



PBL Netherlands Environmental
Assessment Agency

CLIMATE ACTION OUTSIDE THE UNFCCC

**Assessment of the impact of international
cooperative initiatives on greenhouse gas
emissions**

PBL Policy Brief

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Main findings

- International cooperative initiatives are international activities outside the UNFCCC driven by non-state actors or national governments that have committed themselves to reduce greenhouse gas (GHG) emissions or take action to bring about emission reductions as a concomitant effect of other policies.
- International cooperative initiatives are expected to: 1) accelerate implementation and improve the effectiveness of climate policies, and 2) bring about additional emission reductions on top of commitments already made by national governments.
- The large international initiatives selected are projected to deliver annual emission reductions of 2.5 GtCO₂e by 2020 from a no-policy baseline emission level of 55.1 GtCO₂e and 5.5 GtCO₂e annually by 2030 from a no-policy baseline emission level of 62.5 GtCO₂e.¹ There is not much overlap of initiatives; only 0.3 GtCO₂e in 2030.
- At a global level, the estimated emission levels achieved by implementation of measures put forward by international initiatives are roughly similar to what may be expected based on pledges for 2020 proposed at the international climate negotiations and projected reductions by 2030 based on the extrapolation of such pledges. However, we expect to see a large overlap in reductions between initiatives and pledges.
- The overlap between pledges and international initiatives is estimated to be 70%. This is a maximum, based on the assumption that emission reductions from international initiatives will not lead to additional reductions where these occur in those countries that made pledges, provided that they occur in the sectors included in such pledges. This assumption has been made as it is difficult to compare sector targets in initiatives with economy-wide pledges. This differs from the general expectation that these initiatives will lead to additional reductions.

- The combined effect of international initiatives and pledges, including overlap, would lead to emission levels of between 54 and 57 GtCO₂e by 2030, compared to an emission range based on the impact of pledges alone, which is 56 to 59 GtCO₂e (UNEP, 2014a). This will not be enough to close the emission gap between pledges and the emission level necessary to remain on track to meet the 2 °C climate target. More action will be necessary in international initiatives and from national governments.
- The largest reductions are expected from company, city, and REDD+ initiatives, the HFC proposal to amend the Montreal Protocol and the Global Methane Initiative. These initiatives are already projected to increase emission reductions by 4.5 GtCO₂e by 2030.
- It is difficult to assess whether international initiatives are actually delivering on their commitments, as there is poor transparency and a lack of MRV (Monitoring, Reporting, and Verification). It is therefore difficult to identify the critical barriers to the implementation of these initiatives.

Note

- 1 2010 emissions have been harmonised with the UNEP Gap Report (2014) and amount to 49 GtCO₂e. For initiatives with targets before 2030, targets were extrapolated to 2030 on the assumption that an equivalent effort will be made.

1 Introduction

Until recently, climate policy focused mostly on tackling climate change by setting global environmental targets accompanied by legally binding commitments from national governments (Slingerland et al., 2011). Since 1992, countries have negotiated within the United Nations Framework Convention on Climate Change (UNFCCC) resulting in binding targets under the 1997 Kyoto Protocol, and voluntary pledges following the Copenhagen negotiations in 2009. Before the next Conference of the Parties (COP) meeting in Paris, countries are expected to submit Intended Nationally Determined Contributions (INDCs), in which national governments specify their post-2020 contribution to the global effort to limit global warming to 2 °C. Current pledges with a focus on pre-2020, as laid down in the Cancun Agreements, are not expected to be sufficient to meet the 2 °C target and have been estimated to lead to an emission gap of 8 to 10 GtCO₂e (UNEP, 2014a). Although the UNFCCC process does lead to international agreements, the process is slow because of the complexity of the climate change problem and the international context in which this takes place, with many, sometimes conflicting, interests at stake. The Convention also does not indicate what specific measures need to be taken by the various parties to the negotiations.

Apart from the UNFCCC process, there are various international initiatives on climate change mitigation that approach this from a different angle. International cooperative initiatives are defined here *as international activities outside the UNFCCC driven by non-state actors or national governments that have committed to reduce greenhouse gas emissions or take action by which emission reductions will occur as a co-benefit in concert with other policies* (based on definition of Slingerland et al. (2011)). Bilateral initiatives have been excluded. These international initiatives widen the focus to include new agents of change beyond national governments, such as businesses, cities and civil society (Hajer et al., 2015). The international initiatives cover a wide range of public, private and hybrid initiatives at various levels of governance (Van Asselt and Zelli, 2014). They operate in specific sectors and focus on the implementation of mitigation measures.

Non-state actors include local government, the commercial sector and civil society. International initiatives can therefore also include national governments acting outside the UNFCCC or cooperating with non-state actors who often are the main drivers of these initiatives. Such international initiatives could accelerate implementation and increase the effectiveness of national policies as they broaden the coalition of willing parties and strengthen the knowledge necessary for implementation. They could potentially also

increase effectiveness through co-benefits for other areas such as health, air pollution and biodiversity. In addition, they may help to close the emission gap if their activities are additional to the commitments made in the international climate negotiations (referred to as pledges). Many observers envisage a greater role for non-state actors in the UNFCCC process (IVM, 2015) because of this.

In this context, this policy brief aims to assess the impact of major international initiatives on greenhouse gas emissions and the extent to which they could lead to additional emission reductions on top of the pledges already made in the context of the UNFCCC. More precisely, the aim of this policy brief is to *provide insight into the likely contribution that the largest international initiatives will make to reducing greenhouse gas emissions in the period to 2030*. Table 1 summarises the international initiatives included in this analysis.

Section 2 looks at the projected total impact of all the selected initiatives and provides an estimate of the overlap in reductions from these initiatives and current national commitments submitted as part of the international climate negotiations. Section 3 considers the initiatives and their projected impact in more detail. Section 4 discusses the limitations of this assessment and expectations for the international initiatives.

Table 1

Overview of international cooperative initiatives included

International initiatives	Key actors
Top 500 companies in the Carbon Disclosure Project	<i>Key actors:</i> Companies; <i>2010 emissions:</i> 3.2 GtCO ₂ e The Carbon Disclosure Project encourages large companies to set emission reduction targets.
C40 Cities Covenant of Mayors	<i>Key actors:</i> Cities; <i>2010 emissions:</i> 3.5 GtCO ₂ e C40 is a network of 75 megacities that have committed to reduction targets. The Covenant of Majors was initiated by the EU and includes more than 5700 cities, including several small towns, also outside the EU.
Cement Sustainability Initiative	<i>Key actors:</i> Cement companies; <i>2010 emissions:</i> 0.5 GtCO ₂ e Member companies of the Cement Sustainability Initiative measure and report their emissions following a jointly agreed protocol and have set individual targets to reduce CO ₂ intensity.
Global Fuel Economy Initiative	<i>Key actors:</i> UNEP, IEA, transport institutes, national governments; <i>2010 emissions:</i> 0.5 GtCO ₂ e The approach of the Global Fuel Economy Initiative is outreach, research and policy support, especially towards developing countries and aims to improve fuel efficiency in new cars by 50% by 2030.
HFCs proposal to the Montreal Protocol	<i>Key actors:</i> national governments; <i>2010 emissions:</i> 0.5 GtCO ₂ e The HFC proposal to the Montreal Protocol aims to bring about a controlled reduction in HFC emissions over the next 30 years.
Global Methane Initiative Climate and Clean Air Coalition (not included in results)	<i>Key actors:</i> Industries, UNEP, development banks, national governments; <i>2010 emissions:</i> 4.1 GtCO ₂ e Several global initiatives aim to abate methane emissions. The objective of the Global Methane Initiative is to promote stronger international action to mitigate climate change while developing clean energy and stronger economies.

International initiatives	Key actors
<p>New York Declaration on Forests</p> <p>UN-REDD Programme (no quantified target)</p> <p>Bonn Challenge (no quantified target)</p>	<p><i>Key actors:</i> UN, national governments, civil society; <i>2010 emissions:</i> 1.0 GtCO₂e</p> <p>Several global initiatives aim to reduce emissions from deforestation and forest degradation (REDD). The New York Declaration on Forests is a non-legally binding political declaration initiated at the UN Climate Summit which aims to end natural forest loss and restore large parts of forests by 2030.</p>
<p>International Maritime Organization</p>	<p><i>Key actors:</i> National governments; <i>2010 emissions:</i> 0.6 GtCO₂e</p> <p>The countries of the International Maritime Organization have adopted mandatory measures to improve energy efficiency and reduce greenhouse gas emissions from international shipping.</p>
<p>International Civil Aviation Organization</p>	<p><i>Key actors:</i> Airlines, aircraft manufacturers, airspace regulators; <i>2010 emissions:</i> 0.5 GtCO₂e</p> <p>The International Civil Aviation Organization adopted measures announced by the International Air Transport Association to continuously improve CO₂ efficiency by 1.5% per year until 2020 and further actions until 2050.</p>
<p>Zero Routine Flaring by 2030</p>	<p><i>Key actors:</i> World Bank, oil companies, development; <i>2010 emissions:</i> 0.1 GtCO₂e</p> <p>The Zero Routine Flaring by 2030 initiative was introduced by the World Bank to bring oil companies and national governments together to eliminate CO₂ emissions from gas flaring by 2030.</p>
<p>RE100 (small impact)</p>	<p><i>Key actors:</i> Companies; <i>2010 emissions:</i> currently negligible</p> <p>The RE100 aims to have at least 100 large companies making a 100% renewable commitment within a clear time frame.</p>
<p>Aichi biodiversity targets (small impact)</p>	<p><i>Key actors:</i> National governments; <i>2010 emissions:</i> 4.9 GtCO₂e (global land-use emissions).</p> <p>The Aichi biodiversity targets is a set of multilateral agreements with the aim of preserving biodiversity, as laid down in the Convention on Biological Diversity.</p>
<p>UN Millennium goals – sanitation (small impact)</p>	<p><i>Key actors:</i> National governments; <i>2010 emissions:</i> 0.5 GtCO₂e</p> <p>The aim of the Millennium Development Goal (MDG) target on sanitation is to reduce by half the proportion of the population without sustainable access to safe drinking water and adequate sanitation.</p>

2 Total impact of international cooperative initiatives

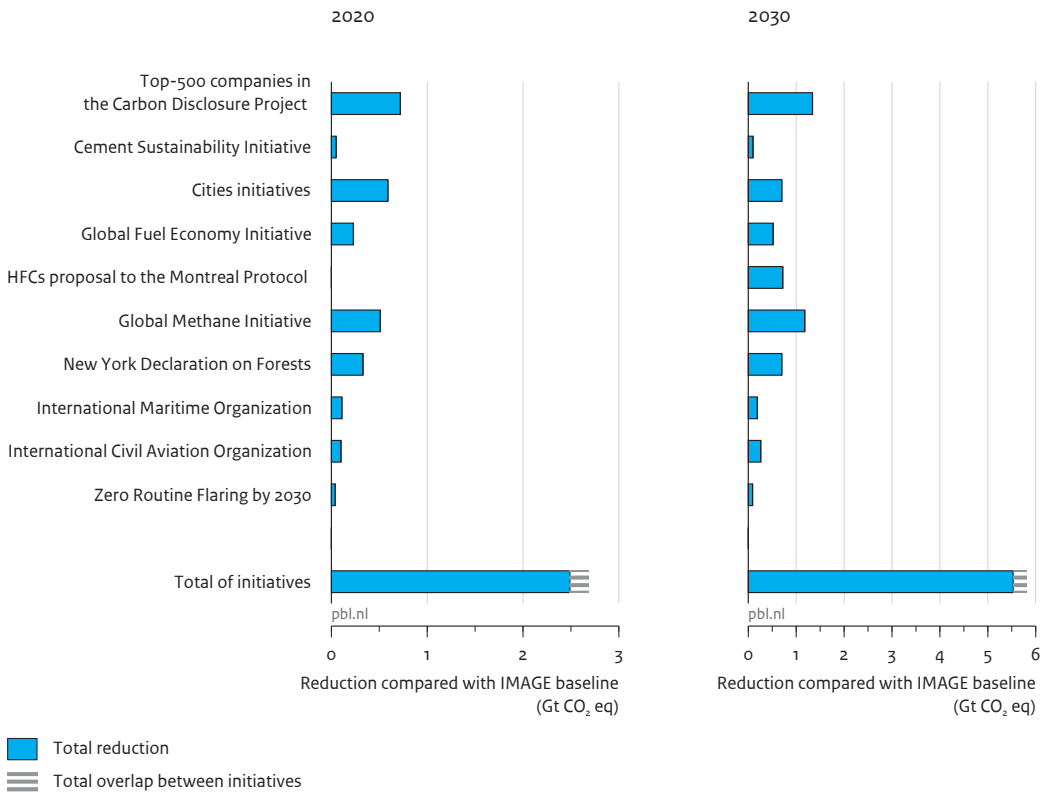
The selected international initiatives could reduce global greenhouse gas emissions by 2.5 GtCO₂e by 2020 and by 5.5 GtCO₂e by 2030. Where appropriate, targets have been extrapolated to 2030. The reductions that these international initiatives provide is roughly similar to what may be expected from the pledges for 2020 submitted to the UNFCCC and reductions by 2030 when these pledges are extrapolated.

The baseline for our assessment is the IMAGE 3.0 (PBL, 2013) baseline scenario, that is based on population and GDP assumptions from the SSP2 scenario (IIASA, 2015), and harmonised to the 2010 global emission level from the UNEP Gap Report (2014a). This scenario does not take into account current climate policies. In this scenario, global greenhouse gas emissions are projected to be 55.1 GtCO₂e by 2020 and 62.5 GtCO₂e by 2030. All projected emission reductions from international initiatives have been calculated relative to this baseline scenario.

The scenario for international cooperative initiatives includes the impact of several large initiatives, all of which have quantified mitigation targets or include concrete measures, and are showing progress towards achieving these targets. Progress implies that there are both sufficient participants in the initiative to ensure success and real action is being taken on the ground. The initiatives were selected from a compilation of initiatives by the UNFCCC¹, the UNFCCC NAZCA website², and the Climate Initiative Platform.³

In some initiatives participants take on individual targets and in others the initiative has one overall target. In our assessment, individual targets were aggregated to estimate the total impact of the initiative based on publications of the initiative itself or from other sources. For initiatives that have defined a single global target for the entire initiative, the target was only applied to those parties already participating in the initiative. For

Figure 1
Greenhouse gas reduction resulting from selected international initiatives



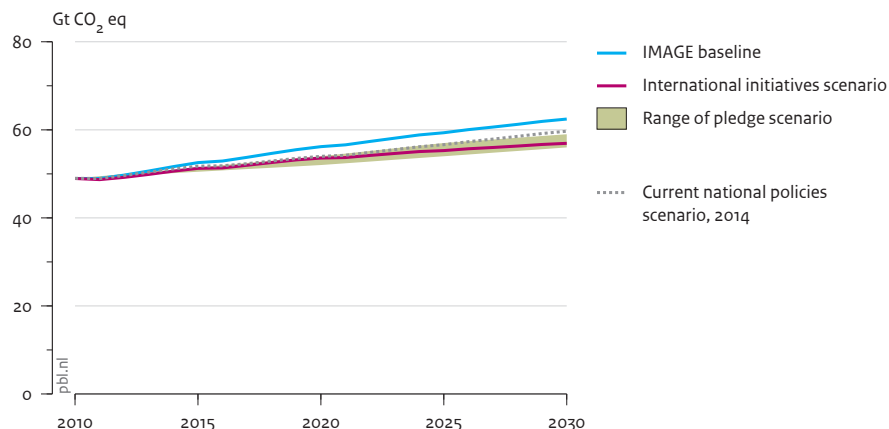
Source: PBL

initiatives with targets before 2030, these were extrapolated to 2030 on the assumption that an equivalent effort will be made, based on a general assumption that the same percentage reduction relative to the baseline will be made.

Each international initiative was assessed individually (see Section 3). The largest reductions are expected from the company initiatives, city initiatives, REDD+ initiatives, the HFC proposal to the Montreal Protocol and the Global Methane Initiative. These initiatives are projected to amount to 2.0 GtCO₂e by 2020 and 4.5 GtCO₂e in emission reductions by 2030.

Figure 2

Global greenhouse gas emissions resulting from selected international initiatives and UNEP pledge scenario



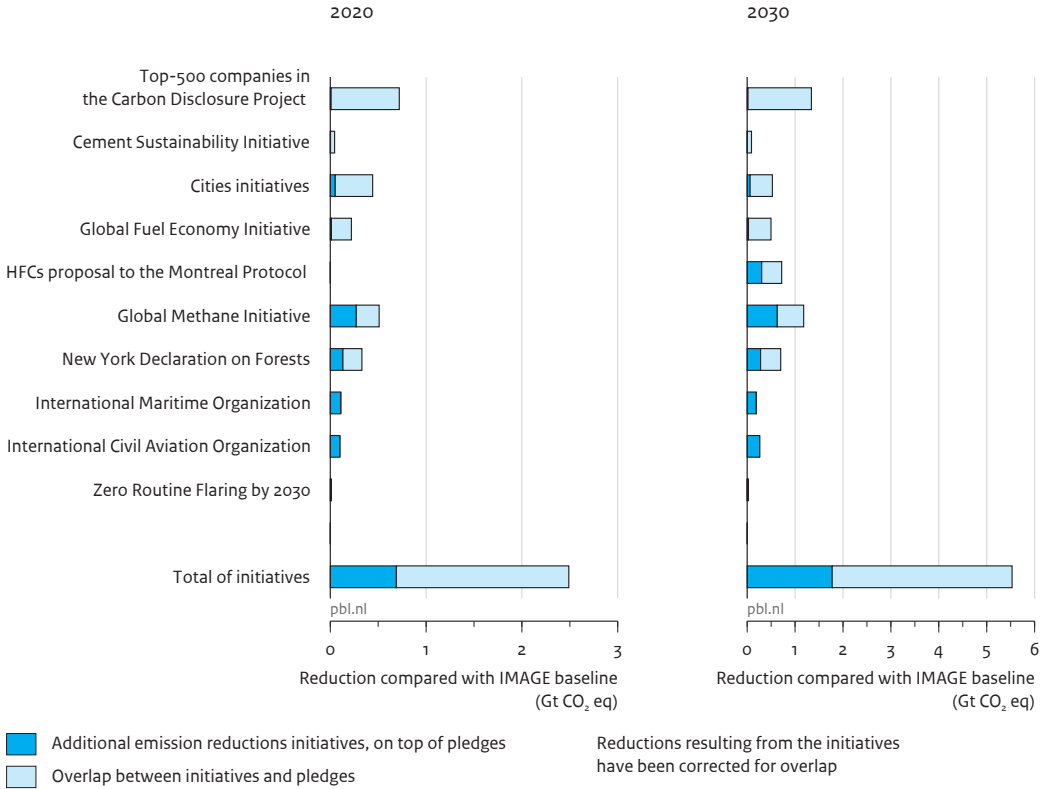
Source: PBL; UNEP 2014

If all the selected initiatives meet their targets, the total projected impact on greenhouse gas emissions will be a reduction of 2.5 GtCO₂e by 2020 and 5.5 GtCO₂e by 2030 (see Figure 1). These reductions will result in projected emission levels of 52.6 GtCO₂e by 2020 and 56.9 GtCO₂e by 2030 (see Figure 2). The projections take into account overlap between initiatives, which is assumed to occur with initiatives aimed at the same sector in the same country (see Appendix). The total overlap is projected to be small; approximately 0.2 GtCO₂e by 2020 and 0.3 GtCO₂e by 2030.

The reduction overlap between the selected international initiatives and the pledge scenario is projected to be 1.8 GtCO₂e by 2020 and 3.8 GtCO₂e by 2030, which is approximately 70% of the total reduction.

Comparing the projected emissions of the initiatives to the emission levels pledged by parties under the UNFCCC, provides an indication of the degree to which the initiatives will help to achieve the pledged targets. It also shows the degree to which they are additional to these pledges. The UNEP Gap Report (2014a) shows that pledges are projected to lead to a global emission level of between 52 GtCO₂e and 54 GtCO₂e by 2020 and between 56 GtCO₂e and 59 GtCO₂e by 2030 (see Figure 2). The figures for 2030 were based on extrapolation from 2020, taking in to account the trends from the current policies scenario of the World Energy Outlook (IEA, 2013). The 2020 pledge emission levels are similar to PBL estimates (PBL, 2015). This implies that the projected emission levels from the pledges are roughly similar to what may be expected from the initiatives.⁴

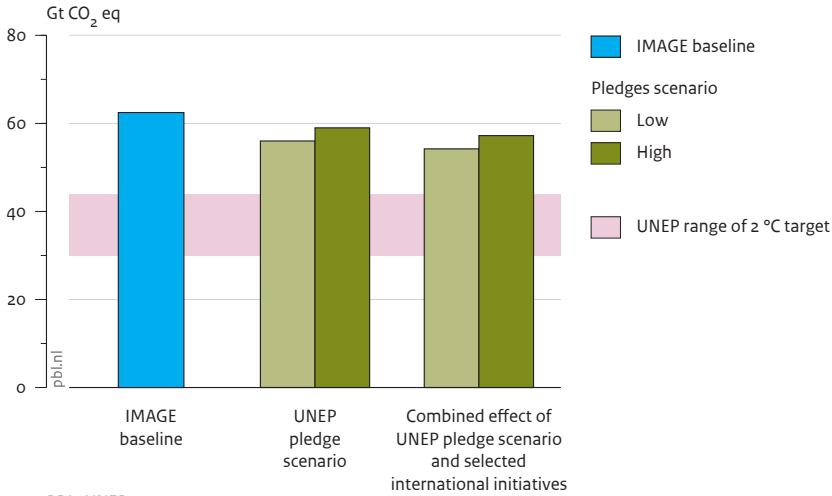
Figure 3
Overlap in greenhouse gas reductions between selected international initiatives and pledges



Source: PBL

To estimate the international initiative reductions that are additional to the pledged reductions, it was assumed that international initiatives will not lead to additional reductions in those countries that have submitted pledges, provided that these occur in sectors that were included in the pledges and cover the same greenhouse gases. In other words, although the international initiatives are generally expected to bring about additional emission reductions, in our assessment it was generally assumed that the emission reductions from international initiatives will to some extent overlap with emission reductions from pledges. This assumption was made for two reasons: 1) it is very difficult to compare sector targets in international initiatives with economy-wide pledges; and 2) it is questionable whether governments would exclude progress made by international initiatives in their monitoring of national emission reductions.

Figure 4
Impact of international initiatives and pledges on greenhouse gas emissions, 2030



The overlap assessment is based on the pledges for 2020, with the same degree of overlap assumed for 2030. The overlap assumption differs from UNEP (UNEP, 2015), in which it was assumed that overlap between international initiatives of non-state actors and national pledges is not likely to be more than a third. A different definition of those taking part in international initiatives was also used compared with this assessment, with the implication that non-state action will generally be in addition to current national policies.

In the individual international initiatives, a large degree of overlap is expected between cities and companies on the one hand and national governments on the other. However, there is no overlap in the international shipping and aviation sectors, as these were not included in any of the pledges (see Figure 3). The Global Methane Initiative and the HFC proposal to the Montreal Protocol also show relatively little overlap as these initiatives operate partly in countries without pledges or in sectors that were not included in pledges made by specific countries (e.g. non-CO₂ gases for China and India).

The combined effect of the pledges scenario and the international initiatives selected would lead to emission levels of between 54 and 57 GtCO₂e by 2030 compared to a pledge range of 56 to 59 (UNEP, 2014a). This will not be sufficient to close the emission gap between pledges and the emission level necessary to meet the 2 °C target.

When the overlap between the selected international initiatives and the pledges scenario is taken into account, 0.7 GtCO₂e in reductions will be additional to the pledges scenario by 2020 and 1.8 GtCO₂e by 2030. This means that implementing both pledges and international initiatives could reduce emission levels to 51–52 GtCO₂e by 2020 and 54–57 GtCO₂e by 2030 (see Figure 4). Although this combined effort would lead to greater emission reductions than expected from pledges alone, it would not close the emission gap between pledges and the emission level necessary to meet the 2 °C target. Therefore, more action will be needed by both international initiatives and national governments.

How international initiatives can accelerate the implementation of mitigation measures or take action in addition to country pledges would require a clear understanding of the interplay between initiatives and national governments, while further research could show how this can be most effectively done.

Notes

- 1 http://unfccc.int/meetings/bonn_jun_2013/items/7655.php, accessed 11 March 2015.
- 2 <http://climateaction.unfccc.int/>, accessed 11 March 2015.
- 3 <http://climateinitiativesplatform.org/index.php/Welcome>, accessed 11 March 2015.
- 4 The emission level in the scenario representing international initiatives is lower than the current policies scenario that takes into account implemented policies and results in an emission level of 59.7 GtCO₂e by 2030 (PBL, 2015), see Figure 2.

3 The impact of individual international initiatives

This section presents the results of the impact of the selected international initiatives on greenhouse gas emissions. These initiatives operate in different sectors (see Table 1) and can be divided into two main groups:

1. International initiatives that operate from an *actor perspective*;
2. International initiatives that operate from a *sector perspective*.

Box 1 Methodology used to determine baseline emissions for individual international initiatives

Baseline projections for actors and sectors were based on the IMAGE 3.0 baseline scenario, based on GDP and population from the SSP2 scenario (IIASA, 2015). The projections were derived differently for actors and sectors. For actors (cities and companies), an emission baseline level was established using the IMAGE baseline trend applied to historical 2010 emissions as published by the initiative. For these actors different IMAGE sector emission projections were aggregated that were selected on the basis of publicly available city and company GHG protocols. Sector baselines were established by scaling down global IMAGE sector emissions on the basis of the share of global emissions represented by the participants in the initiative.

Table 2
Global baseline emissions and emission reductions for individual international initiatives

	History initiative	Baseline		Reduction	
	2010	2020	2030	2020	2030
GtCO₂e					
Actor					
Carbon Disclosure Project - Top 500 companies	3.2	3.8	4.2	0.7	1.3
C40 Cities and Covenant of Mayors	3.5	4.6	5.3	0.6	0.7
Sector					
Cement Sustainability Initiative	0.5	0.6	0.7	0.1	0.1
Global Fuel Economy Initiative	0.5	0.8	1.0	0.2	0.5
North American 2013 HFC Submission to the Montreal Protocol	0.5	1.0	1.3	0.0	0.7
Global Methane Initiative	4.1	5.1	5.9	0.5	1.2
New York Declaration on Forests	1.0	0.5	0.4	0.3	0.7
International Maritime Organization	0.6	0.6	0.7	0.1	0.2
International Civil Aviation Organization	0.5	0.6	0.9	0.1	0.3
Zero Routine Flaring by 2030	0.1	0.1	0.1	0.0	0.1
Overlap				0.2	0.3
Total*				2.5	5.5

* The international initiatives RE100, Aichi biodiversity targets and UN development goals for sanitation were also assessed, but based on their current status impact is small. Climate and Clean Air Coalition mainly impacts black carbon emissions, which were excluded from the results.

Each of the selected international initiatives was assessed individually by comparing the overall target to the IMAGE baseline emission level (see Box 1). When all the estimated reductions are added together and accounting for the overlap between initiatives, the total reductions are 2.5 GtCO₂e by 2020 and 5.5 GtCO₂e by 2030. Table 2 provides an overview of the results per initiative. See Appendix for more online background information on the international initiatives.

3.1 Actors: cities and companies

Carbon Disclosure Project - Top 500 companies

Aim/scope: Reducing direct and indirect (electricity/heat) emissions from companies.

Key actors: Investors, 500 largest global companies.

Estimated reductions: 0.7 GtCO₂e by 2020 compared to a baseline of 3.8 GtCO₂e; 1.3 GtCO₂e by 2030 compared to a baseline of 4.2 GtCO₂e (partly based on extrapolation of 2020 targets).

Companies take action on climate change to increase profitability through efficiency measures, to counter peer or social pressure, and to improve their risk management strategy. They work in an international environment where products are traded globally and therefore strong emission regulation is difficult due to competitiveness issues. Business-led initiatives could overcome this problem (The New Climate Economy, 2014).

The *Carbon Disclosure Project* (CDP) measures and reports business performance on climate change on behalf of their investor signatories (CDP, 2014). It also works to accelerate action on climate change through the Carbon Action Programme, in which it encourages companies to set greenhouse gas emission reduction targets. For this analysis, emission reduction targets were used as reported by the top 500 emitting companies surveyed by the CDP. These companies are responsible for more than 10% of worldwide greenhouse gas emissions (Moorhead, 2014). Of the 500 companies surveyed in 2014, 65% have set emission reduction targets. This group can be divided into 35% that have set targets in line with staying on track to meet the global 2 °C target (CDP, 2015a), while 15% that have set less ambitious targets, and 15% that have set irrelevant targets. The necessary emission reduction for companies to meet 2 °C is about 1.4% reduction per year (CDP, 2012; Moorhead, 2014).

The companies included in our analysis represent 15% of global emissions that can be attributed to businesses. The companies that reported to the CDP are estimated to reduce emissions by 0.7 GtCO₂e by 2020 and 1.3 GtCO₂e by 2030 compared to a baseline level of 3.8 GtCO₂e in 2020 and 4.2 GtCO₂e in 2030. Baseline emissions were based on a reported 2014 emission level of 3.4 GtCO₂e (CDP, 2014). Emission projections were derived from IMAGE baseline emission growth for the industry and energy supply sector. China was excluded as too few companies in this country are participating in the CDP programme. For companies with reduction targets in line with the 2 °C target, it was assumed that on average they will reduce emissions by 1.4% per year based on (CDP, 2015a; Moorhead, 2014); for companies with less ambitious targets an annual emission reduction of 0.7% was assumed. For companies without reduction targets beyond 2020, it was assumed that they will demonstrate equivalent effort in the period up until 2030, divided into equal annual reductions.

C40 Cities and Covenant of Mayors

Half of the world population now lives in cities and this is projected to increase to two thirds of the world population within 20 years, with the strongest increase expected to occur in developing countries (The New Climate Economy, 2014). Urban areas currently account for 71% to 76% of global CO₂ energy emissions (Seto K. C. et al., 2014). Addressing emission reductions at local government level could allow for more flexibility in policy development, implementation and monitoring compared with national governments (CDP, 2015b). This is especially the case when these policies are aligned with other goals, such as economic development, reducing air pollution, reducing congestion and improving public health. Two city initiatives were included in this analysis: 1) *The C40 Cities initiative* and 2) *the Covenant of Mayors*.

The cities included in this analysis represent 25% of all existing cities in terms of emissions. The two city initiatives selected are projected to reduce emissions by 0.6 GtCO₂e by 2020 and 0.7 GtCO₂e by 2030 in total, compared with a baseline level of 4.6 GtCO₂e in 2020 and 5.3 GtCO₂e in 2030. This reduction takes into account the overlap between the two initiatives which is based on (Wouters, 2013) and amounts to 0.1 GtCO₂e in reduced emissions.

C40 Cities initiative

Aim/scope: Reducing direct and indirect (electricity/heat) emissions from large cities.

Key actors: City governments.

Estimated reductions: 0.4 GtCO₂e by 2020 compared with a baseline of 3.5 GtCO₂e; 0.5 GtCO₂e by 2030 compared to a baseline of 4.1 GtCO₂e (based on extrapolation of targets).

The C40 Cities is a network of 75 megacities representing 5% of global greenhouse gas emissions (C40 Cities, 2014). The participating cities are expected to commit to meet and exceed the EU 20% reduction target for 2020.

It is estimated that the C40 initiative will bring about a reduction of 0.4 GtCO₂e emissions from a baseline level of 3.5 GtCO₂e by 2020 and 0.5 GtCO₂e emissions from a level of 4.1 GtCO₂e by 2030. This result is based on the C40 publication (2013), in which it is estimated that the 59 cities that were taking part at the time could potentially achieve 11% reduction by 2020 relative to the baseline. This reduction was applied to the 2020 and 2030 IMAGE baseline for C40 Cities that was calculated by applying the IMAGE growth rate of direct and indirect emissions from cities (based on the buildings, car transport and small industry sectors, including electricity supply) to the 2010 emissions reported by the initiative (C40 Cities, 2013). These emissions were scaled to the population of the additional 16 cities that have joined since 2013 (C40 Cities, 2015).

Covenant of Mayors

Aim/scope: Reducing direct and indirect (electricity/heat) emissions from large cities.

Key actors: Municipal governments.

Estimated reductions: 0.3 GtCO₂e by 2020 compared to a baseline of 1.4 GtCO₂e and based on extrapolation of targets to 0.3 GtCO₂e by 2030 compared to a baseline of 1.7 GtCO₂e.

The Covenant of Mayors that was launched by the EU in 2008, currently has 5,729 signatories¹, representing 186 million people and also includes cities from outside Europe. In contrast to the C40 Cities initiative, several small towns also participate. The initiative assessed 3,400 Sustainable Energy Action Plans (SEAPS) that have been analysed and accepted by the Covenant of Mayors. It constitutes a 28% overall greenhouse gas reduction target for 2020 relative to the base year, which 26% of the cities have chosen as 1990 and 62% as 2005–2008 (Kona, 2015).

It is estimated that the Covenant of Mayors will reduce emissions by 0.3 MtCO₂e by 2020 from a baseline level of 1.4 GtCO₂e and by 0.3 GtCO₂e by 2030 from a level of 1.7 GtCO₂e. This baseline level was calculated by applying the IMAGE emission growth for direct and indirect emissions to the 1990 and 2005–2008 emission levels and scaling the results to the population of the participating cities for which action plans have not yet been analysed and accepted. The reductions were applied to the IMAGE baseline, using the three groups of base years as reported by the initiative. It was assumed that the same percentage reduction will apply in the period between 2020 and 2030.

3.2 Sectors: sector initiatives

Cement Sustainability Initiative

Aim/Scope: Exploring and promoting sustainable development in the cement industry

Key actors: 24 major cement producers responsible for 30% of global cement production.

Estimated reduction: 0.1 GtCO₂ by 2030 relative to a baseline in 2030 of 0.7 GtCO₂.

CO₂ emissions from cement production currently represent about 5% of global CO₂ emissions (WBCSD, 2009) and amount to 1.7 GtCO₂e in the IMAGE baseline. The *World Business Council for Sustainable Development* (WBCSD) initiates sector projects as part of the WBCSD's comprehensive work programme covering all aspects of sustainable development. One of these is the *Cement Sustainability Initiative* (CSI) which is a global effort by 24 major cement producers with production facilities in more than 100 countries. These companies range in size from very large multinationals to smaller local producers.

CSI member companies measure and report their emissions under the jointly agreed *Cement CO₂ and Energy Protocol* and have set individual targets to reduce CO₂ intensity. The CSI aims to reduce CO₂ emissions through four key technology options (WBCSD, 2009): 1) improved thermal and electrical efficiency, 2) alternative fuels for the cement kiln heating process, 3) producing cement with a reduced clinker content, and 4) through carbon

capture and storage (CCS). The CSI technology roadmap includes global targets for 2050 and estimates for CO₂ emission intensity reductions, defined as tonnes of CO₂ emissions per tonne of cement resulting from these technologies up to 2050 (WBCSD, 2009). Mainly the first three technology options will be relevant up until 2030, and are projected to reduce CO₂ emission intensity by 25% relative to 2005 levels. This reduction is in line with the overall 2050 target of 45% decrease in CO₂ intensity.

Those taking part in the CSI represent 30% of global emissions from cement. Emission reduction due to the CSI is estimated at 0.1 Gt CO₂ by 2030 compared to a baseline level of 0.7 Gt CO₂. This reduction takes into account all those taking part in the initiative and was calculated by applying the 2050 intensity target to the IMAGE baseline for the cement sector.

Global Fuel Economy Initiative

Aim/Scope: Improving fuel efficiency of cars.

Key actors: IEA, IFT, UNEP, FIA Foundation, national governments.

Estimated reductions: 0.5 GtCO₂e by 2030 relative to a baseline of 1.0 GtCO₂e.

Emissions from transport are expected to double between 2010 and 2050 (IEA, 2009). To reduce emissions from the transport sector, improving fuel efficiency of light-duty vehicles will be one of the most cost-effective measures available (GFEL, 2012).

The *Global Fuel Economy Initiative* (GFEL) was launched in 2009 by the FIA Foundation, together with three major international agencies – the IEA, the ITF and UNEP. Their approach is threefold: outreach, research and policy support. The focus is on developing countries as these often have no fuel-efficiency policies in place. The GFEL aims to reduce the fuel consumption of new cars by 50% by 2030 compared with average 2005 levels. In our assessment this overall target was applied to every country taking part. There is also a long term target for 2050, which consists of a 50% improvement in fuel efficiency for all cars relative to 2005. At the end of 2013, the GFEL was active in 20 countries in Asia, Central and eastern Europe, Latin America and Africa (GFEL, 2014).

The participants in the GFEL represent 20% of global light-duty vehicle emissions. The GFEL initiative is projected to reduce emissions by 0.2 GtCO₂e by 2020 and by 0.5 GtCO₂e by 2030, compared with a baseline level of 0.8 GtCO₂e in 2020 and 1.0 GtCO₂e in 2030. To calculate emission reductions for 2030, the reduction in efficiency standards for new non-electric light-duty vehicles was implemented in the IMAGE transport model. The reductions account for only 20 of the countries taking part in the Global Fuel Initiative.

North American 2013 HFC Submission to the Montreal Protocol

Aim/Scope: Reducing global HFC emissions by a more stringent reduction scheme under the Montreal Protocol.

Key actors: Governments of Canada, Mexico and the United States and other parties to the Montreal Protocol.

Estimated reductions: 0.7 GtCO₂e by 2030 compared to a baseline of 1.3 GtCO₂e.

Hydrofluorocarbons (HFCs) were introduced under the Montreal Protocol as non-ozone depletion substitutes for chlorofluorocarbons (CFCs) and halons. The aim of this Protocol is to phase out all ozone-depleting substances (ODS). HFC emissions are increasing rapidly as a result of their use as ODS replacements and have the potential to substantially influence climate in the future (Velders et al., 2009).

Although mitigation of HFC emissions is included in the UNFCCC negotiations, this has not so far led to substantial reductions. With no impending global controls on HFCs, the inclusion of HFCs under the Montreal Protocol would be likely to stimulate far more stringent emission reductions (Velders et al., 2012).

In the most recent version of the North American Amendment proposal (UNEP, 2014b) Canada, Mexico and the United States therefore proposed the inclusion of HFCs, with the controlled phasing-out of HFC emissions. This proposal contains a reduction scheme up until 2043 with a delayed phasing-out for Article 5 (mainly developing countries) (EPA, 2013b).

All countries are expected to observe the HFC proposal as they are all signatories to the Montreal Protocol. The emission reductions resulting from implementation of the proposed reduction scheme are projected to amount to 0.7 GtCO₂e by 2030, relative to a baseline of 1.3 GtCO₂e. These reductions account for the substitution of hydrochlorofluorocarbons (HCFCs) by HFCs, as prescribed by the proposal. The volume of HCFCs is based on EPA (2013a). Baseline emissions for HFCs are projected to increase from the present day level of 0.5 GtCO₂e to 1.3 GtCO₂e by 2030. More reductions are expected after 2030, as the proposal runs until 2043.

Global Methane Initiative

Aim/Scope: To advance cost-effective, short-term methane recovery.

Key actors: 42 national governments and the EU, industries, development banks.

Estimated reduction: 0.5 GtCO₂e reduction by 2020, relative to a baseline of 5.1 GtCO₂e; total reduction is projected at 1.2 GtCO₂e reduction by 2030, compared with a baseline of 5.9 GtCO₂e, assuming continued implementation of cost-effective measures after 2020.

Reducing methane emissions will mitigate climate change in the short term, with the added benefit of improving air quality and the option of using the gas as an energy source. In 2010, 37 countries and the European Commission – plus the Asian Development Bank and Inter-American Development Bank – launched the *Global Methane Initiative* (GMI).

The objective of the GMI is to promote stronger international action to mitigate climate change while developing clean energy and stronger economies. This will be done by advancing cost-effective short-term methane recovery from fossil fuel production, transport, agriculture, agricultural waste, landfills and wastewater. Currently 42 countries are members of the initiative, including major economies such as Brazil, Canada, China, the European Union, Germany, India, Indonesia, Italy, Japan, Mexico, Nigeria, Norway, Poland, South Korea, Russia, Turkey, Ukraine, the United Kingdom and the United States. Although the GMI does not specify a final year, it published a fact sheet which included cost-effective reductions until 2020 (GMI, 2011).

For our assessment we made use of US-EPA cost curves (EPA, 2013a) to identify cost-effective reductions per emission source for 2030. We assumed that cost-effective reductions take place at a USD15/tCO₂e, since this is considered a realistic cost level for all sources (GMI, 2011). Earlier versions (EPA, 2006) of these cost curves were used by the GMI to estimate expected reductions. In the updated version, cost-effective emission reductions in agriculture, coal mining and landfills were much smaller than in the previous version, while emission reductions from oil and gas production were much larger in the current version. This shows that there is still a great deal of uncertainty in assessing these options.

In the IMAGE baseline scenario, methane emissions for GMI are projected to increase from 4.1 GtCO₂e in 2010 to 5.9 GtCO₂e by 2030. The estimated emission reduction for the GMI is 47 MtCH₄ by 2030, which is equivalent to 1.2 GtCO₂e, relative to a baseline of 5.9 GtCO₂e. This was calculated by applying the reduction percentages from the cost curves at USD15/tCO₂e to the IMAGE baseline, taking into account that the participating countries represent 52% of global emissions. The major sectors in which the reductions are projected to take place are oil and gas production (37% of total reductions), coal mining (36%), and landfills (20%).

A similar analysis was performed for the methane reduction measures considered in the *Climate and Clean Air Coalition*² initiative, leading to a maximum reduction level of 1.8 GtCO₂e. This value was not excluded in our analysis as it represents reduction potential rather than multilateral reduction targets.

Climate and Clean Air Coalition

Aim/Scope: Reducing black carbon (BC) emissions from diesel vehicles, biomass stoves, brick kilns, coke ovens and waste burning.

Key actors: 44 partner countries and 54 non-state partners.

Estimated reduction: Based on the most recent 100 year global warming potential, the emission reductions are estimated to be 0.8 GtCO₂e by 2020 compared with a baseline level of 3.0 GtCO₂e; the total reduction is projected to be 1.6 GtCO₂e by 2030 relative to a baseline level of 2.1 GtCO₂e, based on extrapolation of targets to this year. The result is very uncertain as BC has mainly a short-term impact.

Short-Lived Climate Forcers (SLCFs) include methane, black carbon, ozone and hydrofluorocarbons (HFCs). Roughly one third of global warming, in terms of CO₂e budget, can be attributed to such non-CO₂ forcers (IPCC, 2014). In 2011, the United States and environment ministers from five other countries launched the *Climate and Clean Air Coalition (CCAC) to Reduce Short-lived Climate Pollutants (SLCP)* (UNEP, 2011). The CCAC currently has 44 partner countries and 54 non-state partners. The members of this coalition have agreed to work together until 2022, but this can be extended by a decision of the coalition. This assessment assumes an extension until 2030.

The effects of black carbon emission reductions were analysed in this study because there is a considerable potential benefit, particularly in the short term. The CACC described seven measures that target BC emissions from incomplete combustion: technical measures, covering diesel vehicles, clean-burning biomass stoves, brick kilns and coke ovens, as well as primarily regulatory measures, including banning agricultural waste burning, eliminating high emitting vehicles and providing modern cooking and heating. While these measures reduce BC emissions they will also reduce organic carbon (OC) emissions, which most likely will have a small positive radiative forcing effect, as opposed to BC (Bond et al., 2013).

Emissions from the participating countries represent 37% of the global total. In 2010, global BC and OC emissions were estimated at 4.7 Mt and 10.7 Mt, respectively. Global baseline emissions are projected to decrease to 3.1 Mt (BC) and 10.3 Mt (OC) by 2030. Applying percentage baseline reductions from Shindell et al. (2012) to the IMAGE baseline resulted in projected reductions of between 1.2 Mt (BC) and 3.0 Mt (OC) by 2020 and 0.9 Mt (BC) and 3.1 Mt (OC) by 2030. This was based on the assumption that all measures would be fully implemented by all participating countries. Taking the most recent 100 year global warming potential (Bond et al., 2013), this is equivalent to 1.6 GtCO₂e in 2030, compared with a baseline emission level of 2.1 GtCO₂e. However, the precise climate effects of BC are very uncertain and only take place in the very short term (BC remains in the atmosphere up to a maximum of several weeks only).

The BC emission reductions as calculated above were not included in the overall results of our assessment. Apart from the large degree of uncertainty, one reason for this is that BC is not a Kyoto greenhouse gas and therefore is not part of the baseline considered in international climate policy negotiations.

New York Declaration of Forests

Aim/Scope: Reducing global greenhouse gas emissions from deforestation and forest degradation (REDD) as well as achieving negative CO₂ emissions from reforestation and land restoration.

Key actors: The New York Declaration on Forests: 26 national governments, 23 large multinationals and more than 50 civil society and indigenous organisations.

Estimated reduction: 0.7 GtCO₂ by 2030 (0.4 GtCO₂ of which through REDD) with an estimated baseline level of 0.4 GtCO₂e (total land-use emissions).

Several global initiatives are concerned with *Reducing Emissions from Deforestation and forest Degradation* (REDD), among which the UN-REDD Programme is well-known. The aim of this programme is to reduce REDD emissions in developing countries and is a sector initiative that originally started in the UNFCCC, but is now a separate UN initiative. Although it is a large-scale international effort, the UN-REDD Programme does not have specific, quantified reduction targets. Therefore, we have included only The New York Declaration on Forests (NYDF) in our assessment which does have such targets.

The NYDF is a non-legally binding political declaration that originated at the UN Secretary-General's Climate Summit as part of its new international sustainable development goals. With the declaration, 26 national governments, 23 large multinationals and more than 50 civil society and indigenous organisations endorsed a global timeline to halve natural forest loss by 2020, and strive to end it by 2030. In addition, the declaration calls for the restoration of 150 million hectares of forest and agricultural land by 2020 with an additional 200 million hectares by 2030. The participants hope to achieve these goals by supporting the agricultural sector in eliminating deforestation for the production of commodities such as palm oil, soy, paper and beef products. The participants further aim to reward countries and territories that reduce forest emissions by creating public policies to increase payments for verified emission reductions.

The NYDF participants represented 20% of global CO₂ land-use emissions in 2010. Emissions from the countries taking part in the initiative are projected to decrease from 1.0 GtCO₂e in 2010 to 0.4 GtCO₂e by 2030. The emission reductions from the NYDF are estimated at 0.7 GtCO₂ by 2030, 0.5 GtCO₂ of which is the result of ending natural forest loss, and 0.2 GtCO₂ of which is the result of reforestation and restoration. Total land-use emissions by 2030 for the IMAGE baseline are estimated at 1.2 GtCO₂, which is considerably less than the annual average for the period 2000–2010; i.e. 4.9 GtCO₂. Only reductions that can be implemented by the participating countries were taken into account. The allocation of regional emissions from IMAGE was done based on forest area per country. With zero deforestation in 2030, it was assumed that land-use change emissions in the participating countries would be net zero. For 2020, this reduction was assumed to be half that of 2030. The impact of reforestation and restoration was assessed on the basis of IMAGE regrowth dynamics that determine carbon uptake up until 2020 and 2030 given the phased restoration under the initiative of 350 million hectares of land.

International Maritime Organization

Aim/Scope: Improving energy efficiency and reducing CO₂ emissions from all international freight and cruise ships above a minimum size.

Key actors: International ship owners; ship builders.

Estimated reduction: 0.2 GtCO₂e by 2030, compared with a baseline level of 0.7 GtCO₂e.

Emissions from international shipping currently represent 2% of global CO₂ emissions and this share is expected to increase in the future. In 2011 the countries of the *International Maritime Organization* (IMO) adopted mandatory measures to improve energy efficiency and reduce greenhouse gas emissions from international shipping. These measures entered into force on 1 January 2013 and address the largest and most energy-intensive vessel types responsible for about 70% of greenhouse gas emissions from international shipping (IMO, 2012).

As almost all countries in the world are members of the IMO, it was assumed they would all implement the mandatory measures. The CO₂ reduction by 2030 after implementation of these measures was estimated at 0.2 GtCO₂e compared with a baseline level of 0.7 GtCO₂e. These reductions were derived by applying the reduction percentages derived from the IMO study (19% to 26%) to the IMAGE baseline. The range depends on the degree of implementation of cost-effective measures and baseline fleet growth assumptions in the scenarios. These reductions lead to emission levels in 2030 that are about the same as present day emissions. This is in line with the conclusions of the most recent IMO study on projected greenhouse gas emissions from shipping (IMO, 2015) (Government of Germany, 2015).

International Civil Aviation Organization

Aim/Scope: Improving energy efficiency and reducing CO₂ emissions from international aviation.

Key actors: Airlines, aircraft manufacturers, airspace regulators.

Estimated reduction: 0.3 GtCO₂e by 2030 compared with 0.9 GtCO₂e baseline emissions.

Emission reductions for international aviation have been excluded from the commitments made under the UNFCCC as it appeared difficult to allocate emissions to specific countries. In 2010, the *International Civil Aviation Organization* (ICAO) adopted a resolution which made reference to commitments announced by the *International Air Transport Association* (IATA) and other sector organisations on behalf of the international air transport industry. These commitments are to continuously improve CO₂ efficiency by an average of 1.5% per year from 2009 to 2020 with an 'aspirational goal' of reducing carbon emissions by 50% by 2050 relative to 2005 levels (ICAO, 2010). The latter was translated into a global fuel-efficiency improvement rate of 2% per year from 2021 to 2050.

The members of the ICAO that are expected to take measures represent 50% of global international aviation emissions. Emission reductions by ICAO were estimated to amount to 0.3 GtCO₂e by 2030 at a baseline of 0.9 GtCO₂e. IATA estimates a reduction of 21% in CO₂ emissions from international aviation due to expected fleet renewals compared with a scenario without fleet renewal, with 2020 emissions of about 0.9 GtCO₂e (IATA, 2009a, b). Applying the targets of 1.5% average annual CO₂ efficiency improvement in the period from 2010 to 2020 and 2% annual improvement thereafter to the IMAGE baseline, suggested that international aviation CO₂ emissions would largely stabilise at 0.5 GtCO₂e by 2020 and 0.6 GtCO₂e by 2030.

Zero Routine Flaring by 2030

Aim/Scope: Reducing CO₂ emissions from gas flaring in oil production.

Key actors: World Bank, oil companies, national governments, development institutions.

Estimated reductions: 0.1 GtCO₂e by 2030 compared with a baseline level of 0.1 GtCO₂e.

The *Zero Routine Flaring by 2030* initiative was introduced by the World Bank and brought together oil companies, national governments and development institutions to agree on eliminating CO₂ emissions from gas flaring by 2030. Although much of the associated gas from oil production is already captured for economic reasons, some is still flared due to technical, regulatory or economic constraints. Ten governments currently endorse the principle of the initiative.

Global flaring emissions are projected to amount to 0.3 GtCO₂e by 2020 and 0.25 GtCO₂e by 2030. The participating countries represented 35% of global flaring emissions in 2010. If it is assumed that emissions from the 10 participating countries were to be eliminated, the total in emission reductions would be 0.1 GtCO₂e by 2030.

Notes

- 1 http://www.covenantofmayors.eu/covenant_signatories.pdf, retrieved 8 April 2015.
- 2 Shindell et al., 2012; UNEP, 2011; <http://www.unep.org/ccac/>.

4 Limitations and expectations

4.1 Limitations of this assessment

Current policies

As the starting point of our assessment is a baseline without current policies, it is not possible to show the overlap between initiatives and national policies that are currently implemented. However, it is possible to compare emission levels after the implementation of current policies, which amount to emission levels of 59.7 GtCO₂e by 2030 (PBL, 2015).¹ This implies a reduction of 2.8 GtCO₂e compared with the IMAGE baseline level, which is less than projected for international initiatives.

Extrapolation of pledges to 2030

To show the overlap between international initiatives and national pledges, we made use of the pledge emission ranges from the UNEP Gap Report (2014c). As there are no pledges yet for the commitment period beyond 2020, the 2030 estimates are based on an extrapolation of the 2020 pledges. It is expected that countries will submit successive pledges, now called Intended Nationally Determined Contributions (INDCs) to the UNFCCC. These submissions are likely to take place before the COP meeting in Paris in December 2015. This assessment could therefore be improved following the submission of the INDCs.

Progress of international initiatives

The results and conclusions as described in the previous sections are based on the assumption that the international initiatives will deliver on their commitments. It is difficult to assess whether these international initiatives can actually achieve this as the commitments that have been made are voluntary and there is some lack of transparency. Accountability and compliance are also difficult to enforce. Furthermore, the lack of MRV (Monitoring, Reporting, Verification) standards inhibit consistent assessment and review of commitments (IVM, 2015). Some initiatives have already started publishing

databases with information on the progress of cities and companies, such as the CDP Open Data Portal² and the Carbons Climate Registry.³ This is a first step, as the Carbon Action Initiative, a CDP initiative, for example, found that only 80% of the companies correctly reported all the details necessary to be able to accurately assess the achievability and ambition of the reduction targets. We did not find any such databases for other initiatives, although the NAZCA UNFCCC database could fill this gap. For almost none of the initiatives there are any cost estimates or feasibility studies publicly available. It is therefore difficult to identify critical barriers to the implementation of these initiatives.

4.2 Expectations of international initiatives

Our assessment includes 11 initiatives that were found to have significant, quantified emission reduction targets. This required either an overall target or, for individual targets for each participant, a publication stating the aggregated emission reductions. Three initiatives that were assessed were estimated to have only a small impact. After this assessment more international initiatives began with more publications providing aggregated targets. This could lead to additional emission reductions on top of the selected initiatives as indicated in our assessment. Therefore, we have included a short list of international initiatives that may be promising but which were not included in our assessment.

The three international initiatives that were assessed but based on their current status have little impact but which could be promising in the near future were:

- *RE100*. The aim is that at least 100 companies will make a global 100% renewable commitment with a clear time frame to achieve their goal. So far 16 companies have joined.
- *Aichi biodiversity targets*. A set of multilateral agreements with the aim of preserving biodiversity, draw up under the Convention on Biological Diversity that 196 countries are signatories to. These targets were assessed using the IMAGE model, and are not expected to result in greenhouse gas emission reductions compared with the baseline. A more ambitious preservation target would have a significant impact in a shorter timescale.
- *The Millennium Development Goal (MDG) target on sanitation* aims to halve the proportion of the population without sustainable access to safe drinking water and adequate sanitation. Implementing measures to improve sanitation could result in methane reductions, but the impact of the initiative, assessed on the basis of the IMAGE baseline, was found to be very small in the short term.

Some initiatives recently published information on targets and some new initiatives have also started. The following may be promising in the near future:

- *The Climate Group States & Regions Alliance/CDP States and Regions*. The alliance includes 27 local government bodies that share expertise, demonstrate impact and aim to influence international climate dialogue. The group provides an annual report on the climate targets set by local governments.
- *1 Gt Coalition*. The 1 Gigaton Coalition supports countries in measuring and reporting reductions of greenhouse gas emissions resulting from their activities and initiatives in the energy sector.
- *We Mean Business / Science Based Targets*. We Mean Business is a coalition of organisations working with thousands of the world's most influential businesses and investors. Science Based Targets is part of this and helps businesses to establish targets in line with climate science.
- *En.Lighten* was set up by the United Nations Environment Programme and the Global Environment Facility and aims to accelerate a global market transformation towards more efficient lighting.
- *Bridging the gap/SloCat*. Both initiatives are multi-stakeholder initiatives that link transport and climate change. They promote action in both the public and private transport sectors.
- *Sustainable Energy for All initiative* is a multi-stakeholder partnership between governments, the private sector and civil society. Launched by the UN Secretary-General in 2011, it has three linked objectives to be achieved by 2030: 1) ensure universal access to modern energy services, 2) double the global rate of improvement in energy efficiency, 3) double the share of renewables in the global energy mix. This initiative also includes the Global Alliance for Clean Cooking Stoves, Zero Routine Flaring, and the Global Energy Efficiency Accelerator Platform. We included the flaring initiative in our assessment.

Notes

1 Harmonised to 2010 emissions from UNEP (2013).

2 <https://data.cdp.net/>.

3 <http://carbonn.org/>.

References

- Bond TC, Doherty SJ, Fahey DW, Forster PM, Berntsen T, DeAngelo BJ, Flanner MG, Ghan S, Kärcher B, Koch D, Kinne S, Kondo Y, Quinn PK, Sarofim MC, Schultz MG, Schulz M, Venkataraman C, Zhang H, Zhang S, Bellouin N, Guttikunda SK, Hopke PK, Jacobson MZ, Kaiser JW, Klimont Z, Lohmann U, Schwarz JP, Shindell D, Storelvmo T, Warren SG and Zender CS. (2013). Bounding the role of black carbon in the climate system: A scientific assessment. *Journal of Geophysical Research: Atmospheres* 118:5380–5552.
- C40 Cities (2013). The Rio numbers: C40 cities can reduce greenhouse gas emissions by over a billion tons per year in 2030. C40 Cities, http://c40-production-images.s3.amazonaws.com/researches/images/17_C40_The_20Rio_20Numbers_20-_20City_20Emissions_20Reduction_20Potential.original.pdf?1388095836.
- C40 Cities (2014). C40 City Diplomacy Update, <http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/events/slidesfragola.pdf>.
- C40 Cities (2015). C40 Blog. C40 Cities, http://www.c40.org/blog_posts/10-years-of-results-c40-by-the-numbers.
- CDP (2012). Business resilience in an uncertain, resource-constrained world. CDP Global 500 Climate Change Report 2012. Carbon Disclosure Project (CDP), <https://www.cdp.net/CDPResults/CDP-Carbon-Action-Report-2012.pdf>.
- CDP (2014). Climate action and profitability. CDP S&P 500 Climate Change Report 2014. Carbon Disclosure Project (CDP) North America, <https://www.cdp.net/CDPResults/CDP-SP500-leaders-report-2014.pdf>.
- CDP (2015a). Mind the science. Science Based Targets, Carbon Disclosure Project (CDP), <https://www.cdp.net/Documents/technical/2015/mind-the-science-report-2015.pdf>.
- CDP (2015b). The state of play. Emissions reporting and climate change action at the sub-national level. Carbon Disclosure Project (CDP), http://www.thedclimategroup.org/_assets/files/TCG-CDP_Emissions_Report__Dec2014.pdf.
- EPA (2006). Global Mitigation of Non-CO₂ Greenhouse Gases. United States Environmental Protection Agency (EPA), Washington DC, http://www.epa.gov/climatechange/Downloads/EPAactivities/GM_Cover_TOC.pdf.
- EPA (2013a). Global Mitigation of Non-CO₂ Greenhouse Gases: 2010-2030. United States Environmental Protection Agency (EPA), Washington DC, report EPA-430-R-13-011, http://www.epa.gov/climatechange/Downloads/EPAactivities/MAC_Report_2013.pdf.
- EPA (2013b). Summary: North American 2013 HFC Submission to the Montreal Protocol U.S. Environmental Protection Agency.

- GFEI (2012). Global Fuel Economy Initiative. Plan of action 2012-2015. Global Fuel Economy Initiative (GFEI), FIA Foundation, International Energy Agency (IEA), International Transport Forum, UNEP, International Council on Clean Transportation (ICCT), <http://www.iea.org/media/files/globalfueleconomyinitiativeplanofaction20122015.pdf>.
- GFEI (2014). Fuel Economy, state of the world 2014. The world is shifting into gear on fuel economy. Global Fuel Economy Initiative (GFEI), FIA Foundation, International Energy Agency (IEA), International Transport Forum, UNEP, International Council on Clean Transportation (ICCT), <http://www.fiafoundation.org/media/44120/gfei-annual-report-2014-executive-summary.pdf>.
- GMI (2011). Global methane emissions and mitigation opportunities. Global Methane Initiative (GMI), https://www.globalmethane.org/documents/analysis_fs_en.pdf.
- Government of Germany (2015). Greenhouse gas emission reduction targets for international shipping. German Federal Environment Agency (UBA), Öko-Institut, CE Delft.
- Hajer M, Nilsson M, Raworth K, Bakker P, Berkhout F, de Boer Y, Rockström J, Ludwig K and Kok M (2015). Beyond cockpit-ism: Four insights to enhance the transformative potential of the sustainable development goals. *Sustainability* (Switzerland) 7:1651–1660.
- IATA (2009a). Aviation and Climate Change Pathway to carbon-neutral growth in 2020. International Aviation Transport Association (IATA), <https://www.iata.org/whatwedo/environment/Documents/aviation-climatechange-pathway-to2020.pdf>.
- IATA (2009b). The IATA Technology Roadmap Report, 3rd Edition. International Aviation Transport Association (IATA), <https://www.iata.org/whatwedo/environment/Documents/technology-roadmap-2009.pdf>.
- ICAO (2010). Environmental report 2010. International Civil Aviation Organization, http://www.icao.int/environmental-protection/Documents/Publications/ENV_Report_2010.pdf.
- IEA (2009). Transport, energy and CO₂. International Energy Agency (IEA), Paris.
- IEA (2013). World Energy Outlook 2013. International Energy Agency, Paris, France.
- IIASA (2015). SSP Database (Shared Socioeconomic Pathways) - Version 1.0. IIASA, <https://secure.iiasa.ac.at/web-apps/ene/SspDb>.
- IMO (2012). Energy efficiency and the the reduction of GHG emissions from ships. International Maritime Organization (IMO), <http://www.imo.org/en/MediaCentre/HotTopics/GHG/Pages/default.aspx>.
- IMO (2015). Third IMO Greenhouse Gas Study 2014. International Maritime Organization (IMO), <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Third%20Greenhouse%20Gas%20Study/GHG3%20Executive%20Summary%20and%20Report.pdf>, London.
- IPCC (2014). Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- IVM (2015). Non-state actors in a Paris agreement. Are cities and companies bridging the ambition gap? in Widerberg O, Pattberg, P. (ed.). Institute for Environmental Studies (IVM), FORES.

- Kona A, Melica G, Calvete SR, Zancancell P, Iancu A, Gabrielaitiene I, Saheb Y, Janssens-Manhout G, and Bertoldi P. (2015). The Covenant of Mayors in figures and performance indicators: 6-year assessment. Joint Research Centre (JRC).
- Moorhead J and Nixon T. (2014). Global 500 greenhouse gases performance 2010-2013: 2014 report on trends. A Thomson Reuters financial and risk white paper. BSD Consulting, Thomson Reuters.
- PBL (2013). Integrated Assessment of Global Environmental Change with Model description and policy applications IMAGE 3.0. PBL Netherlands Environmental Assessment Agency, Bilthoven.
- PBL (2015). PBL Climate Pledge INDC tool. PBL Netherlands Environmental Assessment Agency, Bilthoven.
- Seto KC, Dhakal S, Bigio A, Blanco H, Delgado GC, Dewar D, Huang L, Inaba A, Kansal A, Lwasa S, McMahon JE, Müller DB, Murakami J, Nagendra H and Ramaswami A (2014) Human settlements, infrastructure, and spatial planning. In: Edenhofer O, R Pichs-Madruga, Y Sokona, E Farahani, S Kadner, K Seyboth, A Adler, I Baum, S Brunner, P Eickemeier, B Kriemann, J Savolainen, S Schlömer, C von Stechow, T Zwicker and JC Minx (eds.) *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, United Kingdom and New York, NY.
- Shindell D, Kuylenstierna JCI, Vignati E, Van Dingenen R, Amann M, Klimont Z, Anenberg SC, Muller N, Janssens-Maenhout G, Raes F, Schwartz J, Faluvegi G, Pozzoli L, Kupiainen K, Höglund-Isaksson L, Emberson L, Streets D, Ramanathan V, Hicks K, Oanh NTK, Milly G, Williams M, Demkine V and Fowler D. (2012). Simultaneously mitigating near-term climate change and improving human health and food security. *Science* 335:183–189.
- Slingerland S, Meyer L, Van Vuuren DP and Den Elzen M. (2011). *Forks in the Road. Alternative routes for international climate policies and their implications for the Netherlands*. PBL Netherlands Environmental Assessment Agency, Bilthoven.
- The New Climate Economy (2014). *Better growth, better climate: the New Climate Economy report*. The New Climate Economy. The Global Commission on the Economy and Climate, [newclimateeconomy.report](http://www.newclimateeconomy.report), Washington D.C.
- UNEP (2011). *Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers*. United Nations Environment Programme, http://www.unep.org/pdf/Near_Term_Climate_Protection_&_Air_Benefits.pdf, Nairobi, Kenya.
- UNEP (2014a). *The Emissions Gap Report 2014: A UNEP Synthesis Report*. United Nations Environment Programme (UNEP), Nairobi.
- UNEP (2014b). *Proposed amendment to the Montreal Protocol submitted by Canada, Mexico and the United States of America*. Twenty-Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. United Nations Environment Programme, Nairobi.

- UNEP (2014c). Proposed amendment to the Montreal Protocol submitted by the Federated States of Micronesia. Twenty-Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. United Nations Environment Programme, Nairobi.
- UNEP (2015). Climate commitments of subnational actors: A quantitative assessment of their emission reduction impact. United Nations Environment Programme (UNEP), Nairobi.
- Van Asselt H and Zelli F. (2014). Connect the dots: Managing the fragmentation of global climate governance. *Environmental Economics and Policy Studies* 16:137–155.
- Velders GJM, Fahey DW, Daniel JS, McFarland M and Andersen SO. (2009). The large contribution of projected HFC emissions to future climate forcing. *Proceedings of the National Academy of Sciences of the United States of America* 106:10949–10954.
- Velders GJM, Ravishankara AR, Miller MK, Molina MJ, Alcamo J, Daniel JS, Fahey DW, Montzka SA and Reimann S. (2012). Preserving montreal protocol climate benefits by limiting HFCs. *Science* 335:922–923.
- WBCSD, IEA (2009). Cement technology roadmap 2009. Carbon emission reductions up to 2050. World Business Council on Sustainable Development (WBCSD), International Energy Agency (IEA), <https://www.iea.org/publications/freepublications/publication/Cement.pdf>.
- Wouters K. (2013). Wedging the gap. An analysis of the impact of existing large-scale bottom-up initiatives for greenhouse gas emission mitigation in 2020. Master Thesis. Ecofys, Universiteit van Utrecht, <http://dspace.library.uu.nl/handle/1874/287883>.

Appendix

Table 3
Overlap between initiatives and pledges scenario

	Additional to other ICIs	Additional to pledges
International Initiatives		
Top 500 companies in the Carbon Disclosure Project	100%	1%
WBCSD: Cement sector with the Cement Sustainability Initiative	90%	6%
Major cities initiatives: C40 Cities and Covenant of Mayors	75%	12%
Global Fuel Initiative	96%	5%
Including HFCs in the Montreal Protocol	100%	42%
Methane in Air Pollution policy: Global Methane Initiative	100%	53%
REDD+: Reducing Emissions from Deforestation and Forest Degradation	100%	40%
International shipping sector (IMO)	100%	100%
International aviation sector (ICAO)	100%	100%
Zero Routine Flaring by 2030	29%	18%

Table 4

More information on international initiatives

International initiatives	Website
Selected international alternatives	
Top 500 companies of the Carbon Disclosure Project	https://www.cdp.net/en-US/Results/Pages/Carbon-Action-Reports.aspx
Cement sector with the Cement Sustainability Initiative	http://www.wbcsd.org/work-program/sector-projects/cement/overview.aspx http://www.wbcsdcement.org/co2data http://www.wbcsdcement.org/GNR-2010/index.html
Major cities initiatives: C40 Cities Covenant of Mayors	http://www.c40cities.org/ http://www.eumayors.eu/index_en.html
Global Fuel Economy Initiative	http://www.fiafoundation.org/our-work/global-fuel-economy-initiative
Including HFCs in the Montreal Protocol	http://www.epa.gov/ozone/intpol/mpagreement.html
Methane and black carbon in air pollution policy: Global Methane Initiative Climate and Clean Air Coalition	http://www.globalmethane.org; http://www.epa.gov/climatechange/Downloads/EPAactivities/GlobalMitigationFullReport.pdf http://www.ccacoalition.org/ Shindell et al., 2012; UNEP, 2011; http://www.unep.org/ccac/
REDD+: Reducing Emissions from Deforestation and forest Degradation New York Declaration on Forests Bonn Challenge	http://www.un-redd.org/ http://newsroom.unfccc.int/nature-s-role/un-climate-summit-forests/ http://www.bonnchallenge.org/content/challenge
International shipping sector (IMO)	http://www.imo.org/en/MediaCentre/HotTopics/GHG/Pages/default.aspx
International aviation sector (ICAO)	http://www.iata.org/policy/environment/Pages/climate-change.aspx
Zero Routine Flaring by 2030	http://www.worldbank.org/en/programs/zero-routine-flaring-by-2030
Promising international alternatives	
RE100	http://there100.org/
Aichi biodiversity targets	https://www.cbd.int/sp/targets/ https://www.cbd.int/information/parties.shtml

International initiatives	Website
Selected international alternatives	
The Millennium Development Goal (MDG) target on sanitation	http://www.undp.org/content/undp/en/home/mdgoverview/mdg_goals/mdg7.html http://www.un.org/millenniumgoals/pdf/MDG%20Report%202010%20En%20r15%20-low%20res%2020100615%20-.pdf#page=60
The Climate Group States & Regions Alliance CDP States and Regions	http://www.theclimategroup.org/what-we-do/programs/states-and-regions/ https://www.cdp.net/en-US/Programmes/Pages/states-and-regions.aspx
1 Gt Coalition	http://www.unep.org/energy/Portals/50177/Flyer_1Gigaton_07.pdf
We Mean Business Science Based Targets	http://www.unep.org/energy/Portals/50177/Flyer_1Gigaton_07.pdf http://sciencebasedtargets.org/
En.Lighten	http://www.enlighten-initiative.org/
Sustainable Energy for All initiative	http://www.se4all.org/

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