



**Environmental Audit Committee inquiry into  
the role of carbon markets in preventing  
dangerous climate change**

**Submission by the World Development Movement**

**March 2009**

## **1. Introduction**

1. The World Development Movement (WDM) campaigns to tackle the root causes of poverty. With our partners around the world, we win positive change for the world's poorest people. We believe that charity is not enough. We lobby governments and companies to change policies that keep people poor. WDM is a democratic membership organisation of 15,000 individuals and 70 local groups.
2. We welcome the Environmental Audit Committee's decision to hold an inquiry into the role of carbon markets in preventing dangerous climate change. Given limited time and space, we focus on the following issues set by the inquiry: "prospects for the success of Phase III of the EU Emissions Trading Scheme (ETS)", "the robustness and effectiveness of "offset" schemes (i.e. those without a cap), such as the Clean Development Mechanism (CDM), and the issues around linking them to cap and trade schemes", "effects of the expansion of the EU ETS to encompass aviation", "the relationship between emissions credits and the UK carbon budgets set up under the Climate Change Act" and "transparency of and justification for counting the purchase of emissions credits (especially from "offset" schemes) as decreasing emissions from the UK".
3. In summary:

**"Prospects for the success of Phase III of the EU Emissions Trading Scheme (ETS)" and "the robustness and effectiveness of "offset" schemes (i.e. those without a cap), such as the Clean Development Mechanism (CDM), and the issues around linking them to cap and trade schemes"**

- Phase III of the EU ETS will do little to cut emissions in Europe, partly because of the use of CDM credits to offset emissions.
- Support to developing countries needs to be in addition to large cuts in emissions in the UK and EU, not instead.
- CDM credits have little, if any, impact on reducing emissions in developing countries.
- CDM credits can exacerbate environmental and social harm.

**"The relationship between emissions credits and the UK carbon budgets set up under the Climate Change Act" and "transparency of and justification for counting the purchase of emissions credits (especially from 'offset' schemes) as decreasing emissions from the UK".**

- There is no justification for counting CDM credits as contributing to reducing UK emissions.
- The EU ETS will not reduce UK emissions as needed under the Climate Change Act.
- Additional policies in sectors covered by the ETS, particularly electricity, are needed to ensure the UK is making large cuts in its own emissions.

**"Effects of the expansion of the EU ETS to encompass aviation"**

- Including aviation in the EU ETS will do little to reduce emissions either in the aviation sector or other sectors.
- Including aviation in the EU ETS will not ensure the UK meets its targets to reduce emissions.
- Additional policies are needed to prevent the growth in aviation, such as refusing applications for new runways and introducing higher taxes on aviation.

**2. “The prospects for the success of Phase III of the EU ETS” and “The robustness and effectiveness of "offset" schemes (i.e. those without a cap), such as the Clean Development Mechanism (CDM), and the issues around linking them to cap and trade schemes”**

4. The EU energy and climate package agreed in December 2008 states that in Phase III of the EU ETS, from 2013-2020, around 50 per cent of required reductions can be made through buying CDM credits, rather than reducing the EU-wide cap in emissions. One of the key issues which will therefore prevent the EU ETS from cutting emissions in Phase III is the use of CDM credits.
5. Under the agreement on Phase III of the ETS, the ETS cap will be reduced by 21% on 2005 levels by 2020.<sup>1</sup> In contrast, sectors not covered by the cap will reduce emissions by 10 per cent on 2005 levels. Across all sectors, EU emissions will be reduced by 14 per cent on 2005 levels and 20 per cent on 1990 levels.<sup>2</sup>
6. However, the agreement states that 50 per cent of the required reduction in emissions in the ETS from 2008 to 2020 can be met through buying CDM credits rather than reducing emissions in Europe.<sup>3</sup> Furthermore, CDM credits can be banked from Phase II over to Phase III. Because of the recession, CDM credits are less likely to be used in Phase II, meaning that in Phase III CDM credits are likely to account for more than half of the required reduction in emissions under the ETS. There is a similar allowance for 50 per cent of reductions required by non-ETS sectors to be met through buying CDM credits rather than cutting emissions in Europe.
7. This means European emissions in sectors covered by the ETS will fall by just 10 per cent on 2005 levels by 2020. Overall EU emissions will fall by just 7 per cent on 2005 levels, or 10 per cent on 1990 levels. In contrast, the Intergovernmental Panel on Climate Change has said rich countries need to reduce emissions by 25-40 per cent on 1990 levels, to keep the increase in global temperatures to between 2-2.4°C.<sup>4</sup> To keep global temperatures to 2°C or below, the stated aim of the EU and the UK government, requires larger cuts in emissions.
8. The fact that Phase III of the EU ETS will do little to cut emissions is highlighted by infrastructure decisions currently being taken by energy companies. In the UK, there has been one application to build a new unabated coal power station at Kingsnorth in Kent, and plans are being discussed for further unabated coal power plants at Tilbury, Ferrybridge, Blyth, Longannet and Hunterston. As the EAC said in a previous inquiry:

*“the government is wrong to rely on the EU ETS cap to excuse the increase in emissions that would derive from the new unabated coal-fired power stations. Emissions in the EU ETS do not disappear – they must be accounted for somewhere. The EU ETS is a mechanism designed to reduce emissions; using it as a cover for choosing high emissions technology goes against the purpose of the scheme.”<sup>5</sup>*
9. The price for CDM offset credits is predicted to be low until 2020. It is therefore likely that EU industries in the ETS will use as many CDM credits as they can, rather than buy EU permits (see Table 1 below).

**Table 1. Committee on Climate Change predictions of CDM and ETS prices up-to 2020<sup>6</sup>**

Year	CDM offset credit price projections (central case) (€)	EU ETS allowance price projections (low reference case) (€)
2010	14	24
2015	12	30
2020	16	38

10. Buying credits from outside Europe assumes that climate change can be tackled by reducing emissions in developing countries *instead* of reducing emissions in the UK and Europe. In reality, cuts in developing countries have to be *in addition* to the cuts required of industrialised countries. Industrialised countries currently account for 54 per cent of global CO<sub>2</sub> emissions, whilst containing 20 per cent of the world's population. Developing countries account for 46 per cent of CO<sub>2</sub> emissions, and have 80 per cent of the world's population.<sup>7</sup>
11. To meet global emission reduction targets to prevent dangerous climate change, industrialised countries like the UK have to reduce emissions by around 40 per cent by 2020 and more than 80 per cent by 2050. And some developing countries have to be assisted in halting the growth in emissions, and in the future reducing them. Such help has to be *in addition* to large cuts in emissions in rich countries, not *instead* of cuts in rich countries.
12. The UK Committee on Climate Change has said: "*rich developed economies need to start demonstrating that a low-carbon economy is possible and compatible with economic prosperity, in order to gain developing country commitment to long-term emissions reductions, and need to start driving the technologies and energy efficiency improvements which will make a low-carbon economy possible. They can only do this by employing measures which drive down emissions in rich developed economies rather than relying solely on purchased credits.*"<sup>8</sup>
13. The flooding of the EU ETS with CDM credits will prevent any significant cuts in emissions within Europe, unless additional policies outside the ETS are followed. However, there are also further problems with how the Clean Development Mechanism works, which we address below:

**2.1 The Clean Development Mechanism does not necessarily reduce emissions in developing countries**

14. Under the CDM the largest number of carbon credits has been generated by projects claiming to reduce the potent greenhouse gas HFC-23,<sup>9</sup> rather than CO<sub>2</sub>. One study has found that the value of credits given to HFC-23 projects at current carbon prices is €4.7 billion. However, an estimate of the cost of technology needed to capture and destroy the same amount of HFC-23 is €100 million.<sup>10</sup> Around €4.6 billion has been generated in profit by HFC-23 generating plants, which could then further expand their operations with the reinvestment of this profit.<sup>11</sup>
15. For example, one Indian chemical company, SRF, made €87 million from the sale of carbon credits in 2006/07. Ashish Bharat Ram, managing director of SRF, claimed: "*Strong income from carbon trading strengthened us financially, and now we are expanding into areas related to our core strength of chemical and technical textiles business.*"<sup>12</sup>

## EAC inquiry into the role of carbon markets in preventing dangerous climate change

Submission by the World Development Movement

16. A Joint Committee of the UK Parliament has said that: *“the economic incentives offered by the CDM [Clean Development Mechanism] appear actually to be encouraging the building of refrigerant plants in the developing world, simply in order that the HFC by-products from the plant can be incinerated, and the credits generated from this sold at a large profit.”*<sup>13</sup>
17. The Committee on Climate Change has said: *“there remain concerns as to whether offset credits can ever be as certain a form of emission reduction as domestic reductions. While the procedures for the approval and monitoring of CDM projects are being continually improved, any system of credits for reduction against a hypothetical business-as-usual scenario, is inherently less robust than a cap and trade system where reductions are required in the certifiable total of all emissions.”*<sup>14</sup>
18. A report by International Rivers Network found that three out of four CDM projects were already up-and-running by the time they were approved to generate CDM credits, strongly suggesting that the projects would all have happened anyway.<sup>15</sup> David Victor from the Californian University concludes from his research that: *“It looks like between one and two thirds of all the total CDM offsets do not represent actual emission cuts.”*<sup>16</sup> On a public platform at the UNFCCC meeting in Poznan in December 2008, one European Commission official admitted that at least 40 per cent of CDM projects are not additional to what would otherwise have happened.<sup>17</sup>
19. A report by the US Government Accountability Office to Congress says the CDM's *“effects on emissions are uncertain ... available evidence suggests that some offset credits were awarded for projects that would have occurred even in the absence of the CDM”*.<sup>18</sup>
20. There are further questions over whether CDM projects produce actions that would not have happened anyway. For example, because of a perceived over-reliance on coal as an energy source, China has implemented a new policy of promoting hydro, wind and gas power stations. But even though it is Chinese government policy to promote hydro, wind and gas power, virtually all new hydro, wind and hydro power stations in China are applying for CDM credits.<sup>19</sup> Around 60 per cent of Chinese CDM accredited projects in 2007 were wind, hydro or gas.<sup>20</sup>

### 2.2 The negative impacts of CDM funding

21. Carbon credits are produced on the basis of having a positive climate change impact. Yet carbon credits are sold by private companies which are normally unaccountable to the communities in which they seek to implement their projects. Unfortunately, there are already examples of carbon credit projects exacerbating social harm.
22. The Indian state of Gujarat is one of the most industrialised states in India. Between 2006 and February 2008, 19 projects in Gujarat qualified to receive carbon credits under the Clean Development Mechanism. Of these, 13 (68 per cent) are to reduce HFC-23 emissions from factories (see above on HFC-23 projects). In total, the 19 projects are claimed to have reduced emissions by 12.5 million tonnes of CO<sub>2</sub>eq.<sup>21</sup>
23. The Gujarati NGO Paryavaran Mitra says that some of the industries funded by CDM produce toxic or hazardous local pollution. The reinvested profit from CDM allows these industries to expand their operations, producing more local pollution, without any regulation of the impacts. Mahesh Pandya from Paryavaran Mitra says: *“It is unjust that the rich are allowed to emit whilst paying for more pollution for the poor.”*<sup>22</sup>

## **EAC inquiry into the role of carbon markets in preventing dangerous climate change**

Submission by the World Development Movement

24. In summary:

- Phase III of the EU ETS will do little to cut emissions in Europe, partly because of the use of CDM credits to offset emissions.
- Support to developing countries needs to be in addition to large cuts in emissions in the UK and EU, not instead.
- CDM credits have little if any impact on reducing emissions in developing countries.
- CDM credits can exacerbate environmental and social harm.

### **3. “The relationship between emissions credits and the UK carbon budgets set up under the Climate Change Act” and “transparency of and justification for counting the purchase of emissions credits (especially from "offset" schemes) as decreasing emissions from the UK”**

25. Section 2 above set out the case against counting CDM credits towards reductions in UK emissions.

26. The Committee on Climate Change has to advise the UK government on a limit on the number of international offset credits which can count towards achieving the UK's targets under the Climate Change Act. However, explicitly excluded from this limit are credits purchased from within the EU ETS. Therefore, all CDM credits bought by UK companies to meet targets under the ETS will count towards meeting UK reduction targets, but will not count towards any limit set by the UK government.

27. In December 2008, the Committee on Climate Change said that:

- “there should be no limit to the extent to which allowances purchased by the private sector from within the EU ETS should count towards the UK budget”.
- “there should be a quantitative limit placed on offset credits which can count towards the UK budget, with this limit covering both offset credits purchased by the UK private sector within the EU ETS, and any purchases of offset credits by the UK government”.<sup>23</sup>

28. However, as explained above, the large number of CDM credits now set to be included in the EU ETS means that there is no distinction between allowances purchased by the private sector within EU ETS and CDM credits. Half of the credits purchased to reduce emissions will be CDM credits. If UK companies are restricted in purchasing CDM credits, then the effect will be that other European companies will be able to purchase more CDM credits, and the net impact will be the same.

29. The UK government has to recognise that the EU ETS will not reduce emissions in the UK as required to prevent dangerous climate change. For instance, the Committee on Climate Change has said that the UK electricity sector needs to be decarbonised by 2030, starting now,<sup>24</sup> but this will not happen if the EU ETS is relied on to make this happen. Therefore, additional policies are needed beyond the EU ETS.

30. In summary:

- There is no justification for counting CDM credits as contributing to reducing UK emissions.
- The EU ETS will not reduce UK emissions as needed under the Climate Change Act.
- Additional policies in sectors covered by the ETS, particularly electricity, are needed to ensure the UK is making large cuts in emissions.

#### **4. Effects of the expansion of the EU ETS to encompass aviation**

31. The UK government argues that expansion of aviation, such as new runways at Heathrow and Stansted airports, is partly justified because aviation's inclusion in the EU's Emissions Trading Scheme means that the sector will need to pay to reduce emissions in other sectors in Europe. The reasoning is that total UK emission reduction targets can still be met if aviation pays for extra emissions reductions in other sectors whilst continuing to grow. Including aviation in the European Union's Emissions Trading Scheme (ETS) is the mechanism for this to happen. In Table 2 we set out theoretically how this could work to meet the UK's probable target of reducing greenhouse gas emissions by 42 per cent by 2020 on 1990 levels.<sup>25</sup>

**Table 2. Theoretical effect on UK emissions in 2020 of aviation being included in the EU Emissions Trading Scheme**

Year	Non-aviation emissions (CO <sub>2</sub> eq)	Aviation emissions (CO <sub>2</sub> eq, multiplier of 1.9)	Extra reductions aviation needs to buy from other sectors (CO <sub>2</sub> eq)	Total emissions (CO <sub>2</sub> eq)	Percentage reduction on 1990 levels (CO <sub>2</sub> eq)
1990	776.3	32.1	0	808.4	
2004/06	659.1	69.7	0	728.8	9.8%
2020	450.3 (42% reduction on 1990 levels)	95.6 <sup>26</sup>	77	468.9 <sup>27</sup>	42%

32. In this example, non-aviation sectors reduce their emissions by 42 per cent on 1990 levels by 2020. Aviation emissions grow in line with UK Department for Transport predictions. For the UK to still reduce total emissions by 42 per cent by 2020, aviation emissions would need to actually be reduced by 42 per cent on 1990 levels by 2020; taking aviation emissions down to 18.6 million tonnes of CO<sub>2</sub>eq. Therefore, aviation needs to pay to reduce emissions by a further 77 million tonnes of CO<sub>2</sub>eq (95.6 – 18.6 = 77) on top of the cuts other sectors will already be making. Total UK emissions would be 468.9 million tonnes of CO<sub>2</sub>eq in 2020, a 42 per cent reduction on 1990 levels.

33. However, there are three reasons why the inclusion of aviation in the EU ETS will *not* lead to this reduction in emissions, and so government policy will not be met. We set these out in turn below.

##### **4.1 Permits allocated based on emissions in 2004/06**

34. From 2013, the aviation sector will be allocated permits to emit equivalent to 95 per cent of the sector's average emissions from 2004 to 2006.<sup>28</sup> For UK aviation this is 66.2 million tonnes of CO<sub>2</sub>eq. The growth in aviation emissions from 1990 to 2004/06 is not accounted for. Whilst aviation will have to pay for reductions in other sectors for emissions above 2004/06 levels, it will not have to do so for emissions growth before 2004/06. However, UK, EU and global targets for emission reductions work on a baseline of 1990. In the UK, aviation emissions were 32.1 million tonnes of CO<sub>2</sub>eq in 1990, compared to the annual average of 69.7 million tonnes of CO<sub>2</sub>eq for 2004 to 2006, a growth of 117 per cent.

35. Furthermore, aviation will be allocated the same level of permits every year; it will not have to reduce emissions. In contrast, every other sector in the EU ETS has been allocated permits based on emissions in 1990 minus a reduction target, and permits allocated or auctioned will continue to fall every year.

36. By 2020, aviation will only have to pay to reduce any emissions over 95 per cent of 2004/06 levels (66.2 million tonnes of CO<sub>2</sub>eq). Based on Department for Transport estimates of aviation emissions growth, aviation will emit 95.6 million tonnes of CO<sub>2</sub>eq

**EAC inquiry into the role of carbon markets in preventing dangerous climate change**  
Submission by the World Development Movement

by 2020, and so will need to purchase permits to emit 29.4 million tonnes of CO<sub>2</sub>eq, rather than 77 million tonnes as highlighted in the hypothetical example above. (see Table 3 below). Aviation does not have to pay for the growth in aviation emissions between 1990 and 2004/06 to be reduced elsewhere. Neither does aviation have to contribute to emission cuts below 1990 levels, unlike every other sector. The overall impact of this is that total UK emissions will be cut by 36 per cent rather than 42 per cent, even with every sector other than aviation cutting by 42 per cent.

**Table 3. Effect on UK emissions in 2020 of permits being allocated for aviation on 2004/06 emissions**

Year	Non-aviation emissions (CO <sub>2</sub> eq)	Aviation emissions (CO <sub>2</sub> eq, multiplier of 1.9)	Extra reductions aviation needs to buy from other sectors	Total emissions	Percentage reduction on 1990 levels (CO <sub>2</sub> eq)
1990	776.3	32.1	0	808.4	
2004/06	659.1	69.7	0	728.8	9.8%
2020	450.3 (42% reduction on 1990 levels)	95.6 <sup>29</sup>	29.4	516.5	36.1%

**4.2 Only CO<sub>2</sub> emissions from aviation will be included in the EU ETS**

37. Only CO<sub>2</sub> from aviation will be included in the emissions trading scheme; non-CO<sub>2</sub> impacts will not. This means that rather than having to buy permits to cover the growth in all its emissions, the aviation sector will only need to buy permits to cover the growth in CO<sub>2</sub> emissions. This is 13.6 million tonnes of CO<sub>2</sub> between 2004/06 and 2020 rather than 25.9 million tonnes of CO<sub>2</sub>eq (see Table 4 below). The increase in non-CO<sub>2</sub> impacts of aviation will not be reduced elsewhere. Because the non-CO<sub>2</sub> impacts of aviation are not included, adding the effect of this to the loophole in section 4.1 shows that total UK emissions will be cut by 34 per cent rather than 42 per cent, even with every sector other than aviation cutting emissions by 42 per cent.

**Table 4. Effect on UK emissions in 2020 of permits being allocated for aviation on 2004/06 emissions, and only addressing CO<sub>2</sub> emissions**

Year	Non-aviation emissions (CO <sub>2</sub> eq)	Aviation emissions (CO <sub>2</sub> eq, multiplier of 1.9)	Extra reductions aviation needs to buy from other sectors	Total emissions	Percentage reduction on 1990 levels (CO <sub>2</sub> eq)
1990	776.3	32.1	0	808.4	
2004/06	659.1	69.7	0	728.8	9.8%
2020	450.3 (42% reduction on 1990 levels)	95.6 <sup>30</sup>	13.6	532.3	34%

**4.3 Use of credits from outside the EU**

38. Airlines do not have to pay for equivalent emissions reductions “in other sectors” in Europe. Aviation will be free to trade within the main EU ETS, which means aviation can meet its emissions through buying permits from outside the EU generated by Clean Development Mechanism (CDM) projects.

39. Assuming that the aviation sector buys half of its extra permits from outside Europe,<sup>31</sup> this means that rather than needing to buy permits to emit 13.6 million tonnes of CO<sub>2</sub> from other sectors in Europe, aviation only has to buy 6.8 million tonnes (see Table 5 below).

**Table 5. The actual effect of including aviation in the emissions trading scheme**

Year	Non-aviation emissions	Aviation emissions (CO <sub>2</sub> eq, multiplier of 1.9)	Extra reductions aviation needs to buy from other sectors	Total emissions	Percentage reduction on 1990 levels (CO <sub>2</sub> eq)
1990	776.3	32.1	0	808.4	
2004/06	659.1	69.7	0	728.8	9.8%
2020	450.3 (42% reduction on 1990 levels)	95.6 <sup>32</sup>	6.8	539.1	33.3%

40. Even with:

- every other sector reducing emissions by 42 per cent on 1990 levels by 2020, and
- aviation being included in the ETS,

The impact of including UK aviation in the EU ETS will be to reduce emissions somewhere in Europe by 6.8 million tonnes of CO<sub>2</sub> a year by 2020. This is in contrast with projected growth in UK aviation emissions by the Department for Transport of 25.9 million tonnes of CO<sub>2</sub>eq between 2004/06 and 2020.

41. By 2020 the UK's actual contribution to climate change will have only fallen by 33 per cent, from 808.4 million tonnes of CO<sub>2</sub>eq in 1990 to 539.1 million tonnes of CO<sub>2</sub>eq (see Table 5 above), rather than a policy target of 42 per cent. Including aviation in the EU ETS will not ensure the UK meets its legally binding targets to reduce emissions by 2020 under the Climate Change Act 2008. Therefore, additional policies are needed. If the UK government adopts a 2020 target lower than that recommended by the Committee on Climate Change, or does not ensure other sectors reduce emissions by 42 per cent, then the actual reduction in emissions will be even less.

42. In summary:

- Including aviation in the EU Emissions Trading Scheme (ETS) will do little to reduce emissions either in the aviation sector or other sectors
- Including aviation in the EU ETS will not ensure the UK meets its targets to reduce emissions
- Additional policies are needed to prevent the growth in aviation, such as turning down applications for new runways and introducing higher taxes on aviation.

## References

<sup>1</sup> Council of Ministers and European Parliament. (2008). Greenhouse gas emission allowance trading system. European Parliament legislative resolution of 17 December 2008 on the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community (COM(2008)0016 – C6-0043/2008 – 2008/0013(COD)).

<sup>2</sup> EC. (2008). Questions and answers on the revised EU Emissions Trading Scheme. European Commission. Brussels. 17/12/08.

<http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/796&format=HTML&aged=0&language=EN&guiLanguage=en>

<sup>3</sup> EC. (2008). Questions and answers on the revised EU Emissions Trading Scheme. European Commission. Brussels. 17/12/08.

<http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/796&format=HTML&aged=0&language=EN&guiLanguage=en>

<sup>4</sup> IPCC. (2007). Working group III report: Mitigation of climate change. Chapter 13: Policies, instruments and cooperative arrangements. And IPCC. (2007). Working group III report: Summary for policymakers.

<sup>5</sup> EAC. (2008). Carbon capture and storage: Ninth report of session 2007-08. House of Commons Environmental Audit Committee. 22/07/09.

<sup>6</sup> Committee on Climate Change. (2008). Building a low-carbon economy: The UK's contribution to tackling

## EAC inquiry into the role of carbon markets in preventing dangerous climate change

### Submission by the World Development Movement

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climate change. The Stationary Office. London. December 2008.

<sup>7</sup> US EIA. (2007). World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels, 1980-2005. US Energy Information Administration. June 2007.

<sup>8</sup> Committee on Climate Change. (2008). Building a low-carbon economy: The UK's contribution to tackling climate change. The Stationary Office. London. December 2008.

<sup>9</sup> Hydrofluorocarbons (HFCs) are potent greenhouse gases. HFC-23 is a kind of HFC, one tonne of which is equivalent to 11,700 tonnes of CO<sub>2</sub> emissions in terms of their contribution to climate change. Overall, HFC emissions are low, so make up a small percentage of the world's contribution to climate change.

<sup>10</sup> Harvey, F Bryant, C and Aglionby, J. (2007). Producers, traders reap credits windfall. *Financial Times*. London. 26/04/07.

<sup>11</sup> Smith, K. (2007). *Pollute and profit: So when will Brussels admit that its emissions trading scheme is not only not working, but has proved a disaster?*

<sup>12</sup> Smith, K. (2007). *Pollute and profit: So when will Brussels admit that its emissions trading scheme is not only not working, but has proved a disaster?*

<sup>13</sup> Joint Committee of Parliament on the draft climate change bill. (2007). Final report: Volume I. August 2007.

<sup>14</sup> Committee on Climate Change. (2008). Building a low-carbon economy: The UK's contribution to tackling climate change. The Stationary Office. London. December 2008.

<sup>15</sup> IRN. (2008). Rip-offsets: The failure of the Kyoto protocol's Clean Development Mechanism. International Rivers Network. California. November 2008.

<sup>16</sup> Vidal, J. (2008). Billions wasted on UN climate programme. *The Guardian*. London. 26/05/08.

<sup>17</sup> Marr, S. (2008). Speaking at IETA side event. UNFCCC COP14. Poznan. 06/12/08.

<sup>18</sup> GAO. (2008). International climate change programs: Lessons learned from the European Union's Emissions Trading Scheme and the Kyoto Protocol's Clean Development Mechanism. Report to Congressional Requesters. November 2008.

<sup>19</sup> Wara, M. and Victor, D. (2008). A realistic policy on international carbon offsets. Stanford University Program on Sustainable Energy, Working Paper Number 74. April 2008.

<sup>20</sup> Calculated from <http://cdm.unfccc.int/Projects/projsearch.html>

<sup>21</sup> Calculated from UNFCCC. (2008). <https://cdm.unfccc.int> Viewed on 29/02/08.

<sup>22</sup> Jones, T. (2007). Climate march blog. 17/07/07. <http://climatechangemarch.blogspot.com/2007/07/corrupt-emissions.html>

<sup>23</sup> Committee on Climate Change. (2008). Building a low-carbon economy: The UK's contribution to tackling climate change. The Stationary Office. London. December 2008.

<sup>24</sup> Turner, A. (2008). Letter to Ed Miliband: Interim advice by the Committee on Climate Change. Committee on Climate Change. 07/10/08.

<sup>25</sup> The Committee on Climate Change has advised the UK government that greenhouse gas emissions should be reduced by 42 per cent by 2020 on 1990 levels, if there is an international agreement to cut emissions.

<sup>26</sup> Department for Transport prediction Department for Transport. (2009). UK air passenger demand and CO<sub>2</sub> forecasts. Department for Transport. London. January 2009.

<sup>27</sup>  $450.3 + 95.6 - 77 = 468.9$

<sup>28</sup> In 2012, aviation will be allocated permits to emit the equivalent of 97 per cent of the sector's emissions in 2004/06.

<sup>29</sup> Department for Transport prediction Department for Transport. (2009). UK air passenger demand and CO<sub>2</sub> forecasts. Department for Transport. London. January 2009.

<sup>30</sup> Department for Transport prediction Department for Transport. (2009). UK air passenger demand and CO<sub>2</sub> forecasts. Department for Transport. London. January 2009.

<sup>31</sup> For simplicity, we also assume that aviation buys permits from within Europe from the UK rather than other European countries.

<sup>32</sup> Department for Transport prediction Department for Transport. (2009). UK air passenger demand and CO<sub>2</sub> forecasts. Department for Transport. London. January 2009.