

# Luxembourg's Fair Share in a Climate Constrained World

An analysis of Luxembourg's climate obligations, in the context of a global emergency mobilization to stabilize the climate system, as informed by the Greenhouse Development Rights approach



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# 1. Executive summary

ASTM and Caritas Luxembourg are advocating that, in recognition of their ecological debt<sup>1</sup> to the international community, industrialized nations such as Luxembourg should take the lead in making very ambitious reductions of greenhouse gas (GHG) emissions. Luxembourg, like any other developed country, must also provide sufficient levels of secure financial and technological support for developing countries to mitigate and adapt to the effects of climate change. The Greenhouse Development Rights (GDRs) Framework is designed by EcoEquity and the Stockholm Environment Institute to demonstrate how a global emergency mobilization to stabilize the climate can be pursued while, with equal deliberateness, safeguarding the right of all people to reach a dignified level of sustainable human development. The GDRs model hence puts into practice the UN Climate Convention's (UNFCCC) notion of 'common but differentiated responsibilities and respective capabilities'.

The present analysis of Luxembourg's climate obligations by ASTM, Caritas Luxembourg, EcoEquity and the Stockholm Environment Institute, as informed by the GDRs approach in this report, concludes that Luxembourg's historical obligation<sup>2</sup> and economic capacity would impose a particularly significant climate-related responsibility on the country, which represents nothing more than Luxembourg's fair share of a true global climate mobilization in a climate constrained world.

This report calculates Luxembourg's obligations in a straightforward manner, applying the Greenhouse Development Rights framework to evaluate both the adequacy and the appropriateness of official Luxembourgish climate policy, making reference as appropriate to larger global and European policy initiatives. The question, in a nutshell, is what implications the GDRs approach has for Luxembourg. This report argues that an emergency mobilization is necessary to prevent a climate catastrophe. The Greenhouse Development Rights Framework provides a transparent, principle-based method of calculating appropriate national obligations for every country in the world, developed or not. Although developing countries cannot yet be expected to take on legal obligations beyond those contained in the UNFCCC, the GDRs gives an indication of the kind of

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<sup>1</sup> Ecological debt is a feature of unsustainable economic systems. It refers to the overall depletion of global resources beyond the Earth's ability to regenerate them (Paredis et al., 2004).

<sup>2</sup> The main components of what is now called 'historic responsibility for climate change' have been discussed in international climate negotiations since before the UN General Assembly mandated an Intergovernmental Negotiating Committee to prepare a Framework Convention on Climate Change. Historic responsibility for climate change is often considered to be an ethically relevant criterion for allocating responsibility to reduce the threat of climate change (Friman & Linnér, 2008). In this study we assume that the 'historic responsibility' starts to be counted as of 1990, but if one wished instead to define historic responsibility in terms of emissions since 1865, the installation of first coke driven blast furnaces in Luxembourg (Lamesch, 2011), the result would be a larger share of global obligations for Luxembourg in 2020. Another choice of political interest is the treatment of the net carbon embodied in imports and exports in determining responsibility. This too would increase Luxembourg's share of global responsibility, and thus its share of the global obligation.

agreement that will be needed, once the global community is honestly committed to avoiding a climate catastrophe.

The international negotiations are hampered by the effort-sharing question: who should do how much, and when? And though recent developments in Copenhagen and Cancun have only made this question more pressing, the talks could easily remain blocked for a very long time to come. The international climate policy impasse will not be overcome without a fair global effort-sharing architecture, one that promises a way forward that does not threaten the development of the South. National efforts will be scrutinized and evaluated, and each country will be expected to accept its 'fair share' of effort needed to stabilize the global climate. The wealthy countries - Luxembourg among them - will inevitably be called to much more ambitious positions. But what exactly will this mean?

According to IPCC<sup>3</sup> figures **industrialized countries like Luxembourg** need to adopt GHG reduction targets of 25% to 40% below 1990 levels by 2020, and at least of 80% to 95% by mid-century, in order to prevent global average temperatures from rising more than by 2°C relative to the pre-industrial temperature level - a commonly-accepted threshold for dangerous levels of climate change<sup>4</sup>. But even if they now started to do so, it would still mean they had exploited nearly two-thirds of the earth's finite capacity in terms of GHG stocks in the atmosphere.<sup>5</sup> This is why industrialized countries also need to help open an alternative development path, one by which the world's poorer countries can survive and thrive within the one-third of the original space in terms of GHG stocks that remain in the atmosphere. Hence the obligations of developed countries, such as Luxembourg, will be two-fold: domestic and international.

The **Greenhouse Development Rights (GDRs) Framework** was designed to highlight the core challenges posed by the need for extremely rapid global emissions reductions while, at the same time, preserving the right of all people to reach a dignified level of sustainable human development. This simple concept is then straightforwardly built into an effort-sharing framework based on responsibility and capacity – the two equity principles at the core of the UNFCCC's '*common but differentiated responsibilities and respective capabilities*'. The GDRs Framework is a *methodology* for quantifying these principles based on transparent and well-defined indicators, providing a coherent method for determining what level of contribution different countries would, under a fair and adequate global agreement, need to make to the overall mitigation and adaptation effort. The GDRs model defines both responsibility and capacity, in relation to a development threshold – a level of well being that is modestly above a global poverty line<sup>6</sup>. Individuals living below this threshold are simply not expected to bear the costs of addressing the climate problem and are instead allowed to prioritize development. 'Responsibility' is defined as a country's cumulative emissions since 1990<sup>7</sup>, excluding emissions that correspond to consump-

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<sup>3</sup> Intergovernmental Panel on Climate Change (IPCC).

<sup>4</sup> For further detail, see Appendix 1.

<sup>5</sup> Goldemberg et al., 1996, p. 29.

<sup>6</sup> For further detail, see Chapter 4.3.

<sup>7</sup> Sum of annual global greenhouse gas emissions over a period of time. Because many greenhouse gases persist in the atmosphere for a long time, cumulative emissions greatly influence concentrations and therefore temperature.

tion below the development threshold. To quantify a country's fair share of obligation within an international mobilization, a Responsibility and Capacity Index (RCI)<sup>8</sup> is attributed to it, expressing the country's fair share as a percentage. The RCI takes the concepts of responsibility, capacity and development threshold into consideration.

Usually national obligations are expressed in terms of domestic mitigation targets as a percentage reduction below a base year (1990). In the GDRs framework, in contrast, national obligations are expressed as a percentage share of a global total need, whether that total is a global mitigation requirement measured in tons of carbon, a monetary estimate of the total global costs of mitigation, or the global costs of adaptation. What really matters is **Luxembourg's share of the global climate mobilization need** (16.3 GtCO<sub>2</sub>e worldwide, which has a reasonable probability of keeping global warming below 2°C). Under GDRs, Luxembourg's mitigation obligations can be calculated as a share of the global mitigation requirement, based on its Responsibility and Capacity Index. Calculations for this study to define Luxembourg's share of the global mitigation burden result in roughly 0.072% for 2010. This is ten times higher than Luxembourg's 0.007% share of the global population – it directly reflects its relative wealth and historical responsibility. In 2020, Luxembourg's share (0.064%) of the global mitigation requirement would be a mitigation obligation of about 10.4 MtCO<sub>2</sub>e relative to its business-as-usual emissions (which are, following the most recent estimates, at about 12 MtCO<sub>2</sub>e in 2009).<sup>9</sup> Accepting this as Luxembourg's 'fair share' of the global effort<sup>10</sup> has significant implications for the emission reduction targets required. Figure 1 shows Luxembourg's emissions allocation: its GDRs allocation falls below zero by about 2022 and reflects the fact that, by that time, Luxembourg's mitigation obligation exceeds its projected emissions.

This report looks at **Luxembourg's two-fold obligation – domestic and international**. The analysis illustrates Luxembourg's domestic target for 2020 at about 45% below 1990 levels (emission reduction of 6.1 MtCO<sub>2</sub>e). This alone would not be contributing its 'fair share' to the global effort to tackle climate change though. Cutting its domestic emissions reductions is only one part of Luxembourg's responsibility. An additional obligation to support emissions reductions in developing countries (4.3 MtCO<sub>2</sub>e) adds up to its complete mitigation obligation of 10.4 MtCO<sub>2</sub>e. The GDRs model shows that the obligations of wealthy countries are both large and international, but the model does not, in itself, define the fraction of a given country's total target that should be covered domestically. It not only shows Annex 1's total mitigation obligation, but also shows, as an example, a division of this obligation into a domestic mitigation effort (the area above the middle red line) and an international mitigation effort (the area below the middle red line and above the lower green). Its international obligations can be understood as the 'MRV' (Measurable, Reportable and Verifiable) support from Annex 1 to non-Annex 1 countries required by the Bali Action Plan that is needed to drive the low-carbon transition in the developing world.<sup>11</sup>

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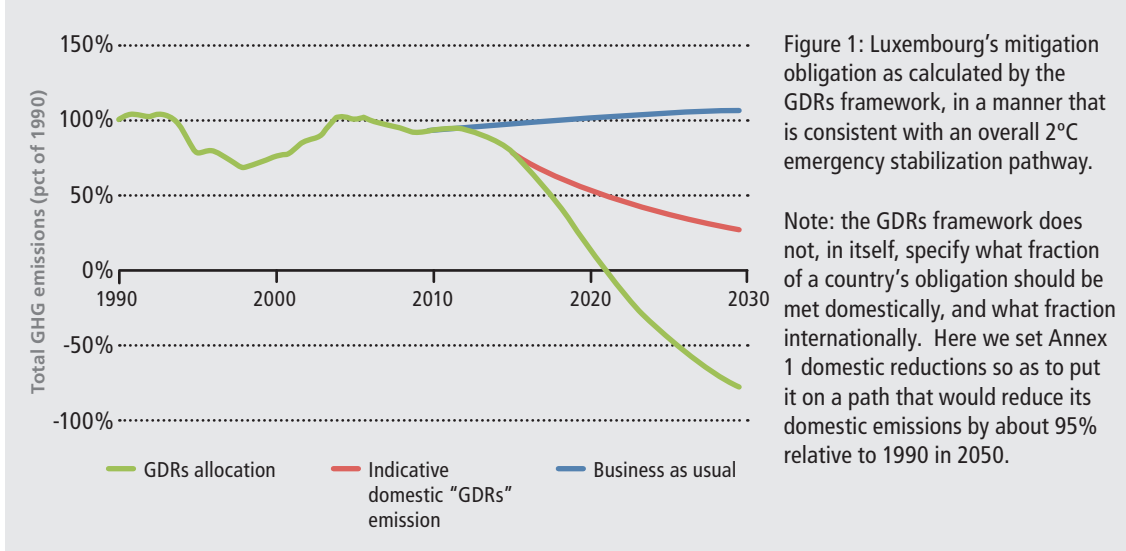
<sup>8</sup> For further detail, see Appendix 2.

<sup>9</sup> The "Reference Scenario" is based on the International Energy Agency's "World Energy Outlook 2009" baseline.

<sup>10</sup> Note that Luxembourg would also have an obligation to accept 0.064% of the global adaptation burden, though adaptation is not discussed in detail in this brief report.

<sup>11</sup> See The United Nations Climate Change Conference in Bali at [http://unfccc.int/meetings/cop\\_13/items/4049.php](http://unfccc.int/meetings/cop_13/items/4049.php).

**Figure 1: Luxembourg's mitigation obligations**



The figure shows Luxembourg's reduction obligation, subtracted from its estimated baseline. The resulting allocation, shown by the lower green line, reaches zero shortly after 2020, and becomes steadily more negative as time goes on, going from 77% below 1990 levels in 2020 to 167% below 1990 levels in 2030. This GDRs allocation with negative emissions for Luxembourg is far more stringent than those now considered politically realistic. However it is both reasonable and proportionate since Luxembourg is a rich country, with high per-capita emissions, and thus a high capacity and a correspondingly high reduction obligation. Also, this figure accurately reflects the necessary level of ambition, if Luxembourg is to do its fair share under an emissions trajectory that is truly consistent with the 2°C objective. This reflects a two-fold obligation to, on the one hand, make domestic reductions and, on the other, invest in international reductions.<sup>12</sup>

Luxembourg's two-fold GDRs obligation is very explicit and so large as to seem entirely implausible and unrealistic by today's standards of political realism. However, the key conclusion of our analysis is that obligations of this scale for countries with high capacity and substantial responsibility are, in the final analysis, absolutely necessary to a viable and effective global climate regime. It is only by way of such large obligations that a climate regime can effectively bring about two vital outcomes. First, driving ambitious domestic reductions, and thus ensuring that the wealthier countries free up sufficient environmental space for the poorer countries to develop. Second, driving equally ambitious international reductions – enabled by technological and financial support from the wealthier countries – and thus ensuring that this development can occur along a decarbonized path.

<sup>12</sup> Note that international action should not be confused with the off-set mechanisms granted to Annex I countries under the Kyoto Protocol (so-called flexible mechanisms, such as the Clean Development Mechanism or emission trading systems), which are considered to be part of the domestic reduction of a country, and that international action should be additional to domestic commitments, rather than substitutional. In Luxembourg's case it is especially important to be aware of that distinction, as the country massively resorts to offset mechanisms.

Finally this report analyses the **'untypical situation' of Luxembourg in light of the GDRs Framework**, which is due to a number of geographic, demographic and economic specificities. Taken together they result in disproportionately high GHG emissions – Luxembourg is the highest emitter of the industrialized countries in terms of *per capita* GHG emissions. If the stringent GDRs emission allocations for Luxembourg look unrealistic in political terms today, the challenges of Luxembourg's emissions scheme need to be understood and addressed. No question this is the starting point of a bottom-up approach (what seems to be possible), such as the 'Climate Partnership' process currently illustrates (a "Round Table" with governmental and civil society representatives). But this report argues that an ambitious climate policy for Luxembourg, an emergency mobilization adequate to the challenges that we are actually facing and that is seriously grounded on the UN Framework Convention's principles of 'common but differentiated responsibilities', has to look at these same challenges, but needs at the same time to integrate a top-down approach (what is necessary) – with the GDRs as one possible way to do it in a fair manner. Every country has its specifics, but a fair end efficient climate regime based on a credible national action-focused approach requires consistent terms of reference for all countries. This report argues that Luxembourg is neither disadvantaged by its central location, nor the method of counting of the Kyoto protocol. It is rather advancing and exaggerating its 'untypical situation', in order to mask its self-interests, to maintain its privileged situation and to justify its insufficient domestic policy measures.

It will be highly challenging - maybe even inconceivable - for Luxembourg's policy makers to combine Luxembourg's commitment to a 4% economic growth rate with an attempt to put in place an ambitious national climate strategy. As we know, the effects of climate change are already a daily reality for many people, particularly for the world's poorest and most vulnerable. Since carbon-based growth is no longer a viable option neither in the North nor in the South, we point at the problem of urgently needed decarbonization in a twice-divided world, one sharply polarized between the nations of the North and the nations of the South and, on both sides, between the rich and the poor people within those nations.



## 2. Introduction

### 2.1. Scope

It's quite clear now, after the jarring disappointment of the Copenhagen conference, and after Cancun's ratification of Copenhagen's bottom-up, largely voluntary approach, that our collective approach to climate policy must change, and the sooner the better. Climate change poses a grave threat to us all and to the world's most vulnerable people in particular. Tackling the climate crisis will require an unprecedented global emergency mobilization even while billions of people are still struggling to escape poverty. Hence, equity is not a mere aspirational goal, but rather a fundamental matter, in realist as well as moral terms. The international climate regime, whatever form it finally takes, will be fair or it will fail. Fundamentally, the situation is as simple as this.

The present analysis of Luxembourg's climate obligations by ASTM, Caritas Luxembourg, EcoEquity and the Stockholm Environment Institute suggests a framework for a global emergency mobilization to stabilize the climate system, which preserves the right to development for all. The Greenhouse Development Rights (GDRs) Framework model puts into practice the UN Climate Convention's notion of 'common but differentiated responsibilities and respective capabilities'. The aim of this study is to outline the sort of principle-based effort sharing system that will be needed to unlock the current climate negotiations, and to show more precisely what effort Luxembourg should deliver under such a framework.

To date the GDRs framework has been applied to Europe, Switzerland, Finland, Canada, Ireland, the Netherlands, Denmark, Poland and Sweden. With this analysis of Luxembourg's position we hope to widen the picture of 'common but differentiated responsibilities and respective capabilities' at the international level.

Although it would be a useful exercise, this report does not look into other issues arising from the environment-development nexus, such as demographic challenges, natural resources depletion or ecosystems loss, nor does it discuss macroeconomic scenarios of a progressive but stringent decarbonization of the world economy. We will not go into detail about concrete policies and measures that should be included into emission reduction plans for Luxembourg – this is the aim of the 'Partenariat pour l'environnement et le climat' ("Climate Partnership") that started in summer 2010. When considering low-carbon solutions, the authors of this study would like to make clear that environmentally unsound and dangerous options such as nuclear power are no option – this conviction has sadly been confirmed by the recent incident at the Fukushima Daiichi nuclear power plant in Japan.

## 2.2. Structure

Chapter 3 frames the moment of global climate negotiations, the success of which will depend on how we deal with the issue of climate justice in light of the development crisis. The obligations that wealthy, industrialized countries have to help developing countries adapt to climate change and transition to a low-carbon future should be key here. Cancun marked a movement beyond the North / South logic of the Kyoto Protocol to a new and explicitly global negotiation. In this context the wealthy countries - Luxembourg among them - will inevitably be called to much more ambitious positions. Whatever shape this move takes, it will mean that national efforts will be scrutinized and evaluated, and that each country will be expected to accept its 'fair share' of effort needed to stabilize the global climate.

The Greenhouse Development Rights Framework was designed to highlight the core challenges posed by the need for ambitious, evidence-based reductions in overall greenhouse-gas (GHG) emissions that are necessary to avoid dangerous levels of climate change while, at the same time, preserving the right of all people to reach a dignified level of sustainable human development. This simple concept is then straightforwardly built up into an effort-sharing framework based on responsibility and capacity – the two equity principles at the core of the UNFCCC's 'common but differentiated responsibilities and respective capabilities'. The GDRs model is presented in chapter 4 of this study.

This report applies the GDRs framework to evaluate both the adequacy and the realism of the official climate policy of Luxembourg, making reference as appropriate to larger global and European policy initiatives. The question, in a nutshell, is what the GDRs approach implies for Luxembourg. It is the goal of chapter 5, the centerpiece of this study, to determine Luxembourg's fair share of a true global climate mobilization, if Luxembourg is to do its fair share under an emissions trajectory that is truly consistent with the 2°C objective.

The level of ambition required as given by the GDRs model is obviously much greater than presently demonstrated and than looks politically realistic in a near future. Luxembourg, being a particularly small and open market-oriented member state, exhibits exceptionally high per-capita CO<sub>2</sub> emissions, and an exceptionally high share of the transport sector in its CO<sub>2</sub> account. This report takes this into consideration wherever applicable and dedicates chapter 6 to the so-called 'untypical situation' of Luxembourg. According to some, a number of exceptions should help the country to escape from the common rules fixed under the UN Framework Convention on Climate Change and the Kyoto Protocol, and - in light of the GDRs Framework – this report highlights why, from a development and social justice perspective, it would be particularly unfair to follow that path.

Finally, in chapter 7, we will draw a series of conclusions and recommendations.

## 3. Framing the moment

The climate challenge cannot really be fully understood in terms of a top-down, principle-based scheme such as Greenhouse Development Rights. But, of course, neither GDRs nor any other equity-based effort-sharing framework ought to be considered in isolation. The GDRs analysis, in particular, is intended to clarify the demands of a global emergency mobilization.

### 3.1. A note on the post-Copenhagen/post-Cancun period

GDRs, taken in the simplest terms, outlines a regime in which the world's nations – those of the North and of the South – have each agreed to carry their 'fair share' of the full climate burden. Unfortunately, Copenhagen and Cancun did not produce the determined step towards such an international climate regime the civil society organizations were hoping for. The sixteenth Conference of Parties, in Cancun in December of 2010, and the Cancun Agreements that emerged from it, ratified the general turn towards voluntary, bottom-up pledges that occurred in Copenhagen.<sup>13</sup> This was in many ways a negative development, which leaves us with the even bigger challenge – how best to move forward towards a global accord that can support the stringent global emissions target that we need. The absence of any high-ambition, fair-shares future, and indeed from any binding multilateral agreement with meaningful compliance and enforcement mechanisms fuels the deep trust deficit the South bears towards the North. This trust deficit will not be easily remedied, and, even more particularly, the South can, in a first step, under current circumstances, not be expected to take on legally binding commitments, not even if these are defined in rigorously principle-based terms. The trust deficit is rooted not only in the specific injustices of the negotiations – the North's free riding, its long chain of broken promises, and so forth – but as well in longer and deeper asymmetries between northern and southern history.

The bottom line is that, at the moment, the South sees any agreement that would legally curtail its emissions as being unacceptable. Nor is its reticence hard to understand. To this point, after all, industrial development has been almost entirely driven by fossil fuels, and why, without the North's demonstrated willingness to help chart out and indeed pave an alternative course, should the countries of the South sign away their rights to follow along this proven pathway?

The North, alas, has failed to demonstrate such a willingness. Quite the contrary, as shown by Annex 1's neglect of its Rio promise to return emissions to 1990 levels by 2000 (notwithstanding its unwitting formal compliance by virtue of the Soviet bloc's economic collapse), the past decade of half-hearted efforts to meet Kyoto commitments (and, in the case of the United States, of entirely shunning them), and, most recently, the North's insistence on a more-or-less immediate 'symmetry' between northern and southern actions. Indeed, the South's distrust of legally binding commitments is strongly linked to the North's inattention to its own emission reductions, and to its failure to definitively 'take the lead in combating climate change and the adverse affects thereof' (as the UNFCCC obliges it to).

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<sup>13</sup> For further information consult: [http://unfccc.int/meetings/cop\\_16/items/5571.php](http://unfccc.int/meetings/cop_16/items/5571.php).

This all rather constrains the current prospects, for a viable 'fair shares' climate accord and, indeed, for any true global mobilization. It tells us, in particular, that we will not see action on the scale that is now so manifestly necessary until the Annex 1 countries finally meet their UNFCCC and Kyoto commitments to provide technological and financial support for mitigation and adaptation in the South. By meeting their dual obligation, to ambitious and sweeping mitigation initiatives at home, and to adequate financial and technological resources to non-Annex 1 mitigation and adaptation, the Annex 1 nations could break the impasse and enable the transition to a viable global regime. Copenhagen of course pursued a far less ambitious agenda, and the result was perceived as catastrophic by many. And Cancun, despite improving the atmosphere, only ratified the Copenhagen approach.

Perhaps the turn towards 'pledge and review' was understandable, particularly given the situation in the US. But even if this is the case, even if we must make the best of the new regime, we must also work to ensure that our trip through the arid lands of pledge and review is as short and successful as possible. Given this, it is critical to understand that despite the pragmatist chorus of contemporary climate policy, fairness remains extremely relevant, and in the long term will likely be decisive. More particularly, the turn towards pledge and review implies that a broad appreciation of fair-shares approaches is more important than ever. And that a principle-based framework like GDRs, which allows us to quantitatively understand the demands of fairness, with specific reference to evidence-based emissions budgets, is key to any acceptable climate future.

Despite the American push for 'symmetry,' and despite the economic crisis, the situation remains essentially the same as it was several years ago. Which is to say that, inconvenient though this may be, a successful mobilization requires that Annex 1 reaffirm its acceptance of the 'full incremental costs' of climate actions. Only this is consistent with the UNFCCC, with Kyoto, and with Bali. Only this would be just. Only this would open the gates to real action.

Which is not, we hasten to add, to excuse the South from earnestly engaging with the realities of the climate crisis. Not only do the more affluent of the southern countries, such as Singapore and South Korea, have a significant capacity to act, but so does China, and this despite its very poor majority. The emerging countries must act, and unless they do, progress on a global climate response will be stymied. The question is how they must act, and here we are compelled to emphasize one word: *voluntarily*.

We say this despite even our own analysis, which suggest that, by a proper reckoning, the South's obligation to act already amounts to about a quarter of the global total. For this, while this is an immensely significant result of the GDRs analysis, it's not everything, and it does not trump the discord and distrust that have overtaken the negotiations. Given this, equity is not a mere aspirational goal. It is a fundamental matter, in realist as well as moral terms. The climate accord will be fair or it will fail.

### 3.2. The fair-shares approach remains legitimate

Climate change poses a grave threat to us all and to the world's most vulnerable people in particular. While Cancun marked a movement beyond the North / South logic of the Kyoto Protocol to a new and explicitly global negotiation, the wealthy countries - Luxembourg among them - will inevitably be called to much more ambitious positions. Whatever shape this move takes, it will mean that national efforts will be scrutinized and evaluated, and that each country will be expected to accept its 'fair share' of effort needed to stabilize the global climate. But what exactly will this mean?

The international climate policy impasse will not be overcome without a fair global effort-sharing architecture, one that promises a way forward that does not threaten the development of the South.

It is helpful to distinguish the long-term from the short. The short-term problem is straightforward enough: The industrialized countries – which committed in 1992 in Rio and again in 2007 in Bali to lead the way to a post-carbon world – have simply not done so. Their emissions trajectories (corrected for the temporary effects of the financial crisis) have not been significantly transformed. Moreover, much of the financial and technological support for mitigation and adaptation in developing countries, which was promised in Rio, in Kyoto, and again in Copenhagen, either has not arrived or has turned out to be non-additional (the case of the 'fast start finance' pledged in Copenhagen).<sup>14</sup> Given this - it is entirely fair to say that the North has not yet demonstrated a real willingness to lead.

The long-term problem is even worse. The international negotiations are hampered by the effort-sharing question: who should do how much, and when? And though recent developments in Copenhagen and Cancun have only made this question more pressing, the talks could easily remain blocked for a very long time to come. This impasse derives from the bitterly unequal nature of our shared social world, putting the development crisis to the centre of the climate problem. Its most obvious implication is that the international climate policy impasse will not be broken without a fair global effort-sharing architecture, one that promises a way forward that does not threaten the development of the South.

We must continue to work through the international discord – Durban is the next major milestone, but it will not be the last – to lay the foundations of robust and explicitly justice-based global understanding. Only by doing so can we hope to reduce long-term global emissions quickly enough to stabilize the climate system. There is still a huge gap between reality, as dictated by the science, and realism, as defined by the politicians. It is a gap that must be closed. The Copenhagen Accord / Cancun Agreement pledges should not be seen as the last word, but rather as a first round of bids in a game aimed at 'ratcheting up' ambition.

The key point here is that, in all the scrum and positioning of domestic and regional politics, it is critical to have a sense of what is necessary and what is fair, a metric against which to measure

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<sup>14</sup> CAN-Europe, 2011 and World Development Movement, 2010.

the adequacy and fairness of individual national pledges and action plans. This, in turn, presumes the existence of something that we might call 'equity accounting.' Such accounting could be useful in both the short term (as a means of assessing how far first-step national pledges are taking us, and gauging the shortfalls in equity terms) and in the long term (as a means of assessing who is and is not doing their fair share, in terms of the overall agreed costs of both the mitigation and adaptation transitions).

The argument here, simply put, is that the Greenhouse Development Rights approach provides a principle-based reference framework that allows activist campaigners and engaged public officials to tell if their countries are doing their fair share, relative to any given global target. The GDRs 'standard case' is calculated in reference to an extremely ambitious global goal, but the general point is independent of such a goal: It is possible to articulate clear equity principles, and to quantify those principles, and to use the resulting analysis to clearly show which nations are doing their fair share, and which are free riding. After Cancun, and regardless of whatever else we focus on, this is something that we absolutely have to do.

### **3.3. Luxembourg's current climate policy**

#### **3.3.1. Luxembourg's climate commitments**

Luxembourg's climate policy is framed by its international climate obligations. Luxembourg contracted to the UN Framework Convention on Climate Change in general and the principle of 'common, but differentiated responsibility' in particular. Mainly, Luxembourg's commitments are determined by the EU negotiations, no additional exclusively national reduction pledges have been made. Therefore, it often makes sense to consider Luxembourg's climate policy along with its EU analogue.

In 1997, at the United Nations conference on climate change hosted in Kyoto, Japan, the European Union committed to reducing greenhouse gas emissions by 8% in the period from 2008 to 2012, with 1990 as baseline. Within the European Burden Sharing process the EU-15 member states split up the 8% in country specific GHG emission reduction commitments. Luxembourg, whose per capita emissions were by far the highest of the EU-15 (in 1990, Luxembourg's per capita emissions were at 35 tons CO<sub>2</sub>e while the average per capita emissions of the industrialized countries were at 10.8 tons CO<sub>2</sub>e), agreed to reduce its emissions by 28%, the highest reduction commitment in the EU-15. Considering that Luxembourg's emissions amounted to 13.12 MtCO<sub>2</sub>e in the baseline year of 1990, implies an average emission commitment of 9.45 MtCO<sub>2</sub>e per year from 2008 to 2012.

In December 2008, the EU-27 adopted the 'Climate & Energy package', which is intended to contribute to a common energy policy and to climate change policy after 2012, the expiration date of the Kyoto commitments. Covering the period 2013-2020, this package intends to reduce EU GHG emissions by 20% below their 1990 levels. This EU 20% reduction target was split up into the EU Emissions Trading System, (ETS sector<sup>15</sup>) which is entirely under EU control and the

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<sup>15</sup> The European Union Emissions Trading Scheme (EU ETS) is the largest multi-national emissions trading scheme in the world. It was launched in 2005 and is a major pillar of EU climate policy. The EU ETS covers more than 10,000 installations with a net heat excess of 20 MW in the energy

non-ETS-sector<sup>16</sup>, which remains under the EU member states' responsibility. The EU committed to reduce its ETS sector emissions by 21% against 2005 levels by 2020. Furthermore, the EU member states collectively engaged to reduce their non-ETS emissions globally by 10% by 2020 (also with 2005 as a baseline year). These non-ETS emission reductions however, are split up into country specific GHG emission reduction commitments.

Luxembourg agreed on a 20% reduction in non EU-ETS sectors, again the highest allocated reduction commitment. While in 1990, the Kyoto baseline year, Luxembourg's Greenhouse Gas emissions amounted to 13.12 MtCO<sub>2</sub>e, they amounted to 13.28 MtCO<sub>2</sub>e in the EU baseline year of 2005. Of this 2.6 MtCO<sub>2</sub>e were allocated to the ETS sector and 10.7 MtCO<sub>2</sub>e to the non-ETS sector. From 2013 onwards, the industries under the ETS sector will no longer be dealt with under national but under EU guidance. In the non-ETS sector, which remains under national guidance, Luxembourg's national target consists of 10.7 MtCO<sub>2</sub>e – 20 % = 8,55 MtCO<sub>2</sub>e by 2020.

**Table 1: Luxembourg's GHG emissions commitments and base year emission<sup>17</sup>**

Emissions (in MtCO <sub>2</sub> e)	1990 (Kyoto base year)	2008 – 2012 (GHG commitments in the Kyoto years ) (-28%)	2005 (EU base year)	2020 (EU commitment year) (- 20 %)	2020 (EU commitment year) (- 25 %)	2020 (EU commitment year) (- 30 %)
<b>Non-ETS sector</b>	5.42	not specified	10.7	8.55	8.03	7.49
<b>ETS sector</b>	7.7	not specified	2.6	2.05	not specified	not specified
<b>Total</b>	13.12	9.45	13.3	10.6	not specified	not specified

With Copenhagen on the horizon, in December of 2009, the EU enticed the international community with a more progressive GHG emission reduction goal, of 30%, provided that other countries would agree on similarly progressive commitments. Unfortunately, Cancun did not rise to the necessary stringency, and the EU has for the moment backed away from the 30% target. It remains in play however, and indeed it is inevitable if a high-ambition future is to be realized. Luxembourg's prime minister, Jean-Claude Juncker has declared himself to be in favor of a European 30% reduction target<sup>18</sup>. Recent research commissioned by the German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety points out that increasing the EU's 2020 greenhouse gas reduction target from 20% to 30% could lead to a GDP increase of up to €620bn (\$840bn) and the creation of up to 6 million additional jobs.<sup>19</sup>.

and industrial sectors which are collectively responsible for close to half of the EU's emissions of CO<sub>2</sub> and 40% of its total greenhouse gas emissions.

<sup>16</sup> An 'Effort Sharing Decision' governing emissions from sectors not covered by the EU ETS, such as transport, housing, agriculture and waste. Under the Decision each member state has agreed to a binding national emissions limitation target for 2020, which reflects its relative wealth. The targets range from an emissions reduction of 20% by the richest member states to an increase in emissions of 20% by the poorest. These national targets will cut the EU's overall emissions from the non-ETS sectors by 10% by 2020 compared with 2005 levels.

<sup>17</sup> Ministère de l'Environnement, 2006.

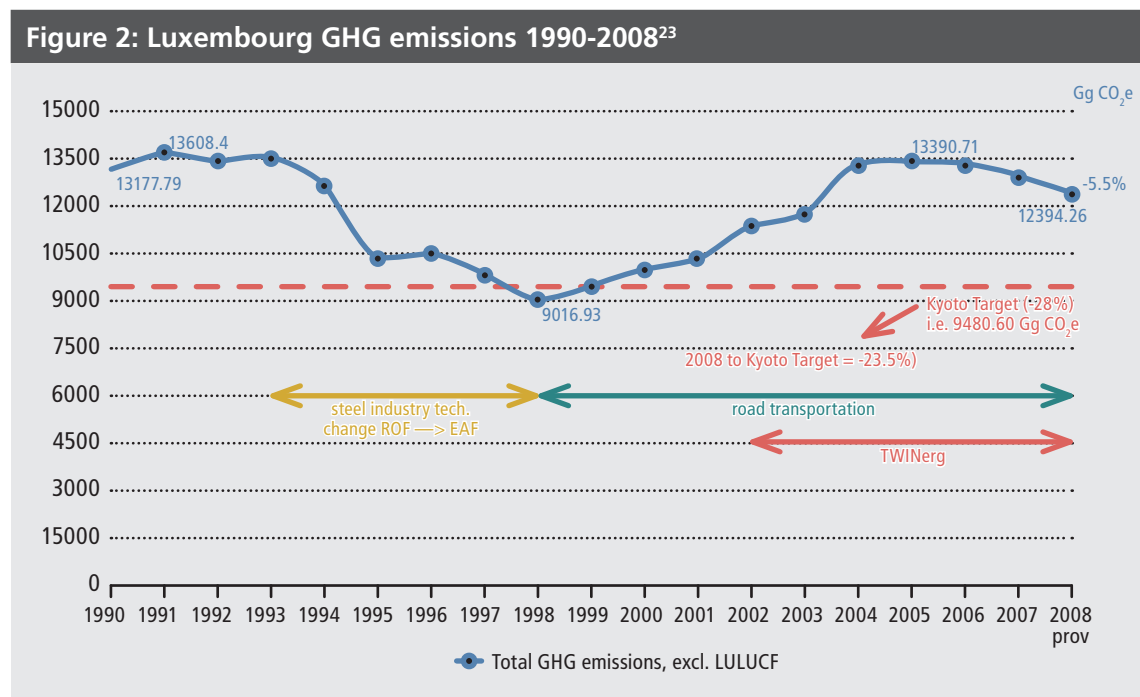
<sup>18</sup> He declared himself in favor of an EU 30% target in the context of an interview with Votum Klima in January 2010.

<sup>19</sup> Jaeger et al., 2011.

But it is highly questionable whether behind closed EU doors the government proactively promotes the 30% target, as the highest reduction burden is usually imposed on Luxembourg. In the case of such a 30% scenario, Luxembourg would be obligated to reduce its 2020 emissions by 30% in the Non-ETS Sector – provided that the EU internal Burden Sharing would not be renegotiated. For the Grand-Duchy, this would result in 2020 in emission allowances of 7.49 MtCO<sub>2</sub>e in the non-ETS sector. The currently also debated –25% target option for 2020 would result in 8.03 MtCO<sub>2</sub>e emissions allowances in the non-ETS sector.

### 3.3.2. Luxembourg's GHG emission pathway

While in 1990 Luxembourg's total GHG emissions amounted to 13.12 MtCO<sub>2</sub>e, in 1998, at its lowest point to date, Luxembourg's total GHG emissions amounted to 8.97 MtCO<sub>2</sub>e<sup>20</sup>. Although, between 1990 and 1998 GHG emissions went down by 32%<sup>21</sup>, this was almost solely due to the iron and steel company, Arbed SA, switching from blast furnaces to electric arc furnaces between 1994 and 1998<sup>22</sup>.



Sources: Environment Agency and MDDI-DEV

Between 1998 and 2005 (highest emission levels in 2005!) total GHG emissions increased by

<sup>20</sup> Ministère du Développement durable et des Infrastructures, 2010b, pp.86, 87.

<sup>21</sup> Ministère du Développement durable et des Infrastructures, 2010b, p.67.

<sup>22</sup> Thöne & Laffer, 2008, pp.7,8.

<sup>23</sup> Ministère du Développement durable et des Infrastructures, 2010b, p.86.



48%<sup>24</sup>, from 8.97 MtCO<sub>2</sub>e in 1998 to 13.28 MtCO<sub>2</sub>e in 2005<sup>25</sup>. This significant increase was due to higher consumption of primary energy<sup>26</sup> in general and extremely high consumption of road fuel in particular. Another important source of GHG emissions was the operation of the combined-cycle gas turbine (CCGT) plant Twinterg in 2002.

	2000	2005	2006	2007	2008	2009 prov
<b>Energie</b>	0,18883	1,45681	1,52687	1,36265	1,15114	1,40248
<b>Industrie</b>	2,52684	2,46225	2,52330	2,61565	2,36606	2,08602
<b>Verkehr</b>	4,72739	7,02407	6,85706	6,59124	6,65331	6,25136
> davon Inland	1,51028	1,53785	1,65241	1,64639	1,69326	1,67917
> davon Treibstoffexport	3,21711	5,48622	5,20464	4,94485	4,96005	4,57220
<b>Haushalte/Handel/ Dienstleistungen</b>	1,49957	1,45147	1,42173	1,35406	1,43123	1,38473
<b>Landwirtschaft</b>	0,74654	0,71177	0,70403	0,71184	0,72547	0,73003
<b>Sonstige Quellen</b>	0,21263	0,16956	0,16148	0,15504	0,16672	0,15565
<b>Gesamt</b>	9,90180	13,27593	13,19447	12,79048	12,49394	12,01033

-8,8% gegenüber 1990 (AAU)

-9,5 gegenüber 2005

Quelle: NIR – Submission 2010v1.2

Luxembourg's GHG emissions peaked in 2005. Since then, they have dropped slightly. A decrease in consumption of primary energy has been observed since the economic and financial crisis started in 2008<sup>28</sup>, so in 2008 emissions dropped to 12.5 and in 2009 to 12 MtCO<sub>2</sub>e (9.8 MtCO<sub>2</sub>e in the non-ETS sector and 2.2 MtCO<sub>2</sub>e in the ETS sector).

In the Second, Third, Forth and Fifth national communication to the UNFCCC (February 2010) the ministry offered an estimate of what national actions could contribute to reductions in GHG emissions. In the additional measures scenario (WAM), that is to say the 'best case scenario', including 'policies and measures' already in place, those planned but not yet implemented or adopted by end 2009, emissions were projected to increase, while they reached 12.49 MtCO<sub>2</sub>e in 2008, they were expected to reach 13.56 MtCO<sub>2</sub>e in 2015 and 13.81 MtCO<sub>2</sub>e in 2020. In other words, the Luxembourg government expected for 2020, in the 'best case scenario' an increase in domestic GHG emissions of around 10% compared to 2008 and of around 5% compared to the baseline year of 1990. This is rather alarming, especially if considering that existing policies and planned measures have not necessarily been implemented as intended. Nevertheless, real emission numbers are, mostly due to the economic crisis, a bit lower:

<sup>24</sup> Ziesing, Eichhammer & Ewringmann, 2009, p.34.

<sup>25</sup> Ministère du Développement durable et des Infrastructures, 2010b, pp.86,87.

<sup>26</sup> Ziesing, Eichhammer & Ewringmann, 2009, p.58.

<sup>27</sup> Ewringmann, 2011.

<sup>28</sup> Claude Wiseler, Minister for sustainable development, at the Assises de la coopération 2010.

<b>Emissions (in MtCO<sub>2</sub>e)</b>	<b>2005 (base year)</b>	<b>2008 (most recent data)</b>	<b>2009 (estimation)</b>	<b>2020 - 20%</b>
<b>Non-ETS sector</b>	10.7	10.4	± 9.8	8.55
<b>ETS sector</b>	2.6	2.1	± 2.2	2.05
<b>Total</b>	13.3	12.5	± 12.0	10.62

Also, the estimated increase in CO<sub>2</sub>-emissions may appear surprising, considering that Luxembourg's GHG emissions peaked in 2005 and have been dropping steadily ever since. But, Luxembourg's government acts on the assumption that Luxembourg's economy will recover from the crisis, while following the classic economic growth model – this would automatically lead to an increase in GHG emissions.

### **3.3.3. Luxembourg's implementation of its international commitments**

When comparing Luxembourg's international commitments with its actual GHG emissions pathway the discrepancy between the two is stark. While under the Kyoto process the country committed to yearly GHG emissions of 9.45 MtCO<sub>2</sub>e from 2008 – 2012, in reality, emissions amounted to 12.5 MtCO<sub>2</sub>e in 2008 and 12 in 2009. Luxembourg's current climate policies do not lead to the requested real emission reductions.

To comply with the Kyoto obligations nonetheless, Luxembourg resorts excessively to the so-called flexible mechanisms, or off-set mechanisms. Under the Protocol, those countries that face difficulties achieving their required GHG emissions reductions domestically are offered the possibility of fulfilling a part of their emission reduction commitments through so-called flexible mechanisms, such as the Clean Development Mechanism (CDM) or emission trading systems. They enable Annex I countries to simply buy their way out of reduction obligations through the acquisition of emission rights, which can be acquired on the international CO<sub>2</sub> emission permit market or by investing in projects located in foreign countries. Luxembourg has already fulfilled about three quarters of its Kyoto obligations by means of off-set mechanisms.<sup>30</sup>

Civil society organizations condemn this excessive recourse to off-set mechanisms as a breach of Article 6.1 (d) of the Kyoto Protocol, which restrictively says '*The acquisition of emission reduction units shall be supplemental to domestic action [...]*'. Also, trading emission rights (see Box 1: 'Hot Air'), as well as CDM Projects, are questionable activities themselves.<sup>31</sup>

<sup>29</sup> Ministère du Développement durable et des Infrastructures, 2011.

<sup>30</sup> Own calculations, based on: Wiseler, Claude, Minister for Sustainable Development and Infrastructure: Answer to Parliamentary Question No. 989 of 8<sup>th</sup> Nov. 2010 from Deputy Camille Gira, Luxembourg, 12 Jan. 2011, [www.chd.lu](http://www.chd.lu) and Mirkes, Dietmar: Clean Development? How Luxembourg is reducing its greenhouse gas emissions abroad, Luxembourg, July 2009.

<sup>31</sup> In Appendix 3 Luxembourg's recourse to off-set mechanisms is exposed in further detail.

### Box 1: 'Hot Air'

When the new EU member countries of the former soviet bloc joined the EU, they accepted the EU's -8 % reduction target, but their emissions went down much more due to their economic downturn of the 1990s. So, today they are enjoying a surplus of AAUs<sup>32</sup> (Assigned Amount Units) which is estimated at about 11 billion tons of emissions rights. These rights are called 'hot air' because they are not a result from planned emission reductions, but just from economic collapse in the 1990s. Luxembourg for instance bought nearly 4 million tons of 'hot air' from Estonia in 2010. Parts of the 'hot air' of the Kyoto period may be transferred to the post-Kyoto period.

Strong international action in addition to strong domestic mitigation efforts are required from the industrialized countries, as the developing countries suffer most in terms of environmental, financial and human impact from climate change, while the industrial countries are most responsible for this change. The latter should therefore provide adequate financial and technical support. The obligations of developed countries, such as Luxembourg, will be two-fold: domestic and international. But in Luxembourg as elsewhere in the wealthy world, international action is generally seen as a small additional request, one that is secondary to the domestic reduction demands that have occupied most of the political debate. So far, Luxembourg's international action is limited to €9 million in Fast Start Finance for the 2010-2012 period, for enhanced action on mitigation (including Reducing Emissions from Deforestation and Forest Degradation, REDD), adaptation, technology development and transfer and capacity building<sup>33</sup>. However, if we are to mount a successful global response to the climate crisis, international action will have to be seen as one of its two vital pillars, equally in need of ambitious action in the mould of an emergency mobilization.

In the context, international action should not be confused with the offset mechanisms granted to Annex I countries under the Kyoto Protocol. The application of off-set mechanisms is considered part of the domestic reduction efforts of a country, while international action is additional to domestic commitments, and not a substitute.

The government of Luxembourg defends its current climate policies with the argument that under the given economic circumstances, its "untypical situation", a more climate friendly course is not possible. According to the official reports Luxembourg's scope of action in climate policies is very restricted. For further detail, see Chapter 6 The GDRs Framework.

<sup>32</sup> Assigned Amount Unit (AAU): Emission units as defined for countries with binding commitments under the Kyoto Protocol. Each country with commitments is given an "assigned amount" of emissions, which are then divided up into AAU's. See for instance <http://www.pointcarbon.com/research/carbonmarketresearch/monitor/>.

<sup>33</sup> Ministère des Affaires Etrangères / Direction de la coopération au développement, 2010.

## 4. The GDRs Framework

The Greenhouse Developments Rights<sup>34</sup> framework was designed to highlight the core challenges posed by the need for extremely rapid global emissions reductions. More particularly, its goal is to outline the sort of principle-based effort sharing system that will be needed before we can seriously expect to achieve such rapid reductions. It seeks to squarely face this fundamental problem: ultimately, the vast majority of the emission reductions required to 'prevent anthropogenic interference with the climate system' must take place in the developing world, where most emissions now occur and where emissions are growing most rapidly. At the same time, the development crisis, and beyond it the fundamental aspirations of the South, demand a vast expansion of energy services to finally eliminate endemic 'energy poverty,' a goal that, in turn, seems inexorably to imply increased carbon emissions.

This is the core of the climate predicament, and the reason why the developing countries insist that, as important as climate stabilization may be, it cannot come at the expense of their development. This, precisely, is the problem that must be solved before any true global emergency mobilization can possibly begin.

### 4.1. The South's dilemma

Figure 3 shows a scientifically realistic assessment<sup>35</sup> of the size of the remaining global carbon budget (upper pathway, red line), defined by a pathway ambitious enough to be considered a true 2°C emergency pathway. We also show the portion of that budget that wealthy Annex 1 countries would consume even if they undertake bold efforts to virtually eliminate their emissions by 2050 (lower pathway, blue line). Doing so reveals, by subtraction, the alarmingly small size of the carbon budget (middle pathway, green line) that would remain to support the South's development. This scientific model serves as reference model<sup>36</sup> within this report.

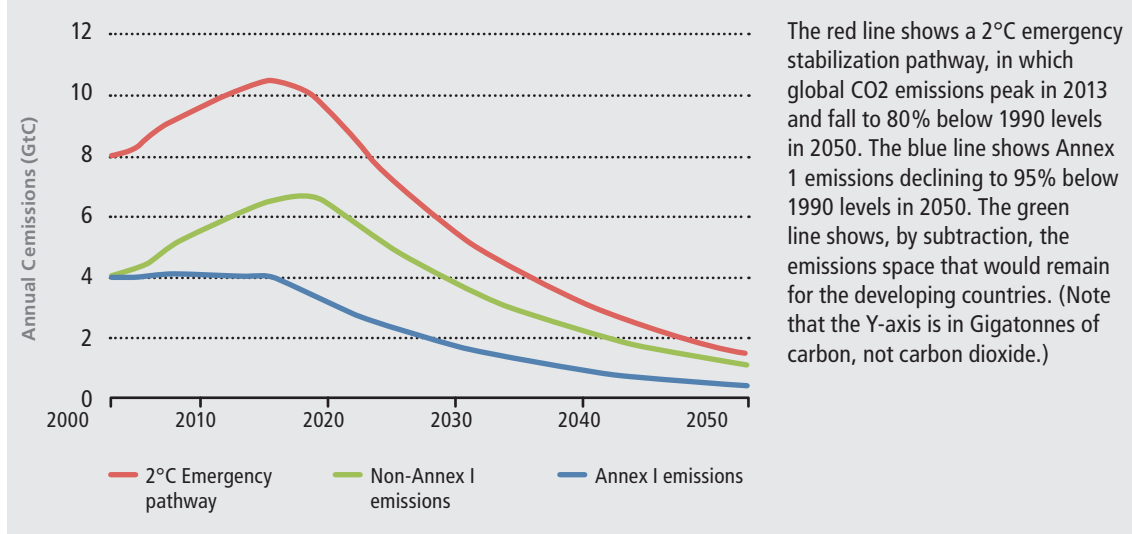
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<sup>34</sup> The reader will find a more complete explanation in the Annexes to this report, along with quantitative results.

<sup>35</sup> Scientific Expert Group on Climate Change, 2007 and Stern, 2006.

<sup>36</sup> Baer, Athanasiou & Kartha, 2008.

**Figure 3: The South's Dilemma**



Bearing in mind, that a temperature target of 1.5°C is strongly justified by the science, this report will nevertheless proceed by way of the now almost universally recognized 2°C target. This target, as the reality minded among us now recognize, specifies a line that really must not be crossed<sup>37</sup>.

The details make the picture starker:

First, the efforts implied by this 2°C emergency pathway are quite heroic, at least by current political standards. It reflects an emergency response, in which global emissions peak before 2015 and decline to 80% below 1990 levels by 2050, such that CO<sub>2</sub> concentrations can peak below 420 ppm and then start to fall steadily toward 350 ppm by the end of the century. Yet even this would hardly mean that we were 'safe.' We would still suffer considerable climate-related impacts and dangers, and would risk an approximately 15-30% chance of overshooting the 2°C line<sup>38</sup>. The IPCC would say that this trajectory was 'likely', but not 'very likely' to keep warming below 2°C.

1. The Annex 1 emission path shown here is far more ambitious than even the most ambitious of current European and American proposals. It has emissions declining at more than 7% annually from 2012 onwards, and ultimately dropping to a near-zero level. Obviously, this is a challenging target; if it can be considered politically plausible today, it is just barely so.
2. Still, despite the apparent stringency of the Annex 1 trajectory, the atmospheric space remaining for developing countries would be extremely constrained; if Annex 1 reductions are any less ambitious, this would only imply even more radical reductions in the South. Even as shown, developing country emissions would have to peak only a few years later than those in the North – still before 2020 – and then decline by more than 5% annually through 2050. And this

<sup>37</sup> For further detail, see Appendix 1.

<sup>38</sup> For much more discussion of this trajectory, see the second edition of the Greenhouse Development Rights book, at <http://gdrights.org/2009/02/16/second-edition-of-the-greenhouse-development-rights>. For a discussion of more recent, and more stringent trajectories, and how their adoption would affect this analysis, see A 350 ppm Emergency Pathway at <http://gdrights.org/2009/10/25/a-350-ppm-emergency-pathway>.

- would have to take place while most of the South’s citizens were still struggling out of poverty and desperately seeking a meaningful improvement in their living standards.
3. The ‘2°C emergency pathway’ as presented here above will serve as a reference pathway throughout this study.

## 4.2. A two-fold obligation

The GDRs approach quantifies equitable shares for each nation of the total global effort required to achieve sufficient mitigation and adaptation. This calculation is not driven by measures of mitigation potential within that individual nation, for GDRs is concerned with equitably dividing the entire global effort of the climate mobilization. The GDRs question, in other words, is what is necessary to avoid dangerous GHG emissions, not what individual nations currently think they could or should contribute to emission mitigation. To answer this question, a top-down rather than bottom-up methodology is needed.

Such an approach allows us to discard the myopic tendency to conceive of national climate obligations in terms of required domestic reductions, and to focus directly on the real objective, which includes both reducing global emissions and ensuring the international financial and technology support needed to ensure that, as people rise out of poverty, they can do so along sustainable, low-emission, paths. The GDRs approach thus implies that those of us with responsibility and capacity bear a two-fold obligation. This obligation follows straightforwardly from our relative historical responsibility and wealth, and there should be nothing very surprising about its size. A quantitative analysis of the country-specific data on incomes and historical emissions leads, in the end, to results that are quite intuitively obvious.

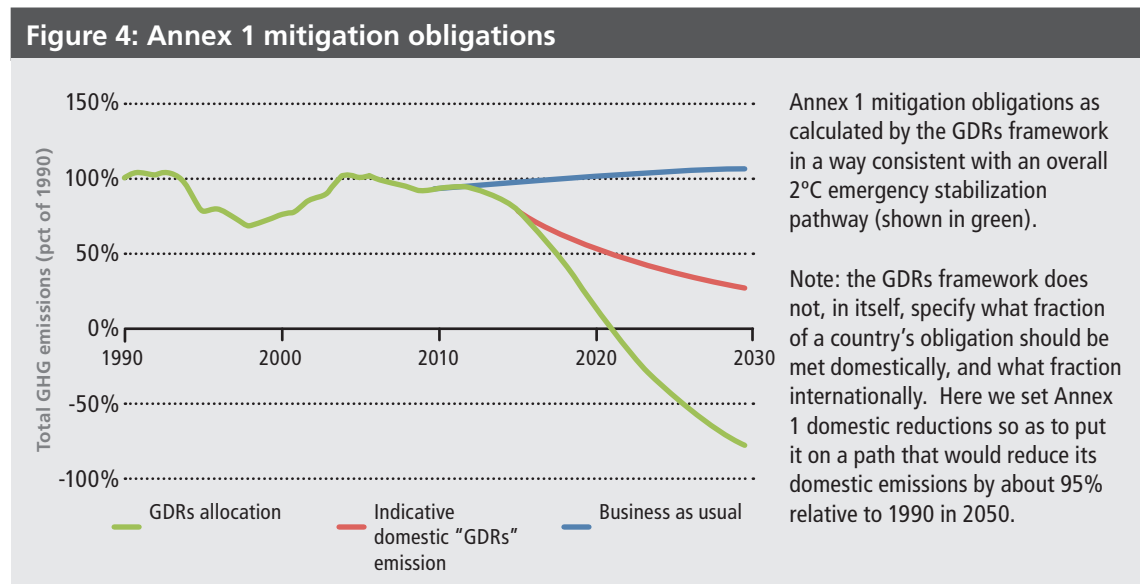


Figure 4 illustrates this point. Note, critically, that it not only shows Annex 1's total mitigation obligation, but also shows, as an example, a division of this obligation into a domestic mitigation effort (the area above the red line) and an international mitigation effort (the area below the red line and above the green). In this case, the domestic mitigation effort is defined as matching the rapid decline needed to put the Annex 1 countries on course toward emission levels consistent with an overall global temperature target of 2°C (see notes at figure 3 p.21). Thus, by 2020, Annex 1's domestic emissions are approximately 50% below 1990 levels. Its international obligations, which are over and above this ambitious domestic effort, reflect an additional mitigation effort of about the same scale. This can be understood as the 'MRV' (Measurable, Reportable and Verifiable) support from Annex 1 to non-Annex 1 countries required by the Bali Action Plan that is needed to drive the low-carbon transition in the developing world.

### 4.3. Making development a priority

Although the Greenhouse Development Rights approach does not begin with a 'realist' logic, it ultimately charts out a set of constraints and considerations that are realist in nature. Beginning with the asymmetric structure of the climate impasse, it asserts that a 'right to sustainable development' is not only ethically justifiable, but also foundational to greenhouse-age geopolitical realism. Its key claim is that, unless the climate regime explicitly preserves such a right, developing country negotiators may quite justifiably conclude that they have more to lose than to gain from any truly unguarded engagement with a global climate regime that, after all, seeks to significantly curtail use of the energy sources and technologies that enabled the industrialized world to bring prosperity to its people.<sup>39</sup>

The core of the GDRs approach is therefore the simple proposition that the poor must, at a minimum, be excused from the burdens of the climate transition. This simple concept is then straightforwardly built up into an effort-sharing framework based on responsibility and capacity – the two equity principles at the core of the UNFCCC's 'common but differentiated responsibilities and respective capabilities'.

GDRs defines both responsibility and capacity, and an overarching notion of obligation that follows from them, in terms of a development threshold – a level of well-being that is modestly above a global poverty line. Individuals living below this threshold are simply not expected to bear the costs of addressing the climate problem, and their income is not taken as contributing to the capacity of the nation within which they live.

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<sup>39</sup> Even today, after Copenhagen and Cancun, the 2008 statement issued by the "G5 countries" (Brazil, Mexico, India, South Africa and China) remains useful for its blunt, straightforward phrasing: "Negotiations for a shared vision on long-term cooperative action at the UNFCCC, including a long-term global goal for greenhouse gases (GHG) emissions reductions, must be based on an equitable effort-sharing paradigm that ensures equal sustainable development potential for all citizens of the world and that takes into account historical responsibility and respective capabilities as a fair and just approach. It is essential that developed countries take the lead in achieving ambitious and absolute greenhouse gas emissions reductions in accordance with their quantified emission targets under the Kyoto Protocol after 2012, of at least 25-40 per cent range for emissions reductions below 1990 levels by 2020, and, by 2050, by between 80 and 95 per cent below those levels, with comparability of efforts among them." (Emphasis added. See <http://www.twinside.org.sg/title2/climate/info.service/climate.change.20080702.htm>)

The GDRs approach defines and quantifies the national burdens appropriate to the world's relatively well-off population. It is this minority, after all, that has the responsibility for the climate. The level at which the development threshold is best set is a legitimate matter for debate, but the key principle is clear: a fair climate regime must differentiate the global poor, who have pressing and legitimate unmet development needs, from the 'global consuming class,' which has reached a level of consumption that significantly contributes to the climate problem, and has similarly acquired enough capacity to help bear the costs of managing that problem.

The development threshold has been defined in terms of income level. This is arguably simplistic, though a case can be made that it is the best option in the context of the climate regime. And it well serves its purpose as a variable applied to determine the RCI. A defensible income level for this global poverty can be explored empirically, and evidence suggests that a global poverty line can reasonably be approximated by \$16 per day (PPP adjusted)<sup>40</sup> (Pritchett, 2003; 2006). For the purposes of this indicative calculation, GDRs set the development threshold at 125% of a global poverty line. This level is, of course, somewhat arbitrary, but its appropriateness is supported by the many other contexts in which a figure such as 125% of a poverty line is taken to define the upper boundary of 'exempt' or 'lifeline' income. We then have (multiplying \$16 by 125%) an indicative development threshold of \$20 per day (or \$7,500 per year) per person (PPP adjusted).

The right to development is itself a right that adheres to individuals, not to countries. In the realm of global treaties, of course, commitments will be assigned at the level of nations, not individuals. Having said this, the 'development threshold' is to be considered as an instrument, whose purpose is to take into consideration individual's development issues in order to allocate climate obligations to the states. Again, the income of individuals living below this threshold is not taken as contributing to the capacity of the nation within which they live. Although the ethos of the GDRs approach strongly suggests that no individual below the threshold should be made to bear the costs of addressing the climate problem, the model is not designed to determinate how a nation's climate obligation is allocated to its citizens. GDRs merely assigns national climate obligations.

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<sup>40</sup> Pritchett concluded that the use of this line 'is justifiable, more consistent with international fairness, and is a better foundation for the World Bank's organizational mission of poverty reduction' and that 'If the poverty line were defined as the level of income at which people typically achieve acceptable levels of the Millennium Development Goal indicators (such as universal primary school completion), it would be set at about [\$16] a day' (Pritchett, 2003; 2006). Note, this figure are calculated on a purchasing power parity (PPP) adjusted basis, and therefore convert to an appropriately lower income level in a local developing country currency than if converted at market exchange rates. It represents the purchasing power of \$7500 in the US, which is not very much. In terms of energy use, food consumption, medical care, and so forth, it goes only slightly beyond bare necessities. Indeed, in the industrialized countries, persons earning this amount or less not only are typically exempted from income taxes, but are eligible for subsidies of various sorts from the national treasury. Different development thresholds are explored via a sensitivity analysis in Baer, Athanasiou & Kartha (2007).



## 4.4. Defining Capacity and Responsibility

The claim that effort sharing should be based on a systematic treatment of responsibility and capacity<sup>41</sup> is not new, and is reflected in many contemporary proposals. What more distinguishes the GDRs approach is rather its deliberate look forward from the existing negotiations, which are still sharply polarized between the Annex 1 and non-Annex 1 blocs, in favour of a truly global approach in which all countries are evaluated in terms of principle-based indicators of responsibility and capacity, defined with respect to a well-defined development threshold.

GDRs defines *capacity* in a manner that accounts for income disparities within countries. To define it, that is, as individual income in excess of the development threshold, summed across all the individuals in a country. Ultimately, since this is all toward the end of a global climate agreement between nations, capacity will be defined – and the costs of the climate transition allocated – on a national basis. But the point here is that, unless capacity is calculated in a manner that accounts for intra-national inequality, it will not meaningfully reflect the development status – the wealth and poverty – of nations.

*Responsibility*, of course, is the central concept behind the ‘polluter pays’ principle, and, like capacity, it has a strong common-sense resonance. The notion of national ‘responsibility for greenhouse gas pollution’ is intuitively – and correctly – understood in terms of the greenhouse gases that nations have emitted. As such, the baseline definition of responsibility must be in terms of cumulative emissions<sup>42</sup>. GDRs adopted 1990 as baseline year, just as it has been fixed in international treaties. As we did with capacity, we argue that the economic disparities within nations imply that responsibility must be conceived in a manner that recognizes the right to development as a right of individuals, not a right of countries. Affluent individual’s emissions are therefore counted toward the country’s responsibility, and hence its obligations.

## 4.5. The RCI

As discussed above, the GDRs approach calculates equitable national shares of the total global effort required to achieve sufficient mitigation and adaptation, based on the capacities and responsibilities of the affluent people living within that nation’s borders. Each nation’s fair share is quantified by means of a specific index developed by GDRs - the Responsibility and Capacity Index (RCI)<sup>43</sup>.

A national RCI is a function of four nationally-specific data elements, plus a global development threshold.<sup>44</sup> The four national elements are:

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<sup>41</sup> For further details, see the second edition of the Greenhouse Development Rights book, at <http://gdrights.org/2009/02/16/second-edition-of-the-greenhouse-development-rights>.

<sup>42</sup> Sum of annual global greenhouse gas emissions over a period of time. Because many greenhouse gases persist in the atmosphere for a long time, cumulative emissions greatly influence concentrations and therefore temperature.

<sup>43</sup> For further detail, see Appendix 2.

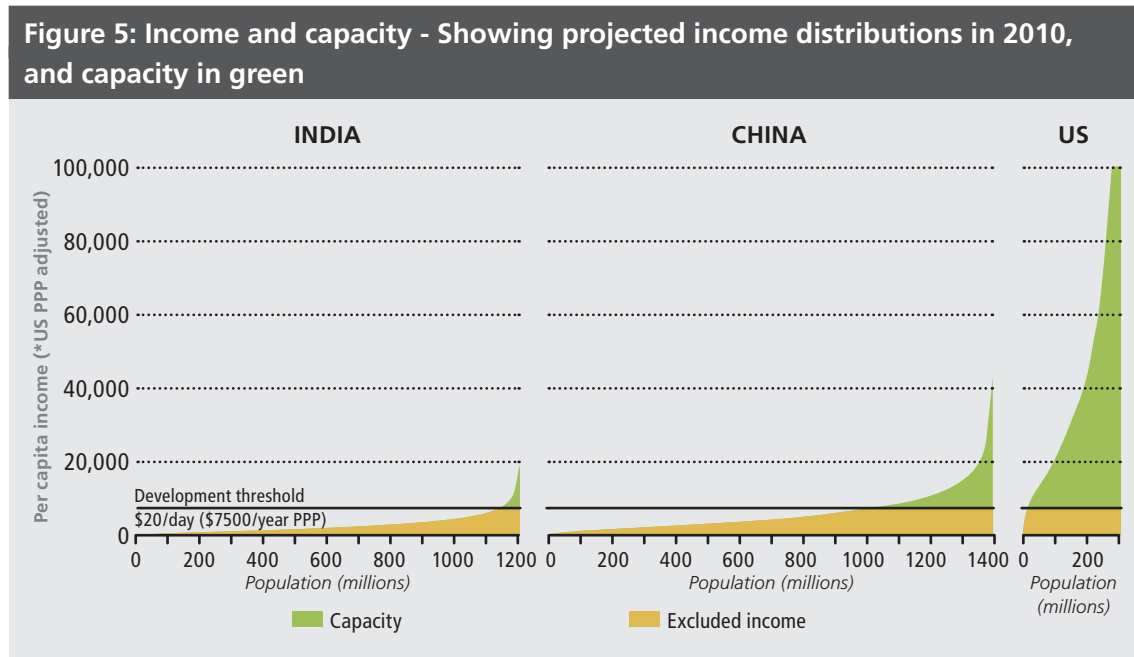
<sup>44</sup> This report does not explain the reasoning behind the RCI, nor why these elements are appropriate to its calculation. For a detailed discussion of these matters, see the latest edition of the Greenhouse

1. Per-capita income,
2. Cumulative per-capita CO2 emissions,
3. Gini coefficients (a measure of intranational inequality),
4. Population.

Two of these – per-capita income and per-capita emissions – are in turn derived from projections for national income, national emissions, and population.

While each country’s RCI, in absolute terms, depends solely on data about that country (and the development threshold), in practice, the RCI is almost always used to allocate a national share of some global obligation – to mitigate, to contribute to a global fund, to pay for adaptation, etc.

The distribution of global RCIs is also dependent on the global ‘development threshold,’ which defines a level of well-being that is modestly above a global poverty line. Individuals living below this threshold are not expected to help bear the costs of addressing the climate problem, on either the mitigation or adaptation side.



## 5. The GDRs applied to Luxembourg

### 5.1. Luxembourg's fair share under GDRs

The GDRs framework provides a transparent, principle-based method of calculating appropriate national obligations for every country in the world, developed or not. Given the state of the negotiations, and given particularly that the developing countries cannot yet be expected to take on legal obligations beyond those contained in the UNFCCC, such an exercise may seem premature.

However it is also useful, as an indication of the sort of accord that will eventually be needed, once the global community is honestly committed to avoiding a climate catastrophe. Thus, in this report, we are calculating Luxembourg's obligations in a straightforward manner, absent the complications of any transition or trust-building strategy. That is to say, the tables and charts in this report reflect a world in which the political impasse that now bedevils the negotiations is resolved, and a fair shares, principle-based, global effort-sharing system has become possible.

### 5.2. Luxembourg's Responsibility and Capacity Index

In the current debate, national obligations are generally understood in terms of domestic mitigation targets expressed as a percentage reduction below a base year. In the GDRs framework, in contrast, national obligations are expressed as a percentage share of a global total need. Luxembourg's percentage share is embodied in its RCI, which can be applied in order to determinate Luxembourg's fair contribution to a global total effort, whether that total is a global mitigation requirement measured in tons of carbon, a monetary estimate of the total global costs of mitigation, or the global costs of adaptation.

What really matters to Luxembourg is its fraction of the global RCI, which defines its fair fraction of the global mobilization need. This fraction will, obviously, depend on data about other countries as well as data about Luxembourg.

Table 4 below indicates the calculation of the RCI for Luxembourg from 2000 through 2030. Note that emissions are calculated based on the allocation of emissions rights to Luxembourg under the GDRs reference case; thus, as Luxembourg's allocation is negative after 2022, emissions are negative and cumulative emissions decrease.

Year	Per Capita Income (\$PPP)	Population	Emissions (MtCO <sub>2</sub> e)	Cumulative Emissions from 1990 (MtCO <sub>2</sub> e)	Share of population over development threshold	Share of global capacity	Share of global responsibility	Share of global RCI
2000	52,708	433,600	9.9	142.1	100%	0.0847%	0.0677%	0.0762%
2005	57,598	461,230	13.3	199.2	100%	0.0860%	0.0643%	0.0752%
2010	60,149	502,066	12.1	257.8	100%	0.0814%	0.0621%	0.0718%
2015	62,338	542,071	9.9	311.2	100%	0.0768%	0.0591%	0.0680%
2020	65,162	573,103	1.7	332.1	100%	0.0725%	0.0550%	0.0637%
2025	67,402	606,180	-5.7	308.6	100%	0.0684%	0.0490%	0.0587%
2030	69,214	640,500	-10.0	264.2	100%	0.0644%	0.0419%	0.0531%

The 100% share of population over the development threshold is discussed in detail in chapter 5.6 p.35 .

### 5.3. Luxembourg’s GDRs obligations

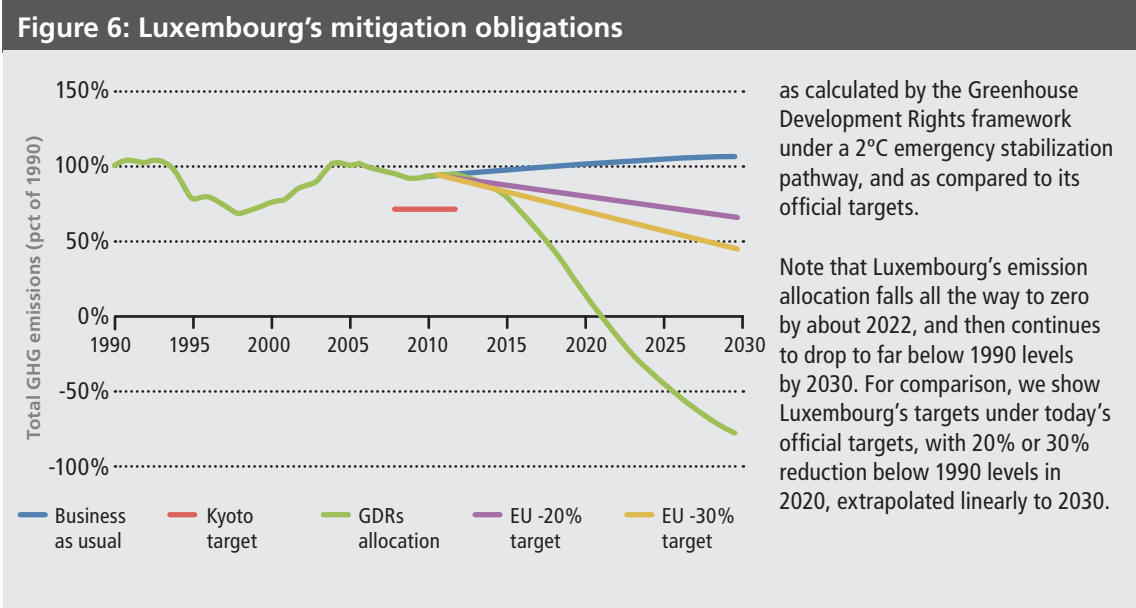
The GDRs framework can be used to calculate national mitigation obligations as follows: The first step is to estimate the global mitigation requirement – that is, the reductions below a projected baseline required to reach a 2°C emissions reduction pathway. In 2020, using our assumptions, the global mitigation requirement is approximately 16.3 billion tons of CO<sub>2</sub>-equivalent. The second is to use the responsibility-capacity indicator to calculate each country’s share of that global mitigation requirement. The third is to define an emission target for each country. By subtracting the country’s share from its own emissions baseline, an emissions budget for each country can be straightforwardly calculated.

Based on GDRs calculations, Luxembourg’s share of the global obligation (RCI) is 0.072% in 2010. This is small in absolute terms, but ten times larger than Luxembourg’s 0.007% share of global population, a result that directly reflects its relative wealth and historical responsibility. Based on plausible but quite uncertain projections of global growth of income and emissions this share would fall to 0.064% in 2020 and 0.053% in 2030. In 2020, Luxembourg’s share (0.064%) of the global mitigation requirement (16.3 GtCO<sub>2</sub>e) would be a mitigation obligation of about 10.4 MtCO<sub>2</sub>e (the ETS and the non-ETS sectors confounded). This is the amount Luxembourg would have to reduce its emissions compared to 1990 (13.3 MtCO<sub>2</sub>-eq).

Accepting this as Luxembourg’s ‘fair share’ of the global effort<sup>45</sup> has significant implications for the emission reduction targets required. How does the GDRs obligation compare to Luxembourg’s existing domestic policy targets? See Figure 6, where a purple line (2<sup>nd</sup> from the top) corresponds to Luxembourg’s official objective of reducing emissions to 20% below 2005 levels by

<sup>45</sup> Note that Luxembourg would also have an obligation to accept 0.064% of the global adaptation burden, though adaptation is not discussed in detail in this brief report.

2020, and an orange line (3<sup>rd</sup> from the top) corresponds to the stronger 30% below 1990 policy target that the EU discusses in its braver moments. The figure shows Luxembourg’s reduction obligation, subtracted from its estimated baseline. The resulting allocation, shown by the lower green line, reaches zero shortly after 2020, and becomes steadily more negative as time goes on, going from 77% below 1990 levels in 2020, falls to well below zero by 2025, and to 167% below 1990 levels in 2030. This reflects the fact that, by that time, Luxembourg’s mitigation obligation exceeds its projected emissions.



This GDRs allocation with eventual negative emissions for Luxembourg is obviously eye-catching - reduction targets are far more stringent than those now considered politically realistic. Thus, it is important to understand why they are both reasonable and proportionate. In Luxembourg’s case, the explanation is obvious. Luxembourg is a rich country, with high per-capita emissions, and thus a high capacity and a correspondingly high reduction obligation.

It emphasizes the point that wealthy countries clearly have reduction obligations, which are higher than their domestic emissions. Nevertheless, this figure accurately reflects the necessary level of ambition, if Luxembourg is to do its fair share under an emissions trajectory that is truly consistent with the 2°C objective. This reflects a two-fold obligation to, on the one hand, make domestic reductions and, on the other, invest in international reductions.

So note that there are other ways to express this ambition. This 77% figure is, to be sure, inevitable, for the climate debate is one in which national targets are almost always, misleadingly, expressed in terms of domestic reductions from a 1990 baseline. In this context, figures like Luxembourg’s 77% underscore the point that wealthy countries properly have reduction obligations that will soon be higher than their domestic emissions, reflecting a two-fold obligation to, on the one hand, make domestic reductions and, on the other, invest in international reductions.

**Figure 7: Luxembourg's mitigation obligations**

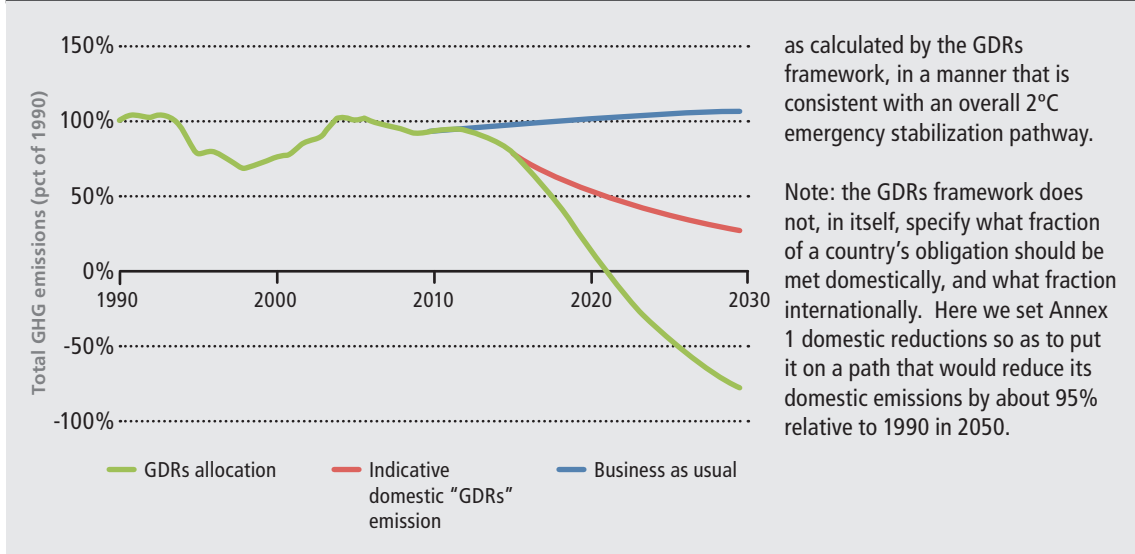


Figure 7 presents an indicative division of Luxembourg's two-fold reduction obligation into a domestic mitigation effort and an international mitigation effort. The GDRs framework does not, in itself, specify what fraction of a country's obligation should be met domestically, and what fraction internationally. Here we set the domestic reduction to be about 45% below 1990 levels in 2020, domestic emissions by 95% relative to 1990 in 2050. In this example, the domestic mitigation effort is defined so as to match the rapid decline needed to put the Annex 1 countries on course toward a target of 95% reductions relative to 1990 levels by 2050. It should be read, then, as an important example, but still only an example, of how the total obligation might be apportioned into a domestic and international reduction obligations. A lower level of domestic ambition would not reduce the size of the total obligation, but indeed would increase the size of Luxembourg's necessary international effort. And, further, it would indicate Luxembourg was not acting in a manner that is consistent with a global push to hold the 2°C line. A lower level of domestic ambition for 2020 would only postpone the problem and therewith demand for even stronger yearly domestic emission reduction from 2020 onwards.

The analysis illustrates Luxembourg's domestic target for 2020 at about 45% below 1990 levels (emission reduction of 6.1 MtCO<sub>2</sub>e). But even if the model exposed in this report would demand for 45% below 1990 levels by 2020, would this be contributing its 'fair share' to the global effort to tackle climate change? The answer is no, for the simple reason that cutting its domestic emissions reductions is only one part of Luxembourg's responsibility.

Its remaining obligation, over and above this domestic effort, to be discharged internationally, reflects another large mitigation effort, as defined by the overall emissions allocation that, as noted above, is about 77% below 1990 levels in 2020. In this case, domestic reductions come to 6.1 MtCO<sub>2</sub>e and international reductions come to 4.3 MtCO<sub>2</sub>-e to be achieved through financing and technology transfer, the two together summing to Luxembourg's 10.4 MtCO<sub>2</sub>e reduction obligation for 2020.

This additional international obligation can be thought of as the measurable, reportable and verifiable (“MRV”) support that is needed to enable a rapid and low-carbon transition in the developing world. Which is to say that Luxembourg, like all countries with high capacity and responsibility, has an obligation to ensure both deep domestic reductions and catalyze rapid reductions in developing countries through financial and technological support.<sup>46</sup>

Note that international action should not be confounded with the off-set mechanisms granted to Annex I countries under the Kyoto Protocol (so-called flexible mechanisms, such as the Clean Development Mechanism or emission trading systems), which are considered to be part of the domestic reduction of a country, and that international action should be additional to domestic commitments, rather than substitutional. In Luxembourg’s case it is especially important to be aware of that distinction, as the country massively resorts to offset mechanisms.

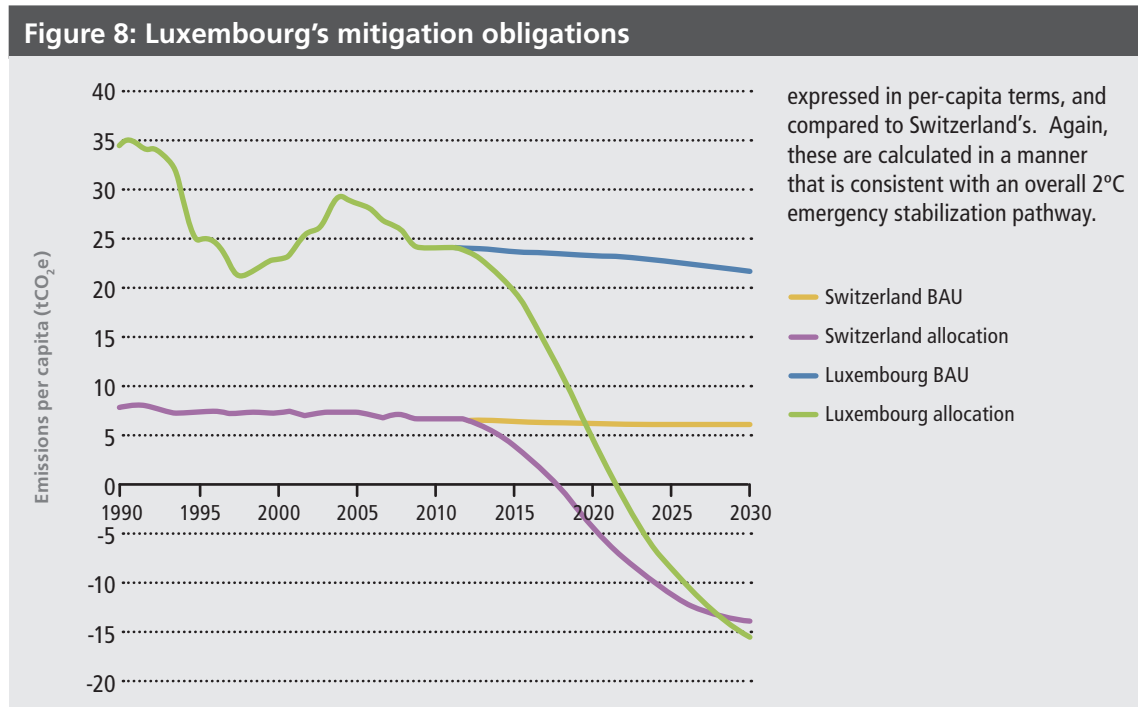
Presented in this way, Luxembourg’s two-fold GDRs obligation is very explicit, and also very large. Indeed, it is so large as to seem entirely implausible and unrealistic by today’s standards of political realism. However, the key conclusion of our analysis is that obligations of this scale for countries with high capacity and substantial responsibility are, in the final analysis, absolutely necessary to a global viable and effective climate regime. It is only by way of such large obligations that a climate regime can effectively bring about two vital outcomes. First, driving ambitious domestic reductions, and thus ensuring that the wealthier countries free up sufficient environmental space for the poorer countries to develop. Second, driving equally ambitious international reductions – enabled by technological and financial support from the wealthier countries – and thus ensuring that this development can occur along a decarbonised path. Please note that GDRs restrictively assigns state’s climate obligations. Although the right to development as such is a right that adheres to individuals, not to countries, the model is not designed to determinate how a nation’s climate obligation is allocated to its citizens.

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<sup>46</sup> It should be remembered that these calculations depend on certain choices used to define capacity, responsibility, and other matters. One choice that is of political importance is the decision regarding the date at which historical responsibility starts to be counted. The results presented here assume a start date of 1990, but if one wished instead to define historical responsibility in terms of emissions since 1950, say, the result would be a larger share of global obligations for Luxembourg in 2020. Another choice of political interest is the treatment of the net carbon embodied in imports and exports in determining responsibility. This too would increase Luxembourg’s share of global responsibility, and thus its share of the global obligation.

<sup>Also</sup> these figures reflect an implementation of GDRs that estimates Luxembourg’s domestic and international obligations in terms of tons of reductions. But as we stated at the outset, the core of the GDRs approach is the calculation of a percentage share, a calculation that can also be done in terms of mitigation obligations calculated in monetary terms. Obligations to support adaptation, it should be noted, must necessarily be done in monetary terms.

## 5.4. Luxembourg's GDRs obligations, in per capita terms



Luxembourg has the largest per-capita emissions in Europe. In 1990 they amounted to 35 tCO<sub>2</sub>e per capita and even in 2009 they still amounted to 24,3 tCO<sub>2</sub>e per capita. By the logic of the GDRs system, Luxembourg's large per-capita emissions demand for a large per-capita reduction obligations. Luxembourg's great responsibility and capacity are both functions of its great per-capita wealth and great per-capita emissions. In Figure 8, we show both Luxembourg's GDRs obligations and Switzerland's. This comparison was picked because both countries are comparable in the sense that they are both above-average affluent countries. Even so, Figure 8 shows that Luxembourg's per-capita emissions are much higher than Switzerland's. This explains why Luxembourg's population stands in a 1/9 proportion to its RCI obligations, while Switzerland's population stands in a much more favorable 1/4.5 proportion to its RCI obligations, as can be extracted from the table below.

	Luxembourg	Switzerland
Share of global population – projected to 2020	0.007%	0.102%
Share of global RCI in 2020	0.064%	0.47%
2020 Mitigation obligation as MtCO <sub>2</sub> e below BAU	10.4	76.2
2020 Mitigation obligation per capita as tCO <sub>2</sub> e below BAU	29.1	11.4



## 5.5. The bottom line

The GDRs emission allocations shown above are especially daunting when presented as reduction trajectories. But they are considerably less so when their implications are examined in terms of economic cost. To do this, we can look to estimates of the cost of an ambitious climate response, and allocate it among nations in accordance with their RCI.

When it comes to estimating the total scale of global mitigation and adaptation costs, there is, of course, tremendous uncertainty. This is not the place to discuss cost estimates in any depth, except to note that they span a fairly wide range. The Stern Review, for example, surveyed a range of modelling analyses and found mitigation costs rising up to the order of 1% of Gross World Product by 2050. This is particularly notable because Stern subsequently revised this estimate upward as he has come to advocate more ambitious climate action.<sup>47</sup> Similarly, a 2009 analysis by the European Commission provided two alternative results. Its macroeconomic analysis concluded that the mitigation scenario would impose in 2020 a 1.0% GWP cost relative to the baseline. Its second, more techno-economic analysis found mitigation costs of €175 billion, or about ¼% of the EC's projected 2020 Gross World Product, a figure that's more or less comparable with other bottom-up analyses, such as a well-publicized McKinsey study that estimated around \$200 billion to \$400 billion for global costs.<sup>48</sup>

There have been a number of important developments on the cost-estimate front. One is that, in late 2009, the former UNFCCC Executive Secretary, Yvo de Boer, relying on UNFCCC research, specifically estimated the annual cost of an adequate climate transition program to be about \$300 billion annually (\$100 billion for adaptation and \$200 billion for mitigation).<sup>49</sup> The other is that the International Institute for Environment and Development released a major new report which, while not providing new cost estimates, did persuasively argue that existing estimates of the cost of adaptation (including the ones relied on by Yvo de Boer) "have a number of deficiencies" and that, in particular, "a re-assessment of the UNFCCC estimates for 2030 suggests that they are likely to be substantial under-estimates."<sup>50</sup>

In the face of such a situation, we find it useful to admit that one cannot know the cost of stabilizing the global climate, and to instead conduct a thought experiment in which we take the 2020 global funding requirement as being exactly 1% of the projected Gross World Product. It is a useful figure to start with, as it is well within the range of published estimates of the cost of a global climate transition, though it is four times larger than the size of the EC's techno-economic estimate, equal to the EC's macroeconomic estimate, and half as large as Stern's revised estimates.

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<sup>47</sup> Stern, 2006 and Stern, 2008.

<sup>48</sup> Pendleton, 2009.

<sup>49</sup> UNEP, 2009.

<sup>50</sup> Parry, Arnell, Berry, Dodman, Fankhauser, Hope, Kovats, Nicholls, Satterthwaite, Tiffin & Wheeler, 2009.

Given assumed total global climate transition costs of 1% of Global World Product<sup>51</sup>, (\$660 Billion in 2020 in our projection), one can ask how GDRs would allocate those costs. The EU's share would be about \$146 billion (22% of the global RCI) and Luxembourg's share (0.064% of the global RCI) would be about \$420 million - this relates to Luxembourg's responsibility to pay for mitigation at home and in developing countries. Similarly, the US, with 30% of the global RCI, would be obligated to pay about \$198 billion, China's share would be \$52 billion (7.9% of the global RCI), India's about \$2.8 billion (0.4%)<sup>52</sup>.

	National Income (Billion \$)	National Capacity (Billion \$)	National Capacity % GDP	National Obligation (Billion \$)	National Obligation % GDP
<b>EU 27</b>	\$15,173	\$12,313	81.15%	\$146	0.96%
<b>EU 15</b>	\$14,106	\$11,547	81.86%	\$132	0.94%
<b>EU +12</b>	\$1,066	\$766	71.79%	\$14	1.30%
<b>Luxembourg</b>	\$37.3	\$33.8	90.51%	\$0.42	1.13%
<b>United States</b>	\$18,177	\$15,607	85.86%	\$198	1.09%
<b>Japan</b>	\$7,069	\$5,777	81.72%	\$56	0.80%
<b>Russia</b>	\$712	\$480	67.48%	\$24	3.31%
<b>China</b>	\$6,744	\$2,816	41.76%	\$52	0.78%
<b>India</b>	\$2,042	\$199	9.77%	\$3	0.14%
<b>Brazil</b>	\$1,374	\$766	55.71%	\$23	1.68%
<b>South Africa</b>	\$344	\$202	58.56%	\$5	1.44%
<b>Mexico</b>	\$1,069	\$623	58.22%	\$10	0.97%
<b>LDCs</b>	\$583	\$22	3.69%	\$2	0.28%
<b>Annex 1</b>	\$44,487	\$36,724	82.55%	\$466	1.05%
<b>Non-Annex 1</b>	\$21,610	\$9,888	45.76%	\$195	0.90%
<b>World</b>	\$66,097	\$46,612	70.52%	\$661	1.00%

These figures assume that the total annual cost of the global climate program is 1% of GWP, projected as \$660 Billion in 2020, and that the obligation is distributed not just among Annex 1 countries, but globally. If they turned out, instead, to be 0.5% of projected 2020 GWP rather than a full 1%, national obligations would come to only half of these figures. Luxembourg's share would drop to \$210 million. Or, considering the EC's 2020 mitigation-only cost estimate of €175 billion (here taken as 220 billion US dollars), which comes to about 0.33% of projected 2020 GWP, Luxembourg's 2020 share would drop to less than \$150 million.

<sup>51</sup> Note that GWP, and thus this figure of 1% of GWP, is based on national income (GNP) calculated in terms of market exchange rates (MER), not purchasing power parity (PPP) adjusted dollars. This change from earlier GDRs publications (e.g., Baer et al., 2008) is designed to take account of the fact that capacity as it is relevant to mitigation is based much more on the prices of goods and services that trade in international markets. The quantitative effects include a substantial decline in reported GWP relative to our PPP-based projections.

<sup>52</sup> We are making the heroic assumption here that the developing world would also be carrying its GDRs-specified share of the global obligation, under a (hopeful) scenario in which the Annex 1 countries have finally and whole-heartedly launched a global climate transition.

Note that the expression of Luxembourg's two-fold climate obligation (domestic and international) in monetary terms is derived from total annual global cost (such as estimated by Stern and others). The amounts found in this brief analysis (€420, €210 or €150 million for Luxembourg by 2020) are nothing more than a monetarisation of the global bill calculated through the RCI for Luxembourg. This has nothing to do with Luxembourg climate transition costs - the expected costs of a decarbonisation of Luxembourg, such as investing in renewable energy, improving energy efficiency, progressively phasing out fuel export, etc. – which is probably much higher than the global climate bill as estimated under GDRs.

We also wish to point out that the expression of this obligation in money should in no means be understood as an invitation to Luxembourg to buy out from its (domestic) obligations, such as is presently done with the massive purchase of emission certificates to fulfil its national climate obligations.

## 5.6. National implementation

As illustrated in Text table 4 page 28 100% of Luxembourg's population is situated above the development threshold. This does not automatically imply though that 100% of Luxembourg's population is equally supposed to bear the responsibility of addressing the climate problem. The right to development is itself a right that adheres to individuals, not to countries. In the realm of global treaties though, commitments will of course be assigned at the level of nations, not individuals. Having said this, the "development threshold" is to be considered as an instrument, whose purpose is to take into consideration individual's development issues in order to allocate climate obligations to the states. The income of individuals living below this threshold is thus not taken as contributing to the capacity of the nation within which they live. Although it is deeply requested by GDRs that no individual below the threshold has to bear the costs of addressing the climate problem, the model is not designed to determinate how a nation's climate obligation is allocated to its citizens. GDRs restrictively assigns state's climate obligations.

While the fixed "development threshold" is certainly a useful one at an international scale, it would not make much sense at Luxembourg national level. Transposing GDRs development threshold directly to Luxembourg's national level would mean to request a climate contribution from 100% of Luxembourg's population.

In 2006, Luxembourg's national absolute poverty line<sup>53</sup> has been fixed at 15.521€ per capita a year (\$19.707<sup>54</sup>) and the relative poverty line<sup>55</sup> had been fixed at 17.688€ (\$22.458) per capita a year. In 2010, the relative poverty line per capita was 19.056€ (\$26.194<sup>56</sup>). The absolute poverty line for 2010 is not available yet. There is a considerable gap between the GDRs \$7.500 a year development threshold and the Luxembourg relative poverty line \$26.194 a year, and it would cer-

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<sup>53</sup> The absolute poverty line considers the consumption of a household by fixing a basket of necessary goods and services to be able to live decently.

<sup>54</sup> The change rate in may 2006 was 1€=1,2697\$

<sup>55</sup> The relative poverty line considers the income of a household and compares it in relation to the incomes of the whole population.

<sup>56</sup> The change rate 1<sup>st</sup> February 2011 was 1€=1,3746\$

tainly not be in the spirit of the GDRs to make 100% of Luxembourg's citizens, including those with an income lying between \$7.500 and \$24.195 bear the costs of addressing the climate problem. This however does not challenge the accuracy of the GDRs 'development threshold' when it comes to allocating the nations' – including Luxembourg's – climate obligation.

How Luxembourg's government would then proceed on a national level to fulfil its internationally determined climate obligations is a matter of a national climate strategy - and is outside the range of this study. Different approaches would be conceivable.

To reach the aim of reducing GHG emissions domestically the Luxembourg Government could promote public transport more ambitiously or increase the taxes on fossil energy to reduce the consumption – to name only two possible measures. Taxes on fossil energy or progressive taxes on earnings could as well deliver financial support for international obligations. Whatever would be the policies of choice, they would have to respect the value of social justice. The policies should not affect the income of people below the relative poverty line even if some of them are "only" at risk of poverty. The right to development should also be respected at the micro level.

## 6. Luxembourg's 'untypical situation' in the light of the GDRs framework

Typically, Luxembourg's climate policy is very bottom-up oriented. It is determined by what seems conceivable, and less by what is necessary. The GDRs framework can complete the current approach by offering a top-down analysis of the climate problem. It illustrates what is Luxembourg's fair share of the GHG emission reduction, that is needed to prevent global warming from exceeding the 2°C line.

This report shows that there is a large discrepancy between what can be considered Luxembourg's fair share and Luxembourg's actual climate change efforts. This is true for its domestic obligations, just as it is true for its international obligations. Luxembourg already encounters serious problems complying with the climate obligations currently imposed on it by the international community, even though they are considerably lower than the climate obligations that would be the country's fair share according to the GDRs framework.

The government justifies Luxembourg's difficulties in climate protection arguing that the country is a special case, - its 'untypical situation'. The term 'untypical situation' as it is used in this report shows up regularly in the official reports of Luxembourg's ministry for sustainable development and infrastructure. It has been used in all languages on several occasions. It appears in German in 2006 as 'außergewöhnliche Situation' in Luxembourg's allocation plan 2008-2012 and in French as 'situation spécifique' in Luxembourg's first action plan on CO<sub>2</sub> emission reduction, and finally in 2010 in English as 'untypical situation' in Luxembourg's Second, Third, Fourth and Fifth National Communication to the UNFCCC. In the aforementioned reports, Luxembourg's specific features, which are used to legitimize the difficulties it encounters when it comes to complying with its climate obligations, are repeatedly insisted upon. It is argued that, under the given circumstances more climate friendly policies are simply not possible and that therefore, the country should be granted 'specific' exceptional rules under international climate agreements, adjusted to its 'specific' situation<sup>57</sup>.

Every country has its specifics, but – as has been illustrated in chapter 2 – a credible national-action focused approach requires consistent terms of reference for all countries. The following chapter analyses Luxembourg's self-declared specifics (Chapter 6.1); its handling of the Kyoto process (Chapter 6.2) and a relativization of the official standpoint, when it comes to climate policy (Chapter 6.3) .

### 6.1. Luxembourg's 'specifics'

According to the aforementioned reports, Luxembourg's scope of action in climate policies is very restricted by the country's limited size, the disproportionate weight of a single emission source for the entire 'climate account', its location at the heart of the main Western Europe transit routes, its strong economic and demographic growth, the predominance of the road transportation sector in its GHG emission account in general and of 'road fuel exports' in particular.

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<sup>57</sup> Ministère de l'Environnement, 2006.

### 6.1.1. The country's limited size

At 2,586 km<sup>2</sup>, the Grand Duchy of Luxembourg is the second smallest EU-member, after Malta at only 316 km<sup>2</sup>. The smallness of the country brings about a certain number of specificities. So for instance, a single emission source can have a disproportionate weighting within the country's overall 'climate account'. Examples are the move by the iron and steel company Arbed SA from blast to electric arc furnaces between 1994 and 1998 (see Chapter 6.1.3), the establishment of the combined-cycle gas turbine (CCGT) plant Twinerg in 2002<sup>58</sup> (see Chapter 6.1.3) and the road transportation sector's extraordinary share of the country's GHG emission account (see Chapter 6.1.4).

Furthermore, unlike Malta, Luxembourg is not an island. It is said to be located '*at the heart of the main Western Europe transit routes*<sup>59</sup>' (see Chapter 6.1.4.2). This leads to a range of "border effects"; its economic dynamism depends in large part on the policies of its bigger neighbours (France, Germany and Belgium). To adapt to this situation, according to Luxembourg's decision makers, the country has inevitably needed to adopt an open economy, and therefore depends substantially on international trade. To guarantee its citizens wealth, the country has adapted to its geographic situation. Luxembourg installed a very well designed fiscal system, which consists in putting itself in favourable tax competition with neighbouring countries. Compared to France, Germany and Belgium, it maintains particularly low tax levels on fuel, liquors, financial products and other niche products. Due to the smallness of the country, these fiscal specifics have huge financial advantages for Luxembourg, but only relatively little financial disadvantages for the big neighbours.

In the aforementioned reports, the geographic situation of the country and its adherent specifics - outlined here above – are given as the reason for Luxembourg's excessive GHG emissions.

### 6.1.2. A strong economic and demographic growth

Luxembourg's open economy is characterized by particularly strong demographic and economic growth. In 2009 Luxembourg's per capita income (\$PPP) amounted to 59.590\$<sup>60</sup>. This is obviously related to work places. To keep the tertiary sector - especially the banking sector – going, manpower is needed. The 2,5%<sup>61</sup> yearly growth in workplaces that the economy produces, provokes immigration and explains the strong commuter flows. The reduction target of 28% was adopted by Luxembourg – and by all the other European and Annex I-countries – in relation to the absolute emissions of the 1990 base year; without taking into account the future growth of their respective populations. But Luxembourg's population grew much faster than the neighbouring countries' populations: between 1999 and 2010 it rose from 427,000 to 502,000<sup>62</sup>, due

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<sup>58</sup> See [www.twinerg.lu](http://www.twinerg.lu).

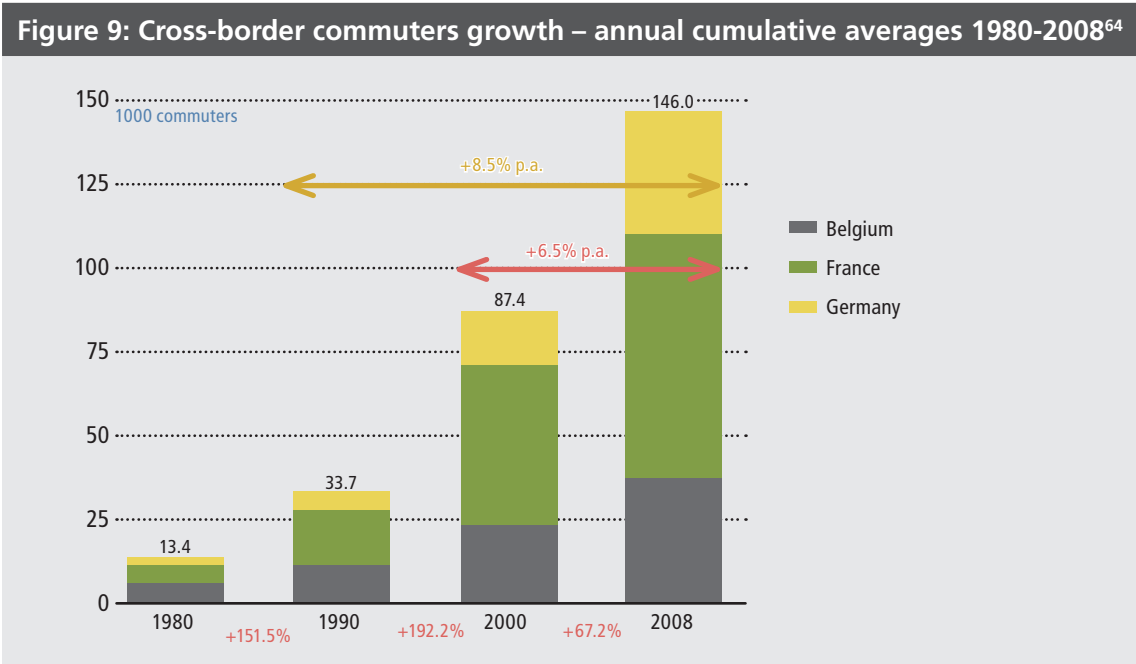
<sup>59</sup> Ministère du Développement durable et des Infrastructures, 2010a.

<sup>60</sup> This figure represents the Gross National Income (GNI) of Luxembourg in 2009. (World Bank, <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>).

<sup>61</sup> ASTM, Caritas, Greenpeace and Mouvement Ecologique, 2009, p. 64.

<sup>62</sup> Eurostat, <http://epp.eurostat.ec.europa.eu/tgm/table>.

mainly to immigration. (This is the same rate of population growth that developing countries are facing, mostly due to their high birth rates). The percentage of foreign nationals grew to ca. 45% in 2010. In addition it is estimated that the number of cross-border commuters – entering the country in the morning to work and leaving the country in the evening - reached more than a 150.000 in 2009. Today they account for 14 % of Luxembourg’s Consumption footprint<sup>63</sup>.



Source: STATEC, Indicateurs rapides, Série L: <http://www.statistiques.public.lu/stat/tableviewer/document.aspx?ReportID=352>

So, in fact, Luxembourg is a regional economic capital offering job opportunities for Belgian, German and French commuters, who increase the the country’s emissions. The rise in population and economic activity entails a correlating increase in built-up areas (housing, office buildings, infrastructure, tertiary sector services) and services, which as well lead to an increase in GHG emissions.

Taking economic growth, based on a high consumption of products, services and primary resources as a *conditio sine qua non*, Luxembourg’s government estimates domestic emissions potentials to be very restricted<sup>65</sup> and the resort to off-set mechanisms unavoidable in order to achieve its Kyoto and EU climate change obligations<sup>66</sup>. The language used in official documents presents the country as having no alternative to economic growth and resource consumption<sup>67</sup>.

<sup>63</sup> Centre de Recherche Public Henri Tudor, 2010.  
<sup>64</sup> Ministère du Développement durable et des Infrastructures, 2010b, p.19.  
<sup>65</sup> Ministère du Développement durable et des Infrastructures, 2010b, pp.144, 146.  
<sup>66</sup> Ministère de l’Environnement, 2006, p. 13.  
<sup>67</sup> Ministère de l’Environnement, 2006, p. 32.

### 6.1.3. The disproportionate weight of a single emission source

Geographical size is indeed a fact that gives a disproportionate weight to some important emission sources: a major example are industrial processes, representing the second largest sector in Luxembourg with regard to GHG emissions. With the process change in the steel industry – between 1994 and 1998 the iron and steel company Arbed SA moved from blast to electric arc furnaces<sup>68</sup> - total emissions from industry and electricity generation – i.e. largely the sectors covered by the EU-ETS – decreased to just 2.4 MtCO<sub>2</sub>e in 1998, or 26.5% of total GHG emissions. In 1990 it produced 8 MtCO<sub>2</sub>e, or about 61% of total GHG emissions.

Another often quoted example is the establishment of the Twinerg combined-cycle gas turbine (CCGT) plant in 2002<sup>69</sup>. The power plant has a capacity of 350 MW. While only a part of TWINERG power production covers national electricity consumption (steelworks, private households...), the biggest part is exported via Electrabel GDF-Suez.

Its operation raised Luxembourg's GHG emission account by 0.9 to 1 MtCO<sub>2</sub>e per year. In 2008 it accounted for 6%, in 2006 even for 8% of Luxembourg's total GHG emissions and about a third of Luxembourg's industry emissions<sup>70</sup>.

And, maybe the most controversial example is the extraordinary share of the road transportation sector in the country's GHG emission account today, especially the important share allocated to 'road fuel exports'. This issue is treated separately in the following chapter 6.1.4.

As these examples show, this specific characteristic of small economies can play – with regard to its GHG gas emission account - in a country's favour (Arbed SA example) or against it (Twinerg example). For sure, Luxembourg would not provide that many jobs to commuters if it were not of high economic interest to the country. It has to acknowledge that this quest for economic advantages mostly comes with increases in the country's emissions.

### 6.1.4. The road transportation sector's predominance in the national emissions account

In the baseline year 1990, the road transportation sector was responsible for only 1.76 MtCO<sub>2</sub>e, but subsequently, national road transport emissions increased tremendously in Luxembourg. In 2006 they were 144% higher than in 1990 - the highest increase in the European Union<sup>71</sup>. In 2008, some 6.65 MtCO<sub>2</sub>e were emitted by the road transportation sector, 53% of the total GHG emissions<sup>72</sup>, and out of these, 4.96 MtCO<sub>2</sub>e, or 74.5%, was the result of road fuel bought by non-residents. 'Road fuel exports' can be divided into transit traffic, commuter fuel consumption

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<sup>68</sup> Thöne, 2008, pp. 7, 8.

<sup>69</sup> See [www.twinerg.lu](http://www.twinerg.lu).

<sup>70</sup> Ministère du Développement durable et des Infrastructures, 2010a, p. 118.

<sup>71</sup> Ziesing, Eichhammer & Ewringmann, 2009, pp. 29,30.

<sup>72</sup> Ministère du Développement durable et des Infrastructures, 2010a, p. 104.



and 'fuel tourism'. 25% of 'fuel export' is due to commuters and 'fuel tourism', while the other 75% are due to transit traffic<sup>73</sup>. The percentages of fuel sales provide a very similar picture: in 2005, 22% of road transportation fuels were sold to residents, 15% to commuters, 7% to 'fuel tourists' and 56% to 'transit traffic'<sup>74</sup>. For the national fleet, the evolution shows a correlation with the growth in both the population and economic activity. It is also explained by an increase in the ratio of passenger cars to inhabitants (from 515 to 675 passenger cars per 1000 inhabitants between 1991 and 2007, i.e. the highest ratio in the EU)<sup>75</sup>. On the one hand, fuel sales certainly represent the deplored disaster for Luxembourg's GHG emissions account and international GHG emissions reduction efforts, but on the other hand, it should be pointed out that Luxembourg's fuel sales result in respectable financial advantages as well (see the following chapter 6.1.4.1).

#### **6.1.4.1. Luxembourg's revenues from fuel taxes**

Taxes on mineral oil represent a considerable part of Luxembourg's state budget. In 2005 for instance €850 million were raised through taxes on mineral oil, which accounted for 11% of national revenue<sup>76</sup>. In addition to this budget revenue derived directly from mineral oil taxes, the fuel market provides other indirect state budget revenues (the concession levy on highway gas stations, positive impacts on sales tax, tobacco tax revenue through tobacco taxes being lower than in neighbouring countries<sup>77</sup>. It is estimated, that all in all about 18% of Luxembourg's state budget, some €1.4 billion a year depends directly or indirectly on Luxembourg's cheap fuel prices. A major revenue deficiency in the state budget would have severe consequences for the entire public social system. Considering that in 2008, some 6.65 MtCO<sub>2</sub>e (53% of Luxembourg's total GHG emissions) were produced by the road transportation sector, this considerably restricts the scope of action in terms of the Kyoto commitments.

According to Luxembourg's official standpoint, a significant increase in Luxembourg's fuel taxes would simply divert tax income to the neighbouring countries and have a significant impact on the Luxembourg state budget, however, an emission reduction with positive effects for the climate would not be a logical side effect<sup>78</sup>.

Certainly, not all the 4.9 MtCO<sub>2</sub>e attributed to Luxembourg's 'road fuel exports' (2007 numbers) would be eliminated if Luxembourg's fuel prices were adjusted to its neighbouring countries fuel prices, but those who now come to Luxembourg specifically for fuel (forced or voluntary 'fuel tourism') and those who make detours (mainly transit trucks; see Chapter 6.1.4.2) through Luxembourg specifically to refuel here, would logically emit less GHG, if Luxembourg's fuel prices were adjusted to its neighbour's levels<sup>79</sup>. Furthermore, the average fuel consumer would be induced to drive less and buy more energy efficient cars<sup>80</sup>.

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<sup>73</sup> Thöne, 2008, p. 41.

<sup>74</sup> Centre de Recherche Publique Henri Tudor, 2010, p. 20.

<sup>75</sup> Ministère du Développement durable et des Infrastructures, 2010b, p. 43.

<sup>76</sup> Thöne, 2008, p. 21.

<sup>77</sup> Thöne, 2008, p. 7.

<sup>78</sup> Ministère de l'Environnement, 2006, p. 26.

<sup>79</sup> Thöne, 2008, pp. 7,8.

<sup>80</sup> ASTM, Caritas, Greenpeace & Mouvement Ecologique, 2009, p. 59.

#### 6.1.4.2. Luxembourg's location « at the heart of the main Western Europe transit routes »

In its National Inventory Report 1990-2008 Luxembourg's Ministry for sustainable development and infrastructure attributes its 'location at the heart of the main Western Europe transit routes'<sup>81</sup> as responsible for the excessive transit traffic through Luxembourg. It says, Luxembourg is a logical transit route for European freight transportation. Also in its 5<sup>th</sup> National Communication the government of Luxembourg explains the extremely high consumption and export of road fuel as a result of some given circumstances such as the country's 'location at the **heart** of the main Western Europe **transit routes** for both **goods and passengers** and the **increase of transport flows** ...'<sup>82</sup> .

This is a rather rudimentary geographic approach. Due to its situation in the southern centre of the rural Eifel-Ardenne region, Luxembourg is more or less peripheral to the main German, Belgian and French areas of economic concentration. And there are other regions 'in the heart of ... Western Europe' which are much closer to these areas of economic activity, but without such an incredible increase in diesel consumption as it happened in Luxembourg, such as the Dutch province of Limbourg or the German speaking part of Belgium.

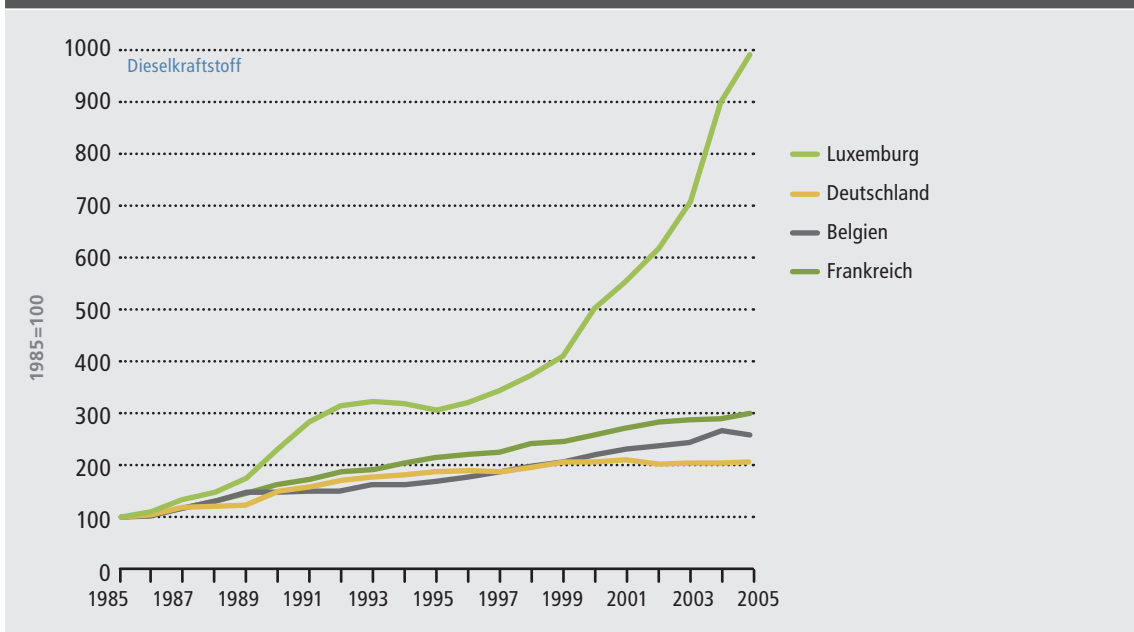
There are indeed three main transnational transit routes, touching Luxembourg tangentially : Antwerp/Brussels to Nancy/Metz, Netherlands via Maastricht/Liège to Nancy/Metz and south-eastern France and the German Rhein-Main region to Liège and Antwerp, but this is not extraordinary or denser compared to other western European regions. It neither explains an increase in transit transport which is higher than the western European average increase in transnational transports nor the exorbitant increase in diesel consumption in Luxembourg alone: here, the demand for diesel increased ten-fold from 1985 to 2005, but two to three-fold in the neighbouring countries Belgium, Germany and France. In the same period, the consumption of petrol increased in Luxembourg by 65%, but even decreased in the other three countries.

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<sup>81</sup> Ministère du Développement durable et des Infrastructures, 2010a, p. 111.

<sup>82</sup> Ministère du Développement durable et des Infrastructures, 2010b, p. 62.

**Figure 10: Diesel sales in Luxembourg and surrounding countries<sup>83</sup>**



A closer look at the geographical distribution of the filling stations provides further evidence (see Box 2).

The reason for this distribution is very simple: fuel is significantly cheaper in Luxembourg. And this is due to a very active Luxembourg tax policy which keeps Luxembourg fuel sale prices always about 20 cent below the sale price in neighbouring countries (incl. The Netherlands):

**Table 7: Fuel prices on 24.6.10 in Euros<sup>84</sup>**

	Luxembourg	Belgium	Germany	France	Netherlands
1 l Diesel	1.01	1.24	1.24	1.24	1.24
1 l petrol super	1.18	1.48	1.43	1.43	1.57

<sup>83</sup> Thöne, 2008, p. 16.

<sup>84</sup> See [www1.adac.de/Auto\\_Motorrad/Tanken](http://www1.adac.de/Auto_Motorrad/Tanken).

## Box 2: Where are tanks filled up?

Three quarters of the 268 filling stations in Luxembourg (in 2008) are situated extremely close to the border. And, if the 'location at the **heart** of the main Western Europe **transit routes** for both **goods and passengers**' were the main reason for this increase, why did this regional increase stop at Luxembourg's border? At the same time, while diesel sales in Luxembourg increased by a factor of ten, filling stations in Belgium, Germany and France up to  $\pm 15$  km from the border nearly all disappeared. For instance, on 1st January 2008, the conjoined Luxembourgish villages of Schengen / Remerschen, situated on the border with Germany, had 1,602 inhabitants and 101 petrol pumps which gives a ratio of one pump per 16 inhabitants. On the German side, the next biggest city is Merzig, some 25 km from the border line, with 30,831 inhabitants, but only 26 pumps ; this gives a ratio of 1 pump per 1,186 inhabitants. German inhabitants on the other side of the border would have to drive 20 km to Mettlach to find the next filling station in Germany. So, inhabitants of the Belgian, German and French border region within  $\pm 10$  km of the border are practically forced to cross over into Luxembourg in order to fill up their tanks (Daniel Ulrich : Tanktourismus, in : <http://geo.uni.lu/joomla/index.>, 2009).

ARAL, one of the biggest fuel sellers in Europe, has its biggest filling station in Europe not in Germany (where it is market-leader) in the most densely populated industrial Rhein/Ruhr-Region where a lot of highways and European transit routes cross, but in Luxembourg: The Aire de Berchem, situated on highway A3 / E 25 on the way from Luxembourg-City to Metz in France. Here, on a normal Thursday afternoon, 4th June 2009, within an hour, 652 cars and 62 trucks have filled up. Only 8% of these trucks came from Luxembourg and 3% from France, but 40% came from Germany.

When a truck driver buys a 1000 litres, his company can save about €250 (minus the additional man-power costs and other running costs a detour involves), and he can go 2,500 km with one filling<sup>85</sup> ; this difference in price is an incentive to make detours. A recent report of the European Federation for Transport and Environment puts Luxembourg in the European context: « Luxembourg is the richest EU Member State, is small, strategically located, and has one of the lowest fuel tax rates, leading to massive fuel tourism as the main text of this report shows. Luxembourg's fuel taxes peaked in 1995 at 43 cents and have since decreased by 23% to 33 cents, largely as a result of strong dieselisation caused by the strong increase in foreign lorries visiting the country to fill up. »<sup>86</sup> The authors consider Luxembourg a 'major fuel tax haven', selling 5 to 8 times more fuel per head of population than its neighbours such that annual earnings from petrol and diesel sales to foreign vehicles since 2005 are about €1,400 per Luxembourg inhabitant.

So, diesel from Luxembourg is spread over all Europe – and money from many European forwarding companies is streaming to Luxembourg's treasury. This tax dumping policy is causing detours by truck companies and inhabitants living close to the border, provoking additional greenhouse gas emissions.

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<sup>85</sup> Beyer, 2009, p. 139.

<sup>86</sup> European Federation for Transport and Environment, 2011.

## 6.2. 'Disadvantaged' by the Kyoto Protocol

In all the documents released by Luxembourg's national authorities, Luxembourg has posited itself as a victim of inappropriate mechanisms stemming from the 'Kyoto regime'. According to this position, the 'untypical' situation hinders Luxembourg from complying with its climate obligations because the mechanisms in question are neither fair nor appropriate.<sup>87</sup> The main argument is that, in 2009, 38% of the GHG emissions accounted to Luxembourg (4.57 MtCO<sub>2</sub>e)<sup>88</sup> were due to 'road fuel exports' – fossil fuels that were bought but not consumed in Luxembourg.

But if the Kyoto Protocol seemed so inappropriate, why sign it in the first place, and even accept one of the highest emissions reduction obligations? At the time the Kyoto Protocol obligations were adopted into Luxembourgish law, the latest confirmed figures available dated from 1998. While in 1990 Luxembourg's total GHG emissions were 13.12 MtCO<sub>2</sub>e, in 1998, at its lowest point to date, Luxembourg's total GHG emissions had dropped to 8.97 MtCO<sub>2</sub>e<sup>89</sup>. This reduction in GHG emissions was almost solely due to the iron and steel company Arbed SA switching from blast furnaces to electric arc furnaces between 1994 and 1998<sup>90</sup>. This remarkable GHG emission reduction by 32%<sup>91</sup> between 1990 and 1998 could explain why Luxembourg's government at the time considered complying with a 28% reduction target believing it to be achievable, as it had already been attained.

Further, Luxembourg's Ministry for sustainable development and infrastructure argues in its official reports, that a 'polluter pays' or 'consumer pays' approach would be much more appropriate and favourable to Luxembourg. They go as far as to call that aspect of the Kyoto agreement an infringement of the 'polluter pays' principle founded in the UNFCCC<sup>92</sup>. They suggest a 'consumer pays' approach or 'polluter pays' approach, in which the emissions embodied in a product are accounted to the country that *consumes*, rather than the country that *produces*.

This is not an unreasonable position; it is shared by many countries, for instance China. Indeed, there are at this point lots of climate analysts that agree that, particularly because this is a highly globalized world, a consumer pays approach would allocate responsibility far more fairly than a producer pays approach.<sup>93</sup> In Luxembourg's case, it is not clear whether fairness is the principal motivation for the preference for consumer-based accounting, or whether it is rather the simple hope of softening Luxembourg's obligations. In practice, however, this may not be how things turn out. Countries that export emissions often turn out to import them as well, and this appears to be the case with Luxembourg.

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<sup>87</sup> Ministère du Développement durable et des Infrastructures, 2010b.

<sup>88</sup> Ewringmann, 2011.

<sup>89</sup> Ministère du Développement durable et des Infrastructures, 2010b, pp. 86,87.

<sup>90</sup> Thöne, 2008, pp. 7,8.

<sup>91</sup> Ministère du Développement durable et des Infrastructures, 2010b, p. 67.

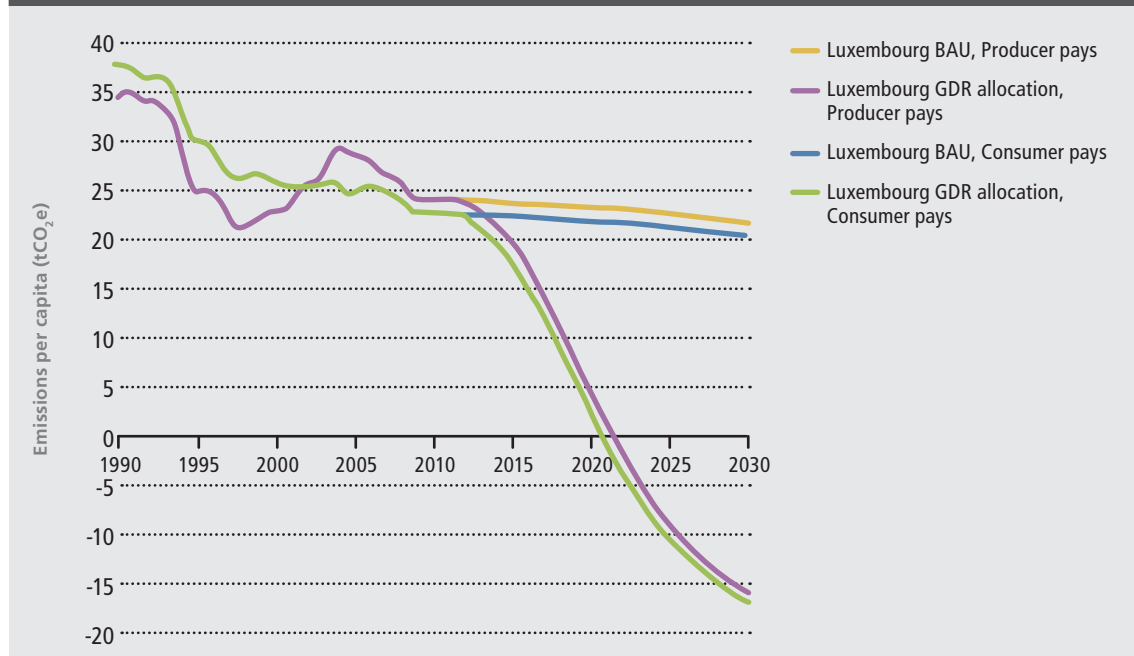
<sup>92</sup> Ministère de l'Environnement, 2006, pp. 20, 32.

<sup>93</sup> Hertwich & Peters, 2009.

### 6.2.5. Classic producer vs. required consumer accounting within the GDRs

Luxembourg's Ministry for sustainable development and infrastructure suggests swapping fuel exports with electricity imports. In 2008 Luxembourg's net electric power import from neighbouring countries consisted of 4346.34 GWh, which corresponds to a full 66% of its net total inland electricity consumption.<sup>94</sup> That electricity corresponded to 4.4 MtCO<sub>2</sub>e<sup>95</sup>, which were charged to the countries that generated them. Under consumer pays rules, those tons would be on Luxembourg's accounts.

**Figure 11: Comparison of Luxembourg's BAU and GDR's-based allocation under normal (producer based, orange and purple) and alternative (consumer based, blue and green) calculations of emissions.**



How much difference does a switch from producer to consumer accounting make to Luxembourg within the GDR model, as it is suggested within the official reports (trading fuel export for electricity imports)? Under GDRs, where national obligations are functions of responsibility and capacity, it makes very little difference indeed. This is very clear in figure 11 and the following table 8: Note that the shift from producer to consumer accounting make very little difference to Luxembourg's RCI (the overall effect is to increase Luxembourg's obligations by about one half of one percent).

<sup>94</sup> Ministère du développement durable et des infrastructures, 2010b, p. 37

<sup>95</sup> Based on calculations extracted from figure II.12-1 of the Second, Third, Forth and Fifth National Communication of Luxembourg (Ministère du développement durable et des infrastructures, 2010b, p. 62). These 4.4 MtCO<sub>2</sub>e are the difference between Luxembourg's GHG emissions as they would be under the Ministry's definition of a polluter pays approach and Luxembourg's GHG emissions 2008 under the Kyoto rule minus Luxembourg's road fuel exports 2008.

**Table 8: Luxembourg's Mitigation Obligations - Consumer vs. Producer accounting<sup>96</sup>**

	Producer Accounting	Consumer Accounting
BAU emissions as percentage of 1990 emissions – projected to 2020	106%	91%
Share of population above development threshold – projected to 2020	100%	100%
Share of global population – projected to 2020	0.007%	0.007%
Share of global RCI in 2020	0.0637%	0.0641%
2020 Mitigation obligation as a reduction target from 1990	77%	83%
2020 Mitigation obligation as MtCO <sub>2</sub> e below BAU	10.4	10.4
2020 Mitigation obligation per capita as tCO <sub>2</sub> e below BAU	29.1	34.2
2020 Mitigation obligation per capita as reduction from 1990	85%	90%

### 6.2.6. The forgotten GHG emissions

Whether a producer or a consumer approach is in Luxembourg's favour or not depends very much on the detailed rules of the EU burden sharing schemes, which sectors are associated with imports and which with exports, and whether they are traded or untraded, and so on. The bottom line in all this is that consumer accounting makes sense, but only when it is done consistently, and across comprehensive networks of trade-related countries.

What can be said for sure is that electricity imports is not the only GHG emitting source Luxembourg is not getting billed for. So for instance, the kerosene for air traffic - which accounts for ca. 5% of Luxembourg's overall energy consumption and shows the strongest growth dynamic of all energy consumption sources - is not allocated to national GHG emission accounts under the IPCC Guidelines. Additionally, it is estimated that Luxembourg exhibits one of the highest amount of flight miles per capita per year.

Another GHG emission source which is not covered by the Kyoto mechanisms is so-called 'grey energy'. In this respect Luxembourg would not benefit at all from a 'consumer' approach. We consider 'grey energy' the polluting energy consumption necessary for the production of consumption goods. In estimates, Luxembourg's 'grey energy' consumption even outweighs the emissions due to 'road fuel export'. In the ecological footprint study the so-called 'grey energy' has been taken into account. It concludes, that if everyone on Earth lived like Luxembourg, 5.7 planets would be needed. Even if the 'road fuel export' Consumption Footprint is not considered, 3.5 planets would still be needed so that everybody could live like Luxembourg's inhabitants<sup>97</sup>. Luxembourg has an especially high account of GHG emissions.

<sup>96</sup> Ministère du Développement durable et des Infrastructures, 2010b. See also the note in Appendix 2.

<sup>97</sup> Centre de Recherche Public Henri Tudor, 2010.

In a global consumption-based accounting model, S. Davis and K. Caldeira compared the carbon intensity of about 30 import and export sectors of countries and country groups, thus arriving at national balances of CO<sub>2</sub> emissions embodied in imports and exports, and at about 10 tons of CO<sub>2</sub>, Luxembourg is the global leader of net imports of emissions per capita: in the production-based Kyoto system, in 2004, Luxembourg totals 25 tons per capita, in their consumption-based model it is 34.7 tons.<sup>98</sup>

### 6.3. Luxembourg, an intentionally privileged model

Over recent decades Luxembourg's leading politicians chose to guarantee its population's wealth through a rapidly growing tertiary sector, especially the banking sector. Also, Luxembourg's state budget dependency on fuel has emerged during the past 20 years because it was designed that way. Luxembourg is deliberately involved in tax competition with its neighbouring countries<sup>99</sup>, as it brings the country considerable financial advantage. In official reports, an open economy devoted to an exponential growth model and a high consumption of goods, services and primary resources is pictured as the only possible path to follow.

In the eighties and nineties, at the time these cornerstones for Luxembourg's extraordinary economic wealth had been set, the negative impact of fuel and general consumption necessary for rapid economic growth on the climate was already known. In that sense the prioritization of economic wealth over ecological wealth can easily be interpreted as a deliberate choice or strategy. Thus, during the past decades Luxembourg's leading politicians have made deliberate choices that have had direct consequences for Luxembourg's prosperity, but also for the climate. A rapidly growing economy might be of a considerable advantage in the short term, but in the long run it can be extremely risky to prioritize economic wealth over ecological sustainability.

The adherence to a growth oriented open economy model procured Luxembourg an impressive per capita income (\$PPP) of \$59,590<sup>100</sup> in 2009. Luxembourg has benefited from an economic growth and the associated wealth, which is considered by many as a privilege. Unfortunately this privilege is at the expense of the climate. In terms of international climate politics it is questionable whether the wish to preserve its economic privileges will be accepted as a legitimate reason for high GHG emissions and the absence of serious emission reductions as promised within the Kyoto process. How might a least developed country such as Mali for instance, with a per capita income (\$PPP) of \$1.190<sup>101</sup> in 2009, accept that Luxembourg can not achieve its promised emissions reductions because it absolutely needs to maintain its privileged per capita income (\$PPP) of \$59,590? Or, how might a vulnerable country like Bangladesh for instance consider Luxembourg a serious partner in fighting dangerous climate change?

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<sup>98</sup> Davis & Caldeira, 2010.

<sup>99</sup> Thöne, 2008, p. 13.

<sup>100</sup> This figure represents the Gross National Income (GNI) of Luxembourg in 2009. (World Bank, <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>.)

<sup>101</sup> This figure represents the Gross National Income (GNI) of Mali in 2009. (World Bank, <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>.) <http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/weorept>.



Even though Luxembourg's authorities in the official reports deplore the unfairness of the UN-FCCC rules, it can be wondered whether the financial advantages Luxembourg obtains from its carbon-loaded economic growth and fuel exports do not considerably mitigate the inconvenience imposed by the international climate community. All in all it accounts for approximately €1.4 billion a year of Luxembourg's state budget, almost 20%<sup>102</sup>. This explains very well why the Luxembourgish authorities are that reluctant to phase out 'road fuel exports'. The Luxembourgish government has been caught in this trap for a number of years now, and what makes it particularly unpleasant is that in the last 11 years CO<sub>2</sub> emissions due to road transport have more than doubled, although real tax revenue from mineral oil sales has remained largely unchanged<sup>103</sup>. Revenues due to the lower specific rates of taxation considerably exceed the costs for CO<sub>2</sub> emissions, such as anchored in the Kyoto Protocol<sup>104</sup>. While fuel exports directly or indirectly account for an estimated €14 billion a year, about €100 million are invested annually in flexible mechanisms.

This could give the impression that Luxembourg's politicians are not disposed to acknowledging the urgency of climate question. The country's economic interests seem to clearly trump its international climate engagements. International climate protection seems only tolerated as long as it is not opposed to economic growth.

It is questionable though, whether in the medium terms ecological constraints are the only constraints to a public model based on endless economic growth. So far Luxembourg benefited from the fact of being surrounded by bigger countries, for which the public revenues through higher taxation on fuel outweigh by far the losses due to lower specific rates of taxation on fuel in Luxembourg. But this is not necessarily maintainable for much longer. The political decisions of the neighbouring countries can negatively surprise the Luxembourg authorities, for instance, the Belgium decision to introduce specific lower tax rates for trucks<sup>105</sup>. There also exists a certain pressure from the EU and bigger member states vis-à-vis Luxembourg's low taxation on fuel. Certain trends at EU level could endanger Luxembourg's fuel income (increase of the minimum rate, price harmonisation of diesel for trucks). Since 2006, slight regressions in selling of mineral oil products have been observed. The estimated repercussions of this regression trend is unclear, 'behind the scenes' the pullback from 'road fuel exports' is considered by many as unavoidable, even though it is publicly presented differently. The growing GHG emissions due to 'road fuel exports' and the related dangers for Luxembourg's public social system, seen by the government as out of their control, is seen by others as the fruits of unsustainable financial politics, exposing the weaknesses of the 'niche politics' deliberately conducted since the nineties (road fuel exports, e-Commerce, low tobacco and alcohol taxes)<sup>106</sup>.

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<sup>102</sup> Ministère de l'Environnement, 2006, p. 26.

<sup>103</sup> Thöne, 2008, p. 25.

<sup>104</sup> Ziesing, Eichhammer & Ewringmann, 2009, p. 84.

<sup>105</sup> Thöne, 2008, p. 50.

<sup>106</sup> ASTM, Caritas, Greenpeace & Mouvement Ecologique, 2009, p. 71.

Luxembourg's environment and development NGOs consider Luxembourg's official climate policies as an infringement of its international climate commitments. It is in breach of one of the UNFCCC's major principles, which states that « the developed country Parties should take the lead in combating climate change ». Luxembourg is being a particularly bad contravener of this principle on the international stage. It is not only not able to diminish its GHG emissions as stipulated, it even envisages further increasing its emissions! Luxembourg having by far one of the highest GHG emissions account per capita (22.8 tCO<sub>2</sub>e in 2007) and by far one of the highest per capita incomes in \$PPP (\$59,590) worldwide, is most definitely meant to take the lead according to the UN Climate Convention. Another core principle of the UNFCCC suggests a 'common, but differentiated responsibility approach'. Again, Luxembourg's historical obligation and economic capacity imposes an important climate responsibility on the country, more elevated than for most other countries. The most evident infringement of the Kyoto Protocol is the non-compliance with Protocol article 6.1.(d) mentioned above, which states that 'The acquisition of emission reduction units shall be supplemental to domestic actions [...]', as illustrated above.

Sooner or later someone will have to take responsibility for the climate; and if it is not the visitors refueling who pay the price for the fuel, then it will probably be Luxembourg's citizens or enterprises<sup>107</sup>. To avoid this, civil society groups suggest national tax reform; a project that has already been discussed at governmental level, but has been shelved in the meantime and not been taken up again so far. Luxembourg has particularly low income taxes and taxes could be diverted from the work force to resource and energy consumption.

ASTM and Caritas Luxembourg, argue that Luxembourg neither is caught in a geographical fatality, nor is it a victim of climate policy. Its actual situation is a result of deliberate policy decisions – and therefore it can be changed. Nobody has the right to preserve his privileges at the expense of others. The Greenhouse Development Rights Framework delivers consistent terms of reference, which can be valid for everybody.

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<sup>107</sup> Thöne, 2008, p. 9.

# 7. Conclusion and recommendations

## 7.1. Wrap-up

This report, for its part, has argued that an emergency mobilization is necessary to prevent a climate catastrophe. It has moreover urged that that mobilization be executed in an equitable way. Neither of these moves is novel, but this report has added a rigorous, principle-based, and data-supported way of quantifying their meaning. In doing so, it leads to a very clear conclusion. Even if the costs of a rapid climate transition are assumed to be quite high, and even if they are deemed to be the sole obligation of the minority of people living above a modest threshold of development (less than one third of the global population today), they would still be quite bearable. At a few dollars per day, the rich and the relatively well-off can easily afford to shield the poor from the costs of combating climate change. They can, in other words, afford to honour a meaningful right to development.

## 7.2. Recommendations

In this spirit, we recommend that Luxembourg:

5. commits itself to evidence-based approaches, and to accepting its fair share of the stringent emission reductions that are required under such approaches; that it recognizes that, under a straightforward codification of the UN Framework Convention's principles of 'common but differentiated responsibilities,' means that Luxembourg should bear about 0.07 % of the global mitigation and adaptation burdens;
6. insists that transparent metrics of capacity and responsibility are the best foundations for a new climate agreement; that it sets out to bridge rather than exploit the international divide; that it recognizes that accelerated de-carbonization and social justice have priority over future economic growth; that it works to ensure the next global climate regime is one that protects and promotes true sustainable development ;
7. embraces the conclusions of such a 'fair shares' analysis, even though it implies a mitigation obligation that will soon exceed its current emissions – for example, it would give Luxembourg a 2020 mitigation obligation of 10.4 MtCO<sub>2</sub> equivalent compared to BAU, which comes to an emissions allocation of 77% below 1990 emissions levels; that obligations on this scale are in fact just and necessary;
8. approaches the climate negotiations with a long-term perspective; that it recognizes, in particular, that the North must lead by example; that it strives to understand why the South is loath to support any global differentiation proposal until the North has demonstrated its willingness to meet its own proper commitments and launch the global climate transition;

9. sees that the South, with its lesser responsibility and its vastly greater need, cannot reasonably be asked to put aside its wariness and pioneer the greenhouse transition.
10. realizes, and publicly affirms, that any climate-related financial obligations are inherently additional to existing ODA (Official Development Assistance) obligations under the EU Fast Start Finance program (until 2012), and that the same criteria should apply for the post-2012 period;
11. changes profoundly its attitude of hiding within the European bubble and starts to face up to its position on the globe as one of the richest industrialized countries. The internal EU redistribution of members' reduction targets does not replace the other obligations of the Climate Convention which Luxembourg signed;
12. stops replacing its domestic reductions with purchased credits, but treats as 'a question of national credibility' domestic reduction over credit purchases. Luxembourg should spend the money reserved for buying credits on investments in domestic reductions and on its Fast Start and Long Term financing obligations as agreed in Cancun;
13. thinks about viable ways of combining the need for economic growth within a climate constrained world and, in general terms, rethinks its never ending growth philosophy ;
14. starts structural changes in different areas, such as tax reform with higher taxes on fossil fuels and a phasing out of exporting fuels ; and
15. continues the dialogue with civil society as started by the 'Climate Partnership' in order to narrow the gap between the bottom-up and the top-down approaches in climate politics.

This report is basically about the principles of capacity and responsibility. But there are other principles, too, in play in the climate negotiations. One of them, which we hope to see more of in the months ahead, is the principle of leadership. It has been lacking and it is easy to understand why. The challenges of the climate emergency, after all, are great ones.

But it is time, now, to rise to such challenges. For change, and for leadership, and for the ability to see that the frenetic pace of current events will not soon abate. And for the realization that, as Nelson Mandela once so keenly noted, 'It always seems impossible until it's done.'

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## 8. Appendix 1: The 2°C pathway

A warming of 2°C over pre-industrial temperature levels has been widely endorsed as the maximum that can be tolerated or even managed. This is true, and remains important, even though the drive to refocus on a temperature target of 1.5°C is strongly justified by the science. Thus, as a matter of realism, this report will proceed by way of a 2°C target which is now almost universally recognized (at least by the reality minded) as one that must not be crossed. Keep in mind that the emerging science has made it clear that even 2°C is by no means safe, a realization that is clearly articulated in the IPCC's Fourth Assessment Report and reinforced by a steady stream of subsequent studies.

This point must be stressed, for the negotiations are now in clear danger of settling into a low-ambition, almost business-as-usual drone. And this even though the science tells us, quite unambiguously, that just the opposite is necessary. There is, for example, a significant if not readily quantifiable risk that a warming of even less than 2°C could trigger the irreversible melting of large portions of the Greenland and West Antarctic Ice Sheets. And, with a manifest warming of only 0.8°C, we are already seeing effects – such as the precipitous receding of the Arctic sea ice – dangerous in themselves and also terrifying steps towards the strengthening of positive feedbacks and accelerated warming. Moreover, and significantly, the fact that these feedbacks are already in motion is strong evidence that the overall sensitivity of the climate system is high, and that stabilization concentrations that even recently were considered to be manageably safe – 450 ppmCO<sub>2</sub>-equivalent for example – are in fact quite dangerous.

Consequently, some are now calling for keeping warming well below 2°C, and two key blocs of countries in the international climate negotiations – the Alliance of Small Island States and the Least Developed Countries, which together represent nearly 800 million people in 80 countries – have explicitly rejected a 2°C goal. They have demanded that nations limit warming to 'as far below 1.5°C as possible.' And, now, Rajendra Pachuri, the head of the IPCC, has gone so far as to say that "as chairman of the Intergovernmental Panel on Climate Change (IPCC) I cannot take a position because we do not make recommendation... But as a human being I am fully supportive of that goal. What is happening, and what is likely to happen, convinces me that the world must be really ambitious and very determined at moving toward a 350 [ppm CO<sub>2</sub>] target."

Yet even as the science increasingly underscores how extremely foolhardy it would be to lock-in a warming of 2°C, many people – particularly since Copenhagen – have lost all confidence that we will be able to prevent such a warming, or even a far greater one. This loss of confidence, moreover, is based not on any doubt about our collective scientific and technological abilities, but rather on the sense, now quite widespread, that our societies are not up to the political challenges of climate stabilization.

Our very different conclusion is that the 2°C line can indeed be held, but that doing so demands courageous initiatives and a robust policy architecture, both of which go beyond politics as usual. That, in particular, they demand a sense of shared global purpose and solidarity that can only be rooted in a commitment to poverty alleviation and sustainable development that is as emphatic

and non-negotiable as the climate crisis itself. Moreover, and critically, we argue that an honest recognition of just how immensely high the stakes really are, and a straightforward analysis of the global effort-sharing system that will be needed to break the international impasse, are pre-conditions to the bold thinking and grand initiatives that are now needed.

Accordingly, we begin our analysis by following the science, with the goal of clearly identifying an adequately precautionary climate objective. We do not analyze here the implications of a temperature target lower than 2°C, though such an analysis is certainly illuminating. But we do define a global emissions objective – a ‘2°C emergency pathway’ – that preserves a good chance of keeping warming below 2°C; this in contrast to the many analyses that are based on targets and trajectories that correspond to at best a roughly 50% chance of success. We then set out to straightforwardly articulate the key elements of a climate architecture that can make that pathway politically viable.

## 9. Appendix 2: The Responsibility and Capacity Indicator (RCI)

A national RCI is a function of four nationally-specific data elements, plus a global development threshold.<sup>108</sup> The four national elements are:

1. Per-capita income,
2. Cumulative per-capita CO<sub>2</sub> emissions,
3. Gini coefficients (a measure of intranational inequality),
4. Population.

### 9.1. Data and data sources

The RCI database includes all 192 countries that are members of the UNFCCC, plus Taiwan, Iraq, and the West Bank and Gaza. Data for China and Hong Kong, which are typically reported separately in most income and emissions databases, are combined.

#### 9.1.1. Income

Most historical income data comes from the World Bank's World Development Indicators Online, which contains data for national income for almost all of the 195 countries in the GDRs database. For a few others the CIA World Factbook is used.

Income projections from 2010-2015 are based on projected growth rates from the International Monetary Fund, applied to reported 2009 income. Income projections from 2016 to 2030 are based on the International Energy Agency's World Energy Outlook 2009. The projected growth rate for Europe, which is applied to Luxembourg, is about 1% annually in 2010 and increases gradually to about 2.2% by 2030.

Projected income is then dynamically adjusted to take account of the expected change in PPP conversion factors. A statistical relationship between MER (market exchange rate) and PPP-based income is used to adjust the PPP conversion rate as national incomes converge or diverge from the projected per capita income of the US economy, which is the reference case for PPP calculations.

NOTE: In previous published versions, all income figures reported were in PPP adjusted terms. In this report, income is reported in market exchange rate terms; the development threshold, however, is calculated as a PPP-adjusted figure (\$7500 annual per capita income in PPP terms).

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<sup>108</sup> This appendix does not explain the reasoning behind the RCI, nor why these elements are appropriate to its calculation. For a detailed discussion of these matters, see the latest edition of the Greenhouse Development Rights book, downloadable at [www.greenhousedevelopmentrights.org](http://www.greenhousedevelopmentrights.org).

### **9.1.2. CO<sub>2</sub> emissions**

Historical estimates through 2008 of CO<sub>2</sub> emissions from fossil fuel use and cement manufacturing are taken from the data set of the United States Energy Information Agency, the International Energy Agency, and the Carbon Dioxide Information and Analysis Center. Emissions for 2009 are based on data from the Netherlands Environment Ministry (PBL). Baseline emissions are projected after 2012 based on projected growth rates from the International Energy Agency's World Energy Outlook 2009, applied to calculated 2009 emissions. Per-capita emissions are calculated from national emissions and historical/projected population.

Luxembourg's CO<sub>2</sub> and non-CO<sub>2</sub> GHG emissions were modified from the defaults by using the projections for 2010-2020 from their Second, Third, Fourth and Fifth National Communication, specifically the 'WEM' ('With Existing Measures') case.

The GDRs framework calculates responsibility in terms of cumulative emissions. But note that it also supports projections of responsibility into the future, for which emissions data is not available. Thus, in projections if not historical cases, responsibility diverges from emissions. Because wealthy countries are assumed to be supporting emissions reductions internationally, it is not emissions but the annual allocation of emissions rights which accumulates as 'responsibility'. That is to say, when a country's emissions allocation declines to zero and below, its responsibility ceases to increase and begins to decline.

### **9.1.3. Gini Coefficients**

Gini coefficients for the majority of countries in the GDRs database are taken from the World Income Inequality Database. For countries which have reliable national or supranational sources (e.g., US Census Bureau, EU Europa database) newer Ginis are used where available. For some countries other sources are used, and for those for which no published figures are available, Gini coefficients are estimated on the basis of comparable countries.

For Luxembourg, the figure used in the GDRs database is 28, from a survey reported in the WIID database. Gini coefficients are assumed to remain the same going forward – not because they are expected to remain the same, but because there is no reliable statistical pattern to the change in Gini coefficients over time. (There is a strong current correlation between per capita income and inequality as measured by Gini coefficients, with rich countries having on average significantly lower inequality than poor countries, but recently inequality has been increasing in countries across the income spectrum from the US to China.)

### **9.1.4. Population**

Current, historical and projected population for most countries are taken from the United Nations Population Division's medium variant. For Luxembourg the data for 1990-present is taken from the Eurostat database, with growth rates for the years 2010-2015 taken from the IMF (closer to historical trend than the UN Medium Variant) and after that from the UN.



## 9.2. Calculating the RCI from the GDRs dataset

Because there are some moderately complex calculations involved in deriving the RCI, the actual work is done by a computer program – the ‘GDRs Calculator’ – that was written and is maintained by Eric Kemp-Benedict of the Stockholm Environment Institute in Boston, Massachusetts. The calculator is online at <http://www.ecoequity.org/GDRs/Calculator/>.

Central to the calculation is the commonly used assumption that national income distributions can be modeled as lognormal distributions. The lognormal distribution has been shown to provide a reasonable approximation of measured income distributions. With this assumption, any national income distribution can be modeled with just a Gini Coefficient and the per-capita income.

Using this assumption, the capacity and responsibility for each country for each year can be calculated from the underlying dataset, and then combined into the RCI. Capacity for a given year is defined as the sum of the income of all individuals in the country, excluding the total income of everyone under the (\$7500) development threshold, and, for people making more than \$7500 annually, counting only income above that threshold. Responsibility is calculated in a similar manner, assuming that emissions are linearly proportional to income (that is, assuming that all individuals have the same ratio of emissions to income); that is, all emissions are excluded for those whose incomes are under the development threshold, and emissions equivalent to \$7500 of consumption at the national average carbon intensity are excluded for those with income over the threshold. Unlike the calculation of capacity, however, responsibility is calculated on a cumulative basis, starting from 1990, so that responsibility in (say) 2015 is the sum of responsibility calculated in this way for each year from 1990-2015. Capacity and responsibility are then normalized as a percentage of the global total, and combined into a single ‘Responsibility and Capacity Indicator’ by taking the average. (Note that one could also choose to weight one more heavily than the other).

It should also be noted that, because the RCI is based on the projected allocation, and the allocation is a function not just of the RCI but also of the assumed national BAU emissions baselines and the global target trajectory, the RCI itself is sensitive to the emissions baselines and targets.

## 9.3. Special considerations for this report

One adjustment has been made to the standard GDRs calculations for this report. The national baselines and allocations have been estimated in terms of all greenhouse gases (GHGs), to conform with the terms of the national and especially Annex 1 policy discourse; whereas the standard GDRs approach, as reflected, for example, in the Greenhouse Development Rights book (Baer et al, 2008), uses only CO<sub>2</sub> due to the unavailability of reliable all-GHG measurements and projections for developing countries.

It should be noted that projections through 2012 define emissions levels as levels prior to afforestation and use of Kyoto mechanisms, since doing so best approximates actual domestic emissions as they will be in 2012. It should also be noted that while these projections, in all GHG terms,

are used in the figures, the database which drives the RCI calculator has not been changed; thus there is a small discrepancy between the reported RCI and that which would be implied by the more detailed, all-gas projections.

Finally, the conversion between CO<sub>2</sub> and all GHGs for the emissions reduction pathway was made on the basis of an estimate from the World Resources Institute's Climate Analysis and Indicators Tool v. 6.0, which estimates that worldwide non- CO<sub>2</sub> emissions are equal to about 30% of CO<sub>2</sub> emissions in 2005; thus the annual mitigation requirement is simply assumed to be 1.3 times the value for CO<sub>2</sub> only.

## 10. Appendix 3: The currently applied 'solution': Luxembourg's reliance on off-set mechanisms

In recognition of the challenging nature of GHG emission reductions that countries with commitments under the Kyoto Protocol are facing, the signatories agreed upon a range of flexible mechanisms (Clean Development Mechanisms, Joint Implementation, Emission Trading) within the Kyoto regime. These mechanisms shall allow those countries that face difficulties reducing GHG emissions domestically by the required amount, to buy supplementary emission reduction units and by doing so make a financial contribution to climate friendly processes elsewhere. These emission reduction units can be acquired on the international carbon market or by investing in projects located in foreign countries. The application of off-set mechanisms is considered as being part of the domestic reduction of a country.

To comply with the Kyoto obligations, with all the 'specifics' and 'disadvantages' evoked in Chapters 3.3. and 6, Luxembourg resorts excessively to the so-called flexible mechanisms, or off-set mechanisms. Civil Society Organizations condemn this excessive recourse to off-set mechanisms as a breach of Article 6.1.(d) of the Kyoto Protocol, which restrictively states 'The acquisition of emission reduction units shall be supplemental to domestic action [...]' (see Box 3).

### Box 3: 'Unlimited offsetting'<sup>109</sup>

**Based on the results of international networks' analyses of the use of off-sets, Luxembourg's civil society organizations strongly criticize the government's purchase policy of emission rights because:**

- by definition, it is a zero-sum game with no real GHG emission reductions; it keeps the country from initiating concrete domestic actions, which could actually reduce national emissions.
- as about two thirds of the already purchased emission rights have been generated in CDM-projects in the developing countries, this 'buying policy' is diametrically opposite to the spirit of the UN Framework Convention on Climate Change that the industrialized countries have to lead through action.
- most of these emission rights had already been bought before Luxembourg sent its first National Communication to the UNFCCC (called « Second, Third, Fourth and Fifth National Communication of Luxembourg », February 2010), not respecting Article 6 and 7 of the Kyoto Protocol and their principle that the use of emission rights 'shall be supplemental to domestic actions'.
- in practice, a large part of CDM projects are heavily suspected to be "anyway-projects" which would also have been implemented without selling emissions rights. Consequently, they are not 'additional', as required by the CDM rules, and cannot offset emissions of the buyer of their credits.
- social and environmental standards are often neglected so that the projects do not assist the host countries in achieving sustainable development, as Article 12. 2. of the Kyoto Protocol stipulates. This shows that in order for Luxembourg to assume its "fair share" of the global climate mitigation effort it is not sufficient to assure a certain percentage of emission reductions, but that the means by which these reductions are attained are of equal importance.

At the meeting in January 2010 with the Luxembourg NGO network Votum Klima, Prime Minister Juncker affirmed that it is indispensable for a country's credibility, to reduce the major part of its GHG emissions domestically and that the acquirement of emission rights abroad can only play a secondary role. Half a year later, in August 2010 however, Luxembourg had already purchased stakes in five Carbon Funds and ERPA's (Emission Reduction Procurement Agreements) from individual projects equivalent to some 11 - 12 million tons of emission rights for the amount of €124 million.<sup>110</sup>

<sup>109</sup> See: [www.cdm-watch.org](http://www.cdm-watch.org), [www.climnet.org](http://www.climnet.org) and [www.internationalrivers.org](http://www.internationalrivers.org).

<sup>110</sup> Own calculations, based on: Wiseler, Claude, Minister for Sustainable Development and Infrastructure: Answer to Parliamentary Question No. 989 of 8 Nov. 2010 from Deputy Camille Gira, Luxembourg, 12 jan 2011, [www.chd.lu](http://www.chd.lu), and on Point Carbon: Carbon Market Monitor, 7 Fe 2011.

Following the most recent estimates<sup>111</sup>, Luxembourg's difference between target and real emissions for the Kyoto period 2008 – 2012 will be about 15 million tons, so these 11 - 12 million tons of emissions rights already cover roughly three quarters of Luxembourg's reduction commitments for the period. According to the 2nd, 3rd, 4th and 5th National Communication, Luxembourg foresees Kyoto mechanisms-related expenses of around €360 million for the period. Furthermore, in the budget for 2010 (€69.9 million) and the budget proposals for 2011 (€94.6 million) and 2012 (€111.1 million) all together, the government assigned €275 million for even more emission rights.<sup>112</sup>

The €399 million injected in total until 2012 would allow Luxembourg to achieve far more than 100% of the required domestic GHG emission reductions by means of flexible mechanisms. While NGOs allege that a 20% - 40% emission reduction by 2020 could to a large extent be achieved domestically, the government considers significant recourse to off-set mechanisms as inevitable. The influential Fedil, the Luxembourg Business Federation Luxembourg, openly advocates the unlimited use of offset mechanisms.<sup>113</sup>

The imbalance that exists between Luxembourg's domestic actions and the buying out of its commitments though risks persisting a little longer. As illustrated here above, Luxembourg's government appears rather reluctant to change its policy, and at the supranational level pressure increases, but not dramatically. Under the EU Climate and Energy Package, which applies to the period 2013-2020, Luxembourg will have the right – with reference to the 2005 baseline - to offset per year up to 4 % - of its 20% reduction commitment in the non EU-ETS sectors by means of flexible mechanisms from outside the EU; over the eight years this amounts to about 40% of the whole reduction commitment. But also the remaining 60 % does not necessarily have to be accomplished domestically, because Luxembourg can buy so-called AAUs (Assigned Amount Units – emission rights from other European member states which they do not use) – and this in an unlimited way. Ultimately, Luxembourg will have the possibility to offset 100% of its emissions.

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<sup>111</sup> Ewringmann, 2011b.

<sup>112</sup> Gouvernement luxembourgeois, 2010.

<sup>113</sup> Chambre de Commerce, Chambre des Métiers, Fédération des Artisans et Fedil lors d'une prise de position commune dans le cadre du Partenariat pour l'Environnement et le Climat, Luxembourg, June 2010.

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## 13. Acronyms

AAU	Assigned Amount Unit
ASTM	Action Solidarité Tiers Monde
BAU	Business As Usual
CDM	Clean Development Mechanism
CO <sub>2</sub>	Carbon dioxide European Commission
ERPAs	Emission Reduction Procurement Agreements
ETS	Emission Trading Scheme
EU	European Union
EU+12	European Union plus 12 other states
EU-15	European Union at 15 member states
EU-27	European Union at 27 member states
GDP	Gross Domestic Product
GDRs	Greenhouse Development Rights
GHG	Greenhouse Gases
GNP	Gross National Product
GtCO <sub>2</sub> e	Giga Tonnes of CO <sub>2</sub> equivalentWorld Product
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land Use, Land-use Change and Forestry
MER	Market Exchange Rates
MRV	Measurable, Reportable and Verifiable
MtCO <sub>2</sub> e	Million Tonnes of CO <sub>2</sub> equivalent
NGO	Non Governmental Organization
ODA	Official Development Assistance
ppm	parts per million, Tonnes of CO <sub>2</sub> equivalent
UN	United Nations
UNFCCC	United Nations Framework Convent
US	United States (of America)
WAM	With Additional Measures
WEM	With Existing Measures
WIID	World Income Inequality Database