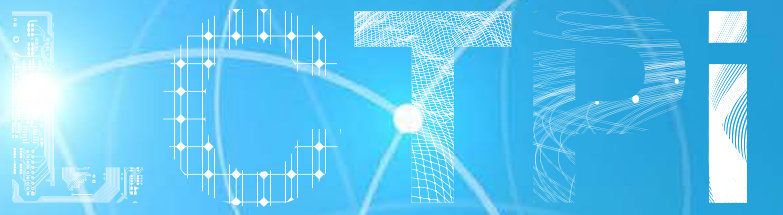
RENEWABLES

BELOW50

Low Carbon Technology Partnerships initiative



2016

From Ambition to Implementation

CEMENT

LOW-CARBON FREIGHT

CHEMICALS

CLIMATE SMART AGRICULTURE

ENERGY EFFICIENCY IN BUILDINGS

wbcsd

FORESTS AND FOREST PRODUCTS AS CARBON SINKS

About WBCSD

The World Business Council for Sustainable Development (WBCSD) is a global, CEO-led organization of over 200 leading businesses and partners working together to accelerate the transition to a sustainable world. WBCSD helps its member companies become more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

WBCSD member companies come from all business sectors and all major economies, representing a combined revenue of more than $8.5 trillion and 19 million employees. The WBCSD global network of almost 70 national business councils gives members unparalleled reach across the globe. WBCSD is uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

www.wbcsd.org Follow us on Twitter and LinkedIn

Acknowledgements

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Disclaimer

This publication is released in the name of the World Business Council for Sustainable Development (WBCSD). The content of this report has been informed by the LCTPi working groups however it does not necessarily reflect the views of all companies and partner organizations who are engaged across the program or the member companies of the WBCSD. Please note that data published in this report reflect the status at the end of October 2016.

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Peter Bakker
President and CEO

Foreword

The Paris Agreement entered into force on Friday 4th November 2016 and it was a global signal that the transition to a low carbon economy is stronger than it has ever been before. In this context, the Low Carbon Technology Partnerships initiative (LCTPi) is a very powerful initiative. It is a distinctive collaborative platform positioned to accelerate structural transformation, technological change and innovation, and support ambitious climate action at the company level.

Collaborative initiatives are not easy. They require concerted efforts and the collective will to move participants in the same direction. But 2016 has proved the strength of the LCTPi methodology. LCTPi brings forward-thinking companies together to share a vision, agree and deliver actions, report progress and then re-evaluate whether the vision is still valid or whether it needs to be upgraded.

As the world holds governments to account for the commitments made in Paris, we are committed to doing our part by reporting how LCTPi has started to deliver the solutions that will keep the world ahead of its emission targets. Demonstrating implementation progress is critical to achieving the climate goals. It helps companies understand the solutions, provides peer learning, and builds the confidence required for more businesses to implement climate solutions. Tracking and verifying progress on the LCTPi is also essential for the credibility of our “business determined contribution” to the global effort.

This is the first annual report in which we share progress on the 8 current LCTPi working groups in their first year of implementation. By reporting on progress and continuously expanding solutions, business can also help governments deliver on their climate commitments. We hope that our report inspires governments, as they review and upgrade their national climate plans, to increase their ambition.

María Mendiluce
Managing Director, Natural Capital

Business is the best implementation partner for national governments eager to make the most of low-carbon opportunities. LCTPi provides a solid platform for governments to engage in and to learn about the best practices of industry. This means that when they review their nationally determined contributions (NDCs) they can capitalize on the latest innovations and technology.

In this important year of implementation, LCTPi is driving a business-led story which goes further than tackling just the emissions that will curb dangerous climate change. 2016 has squarely focused attention on the level of business opportunity in the low-carbon economy. LCTPi will create jobs and economic activity. It will also help deliver on the Sustainable Development Goals. The projects and plans that are developing under LCTPi are not just going to deliver on goal 13 but will impact on at least 12 of the 17 goals.

We are also encouraged that new LCTPi work is expanding into new areas that will help to close the emissions gap. The LCTPi on low-carbon freight is an exciting contribution to the decarbonization of transport, a new area that was not assessed in our original LCTPi impact analysis for COP21.

In the next few years, we will continue to strengthen company participation in LCTPi working groups, create synergies across groups, increase engagement with policy makers and expand into new areas. We are eager to report progress and share best practice regularly to accelerate the implementation of business solutions around the world.

"No more significant organization, in potential, has appeared on the horizon in the history of renewable fuels — owing to its global reach, low-carbon focus, and the reputation of the players involved. We'll be fascinated to see how [below50] turns ambition to practical action over the coming months"

Biofuels Digest,
June 2016

Executive summary

The Low Carbon Technology Partnerships initiative (LCTPi) is a unique, action-oriented program that brings together companies and partners to accelerate the development of low-carbon technology solutions to stay below the 2°C ceiling.

The initiative was applauded at COP21 as CEOs publicly expressed support for a set of LCTPi ambitions and mobilised their companies to implement the LCTPi action plans. 2016 has been the year to start making good on the promises made.

96 companies have now made 103 public endorsements of LCTPi and are moving to implementation. Nearly 50 partners are working with companies across the eight active LCTPi working groups. Since the start more than 165 companies have been part of the LCTPi program. Over 1500 business representatives and policy makers have contributed to shaping the solutions in international dialogues conducted in key emerging markets over 2015 and 2016.

The LCTPi methodology has been applied by the eight active working groups and includes the following steps:

- quantifying the emissions reduction potential for the sector which sets the working group's ambition;
- assessment of the barriers to achieve that ambition;
- identification of solutions to overcome those barriers;
- development of action plans against which groups will focus their efforts;
- setting a monitoring framework with annual and longer term performance indicators; and
- preparing an annual progress report that includes outcomes and deliverables.

In 2018 we plan to review the ambition and the barriers and solutions using evidence collected during three years of implementation of the action plans.

"With a recent International Transport Forum study projecting that freight volumes could quadruple by 2050, the Low-carbon Freight initiative is an important catalyst to spearhead solutions to help manage and mitigate transport sector emissions. UPS is glad to collaborate, innovate and share our learnings."

Alan Gershenhorn,
Executive Vice President and Chief Commercial Officer for UPS

The level and speed of progress has varied across the sectoral working groups, but there are some key achievements to celebrate:

- **For the first time, the new LCTPi on low-carbon road freight has produced reliable global numbers on the emissions reduction potential of key solutions in the sector.** Three previously untapped solutions (optimisation, relaxing delivery windows and sharing assets) could contribute 1220 Mt CO_2 per annum emissions reduction in 2030 compared to 2015.

- **For the first time, industry consensus has been reached on the essential sustainability criteria for low-carbon fuels under Below50,** the new campaign to build the market for the world's most sustainable transport fuels

- **Two major Chinese companies have joined the LCTPi Cement following COP 21 and 2016 saw the 10th year of reporting of independently-verified energy and CO_2 emissions data for the cement sector.**

- The companies engaged in REscale, the LCTPi for the renewables sector, are responsible for a significant increase in global installed renewable capacity. This year, data showed that the **renewable capacity of REscale member companies increased by 22% from 2014 to 2015** – this is more than double the rate of increase in the global renewable capacity over the same period.

- National and regional engagement is increasing across the LCTPi working groups, for example, **three new energy efficiency in buildings platforms** were launched in Jakarta, Shanghai and Jaipur and the **climate smart agriculture** working group will shortly roll out programs across north America, Brazil, India, Ghana and the ASEAN region.

LCTPi progress will continue to be tracked in the coming years and results will be presented in annual progress reports.

There is recognition that action must be scaled-up in all markets and more companies are encouraged to join this growing global initiative.

"CNBM supports LCTPi and will effectively promote the technology communication and cooperation in the cement industry. Following the suggested action plans, our Company will accelerate technical innovations and optimize solutions in key fields. It is important to accomplish low-carbon development from materials to production and application, to explore the way of harmonizing the industry with nature."

Zhiping Song,
Chairman, China National Building Materials (CNBM) Group

Companies engaged

in LCTPi in 2016

Introduction

Climate change is the most pressing challenge we face.

Global temperatures are increasing. Science has confirmed that we must limit the rise to under 2°C in order to avoid the most serious consequences for people, the environment and economies worldwide.

In December 2015, 192 countries brokered a deal to take bold climate action to meet this target, with a stretch goal of limiting the rise to 1.5°C. What was once considered unthinkable – the global agreement of many diverse nations and interests around the globe – is now unstoppable. The early entry into force of the Paris Agreement demonstrates the resolve of national governments to signal that we are moving towards an inevitable low-carbon future.

We must transform our energy, industry, agriculture and forestry systems to reverse the rise in greenhouse gas emissions and achieve a net-zero emissions society in the second half of the century.

The Low Carbon Technology Partnerships initiative (LCTPi) is unprecedented in its potential for scale and impact for a low-carbon world. With a solid framework, proven methodology and clear agenda, LCTPi is a unique, action-oriented program that brings together companies and partners to accelerate the development of low-carbon technology solutions to stay below the 2°C ceiling.

An analysis of the potential impact of the LCTPi as a whole highlights that if the ambitions of the LCTPi are met it could cut emissions by around 25% from business as usual and get society 65% of the way to a 2°C emissions pathway. In addition, it could channel $5-10 trillion of investment toward low-carbon sectors of the economy and support 20-45 million person-years of employment.

New companies that joined LCTPi in 2016 include:

Ambuja Cement
Bunge
BT
Carbon Recycling International
China National Building Material Group
China Resources Cement
CPFL Energia
Dunar Food
Old Mutual
Red Rock Biofuels
SAB Miller
Scania
SCG
Tata Group
UPM
Yes Bank

It is important to note that while new companies have joined in 2016, several companies have left LCTPi since COP21. This may be because companies have merged, do not have the resources needed to actively participate in the work programs or the selected action plans do not respond to the company's core activities or strategic priorities. However, most of the companies that have left support the concept and the ambition of the LCTPi program. On a positive note, there is a significant increase in companies that are committed and recognise the value of this collaborative enterprise.

Post-Paris, companies continue to be highly engaged in the process of implementing climate action. 103 public commitments to the ambition and action plans of LCTPi have been made by 96 companies.

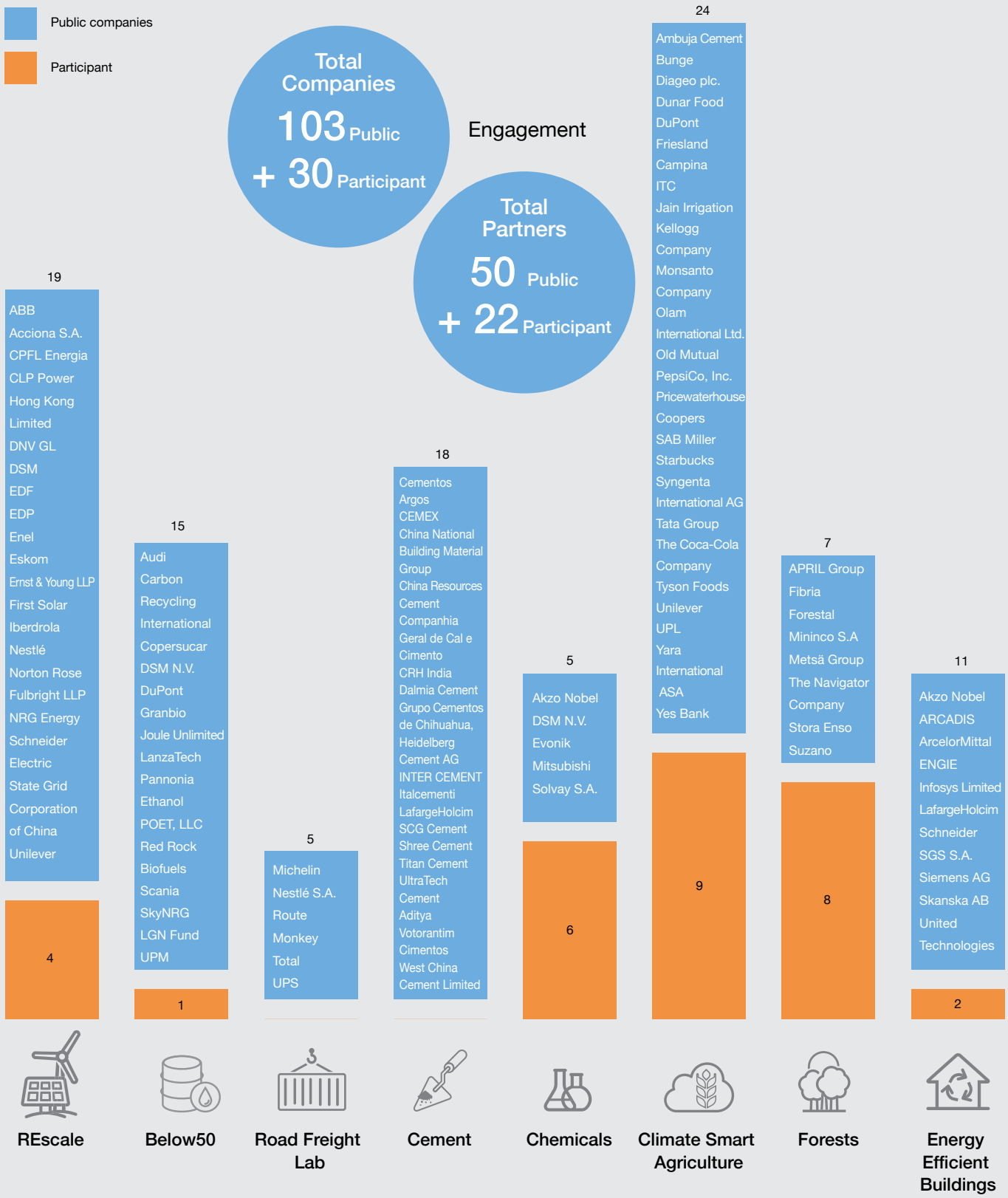
LCTPi has support at the highest levels of business. CEO support was established for LCTPi at COP21 and continues in 2016. This is an essential driver for collaborative initiatives.

LCTPi companies are significant and influential. Combined revenue of companies engaged in 2016 exceed USD 2.25 trillion and 43 LCTPi companies are listed in the Forbes Global 2000 list.

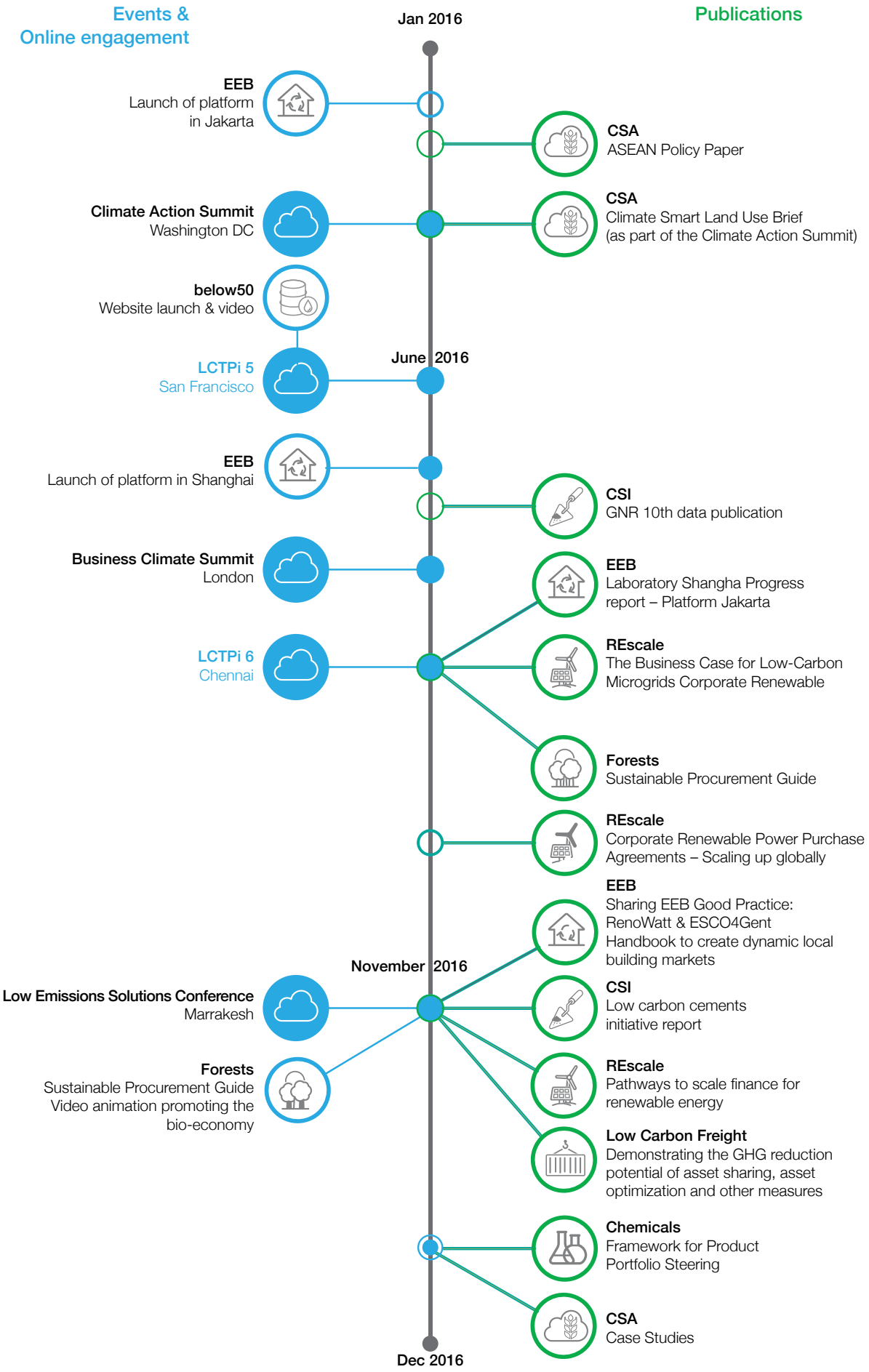
The LCTPi website has an average of over 1000 unique site visits per month

LCTPi is truly global in its reach. LCTPi companies have operations in over 200 countries and territories around the world.

Number of companies engaged in LCTPi projects in 2016



LCTPi in 2016



LCTPi 5

San Francisco, June 2016

Taking place back-to-back with the seventh Clean Energy Ministerial, around 250 participants engaged in a discussion on how to accelerate a transition to a low-carbon economy.

The event featured the launch of the "Below50" campaign, a global collaboration that brings together the entire value-chain for sustainable fuels - fuels that produce at least 50% less carbon dioxide emissions than conventional fossil fuels.

In his closing remarks, Peter Bakker, President and CEO, WBCSD, praised the private sector for no longer focusing on "why" but on "how" it can implement a low-carbon economy.

"Initiatives such as "Below50" show the importance of adding the voice of businesses to the discourse of low-carbon solutions."

Tom Steyer
Founder and President, NextGen Climate at LCTPi 5 in San Francisco

In 2016, LCTPi has laid the groundwork that will turn the ambitions of Paris into implementation.

Two milestone events were convened to ensure there were opportunities to share lessons between working groups and discuss the relevance of LCTPi solutions in two key markets.

"We want to help drive the energy industry towards a cleaner future. Collaboration will help us get there."

Rajiv Mishra
Managing Director, CLP India at LCTPi 6 in Chennai

LCTPi 6

Chennai, October 2016

In Chennai, participants continued the international dialogue on the private sectors role in supporting ambitious climate action.

The meeting took full advantage of gaining a deeper understanding of the challenges, opportunities and leadership that are particular to the Indian context. Discussions connected global and local perspectives to support more meaningful implementation plans. The meeting will also shared lessons learned and look ahead to ensure momentum is maintained for 2017.

Renewables

Ambition

Renewable energy is increasingly reliable and cost-competitive with conventional generation sources. Through the REscale LCTPi, leading energy and technology companies are working together on solutions to accelerate the deployment of renewables and the transition to a low-carbon electricity system. The ambition is to scale-up renewable deployment in line with the IEA 2°C scenario - this equates to an additional 1.5 TW deployed by 2025. This is equivalent to nearly twice the peak demand of the United States.

Status

The power sector currently contributes around 37% of global emissions. Producing power from renewable energy is one significant way of reducing these sector emissions. As the costs of renewable technology decrease and new technological and market advances help to overcome variable generation patterns, many investors and corporates regard renewables as an attractive investment opportunity. In addition, with growing global energy demand, building and operating renewable projects is a prosperous and sustainable business model for developers, IPPs and many utilities alike.

The main challenges for scaling-up RE deployment are: access to new finance instruments, ensuring bankability of projects, improving the integration of growing levels of renewables into electricity markets as well as delivering clean, affordable energy for the billions of people who lack access.

There is a clear trend towards business models and financing approaches outside of the traditional models. These new approaches have great potential to facilitate the scale-up of renewable energy and to continue driving reductions in cost.

Firstly, there is great promise in the growing diversity of investor types as well as financing vehicles. This has the potential to widen the pool of available capital, and leverage the benefits of new financing instruments to deliver reductions in the cost of capital. The diversity of available instruments is increasingly appropriate for those projects needing finance: from large utility scale projects, to distributed embedded generation and microgrids in remote areas.

Secondly, corporate procurement of renewable energy is on the rise and presents a substantial opportunity to increase demand for renewable energy and to improve project bankability. The use of RE by large corporations both for economic and reputational reasons is increasing, thanks to early success in North American markets.

Thirdly, with the maturity of some technologies, regulators across a wide range of markets have or are changing their support structures away from Feed-in Tariff models towards variable top-up payments. These new structures will enable a more efficient and effective generation from renewables reacting to market signals.

Lastly, technical solutions for low-carbon microgrids are available and bankable, and progress has been made in developing effective business models for deployment of these systems.

Actions

We have achieved impact by improving the understanding of opportunities that renewable energy offers to stakeholders along the supply chain: from technology providers, developers and regulators, to financial institutions and consumers.

By producing three reports - on power purchase agreements, scaling finance for renewables and the business case for low-carbon microgrids - and holding numerous multi-stakeholder workshops, we have significantly expanded the knowledge that can help turn these opportunities into action. This includes providing concrete solutions on how different parties can overcome challenges ranging from the use of new financing vehicles to guidance while negotiating PPAs and key success factors in building and operating renewable-based microgrids. Our extensive partnerships with other influential organisations in the renewable sector contributes to this sharing of best practice and experiences.

A key part of the REscale work is to increase awareness and knowledge of new business models and financing vehicles available today that make a strong business case for investment and deployment of renewables. As such, the organisation of several topical workshops and webinars formed an important part of the actions in 2016 and provided an independent space to share experiences and advance on key barriers.

During 2016 we have seen a steady increase of interest on REscale activities with eight new companies joining, taking the total of the group to 20 members across the RE value chain (producers, technology developers, consumers, lawyers, financiers, etc.).

Discussions during global LCTPi events (in San Francisco in June and Chennai in October) have spread knowledge and best practice in local and very dynamic settings. These have been captured in the *'Corporate Renewable Power Purchase Agreements – scaling up globally'* report, explaining the benefits of the corporate renewable Power Purchasing Agreement (PPA) business model as a critical component of improving bankability and speeding up deployment rates.

An important element of the action plans this year was bridging the gap between investors and producers of RE. As detailed in the *'REscale – Pathways to scale finance for renewable energy'* report, new financing vehicles facilitate higher investment volumes and engage a broader range of investors.

Finally, the increase of renewable deployment in remote areas that lack access to energy will be vital to achieving growth and ensuring it is not at the expense of using fossil fuels. In that context, the *'Business Case for Low Carbon Microgrids'*

Companies
ABB
Acciona S.A.
BT
CLP Power Hong Kong Limited
CPFL Energia
DNV GL
DSM N.V.
EDF
EDP
Enel
Eskom
First Solar
Iberdrola
Nestlé S.A.
NRG Energy
Schneider Electric
State Grid Corporation of China
Unilever

Contributers
Ernst & Young LLP
Norton Rose Fulbright LLP

Partners
Clean Energy Ministerial
Climate Bonds Initiative
International Energy Agency
International Finance Corporation
RE100

demonstrates the viability of low-carbon microgrids, using real project examples to raise awareness and promote market growth of renewables in decentralised systems.

In 2017, the REscale LCTPi will look to have an impact in new regions, establish wider collaborations and move into new deep dives. Despite the dramatic cost reductions seen over the last 12 months, and growing demand for renewable assets from investors, the barriers to a significant scale-up remain in place. Innovative business models and financing approaches are driving much of recent deployment and cost reductions, but they need to be applied globally to achieve the IEA 2DS.

Impact

Between 2014 and 2015 there was a 9% increase in worldwide installed renewable capacity, which continues the positive trend of previous years. The companies involved in REscale contributed 1/3 of this capacity increase. Installed renewable capacity of REscale member companies increased by 22% from 2014 to 2015 - a rate more than two times larger than the global renewable capacity rise over the same time. Their total installed renewable capacity equals the combined renewable capacity of Germany, France, Italy, Spain, Austria, Belgium, Netherlands, Denmark, Sweden and Finland together.

Investments in renewables globally is showing constant growth, enhanced by the clear message of the Paris Agreement and the increasing quota of major investment banks investing in renewable technologies. In 2015, 285 billion USD global new investment was directed to the renewable sector. To achieve the 1.5 TW additional capacity ambition, USD 3.5 trillion additional investment is needed. 1.5 TW growth from 2015-2025 equates to 152GW per year on average – in 2015 this was comfortably met with 156GW newly installed renewable capacity.

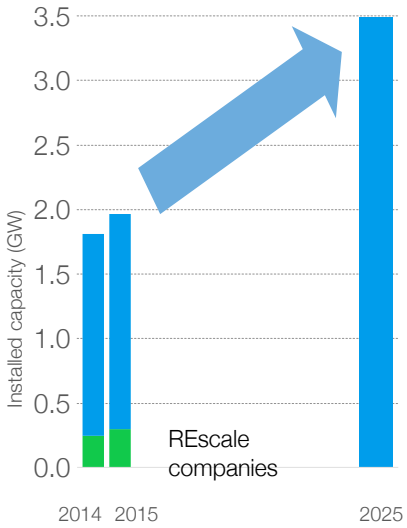


Figure 1 - Renewable Energy growth and ambition.

Recommendations

While the companies engaged in REscale are taking the lead, success also depends on urgent action by governments and regulators. The fundamental policy recommendations emerging from our work can be found in our *'Scaling up renewables'* report. However, there are very specific learnings that have emerged from our activities in 2017:

- Scaling finance for renewable energy requires stable and transparent energy policy that provides certainty for investors. Regulations should be reviewed to remove systemic bias and ensure that they do not systemically disincentivize investment in clean energy infrastructure. Government should ensure "smart" use of limited public funds, as the targeted use of these public funds can help to scale-up private sector investment.

- Creating an enabling environment for Corporate Renewable PPAs requires the removal of any prohibitions for entering third-party PPAs. It is essential to combine this with renewable incentives that cost-effectively support the development of renewable electricity projects (where necessary) and establish guarantees of origin or other similar certificate systems to show that renewable power is available for corporate buyers at a sensible cost.

- Scaling-up microgrid projects in developing countries needs a transparent, stable regulatory and legal framework. Fossil fuel subsidies should be reduced or entirely abolished and innovative instruments to finance microgrids should be supported with adequate policies.

"No more significant organization, in potential, has appeared on the horizon in the history of renewable fuels — owing to its global reach, low-carbon focus, and the reputation of the players involved. We'll be fascinated to see how the organization [below50] turns ambition to practical action over the coming months."

Biofuels Digest
June 2016

below50

"The below50 campaign is a great example of a cross-sectoral business platform to drive growth and commercialization of sustainable technologies for low-carbon transportation fuels, together with investors and policy-makers."

Rob van Leen
Chief Innovation Officer of Royal DSM

"DSM recognizes that the complexity of the issues is too big for any one party to tackle alone. These types of partnerships are a necessity to drive societal change."

Ambition

below50 aims to create a critical mass of players (developers, users and investors) through the below50 campaign to grow the global market for the world's most sustainable fuels.

Our ambition is to reduce CO_2 emissions by replacing 10% of global transportation fossil fuel use with Low-carbon Transport Fuels by 2030 and 27% by 2050, which is equivalent to 2.1 Gt CO_2 avoided per year *(see figure 2)*.

Status

Sustainable fuels offer a strong business opportunity not only for their potential to reduce CO_2 emissions using the current fuel infrastructure, but also given the opportunity for new innovative business models within the circular economy and bio-economy. Low-carbon transport fuels present a huge growth opportunity that is expected to double to USD 185 billion in the next 5 years.[1]

Since COP21, more companies are investing in these high-potential technologies. Successful examples include the collaboration between SkyNRG, South African Airways and Boeing to deliver the first flight using jet fuel made from tobacco plants, and the new jet fuel created by the partnership between Virgin Atlantic and Lanzatech. The companies engaged in below50 are delivering a range of sustainable fuel technologies as illustrated in *(figure 3)*.

The low-carbon fuels industry faces challenges linked to low oil prices, high CAPEX, regulatory hurdles and the pushback from existing energy players. However, low-carbon

[1] "Biofuels Markets and Technologies report" Pike Research

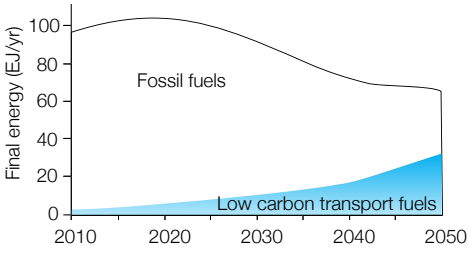


Figure 2 - Final global energy supply for transport split by fossil fuels and low-carbon transport fuels *(source: LCTPi Low-carbon Fuels Report 2015)*

Companies
Audi
Carbon Recycling International
Copersucar
DSM
DuPont
GranBio,
Joule Unlimited
LanzaTech
Leveraged Green Energy
Novozymes
POET
Scania
SkyNRG
Red Rock
UPM

Partners
Arizona State University
Associação Brasileira de Biotecnologia Industrial
Biofuels Digest
BSR
Carbon War Room
Center for Strategic Studies and Management
International Energy Agency
Low Carbon Fuels Coalition
RSB
SE4ALL
Yale University

fuels have a fundamental role to play in the decarbonization of transport. Clear long-term policies and financial support are a necessary component for ensuring low-carbon transport fuels are able to overcome these barriers and reach full commercial status.

Actions

2016 has been a critical and important year for below50. Through LCTPi, WBCSD has created the only global platform that brings companies together across the entire value chain of sustainable transport fuels. It is the first time ever that stakeholders along the entire fuel supply chain, particularly on the producer side, have come together to define what a sustainable fuel is and how to address the barriers to scaling-up.

The group and the secretariat have established new partnerships with leading organizations, forming an advisory board to provide strategic guidance and assurance to the group. Some of these organizations include: IEA, Yale, SE4ALL, ASU, ABBI, Carbon War Room and RSB. An innovative media partnership has been established with Biofuels Digest, the most influential and respected trade media outlet in the industry, for wider outreach.

below50 has started implementing the frameworks that will enable scale-up to take place though market growth, policy discussions and engaging with investors.

Though the below50 global campaign we aim to grow a global corporate market for the best-of-breed sustainable low-carbon transport fuels. The collaboration is designed to increase the number of companies using below50 fuels and demonstrate that these fuels make good business, reduce emissions by at least 50% relative to conventional fossil fuels and respect the highest environmental standards. To do that, below50 has worked closely with world-renowned sustainability standards to ensure that key sustainability parameters (for example related to water, land use and food security) are integrated into the below50 admission criteria.

During CEM7 and LCTPi 5 events in San Francisco, below50 was launched publicly. A few months later, the criteria for joining was finalised in close collaboration with RSB, SE4ALL in a multi-stakeholder effort that involved more than 20 organisations. These specific criteria were created for each part of the supply chain including feedstock growers, producers & technology providers, infrastructure, fleet operators, customers, financiers, OEMs and governments, and is illustrated in *(figure 4)*.

In 2017 below50 will launch an online marketplace that provides insight and assistance to stakeholders around the best fuels and how they can meet differing regional circumstances *(ie. which fuels are best for specific demand needs)*.

Following on from our engagement in Brazil during 2015, below50 and ABBI launched the below50 campaign in Sao Paulo at the BIO-LATAM and in Brasilia at the National Bio-economy Forum with presence of the Ministers of Environment, Science and Technology, and External Affairs. In November, at COP22, below50 will report progress to policy-makers on the major developments over the year.

For the first time below50 met with financiers and investors in London to discuss exclusively the current investment barriers and opportunities that low-carbon fuels represent. Some of the barriers identified were: lack of knowledge from investors and policy makers about the below50 technologies, its success rate and potential; low cost competitiveness of certain below50 fuels; and an absence of suitable financial products currently available that make low-carbon fuel projects and its risk profile attractive. In 2017, below50 will continue with these dialogues and work on solutions to address these barriers highlighted.

Impact

Early feedback on below50 highlights how this campaign is filling an important gap in building momentum on key low-carbon solutions:

“No more significant organization, in potential, has appeared on the horizon in the history of renewable fuels — owing to its global reach, low-carbon focus, and the

reputation of the players involved. We'll be fascinated to see how the organization turns ambition to practical action over the coming months" Biofuels Digest, June 2016

"A 2 degree rise in temperature is closer than we think. We have to be smarter than the problem. below50 is a way we can aggressively move towards a low-carbon future. Together, we must act now and ignore all calls to inaction," Jennifer Holmgren, CEO of Lanzatech.

"With the critical need to decarbonize the transport sector immediately to meet global climate change mitigation goals, we need initiatives like below50 that engage breakthrough sustainable mobility technology companies and large public & private sector institutions to accelerate scale up and impact," Brian Baynes, CEO of Joule Unlimited.

"The below50 campaign is a great example of a cross-sectoral business platform to drive growth and commercialization of sustainable technologies for low-carbon transportation fuels, together with investors and policy-makers," said Rob van Leen, Chief Innovation Officer of Royal DSM. "DSM recognizes that the complexity of the issues is too big for any one party to tackle alone. These types of partnerships are a necessity to drive societal change."

Recommendations

The low-carbon fuels industry wants to invest in new markets where there is a good economic, social and environmental business opportunity. As a necessary counterpart, public policies should allow companies to increase their business, on reasonable terms and agreeable returns on investments, and thereby support the transition to low-carbon fuel technologies.

This means that key policies must promote long-term stability with clear and transparent policies which are necessary to reduce investor risks. Measures such as guaranteed market share and ambitious CO_2 emission reduction targets will help investors to increase their investments.

Market-based approaches are also needed. For example, a defined carbon pricing system or feed-in tariff, which will allow the market to pick and develop the best opportunities, as well matching resources and technologies that are best suited to local circumstances.

We also recommend support and market signals to increase market demand for low-carbon fuels, for instance, mandatory blending ratios imply a secured market demand and thus will create security for investors in new production facilities.

Finally, investment and support for innovation and R&D for all low-carbon fuel technologies is needed to follow a 2°C pathway, emerging and new technologies need to be deployed in addition to existing low-carbon fuels. This will require innovation and R&D through public-private cooperation, bringing down the costs of transport fuels along the learning curve.

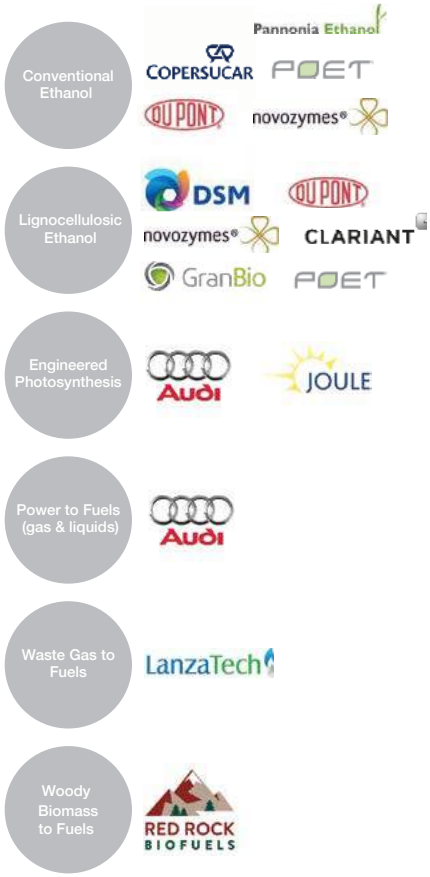


Figure 3 - Portfolio of low-carbon fuel technologies currently represented in below50

Figure 4 - Overview of the below50 sectoral commitment

		Supply		Demand		Enablers			
		Feedstock	Producers	Fleet Operators	Customers	Infrastructure	Technology	Investors	Governments
Criteria	Commitment (sign-up)	Commitment to 12 Sustainability Principles	Commitment to 12 Sustainability Principles and Minimum output capacity/revenue	Commitment to increasing its use of below50 fuels as a percentage of total fuel use by 2020. [1]	Commitment to minimize emissions from business travel and/or logistics by preferring services that use low carbon fuels	Committed to Carbon War Room's Regional Take off Program (Airports)	Commitment to actively research and develop technology for below50 fuels (R&D)	Commitment to maximising the investment in below50 fuels across relevant operations	
	Action (approved)	3rd party assurance of the 12 Sustainability Principles	3rd party assurance of the 12 Sustainab. Principles [2] - GHG inc/ ILUC	Companies must have undertaken an investment/contract for ongoing use of below50 fuels.	Companies must have in their procurement principles and/or business travel policy a sentence about low carbon fuels, with preference for a significant role.	Airports must have undertaken an investment/ contract for ongoing use of below50 fuels.	Technology has been used , at least, in one demo or commercial project with below50 fuels	Funded or Invested in below50 projects across the supply chain (e.g. equity, debt)	Governments who join need to have pro-sustainable fuel policies.

Low-carbon freight

"With a recent International Transport Forum study projecting that freight volumes could quadruple by 2050, the Low-carbon freight initiative is an important catalyst to spearhead solutions to help manage and mitigate transport sector emissions. UPS is glad to collaborate, innovate and share our learnings."

Alan Gershenhorn
Executive Vice President and Chief Commercial Officer for UPS

Ambition

Low-Carbon Freight aims to demonstrate the potential for collaboration in road freight to help meet the science-based target of 48% reduction in absolute CO_2 emissions between 2010 and 2050. We will do this by exploring the currently untapped and unmapped potential for emissions reductions through optimisation and collaboration between companies on road freight transport.

Status

Transport accounts for 25% of global final energy consumption, and road-freight is a rapidly growing component of that, especially in developing countries. Until now, there has been little understanding of how road freight contributed to the emissions from this sector.

In 2016 this group delivered the first-ever reliable global numbers: road freight contributes 2,230 million tonnes of CO_2 per annum.

Given the expected growth in demand for freight transport, this figure is expected to grow to 2800 $MtCO_2$ by 2030 and 3840 Mt CO_2 by 2050 under a business-as-usual (IEA 4DS) scenario[2].

Freight transport carries other environmental and social impacts (congestion, local air pollution, noise, etc) that can be tackled in conjunction with CO_2 emissions as we embark on the urgent need to transform the industry and those reliant on it.

There are already a myriad of initiatives looking at road freight, but they are frag-

[2] International Transport Forum data (unpublished)

mented and focus either on vehicle efficiency or alternative fuels. The unique value of the LCTPi group is that it has explored these solutions in comparison with others that are often overlooked. In particular, optimization, relaxing delivery time windows and asset-sharing show promising untapped potential to reduce the negative impacts of road freight.

Another feature of these three solution areas is that companies will need to collaborate to reap the potential GHG reduction benefits. As such, Low-carbon freight is uniquely placed to help companies understand the opportunities and develop solutions.

Actions

Since COP21, Low-carbon freight has mapped the GHG reduction potential of a range of solutions with an emphasis on deploying optimization and collaborative solutions. Together with the International Transport Forum, the results from data collection and modelling have been extrapolated to global freight movements and future scenarios *(Figure 5)*.

These ground-breaking results will be widely disseminated to academia, trade groups and business. Efforts to increase awareness of the potential are urgently needed to help catalyze adoption of these solutions by companies and countries.

To capitalise on this massive untapped opportunity, a remaining challenge will be to design a solution that enables access for small and medium-sized enterprises, especially given that most road freight movements are carried out by these types of operators.

The business opportunity is real and scalable. The required technology is available.

However, the unique value proposition for our initiative is the way it will combine existing technologies with the trust that has been developed under the LCTPi process, to facilitate the collaborative design of a platform that allows data and asset-sharing along with optimization.

Low-carbon freight will now begin building coalitions of companies, government and customers in different locations to carry out demonstration projects and implement

Companies
Michelin
Nestlé
Route Monkey
Total
UPS

Partners
International Transport Forum
Smart Freight Centre

these ideas. The goal is to share and scale replicable models to achieve emissions reduction actions in road freight globally.

Impact

The cumulative potential across the three measures of optimisation, relaxing delivery windows and sharing assets is over 50% reduction in CO_2 emissions. In other words, these three previously unmapped solutions could contribute 1220 Mt CO_2 per annum emissions reduction in 2030 compared to 2015.

Recommendations

The increasing trend for shorter time windows for delivery, combined with the rise of internet shopping, has the potential to significantly increase emissions from transport. A common platform for road freight operators to share their assets can improve the utilization of space on fleets (reduce empty miles) and would result in significant emissions savings. Distribution centers and other shared infrastructure that allow co-parcelling of shipments/deliveries across different companies are essential to reducing emission from road freight.

Alternative fuels (see below50 section) and electric vehicles cover a range of technologies with different potentials to reduce emissions, but they also vary in their current suitability for different applications. It is essential that investments are made into improving and deploying these technologies. Significant potential exists to improve the efficiency of road freight vehicles. Supporting the shift to modernize the rolling stock and incorporate more efficiency measures in the design of future vehicles will be essential to tackling emissions.

The challenge of decarbonizing road freight transport is so great that all measures should be pursued in parallel. While solutions such as electrification may seem to negate the need for implementing other solutions, the transition to fully renewable power supply can be expected to take time and does not remove the need to address energy security.

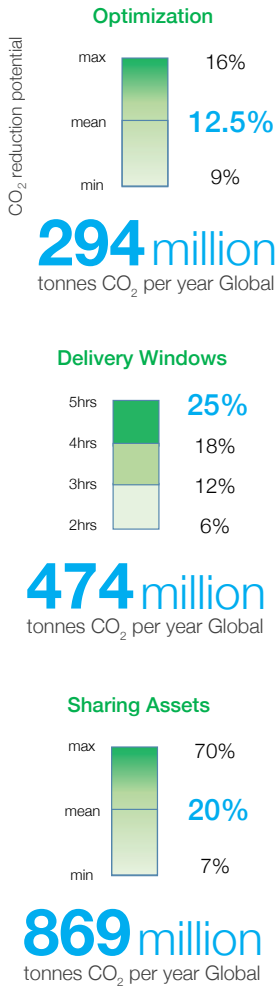


Figure 5 - Emissions reduction potential in road freight transport

"Building on 15 years of collaboration, the Cement Sustainability Initiative and its members are working towards scaling up their efforts through the implementation of identified business solutions across the majority of cement companies worldwide. At LafargeHolcim, we are fully committed to playing our part in supporting the work of the group on transparency, innovation and operational excellence."

Eric Olsen
CEO, LafargeHolcim

Cement

"The Paris conference was an opportunity to present Argos' contribution on environmental innovation, which consisting on value-added products already on the market. Together with its members, the CSI will strive fostering innovation with collaborative efforts between private and public sectors, strengthening education tools to get even better results."

Jorge Mario Velasquez
President, Grupo Argos
(formerly President of Cementos Argos)

Ambition

In 1999, the Cement Sustainability Initiative (CSI) was created at the initiative of a group of visionary CEOs who identified that a collaborative approach would be necessary to scale-up and accelerate the implementation of solutions to mitigate CO_2 emissions. This approach was launched under the auspices of the World Business Council for Sustainable Development (WBCSD).

Fully responsible and being aware that what gets measured gets managed, the CSI and its members have developed a common protocol for reporting their energy consumption and CO_2 emissions, based on the greenhouse gas (GHG) protocol developed by WBCSD and the World Resources Institute (WRI). Based on that work, they built the most comprehensive database of independently-verified energy and CO_2 emissions of any industrial sector, the Getting the Numbers Right (GNR) database. 2016 marks the 10th reporting exercise.

With the ambition to evaluate the potential of the whole cement sector (beyond CSI membership), the CSI led an ambitious evaluation process that estimated a maximum potential for sectoral carbon emissions reduction by a range of 20 to 25 % by 2030 compared to business-as-usual. This represents approximately one gigaton of CO_2 emissions reduction (equivalent to Germany's CO_2 emissions in the full year of 2016).

The CSI and Cement LCTPi partners have identified the barriers that the industry currently faces, as well as the stakeholders that can help remove them and scale-up business solutions.

"CNBM supports LCTPi and will effectively promote the technology communication and cooperation in the cement industry. Following the suggested action plans, our Company will accelerate technical innovations and optimize solutions in key fields. It is important to accomplish low-carbon development from materials to production and application, to explore the way of harmonizing the industry with nature."

Zhiping Song
Chairman, China National Building Materials (CNBM) Group

Status

Cement-based products are increasingly used around the world to match the demand for trends like urbanization and associated infrastructure needs. Globally, cement production accounts for more than 5% of worldwide man-made CO_2 emissions and CSI members account for one-third of the world's cement production.

The Cement LCTPi provides the framework for scaling-up at a full sector level what the CSI has been doing for more than a decade.

In the future, countries may be required to provide details of mitigation targets including scope and coverage of GHGs, baselines and reference points. Databases such as the CSI's GNR database will gain importance for ensuring consistency and accuracy of GHG national inventories and for developing new international market mechanisms.

The cements of the future will be less carbon intensive, alternative fuels will be used more often and more sustainable buildings requirements will replace current construction practices. The properties of concrete construction can also help increase the resilience to climate change impacts in the built environment.

Actions

The Cement LCTPi is working towards scaling-up its members' efforts and leveraging the implementation of identified business solutions to a broader number of cement companies worldwide.

The Cement LCTPi is working on: expanding the use of CSI tools on CO_2 and energy measurement; enhancing energy efficiency of the cement manufacturing process; enhancing the use of alternative fuels and cement components; understanding avoided emissions in the use phase of concrete as a sustainable building material; and exploring novelties in the production process and developing new low-carbon cements.

The CSI has paved the way in the approach for emissions reduction across the entire sector, and developed in 2009 the first sectoral low-carbon roadmap for the cement sector, in partnership with the International Energy Agency (IEA). The CSI is currently both updating existing technology papers and developing new ones to be included in the update of this roadmap planned for 2017.

During 2016, extensive discussions were undertaken in Europe, North & South America as well as Asia to identify new technologies, to develop a non-competitive platform for common research on new low-carbon cements, and to involve downstream users. These findings will be included in the continuous review and update of the CSI's strategy and action plan on climate and energy, which is due for approval in December 2016.

The CSI has increased the granularity of its global low-carbon technology roadmap through the development of regional roadmaps for India, Brazil and Latin America. These regional roadmaps outline existing and potential technologies available in the local context, and how they may help the industry support a halving of global CO_2 emissions across all areas of business and society. They aim to help policy-makers and financial institutions work with the cement industry to adapt for a carbon-constrained world.

A customized version of the roadmap was developed for India in 2013. Since then, Indian cement companies have implemented energy efficiency solutions, in some cases exceeding the anticipated savings. International Finance Corporation will fund the Indian roadmap's phase 2 on resource efficiency studies in 2017 and the overall impact of the different measures undertaken will be assessed in 2018.

In Brazil, consultations for the development of the Brazilian roadmap continued in 2016, coordinated with the Brazilian cement associations and with participation from the industry, stakeholders and ministerial representatives. In September 2016, the launch of a roadmap project for the Latin American region was approved, supported by local trade associations with a potential pilot program in Colombia.

Companies
Cementos Argos
Cemex
China National Building Material (CNBM) Group[3]
China Resources Cement[3]
CRH
Dalmia Cement (Bharat)
Grupo Cementos de Chihuahua (GCC)
HeidelbergCement
InterCement
Italcementi[4]
LafargeHolcim
SCG Cement
Secil
Shree Cement
Titan
UltraTech Cement
Votorantim Cimentos
West China Cement

Partners
International Energy Agency
International Finance Corporation
The European Cement Association
Portland Cement Association
Feracion Interamericana del Cemento
Sindicato Nacional da Indústria do Cimento Brasilian Portland Cement
Confederation of Indian Industry
Cement manufacturers association
European Bank for Reconstruction and Development
École polytechnique fédérale de Lausanne

[3] Two new participants joined after COP 21: CNBM and China Resources Cement from China

[4] Italcementi was acquired by HeidelbergCement in 2016.

During this year, discussions continued to explore the possibility of partnering with a Chinese research institute to carry out a scenario study to understand the emission reduction potentials of the cement industry in China. Discussion will continue in 2017 with local trade associations, including developing a customised version of the CO_2 reporting protocol that can address specific regulatory requirements in the local context.

Impact

July 2016 saw the publication of GNR data for 2014, as part of the CSI's ongoing efforts to deliver uniform information. The report delivers accurate and verified data so that the industry can understand its own current and future performance potential.

GNR 2014 results were published in July 2016 and completed the first decade of GNR reporting. The report includes information from 934 facilities around the world, covering approximately 21% of global cement production, with 83% of the data independently assured (Figure 6 and 7). The one-year difference between data collection and publication is needed for anti-trust reasons, thus disconnecting the reported CO_2 emissions from the current production volume.

Data shows that in 2014 the cement industry has continued to improve its emissions reductions. Specific net emissions (discounting the use of alternative fuels) are 19% below 1990 levels. Including the saved emissions achieved by using biomass, participating companies have avoided 110 million tons of CO_2 emissions. These results have been achieved by significant investment in more efficient kilns, higher fossil fuels substitution, increased use of biomass and improved clinker mineralogy, so that the clinker content of cement can be reduced.

Recommendations

The Cement LCTPi seeks predictable and objective long-term policies that ensure a level-playing field, enable huge CAPEX investments for which appropriate financial mechanisms and incentives are strongly encouraged. International cooperation should also be strengthened to gather reliable, industry level energy and emissions data. This includes supporting effective policy development, tracking performance, identifying regional & national performance gaps and best practice benchmarking.

It is also important to increase the use of alternative fuels, for which policy-makers should facilitate understanding of stakeholders and public on their role in GHG emission reduction. This includes governments introducing industrial ecology frameworks and promoting a recycling-based society and rewarding investments in energy efficiency in relation to their societal benefits. Regulatory frameworks should support the development of regional processes that encourage the use of alternative fuels.

Efforts to mitigate climate change should be accompanied by a concerted strategy to build adaptation and resilience to climate change. This should include a revision of existing standards, strengthening of building codes and inclusion of resiliency criteria in the development of infrastructure. Enabling policies and international collaboration for the deployment of carbon capture storage & use technologies should also be promoted.

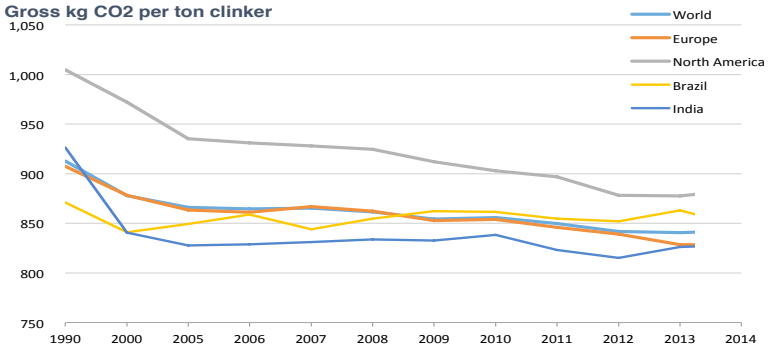


Figure 6 - Gross kg CO_2 per ton clinker
***source:** CSI Getting the Numbers (GNR) database (www.wbcsdcement.org/GNR)*

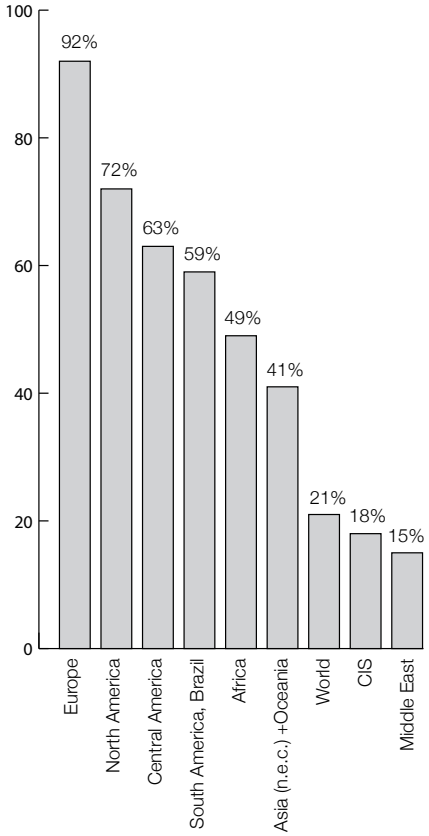


Figure 7 - Share of regional cement production included in GNR database
(% of cement production, 2014)

***source:** CSI Getting the Numbers (GNR) database (www.wbcsdcement.org/GNR)*

"The Cement LCTPi launched during COP21 in Paris identifies a number of barriers to low-carbon technologies that are beyond the control of the cement sector; the CSI and its member companies are eager to collaborate with other actors, particularly governments and other policy-makers, on the removal of these barriers. We at Dalmia Cement are banking on LCTPi in a big way to ensure that we remain one of the lowest carbon footprint cement producer and sustainability champion in the global cement world."

Mahendra Singhi
Group CEO, Dalmia Cement Bharat Limited

Chemicals

"As an 'industry of industries', the chemical sector is a key enabler to the low-carbon future. We engage with our partners within the industry and along the value chain on low-carbon, sustainable solutions. A common framework for product portfolio sustainability assessment will steer others across the industry and along value chains towards more low-carbon solutions. The technology roadmaps on breakthrough technologies and on the synergies of CCU with other energy-intensive industries are also critical for the chemical industry to understand where we will invest in new technologies in the future. Together, initiatives such as these have the potential to stimulate action towards achieving the Paris Accord and I encourage others to join us on this journey."

Jean-Pierre Clamadieu
CEO, Solvay

Ambition

Building a sustainable world where more than 9 billion people can live within the boundaries of the planet is a powerful mission. It means that society must re-invent most of the conveniences that we take for granted in everyday life.

The chemicals LCTPi aims to unlock an additional 1 gigatonne of CO_2e savings per year by 2030 through chemical products serving key sectors like buildings, automotive, packaging and food. Besides leveraging these additional GHG savings through the extended use of our products, we are working on new technologies that can bring up to 0.4 Gt CO_2e reduction per year in our industry's emissions by 2030, on top of anticipated efficiency gains.

Status

With a global agreement on climate change, the imperative for low-carbon, sustainable solutions is greater than ever. The chemical industry produces materials that are core to production and solutions; serving areas as diverse as health, agriculture, clothing, construction, transport and leisure and contribute to the development of resilient infrastructure. In many instances, chemical products and materials help avoid emissions during their use phase which counterbalance emissions in the manufacturing phase.

Chemicals contribute an estimated 2.1 to 2.4 Gt CO_2e per year (direct and energy-related indirect), of the GHG emissions globally. Reducing the carbon footprint from the chemical industry requires actions in multiple fronts: efficiency gains and investment in low-carbon technologies in chemicals production, and leveraging additional GHG savings using chemical products in the value chain.

The positive contribution of chemical products to avoid GHG emissions is still not yet fully exploited. There are many proven solutions that are commercially available and ready to be applied.

Actions

2016 has seen the chemicals LCTPi launch new developments in innovative low-carbon technologies and outcomes to strengthen the low-carbon solutions from the industry.

Chemicals LCTPi has developed a chemical industry sustainability metrics plan, to promote wider use and adoption by the industry. The plan focuses on leveraging links with chemical sector organizations and showcasing the business value of common sustainability metrics, such as the Avoided Emissions guidance for the chemical industry. Additionally, a process to update the guidance for accounting and reporting on Avoided Emissions, developed by the ICCA and the WBCSD was initiated in 2016.

Continuing with our wish to understand the technology potential in the chemical industry, Cefic is leading the development of a report to further investigate breakthrough technologies in different scenarios in Europe, including: power-to-chemicals, carbon dioxide conversion without hydrogen, power-to-heat, biomass and biomass waste streams to chemicals, low TRL technologies (with a 2050 timeline), carbon capture and storage, power to fuels for the mobility sector.

The roadmap exercise will continue in 2017, and identify technology barriers, necessary breakthroughs, assessment of the availability of alternative feedstock and carbon-free electricity, approximate quantification of required investments.

One of the areas that has raised more interest this year is the need to understand better the opportunities for carbon capture and use for energy intensive industries such as chemicals, cement, and steel. We have started a study that shows the potential technologies and their synergies for CO_2 as a raw material at the interface of three key industrial sectors, as well as the barriers and enablers for these technologies to reach scale.

During 2016 we have also developed a framework for companies to assess the impact of their entire product portfolio, and steer their products in a more low-carbon, sustainable pathway. This framework was developed by a wider group of chemical companies beyond the initial LCTPi group and contribute to stimulating more low-carbon solutions from the industry.

Finally, we have been exploring the potential of avoided emissions of chemicals in the buildings value chain. In collaboration with Energy Efficiency in Buildings (also covered in this report) we are developing a common framework for assessing sustainability performance through the Lifecycle Analysis for Buildings Value Chain project.

During 2016, we investigated the business case for life cycle metrics in Construction and Real Estate, which led to publishing a report that highlights the opportunity for creating a common language across the value chain based on energy and carbon life cycle metrics.

LCTPi Companies
Akzo Nobel N.V.
DSM N.V.
Evonik Industries AG
Mitsubishi Chemical Holdings Corporation
Solvay S.A.

Other companies engaged in related work:
BASF
Clariant
Covestro
Eastman Chemical
SABIC

Partners
CEFIC
DECHEMA

Impact

The technology roadmap work will result in a sound understanding and agreement of the potential opportunities for breakthrough technologies in the chemical industry. This work is critical to the future investment of chemical companies in low-carbon technologies for chemicals production. Additionally, the agreement to engage across sectors with others in energy-intensive sectors, to understand the synergies and opportunities for CCU will be key to understanding how CO_2 can be used as a raw material in the future.

While this work will continue in 2017, the agreement to further understand these technologies is aimed to stimulate decisions on low-carbon technologies that will have a lasting impact.

Recommendations

The barriers for deploying low-carbon technologies identified in the LCTPi Chemicals report remain. However, in 2016 the chemicals LCTPi companies and partners have worked to further investigate the barriers and enablers specific to breakthrough technologies, as well as engage along the value chain further strengthen and align on common approaches to measuring and communicating on sustainability performance.

To facilitate the market reach of these technologies we must overcome information gaps on new product solutions and work on universally accepted criteria that consider the whole life-cycle of a product. This may, for instance, involve developing common standards for specific products or value chains (e.g. sustainable buildings, biofuels, transportation). It could also involve strengthening platforms for knowledge sharing.

Risk sharing is important in technologies that are at their earlier stages of development. Sharing upfront costs of breakthrough technologies and low-carbon solutions through collaborative financing mechanisms, public-private partnerships and steady protection of intellectual property. This may require supportive regulatory frameworks that allow the development of innovative business models (e.g. capturing OPEX as well as CAPEX). Particularly at early stages of technology readiness levels, upfront costs may necessitate access to novel financing mechanisms for appropriate risk sharing.

Finally, we must find ways to address the skills gap, by building more capacity and understanding of how our low-carbon, sustainable solutions can be deployed in key applications like buildings, automotive, food and packaging.

Whilst the importance of these barriers varies from technology to technology and from value chain to value chain, there is a general lack of alignment of multi-stakeholder priorities as an overarching barrier and a cause for the existence of other barriers. To stimulate the uptake of sustainability offerings, it is essential to develop a common understanding between the various stakeholders involved at each value chain level, and to implement actions and policies to make not just individual sectors but entire value chains more sustainable.

Climate Smart Agriculture

Ambition

Combining the three pillars of Climate Smart Agriculture (productivity, resilience and mitigation) the Climate Smart Agriculture (CSA) LCTPi is contributing to increasing the resilience and productivity of farmers in our food system to make 50% more food available and strengthen the climate resilience of farming communities, whilst reducing agricultural and land-use change emissions from agriculture by at least 50% by 2030 (3.7 Gt CO_2 eq/yr) and 65% by 2050.

The emissions reductions cited in this ambition are derived from the elimination of deforestation in supply chains and the halving of the GHG footprint of food loss from the farm to the shelf. In making 'more food available' there is certainly a need to close yield gaps and improve productivity, however this ambition also considers the opportunity to make more food available, both to humans and to animals, from the avoidance of post-harvest losses.[5]

Status

Since the Paris Agreement of 2015, many countries have submitted their INDCs. More than 80% of these INDCs include agriculture as a sector where there will be a mitigation focus and more than 60% of INDCs cite adaptation strategies in their submissions.

Given that agriculture represents around 25% of total global emissions, the INDCs give the private sector a clear signal to prioritise both emissions reductions and to consider ways in which agriculture and land-use could be used as a carbon sink. This creates a huge opportunity for CSA approaches to be taken up at scale and adopted as part of national level strategies.

[5] See more at Food Loss Reporting Standard publication

Importantly, Climate Smart Agriculture works through the value chain of producers to retailers. This enables corporate commitments and emissions reduction targets related to the Bonn Challenge (a global effort to restore 150 million hectares of the world's deforested and degraded land by 2020 and 350 million hectares by 2030) and food loss and waste to be incorporated into CSA planning.

Figure 8 – Companies in the CSA LCTPi

Companies
Ambuja Cement
Bunge
Diageo plc.
Dunar Food
DuPont
Friesland Campina
ITC
Jain Irrigation
Kellogg Company
Monsanto Company
Olam International Ltd.
Old Mutual
PepsiCo, Inc.
PwC
SAB Miller
Starbucks Coffee Company
Syngenta International AG
Tata Group
The Coca-Cola Company
Tyson Foods
Unilever
UPL
Yara International ASA
Yes Bank

Partners
Beyond zero emissions
BSR
CDP
CGIAR
Climate Change Coalition Brasil
Climate-KIC
Consumer Goods Forum
Field to Market
GEF
Global Alliance for CSA
North American Climate Smart Agriculture Alliance
Provision Coalition
Sustainable Food Lab
The World Bank Group
We Mean Business

Actions

During 2016, CSA has expanded to cover the full value chain group including sectors such as retail, finance, fast moving consumer goods, technology providers, commodity traders and chemical companies.

Based on the work completed in 2015, CSA has agreed on four priority action areas:
- building smallholder resilience;
- scaling up investment in CSA;
- improving business ability to trace, measure and monitor CSA progress;
- and Implement agri-driven zero deforestation

These areas will be addressed in the five priority regions of North America, Brazil, India, Ghana, and ASEAN.

During 2016, all of the countries that will road-test programs to build smallholder resilience have been identified; and company training programs were reviewed for potential CSA linkage and their broader potential to meet the SDG goals, notably on climate and food security.

Innovative finance products have been identified through the regional dialogues in our priority countries, noting that each region has specific approaches to creating opportunities for smallholders to access better financial options. These will be explored further for scale-up potential through regionally specific approaches in 2017.

Applications for funding have been made for West Africa, in partnership with IUCN, to consider landscape-level implementation of CSA. CSA has also joined forces with the Global Alliance for Climate Smart Agriculture and we expect to make joint funding applications in 2017.

As part of the ongoing process to improve business ability to trace, measure and monitor CSA progress, all member companies have been surveyed by the CGIAR research programme on Climate Change, Agriculture and Food Security (CCAFS) on their approaches to monitoring, reporting and verification approaches. Seven global companies have submitted their data sets and parameters. Three companies have committed to pilot the CSA reporting tool.

The CSA LCTPi has additionally committed to work on avoiding deforestation in Indonesia, soil health in North America and on a new business solution advanced by Syngenta to better manage landscapes for connectivity. These actions will have the largest impacts on the carbon footprint of the sector.

Impact

In 2016 the CSA initiative developed five 'road test' regions. These were determined as priority regions based on company levels of engagement, key commodities at risk, the threat of climate change and the level of aid and donor finance being directed towards CSA in the region. During 2016 we started our work through regional meetings with the national or regional WBCSD Global Network partners, local NGOs and farmers.

In North America, we held two face-to-face meetings, one in Rome and one in San Francisco, to better understand the context of working in the politicised USA agricultural environment. We also sought to understand where the North American Climate Smart Agriculture Alliance and BSR could partner with the member companies on shared initiatives. The findings of those discussions were captured in the *Catalyzing Climate-Smart Land Use for a Sustainable Future report*. The group will develop an action plan for North America with the BSR, and will collaborate on scaling-up CSA in the region.

In Brazil, following a successful 2015 meeting, we have developed an agenda for the country with local organizations and to support the aims and objectives of the Brazilian Coalitions for Climate, Agriculture and Forests. To reach out to the Brazilian companies we have partnered with the local global network partner CEBDS to work in the region.

In Ghana, under the umbrella of the global CCAFS programme we will be working on the Climate Smart Value Chain Initiative being implemented by the International Center for Tropical Agriculture (CIAT), the International Institute of Tropical Agriculture (IITA), the Rainforest Alliance, Root Capital and the Sustainable Food Lab. In 2016 and 2017, the focus will be on scaling-up landscape-level approaches within climate transformation zones, and seeking to develop carbon sinks across these landscapes to provide greater biodiversity connectivity and a potential source of revenue from carbon income as well as from alternative crop production in areas highly affected by climate change.

India is the most developed of the CSA regions, with a strong contingent of local companies. It is supported by the Earth Genome and WBCSD's Water cluster, working on the development of a new India agriculture tool. This tool will assist emissions reductions by optimizing agricultural inputs to maximise farmer incomes and allows farmers and business to make informed decisions by using digital, interactive platforms that contain the latest data sets.

In the ASEAN region, over 15 global agri-business companies met in September 2016 with the objective of determining responses and recommendations to the key questions on finance, technology, policies, landscape level approaches in adopting and implementing CSA across the region. The main findings were that the demand side management of water, small holder livelihoods and linking CSA to the regional INDCs for agriculture would be clear areas of alignment and would form a CSA work plan for 2017. Detailed information can be found in the *Landscape Fires In Indonesia* and the White paper: *Efficient Agriculture, Stronger Economies in ASEAN – Private Sector Perspectives for Policy Makers*.

Recommendations

We will use the formal forums of the FAO, World Bank and the Global Alliance for Climate Smart Agriculture to advance the implementation of our action plans.

We recommend policy-makers develop national CSA strategies that can be used to meet INDC commitments for both adaptation and mitigation from the sector. This should involve identifying the most 'at-risk' regions for climate change and develop regionally specific adaptation strategies. They should also consider different investment vehicles and climate finance mechanisms for CSA.

We believe that the Global Alliance for CSA is an effective multi stakeholder platform to address these issues that should continue to consider how CSA can contribute to multiple SDGs, and use SDG 2 (ending hunger and sustainable agriculture) as a foundation for rural development.


HELLO
HELLO
HELLO

Forests & forest products as carbon sinks

Ambition

FSG aims to increase the carbon stored in forests and forest products by 6 $GtCO_2$/year. Our ambition is to: Bring the world's forests under sustainable management to stabilize forest cover by 2030 and restore forest cover to 1990 levels by 2050; meet the tripling global demand for forest products from sustainably managed forests by 2050; and fast-track development of the bio-economy through cross-sector and value chain collaboration.

Our proposed solutions cover three priority action areas: sustainable forest management (SFM), forest products and the bio-economy and ways to ensure resource efficiency and commercialize breakthrough technologies. These solutions for sustainable production and consumption reflect the need to increase yields and forest carbon stocks over the long-term.

Status

Following the Paris Agreement of 2015, many countries have committed to take measures in carbon forestry, energy from woody biomass and to consider how to account for carbon in forest products. This is a major development for the member companies and this certainty of policy will spur renewed activity within the group.

While each country's plans are not detailed, there is a strong emphasis on forest conservation and re-forestation activities. Apart from the USA and Canada, most countries have not stipulated the role of forest products or the development of bio-economy solutions as part of their plans. This is a clear area where the FSG want to focus our activities and recommendations.

Figure 9 – FSG key indicators.

Companies
APRIL Group
Fibria
Forestal Mininco S.A. (CMPC Forestal)
Metsä Group
The Navigator Company
Stora Enso
Suzano

During 2016, there have been some promising developments in the area of wood construction, with the approval of green building certification for tall wooden buildings and strong media interest in wooden construction.

Actions

To grow the market of wood products and increase the amount of carbon stored in forests and forest products, large procurers should be aware of the different forest and paper products that encourage recycling and sourcing from sustainably managed forests. FSG believes there are multiple benefits in replacing energy intensive products with wood-based products. To help them, FSG with WRI has developed during 2016 a new *Sustainable Procurement Guide of Forest Products* for wood and paper products. FSG has engaged with all certification bodies to increase the area of land under certification and thus grow the area of sustainably managed forests

To encourage the deployment of bio-economy solutions, FSG has worked with the FAO to develop new guidelines for a sustainable bio-economy and will be working with the FAO from 2017 to 2020 on bio-economy development. FSG is leading the Biomass to Energy dialogue, which includes the largest global biomass producers and users, on making biomass from sustainably managed forests a significant part of the carbon-neutral renewable energy mix.

We will continue to work in promoting sustainable woody biomass in both industrial energy use and traditional uses for domestic cooking. Both uses of biomass should be derived from sustainably managed forests and have broad scope to incentivise the increase of forest coverage, including forests on degraded lands.

Raising awareness of the role of forests in the transition to the low-carbon economy is highly important, now that all countries are looking at how to comply with the Paris Agreement. FSG continues to produce materials and videos to encourage the use of forest products and importantly to re-use and recycle fibre.

Impact

FSG has started reporting its impact and progress in annual KPIs *(figure 9)*.

Recommendations

Our recommendations on biomass are also relevant to the development of new principles and policies. We have participated in the FAO sustainable bio-economy guidelines and have committed to support the second phase of this work from 2017-20.

During 2016, FSG has developed specific policy recommendations that build on the broad policy requests that were presented at COP21. They aim to develop the bio-economy and provide the much-needed demand side stimulus for an increase in the global productive forest extent.

These recommendations and actions include measures that: advocate for the use of woody biomass from sustainably managed forests; maintain or enforce carbon-neutral accounting approaches for sustainably produced woody biomass; develop awareness for the need to procure products from sustainably managed forests; and encourage the increased uptake of forest products, such as through the USDA bio preferred program.

We recommend regulatory approaches to stimulate the development of the bio-economy, including removing fossil fuels subsidies and creating a level playing field for renewable resources. Such regulatory approaches include amendments to building codes that facilitate larger and higher wooden buildings and mandated fuel formulation to include forest derived biofuels.

Energy Efficiency in Buildings

Ambition

By 2030, the Energy Efficiency in Buildings (EEB) LCTPi aims to reduce the projected energy use in buildings by 50%. Achieving this ambition is not an easy task. There are many non-technical barriers that lie in the complex relationships and interactions between market participants and which hamper the uptake of energy-efficient building solutions. However, solutions can be found by engaging the full range of stakeholders across the building value chain in local markets.

The EEB project aims to bring value chain stakeholders together in 50 local markets labs to understand and materialize energy savings by overcoming market barriers and developing investment-ready, ambitious and sustainable local markets for energy-efficient buildings by 2020.

Status

Buildings consume large amounts of energy and are responsible for 20% of global GHG emissions. If we don't act now, global energy use in buildings could grow three-fold by 2050. Under current conditions the global Energy Efficiency in Buildings market is set to grow from US$90bn in 2014 to US$125bn in 2020. This presents a large business opportunity. However, this investment must be almost doubled by 2020 to set us on the path to fulfil the Paris Agreement.

Actions

The EEB project brings value chain stakeholders together locally to participate in a three-day EEB Laboratory (EEB lab) to develop actions plan to overcome market barriers and galvanize local action. These plans are then driven over the long-term by a local EEB platform.

Through the EEB labs and EEB platforms, the EEB project facilitates local business-to-business and business-to-customer networks by providing a neutral setting for dialogue with committed local and national public authorities. It delivers the enabling frameworks to increase deal-flow and projects that require energy efficient technology and trade skills.

Experience from these local multi-stakeholder engagements has shown that the following core topics typically surface in all local building markets:

- lack of awareness and leadership particularly related to challenges in making the business case;
- workforce capacity and the need for proper skills and collaboration along the value chain to implement the right solutions;
- lack of adequate financing models; and
- lack of consistent and long-term policy frameworks (national and sub-national), including regulations and incentive schemes.

The approach of these local multi-stakeholder engagements has been piloted in 10 cities across the world (figure 10) up to 2016. Established EEB Platforms continued to perform in 2016, with strong examples of progress particularly in EEB Houston, Warsaw, Jakarta and Jaipur. Actions plans for Rio de Janeiro and Kuala Lumpur will be published by the end 2016 early 2017 as well as a market review for Singapore.

The 10th pilot took place in Shanghai in February 2016, followed by the launch of the EEB platform in June 2016. Participants attended from throughout the private sector together with representatives from the Hongkou government. The local coordinator of the EEB Platform, the Green Buildings Professional Partnership (GBPP), will continue to manage local action to increase EEB awareness, capacity, finance, and policy in Shanghai.

The EEB Platform Jakarta was launched in January 2016. It is co-led by the Green Building Council Indonesia (GBCI) and the Indonesia Business Council for Sustainable Development (IBCSD). It is developing activities to drive the EEB market through awareness raising, capacity building, finance and policy initiatives.

In Houston, there is a potential to reduce energy consumption by buildings by 30%. EEB Houston strengthened the coordination between building sector stakeholders by creating a Career Glide Path flow-chart that demonstrates a variety of EEB training opportunities for building operators. These tools increased the appetite for implementation of EEB solutions and the operational effectiveness of installed technologies. In addition, EEB Houston helped establish a $100m investment pipeline for a PACE (Property Assesses Clean Energy) financing platform, providing support to assist the regulatory changes necessary to implement this program.

The EEB platform in Warsaw brought together a previously fragmented group of organizations to develop a common vision for energy efficiency in the building market. It also enabled a new dialogue between the private sector and the public sector at both local and national level.

In June, EEB platform Poland presented the interim findings of a study on operating costs of 48 office buildings mostly located in Warsaw. The data will enable building operators to compare their performance in the local context, improve building management and save costs. The open source report entitled “Operation cost in commercial buildings” will be published in November 2016. Following a recommendation from the EEB lab, the European Bank of Construction and Redevelopment have now made available €200m financing for energy efficiency investment in residential buildings.

A new Indian platform in Jaipur was launched in June. The launch event supported the sharing of best practices and promotion of a data driven approach to EEB.

Companies
LafargeHolcim (co-chair)
United Technologies (co-chair)
Akzo Nobel N.V.
Arcadis
ArcelorMittal S.A.
Infosys Limited
Schneider Electric
SGS S.A.
Siemens AG
Skanska AB

Partners
World Green Building Council
International Energy Agency
Urban Land Institute

The platform provides an opportunity for stakeholders in the buildings value chain to collaborate, discuss market barriers and engage in peer learning activities for adoption of energy efficiency measures.

Impact

The EEB initiative was selected as a Flagship Project of the United Nations 10 Year Framework of Programmes on Sustainable Consumption and Production. This recognition of the significant achievements of EEB provides an external and independent quality assurance.

In 2017 the project will continue to work with partners to establish up to 50 local platforms by 2020. Companies that actively engage in EEB programs will become first movers of this promising market, while demonstrating visible leadership at both the global and local level.

+1000 stakeholders engaged over the 10 EEB laboratories

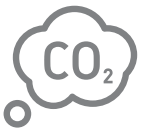
Recommendations

National and sub-national governments have an important role to play in helping the building sector achieve higher levels of energy efficiency and sustainability. By developing action plans jointly with the private sector they also gain necessary insights and support on how the building sector can contribute significantly to their intended nationally determined contributions to climate change mitigation (INDCs).

Through 2016 and beyond, the LCTPi-EEB members will continue to identify opportunities to advocate for long-term policy frameworks on energy efficiency in buildings.

EEB will ensure that action on policy and regulation will be included in the core topics addressed by local partners committing to set up and implement local action plans. Through our engagements, we are collecting good examples of measures that can be pushed by national and sub-national authorities. For example, national and local governments should establish national/local strategies that provide a clear policy framework on how to achieve an energy-efficient building stock. This includes the adoption, strengthening and enforcement of building energy codes and setting and maintaining incentive schemes linked to actual energy performance and improvements.

All actors involved should help create an energy-aware culture among building professionals and citizens. They should promote transparency on energy consumption for residential and commercial buildings (through e.g. energy audits, benchmarking, labelling).

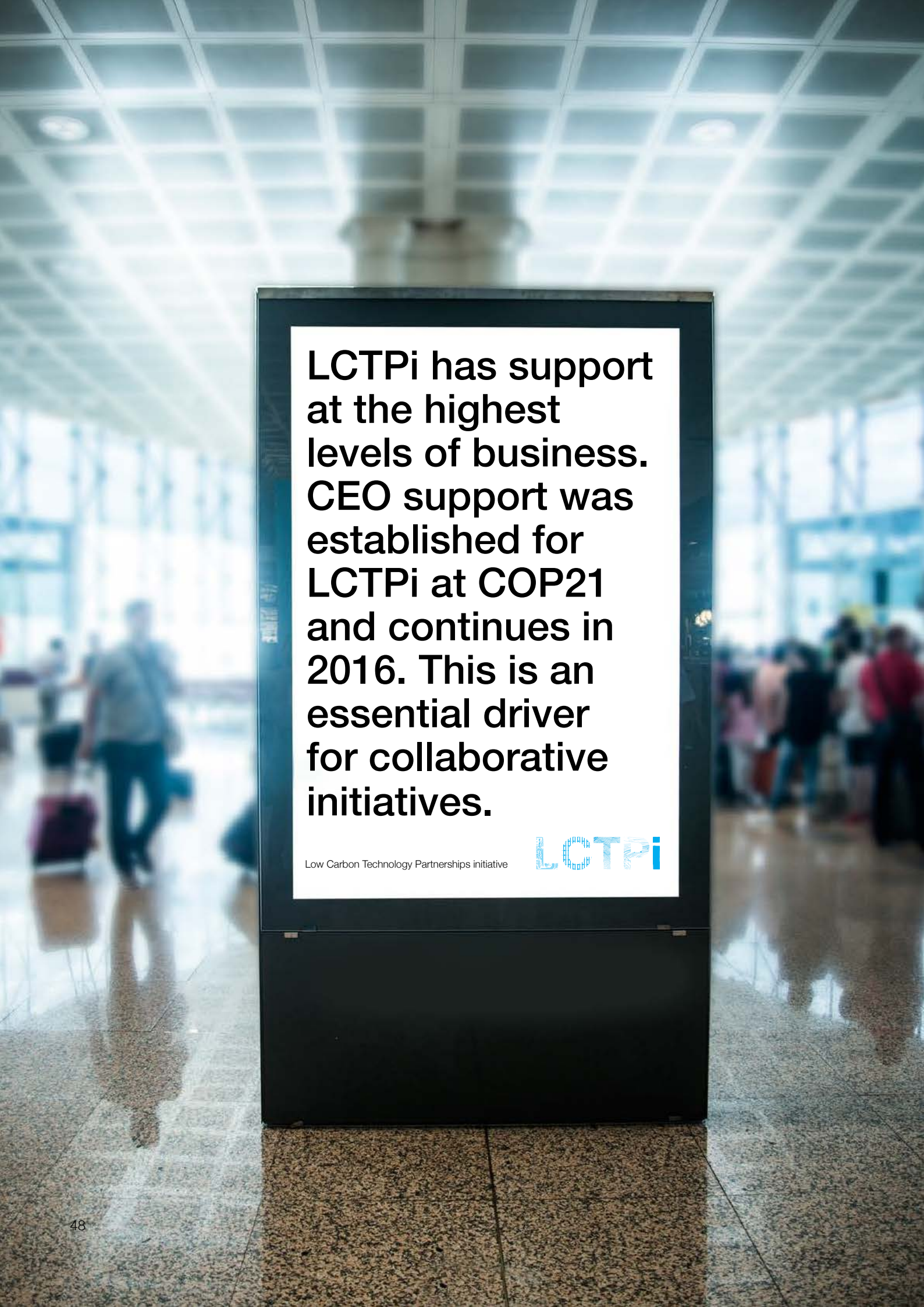


Carbon capture and Storage

Even with the changes in the energy system now underway and the pressing need to address rising levels of carbon dioxide in the atmosphere, fossil fuels will continue to form an important part of economic growth for the near future. CCS is a key tool to decrease the net emissions from fossil fuels, yet recognition of this technology remains weak. Deploying CCS – with an early focus on large-scale demonstrations in carbon intensive economies – can be game-changing in the context of managing and eventually limiting our cumulative emissions.

The CCS LCTPi aimed to help accelerate the deployment of CCS, recognizing that a global emissions pathway consistent with 2°C as described by IEA will require the storage of at least 1 gigaton of CO_2 annually by 2030. The global pathway is ambitious. It will require upwards of 500 commercial scale projects in the near-term, but at today's rate of deployment less than ten percent of this can be achieved. This is not enough, and a real acceleration of CCS deployment is needed.

Through LCTPi CCS two innovative public private partnership (PPP) proposals were developed in 2015 to accelerate CCS deployment by addressing two key challenges: funding of CCS value chains and CO_2 storage capacity being available on time. In 2016, these proposals were taken up by the Oil & Gas Climate Initiative with a view towards implementation.


LCTPi has support at the highest levels of business. CEO support was established for LCTPi at COP21 and continues in 2016. This is an essential driver for collaborative initiatives.
Low Carbon Technology Partnerships initiative
LCTPi

Outlook to 2017

2016 has laid the ground work for continued and increased levels of activity in 2017

Maintain and expand company engagement

LCTPi working groups remain open for new companies to join. Membership has been slightly increased through 2016 but it is anticipated that groups will need to maintain momentum and ensure action plans provide room for fresh perspectives from new joiners in 2017.

Deeper engagement at the national level

In 2017, LCTPi working groups will facilitate dialogues between business and policy-makers at the national level to strengthen the Nationally Determined Contributions and provide input to UNFCCC on best practices, harmonized rules and timelines to promote a race-to-the-top.

New LCTPi working groups to help fill the emissions gap

At COP21, an analysis of the potential cumulative impact of LCTPi highlighted that if the ambitions of the LCTPi are met it could cut emissions by around 25% from business as usual and get society 65% of the way to a 2°C emissions pathway.

In order to help close the remaining emissions gap and support national emissions reduction targets, LCTPi will seek to develop new working groups in sectors such as carbon capture and use, ICT and further transport sub-sectors.

Plan to increase ambition in 2018

As national governments seek to increase their national emissions reduction targets in 2018, the LCTPi working groups will mirror this process. Working groups will review and aim to ratchet up their statements of ambition in this important year.

How to engage in LCTPi

Join LCTPi and capitalize on the economic opportunities that innovative solutions and new partnerships will bring.

To join a working group, choose your contact from the group leaders below:

Renewables	Mariana Heinrich	heinrich@wbcsd.org
Carbon Capture & Storage	Rasmus Valanko	valanko@wbcsd.org
Energy Efficiency in Buildings	Roland Hunziker	hunziker@wbcsd.org
Cement	Philippe Fonta	fonta@wbcsd.org
Below50	Edgar Galrao	galrao@wbcsd.org
Climate Smart Agriculture	Matthew Reddy	reddy@wbcsd.org
Forests & Forest Products	Matthew Reddy	reddy@wbcsd.org
Low-carbon Freight	Rasmus Valanko	valanko@wbcsd.org
Chemicals	Andrea Brown	brown@wbcsd.org

If you are interested in helping to establish a new LCTPi working group or to learn more about the management of the LCTPi process please contact **María Mendiluce**, Managing Director, Natural Capital: mendiluce@wbcsd.org

For more information about LCTPi, please visit our website: **http://lctpi.wbcsd.org/**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in its reach. LCTPi
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LCTPi

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