

(1997) OECD COUNTRIES

PROGRESS TOWARDS ENERGY SUSTAINABILITY IN OECD COUNTRIES by Dean Anderson

1. **Preface**
2. **Progress indicators**
3. **Executive summary**
4. **Trends in energy intensity**

- **Introduction**
- **Country reports**

5. **Changes in the mix of supply side energy sources**

- **Introduction**
- **Country reports**

6. **Progress in implementing national climate change programmes (error in old data)**

- **Introduction**
- **The European community**
- **The EU-15 countries**
- **The Non-EU OECD countries**

7. **Trends in transport**

- **Introduction**
- **Country reports**

8. **Trends in transport**

- **Introduction**
- **Country reports**
Progress Indicators

1. Preface

This preliminary report has been prepared by Dean Anderson as part of the Global Energy Observatory (GEO) project. Due to time and funding constraints, the report is qualitative and uses simple indicators of progress. The need to develop quantitative indicators and a more rigorous analytical approach is recognised and methodological refinements are being made by researchers in both universities and international organisations including Lawrence Berkeley Laboratory (Berkeley, California), ADEME (Paris, France), the World Bank, and the International Energy Agency. However the urgent need of the moment is for a concise, broad overview of the 'problem', a term used advisedly because progress in OECD countries towards

sustainable energy since 1992 in most OECD countries has been limited and uneven.

Any treatment of global economic and environmental sustainability must consider energy production and consumption as a central preoccupation. Throughout history, energy, mostly in the form of fuel combustion, has been a major driver of economic growth and a primary contributor to environmental pollution. Until recently such pollution was perceived as being local and regional in extent but during the past decade the spectre of global warming has alerted mankind to the global implications of fossil fuel use for power production, heating, transport, and in manufacturing processes. In the absence of environmental constraints, alternative sources of energy would during the coming century be expected to gradually displace fossil fuels as production of the latter begins to exceed discoveries of new reserves, thus putting upward pressure on prices and reinforcing the market dominance of countries controlling the largest remaining supplies. The 'penetration' of alternative sources would be expected to gradually accelerate as economies of scale and technological advances improve their economics relative to those of fossil fuels. However, the conclusion is now inescapable that decades before the prices of fossil fuels increase to the point where they affect consumption patterns, global environmental restrictions will have become the main drivers of change. International agreements to reduce sulphur dioxide emissions have been in effect in Europe and North America for a number of years and the UN Framework Convention on Climate Change (UN FCCC), adopted in 1992 at the Earth Summit in Rio de Janeiro, today has over 160 members. Under the auspices of the UN FCCC, an international treaty requiring developed (Annex I) countries to reduce their greenhouse gas (GHG) emissions after the year 2000 is likely to be agreed by the end of 1997.

Since the bulk of GHG emissions are attributable to energy use, government climate change abatement programmes of Annex I countries are primarily focused on reducing CO₂ emissions from fossil fuel combustion, improving energy end use efficiency, and reducing the energy intensity of economic activities (they are secondarily focused on increasing the capacity of carbon sinks, such as forests, and reducing non-energy related emissions of CO₂, methane, nitrous oxide, and other GHGs). A lot can be learned about the progress of developed countries in working towards energy sustainability by objectively examining the record of performance of governments in implementing their national climate change programmes. This is especially the case because the UN FCCC requires Annex I parties to submit semi-annual progress reports ('national communications').

Thus, a major source of the information in this report is the 'national communications' of Annex I parties to the UN FCCC, supplemented by critical analyses of climate change programmes by environmental NGOs, and academics. The other major sources are IEA and OECD publications on energy and the environment.

This report is limited to 22 countries which are members of the Organisation for Economic Co-operation and Development. Iceland and Turkey, though OECD members, are not covered, nor are any other countries which may have joined the OECD in 1996 or 1997.

2. Progress indicators

The 'simple' indicators used in this report are:

- **trends in energy intensity.** This measure indicates the effect on energy consumption of the combination of: (1) changes in the level of energy-using economic activity; (2) changes in the distribution of energy-using activities, such as a shift in production from ones using more energy per unit of production to ones using less; and (3) changes in the efficiency with which a product or activity uses energy, such as how

much electricity a refrigerator uses in a day.

- **changes in the mix of supply-side energy sources** from more to less GHG emitting: from coal and oil to natural gas; from fossil fuels to renewables, especially 'new' renewables (solar, wind, small (run-of-the-river) hydro; geothermal, and renewable biomass); from nuclear to non-nuclear (nuclear is treated as a special case since its potential contribution to climate change mitigation and sustainable energy is offset by the health and safety risks it poses);
 - **progress in implementing national climate change programmes.** This qualitative indicator is used because climate change programmes: (1) represent recent initiatives, in place in OECD countries only since 1990 at the earliest (more commonly 1992 or 1993); and (2) incorporate many measures important to energy sustainability, including ones addressing conservation, efficiency, and increased use of renewable sources;
 - **trends in transport**, including the development of more efficient vehicles and modal shifts from private vehicle/road use to public forms (inter-city rail and urban mass transit);
 - **trends in energy efficiency** in industry and in the commercial and residential sectors. Measuring energy efficiency requires disaggregation of data down to the level of individual energy using equipment and activities, something which few countries have undertaken.
-

3. Executive summary

One needs be careful about generalising too freely, especially when drawing broad normative conclusions about the overall and relative progress of developed countries in moving towards energy sustainability. This is particularly true in regard to energy intensity, which is more a function of a country's resource base and comparative advantage than of conscious energy policy. Canada, the US, New Zealand, and Australia are the most energy-intensive OECD countries (after tiny Luxembourg). Of these the US has the most diversified economy and the most room for 'no regrets' reductions in energy intensity. The others, being more dependent on resource-based industries for export income are limited in what they can do to reduce their energy intensities at no or low cost. Japan, Italy, and Denmark are the least energy-intensive economies, Japan by dint of strenuous efforts to reduce dependence on foreign fossil fuel imports while simultaneously developing the world's most dynamic manufacturing-based export economy. Though Denmark and Italy share Japan's desire to reduce oil imports, their economies have historically been more oriented towards the production and export of agriculture-based and light industrial goods.

Government policies favourable to fuel-switching and supportive of 'new' (non-largescale hydro) renewables R&D and commercialisation are common to all OECD countries, at least since the introduction of climate change programmes, which all OECD countries now have in place. Underlying motivations and the extent of efforts vary considerably, however. Australia has the least serious fuel-switching programme in spite of having substantial natural gas reserves, an ironic situation explained partly by internal politics favourable to coal and partly by the government's desire to maintain Australia's position as the world's leading coal exporter. As a result, Australia may be unwilling to accept or comply with a climate change protocol requiring OECD countries to reduce their GHG (or carbon) emissions after 2000. At the other end of the spectrum, the UK has since the late 1980s had the world's most aggressive fuel-switching programme, a function of its having substantial gas reserves combined with the Conservative government's desire to end coal subsidies as a free market policy. In some OECD countries, fuel-switching from coal to cleaner-burning gas is sound environmental policy and will reduce local air pollution while facilitating achievement of the government's climate change commitments in the near- and medium-terms; however, these countries may in the longer term replace dependence on oil and coal imports with even more

problematical dependence on natural gas, global reserves of which are smaller than those of oil and coal. Dependence on natural gas being unsustainable both economically and geographically in the long run, there is a critical (though not generally perceived as urgent) need for OECD countries to use the present and future gas bubble period to make a steady and deliberate transition to 'new' renewables. This is simply not happening anywhere in the OECD. The US programme, kick-started in the early 1980s by generous subsidies and policies favourable to renewables, died within a decade after oil prices softened and as more optimistic estimates of the extent of global natural gas supplies became accepted. Even the most aggressive government support programmes - those of the UK, Germany, and Denmark - are very small. Forecasts throughout the OECD of future renewables market penetration levels are modest in the extreme, a few percent at best (except in Denmark, which hopes to get 30% of its electricity from 'new' renewables by 2020). While costs are coming down gradually for most new renewable technologies, the pace of 'cost convergence' with traditional sources is painfully slow, because reductions are coming mainly from technological refinements rather than from the economies of scale which could be realised if the market were growing fast enough to warrant mass production.

The progress of OECD countries towards meeting their UN FCCC commitments are a good partial indicator of progress towards energy sustainability. This is because all such programmes include measures to encourage energy efficiency and conservation, fuel-switching, and renewables commercialisation. What varies among countries is the seriousness of specific measures as shown by, among other things, government funding levels and the willingness and political ability of governments to impose sanctions on lagging sectors and organisations. Many countries, including the US, Germany, Australia, Canada, the Netherlands, and Japan are relying heavily on voluntary programmes, which are more politically acceptable than command-and-control measures and taxes. But among these countries, only the governments of Germany and the Netherlands have made it clear to industry that failure to achieve voluntary targets or otherwise to show real progress will lead automatically to new taxes or mandatory standards.

Very few OECD countries are on track to stabilise their GHG or carbon emissions at their 1990 level by 2000 as called for (in most cases) by their climate change plans. Nor are OECD countries starting to make the structural changes which will be necessary to reduce emissions after 2000 if the ongoing UN FCCC negotiations produce a protocol requiring developed countries to do so. The performance gap in developed countries has engendered a credibility gap vis a vis developing countries, which are looking to the developed countries for leadership on climate change mitigation.

In all OECD countries, the least sectoral progress towards energy sustainability is being made in transport. As our country reports show, rapid growth in both passenger and freight road transport is universal. In most countries public transport infrastructure is deteriorating, thereby becoming less attractive to travellers and shippers of goods and increasing reliance on private vehicles. In many countries vehicles are becoming on average less energy efficient as consumers choose more powerful cars and utility vehicles and as they increase the distances they drive and/or number of trips they make. This is almost as true in countries with high petrol taxes and vehicle purchase taxes as those with low taxes. Indeed, it may be said that transport is the Achilles heel of the 'drive' towards energy sustainability. Progress is not only negative but appears to be accelerating in the wrong direction. There are only a few positive examples of forward movement: the relatively advanced urban mass transit systems of Germany; bold action by Austria to reduce through-transit freight traffic; and the development of a road/rail freight network in Switzerland. The development of substantially more efficient as well as alternative-fuel vehicles holds great promise but is making little headway in the face of foot-dragging on the part of vehicle manufacturers and low consumer interest.

The picture is a little better for energy efficiency programmes, which though often a relatively low priority of the governments of OECD countries, do not face as much overt hostility as policies aimed at reducing road travel and private vehicle use. The climate change

programmes of most OECD countries include a long list of energy efficiency measures in the residential, commercial, industrial and public or institutional sectors. The challenge is to determine the relative effectiveness of different measures in the absence (usually) of performance data and candid internal assessments. The governments of Canada and the US seem particularly disposed to 'sell' their voluntary energy efficiency programmes rather than to provide quantified, objective evaluations of results. Indeed, the country reports on energy efficiency in this report do little more than convey an impression of the kinds of policies and measures being undertaken and, in some cases, the relative seriousness with which the different OECD government treat energy efficiency. Italy and the UK stand out as countries whose economies would benefit from energy efficiency improvements but whose governments have shown themselves to be politically or administratively unable to provide adequate funding to programmes in place. In contrast, Japan and Denmark have made real progress in implementing tough measures, ostensibly because they perceive improving energy efficiency as a particularly cost-effective way to reduce their dependence on imported fossil fuels. Japan has made the greatest effort in the industrial sector, but has done less to improve energy efficiency in buildings and appliances; despite this, the energy intensity of these sectors is considerably lower than in the US because of the smaller buildings and vehicles in Japan, though these now form the sectors of most rapid growth. Norway, like Japan, has focused most on the industrial sector, but the strategy has been more towards electrification based upon hydro power than towards improved efficiency. The governments of Germany and the Netherlands have shown the seriousness with which they regard improved energy efficiency by the tough, quantified targets they have set and their avowed (though as yet unproven) willingness to impose taxes if voluntary programmes fail to achieve the established targets. Contrastingly, in Spain and Portugal, improving energy efficiency is a much lower priority of government than advancing economic development. In Switzerland and Austria, referenda and polls have shown that inhabitants place a high priority on improving energy efficiency on environmental grounds, causing their elected officials to search for ways to reconcile the divided responsibilities of federal and local governments and to work together to achieve meaningful results. Overall, Switzerland has the strongest set of policies in the OECD aimed at improving energy efficiency.