agency disregarded the law, due process, its own guidelines, and internal dissent; used advisory committees populated by its own clients; selectively manipulated and ranked data; disregarded biases and confounders; improvised ad hoc methods of analysis; and flaunted statistical standards to reach the imaginary support of a preconceived position that the agency had publicized some years earlier. The transparent evidence of the Court's decision conveys a moral force that many find deeply uncomfortable, especially since EPA has a long record of weaving its own kind of science to fit favored policies (*2*).

If legitimate doubts about the Court's conclusions are harbored, it would be of value to open a debate about the facts.

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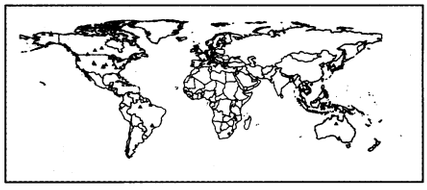
Estimating the CO_2 Uptake in Europe

In her informative and well-written article "New network aims to take the world's CO_2 [carbon dioxide] pulse," Jocelyn Kaiser (News Focus, 24 July, p. 506), reports "preliminary findings [indicating] that European forests absorb a net total of up to 0.28 petagrams of carbon a year—a third of the continents' industrial emissions." As the initiator and coordinator of the team effort aimed at estimating the net carbon dioxide uptake from European Union (EU) forests undertaken under the auspices of the Euroflux project (managed and funded by the European Commission's "Environment & Climate" Programme), which Kaiser cites, I offer five points of clarification. These five points entail major policy implications. First, the uptake estimate concerns the year 1997. Second, I compare the forest uptake figure to all anthropogenic emissions, rather than just to industrial emissions. Third, the estimate limits itself to forests within the confines of EU borders. Fourth, similarly, anthropogenic emissions refer to the EU, rather than to the European continent. Fifth, and finally, I presented our preliminary results at the Netflux meeting held in Montana (3 to 5 June 1998) as a pair of numbers, that is, 0.12 to 0.28 petagrams—between 10%



Global CO_2 monitoring network

and a third of EU anthropogenic emissions. I used a pair of numbers to highlight that such estimates involve unresolvable uncertainties.

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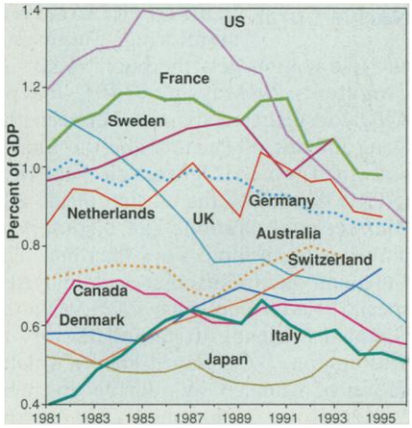
Big Spenders?

In his Policy forum "The scientific investment of nations" (*Science*'s Compass, 3 July, p. 49), Robert M. May concludes that "in countries with relatively high investment in defense R&D [research and development], public funding has fallen

steeply." This statement is only partly correct, perhaps because May does not appear to have looked at gross expenditure deflated and converted to constant dollars. He seems to be referring only to Britain, France, and the United States, which have decreased their military R&D investment, in gross terms and as a fraction of gross domestic product.



Trends in government-funded gross expenditure on R&D as percent of gross domestic product [R. M. May, *Science* **281**, 49 (1998)]

Among members of the Organization for Economic Cooperation and Development (OECD), Germany ranks fourth in military R&D investment. Germany has made real increases in public investment in military R&D since 1994. Before that, Bonn had underfunded some programs. Shortfalls were covered by industry and international partners, so total military R&D investment probably did not fall steeply (*1, 2*).

Japan has the fifth largest gross public investment in military R&D in the OECD and probably the fourth largest, if one includes privately funded R&D. Japan's public funding of military R&D has increased steadily in real terms since 1976, and in 1996 was 220% of what it was in 1986 (*1, 2*).

South Korea is a new member of the OECD and has reported its military R&D investment to Paris for only 1 year. The purchasing power of Korean military R&D investment ranks sixth in the OECD. Korean government reports reveal that Seoul has increased military R&D investment steadily since 1989. It tripled in real terms between 1989 and 1997 (*2, 3*).

In neither Japan nor Korea has the increase in military R&D been at the expense of civilian R&D (*1–5*).

Outside the OECD, Russia has steeply decreased investment in military R&D (*2, 6*). The trend in China is unknown after a steep decrease in the 1980s. Reports of an increase since 1991 cannot be confirmed (*2*).

In 1997, the purchasing power of India's military R&D investment was about equal to Germany's (*1, 7, 8*). India's budget for military R&D was increased by 32% in real terms for fiscal year (FY) 1998–1999. Indian military R&D investment has been increasing steadily since the 1991 (*2, 7, 8*). In contrast with Japan and Korea, Indian government investment in military R&D increased simultaneously with decreases in government investment in civilian R&D before the FY 1998–1999 budget, although there is not clear evidence of a causal link (*2, 8*).

In summary, two of the six biggest investors in military R&D in the OECD are steadily increasing their military R&D investment. Globally, at least four of the 10 biggest investors in military R&D are increasing their budgets.

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Response

My Policy Forum focused on the G7 nations, along with five other countries, each with an output of research that is particularly high in relation to population size of gross domestic product. Arnett correctly assumes that, in this context, my discussion of declining defense R&D referred primarily to the United States, the United Kingdom, and France, which have defense R&D expenditures that are far more than the fourth-place Germany or Japan.

Space did not permit my elaborating on this point (or on many others). I welcome Arnett's more detailed and thought-provoking comments.

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NRC on Global Change

The News & Comment article "Global change fights off a chill" by Andrew Lawler (12 June, p. 1682) provides a good summary of the recent National Research