



PERGAMON



Atmospheric Environment 0 (2001) 1-2

---



---

**ATMOSPHERIC  
ENVIRONMENT**


---



---

www.elsevier.com/locate/atmosenv

## New directions: my own private Kyoto, ☆, ☆ ☆

It is all very easy to view greenhouse gas emission and climate change as being unaffected by us as individuals. Changes in government and big business policy are seemingly the only route to emission cuts. Indeed, with negative comments by the United States on the Kyoto Protocol, and the likelihood of intense wrangling over Clause 3.4, it is all very easy to despair of real progress ever being made. However, with the possibility of equal emission quotas per capita being used at some future date and that, in reality, any real change must start at the individual level (Mike Hulme, Times Higher Education Supplement Letters, April 2001), our personal impact on Kyoto Protocol targets is worth considering.

Although the Kyoto Protocol defines targets for greenhouse gas emission for whole countries, could individuals meet similar cuts in their own greenhouse gas budgets? Could they do it without large economic cost? And what could be used under Clause 3.4 of the Protocol as an 'additional activity'?

Let us take the original US Kyoto commitment of a 7% cut below 1990 levels, and its actual 1998 emission status of an 11% increase on 1990 levels (US environmental protection agency (EPA), 2001) as our starting point. As individual US citizens we are each faced with cutting our current total greenhouse gas emissions by about 16%. Firstly, let us consider making cuts in our direct greenhouse gas emissions. On average each US citizen produces around 6.6 ton of greenhouse gas (about 25 ton CO<sub>2</sub> equivalent) per year (EPA), so to make all of our Kyoto cut directly would need a personal cut of about 2 tons per year. One of our biggest greenhouse gas producers is probably our car, some churning out more than 10 tons each year (Fig. 1).

Let us say we trade in our gas guzzling four wheel drive or sports car for something more fuel efficient. For instance, if we trade in our Mitsubishi Montero

(12.6 tons CO<sub>2</sub> equivalent/year) for a Mitsubishi Mirage (5.5 tons CO<sub>2</sub> equivalent/year) we would reduce our total greenhouse gas emission by a huge 7 tons a year or 28%. Assuming that we are married and have two children this car trade-in represents a greenhouse gas emission cut of about 7% per person—almost half the Kyoto commitment for the whole family met in one sweep! Not only that, this method of reducing our greenhouse gas emission is very cost effective, the savings in petrol with our new car amounting to more than \$1000 per year. If we cannot do without our large engined car then setting up a carpool with friends, whereby we reduce our car use by just two days a week, could result in a 3% cut in our greenhouse gas emission (0.7% for our family as a whole).

Next let us consider ways of making indirect greenhouse gas cuts under Clause 3.3. Assuming we've got some garden, we can reduce our net greenhouse gas emissions by planting trees. Let's take the case of an average tree, using around 25 kg of C per year. For each one of these trees that we plant we get a net reduction in our personal greenhouse gas emission of about 0.3%. So, assuming our garden is large enough to plant just four trees, we can achieve a cut of more than 1%. Also in the garden, changing our lawn mower from a powered to a push model could reduce our greenhouse gas production by another 40 kg or 0.5% each year.

Clause 3.4 of the Kyoto Protocol allows us to account for some of our cuts using so called "additional activities". What exactly comprises additional activity is the subject of some contention, but for simplicity's sake let's say that existing trees in your garden don't count, but improved insulation and installation of solar panels do. If we take the example of heating/air conditioning in our home, reductions of up to 1200 kg CO<sub>2</sub> equivalents or more than 16% (4% for our family of four) of our greenhouse gas emission may be possible with improved insulation. Similarly, the use of more efficient appliances in our home may allow substantial reductions. A high efficiency washing machine and fridge could reduce our greenhouse gas emission by up to 0.8% and 0.4% each year, respectively. Outside, assuming we live in a relatively sunny area, we can install solar panels to provide heating and further reduce our greenhouse gas emission by up to 1.5%. On the

\* Contributions to New Directions are welcome, as is correspondence on this or previous columns. Please see <http://www.uea.ac.uk/~e044/newd.html> for further details, or contact Dr. W.T. Sturges at [new.directions@uea.ac.uk](mailto:new.directions@uea.ac.uk).

☆☆ All cited data were obtained from the US EPA ([www.epa.gov](http://www.epa.gov)) and US Department of Energy ([www.energy.gov](http://www.energy.gov)) unless otherwise stated. Further information on vehicle emissions can be obtained at [www.fueleconomy.gov](http://www.fueleconomy.gov).

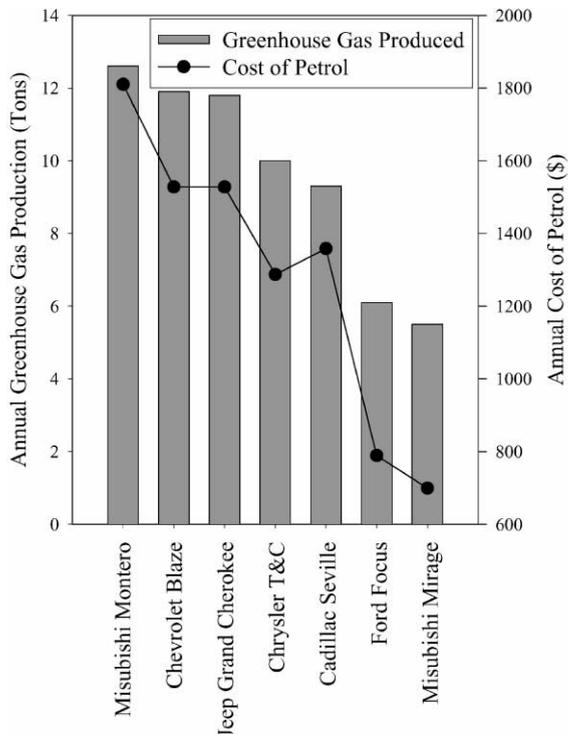


Fig. 1. Greenhouse gas production and petrol cost for a range of popular cars in the US. Data are based on 45% highway and 55% city driving, 15,000 annual miles and a fuel cost of \$1.81 per gallon (US Department of Energy and US EPA, 2001). Greenhouse gas emissions expressed in CO<sub>2</sub> equivalents (Greet Model, Argonne National Laboratory, <http://www.transportation.anl.gov/ttrdc/greet/index.html>).

financial side, more efficient appliances are available at similar prices to less efficient models, but will result in lower energy supply costs. Indeed, more efficient air conditioning systems can reduce heating and cooling bills by up to 40%.

Finally, we can also account for some cuts (a maximum of 50%) using Article 12 of the Kyoto Protocol, the 'Clean Development Mechanism'. This would involve helping our neighbours, friends and

family to reduce their net greenhouse gas emissions by, for example, helping them plant their own trees. If we were to plant a tree in the gardens of ten of our friends and family we could credit ourselves with a net reduction in our personal greenhouse gas emission of a further 3%. However, doing this may restrict the ability of our friends and family to make their own reductions in greenhouse gas emission by limiting the space available.

Overall then, direct cuts in our greenhouse gas emissions through changes in transport use may be the quickest and most effective means of trying to meet our own personal Kyoto commitments. Such changes will, by necessity, also drive change in government and big business practice. With improved fuel efficiencies and 'clean fuel' technologies, a real reduction in automotive greenhouse gas production is possible without increased cost to us as consumers. Similarly, the use of more energy efficient appliances in the home, the planting of trees, and the installation of solar panels can all help us on the way to meeting our Kyoto commitment without hitting our pockets. For our theoretical US family of four, making this series of small changes could achieve a cut in their collective greenhouse gas emissions of more than 13%, bringing their emissions down below 1990 levels, and well on the way to meeting the full Kyoto commitment. In the end, whether greenhouse gas concentrations in the atmosphere continue to increase, or whether they are stabilized and even reduced, is up to each of us to decide..

David S. Reay

*Institute of Ecology and Resource Management,  
University of Edinburgh, Mayfield Road,  
Edinburgh, Scotland EH9 3JU, UK*

*E-mail address: david.reay@ed.ac.uk*

**Dave Reay**, a Research Fellow at the University of Edinburgh, conducts research into the effects of land use on nitrous oxide and methane emission, with particular emphasis on the importance of inorganic nitrogen.