



# Climate commitments of subnational actors and business

A quantitative assessment of their emission reduction impact



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June 2015

# Contents



ii

Acronyms .....	iii
Glossary .....	iv
Acknowledgements .....	v
Executive Summary .....	vi
<b>1 Introduction .....</b>	<b>1</b>
<b>2 Non-state climate initiatives .....</b>	<b>3</b>
<b>3 Methodology .....</b>	<b>5</b>
3.1 Introduction .....	5
3.2 Categorisation of initiatives .....	5
3.3 Criteria for the selection of initiatives .....	5
<b>4 Company initiatives .....</b>	<b>7</b>
4.1 Introduction and scope .....	7
4.2 Description of selected initiatives .....	8
4.3 Quantifying company initiatives .....	8
4.3.1 Determining company GHG emissions .....	9
4.3.2 Projecting company emissions to 2020 .....	9
4.3.3 Estimating the impact of company initiatives .....	9
4.4 Results and conclusions .....	9
<b>5 Initiatives of cities and regions .....</b>	<b>11</b>
5.1 Introduction and scope .....	11
5.2 Description of selected initiatives .....	12
5.3 Quantifying city and regional level initiatives .....	13
5.4 Results and conclusions .....	13
<b>6 Sectoral initiatives .....</b>	<b>15</b>
6.1 Introduction .....	15
6.2 Energy efficiency initiatives .....	15
6.3 Oil and gas initiatives .....	17
6.4 Forestry initiatives .....	18
6.5 Agriculture Initiatives .....	19
6.6 Finance Initiatives .....	20
6.7 Other Initiatives .....	21
<b>7 Overlap analysis .....</b>	<b>23</b>
7.1 Overlap between non-state action areas .....	23
7.2 Overlap with national pledges .....	24
<b>8 Conclusion .....</b>	<b>27</b>
References .....	29
<b>Appendix 1 List of major non-state initiatives quantified in this study .....</b>	<b>31</b>
<b>Appendix 2 Specific methodologies and assumptions for the quantification of the selected initiatives .....</b>	<b>33</b>
Methodological steps for company initiatives .....	33
Methodological steps for city and regional level initiatives .....	34
Methodological steps for sectoral initiatives .....	35

# Acronyms



iii

ACCO	Association of Climate Change Officers	IPCC	Intergovernmental Panel on Climate Change
ADP	Ad-Hoc Working Group on the Durban Platform for Enhanced Action	IRENA	International Renewable Energy Agency
ACEC	Africa Clean Energy Corridor	ITF	International Transport Forum (of the OECD)
ASEI	Asia Solar Energy Initiative	IUCN	International Union for Conservation of Nature
BAU	Business As Usual	LNG	liquefied natural gas
BEI	Baseline Emission Inventory	Mt	megaton
BELC	Business Environmental Leadership Council	NAZCA	Non-State Actor Zone for Climate Action
CBD	Convention on Biological Diversity	NGO	non-governmental organization
CCAC	Climate and Clean Air Coalition	nrg4SD	Network of Regional Governments for Sustainable Development
CCBA	Climate, Community and Biodiversity Alliance	OECD	Organisation for Economic Co-operation and Development
cCR	carbonn Climate Registry	PDC	Portfolio Decarbonisation Coalition
CDP	(formerly) Carbon Disclosure Project	REDD+	Reduced Emissions from Deforestation and Forest Degradation
CISL	Cambridge Institute of Sustainable Leadership	R20	Regions of Climate Action
CoM	Covenant of Mayors	SBT	Science Based Targets
CO <sub>2</sub> e	carbon dioxide equivalent	SEAD	Super-efficient Equipment and Appliance Deployment
COP	Conference of the Parties (to the UNFCCC)	SEAP	Sustainable Energy Action Plan
CSI	Cement Sustainability Initiative	SEII	Solar Europe Industry Initiative
C2ES	Center for Climate and Energy Solutions	SIDS	Small Islands Developing States
C40	C40 Cities Climate Leadership Group	SLCP	short-lived climate pollutant
EERE	US Department of Energy	TFA	Tropical Forest Alliance
FIA	Fédération Internationale de l'Automobile	UCLG	United Cities and Local Governments
GBPN	Global Buildings Performance Network	UITP	International Association of Public Transport
GCF	Governors' Climate and Forest Task Force	ULCOS	Ultra-Low CO <sub>2</sub> Steelmaking
GEF	Global Environment Facility	UNEP	United Nations Environment Programme
GFEI	Global Fuel Economy Initiative	UNFCCC	United Nations Framework Convention on Climate Change
GGFR	Global Gas Flaring Reduction Partnership	UNGC	United Nations Global Compact
GHG	greenhouse gas	WBCSD	World Business Council on Sustainable Development
Gt	gigatonne	WEO	World Energy Outlook
ICCT	International Council on Clean Transportation	WMCCC	World Mayors Council on Climate Change
ICLEI	International Council for Local Environmental Initiatives	WRI	World Resources Institute
IDFC	International Development Finance Club	WWF	World Wide Fund for Nature
IEA	International Energy Agency		
IEA ETP	IEA Energy Technology Perspectives		
IGO	intergovernmental organization		

# Glossary



iv

**Additionality:**

A criterion sometimes applied to projects aimed at reducing greenhouse gas emissions. It stipulates that the emission reductions accomplished by the project must not have happened anyway had the project not taken place.

**Business-as-usual:**

A scenario that describes future greenhouse gas emission levels in the absence of additional mitigation efforts and policies (with respect to an agreed set).

**Carbon dioxide equivalent:**

A way to place emissions of various radiative forcing agents on a common footing by accounting for their effect on climate. It describes, for a given mixture and amount of greenhouse gases, the amount of carbon dioxide that would have the same global warming ability, when measured over a specified time period. For the purpose of this report, greenhouse gas emissions (unless otherwise specified) are the sum of the basket of greenhouse gases listed in Annex A to the Kyoto Protocol, expressed as carbon dioxide equivalents assuming a 100 year warming potential.

**Extensification:**

Development of a more extensive production system in agriculture, i.e., one which utilizes large areas of land, but with minimal inputs and expenditures of capital and labour.

**Intensification:**

An increase in agricultural production per unit of inputs.

**Non-state climate initiatives:**

Initiatives outside of the United Nations Framework Convention on Climate Change aimed at reducing emissions of greenhouse gases by, for example, promoting actions that are less greenhouse gas intensive, compared to prevailing alternatives. Cooperative initiatives also involve national and subnational partners (they are often referred to as, simply, 'cooperative initiatives').

**Pledges:**

For the purpose of this assessment, pledges include Annex I targets and non-Annex I actions, as included in Appendix I and Appendix II to the Copenhagen Accord, and subsequently revised and updated in some instances.

**Regions:**

Areas in a country. Often, but not always, self-governing. Also called provinces or states.

**Sensitivity:**

A technique used to determine how different values an input variable will impact the results of a calculation under a given set of assumptions.

**State actors:**

Any national or subnational government. In this context, non-state actors refer to parties outside any formal government structure.

# Acknowledgements



V

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# Executive Summary



vi

Initiatives which catalyse climate action are now recognised increasingly as playing an important role in mitigating greenhouse gas emissions (GHG) and bridging the global emissions gap. The number and range of these initiatives is growing rapidly. There are several open questions about these initiatives at a global scale, including what contribution they can make to closing the emissions gap, but also what makes a successful initiative and how can this be replicated and scaled up. This paper focuses on the first of these questions.

Quantifying the emission reduction contribution these initiatives can (or are likely to) make is now critically important to understanding their overall impact on international climate mitigation efforts. By demonstrating what is already being achieved through these initiatives, such analysis could also play an important role in encouraging national governments to pledge more ambitious commitments through the international negotiations. In this report, we present a quantitative assessment of the total GHG emissions mitigation impact in 2020 of current important non-state climate action.

## 1. What are non-state initiatives?

Non-state climate initiatives is the name given to the set of initiatives that are driven by other actors than central governments: cities, regions, companies, NGOs, etc. The aims and activities of initiatives range from high level political or technical dialogue to concrete mitigation objectives and actions. There is a wide variety of initiatives across many sectors. These initiatives often deliver emission reductions on a short term – in many cases ahead of government action – and also deliver other benefits linked to sustainable growth. We concentrate in this analysis on co-operative initiatives, that are international in nature, which involve groups of actors working together in a structured way. In addition to these co-operative initiatives, many individual actors, such as cities, regions, companies, NGOs, but also citizen collectives, have committed to action on their own.

By April 2015, more than 180 co-operative initiatives had been identified and included in the Climate Initiatives Platform, with more than 20,000 participant organisations (including NGOs, IGOs, companies, research institutions, national and subnational governments as well as international

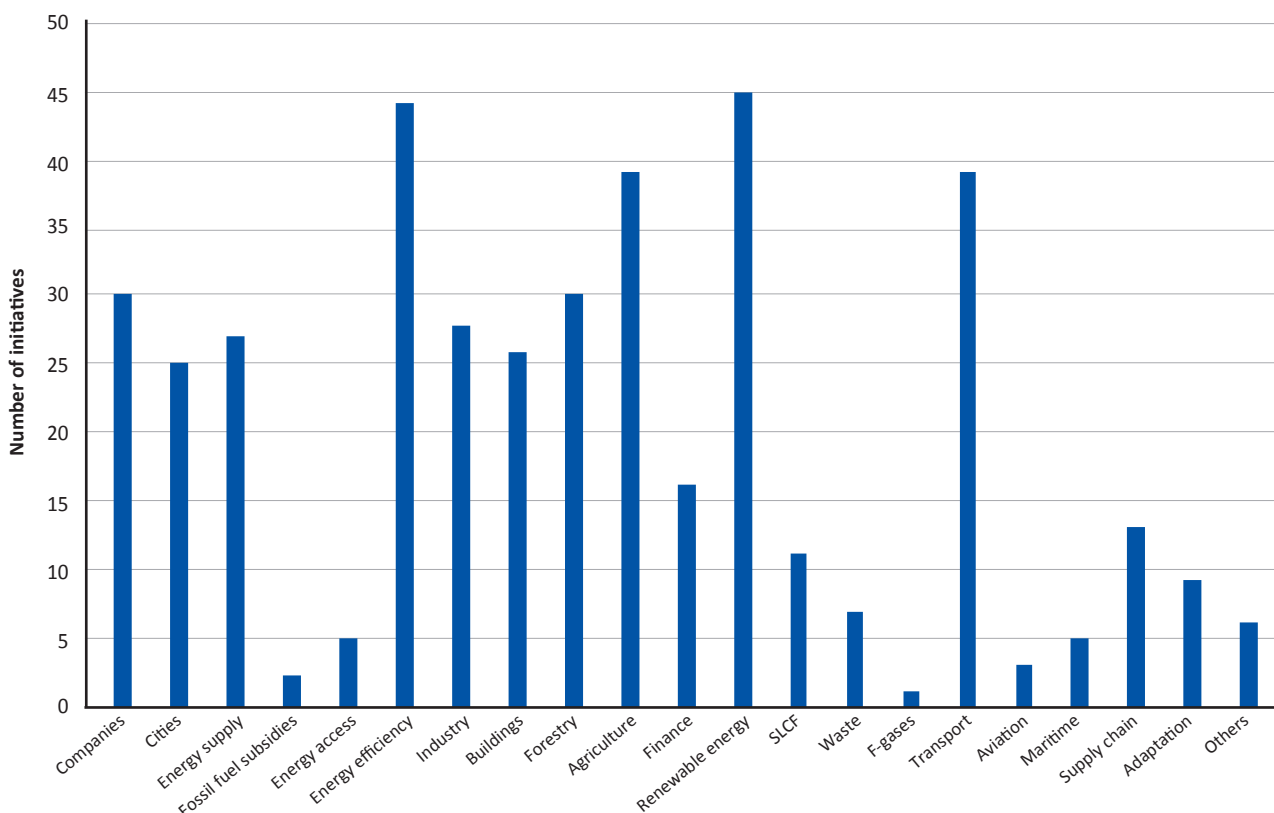


Figure A: Number of initiatives by thematic focus. Many initiatives have more than one thematic focus



organisations). Table A below shows the number of initiatives in different themes. The themes where there are most initiatives are: renewable energy, energy efficiency, transport and agriculture.

**2. How did we select which initiatives to quantify?**

While all initiatives can play a role in the long-term transition to a low-carbon future, certain conditions are needed to deliver actual emission reductions on the ground. These conditions include concrete mitigation actions and/or quantified mitigation targets, a range of participants (which can include governments, but must include non-government actors) and participants that have the power to realise the emission reduction.

We therefore give priority in this analysis to those criteria as described below, alongside the volume of emissions targeted.

*Concrete mitigation action or targets*

In a number of the initiatives, the participants agree upon mitigation targets or actions to reduce their own emissions. The targets or actions do not necessarily have to be the same

for all participants. Where agreed targets or actions exist, the initiative is deemed has having concrete targets. In other initiatives, the mitigation objective is more broadly defined for a sector, for example in agriculture or energy supply. We classify these as having concrete actions if there has been some demonstrable progress towards the objective, or if there are specific actions, with responsibilities and timescales, defined.

*Capacity to deliver*

In this report we focus on those initiatives that are directly actionable by the participants, i.e. that are within their direct sphere of decision.

*Targeted volume of emission reductions*

The total volume of emission reductions delivered by an initiative is determined by the geographical and sectoral scope covered and the percentage of reduction achieved below a business-as-usual scenario. For practical purposes, in this report the focus is set on those initiatives that have the potential to deliver a total volume of emission reductions above a threshold, which is defined at 50 MtCO<sub>2</sub>e per year in 2020.

**Table A: Quantified initiatives in this study**

Company Initiatives	
<b>Business Environmental Leadership Council (BELC)</b>	BELC is the largest U.S.-based group of corporations. Companies adopt voluntary emission reduction targets and innovative programs in energy, carbon sequestration and waste management.
<b>Cement Sustainability Initiative (CSI)</b>	CSI is an alliance of 25 leading companies in the global cement industry created under the WBCSD. Participants commit to developing a climate change mitigation strategy, setting reduction targets for CO <sub>2</sub> and reporting annually on their progress.
<b>World Wide Fund for Nature (WWF) Climate Savers</b>	WWF Climate Savers is for companies seeking to substantially reduce their carbon footprints. Each participant sets a reduction target in absolute terms and within a defined timeframe.
<b>Ultra-Low CO<sub>2</sub> Steelmaking (ULCOS)</b>	ULCOS is a consortium of 48 European companies and organisations from 15 European countries. The aim of the ULCOS programme is to reduce the CO <sub>2</sub> emissions of today's best steel production routes by at least 50%.
<b>Caring for Climate</b>	Caring for Climate is an initiative aimed at advancing the role of business in addressing climate change. Participants commit to set voluntary targets to improve energy efficiency and to reduce their carbon footprint.
<b>Science-Based Targets</b>	A joint initiative by CDP, the UN Global Compact, the World Resources Institute and WWF launched in 2014, aiming to increase corporate ambition on climate action consistent with limiting global warming to less than 2 °C compared to pre-industrial temperatures.
City and Region Initiatives	
<b>C40</b>	C40 cities are a network of the world's megacities committed to taking action that reduces global GHG emissions.
<b>carbonn Climate Registry (cCR)</b>	cCR is not only an initiative itself, but the reporting platform for two other initiatives: The Global Cities Covenant on Climate – The Mexico City Pact
<b>Covenant of Mayors</b>	The CoM is a group of city mayors, mostly from the EU, who commit to meet and exceed the EU CO <sub>2</sub> reduction target of 20% by 2020 (from a 1990 baseline).
<b>The Climate Group's State and Regional Alliance</b>	The State and Regional Alliance brings together 27 subnational government leaders to share expertise, demonstrate impact and influence the international climate dialogue. In 2005 they signed the Montreal Declaration of Federated States & Regions, in which they commit to setting targets and implementing climate action in their own jurisdictions.

Sectoral Initiatives	
<b>en.lighten</b>	The en.lighten initiative was established to accelerate a global market transformation towards environmentally sustainable, energy efficient lighting technologies. It supports participating countries to develop strategies and policies targeting the phase-out of inefficient incandescent lamps.
<b>Global Alliance for Clean Cookstoves</b>	The Global Alliance for Clean Cookstoves aims to help overcome the market barriers that currently hinder the widespread production, deployment, and use of clean cook stoves in the developing world. Begun in 2010, it is a public-private alliance of government, IGOs, NGOs and private sector organisations.
<b>Global Gas Flaring Reduction Partnership (GGFR)</b>	The GGFR work program focuses on reducing the barriers to gas flaring reduction in partner countries. It consists of government and company members and is managed and facilitated by a World Bank team.
<b>Tropical Forest Alliance</b>	The Tropical Forest Alliance – along with two related initiatives – supports private sector members to engage with governments, civil society leaders and other businesses worldwide, to achieve a reduction in the deforestation of tropical forest. Its partners take voluntary actions, individually and in combination, to reduce the tropical deforestation associated with the sourcing of commodities, such as palm oil, soy, beef, paper and pulp.
<b>The New Vision for Agriculture</b>	Defined by World Economic Forum partners in 2009, the New Vision for Agriculture holds that to meet the world's needs, sustainable agriculture must simultaneously deliver food security, environmental sustainability and economic opportunity. Together with 32 key partner organisations, this initiative has so far engaged over 350 organisations.

### 3. Which initiatives are included?

In calculating the total, we analysed 15 major initiatives in the areas of: cities and regions; companies; and sectors, such as energy efficiency, methane, agriculture and finance. The initiatives that we took into account in the assessment of total impact are included in Table A.

### 4. How are the emissions reductions quantified?

The method used to quantify the emission reductions that would result from each initiative, depends on the form of the commitments and the information available. We calculate the reductions relative to a business-as-usual scenario that aims to take account of current government policies. The methodology is tailored to the individual initiatives (or initiative types). Cities and companies tend to have individual targets even within a co-operative initiative. The methodology used for these initiatives is therefore based on an aggregation of these individual targets. Other types of initiatives need to be quantified in a different way. These methodologies are described in detail in the report. The calculations initially assume that the initiatives act in isolation from each other, but of course there are overlaps. For example, many companies with reduction commitments will be in cities covered by initiatives, and city and company reduction commitments may well be achieved in part through efficient lighting. In addition, we therefore adjust the totals to account for overlaps between initiatives, both in the same sector and between sectors.

### 5. What will these initiatives contribute in 2020?

Our study shows that action from existing climate initiatives involving cities, companies and sectors could save 2.9 GtCO<sub>2</sub>e, with a range of 2.5–3.3 GtCO<sub>2</sub>e. This is corrected for overlap between the initiatives.

Although much of the focus in the international negotiations is on the period after 2020, i.e. 2025 and 2030, many of the initiatives focus on action over a shorter timescale. We, therefore, concentrate on quantifying the impact in 2020.

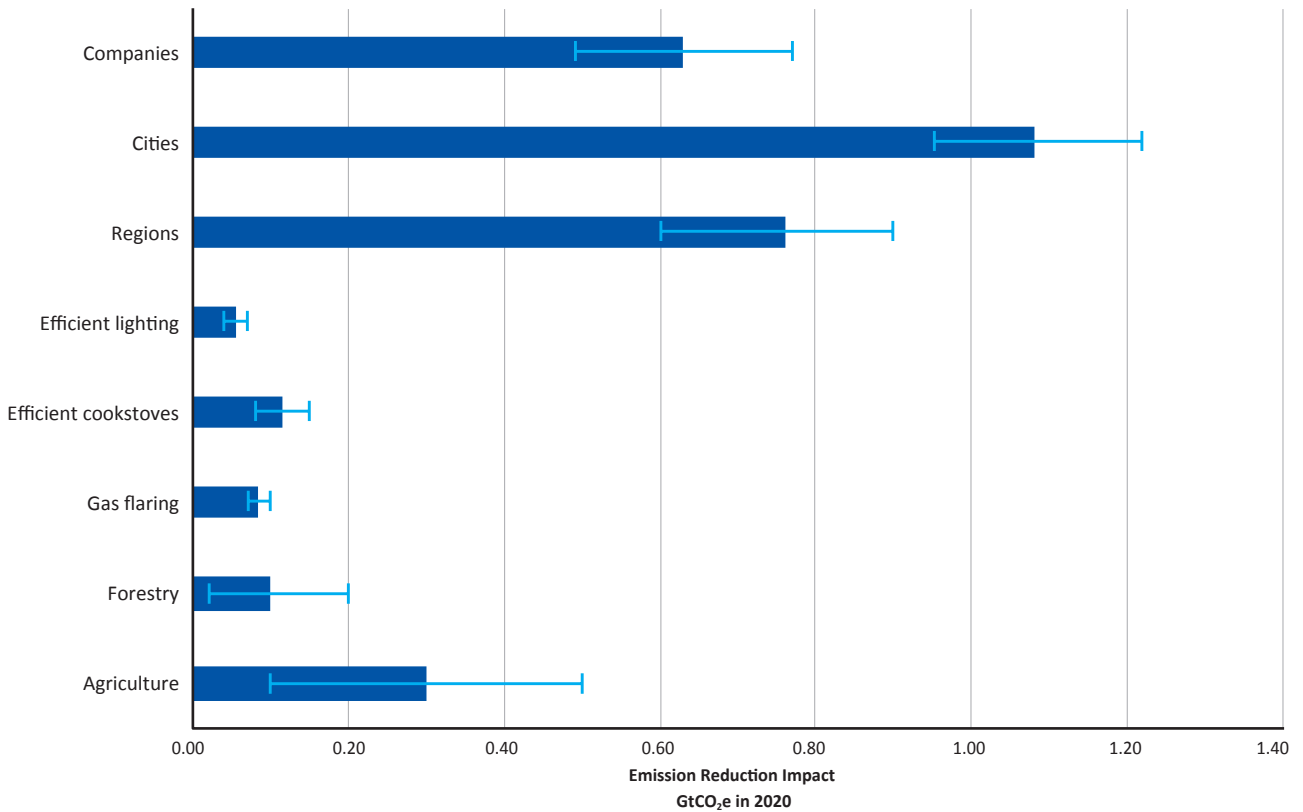
Figure B shows the emission reductions expected from the major initiatives analysed in this report. The data in this figure are not corrected for overlap between the initiatives. Therefore, the total impact is slightly lower than the sum of the impact of the individual initiatives.

We also analysed to what extent there is overlap between the impact of these initiatives and government pledges. Although this overlap is difficult to quantify, we are confident that the overlap is not more than one third of the impact of the initiatives, i.e. less than 1 GtCO<sub>2</sub>e. In future it is essential that initiatives are tightly defined both in terms of goals as well as quantified emission reductions.

In addition to the major initiatives shown above, there are initiatives that could deliver significant reductions, but that for a variety of reasons had to be left out of this analysis. This is particularly the case for forestry and finance initiatives.

### 6. What can we conclude about the impact of non-state initiatives?

The more than 180 initiatives that we initially considered are very diverse in scope and approach. Some make a direct contribution to closing the emissions gap, whereas others advocate action that is largely driven by governments. There is another group that lays the foundation for future action by encouraging reporting of emissions. Major initiatives of cities and regions are already delivering commitments that should result in emission reductions even higher than was previously identified as possible. Companies are also making commitments that represent a significant proportion of the



**Figure B: Emission reduction impacts found in this study**

identified potential. However, there remain areas where there is an untapped potential for specific action. These include in particular energy efficiency and renewable energy, but also agriculture and forestry. Although many initiatives exist in these sectors, they lack either specific actionable objectives and the means to deliver them, or scale. The initiatives we analysed cover only part of the potential that could be delivered by non-state initiatives.

This analysis should be considered as a snapshot of where initiatives stand today. Many initiatives are scaling up or are

still in a too early phase to quantify. There is great scope for initiatives to scale up and to learn from the success in city and company initiatives for formulating quantifiable goals that are actually delivered. With greater emphasis on the quantification of emission reductions of the initiatives alongside a similar effort on the national pledges we are able to ultimately provide a more accurate picture.

UNEP will continue to track these commitments by subnational actors and business and integrate the newest developments in the 2015 Emissions Gap Report.



## 1

## Introduction



1

Over 90 countries have made voluntary pledges and commitments toward cutting their emission levels. However, despite these and related efforts, current pledges and commitments are not sufficient to keep the average rise in global temperature below 2 degree Celsius compared to preindustrial levels: the associated “gap” in required emissions reductions is not closing. The 2013 UNEP Emissions Gap Report (UNEP 2013), reported that the gap in 2020, defined as the difference between global emission levels consistent with the 2 °C target and the emission levels expected if country pledge cases are implemented, is between 8–10 GtCO<sub>2</sub>e. The 2014 UNEP Emissions Gap Report (UNEP 2014) indicates that the emission gap in 2020 has remained unchanged if the basis is the least cost scenario starting with reductions in 2010.

Initiatives which catalyse non-state climate action are now recognised increasingly as playing an important role in mitigating greenhouse gas emissions and bridging the global emissions gap. The number and range of these initiatives is growing rapidly. At the end of 2014, more than 180 co-operative mitigation-focussed initiatives with potential for global impact were counted (Climate Initiatives Platform, 2015). In addition to these initiatives, there are many thousands of others that are smaller in scale with limited numbers of participants. Many new initiatives were launched during the UN Climate Summit in New York in September 2014 (Climate Summit, 2014) and non-state actions have become increasingly cited during the UNFCCC climate negotiations in recent years<sup>1</sup>. The Non-State Actor Zone for Climate Action (NAZCA) portal was launched by the Peruvian Presidency of UNFCCC COP20/CMP10 in collaboration with the UNFCCC to progressively showcase the extraordinary range of actions being undertaken by thousands of cities, investors and corporations.

There are several open questions about these initiatives at a global scale, including what contribution they can make to closing the emissions gap, but also what makes a successful initiative and how can this be replicated and scaled up. This paper focuses on the first of these questions. Quantifying the contribution these initiatives can (or are likely to) make is now critically important for understanding their overall impact on international climate mitigation efforts. By demonstrating what is already being achieved through these initiatives, such analysis could also play an important role in encouraging national governments to pledge more ambitious commitments through the international negotiations.

In this report, we present a quantitative assessment of the total GHG emissions mitigation impact in 2020 of current non-state climate action. We concentrate on those initiatives that have potential to be large scale. Although much of the focus in the international negotiations is on the period after 2020 i.e. 2025 or 2030, many of the initiatives focus on action over a shorter timescale, with targets up to 2020. We therefore concentrate on quantifying the impact in 2020. We expect that over the next few years, new targets for the post 2020 period will be agreed by existing and new members of initiatives. Thus any quantification now for post 2020 would likely lead to an underestimate of the contribution from initiatives.

The total calculated impact represents the GHG emission reduction and takes into account overlaps between initiatives. We will also estimate to what extent the emission reductions are additional to those achieved through climate action of national governments.

<sup>1</sup> For example, through the ADP-2 platform: <http://unfccc.int/resource/docs/2014/adp2/eng/l05.pdf>



## 2 Non-state climate initiatives



Non-state climate initiatives is the name given to the set of initiatives that are driven by other actors than Parties to the UNFCCC: cities, regions, companies, NGOs, etc. This does not mean that the initiatives exclude participation of central governments; indeed many of the more successful ones combine government and non-government actors, but the main drivers come from actors other than central government.

There is a wide variety of initiatives across many sectors. These initiatives often deliver emission reductions on a short term – in many cases ahead of government action – and also deliver other benefits linked to sustainable growth. We concentrate in this analysis on co-operative initiatives that are international in nature, which involve groups of actors working together in a structured way. In addition to these co-operative initiatives, many individual actors, such as cities, regions, companies, NGOs, but also citizen collectives, have committed to action on their own.

We took the Climate Initiatives Platform<sup>2</sup> as the main basis for our assessment. By April 2015, more than 180 mitigation

initiatives had been identified, with more than 20,000 participant organisations, including NGOs, companies, research institutions, national and subnational governments as well as international organisations (Climate Initiatives Platform, 2015). Figure 2.1 shows the number of initiatives in different themes. The themes where there are most initiatives are: renewable energy, energy efficiency, transport and agriculture. These themes largely correspond to the areas where the greatest potential was identified in the UNEP Emissions Gap Report 2013 (UNEP 2013), with the exception of short lived climate pollutants, where there seem to be fewer initiatives.

The aim, scope and degree of concrete action of the initiatives varies considerably, from knowledge sharing platforms, to initiatives in which the participants sign up to specific targets. The degree of monitoring and reporting of the initiatives is also very varied. The degree to which initiatives can be quantified further differs, depending on design.

Because some actors are in more than one initiative and/or similar actions contribute to several initiatives, in any

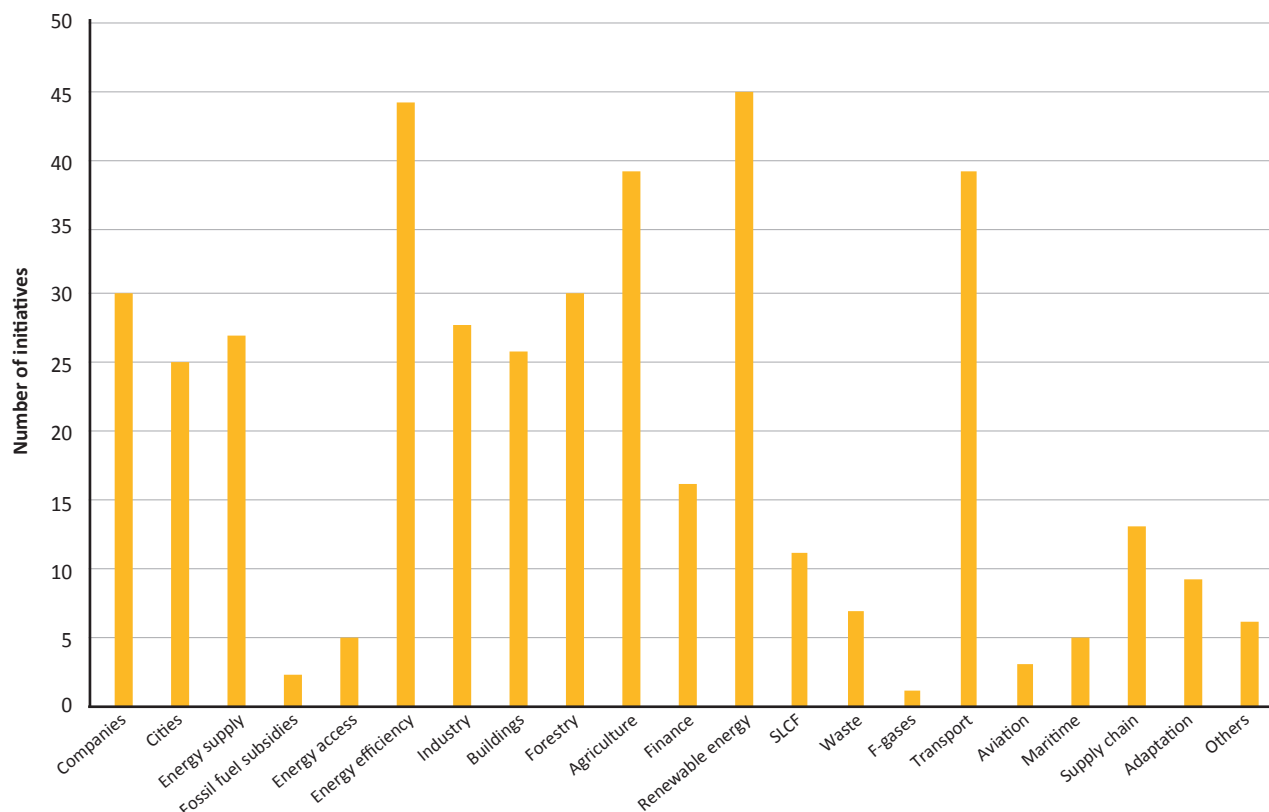


Figure 2.1: Number of initiatives by thematic focus. Many initiatives have more than one thematic focus.

<sup>2</sup> <http://climateinitiativesplatform.org/>.

analysis, overlaps between initiatives need to be taken into account. The methodology we have adopted is outlined in the next section and then described in more detail in the sections on different initiative types as well as in Appendix 2.

As well as co-operation of parties within an initiative, in many cases initiatives co-operate with each other. This can reinforce action and help scale up initiatives. Examples of more

overarching initiatives include the Compact of Mayors, the 1 Gigaton Coalition and the 2014 Global Investor Statement on Climate Change. These overarching initiatives are described in the relevant sections. The emission reductions for different initiatives are in most cases calculated from the targets of specific actors so it is assumed that aggregation effects of these overarching initiatives will be reflected in those targets.





# 3 Methodology

## 3.1 Introduction

To quantify the effect of these initiatives, we select the most significant ones, calculate the emission reductions that they will deliver, taking into account the overlap between initiatives, and with the pledges and commitments made by national governments in the UNFCCC process. Figure 3.1 below describes the overall methodology. The details of the quantification are given in the following sections for each type of initiative. Appendix 2 contains a more detailed description of the methodological steps and assumptions for the quantification of the selected initiatives.

If we talk about the business-as-usual development in this report, we assume that all firmly implemented current policies are included.

## 3.2 Categorisation of initiatives

For this analysis, we have categorised the initiatives into companies, cities/regions and sectoral. The companies and cities/regions are separated out as the targets for these initiatives often cut across many themes, for example renewable energy, energy efficiency and low carbon transport. As a rule the emphasis is on direct emission

reduction within the operations of the company<sup>3</sup>, or within the boundaries of cities and regions. The sectoral initiatives focus on actions within a sector, often, but not always, bringing together different types of actors, for instance in the supply chain.

## 3.3 Criteria for the selection of initiatives

We follow the following definition for inclusion of initiatives, in line with the Climate Initiatives Platform (Climate Initiatives Platform, 2015):

- have the potential to contribute to reduction of greenhouse gas emissions<sup>4</sup>; *and*
- are international in scope or have the potential for significant impact at global scale; *and*
- are either dialogues, formal multilateral processes or implementation initiatives<sup>5</sup>.

The aims and activities of the identified initiatives range from high level political or technical dialogue, to concrete mitigation objectives and actions. While all initiatives can play a role in the long-term transition to a low-carbon future, certain conditions are needed to deliver emission reductions over and above those pledged by governments. These conditions include concrete mitigation actions and/or

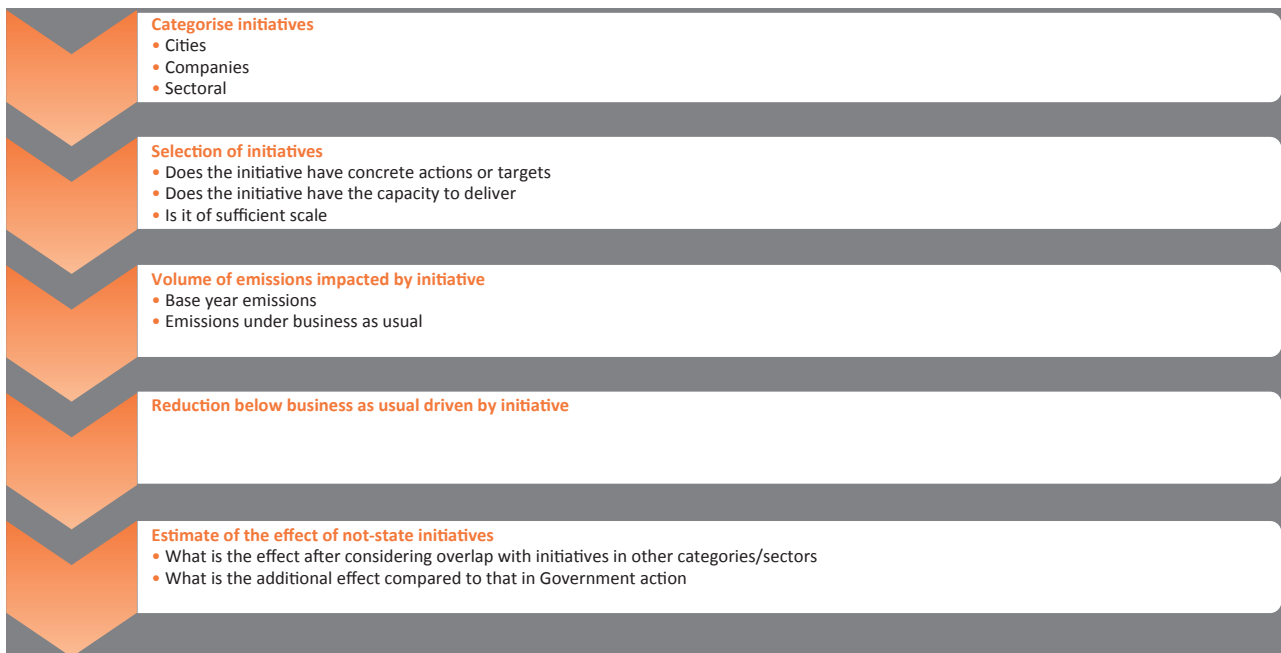


Figure 3.1: Outline methodology for quantification

<sup>3</sup> In general also including indirect emissions.

<sup>4</sup> Initiatives with the primary focus of adaptation were not included, although some of the initiatives include both mitigation and adaptation.

<sup>5</sup> Initiatives focused on enabling countries to meet their pledges through sharing good practices and technical knowledge.

quantified mitigation targets, a range of participants (which can include governments, but must include non-government actors) and participants that have the power to realise the emission reduction. We therefore give priority in this analysis to those criteria, alongside the volume of emissions targeted.

#### Concrete action or targets

In a number of the initiatives, the participants agree upon targets or actions for reducing their own emissions, both direct and supply chain emissions in some cases. The targets or actions do not necessarily have to be the same for all participants. Where agreed targets or actions exist, the initiative is deemed to have concrete targets. Examples of this type of initiative are particularly found in the cities and companies areas. In other initiatives, the mitigation objective is more broadly defined for a sector, for example in agriculture or energy supply. We classify these as having concrete actions if there has been some demonstrable progress towards the objective, or if there are specific actions, with responsibilities and timescales, defined.

#### Capacity to deliver

The potential for effective mitigation impact depends on the chances of meeting the stated aspirations. Some initiatives define mitigation objectives that depend solely on their decisions and capacity of participants. In other cases, initiatives define mitigation objectives that can only be achieved through actions that fall beyond participants' direct sphere of decision e.g. by the widespread adoption of a certain technology in an economic sector. In this report we focus on those initiatives that are directly *actionable* by the participants.

#### Targeted volume of emission reductions

The total volume of emission reductions delivered by an initiative is determined by the geographical and sectorial scope covered and the percentage of reduction achieved below a business-as-usual scenario. For practical purposes, in this report the focus is set on those initiatives that have the potential to deliver a total volume of emission reductions above a threshold, which is defined at 50 MtCO<sub>2</sub>e per year in 2020<sup>6</sup>. This threshold was informed by previous work on quantifying initiatives e.g. Wouters 2013, with the aim of including those initiatives which would be material in the final total.

6

<sup>6</sup> This threshold does not apply for 'cities' and 'companies' initiatives, since the mitigation impact is calculated at an aggregated level for the whole group; however, it is relevant for 'sectorial' initiatives as they are quantified on an initiative per initiative basis.

# 4 Company initiatives

## 4.1 Introduction and scope

The corporate sector plays a crucial role in the combat against climate change. The top 1,000 largest greenhouse gas (GHG) emitting companies are responsible for the annual emission of 10 GtCO<sub>2</sub>e, or about 20% of the world’s annual GHG emissions<sup>7</sup>. Various initiatives exist trying to catalyse emission reductions in this sector, with almost a quarter of the top 1,000 emitting companies participating in one or more initiatives (Wouters, 2013).

There are many company initiatives with sustainability or environmental aims, but we identified 10 with the main aim to address the challenges of climate change. Almost all initiatives have a global coverage, with some however focussing on particular regions of the world. Some initiatives are specifically aimed at a particular energy-intensive sector, such as the cement or steel sector. The first identified initiative, Responsible Care, started in 1985 and the most recent one, RE100, started at the end of 2014.

Figure 4 provides an overview of the identified initiatives, their start date and the number of companies participating in each.

None of the company initiatives have a joint emission reduction target for the initiative, except one (ULCOS). Some initiatives require the participating companies to set their own emission reduction commitments, while in others they do not have to set clear commitments and these initiatives act as a platform to exchange best practices and advocacy.

The latter is the case for Responsible Care, World Business Council for Sustainable Development (WBCSD), the Association of Climate Change Officers (ACCO) and The Clean Revolution. Additionally, CDP Supply Chain provides a platform for exchanging information on climate change management. These initiatives have therefore not been selected for quantification, as there is no direct link between these initiatives and company targets. CDP Carbon Action mostly stimulates GHG emission reductions in companies

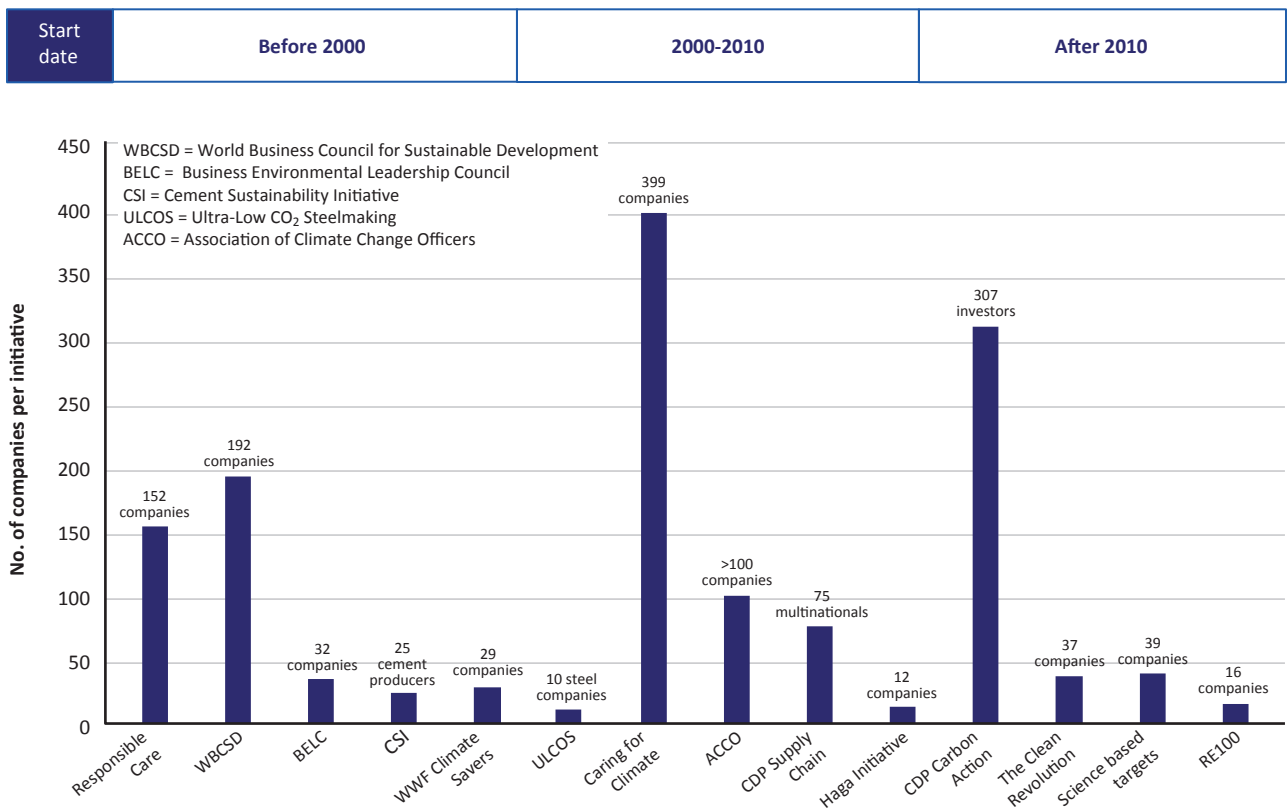


Figure 4: The company initiatives identified in this study, their start date and the number of participants

<sup>7</sup> Jong (2011) estimated that the GHG emissions of the top 1,000 GHG emitting companies was 10 GtCO<sub>2</sub>e in 2008. Global GHG emissions were 50.9 GtCO<sub>2</sub>e in 2010 with the scale of global GHG emissions having remained around that level over the years (European Commission JRC, 2014).

other than the investing participants' own company, and the participants' company will most likely participate in one of the other initiatives too. The Haga Initiative is also not quantified, being primarily focused on Swedish companies and subsidiaries and therefore having a scope too narrow for quantification. RE100 was only launched recently at the UN Climate Summit in 2014 and it is too early to assess its impact. Companies belonging to the following initiatives are included in the analysis: the Business Environmental Leadership Council (BELC), Cement Sustainability Initiative (CSI), World Wide Fund for Nature (WWF) Climate Savers, Ultra-Low CO<sub>2</sub> Steelmaking (ULCOS), Caring for Climate and Science Based Targets.

## 4.2 Description of selected initiatives

The Center for Climate and Energy Solutions (C2ES) created **BELC** in 1998, with the belief that business engagement is critical for developing efficient, effective solutions to the climate problem (C2ES, 2014). BELC is the largest U.S.-based group of corporations, consisting of 32 members focused on addressing the challenges of climate change and supporting mandatory climate policy. Companies adopt voluntary emission reduction targets and innovative programs in energy, carbon sequestration and waste management.

The **CSI** is an alliance of 25 leading companies in the global cement industry created under the WBCSD in 1999 as a sector-project (WBCSD, 2014). The CSI provides a platform for sharing understanding of sustainability issues and to identify actions and facilitate steps cement companies can take to accelerate progress towards sustainable development. When participants sign the CSI Charter, they commit to developing a climate change mitigation strategy, setting reduction targets for CO<sub>2</sub> and reporting annually on their progress, including independent third party assurance.

**WWF Climate Savers** is a global leadership platform, which positions multinational corporations at the forefront of the low-carbon economy (WWF, 2014). WWF currently collaborates with 28 global companies through the Climate Savers programme. The programme acts as a sounding board and provides guidance for companies seeking to substantially reduce their carbon footprints. The member companies work with other companies, suppliers and partners to implement innovative solutions for a low carbon economy. Each participant sets a reduction target in absolute terms and with a defined timeframe. Targets and progress are reviewed on a regular basis and publicly communicated.

**ULCOS** is a consortium of 48 European companies and organisations from 15 European countries, coordinated by ArcelorMittal, that have launched a cooperative research & development initiative to enable strong reduction in CO<sub>2</sub> emissions from steel production. The aim of the ULCOS programme is to reduce the CO<sub>2</sub> emissions of today's best steel production routes by at least 50%. It is not stated when this target is to be reached.

**Caring for Climate** is the UN Global Compact, UNEP and UNFCCC's initiative aimed at advancing the role of business in addressing climate change (Caring for Climate, 2014). UN Secretary-General Ban Ki-moon launched the initiative in 2007 and currently it has 399 signatories. The initiative helps companies to advance practical solutions, share experiences and shape public policy and public attitudes. By supporting the Caring for Climate Statement, participants commit to setting voluntary targets to improve energy efficiency and to reduce their carbon footprint. Participants report publicly and annually on the achievement of those targets.

**Science Based Targets** is a joint initiative by CDP, the UN Global Compact (UNGC), the World Resources Institute (WRI) and WWF launched in 2014, aiming to increase corporate ambition on climate action consistent with limiting global warming to less than 2 °C compared to pre-industrial temperatures (SBT, 2015). Ecofys, as the technical partner, developed a target-setting methodology that allows companies to set credible, science-based GHG emission reduction targets on a company-wide level consistent with the two degree pathway. So far, 39 companies have made a commitment, via CDP, to set science-based targets (CDP, 2015). Companies are supported by methodological guidance and tools to set their target. A platform to track the performance of companies is being developed.

## 4.3 Quantifying company initiatives

The selected company initiatives do not have specific joint targets, but setting a GHG emission reduction target is a prerequisite to joining the initiatives. The exception is ULCOS, which is the only initiative that has stated a quantitative target. However, meeting this target relies heavily on the efforts of the participating companies to reduce their own CO<sub>2</sub> emissions. The quantification of the impact due to the selected company initiatives is therefore based on the individual targets of the companies and carried out using the following steps:

1. Determine the total GHG emissions of companies participating in one or more selected company initiatives;
2. Estimate the GHG emissions by 2020 under a business-as-usual (BAU) scenario;
3. Estimate the impact of the company initiatives on the BAU emission.

### 4.3.1 Determining company GHG emissions

We determined annual emissions for companies from a number of sources, including those reporting to CDP as part of their own sustainability programme. More details are given in Appendix 2. This resulted in the final GHG emission data set covering 167 companies out of the 500+ companies participating in at least one of the selected initiatives. Most companies not in our GHG dataset belong to the financial, technology or consumer product sector and generally have lower emissions. The total emissions from companies in our dataset were 3.2 GtCO<sub>2</sub>e in 2013 in terms of scope 1 and 2 emissions<sup>8</sup>. This is a significant total when

taken in the context of emissions from the top 1000 emitting companies of 10 GtCO<sub>2</sub>e.

### 4.3.2 Projecting company emissions to 2020

The total GHG emissions of the 167 companies participating in one or more selected company initiatives is projected to 2020 using the International Energy Agency (IEA) World Energy Outlook (WEO) 2014. We use the emissions growth rates in the Current Policies scenario projections until 2020 to estimate the BAU emissions in 2020<sup>9</sup> (IEA, 2014). The increase in emissions depends on the sector of each company:

- For utility companies, the emission projections depends on operational region of the company
- For companies in all other sectors, the emission projections for the industry sector globally is used

### 4.3.3 Estimating the impact of company initiatives

To calculate the impact as described below, we needed a range of information including base year emissions, target formulation and the year in which the target was announced. It was not possible within the scope of this project to do this for all 167 companies so a random sample of 50 companies are used to estimate the impact of the selected company initiatives. We selected the random sample of companies proportionally to the number of companies participating in each initiative, because the information in the database was insufficient for the assessment. We therefore had to collection additional information for each individual sample company. Each initiative is represented at least once.

Some companies only set their GHG reduction targets after participating in one of the initiatives, whereas other companies had targets before engaging with any initiative. Companies also continuously update their target based on their achieved performance and future expectations. A business-as-usual emission projection would therefore be different from a company's perspective. To appropriately account for actions taken by each individual company, the starting year for BAU emission projections for each sample company is the year in which the company first made a quantitative emission reduction target<sup>10</sup>. To reflect the BAU emissions that would have been the view when the company made the commitment, we used the growth rate in emissions from the base year to 2020 from the version of the WEO which has the same base year. For companies with an emissions intensity target, we assume a 1% annual improvement of emission intensity under BAU. See Appendix 2 for further clarifications.

The impact of the emission reduction targets of the sample companies, in terms of the absolute emission reductions as compared to BAU, is then determined. This allows us to determine an average GHG reduction commitment in percentage. Applying this percentage against the projected BAU total GHG emissions of participating companies yields the impact of the selected company initiatives by 2020.

## 4.4 Results and conclusions

The total GHG emission projections in 2020 for companies participating in at least one selected company initiative and with emissions data in our dataset is 3.6 GtCO<sub>2</sub>e under the BAU scenario, up from 3.2 GtCO<sub>2</sub>e in 2013. Furthermore, the estimated GHG emissions of the participating companies without emissions available in the database, primarily from the financial, technology or consumer product sector, is 0.4 GtCO<sub>2</sub>e in 2020 (estimated based on emission rates of companies for which emissions are known). This brings the total GHG emissions to 4.0 GtCO<sub>2</sub>e under the BAU. The sample companies had an average commitment to reduce their BAU emissions by 22.6% by 2020, equivalent to an emission reduction impact in 2020 of 0.90 GtCO<sub>2</sub>e. However, of the 50 sampled companies, only 35 quantifiable emission reduction targets could be taken into consideration for the assessment<sup>11</sup>. Accounting for the lack of quantified emission reductions in 30% of the sampled companies, **on average, the emission reduction impact of the commitments of companies participating in the company initiatives is 0.63 GtCO<sub>2</sub>e by 2020.** The majority of the sample companies have set a target for 2020, with some companies not even having targets up to 2020. Only a handful companies have set targets beyond 2020.

Overall, the companies appear to be on track to meet their emission reduction commitments based on the sample companies. Emissions in 2013 were 23.6% below BAU emission for 2020. To remain on track with the commitments, companies need to stabilise their emissions and hence continue their efforts to improve their emissions performance; if companies would let emissions grow at BAU rates from 2013, this would put them off track.

Previous studies based on the top 1,000 largest GHG emitters have estimated a similar emission reduction commitment for company initiatives. Wouters (2013) used a similar methodology as in this report, using a sample of 25 of the top 1,000 GHG emitting companies who were participating in

<sup>8</sup> Scope 1 emissions are direct GHG emissions from e.g. combustion of fuels or process emissions. Scope 2 emissions are indirect GHG emissions, i.e. GHG emissions associated with the consumption of purchased electricity or heat.

<sup>9</sup> The Current Policies scenario projections from the WEO 2014 may already include the emissions reduction impact of some of the company initiatives. However, since it is not known which company initiatives are included in the Current Policies scenario, this impact in the BAU cannot be taken into account.

<sup>10</sup> For some companies the emission data in the year in which they made their first GHG reduction commitment is not available. The starting year has then been set at the earliest year in which GHG emission data is available.

<sup>11</sup> The different reasons for being able to include the 15 companies in the assessment include: the targets are set their emission reduction targets on an annual basis without having a clear commitment to continue their efforts, no new targets for the future have been defined yet, the target is only for a small share of the company's emissions, the target is for Scope 3 emissions such as business travel only or no target for GHG emission reduction itself but e.g. renewable energy.

company initiatives. She estimated a 16% average reduction target compared to BAU, resulting in a commitment of 0.73 GtCO<sub>2</sub>e in 2020. The main difference is the base year from which the BAU projections were made. Whereas Wouters (2013) used the 2008 GHG emissions of the sample companies, our methodology uses GHG emissions of the year in which the company announced a quantitative emissions reduction commitment. For some companies the base year was therefore before 2008, resulting in higher BAU emissions on average and thus a higher average reduction target compared to BAU.

The main uncertainties in the quantification of the effect of the initiatives are the BAU development, both in terms of absolute emissions growth and emissions intensity, and the selected sample companies. We performed a sensitivity analysis of commitment impact arising from the company initiatives, varying the annual growth assumptions and BAU emission intensity improvement by +/- 0.3% and determining the error in the result attributable to the

sampling of the commitments. Table 4.1 shows the impact of the uncertainties.

**Table 4.1 Sensitivity analysis of the companies initiatives emission reduction impact**

Uncertainty factor	Emission reduction impact	
	Uncertainty in 2020 (GtCO <sub>2</sub> e)	Difference to BAU in 2020 (GtCO <sub>2</sub> e)
BAU variation (+/- 0.3%)	+/- 0.04	0.59–0.67
Commitment sampling	+/- 0.14	0.49–0.77

This leads to a combined variation of +/- 0.14 GtCO<sub>2</sub>e based on error propagation calculations, meaning that the range of the estimated GHG reduction impact is 0.49–0.77 GtCO<sub>2</sub>e by 2020 due to uncertainties in the calculation methodology.



# 5 Initiatives of cities and regions

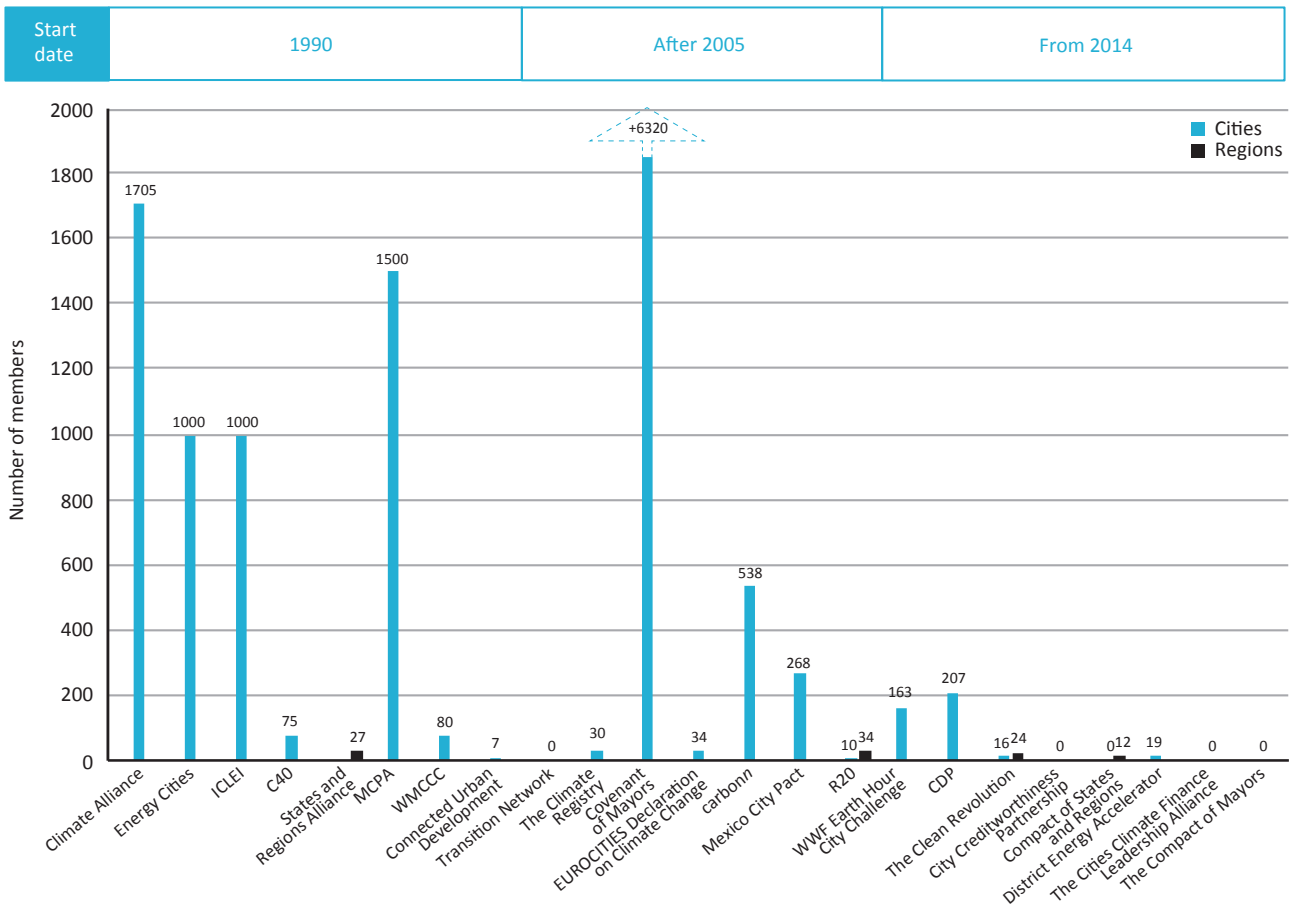
## 5.1 Introduction and scope

Cities are central to the world’s efforts to address the threat of climate change. The IPCC estimates that urban areas account for 71–76% of energy-related CO<sub>2</sub> emissions and that the world’s cities produce almost half (37–49%) of all global greenhouse gases (Christ, 2014). City initiatives enable participating cities or mayors to lead, show their national governments the extent of actions they are already undertaking and to positively influence national level strategies and policies. The initiatives cover all sizes of towns and cities. Similarly, at the subnational level, various forms of decentralisation offer subnational governments the responsibility to plan and establish their own (institutional) mechanisms to approach climate change mitigation. Sub-national jurisdictions, such as state or regional governments, have even attempted to compensate for the lack of political will at the national level (Somanathan et al., 2014).

We identified a total of 21 city or regional-level climate initiatives. Some started in the 1990s, but the majority started after 2005, including a few that were only announced during the UN Secretary-General’s Climate Summit in September 2014. The initiative with the most participants is the Covenant of Mayors, which has 6,317 cities of all sizes signed up (Covenant of Mayors, 2015). See Figure 5.1 for an overview of the initiatives and their number of city or regional level participants.

These initiatives take various forms and cities and regions in these initiatives also report on a number of different platforms. The reporting platforms, which may also be part of some of the initiatives, include carbonn Climate Registry (cCR) and CDP<sup>12</sup>.

The majority of initiatives are networks of cities or regions aiming to collaborate and share knowledge on GHG



**Figure 5.1: City- and regional-level initiatives identified in this study, their start date and the number of participants in each**  
 Source: Own compilation based on websites of initiatives NB The most recent initiatives have not yet finalised lists of participants.

<sup>12</sup> CDP is a global not-for-profit organization, founded in 2000 which operates a global natural capital disclosure system through which more than 4,500 companies from more than 80 countries and 207 cities report, manage and share vital environmental information.



**Box 1: UN Climate Summit 2014 Initiatives for cities and regions****Compact of Mayors**

The Compact of Mayors is an agreement by city networks, including ICLEI-Local Governments for Sustainability (ICLEI), C40 Climate Leadership Group (C40), United Cities and Local Governments (UCLG), and then by their members, to undertake a transparent and supportive approach to reduce city-level emissions, and to reduce vulnerability from, and enhance resilience to, climate change, in a consistent and complimentary manner to national level climate protection efforts. It builds on the ongoing efforts of Mayors that increasingly set ambitious, voluntary city climate commitments or targets for greenhouse gas (GHG) emission reduction and to address climate risk; report on progress towards achieving those targets by meeting robust, rigorous and consistent reporting standards (as established through City Networks); and make that information publically available by reporting through a recognized city platform such as CDP Cities programme and carbonn Climate Registry.

**Compact of States and Regions**

The Compact of States and Regions represents a commitment by global state and regional government networks, including nrg4SD, R20 and The Climate Group, and CDP, to provide an annual assessment of commitments (i.e. GHG reduction targets), and progress towards those commitments (i.e. GHG inventory data), made by state and regional governments around the world to support international climate governance processes. In early 2015, the CDP's states and regions platform was launched, which acts as the reporting platform for the Compact.

emission reductions. For example, R20 works to connect regions, technology and finance to build sustainable low-carbon projects. R20 reports to cCR and is a partner in the Compact of States and Regions. The Climate Group also runs an initiative called States and Regions Alliance, which encourages reporting of emissions from states and regions. Many of these initiatives are linked to each other and many cities participate in multiple initiatives. For example, Climate Alliance is a Covenant Supporter of the Covenant of Mayors, and the Mexico City Pact was the result of an alliance between, among others, the World Mayors Council on Climate Change (WMCCC) and ICLEI - Local Governments for Sustainability. Others are networks of cities for which greenhouse gas mitigation is not a main aim, such as Cities Alliance and United Cities and Local Government.

Based on the criteria outlined in Section 3, and taking into account the overlap in membership between the initiatives, we selected the following initiatives for quantification: C40, the carbonn Climate Registry (cCR), the Covenant of Mayors, and the Climate Group's State and Regions Alliance. The cCR is also the registry to report the emissions of the Mexico City Pact and the WWF Earth Hour Challenge cities. Further details of the selection process are in Appendix 2.

The initiatives that started in 2014 (see Figure 5.1) are still in the early stage of development, with potential to be significant in size. Based on the criteria we use for selection, these initiatives have not been quantified separately for what they will deliver in 2020 (see Box 1 for description of these initiatives). The potential size of all the initiatives announced at the UN Climate Summit 2014 has been quantified by Yale University to be 2.54 GtCO<sub>2</sub>e (Hsu et al, 2015). This includes 0.45 GtCO<sub>2</sub>e from the Compact of Mayors, some of which will be accounted for in this analysis because the Compact of Mayors brings together a number of existing initiatives.

**5.2 Description of selected initiatives**

The **carbonn Climate Registry (cCR)** hosted by ICLEI is not only an initiative itself, but the reporting platform for two other initiatives: **The Global Cities Covenant on Climate – The Mexico City Pact**, which commits cities to ten action points, including to reduce their local GHG emissions voluntarily, to adopt mitigation measures to achieve their targets and to report their emissions and targets through the cCR; and the **WWF Earth Hour Challenge**, where cities ideally commit to targets for reducing CO<sub>2</sub> emissions, although this is not required. Emissions and targets of participating cities are also reported through cCR. Participating cities reporting to cCR are from many supranational regions (e.g. Asia and Pacific, Latin America, North America, Europe, Sub-Saharan Africa<sup>13</sup>).

The **C40** network is an initiative of the world's megacities committed to taking action that reduces global GHG emissions (CDP, 2014). Over 100 of the cities in the C40 network report to CDP, along with others that report but don't have commitments as part of an international initiative. In addition to running the largest system for corporate environmental reporting, CDP operates a major initiative for cities. Each year, CDP invites cities around the world to report their progress in reducing emissions, setting targets and managing climate risks. In 2014, 207 cities on six continents responded to CDP's call to measure and manage their climate change-related data. CDP is the official reporting platform for the C40, as well as an approved mechanism for cities making commitments under the Compact of Mayors. City data is available for free on CDP's open data portal<sup>14</sup>.

In addition to the reporting on the CDP platform, an Open Data Portal for C40 cities was launched in 2015, which provides recent, annual city-wide emissions for C40 cities. It is also explained how cities measured emissions (primary protocol) and why emissions rose/fell since the prior reporting period (C40, 2015).

<sup>13</sup> Regions not included are for example Middle East, North Africa, and Pacific Islands States.

<sup>14</sup> Accessible at <http://data.cdp.net>



The **Covenant of Mayors (CoM)** is the initiative with the most signatories. It is a group of city mayors – mostly from the EU, but also non EU<sup>15</sup> – who commit to meet and exceed the EU CO<sub>2</sub> reduction target of 20% by 2020 (from a 1990 baseline). Signatories also commit to submitting a Sustainable Energy Action Plan (SEAP). A registry is available on the website.

The Climate Group's **State and Regions Alliance** has 27 members, representing economically powerful regions across Europe, the Americas, South Asia, Australia and Africa. The initiative brings together subnational government leaders to share expertise, demonstrate impact and influence the international climate dialogue. In 2005, they signed the Montreal Declaration of Federated States & Regions, in which they commit to setting targets and implementing climate action in their own jurisdictions. The alliance has since issued a series of declarations which also commit its members to further ambitious actions in their regions (The Climate Group, 2015).

### 5.3 Quantifying city and regional level initiatives

The quantification approach depended on the data availability. The general approach to quantifying city or regional initiatives is to take base year data at the highest level of disaggregation available (individual cities or groups of cities), calculate emissions in 2020 based on the targets agreed in the initiative and then compare that to the emissions calculated from base year emissions multiplied by a business-as-usual (BAU) growth rate for 2020. As many cities will already be deviating from the BAU path derived from the year they made the commitment, we calculate the BAU starting with the emissions level in the year when the commitment was made and using IEA World Energy Outlook Current Policy or Reference scenario published for that same year. If the target emissions in 2020 are below the BAU emissions, there is an additional emission reduction delivered by the initiative.

Base year emissions for individual C40 cities are available from the CDP database ([www.cdp.net](http://www.cdp.net))<sup>16</sup>. The Covenant of Mayors has no publicly available database, but the European Commission's Joint Research Centre published its 6<sup>th</sup> annual assessment in 2015 based on 5,296 signatories (as of May 2014), which gives aggregate base year emissions. carbonn is a publicly available database; however, data use restrictions meant, that for the purpose of this paper, we were only able to use their reported summary data.<sup>17</sup>

**C40 initiative:** 36 cities with targets recently reported their community emissions to the CDP, with base (or reference) years ranging from 2005 to 2013. The majority of targets were for 2020, 2025 or 2030. In cases where targets were for other years than 2020, the targets were converted to an

annual reduction rate to calculate emissions in 2020. It is assumed that most cities made their commitments around 2007–2008.

**Covenant of Mayors (CoM):** The Covenant of Mayors reports the Baseline Emission Inventory (BEI), which is a quantification of the amount of CO<sub>2</sub> emitted due to energy consumption in the territory of a Covenant signatory within a given period of time. The recommended base year is 1990. The information provided is the emissions in the base year for all cities with a target (i.e. 0.69 GtCO<sub>2</sub>e) and the planned emission reductions, i.e. 0.188 GtCO<sub>2</sub>e by 2020 relative to the base year, based on the Sustainable Energy Action Plans (SEAPs).

**cCR:** The carbonn Climate Registry reports the total annual emissions of its 422 cities, which is 2.25 GtCO<sub>2</sub>e for 2013–2014. The average annual emission reduction commitment is 1.3%<sup>18</sup>. Based on the reported emissions as of March 2014, the BAU based on the current policies scenario of the WEO for 422 cities is calculated. It is not possible to apply a regional approach here, because cities from a range of regions report to carbonn.

**The Climate Group's States and Regions Alliance:** The same approach as for the C40 cities was applied. 20 of the 27 regions provided information on the Climate Group's website (The Climate Group, 2015) related to their recent emissions and targets for emission reduction. Based on research from other sources and additional information, such as the emissions of the base year, committed emission reductions could be quantified (The Climate Group, 2015). The majority of targets were for 2020 and/or 2050.

### 5.4 Results and conclusions

**The three city level initiatives (C40, CoM, cCR) together, correcting for their overlap with each other, achieve 1.08 GtCO<sub>2</sub>e of additional emission reductions in 2020 as compared to a current policies scenario. The regional initiative (States and Regions Alliance) achieves 0.76 GtCO<sub>2</sub>e per year of additional emission reductions in 2020.**

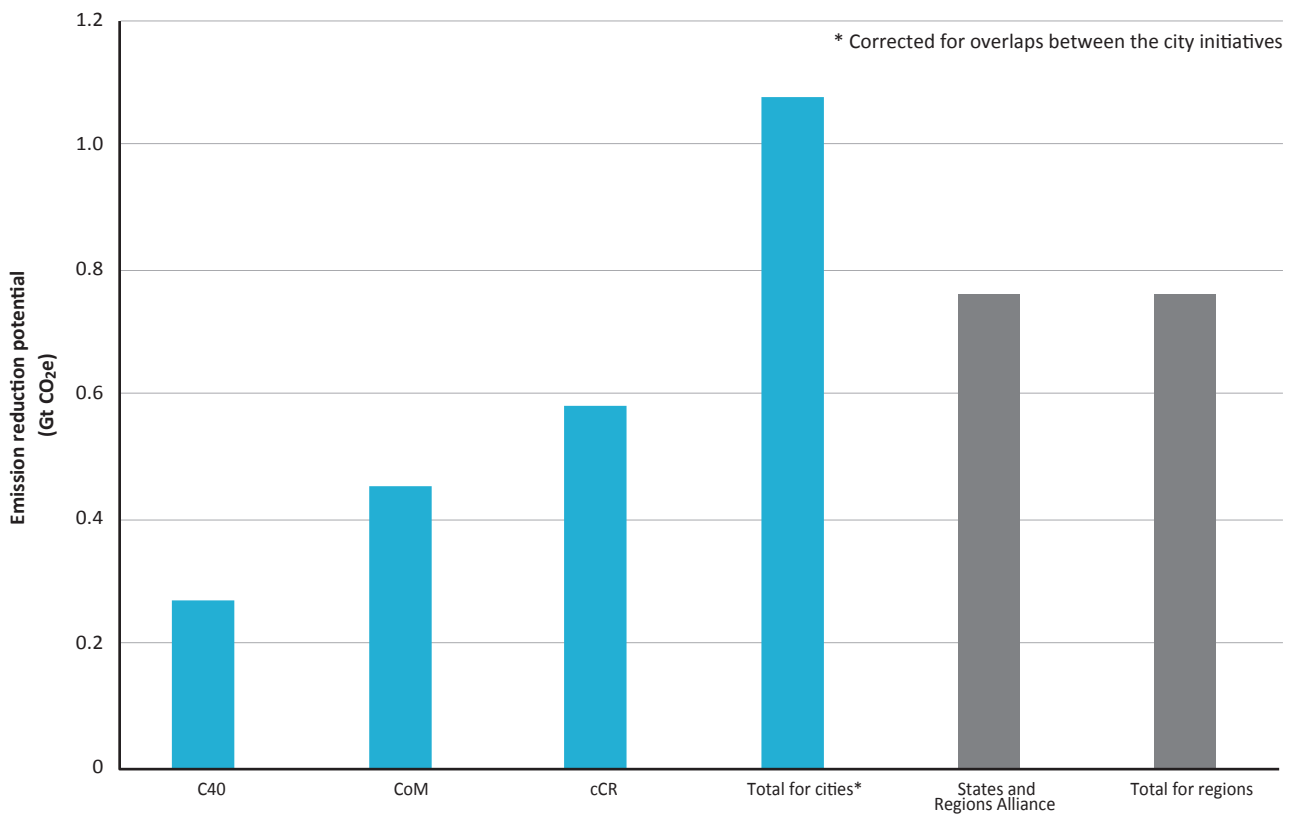
We calculated that, altogether, 36 C40 cities have committed to reducing emissions from the base year by 0.2 GtCO<sub>2</sub>e by 2020. The net effect of these commitments compared to the BAU is 0.3 GtCO<sub>2</sub>e. The Covenant of Mayors reports that its signatories have committed to a reduction of 0.2 GtCO<sub>2</sub>e by 2020 compared to the base emissions inventory. The CoM has additional emission reductions of 0.5 GtCO<sub>2</sub>e by 2020 compared to the current policies scenario. Based on reported commitments, the 422 cities reporting to the carbonn Climate Registry will reduce emissions by 0.6 GtCO<sub>2</sub>e in 2020 compared to BAU. Some cities are members of more than

<sup>15</sup> Includes also cities from Azerbaijan, Kazakhstan and Israel and Palestine.

<sup>16</sup> The CDP gave the writers permission to use the cities database for the purpose of this paper.

<sup>17</sup> See cCCR Annual Report 2013, published March 2014.

<sup>18</sup> 54% of the reduction commitments towards 2020 are above 1% per year, exceeding the value of even the most ambitious national governments under the Kyoto Protocol.



**Figure 5.2 Emission reductions of the cities and regional initiatives. Source: Own calculations.**

one of the above city level initiatives. The total achievements of additional emission reductions of the three city level initiatives, 1.08 GtCO<sub>2</sub>e, accounts for this overlap.

At the regional level, 21 regions of the 27 members of the States and Regional Alliance commit to an additional emission reduction of 0.76 GtCO<sub>2</sub>e compared to the BAU scenario. Figure 5.2 provides an overview of the reduction potential of each city and region initiative. The overlap between emission reductions of regions and those of cities within those regions is taken into account. The quantification method is described in Appendix 2.

Previous studies only included estimates for the cities initiatives. Blok et al. (2012) estimate cities initiatives could reduce GHG emissions by up to 0.7 GtCO<sub>2</sub>e by 2020. Wouters (2013) calculated an emissions savings impact (0.86 GtCO<sub>2</sub>e) for the same city initiatives as in this paper, but with a range 0.67–1.10 GtCO<sub>2</sub>e. Wouters's approach was simpler in this study in two aspects. Firstly, BAU projections were made

from the last available year instead of the base year. Secondly, Wouters converted all emission reduction commitments of C40 cities to a 10-year reduction target and applied the weighted average of these commitments to the emissions of all cities with a target.

We performed a sensitivity analysis of commitment impact arising from the city and region initiatives, varying the annual growth assumptions by +/- 0.3%. From this sensitivity the range for the cities is 0.9–1.2 GtCO<sub>2</sub>e and for the regions 0.6–0.9 GtCO<sub>2</sub>e.

Based on the committed emission reductions for 2020, we assume that the cities and regions will reach or be on track to reach 2030 targets by 2020. Although there is reporting of city and region emissions on platforms such as CDP and cCr, the year for which the emissions are reported is not always a recent year so it is difficult to draw conclusions about progress towards the targets.

# 6 Sectoral initiatives

## 6.1 Introduction

Of the 180 initiatives considered for inclusion, the vast majority (156) are linked to specific sectors and industries. However, there is much variation between these initiatives and only a few have concrete commitments and the power to achieve them. Sectoral initiatives are cooperations between parties, that normally include companies and non-government actors. They can include central governments, but we excluded initiatives that are driven by central governments only. The initiatives that meet our criteria are found in the sectors of energy efficiency (including the building sector, lighting and appliances), upstream emissions from the oil and gas industry, forestry, agriculture and finance. Furthermore, a few initiatives do not meet all of our selection criteria, but are still worth mentioning for their potential. An overarching initiative, the 1 Gigaton Coalition, is described in Box 2.

For the city, regional and company initiatives, the additionality can be determined by the use of a BAU scenario constructed to reflect the effect of current policies. For many of the initiatives in this section, it is difficult to identify global BAU scenarios. In this section, therefore, the quantification is of the specific effect of each initiative and the additionality is addressed separately. Detailed calculations and the methodology for estimating the potential impact of these initiatives are found in the appendix.

## 6.2 Energy efficiency initiatives

We identified a total of 14 energy efficiency initiatives with the potential to be of scale. Seven are related to building efficiency, five to efficiency of appliances (including lighting) and one related to clean and efficient cookstoves.

Of these 14, only two have set targets and/or have members with an official commitment to the initiative, the requirements for being quantifiable in our context. One is UNEP/GEF's en.lighten initiative, which started in 2009, and the other is the Global Alliance for Clean Cookstoves, which started in 2010. In these two cases, the members or the initiative itself have clearly stated a commitment to a target (En.lighten Initiative, 2015; Global Alliance for Clean Cookstoves, 2015).

Several buildings initiatives have specific targets, such as the Global Buildings Performance network (GBPN), which has the ambition to reduce the world's energy-related CO<sub>2</sub> emissions to 25% under BAU in 2020. Another such initiative is Renovate Europe, a political communications campaign with the ambition to reduce the energy demand of the EU building stock by 80% by 2050, as compared to 2005 levels, through legislation and ambitious renovation programmes (GBPN, 2015; Renovate Europe, 2015). However, the members of these initiatives do not have corresponding commitments towards emission reductions, and/or the initiative does not have a demonstrable track record of achievement.

Other initiatives focus their work on enabling conditions through technical dialogue, such as the World Green Building Council, or the World Business Council for Sustainable Development (WBCSD): "The WBCSD Energy Efficiency in Buildings project supports and drives the transformation of the building market towards radically lower energy use in buildings." Similarly, the Super-efficient Equipment and Appliance Deployment (SEAD) initiative aims to engage governments and the private sector to measure the potential of appliance and equipment efficiency and consequently transform the global market for these types of technologies. These initiatives are also not aimed at direct emission reductions.

### Box 2: The 1 Gigaton Coalition

The 1 Gigaton Coalition is a voluntary international framework to increase efforts to measure and report reduced greenhouse gas (GHG) emissions resulting from renewable energy and energy efficiency initiatives and programs, particularly in developing countries. The Coalition will work with initiatives and organisations already involved in tracking and supporting renewable energy and energy efficiency activities in developing countries.

The 1 Gigaton Coalition aims:

- To gain global recognition and credibility for achievements made in reducing GHG emissions through renewable energy and energy efficiency activities;
- To increase the visibility of mitigation efforts through measuring and reporting of emissions;
- To track progress achieved in climate change actions to identify where additional mitigation effort/support may be needed;
- To strengthen technical capacity to measure and report greenhouse gas emissions.

**Box 3: UN Climate Summit Initiatives accelerators****Building Efficiency Accelerator**

A global network of businesses, NGOs and international organisations, in collaboration with civil society and subnational government leaders, will provide tools, expertise, technical capabilities and financial support to help accelerate building efficiency policy and project initiatives in certain cities. Five cities, Copenhagen (Denmark), Toyama (Japan), Mexico City (Mexico), Lima (Peru) and Milwaukee (USA) have signed up to the initiative.

**Efficient Appliances Accelerator**

The Global Partnership on Appliances and Equipment supports countries to put in place norms and policies leading to the deployment of highly efficient air conditioners, refrigerators, fans, electric motors and distribution transformers. Sixteen countries in Latin America and the Caribbean and twelve countries in Southern Africa have expressed their intention to join. Partners to the initiatives include members of the private sector, the Inter-American Development Bank and the World Bank, as well as international organisations and other energy efficiency initiatives such as the Energy-Efficient End Use Equipment initiative of the International Energy Agency, and the Super-Efficient Appliance Deployment initiative (SEAD).

**Lighting Efficiency Accelerator**

The UNEP/GEF en.lighten initiative, a public-private partnership that accelerates the global transition to efficient lighting is being expanded as a SE4ALL Lighting Efficiency Accelerator. En.lighten currently supports 73 developing and emerging countries with transitioning to efficient lighting technologies through its Global Efficient Lighting Partnership Programme. The programme aims to phase-out inefficient incandescent lighting by 2016. Eleven countries joined the effort via the accelerator platform.

**District Energy Accelerator**

The Global Initiative on District Energy Systems aims to support cities and subnational/national governments to develop, retrofit or scale up district energy systems. 18 cities, seven private sector partners, two international networks and five international partners have expressed interest to join. Five of those cities are already using district heating, cooling or combined systems and have already achieved a combined reduction of 1.4 MtCO<sub>2</sub>e per year – see Global Energy Efficiency Accelerator Platform Action Statement and Action Plan (2014). Support will come from international and financial partners, and the private sector.

Four energy efficiency accelerators were launched under the Global Energy Efficiency Accelerator Platform of the Sustainable Energy for All Initiative in September 2014 (see Box 3). This includes the Lighting Efficiency Accelerator, which is an expansion of the previously mentioned, quantifiable en.lighten initiative. While countries have already expressed their intention to join, these new initiatives have not yet announced official commitments towards measurable energy efficiency improvements.

**en.lighten**

In 2009, the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF) established the en.lighten initiative, to accelerate a global market transformation towards environmentally sustainable, energy efficient lighting technologies. It supports participating countries in developing strategies and policies targeting the phase-out of inefficient incandescent lamps, thereby aiming to reduce the release of GHG emissions and mercury from fossil fuel combustion. The initiative started as a public-private partnership between UNEP, OSRAM and Philips Lighting with the support of the Global Environment Facility. In 2011, the National Lighting Test Centre of China joined the initiative, followed by the Australian Government in 2013 to support the initiative in engaging with developing countries in Southeast Asia and the Pacific.

Shifting to energy efficient lighting significantly lowers electricity bills, reduces energy imports, improves end-user welfare and reduces GHG emissions. To determine the possible impact in 2020, details of the targets and activities of the countries that were part of the Global Efficient Lighting Partnership Programme in May 2015 were determined.

Based on this information as well as input assumptions and data used in en.lighten's own impact assessment as well as data received from the initiative (UNEP, 2015)<sup>19</sup>, the avoided emissions were estimated. It has been estimated that the current en.lighten partner countries alone will save 0.055 GtCO<sub>2</sub>e with a range **0.04–0.07 GtCO<sub>2</sub>e annually by 2020**. More details are in Appendix 2.

**Global Clean Cookstove Alliance**

In 2010, a public-private alliance of government, IGOs, NGOs and private sector organisations was established. It aims to help overcome the market barriers that currently hinder the wide-spread production, deployment, and use of clean cookstoves in the developing world. The goal is that, by 2020, 100 million households will have adopted clean and efficient cookstoves and fuels. The alliance funded a research paper by Bailis et al. (2015)<sup>20</sup> to identify the emission reductions resulting from the target, while also considering the sustainability of woodfuels. It

<sup>19</sup> UNEP/GEF en.lighten (2014). The Second Generation On-Grid Country Lighting Assessments.

<sup>20</sup> Bailis, R., Drigo, R., Ghilardi, A. and Masera, O. (2015). The Global Footprint of Traditional Woodfuels. Nature Climate Change 5, 266–272.

identified that, in 2009, 27–34% of woodfuels worldwide were harvested unsustainably and that the distribution of 100 million improved cookstoves by 2020, according to the programmatic priorities of the Global Clean Cookstove Alliance, would result in annual emission reductions in the range of 0.1–0.2 GtCO<sub>2</sub>e.

The BAU distribution of cookstoves according to current policies is difficult to determine. The International Energy Agency (IEA), in their World Energy Outlook 2014, assumes a significant rise in the use of clean cookstoves, but the exact number is not given. A comparison of different cook stove programmes worldwide from 1996–2010 indicates annual distribution levels of 70,000–1.88 million stoves (Persoon, 2010)<sup>21</sup>. The most comparable global cookstove programme to the Global Clean Cookstove Alliance is its predecessor, the Partnership for Clean Indoor Air. In its last year of programme operation, it sold 2.48 million stoves worldwide. Based on this, a BAU range of between 1 million and 2.5 million cook stoves distributed worldwide is assumed. This would mean 75–90 million of the 100 million improved cookstoves to be distributed between 2010 to 2020 can be considered additional, giving an additional emission reduction 0.12 with a range of **0.08–0.15 GtCO<sub>2</sub>e** by 2020.

### 6.3 Oil and gas initiatives

Many oil producing wells also produce natural gas as a co-product, with the potent greenhouse gas methane as the main component. However, in many cases there is no business case for using this gas in a cost effective way, especially in remote locations where costs of pipelines or LNG terminals would be prohibitive. The gas is then either vented (emitting methane directly to the atmosphere) or flared (burning the natural gas and emitting CO<sub>2</sub>, which is less harmful). The upstream (production side) of the oil and gas sector is therefore a major source of emissions.

The IEA identified minimising methane emissions from upstream oil and gas production as one of four key global GHG mitigation opportunities, noting that upstream methane reductions could account for nearly 15% (over 0.5 GtCO<sub>2</sub>e) of the total GHG reductions needed by 2020 to keep the world on a 2 °C warming path (Climate & Clean Air Coalition, 2015).

We identified two initiatives that aim to reduce emissions from this sector: the World Bank-lead Global Gas Flaring Reduction Partnership (GGFR), and the more recent UNEP-lead CCAC Oil and Gas Methane Partnership.

#### Global Gas Flaring Reduction Partnership (GGFR)

The GGFR work program, managed and facilitated by a World Bank team and with government and company members<sup>22</sup>,

focuses on four key areas to overcome the barriers to gas flaring reduction in partner countries (Global Gas Flaring Reduction, 2015):

- Commercialization of associated gas
- Regulations for associated gas
- Implementation of the global flaring and venting reduction standard
- Capacity building to obtain carbon credits for flaring and venting reduction projects.

The GGFR has already achieved specific results aimed at reducing flaring and will contribute to the progressive reduction of greenhouse gas emissions around the world. Some of these results include the endorsement of a “Global Standard for gas flaring reduction”, the implementation of demonstration projects for associated gas utilization in seven countries, and assistance to six countries<sup>23</sup> in meeting flaring reduction targets by specific dates.

The avoided flared gas, through GGFR facilitated carbon projects, is estimated to be approximately 12 billion cubic meters per year, equivalent to 25 MtCO<sub>2</sub>e emission reductions in 2012.

Global flared natural gas was reduced from 172 billion cubic meters (bcm) in 2005 to 140 bcm in 2011. The GGFR expects all oil producers from around the world, companies and countries, to further cut flaring by 30% in the next five years, which would reduce flaring from 140 bcm in 2011 to 100 bcm by end of 2017 and correspond to emission reductions of **0.085 GtCO<sub>2</sub>e/year**. This seems achievable, given that a continuation of the trend from 2005–2011 to 2020 would lead to a reduction of 92 bcm, equivalent to over 0.1 GtCO<sub>2</sub>e/year by 2020. BAU projections for methane from oil and gas activities are still increasing over the next five years (EPA, 2012), so it is assumed that all these emission reductions are additional.

#### CCAC Oil and Gas Methane Partnership

The Climate and Clean Air Coalition (CCAC) has created a voluntary initiative to reduce methane emissions in the oil and gas sector: the CCAC Oil and Gas Methane Partnership. The CCAC officially launched the Partnership with founding companies at the UN Secretary General’s Climate Summit in New York on 23 September 2014. The founding companies are: BG-Group, Eni, Pemex, PTT, Southwestern Energy, Total and Statoil.

The CCAC Oil and Gas Methane Partnership provides companies with a mechanism to systematically and responsibly address their methane emissions and to demonstrate to stakeholders that they are doing this. A company joining the CCAC Oil and Gas Methane Partnership

<sup>21</sup> Persoon, G.J. (2010) Towards 500 million improved cookstoves. A comparative analysis of three dissemination programmes and the role of CDM and black carbon. Master Thesis, Utrecht University.

<sup>22</sup> Partners are Alberta (Canada), Azerbaijan, European Union, Cameroon, Republic of Congo, France, Gabon, Indonesia, Iraq, Kazakhstan, Khanty-Mansiysk (Russian Federation), Kuwait, Mexico, Nigeria, Norway, Qatar, United States of America, Uzbekistan, BP, Chevron, Eni, Exxon Mobil, Kuwait Oil Company, Pemex, Qatar Petroleum, SNH (Cameroon), Shell, SOCAR, Sonatrach, Statoil, TOTAL, European Bank for Reconstruction and Development (EBRD), and The World Bank.

<sup>23</sup> Nigeria, Equatorial Guinea, Cameroon, Algeria, Kazakhstan, and Qatar.



voluntarily commits itself to the following in its participating operations:

- Survey for nine core sources that account for the bulk of methane emissions in typical upstream operations;
- Evaluate cost-effective technology options to address uncontrolled sources with a view toward implementation; and
- Report progress on surveys, project evaluations and project implementation in a transparent, credible manner that demonstrates results.

The six founding companies represent about 6% of the global oil production. Should these companies reduce the same share of the potential 0.5 GtCO<sub>2</sub>e identified by the IEA, this would lead to emission reductions of **0.03 GtCO<sub>2</sub>e** in 2020. However, the participating companies are not committing to cut their methane emissions by a specific level and this figure is therefore not included in the total (Gallucci, 2014).

## 6.4 Forestry initiatives

There are a number of initiatives in the forestry and land use area, of which three only would potentially meet the criteria for quantification: The Bonn Challenge, Tropical Forest Alliance 2020 and Governors' Climate and Forest Task Force (GCF).

### The Bonn Challenge and Initiative 20x20

At the invitation of the German Government and IUCN, the Bonn Challenge was established at a ministerial roundtable in September 2011. It calls for the restoration of 150 million hectares of deforested and degraded lands by 2020. Initiative 20x20 is a country-led initiative that aims to restore 20 million hectares of land in Latin America and the Caribbean by 2020. It supports the Bonn Challenge, so it is not quantified separately. The Bonn Challenge is an action-orientated platform to facilitate the implementation of several existing international commitments that require restoration, including the CBD Aichi Target 15, the UNFCCC REDD+ goal, and the Rio+20 land degradation target.

The Bonn Challenge facilitates exchange and learning, supports the generation of new knowledge and tools, and acts as vehicle to mobilise finance, capacity and experts' support to address the practicalities of in-situ landscape restoration.

So far, pledges have been received for 20 million hectares, and are being finalised for a further 40 million hectares, through 11 countries' commitments. This represents 39% of the 2020 objective (Bonn Challenge, 2015). IUCN estimates that achieving the target of restoring 150 million hectares would function as a yearly carbon sink of 1 GtCO<sub>2</sub>e/year (IUCN, 2014). Taking into account only current pledges and the ones being finalised now, a potential 0.2–0.4 GtCO<sub>2</sub>e could be saved annually by 2020. Given that the initiative is to facilitate international country (UNFCCC) commitments, we report these numbers but do not include in totals.

### Consumer Goods forum Achieving Zero Net Deforestation, Tropical Forest Alliance 2020 and CDP Eliminating deforestation from the supply chain

These three initiatives all engage with companies to achieve zero net deforestation in their supply chain. To a large extent though, they currently overlap, so the quantification here concentrates on the Tropical Forest Alliance, which was founded by the Government of the United States and the Consumer Good Forum following discussions before and during the Rio+20 Conference in 2012.

The Tropical Forest Alliance supports private sector members to engage with governments, civil society leaders and other businesses worldwide, to achieve a reduction in the deforestation of tropical forest. Its partners take voluntary actions, individually and in combination, to reduce the tropical deforestation associated with the sourcing of commodities, such as palm oil, soy, beef, paper and pulp (Tropical Forest Alliance, 2015).

Based on a simplified version of the approach used in the Ecofys/CISL project "Wedging the Gap: Private Sector GHG Emission Reduction Initiatives" (forthcoming) (International Climate Initiative, 2015) an estimation was made for the impact the initiative could have in 2020, with a specific focus on its private sector members. For this analysis, a further focus was put on palm oil, the main commodity addressed by TFA 2020. The annual increase in the palm oil area harvested is the main driver of deforestation in Southeast Asia, where the crop is mostly produced. For this analysis an annual increase in area harvested in the range of 5–10% in Indonesia and 2.5–3.6% in Malaysia was assumed.

Most companies address the issue of deforestation by pledging to source their palm oil 100% sustainably through the help of certification schemes, such as the Roundtable for Sustainable Palm Oil (RSPO). While certification certainly contributes positively to more sustainable palm oil production and can be used to claim that no deforestation takes place due to the companies' palm oil operations, certification cannot be used to claim that overall deforestation decreases due to certification. Under RSPO direct production chain emission savings can be claimed, for instance savings from palm oil biodiesel compared to the fossil reference. However for our analysis we focus only on deforestation emissions. In this case the emission reductions resulting from a decrease in deforestation can only be claimed if the entire sector would be certified or if governments would manage to effectively ban deforestation, thereby steering oil palm plantation area expansion towards non-forested land. Otherwise one would only see a move by the companies sourcing sustainably towards expansion into low carbon value land while the others would continue expanding into forest area. Currently TFA members hold a market share of around 45% in palm oil production.

The 'waterbed effect' described above means that while sourcing sustainably can be seen as no longer contributing

to deforestation from a company perspective, emission reductions cannot be easily claimed. Increasing membership and taking up efforts in steering expansion towards low carbon value forest and land type would greatly increase the initiatives impact. If the situation of net zero deforestation was achieved in 2020, current TFA 2020 member companies could claim emissions savings of around 0.1 GtCO<sub>2</sub>e with a range of **0.02–0.2 GtCO<sub>2</sub>e** by sourcing their palm oil 100% sustainably<sup>24</sup>. Upscaling to the entire palm oil sector would lead to an emission reduction in the range of 0.05–0.45 GtCO<sub>2</sub>e. More details are in Appendix 2.

The impact of these three initiatives can be further increased if efforts currently taken with regards to palm oil are extended to other key commodities driving deforestation. However, the data on which to base the analysis is more limited and uncertain, so we have not extended the quantification.

**Governors' Climate and Forest Task Force (GCF)** is a subnational cooperation between 26 states and provinces from Brazil, Indonesia, Mexico, Nigeria, Peru, Spain, and the United States. The Task Force aims to advance jurisdictional programs designed to promote low emissions rural development and reduced emissions from deforestation and land use (REDD+), and link these activities with emerging GHG compliance regimes and other pay-for-performance opportunities.

Total GHG emissions from tropical deforestation is estimated at 3 GtCO<sub>2</sub>e per year (REDD Monitor, 2012) and the GCF estimates that 25% of the tropical forests are within its jurisdiction. Based on current tropical deforestation emissions and assuming the target is reached, the initiative would result in 0.6 GtCO<sub>2</sub>e fewer emissions annually. Initial progresses can be already measured: for example, in six Brazilian provinces, deforestation rates declined by more than 70% from 2006–2012. Furthermore, concrete commitments to reduce deforestation have already been made in Brazil for example, where the Rio Branco Declaration (Governors' Climate and Forests Task Force, 2014) was signed in August 2014. Under this, 21 GCF governors committed their states and provinces to reducing deforestation 80% by 2020. However, action in this initiative depends on there being stable funding and so the possible impact is not included in the total.

**The Climate, Community and Biodiversity Alliance (CCBA)** was founded in 2003, with the objective to stimulate and promote land management activities that credibly mitigate global climate change, improve the human well-being, and conserve biodiversity. The CCBA develops the Climate, Community and Biodiversity Standards (CCB standards) that foster the integration of best-practice and multiple-benefit approaches into project design and implementation, and can be applied to any land management project (e.g. reduction of emissions from deforestation and forest degradation projects; projects that remove carbon dioxide

by sequestering carbon). The CCBA does not operate to achieve specific emission reduction targets. Nonetheless, as of November 2013, more than 130 projects are using, or are planning to use, the CCB standards, representing over 11 million hectares of conservation and over 480,000 hectares of restoration of native forests, with total estimated annual GHG emission reductions of over 0.030 GtCO<sub>2</sub>e.

## 6.5 Agriculture Initiatives

**The Climate and Clean Air Coalition (CCAC) - Agricultural Initiative** is a voluntary effort of 40 state partners and 53 international organizations and civil organizations dedicated to speed up actions to reduce emissions of short-lived climate pollutants (SLCPs): methane, black carbon and hydrofluorocarbons emissions. The initiative focuses on identifying and facilitating the implementation of best management practices and technologies, tailored to national and local contexts, including needs assessments and studies as well as development of knowledge products to raise awareness, training and capacity-building in livestock and manure management, paddy rice production, and open agricultural burning. However, this initiative has not set specific emission reduction targets or actions for its members except in the area of paddy rice production. With currently planned CCAC agricultural activities, an annual reduction of 4 MtCO<sub>2</sub>e could be achieved from the implementation of the paddy rice production efforts in target countries.

**The New Vision for Agriculture** - defined by World Economic Forum partners in 2009 - holds that to meet the world's needs, sustainably agriculture must simultaneously deliver food security, environmental sustainability and economic opportunity. The Vision thus sets a goal to increase agricultural production by 20%, while decreasing emissions per ton of production by 20% and reducing rural poverty by 20%, each decade until 2030. This will require a multi-stakeholders agriculture-sector transformation at the global and national level.

Together with 32 key partner organisations, this initiative has engaged over 350 organisations. At a global level, it has partnered with the G7 and G20, while, at the regional and country level, it has catalyzed multi-stakeholder partnerships in 16 countries in Africa, Asia and Latin America, including two regional partnerships called Grow Africa and Grow Asia. Together, these efforts have mobilized over USD 10 billion investment commitments, of which USD 1.2 billion has been implemented, and reached over 3.6 million smallholder farmers. We assume that the level of investment commitments and implementation will lead to concrete action from this initiative. The agricultural emissions from the countries involved in the initiative, and the penetration rate of the initiative itself, gives estimated emissions of 1.3 GtCO<sub>2</sub>e for 2010 (Food and Agriculture Organization, 2015). Based on CEA (2014), BAU food production will increase by 10–14% by

<sup>24</sup> Through trusted certification like the RSPO

2020. Assuming the objectives of this initiative are achieved, there would be an additional 6–10% of production increase. Trends in emissions per ton of agricultural production are complex because of competing factors, such as increasing fertiliser use and intensification versus extensification. To calculate the effect of the initiative, we take two cases: one where the increase in productivity comes from the same area of land and one where the land use increases in line with productivity. In both cases, the emissions factor is assumed to be the same under BAU and to decrease by 20% due to the initiative. Using these assumptions, the emission reductions compared to BAU if the objectives of the initiative are met are nearly the same: 0.29–0.33 GtCO<sub>2</sub>e. However, there are significant uncertainties in the assumptions underlying the calculation and in the achievement of the target and we assume 0.3 GtCO<sub>2</sub>e with a range of 0.1–0.5 GtCO<sub>2</sub>e.

## 6.6 Finance Initiatives

There are a number of different initiatives involving financial institutions, with the aim to scale up financing available for climate change investments (both mitigation and adaptation). As with the other initiatives in this chapter, we quantify the total effect of the initiative here and address additionality subsequently. As well as the specific initiatives described, initiatives launched at the 2014 UN Climate Summit are described in Box 4.

The insurance industry's **Climate-smart Investment initiative** aims to transform mainstream asset management in the insurance industry by placing more emphasis on climate risk. The rationale is to create a framework that firstly, enables the integration of disaster and climate risk and resilience considerations across all asset classes, and secondly, increases institutional investors' understanding of disaster risk by emphasising the viability of community-based micro-insurance projects. These can increase the resilience of the poorest segments of populations. The participants in the initiative have pledged to double its total investments from USD 42 billion to USD 84 billion by end of 2015. The

participants furthermore pledged to increase climate-smart investments tenfold to USD 420 billion by 2020.

The initiative is working on a definition of 'climate-smart'; in the absence of that definition, we assume that these available funds are invested in clean buildings (26%), power (21%), transport (49%) and industry (4%). This split is based on the difference in the breakdown of investments in the 6DS and in the 2DS scenario from IEA ETP (excluding transport). We use IEA ETP figures for investments per sector in the 2DS and 6DS scenarios. We compare this with the emissions per sector under both scenarios, to get to emissions per dollar invested for each sector. On this basis, the climate-smart investments could deliver a reduction of GHG emissions of 340 MtCO<sub>2</sub>e by 2020. However, as the definition of climate-smart is still uncertain and the additionality of this investment to government action or pledges is also unclear, these reductions are not included in the totals given in Section 8.

**International Development Finance Club (IDFC)** finances a wide range of projects focused on development, climate and clean energy. In 2010, the total commitments of the IDFC Members added up to approximately USD 390 billion (World Bank Group: USD 72.9 billion), KfW (Germany; USD 108 billion) and BNDES (Brazil; USD 105 billion). It has been calculated that green finance commitments in 2013 was about USD 99 billion, of which USD 72 billion went to green energy and GHG mitigation projects. Assuming a linear increasing trend of green energy and GHG mitigation investments on the basis of most recent annual trends, by 2020 the investments would be equal to USD 121 billion<sup>25</sup>. However, IDFC members are in the main multilateral or national development banks. It is therefore assumed that this financing is not additional to government pledges, but instead an enabling mechanism to meet the pledges.

**Portfolio Decarbonisation Coalition (PDC)** is a multi-stakeholder initiative co-founded by the United Nations Environment Programme and its Finance Initiative (UNEP FI), the fourth national pension fund of Sweden (AP4), Europe's

### Box 4: UN Climate Summit finance initiative

The **2014 Global investor statement on climate change** is a statement signed by 348 investors representing more than USD 24 trillion in assets. They pledge to:

- Work with policy makers to support and inform their efforts to develop and implement policy measures that encourage capital deployment at scale to finance the transition to a low carbon economy and encourage investment in climate change adaptation.
- Identify and evaluate low carbon investment opportunities that meet our investment criteria and consider investment vehicles that invest in low carbon assets subject to our risk and return objectives.
- Develop capacity to assess the risks and opportunities presented by climate change and climate policy to our investment portfolios, and integrate, where appropriate, this information into our investment decisions.
- Work with the companies in which we invest to ensure that they are minimising and disclosing the risks and maximising the opportunities presented by climate change and climate policy.
- Continue to report on the actions we have taken and the progress we have made in addressing climate risk and investing in areas such as renewable energy, energy efficiency and climate change adaptation.

<sup>25</sup> 72+7\*7= USD 121 billion.



largest asset manager Amundi, and CDP. PDC aims to drive GHG emission reductions on the ground by mobilising a critical mass of institutional investors committed to gradually decarbonising their portfolios. The first objective is to convene a critical mass of investors (minimum of USD 500 billion) disclosing the carbon footprint of their investments. The second goal is to assemble a coalition of investors who, in aggregate, will commit to decarbonising at least USD 100 billion in institutional investment across asset classes. As of 2015, PDC reported members with a total USD 40 billion of committed investments. However, the members have not yet committed to decarbonisation, so this initiative is not included in the quantification. Even if the commitment were made, quantifying the additional effect of such a commitment would be complex because of considerations such as sale of high carbon assets to other investors.

## 6.7 Other Initiatives

We further identified a number of initiatives that did not meet our selection criteria, but are still worth mentioning because of their potential large contribution or original approach. For these initiatives, quantification is either impossible, or the initiative does not seem to have the power to realise the reductions.

### Renewable energy initiatives

There are a number of solar energy initiatives, including 300GW/a, Solar Europe Industry Initiative (SEII) and the SunShot Initiative, which are aimed at awareness raising and technological development. These are not included in the analysis, as they are judged to lack specific actions and/or the capacity to deliver emission reductions.

The Asia Solar Energy Initiative (ASEI) made a commitment to increase the amount of new solar power generation in the Asia and Pacific region to 3 GW by 2013, but does not have a commitment beyond 2013. Even if the 3 GW is assumed to still be generating in 2020, emission savings are very small. Three initiatives were also launched at the UN Climate Summit (see Box 5), but do not yet have specific, actionable commitments.

### Transport initiatives

Emissions of the road transport sector are very large (7 GtCO<sub>2</sub>e in 2010) and growing fast, with an increasing share of the population having access to their own vehicles, especially in the developing world. The IEA World Energy Outlook 2014 projects the global transport energy demand to grow from 2.5 Gt of oil equivalent (Gtoe) in 2012, to over 2.8 Gtoe in 2020 and 3.4 Gtoe in 2030, under its 'current policies' scenario.

The **Global Fuel Economy Initiative (GFEI)** is a partnership between six organisations<sup>26</sup>. It aims to improve global average fuel economy of light-duty vehicles (cars) by 50% by 2050<sup>27</sup>, by improving the fuel economy of new cars through incremental efficiency improvements, and by additional measures, such as eco-driving and improved vehicle maintenance. Studies have shown that these fuel economy improvements are indeed feasible (Eads, 2011). Although GFEI has not set a 2020 target for non-OECD countries, fuel economy improvement is necessary before 2020 to be able to reach the 2030 and 2050 targets. An improvement of 3.0% per year in average vehicle fuel efficiency is needed worldwide from 2012 onwards to reach these targets (Cuenot & Körner, 2012). Wouters et. al. (2013) estimate that if the 2030 and 2050 targets are met,

### Box 5: Renewable energy initiatives launched at the UN 2014 Climate Summit

The **Africa Clean Energy Corridor (ACEC)** initiative aims to substantially increase deployment of renewable energy in Africa, reducing carbon emissions and dependence on imported fossil fuels and leading to a more sustainable and climate resilient economic growth. Partners in the ACEC Initiative include: African and Partner governments, regional bodies, international finance institutions, UNDP, and UN Economic Commission for Africa, and from the private sector, Copperbelt Energy Cooperation and ENEL. The international renewable energy agency (IRENA) acts as the ACEC hub, facilitating multi-stakeholder efforts and providing support and technical assistance through in-house expertise and matchmaking.

The **Global Geothermal Alliance** offers a platform for a more effective communication among key stakeholders, to enhance the provision of customised support for identifying opportunities, and support mechanisms to scale up geothermal capacity in developing countries. Partners in the Global Geothermal Alliance include governments, The Inter-American Development Bank, the World Bank Group and IRENA.

The **SIDS (small islands developing states) Lighthouses** is a framework for action aimed at a programmatic deployment of renewables to enable their energy system transformation. This is to be achieved by moving away from developing projects in isolation, instead using a holistic approach that considers all relevant elements, spanning from policy and market frameworks, through technology options to capacity building. Partners include the SIDS governments, ENEL, European Union, France, Germany, Indian Ocean Commission, IRENA, Japan, New Zealand, Norway, SE4ALL, United Arab Emirates, United States of America, UNDP and The World Bank Group.

<sup>26</sup> The International Energy Agency (IEA), United Nations Environment Programme (UNEP), International Transport Forum of the OECD (ITF), International Council on Clean Transportation (ICCT), Institute for Transportation Studies at UC Davis, and the FIA Foundation.

<sup>27</sup> With a subtarget of 30% by 2020 in OECD countries.

this would result in emission reductions of 190 MtCO<sub>2</sub>e (of which 60 MtCO<sub>2</sub>e would be from OECD regions and 140 MtCO<sub>2</sub>e from non-OECD regions). This initiative is not included in the total for 2020 as it largely supports research and development and is relatively limited in terms of specific actions to reduce GHG.

Besides individual transportation, addressed by the GFEI, public transportation also offers major opportunities for reducing emissions from the transport sector. In September 2014, the International Association of Public Transport (UITP) presented its initiative to double the market share of public transport worldwide by 2025 (UITP, 2014) in its

**UITP Declaration on Climate Leadership.** Meeting the doubling objective would save emission of 550 MtCO<sub>2</sub>e (UITP, 2014) and support the objectives of international climate negotiations in both developed and developing countries. The UITP has 1,300 member companies from 92 countries (UITP, 2015). Members are public transport authorities and operators, policy decision-makers, research institutes and the public transport supply and service industry. This overarching declaration is mainly supporting activities that are initiated by cities and therefore has major overlap with the calculated reduction from city initiatives. Given this, and the less specific nature of commitments, emission reductions from this initiative are not included.



# 7 Overlap analysis

## 7.1 Overlap between non-state action areas

The calculations in the previous sections assume that the initiatives act in isolation from each other, but of course there are overlaps. For example, many companies with reduction commitments will be in cities covered by initiatives, and city and company reduction commitments may well be achieved in part through efficient lighting. In this section, we estimate the degree of overlap between initiatives in different sectors. It should be emphasised that the methodology chosen gives order of magnitude approximations for the degree of overlap and is not intended to be exhaustive. Overlaps within a sector are included in the relevant sections above.

The dark grey squares in the table below indicate the overlaps considered.

**Table 7.1: Overlap between mitigation initiatives**

	Companies	Cities	Regions	Energy Efficiency	Energy Supply	Forestry	Agriculture
Companies							
Cities							
Regions							
Energy Efficiency							
Energy Supply							
Forestry							
Agriculture							

### Companies and cities

As mentioned earlier, emissions from cities represent 71% of global energy-related CO<sub>2</sub> emissions; the cities in the initiatives included in this analysis constitute 15% of that total. According to cCR analysis, one third of the emissions from cities in the initiative are from industry. Companies in the initiatives would not necessarily all be classed as industry. However, the ones with higher emissions generally are, so we assume that the overlap of all companies with cities is one third. The companies in initiatives included in this analysis makes up 32% of the emissions from the top 1000 largest companies. We assume that the top largest companies represent a large proportion of the total company emissions. We therefore estimate that the overlap is 15%\*33%\*32%, i.e. overlap is between cities and companies is 2% of the total emission reductions of 1.08 GtCO<sub>2</sub>e from cities.

### Companies and regions

We assume that the – in terms of GHG emission reductions – companies in our analysis are spread proportionally among the regions analysed and other regions. The top 1000 companies represent about one third of total energy-related GHG emissions. The companies that are included in our analysis represent 32% of the total emissions in the group of the top 1000 emitting companies. With an average company emission reduction of 23%, this means that the overlap between the company commitments and region commitments is (33%\*32%) is about 10% of the emission reduction commitment of the regions (0.65 GtCO<sub>2</sub>e per year by 2020).

### Cities and subnational regions

The overlap of additional emission reductions between cities and regions is relatively small, 0.11 GtCO<sub>2</sub>e. The total net emission reductions of all regional and cities initiatives (accounting for the overlap between the city- and regional level initiatives) is 1.73 GtCO<sub>2</sub>e per year in 2020 compared to their BAUs.

### Lighting and cities / regions

The overlap of cities in initiatives with countries in the en.lighten calculation is small and these cities make up only 4% of the total population of those countries. We assume that annual savings from en.lighten are closely related to population so of the savings of 0.055 GtCO<sub>2</sub>e, 4% is an overlap with city savings. There is no overlap between en.lighten and the regions, because the regions considered in the States and Regions Alliance that emission reductions were quantified are in countries not covered by en.ligthen.

### Lighting and companies

The US Department of Energy (EERE, 2002) estimate that lighting in industry constitutes 18% of total lighting. As a first approximation, we assume this proportion is unchanged since 2002, applies to all of the countries in the en.lighten calculation and that the companies in the initiatives are represented in all these countries. As mentioned previously, we assume companies in the initiatives make up 32% of the total emissions from companies. Based on these assumptions, the overlap is (18%\*32%) i.e. 6% of the en.lighten savings.

The total overlap with initiatives in other sectors is therefore estimated to be 0.21 GtCO<sub>2</sub>e per year by 2020. It is not possible to account fully for all the overlaps; for example, there are overlaps between regions and agriculture, regions and energy supply, and utility companies and electricity

savings. However, the analysis here suggests that the total overlap is relatively small.

## 7.2 Overlap with national pledges

In this report, we calculate a total impact of all non-state action in 2020 together of nearly 3 GtCO<sub>2</sub>e, taking into account overlap between the initiatives. An important next question is whether the initiatives overlap with what will be achieved with the implementation of the pledges that countries have submitted for 2020.

To examine this question, we first of all make an analysis of the regional distribution of the emission reductions that are a result of the non-state action. This is given in Table 7.2.

From this table, we see that the emission reduction is distributed fairly well over the world. For some initiatives there is some overrepresentation of the EU and the USA, but that is limited. So, we can conclude that the impact of non-state action does not cluster in specific regions.

This is also the case for the distribution of the impact of pledges. From analysis of the Climate Action Tracker (CAT, 2015), we learn that most of the major countries and the EU are in the category “medium”, some in the category “inadequate” (on a scale ranging from inadequate to role model).

We will make a quantitative assessment of the overlap in two ways. First, by looking at all the pledges together, and second by looking sector-by-sector.

The current pledges together are estimated to have an impact of 5–7 GtCO<sub>2</sub>e emission reduction in the year 2020 compared to a business-as-usual scenario. From this 5–7 GtCO<sub>2</sub>e, it is estimated that 4 GtCO<sub>2</sub>e will already be achieved through current policies (UNEP, 2014), so 1–3 GtCO<sub>2</sub>e remains to be achieved through pledges that still need to be translated into actual policies.

This impact should be seen in relation to the total emission reduction potential of  $17 \pm 3$  GtCO<sub>2</sub>e (UNEP, 2013). The total current pledges use 30–40% of this potential. The part of pledges that is still to be translated into policies uses 8–23% of the remaining potential. If we assume this latter fraction that overlaps with the non-state action we get an overlap of 0.2–0.7 GtCO<sub>2</sub>e.

If we look at sector-by-sector, we get the following picture. For our analysis of cities, regions and companies we have used the Current Policy Scenario of the World Energy Outlook (WEO, 2014) as a baseline. This scenario takes into account “only those policies and implementing measures that have been formally adopted as of mid-2014” (WEO, 2014). The New Policies scenario takes into account, beyond the formally adopted policies, also “relevant policy proposals,

**Table 7.2: Regional distribution of emission reductions that are a result of non-state action**

Type of action	Estimated impact without correcting for overlap (in GtCO <sub>2</sub> e)	Regional distribution
Companies	0.63	Most companies have headquarters in the EU, USA, and some in Asia (including a large Chinese utility). However, especially for industrial companies the production facilities are probably spread more evenly across the world.
Cities	1.30	Covenant of Mayors predominantly in the EU. The other initiatives are largest in the US (about one quarter), somewhat smaller in the EU. Carbonn is also strong in Asia (more than 40%), C40 includes some big cities in Latin America and Russia.
Regions	0.76	EU and USA about 30% Canada and Mexico nearly 20% Latin America 20%
Efficient lighting	0.05	Africa, Asia and Latin America
Efficient cookstoves	0.12	Largest deployment is in Asia, mainly China. Africa about 20%
Reduce gas flaring in oil and gas industry	0.09	All world regions with significant oil and gas operations covered.
Reducing deforestation	0.1	Latin America, Africa, USA
Agriculture	0.3	16 countries in Africa, Asia and Latin America

even though specific measures needed to put them into effect have yet to be fully developed". This leads to a further emission reduction of 1.3 GtCO<sub>2</sub>e in 2020 and could be used as a proxy for the additional impact of pledges, beyond policies already implemented. Using the New Policies scenario as a baseline instead of the Current Policies Scenario reduces the impact of the company, cities and region initiatives by 10–15%, which results in an overlap 0.2–0.3 GtCO<sub>2</sub>e. It may be that the impact of additional policies is more than the 1.3 GtCO<sub>2</sub>e assumed in the World Energy Outlook, but this is definitely not more than a doubling, given the total impact of additional policies assumed in UNEP (2014) and the fact that the World Energy Outlook only covers the energy-related emissions. This would bring the overlap to at most 0.7 GtCO<sub>2</sub>e. In the other areas, there is limited policies implemented in the areas of agriculture and cookstoves; we

will assume an overlap here of 20% of the non-state action. More policies are in place for stopping deforestation, and for oil and gas production, so here we will assume an overlap of 50% of the non-state action. This will lead to an additional overlap of 0.2 GtCO<sub>2</sub>e, bringing the total to 0.4–0.9 GtCO<sub>2</sub>e.

We therefore conclude that the overlap between the impact of non-state action and the impact of policies related to pledges is uncertain, but most likely not more than one third of the total impact of non-state action.

With greater emphasis on the quantification of emission reductions that these initiatives can deliver alongside a similar effort on the national pledges, we are able to ultimately provide a more accurate picture.



# 8 Conclusion

Our study shows that committed action from existing non-state climate initiatives involving cities, regions, companies and sectors could deliver emission savings of 2.9 GtCO<sub>2</sub>e, with a range of 2.5–3.3 GtCO<sub>2</sub>e, additional to what will be delivered by currently implemented policies and measures. For comparison, the impact of government pledges in 2020 is 5–7 GtCO<sub>2</sub>e. We estimate that the overlap between the impact of pledges and the impact of non-state commitments is less than 1 GtCO<sub>2</sub>e. These reductions are a contribution in their own right to closing the gap of 8–10 GtCO<sub>2</sub>e between global GHG emission levels consistent with the 2 °C target and the emission levels expected if country pledge cases are implemented. However, these non-state initiatives can also play a role in raising the level of ambition of governments by demonstrating what is possible with concerted action.

Quantifying the emission reductions delivered by these non-state climate initiatives remains a challenge, particularly in the context of the gap between country pledges and the path to 2 °C. In this context, the overlap between initiatives and the overlap with government pledges are important. In this study, we have made estimates to represent that additionality in the totals presented here. Initiatives where

additionality is uncertain are reported in the relevant section above. They include forestry and financial initiatives that may deliver significant emission reductions.

The initiatives we analysed cover only part of the potential reduction that could be delivered by non-state initiatives. The UNEP 2013 Gap report presented estimates of the potential emission reductions that might be delivered by initiatives in different sectors. Table 8.1 shows a comparison of those potentials with the emission reductions expected from major initiatives, and includes the elements needed to deliver them i.e. including concrete mitigation actions and/or quantified mitigation targets, a range of participants, and participants that have the power to realise the emission reduction.

As discussed, a large number of non-state climate initiatives currently exist and they are very diverse in scope and approach. Some include members that make a direct emission reduction commitment, which will contribute to closing the emission gap. Others stimulate action that will deliver emissions savings additional to government action, but without having a direct commitment, whereas others support action that is largely driven by government.

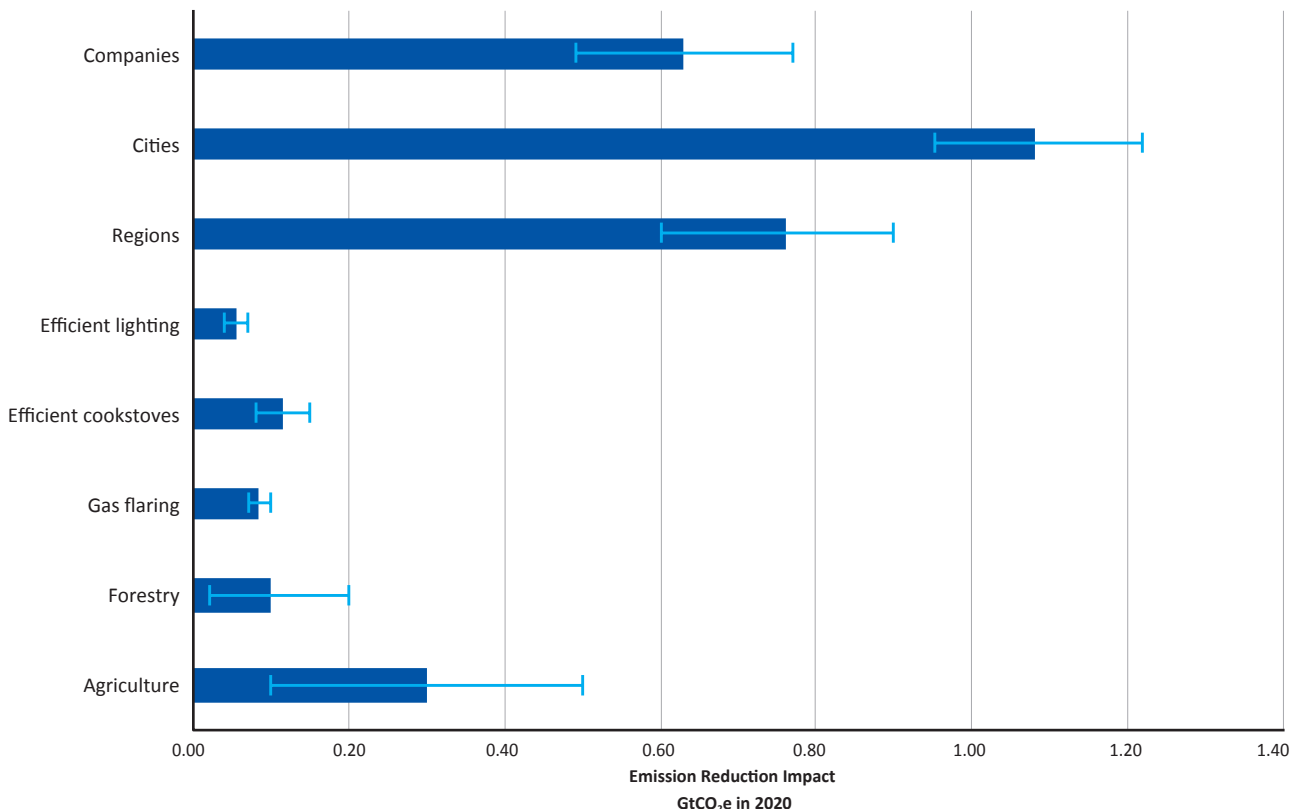


Figure 8.1: Emission reduction impacts found in this study

Table 8.1: Potentials from the UNEP Emissions Gap Report 2013 (relevant sections) and emission reductions in this study

Mitigation measures and areas	Reduction potential			Reduction from major initiatives (without correcting for overlap)  This study GtCO <sub>2</sub> e per year in 2020
	Wedging the gap (Blok et al 2012) GtCO <sub>2</sub> e per year in 2020	UNFCCC (UNFCCC, 2013) GtCO <sub>2</sub> e per year in 2020	IEA energy/ climate map (IEA, 2013) GtCO <sub>2</sub> e per year in 2020	
Companies (excluding voluntary off-sets)	1.3			0.63
Cities	0.7			1.08
Regions	0.6			0.76
Efficient lighting	2.4	2	1.6	0.06
Efficient cookstoves	*			0.12
Methane and other short lived climate pollutants	*	1.1	0.6	0.09
Fluorinated greenhouse gases	0.3	0.5		0.00
Reduce deforestation	1.8	1.1–4.3		0.10
Agriculture	0.8	1.3–4.2		0.30
Renewable energy	3	1–1.5		0.00
International transport	0.2	0.3–0.5		0.00

\* Not quantified

Comparing the initiatives making a direct contribution with potential reductions (Table 8.1) shows that major initiatives of cities and regions are already delivering commitments that should result in emission reductions even higher than was previously identified as possible. Companies also are making commitments that represent a significant proportion of the identified potential. However, there are also areas where there is an untapped potential for specific action. These include, most of all, energy efficiency and renewable energy. Although many initiatives exist in these sectors, they lack either specific actionable objectives and the means to deliver them, or scale. This also holds for agriculture and forestry. There is great scope for both other initiatives and other countries to scale up, and for them to learn from the success in city and company initiatives at formulating quantifiable goals that actually are delivered.

The figures given in this study represent the potential emission reductions delivered by 2020 based on reported targets and progress. Reporting is a very important part of many initiatives, although not all have robust monitoring and verification. Without this monitoring and verification, it may be difficult to robustly demonstrate the success of the initiatives in delivering the emission reductions stated. The importance of this to the successful running of each initiative needs to be considered explicitly, but in the context of global discussions on the emissions gap, this will be an issue.

UNEP will continue to track the commitments by subnational actors and business and integrate the newest developments in the 2015 Emissions Gap Report.



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# Appendix 1

## List of major non-state initiatives quantified in this study

31

Quantified Initiatives	
Company Initiatives	
<b>Business Environmental Leadership Council (BELC)</b>	Created by C2ES in 1998, <b>BELC</b> is the largest U.S.-based group of corporations, consisting of 32 members focused on addressing the challenges of climate change and supporting mandatory climate policy. Companies adopt voluntary emission reduction targets and innovative programs in energy, carbon sequestration and waste management.
<b>Cement Sustainability Initiative (CSI)</b>	<b>CSI</b> is an alliance of 25 leading companies in the global cement industry created under the WBCSD in 1999 as a sector-project. The CSI provides a platform for a shared understanding of sustainability issues and to identify actions and facilitate steps cement companies can take to accelerate progress towards sustainable development. When participants sign the CSI Charter they commit to developing a climate change mitigation strategy, setting reduction targets for CO <sub>2</sub> and reporting annually on their progress including independent third party assurance.
<b>World Wide Fund for Nature (WWF) Climate Savers</b>	<b>WWF Climate Savers</b> acts as a sounding board and provides guidance for companies seeking to substantially reduce their carbon footprints. The 28 multinational member companies work with other companies, suppliers and partners to implement innovative solutions for a low carbon economy. Each participant sets a reduction target in absolute terms and within a defined timeframe. Targets and progress are reviewed on a regular basis and publicly communicated.
<b>Ultra-Low CO<sub>2</sub> Steelmaking (ULCOS)</b>	<b>ULCOS</b> is a consortium of 48 European companies and organisations from 15 European countries. Coordinated by ArcelorMittal, they have launched a cooperative research & development initiative to enable strong reduction in CO <sub>2</sub> emissions from steel production. The aim of the ULCOS programme is to reduce the CO <sub>2</sub> emissions of today's best steel production routes by at least 50%.
<b>Caring for Climate</b>	<b>Caring for Climate</b> is an initiative aimed at advancing the role of business in addressing climate change. Launched in 2007, it currently has 399 signatories. The initiative helps companies to: advance practical solutions; share experiences; and shape public policy, as well as public attitudes. By supporting the Caring for Climate Statement, participants commit to set voluntary targets to improve energy efficiency and to reduce their carbon footprint. Participants report publicly and annually on the achievement of those targets.
<b>Science-Based Targets</b>	A joint initiative by CDP, the UN Global Compact, the World Resources Institute and WWF launched in 2014, aiming to increase corporate ambition on climate action consistent with limiting global warming to less than 2 °C compared to pre-industrial temperatures.
City and Region Initiatives	
<b>C40</b>	<b>C40</b> cities are a network of the world's megacities committed to taking action that reduces global GHG emissions. The CDP provides a reporting platform where cities can disclose their climate mitigation, adaptation and water management data. In 2015, an Open Data Portal for C40 cities was launched, which provides recent annual city-wide emissions.
<b>carbonn Climate Registry (cCR)</b>	<b>cCR</b> is not only an initiative itself, but the reporting platform for two other initiatives: <b>The Global Cities Covenant on Climate – The Mexico City Pact</b> , which commits cities to 10 action points, including to reduce their local GHG emissions voluntarily, to adopt mitigation measures to achieve their targets and to report their emissions and targets through the cCR; and the <b>WWF Earth Hour Challenge</b> , where cities ideally commit to targets for reducing CO <sub>2</sub> emissions, although this is not required. Emissions and targets of participating cities are also reported through the cCR. Its secretariat is provided by ICLEI.
<b>Covenant of Mayors</b>	The <b>CoM</b> is a group of city mayors, mostly from the EU, but also non EU <sup>13</sup> , who commit to meet and exceed the EU CO <sub>2</sub> reduction target of 20% by 2020 (from a 1990 baseline). Signatories also commit to submitting a Sustainable Energy Action Plan (SEAP). A registry is available on the website.

<b>The Climate Group's State and Regions Alliance</b>	The <b>State and Regions Alliance</b> brings together 27 subnational government leaders to share expertise, demonstrate impact and influence the international climate dialogue. In 2005 they signed the Montreal Declaration of Federated States & Regions, in which they commit to setting targets and implementing climate action in their own jurisdictions. The alliance has since continued to formulate its members' expectations from national and international decision takers in a series of declarations, which also commit its members to further domestic ambitious actions.
<b>Sectoral Initiatives</b>	
<b>UNEP/GEF's en.lighten initiative</b>	The <b>en.lighten initiative</b> was established to accelerate a global market transformation towards environmentally sustainable, energy efficient lighting technologies. It supports participating countries to develop strategies and policies targeting the phase-out of inefficient incandescent lamps, thereby aiming to reduce the release of CO <sub>2</sub> and mercury emissions from fossil fuel combustion.
<b>Global Alliance for Clean Cookstoves</b>	The <b>Global Alliance for Clean Cookstoves</b> aims to help overcome the market barriers that currently hinder the wide-spread production, deployment, and use of clean cook stoves in the developing world. Begun in 2010, it is a public-private alliance of government, international government organisations (IGO), NGOs and private sector organisations.
<b>Forestry Initiatives</b>	
<b>Tropical Forest Alliance</b>	The Tropical Forest Alliance – along with two related initiatives - supports private sector members to engage with governments, civil society leaders and other businesses worldwide, to achieve a reduction in the deforestation of tropical forest. Its partners take voluntary actions, individually and in combination, to reduce the tropical deforestation associated with the sourcing of commodities, such as palm oil, soy, beef, paper and pulp.
<b>Oil and Gas Initiatives</b>	
<b>Global Gas Flaring Reduction Partnership (GGFR)</b>	<p>The GGFR work program focuses on four key areas to overcome the barriers to gas flaring reduction in partner countries:</p> <ul style="list-style-type: none"> <li>• Commercialisation of associated gas</li> <li>• Regulations for associated gas</li> <li>• Implementation of the global flaring and venting reduction standard</li> <li>• Capacity building to obtain carbon credits for flaring and venting reduction projects.</li> </ul> <p>It consists of government and company members and is managed and facilitated by a World Bank team.</p>
<b>Agriculture Initiatives</b>	
<b>The New Vision for Agriculture</b>	Defined by World Economic Forum partners in 2009, the New Vision for Agriculture holds that to meet the world's needs, sustainable agriculture must simultaneously deliver food security, environmental sustainability and economic opportunity. Together with 32 key partner organisations, this initiative has so far engaged over 350 organisations.

# Appendix 2

## Specific methodologies and assumptions for the quantification of the selected initiatives



### Methodological steps for company initiatives

The effect of company initiatives was quantified based on the individual targets of the companies. Quantifying the effect of every company initiative individually was not possible within the timescale of this study, so we took an approach in which we randomly selected 50 companies and used their weighted average emission reductions in 2020, compared to BAU, as representative of the achievement of all companies in the initiatives. For the randomly selected 50 companies, we based BAU on the emissions from the year in which the commitment was made. These emissions were not available for the full list of companies, so when applying the weighted average emission reductions, we used 2013 GHG emissions to calculate business-as-usual.

#### Quantifying the 2013 GHG emissions of companies

Many companies report their annual emissions to the CDP as part of their own sustainability programme. Two complementary methods have been used to ensure a sufficiently high coverage of GHG emissions among the 507 identified companies participating in one or more initiative, updated to most recent available data:

- We identified the companies in the top 1000 largest GHG emitters list, compiled by Jong (2011), that participate in at least one of the selected company initiatives. These companies cover 31% of the total GHG emissions in the top 1000 list, based on 2008 emissions. We updated the GHG emissions of these companies to the latest GHG available from the CDP data, which dated from 2012 or 2013. Some companies do not report to the CDP and so we complemented the GHG emissions data of the largest GHG emitting companies manually. This yielded a coverage of 30% of the total GHG emissions in the top 1000 list, or 98% of the top 1,000 emitting companies participating in at least one selected company initiative.
- Business structures change over time, and the top 1000 list may have not captured all of the largest emitters participating in company initiatives. Furthermore, we only identified 123 of the almost 500 companies participating in one or more selected company initiatives in the top 1000 list. We expanded the GHG emissions data with other participating companies reporting to the CDP, focussing on the highest emitters. This resulted in the GHG emission data set covering 167 companies.

We subsequently estimated the GHG emissions of the remaining 340 companies without emissions data on an

aggregated level. The majority of the companies belong to the financial, technology or consumer product sector. Using the average emissions of companies in these sectors for which we had emission data, the average emission of each company in financial, technology and consumer product sectors was estimated. Assuming that each sector covers a third of the remaining 340 companies, the average emission per company was estimated at 1.05 MtCO<sub>2</sub>e in 2013.

#### Projecting emissions from the full company list to 2020

BAU emissions in 2020 for the list of 167 companies with emission data were calculated by:

- For utility companies, the growth between 2012 and 2020 in the World Energy Outlook (WEO) 2014 current policies scenario of emissions in the power sector was used to calculate 2020 emissions
- For companies in all other sectors, the growth between 2012 and 2020 in the WEO 2014 current policies scenario of the final energy consumption for the industry sector globally was used

We also used the growth between 2012 and 2020 in the WEO 2014 current policies scenario of the industry sector's final energy consumption globally for the estimated emissions of the 340 companies without detailed emission data.

#### Estimating the impact of company initiatives

A random sample of 50 companies from the full list of 167 was used as a basis. The sample was constructed to be proportional to the number of companies participating in each initiative, with each initiative represented at least once. For these sample companies, data from the CDP and from literature sources was used to identify their reduction targets for 2020 and the year in which the commitment was made.

The BAU projection for each of these companies was determined from the year in which the company first made a commitment to a quantitative emission reduction target. Base year emissions for that year have been obtained from the CDP or from alternative company reports, depending on availability. To reflect the BAU emissions that would have been the view when the company made the commitment, we used the growth rate in emissions from the base year to 2020 from the version of the WEO which has the same base year i.e. for a 2006 base year, we use WEO 2008. As mentioned above, we used different growth rates for utilities versus other sectors. For companies with an emissions intensity target, we assumed a 1% annual improvement of emission intensity under BAU.



The impact of the emission reduction targets of the sample companies in terms of absolute emission reductions, compared to BAU, was then determined. To apply this to the total company list, we calculated a weighted average (in terms of percentage) reduction from the sample companies as compared to BAU. The impact of the initiatives was then calculated by multiplying the 2020 emissions under BAU from the full list by this percentage reduction. The final impact calculation was subsequently corrected for the number of sample companies without an emission reduction target.

### Methodological steps for city and regional level initiatives

The effect of city and regional level initiatives was quantified, where possible (i.e. C40 and States and Regional Alliance), based on the individual targets of the cities or regions. However, for the cities of the Covenant of Mayors (CoM) and the carbonn Climate Registry (cCR), such individual information, though publicly reported, was not available for our purpose. Instead, the sum of expected reductions in 2020, as compared to the base year of the commitment, and reported average commitment per year, were applied for the CoM and the cCR, respectively.

#### Step 1: Data gathering

Current and base year community emissions data, as well as reduction targets, were taken from the CDP database for reporting C40 cities. Data for the Covenant of Mayor cities is the Baseline Emission Inventory (BEI), which is a summarised quantification of the amount of CO<sub>2</sub> emitted due to energy consumption in the territory of a Covenant signatory within a given period of time, for all cities, and the planned emission reductions until 2020. For cCR, summary data on current emissions was available, i.e. 2.25 GtCO<sub>2</sub>e, and the average commitment of the 422 cities (as of March 2014) was estimated at 1.3% per year. For the Climate Group's State and Regions Alliance, information on targets was generally available on their website, while the base year emissions in many cases had to be individually collected from relevant regional inventory reports.

*Sources of data:* CDP database ([www.cdp.net](http://www.cdp.net)), The Covenant of Mayors 6-year Assessment (2014), the carbonn Cities Climate Registry Annual Report 2013, the Climate Group's States and Regions Alliance key commitments document 'State and regional government action on climate change and the Clean Revolution (December, 2011)', and its website ([www.theclimategroup.org/programs/states-and-regions/](http://www.theclimategroup.org/programs/states-and-regions/)), as well as relevant regional sources<sup>28</sup>.

Summary data of cCR and Covenant of Mayors does not list individual cities. Therefore, members with targets or commitments (SEAP) that were member of the relevant initiative at the time of assessment were assumed to have been included. This was an important assumption for later initiative overlap calculations.

The use of summary data from the Covenant of Mayors and the cCR meant that we could not use a regional approach in attributing emission reductions. The available information, especially for the States and Regions Alliance, was limited. For Bavaria, Connecticut, Gujarat, Lombardy, La Reunion and Kwazulu-Natal, information on targets was entirely missing. These members also did not sign the recent June 2012 States and Regional Rio Clean Revolution Statement.

Due to the limited information on the website of the States and Regional Alliance, information had to be supported using other sources (see sources in footnote 43). Where information was not available, an estimation was made. The percentage emission reduction targets for Quintana Roo and Rio de Janeiro states were estimated using the average of emission reduction targets of other regions that have a 2005 reference year for their commitments. For Upper Austria, as well as South Australia/ New York, the emission targets were 2030 and 2050 respectively and a linear approach was used to determine the emission reduction until 2020.

#### Step 2: Calculate the 2020 BAU emissions

Starting with the base year emissions, an annual emissions growth rate based on WEO scenarios was calculated for C40 cities and the States and Regional Alliance. For C40, the growth rate was calculated based on data from WEO 2008

<sup>28</sup> - Ministerium für Umwelt, Klima und Energiewirtschaft, Baden-Württemberg. Oct 2014. Erneuerbare Energien in Baden-Württemberg.  
 - Basque Government. Department of the Environment and Regional Policy. Greenhouse Gas Inventory, Index of the evolution of total greenhouse gas emissions by type of gas. Basque Country. Base Year 1990. 1990-2012. Eustat.  
 - 2010 emissions from Complément à la brochure « Chiffres-clés de l'énergie en Bretagne, édition 2015 », <http://www.fedre.org/content/premier-bilan-energetique-1990-2008-pour-la-bretagne>  
 - <http://www.arb.ca.gov/cc/inventory/data/bau.htm>  
 - Tracking progress in Catalonia towards Kyoto targets. First report. November, 2010. Govt of Catalonia.  
 - <http://www.iledefrance.fr/sites/default/files/mariane/RAPCR41-12RAP.pdf>  
 - Overview: What climate change means to Manitoba.  
 - New York State Greenhouse Gas Inventory and Forecast: Inventory 1990-2011 and Forecast 2012-2030. Final Report April 2014.  
 - Ontario's climate change update 2014. Ministry of Environment and Climate Change Ontario.  
 - Programa Estatal de Acción ante el Cambio Climático (Quintana Roo) - Statewide Program of Action on Climate Change (Quintana Roo)  
 - Greenhouse gas and energy observatory. Key figures - May 2013 of the Rhône-Alpes region. RAEE and Air Rhone Alpes.  
 - ACT Nº 13.798, NOVEMBER 9, 2009 Sao Paolo State Policy on Climate Change Act  
 - Scottish Government: <http://www.gov.scot/Publications/2012/07/9583/2>  
 - Tackling Climate Change. South Australia's GHG Strategy 2007-2020. Govt of South Australia  
 - Tasmanian State Greenhouse Gas Inventory 2011-12 [www.dpac.tas.gov.au/divisions/climatechange/what\\_the\\_government\\_is\\_doing/greenhouse\\_gas\\_accounts](http://www.dpac.tas.gov.au/divisions/climatechange/what_the_government_is_doing/greenhouse_gas_accounts),  
 - Markus Schwarz, Sebastian Goers, Michael Schmidthaler, Robert Tichler, (2013) Measuring greenhouse gas abatement costs in Upper Austria, International Journal of Climate Change Strategies and Management, Vol. 5 Iss: 3, pp.246 - 266  
 - Climate Change Annual Report December 2014, Welsh Govt  
 - Wallonian 2013 Climate Decree

and WEO 2014, while for the States and Regional Alliance, only data from the WEO 2008 was used. A relevant regional growth rate was used for each city or region e.g. emissions growth for Rio de Janeiro relates to the projected emissions for Latin America.

For cCR, base year emissions were not available; therefore, the sum of all current emissions was used with an annual growth rate, to extrapolate from 2013 to 2020. As summary data was used, a global growth rate, based on data from WEO 2012, was used. For Covenant of Mayors, the BEI was used to calculate the BAU in 2020. Data from WEO 2010 was used.

*Sources of data:* IEA's World Energy Outlook 2008, 2010, 2012, 2014.

For the cities, no urban reference growth scenarios were available<sup>29</sup>. Therefore, the WEO Current Scenario carbon-dioxide emissions from fuel combustion were used. Emissions from urban areas are largely energy-related emissions i.e. building and transport energy use. Similarly, for the regions, the WEO Current Policies Scenario energy-related emissions were used. Here it should be noted that regions also incorporate non-CO<sub>2</sub> related emissions, such as from agriculture and industrial processes, which have different growth rates to energy. For the Covenant of Mayors, as the emissions in the BEI come from cities with different base years, i.e. 1990, as well as 2005 and later, a differentiated annual global growth rate was applied. The emissions of the BEI from cities with a base year of 1990 (i.e. 26% of BEI emissions) used an annual global growth rate (derived from emission growth from 1990 to 2020) for this 30-year period. For the other 74% of emissions from the BEI, an annual global growth rate (derived from emission growth from 2008–2020) was applied for a 15-year period (i.e. 2005–2020). As we are dealing with a geographical mix of cities of different sizes and regions, a regional approach for the Covenant of Mayors cities, like that of the C40 cities, was not applicable.

Different versions of the WEO scenarios were used for the different initiatives, working on the simplified assumption that the year the initiative started is also the year that the cities declared their targets and calculated their BAUs, based, for example, on the most recent projections. Therefore, since the C40 initiative started in 2005, the WEO 2008 was applied, except for cities with the base year in 2012 or later, in which case the WEO 2014 was used. The CoM started in 2008; therefore the 2008 scenario data from the WEO 2010 were used. The cCR started in 2010; therefore the data from WEO 2012 was used. The States and Regional Alliance started in 2005; therefore the data from WEO 2008 was used.

### Step 3: Calculate city or region emission reductions

For the C40 and the State and Regions Alliance, the emission reductions until 2020 were calculated by multiplying the base year emissions by the % reduction of the participants' target. If the target is for 2020, it is a direct calculation. If the target

is prior to 2020, then we assumed no further reduction after that target date. In the cases where the target is after 2020, which was the case for some cities of C40 and few regions of the States and Regions Alliance, a linear approach was used. For the cCR, the emission reduction is already reported. A 1.3% annual emission reduction is assumed, based on the cCR report that 54% of the reduction commitments towards 2020 are above 1% per year. Finally a sensitivity analysis was performed. The additional emission reductions were again calculated, this time compared to a BAU with an annual growth rate adjusted by  $\pm 0.3\%$ .

An implicit assumption is that the city and region targets are citywide or region-wide in terms of total GHG emissions, and not just focussing on government operations.

For the State and Regions Alliance, in some cases either targets, the target year, or the target emissions were not reported. Therefore, additional research from various sources was incorporated. In the case of Rio de Janeiro State, there are no GHG emission reduction targets, but there are sectoral and renewable energy targets. As Rio de Janeiro State uses 2005 as a base year reference, the average emission target of regions with 2005 as a base year was applied instead as a 2020 GHG emission target. This approach was also used for estimating missing target information for Quintana Roo.

### Step 4: Overlap between cities initiatives

For each of the city initiatives selected, we compiled the list of participating cities and identified those cities with a target that report to more than one initiative. If a city belongs to more than one initiative, this overlap is accounted for in the order C40, cCR, CoM i.e. cities that are in both C40 and cCR are removed from the calculation for cCR, cities in C40 and cCR are removed from CoM. For the overlap of Covenant of Mayor with C40 cities, the emission reductions from the base year of their commitment is deducted from the BEI. For both the Covenant of Mayors and the cCR, only summary emissions data is available and therefore we calculated the overlap of their emission reductions by deducting their population overlap. The overlap of C40 with cCR is based on the most recent reported emissions.

### Step 5: Overlap between cities and regional initiatives

We first identified which C40, CoM and cCR cities are located in one of the 20 considered regions of the State and Regions Alliance. We then deducted the additional emission reductions of the following C40 cities: Toronto, San Francisco, Los Angeles, Paris, Rio de Janeiro and Sao Paulo. In CoM, at least 13 major cities are located in California, Quebec and Ontario. In cCR, at least 42 cities are located in Wallonia, North Rhine Westphalia, Catalonia, Basque Country, Scotland, Wales, Rhône-Alpes and Baden-Württemberg. Here, the approach was to sum the total city population per region. Then, for each region, the additional emission reductions per capita was calculated and multiplied by the population of the overlapping cities.

<sup>29</sup> Stockholm Environment Institute (June 2014). Advancing climate ambition: How city-scale actions can contribute to global climate goals. Working Paper.

The cCR contains many small cities, and therefore it is possible that not all cities that are part of a region were actually considered. For this reason, a 20% upper range was given for the city region overlap of cCR cities to account for this.

## Methodological steps for sectoral initiatives

### Methodology – en.lighten

#### Step 1: Reproduction of en.lighten assessment

In a first step, a calculation tool was set up to reproduce the results from en.lighten's own assessment study:

- (a) Using the en.lighten data on current lamp type stock per country and sector (residential, commercial and outside), as well as operation hours and wattages for the different lamp types
- (b) This data is available for 120 different countries (developing and developed)

#### Step 2: Impact scenario (current)

For the impact scenario, the energy consumption from lighting was determined in 2010 and 2020. The resulting energy savings were then converted into emission savings

The energy consumption from lighting in 2010 was determined in the following way:

- (a) **Before transition (2010):** Using the en.lighten data on current lamp type stock per country and sector (residential, commercial and outside), as well as operation hours and wattages for the different lamp types
- (b) **After transition (2010):** Using the new defined replacement tables, the lighting stock for a country is determined after transition, depending on the policy category the country falls under. The following policy categories were defined:
  - GLS ban w/o LED campaign
  - GLS ban w/ LED campaign
  - GLS and HAL ban w/ LED campaign
  - No ban in place
- (c) **Theoretical energy savings (2010):** the theoretical energy savings were calculated based on this direct transition, which does not take the time component for transition into consideration

The energy consumption from lighting in 2020 was determined in the following way:

- (a) The energy consumption from lighting in 2020, a scale up factor was determined, based on the population growth as well as the change in electrification level
  - From en.lighten's assessment tool, the electrification levels in countries was extracted into our calculation tool
  - Assumptions were made on how electrification levels will change in different country groups from 2010 to 2020
- (b) **Before transition (2020):** to determine the energy consumption from lighting before transition in 2020, the

value for 2010, calculated in step 2a., was multiplied with the scale up factor determined in step 3a.

- (c) **After transition (2020):** to determine the energy consumption from lighting before transition in 2020 the value for 2010, calculated in step 2b. was multiplied with the scale up factor determined under step 3a.
- (d) **Theoretical energy savings (2020):** the theoretical energy savings were calculated based on this direct transition, which does not take the time component for transition into consideration

The actual **energy savings** in 2020 for the **current impact scenario** was calculated as follows:

- (a) Target years for the phase out of incandescent lamps were obtained based on the policy categories and information collected for the participating countries. Where there is little activity currently in banning incandescent lamps, the target year was set to 2025
- (b) Using a weighted average life time for the different bulb types, as well as the operation hours, the share of the stock that has gone through transition was calculated for 2020. This was based on the commencement of replacement from the target year for incandescent phase-out onwards
- (c) This share was then multiplied with the theoretical energy savings in 2020 from step 3d to determine the actual energy savings

The final point is to determine the **MtCO<sub>2</sub>e emission** equivalent to these energy savings:

Using the IEA Emission factors for the different countries/regions, the energy savings calculated in step 4c. were converted into GtCO<sub>2</sub>e for each country of the participating countries in the Global Efficient Lighting Partnership Programme.

#### Max/Min ranges for emissions

To account for uncertainty in the input assumptions, a range of different assumptions were made in the replacement tables, as well as for the assessment of progress towards electrification levels under a minimum and maximum assumption scenario

#### Input assumptions

1. Replacement matrixes for different country policy scenarios (Max/Min):
  - GLS ban w/o LED campaign
  - GLS ban w/ LED campaign
  - GLS and HAL ban w/ LED campaign
  - No ban
2. Assumption on progress towards electrification from 2010 to 2020
3. Assumptions on CO<sub>2</sub> factors per region (if not available for the individual countries)

#### Data sources used

- UN population current and growth projection (medium fertility)



- IEA emission factors and electricity consumption, extracted from IEA energy balances
- Lighting consumption values, bulb stock information, bulb wattages, operation hours, lamp life based on data from en.lighten assessment tool: <http://learning.enlighten-initiative.org/Tools.aspx>
- UNEP/GEF en.lighten initiative (2014): *The Second Generation On-Grid Country Lighting Assessments. Modelling Methodology for Energy and Financial Savings Potential from Replacing All On-Grid Lighting in All Sectors*
- Information on phase-out targets and target years of countries involved were received directly from the initiative

## Methodology Global Alliance for Clean Cookstoves

### Step 1: Data gathering

A literature search identified a scientific research paper by Bailis et al. 2015. The approach they followed is to first check to what extent woodfuel demand exceeds supply. This is used to identify specific “hotspots”, where harvesting rates are likely to cause degradation or deforestation and thus are not sustainable. In a second step, 100 million improved cook stoves will be allocated and disseminated according to the programmatic priorities of the Global Clean Cookstove Alliance. It identified for 2009 that 27–34% woodfuels were harvested unsustainably. The largest hotspot for non-sustainable harvesting occurs in East Africa: Eritrea through western Ethiopia, Kenya, Uganda, Rwanda and Burundi. In Asia, hotspots occur in parts of Pakistan, Nepal, Bhutan, Indonesia and Bangladesh. Net emissions from woodfuels were 1–1.2 GtCO<sub>2</sub>e in 2009. The 100 million improved cook stoves to be distributed by 2020 could reduce this by 11–17%.

*Source:* Bailis, R., Drigo, R., Ghilardi, A. and Masera, O. (2015) The Global Footprint of Traditional Woodfuels. *Nature Climate Change* 5, 266–272.

The paper assumes that 100 million improved cook stoves will be successfully allocated and disseminated according to the programmatic priorities of the Global Clean Cookstove Alliance.

### Step 2: Identification of business-as-usual 2020

A comparison of different cook stove programmes worldwide from 1996–2010 indicates annual distribution levels of 70,000 to 1.88 million stoves (Persoon, 2010). Therefore, the low range of annually distributed stoves is defined as 1 million. The most comparable global cook stove programme to the Global Clean Cookstove Alliance is its predecessor, the Partnership for Clean Indoor Air. In its last year of programme operation, this programme sold 2.48 million stoves worldwide. This is used as the upper end of the BAU. This range is kept constant until 2020. Therefore, under a

current policies BAU scenario, in the period 2010–2020, 10–25 million improved cook stoves would be distributed. This would mean 75–90 million of the 100 million improved cook stoves can be considered additional and an additional emission reduction of 79–145 MtCO<sub>2</sub>e/yr by 2020.

*Source:* Persoon, G.J. (2010) Towards 500 million improved cookstoves. A comparative analysis of three dissemination programmes and the role of CDM and black carbon. Master Thesis, Utrecht University. Partnership for Clean Indoor Air (2012) PCIA BULLETIN–2010 Results Reporting Supplement.

We assume that the last year of operation of the PCIA’s successful distribution of improved cook stoves can be continued. However, the PCIA stopped its operation after 2010. The annual stove distribution rate is considered to stay the same until 2020.

## Methodology Tropical Forest Alliance 2020

### Step 1: Emissions resulting from increase in palm oil production

1. For the commodity palm oil (oil, palm fruit), historic data on area harvested (1990–2013) was exported from FAOSTAT<sup>30</sup> for the major producing countries within the tropical belt:
  - Indonesia (45% share in production in 2013 among tropical countries) and Malaysia (36% share among tropical countries)
2. The area values were extended from 2013–2020 through two scenarios:
  - (a) **Minimum:** by carrying on the observed trend from, which resulted in an average annual increase in area harvested of 5% in Indonesia and 2.6% increase in Malaysia
  - (b) **Maximum:** based on the annual growth rate provided by FAOSTAT which was 9% for Indonesia and around 3.4% for Malaysia
3. The minimum and maximum additional area harvested was determined. This represents the increase in area effected by palm oil due to the increase in its production volume over the years
  - (a) **Minimum scenario:** additional area harvested per year: difference in area harvested in two following years under minimum scenario 2a
  - (b) **Maximum scenario:** additional area harvested per year: difference in area harvested in two following years under minimum scenario 2b
4. Determination of emissions MtCO<sub>2</sub>e that can be attributed to palm oil: **Baseline scenario**
  - (a) Using the typical expansion patterns observed for the commodity, together with carbon content values for the different types of forest that the commodity enters, the MtCO<sub>2</sub>e were estimated

<sup>30</sup> FAOSTAT, 2015: <http://faostat3.fao.org/download/Q/QC/E>.

5. Determination of MtCO<sub>2</sub>e that can be attributed to palm oil: **Certification scenario**
- (a) In this scenario, it was assumed that with 100% sustainable certification of the commodity, the expansion into certain types of land – namely virgin forest, peatland and high carbon value forest – will not take place, as the certification scheme will include forest management options. This “certification expansion” was used together with the carbon content values from the baseline scenario to determine the MtCO<sub>2</sub>e under the certification scenario.
- (b) For the maximum scenario under certification it was further assumed that a halt in deforestation is gradually achieved by 2020

6. Assumptions:

**Table A: Assumed expansion patterns (same patterns were assumed for Indonesia and Malaysia)**<sup>31</sup>

Forest Type	Expansion pattern	
	baseline	certification
Area share of peat	4%	0%
Area share of shrubs/grass and deforested (previously converted) land	55%	75%
Area share of virgin forest	37%	0%
Area share secondary forest	4%	25%

**Table B: Estimated emission factors (same for Indonesia and Malaysia)**<sup>32</sup>

Forest Type	Emission factor [tCO <sub>2</sub> /ha]	
	min	max
Area share of peat	226	776
Area share of shrubs/grass and deforested (previously converted) land	110	132
Area share of virgin forest	381	693
Area share secondary forest	183	381

A range of MtCO<sub>2</sub>e emissions was determined for the baseline as well as the certification scenario, arising from the minimum and maximum scenarios for the additional area harvested and the emission factor assumptions. In the maximum scenario for certification emissions become 0 as it is assumed that net zero deforestation is achieved

**Table C: Determined Emissions in 2020 under the baseline and certification scenario**

Forest Type	Emissions in 2020 [GtCO <sub>2</sub> /a]	
	min	max
Indonesia baseline	0.09	0.4
Indonesia certification	0.05	0
Malaysia baseline	0.03	0.07
Malaysia certification	0.01	0

### Step 2: Private sector impact

- For the bottom up approach, the volume (t) of palm oil handled by TFA 2020 private sector members, together with the share of certified palm oil, was collected private sector members of the TFA 2020 hold roughly (a) 45% of the market
- Using the 2020 emissions determined under the Step 1 calculations, together with production values of palm oil in 2020, emission factors were determined in tCO<sub>2</sub>e/t for the baseline scenario, as well as for the certification scenario
- Using these emissions factors, the emissions caused by the palm oil handled by the companies were determined
  - Baseline scenario:** the share of uncertified palm oil was multiplied with the baseline scenario emission factor and the share of certified palm oil was multiplied by the certification scenario emission factor
  - Certification scenario:** under this scenario it was assumed that all palm oil handled by the member companies was sustainably sourced; therefore only the certification scenario emission factor was used.

### Limitations

- Volume handled by companies in 2020 is based on the 2013 shares
- Where expansion patterns were based on specific regions, it was assumed that the same patterns applied to the entire country/region.

### Input assumptions

- Production volumes/area harvested can be extended to 2020 by trending historic developments
- Expansion patterns for palm oil (based on literature and expert estimates)
- Maximum and minimum emission factors/carbon content for different types of forest (peat, deforested, virgin, secondary forest) were based on different countries
- Assumed that emission factors/carbon content in Malaysia is similar to Indonesia
- A rough emission factor for “handled palm oil” can be estimated as tCO<sub>2</sub>e/t production in 2020 for the baseline and certification scenario

<sup>31</sup> Based on Agus et al. (2013): Historical CO<sub>2</sub> Emissions from Land Use and Land Use Change from the oil palm Industry in Indonesia, Malaysia and Papua New Guinea.

<sup>32</sup> Based on Agus et al. (2013): Historical CO<sub>2</sub> Emissions from Land Use and Land Use Change from the oil palm Industry in Indonesia, Malaysia and Papua New Guinea.

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- Annual Communication of Progress (ACOP) Reports to the Roundtable on Sustainable Palm Oil (RSPO):
  - ACOP 2013/2014 - McDonald's Corporation<sup>33</sup>
  - ACOP 2013/2014 - Cargill Incorporated<sup>34</sup>
- CDP, 2015: <https://www.cdp.net/en-US/Pages/HomePage.aspx>
  - CDP Forests 2014 Information Request Marks and Spencer Group plc
  - CDP Forests 2014 Information Request Marfrig Alimentos S.A.
  - CDP Forests 2014 Information Request Nestlé
- FAOSTAT, 2015: <http://faostat3.fao.org/download/Q/QC/E>
- Roundtable on Sustainable Palm Oil (2014): Impact Report 2014
- Sustainability report:
  - M&S Plan A Report 2014<sup>35</sup>
- Union of Concerned Scientists: Palm Oil Scorecard: Company Profiles<sup>36</sup>
  - UoCS (2014): Donuts, Deodorant, Deforestation
  - Scoring America's Top Brands on Their Palm Oil Commitments.<sup>37</sup>
- WWF (2013): Palm Oil Buyers Scorecard – Measuring the Progress of Palm Oil Buyers<sup>38</sup>.

## Methodology New Vision for Agriculture

### Step 1: BAU growth in food production

As total population likely climbs above 9 billion in this century, food demand is expected to outstrip population growth, as rising incomes drive per capita consumption, particularly meat consumption, higher. CEA (2014) estimates that food production will increase from 50% to 110% by 2050 (in calorific content) compared to 2010, based on UN and

FAO population and diet projections. Interpolated to 2020, this means a global food production increase of 10–14% compared to 2010.

### Step 2: Baseline emissions

Baseline emissions are calculated from FAO statistics, taking into account the countries included in the initiative.

### Step 3: Emission reductions

If the current area of land stays the same, there will be a 12% (average of 10–14% range) increase in the emissions under BAU and no change in the emissions under the initiatives. If productivity increase from the initiative comes from a reduced amount of land, BAU will still be 12% there will be an 8% decrease in emissions from the initiative case.

## Methodology Climate Smart Investments

### Step 1 Calculate the emission reductions per USD invested

We take the difference of the cumulative investments per sector (2011–2050) in the 6DS and the 2DS scenario from IEA ETP to calculate an average annual rate of investment. We then calculate the difference in emissions from each sector in 2020 between the 6DS and 2DS scenarios. We assume that any additional investment starts in 2015; this means that the cumulative investment for the six years from 2015–2020 results in the avoided emissions in 2020. This gives us the emission reduction per USD invested in each sector. However, additional investments alone are not the difference between the scenarios; there is also additional government action, so we adjust the figure down by 20%.

### Step 2 Calculate the emission reductions in 2020.

We assume that the additional funds are invested in the same proportion as the ETP: clean buildings (26%), power (21%), transport (49%) and industry (4%). Multiplying the funds in each area by the sector specific investment factor gives the emission reductions. This represents the total reductions and is not in this case relative to a BAU.

<sup>33</sup> <http://www.rspo.org/file/acop2014/submissions/mcdonalds-corporation-ACOP2014.pdf>

<sup>34</sup> <http://www.rspo.org/file/acop2014/submissions/cargill-incorporated-ACOP2014.pdf>

<sup>35</sup> <http://planareport.marksandspencer.com/downloads/M&S-PlanA-2014.pdf>

<sup>36</sup> [http://www.ucsusa.org/global\\_warming/solutions/stop-deforestation/palm-oil-scorecard-company-profiles.html#.VVXGQpPWKJ1](http://www.ucsusa.org/global_warming/solutions/stop-deforestation/palm-oil-scorecard-company-profiles.html#.VVXGQpPWKJ1)

<sup>37</sup> [http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global\\_warming/deforestation-free-palm-oil-scorecard.pdf](http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/deforestation-free-palm-oil-scorecard.pdf)

<sup>38</sup> [http://wwf.panda.org/what\\_we\\_do/footprint/agriculture/palm\\_oil/solutions/responsible\\_purchasing/palm\\_oil\\_buyers\\_scorecard\\_2013/](http://wwf.panda.org/what_we_do/footprint/agriculture/palm_oil/solutions/responsible_purchasing/palm_oil_buyers_scorecard_2013/)



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