FROM DOING BETTER TO DOING ENOUGH: ANCHORING CORPORATE SUSTAINABILITY TARGETS IN SCIENCE

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EXECUTIVE SUMMARY

The world today faces significant environmental challenges including climate change, deforestation, and water scarcity. These in turn threaten communities' well-being, countries' national interests, and companies' bottom lines. Business action to address these challenges does not yet match the urgency or scale of the challenges. A different approach is needed.

Over the past two years, momentum has been building for companies to establish targets to reduce greenhouse gas (GHG) emissions in line with the level of reductions that the scientific community agrees is required to limit the risk of catastrophic climate change. One hundred seventy-five companies have thus far committed to establish these "science-based" targets through the Science-Based Targets initiative.[1] These types of target have two important characteristics. First, they are designed to solve an underlying problem such as climate change with the necessary level of ambition. Second, they provide an objective vision among all stakeholders of what success looks like, creating a focal point for cohesive action.

Several complementary methodologies have already been developed that guide companies on how to set science-based targets for GHG emissions reductions. These include the methodologies documented by the Science-Based Targets initiative, a partnership between CDP (formerly the Carbon Disclosure Project), the UN Global Compact, World Resources Institute (WRI), and World Wide Fund for Nature (WWF) that is working with companies to help them determine the amount by which GHG emissions need to be cut to prevent the worst

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Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues. Most working papers are eventually published in another form and their content may be revised.

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impacts of climate change.[2] While there has been increasing awareness that these types of target are needed for other environmental impact areas, less work has been completed thus far on how to actually define them.

This paper is based on work that WRI completed with Mars Incorporated in 2016 to establish a scientific foundation for targets for the company's GHG, land, and water impacts. WRI and Mars Incorporated agreed at the outset to share learning and insights from this experience to help other companies take steps in this direction. The paper documents the approach taken and key issues to be considered. Rather than provide a definitive methodology, it is intended to contribute insights and serve as a catalyst to the community of companies, non-governmental organizations (NGOs), and consultants advancing the idea of using science as an anchor for corporate environmental target setting. The steps followed by Mars Incorporated and WRI are shown in Figure ES-1.

Mars Incorporated and WRI concluded that establishing targets anchored in science is possible, but that the process is challenging. By selecting GHGs as the starting point, an implicit decision has already been made that GHGs are Mars Incorporated's most material impact on air. However, identifying the most material impacts on land and water is harder to accomplish. Both water and land as impact categories comprise multiple challenges.

Figure ES-1 | **Steps to Set Corporate Targets Anchored in Science for Multiple Environmental Impacts**

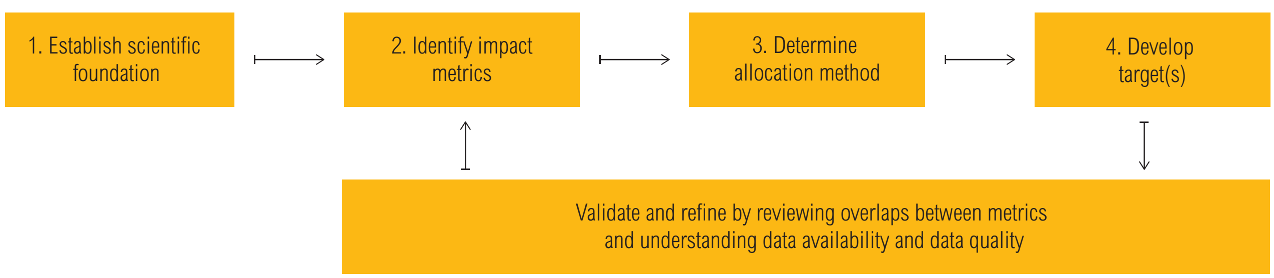


Table ES-1 | **Questions that Need to Be Addressed**

STEP	ISSUES TO CONSIDER
1. Establish scientific foundation What scientific evidence assesses the problem?	▪ Is there consensus among key stakeholders on the scientific foundation? If not, what would be a conservative approach? ▪ What are the sources of the best available science? ▪ Is the impact global or locally specific?
2. Identify impact metrics How can the company's progress toward limiting its impact on the environment be measured?	▪ Who are the audiences for the metrics? ▪ What metrics and data are required (considering overlapping issues) and available to meet the needs of different audiences? ▪ Are the selected metrics actionable and meaningful for measuring progress and how frequently should they be measured?
3. Determine allocation method What share of the problem is the company's responsibility?	▪ Which of the currently available allocation approaches is most appropriate for use by the company? ▪ What other political, economic, cultural, or rights-based issues should be considered? ▪ Will the allocation method adopted by the company be considered reasonable by key stakeholders such as other companies, other resource users, affected communities, NGOs?
4. Develop targets What is the environmental condition that the company will strive to achieve?	▪ In addition to scientific evidence, are there commonly agreed priorities, supported by the international community or civil society with which company targets should align? ▪ Has a full assessment of the company's value chain been completed and all significant impacts included in the target? ▪ What end year (and base year if applicable) should be used for the targets? How will they be reevaluated when there are structural changes to the company or updates to the science?

Water for example, can involve water quality, water availability, and access to water. Land challenges are even more varied and can include soil health, habitat change, biodiversity loss, and more. More data than is currently available are needed too. The process is necessarily iterative, and there is no "one size fits all." However, the necessary building blocks can be identified. Mainstreaming the use of science to anchor corporate environmental targets holds the promise of catalyzing collective action on the scale needed to address some of the world's most critical development challenges.

INTRODUCTION

The world is currently on course for a catastrophic rise in average global temperatures by the end of this century of 6 degrees Celsius above pre-industrial levels, if additional ambitious efforts are not made to reduce greenhouse gas emissions.[3] Only 15 percent of the world's forests remain intact[4] and over the past decade we have learned that more than a billion people live in water-scarce regions.[5] These facts are alarming but not new. Companies are increasingly aware of the business implications of environmental degradation and it is becoming common practice to establish corporate targets focused on reducing environmental impacts.[6]

Aligning targets with what *must* be achieved as evidenced by a scientific understanding of the problem represents the leading edge of corporate thinking on target setting. With a growing number of companies adopting science as an anchor for setting GHG reduction targets, this working paper introduces initial thinking by WRI and Mars Incorporated on how corporate sustainability targets anchored in science can be developed for other environmental impact areas, such as land and water. As a result, WRI and Mars Incorporated aim to seed new thinking within companies, NGOs, and consultants on how science can be used to increase the ambition of environmental targets.

BACKGROUND

As with financial targets, environmental targets can help companies to:

- communicate priorities and performance expectations;
- develop strategies;
- track progress; and
- catalyze innovation and creativity.

This information can in turn inform investors, customers, employees, and other stakeholders on a company's response to environmental impacts and the associated business risks. Recent years have seen increased awareness that corporate environmental performance must improve. For example, the Global Reporting Initiative (GRI) encourages companies to discuss the performance of the organization in the context of the limits and demands placed on environmental or social resources at the sector, local, regional, or global level.[7] Furthermore, the World Business Council for Sustainable Development (WBCSD) aligned corporate strategies with the Stockholm Resilience Centre's Planetary Boundaries research in the design of its Vision 2050 report and the subsequent Action 2020 program.[8]

However, an extensive study by researchers from the Technical University of Denmark and Aalborg University of 40,000 corporate sustainability reports between 2000 and 2014 found that only about 5 percent of companies mention some type of ecological limits, such as those defined by the Planetary Boundaries research. Of those, most did not provide detail on current or planned changes to address the recognized limits.[9]

Momentum has been building, however, to move away from using feasibility—that is, the practice of setting targets on what can knowingly be achieved, based on current technology and practice—or peer benchmarking as a basis for establishing targets, and instead anchor reduction targets in the best available science (see Box 1). In the case of GHGs, this new generation of targets is informed by a well-grounded and scientific understanding of what needs to happen to reduce the worst effects of climate change, as well as by political considerations, local context, and civil society perspectives (see Box 2).

Shifting to targets anchored in science in areas beyond GHG emissions is also critical to ensure that other natural resources, such as water and forests, can continue to provide goods and services to support human well-being, such as clean water, flood control, productive soil, and climate regulation.

To meet the long-term needs of companies, society, and the environment, engagement in policy and natural resource governance will also be required to secure effective regulations, rules, laws, and governance of shared resources. When companies establish targets based on feasibility alone, there is little incentive to go beyond what

Box 1 | **Science-Based Targets Initiative for Reducing Corporate GHGs**

Science-Based Targets is a joint initiative by CDP, the UN Global Compact (UNGC), WRI, and WWF to inspire companies to set targets consistent with the level of decarbonization that, according to scientific evidence, is required to limit global warming to less than 2°C above average pre-industrial global temperatures. The principle behind science-based targets is that if all companies delivered on goals with this level of ambition, then the corporate sector would be making its appropriate contribution to the overarching goal of limiting warming to less than 2ºC.

As of July 2016, 175 companies have committed to setting a science-based target for GHG emissions reductions. Examples of targets that have already been established and approved by the initiative include:

- **Dell Inc.:** Dell commits to reduce GHG emissions from their facilities and logistics operations 50% by 2020, using a 2010 base-year. Dell also commits to reduce the energy intensity of their product portfolio 80% by 2020, using a 2011 base-year.
- **General Mills:** General Mills commits to reduce absolute emissions 28% across its entire value chain (scopes 1, 2, and 3), from farm to fork to landfill by 2025, using a 2010 base-year.
- **NRG Energy:** NRG Energy commits to a 50% reduction in absolute emissions by 2030 from a 2014 base year (scopes 1, 2, and 3). The company also has a long-term target: a reduction of 90% in absolute emissions by 2050 from 2014 levels (scopes 1, 2, and 3).

More information about the *Science-Based Targets initiative*, including additional companies that are establishing a science-based target can be found at: http://sciencebasedtargets.org.

Box 2 | **Defining and Describing "Science-Based Targets"**

The term "science-based targets" arose in the United States when environmental groups were encouraging companies to increase the ambition of their GHG reduction targets by anchoring them in science. This was seen as particularly important, not only to ensure that corporate target setting mirrored the scale of the challenge but also because the political context of the United States at the time was one of science denial. Science provides the objectivity in "science-based targets," which are also informed by subjective influences, for example moral and ethical considerations and civil society perspectives.

Although the term "science-based targets" is not strictly accurate because these targets include both science and subjective influences, science is the anchoring component and the term is becoming widely used and understood to mean a target that is informed by science and sufficient to solve the problem. Another term with the same meaning that is also widely used is "context-based targets."

may be a commonly accepted understanding of what is possible. In contrast, by anchoring targets in science, companies can rely on an objective assessment of the challenges at hand, and engage other stakeholders to find collective solutions to meet required conditions.

Therefore, setting targets anchored in science and working with governments to help promote collective action are crucial building blocks for companies to accomplish the change (in production processes, product design, and business models) needed to support a sustainable future. Targets can help build on a company's individual progress in reducing impacts to ensure that the environment more broadly is improving. Rather than guiding companies on "what *can* be done," these new targets make clear "what *needs* to be done."

OBJECTIVES

Mars Incorporated approached WRI in mid-2015 seeking guidance on how to establish new targets for three priority impact areas: GHGs, land, and water. Specifically these targets would need to be anchored in science, a key priority for the company (see Box 3). Working jointly, Mars Incorporated and WRI aimed to achieve four objectives:

1. Establish a system of metrics to monitor environmental impacts across the full value chain.
2. Identify three overarching and high-level metrics—one each for GHGs,[10] land,[11] and water[12]—to inform company executives and permit corporate-wide tracking of progress.
3. Identify the science needed to inform corporate targets for GHGs, land, and water.

4. Identify relevant sources of data to populate the metrics and track progress toward the targets.

At the request of Mars Incorporated, the project was bound by the following guiding principles:

- align with the Planetary Boundaries research,[13] to identify impact areas and measure impacts in absolute terms (e.g., tonnes CO_2) and not relative to production (e.g., CO_2 per unit of output);
- consider the full value chain, from raw materials sourcing to consumer product use;
- apply allocations to determine the company's share of impacts;
- acknowledge and account for interdependencies between impact areas; and
- identify recommended targets without concern for feasibility.

From WRI's perspective, the project was innovative for three inter-related reasons:

- *Ambition*. Framing a set of targets around what needs to be achieved based on science, rather than on what may be considered feasible, represents the leading edge of corporate thinking on target-setting.
- *Synergies*. Using science to inform not just GHG targets but multiple impact areas like land and water breaks new ground. Especially interesting was the opportunity to identify synergies and tensions between the different impact areas.
- *Impact versus risk*. Many companies concerned about the environment seek to understand how environmental impacts such as water scarcity or deforestation may pose operational or reputational risks to the company. A more ambitious approach also considers the impact a company's business has on the environment. For example, how will continued sourcing of a water-intensive raw material impact the watershed's ability to replenish its water supply? Resulting strategies focus on what actions might be employed to ensure a healthy watershed for *all*. Like the risk approach, there are clear business benefits because operational or reputational risk can be limited. There is also potential for greater environmental benefits.

To pursue the objectives, following the guiding principles provided by Mars Incorporated, WRI drew extensively on published research and expert consultation, including a workshop with more than 50 experts from academia, NGOs, and business, and identified four major challenges that needed to be addressed:

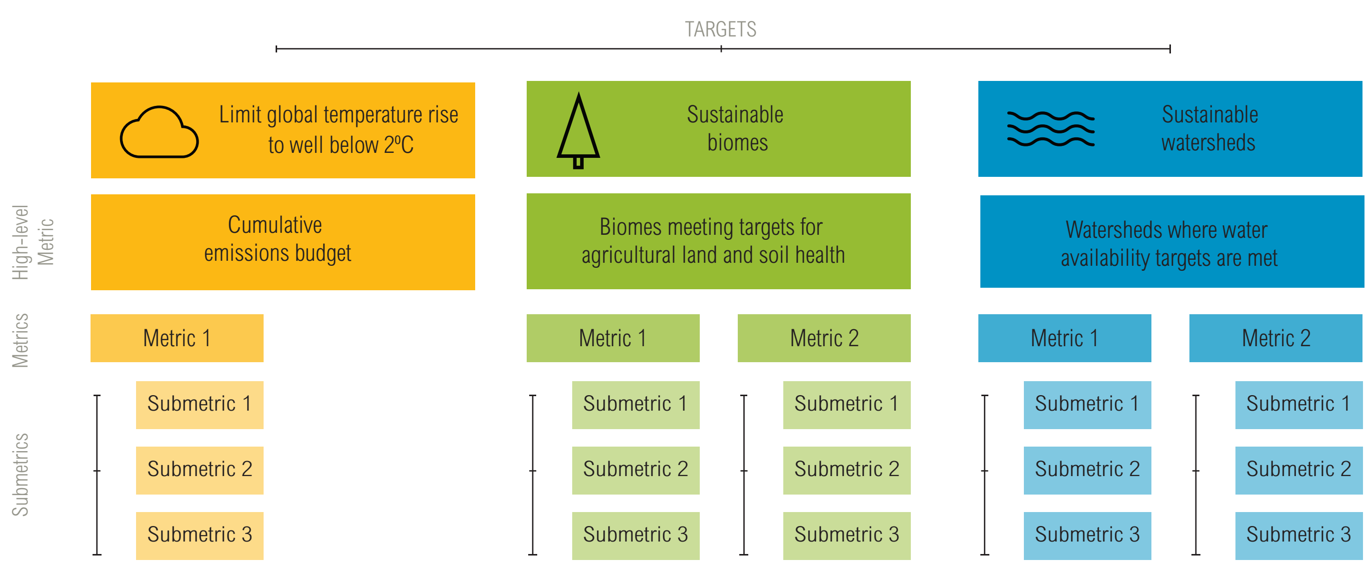
- While climate change science is complex, measuring progress in reducing GHG emissions benefits from two important characteristics: a single boundary and a single measurement unit. The boundary for GHG emissions is the global atmosphere, so the geographic location of GHG emission sources is irrelevant. The same is not true of either land or water. In both cases, impacts and their consequences are location-specific—for example, at the forest or watershed level—with important implications for the local environment.
- Scientists have been able to translate the impact of different GHGs into a common currency—carbon dioxide equivalent (CO_2e). In the case of land and water, however, the impacts are diverse and their effects differ from place to place. As a result, there is no easy way to combine impact measurements into a single unit of measure like CO_2 equivalent. For example, impacts on land include a range of issues such as tree cover loss, biodiversity loss, soil health degradation, and invasive species, among others. Similarly, the global water crisis is characterized by multiple intertwined challenges such as water scarcity, floods, droughts, declining water quality, impacts on human rights, and loss of water-related ecosystems.[14]
- While GHG emissions are not the only impact on atmospheric health, they are relevant to all companies regardless of sector. For land and water, different impacts may be relevant to different companies, depending on their location, sector, and point in their value chain. For example, deforestation could be a priority for a company producing beef in Brazil, but grassland and wetland preservation might be more relevant to corn growers in the U.S. Midwest. Similarly, water scarcity is a concern for companies in many parts of the world, such as North Africa and China but, in parts of Southeast Asia, river flooding may be of greater concern.

- Providing just three metrics to sit atop a corporate metrics system, one each for GHG emissions, land, and water, is challenging. Simplifying complex environmental impacts down to a single metric is fraught with issues. Corporate leadership integrates only a very limited number of metrics into overall management decisions. For example, very few (typically three to five) key financial metrics are used to assess business growth; examples might be sales growth, earnings, or return on assets. These metrics are deployed across the entire enterprise, and are not isolated by sections of the supply chain. For Mars Incorporated, duplicating this approach for environmental metrics is considered desirable to help gain buy-in from corporate leaders. The company therefore provided WRI with a fixed budget of three management-level impact metrics, challenging WRI to identify metrics that would cover as much of the impact areas as possible. This necessitated eliminating redundancies and trading perfection for pragmatism.

  The three top-line metrics should build upon a system of supporting metrics (see Figure 1 for an example), replicating the way in which financial metrics cascade and are modified for lower levels of the company. For example, a CEO might focus on sales growth, earnings, and return on assets, but an individual working on the manufacturing line may be focused on product quality, production rate, and scrap levels. This is acceptable because it is understood that product quality drives repeat consumer purchases, which in turn drives sales growth. A high production rate and low scrap level drives earnings and return on assets. The same logic can prevail with a system of environmental metrics. For example, at the management level, the right metric might be absolute GHG emission reductions but at the factory level the appropriate metric might be energy efficiency, whereas for the energy buyer it might be the percentage of renewables procured.

Throughout the rest of this document, practical examples are provided that illustrate learnings from WRI and Mars Incorporated's work together, including insights into how the company could apply each step of the process. The paper describes the general approach used and highlights questions that need to be addressed in each step. This is not a one-size-fits-all approach, but rather an example of how a company can set targets anchored in science.

Figure 1. | **Generic Example of a System of Supporting Metrics**



Box 3 | **In Practice: Anchoring Targets in Science—the Perspective of Mars Incorporated**

There are four principal reasons why Mars Incorporated uses science to inform its target setting:

Solve the problem. The consequences of excessive environmental impact have been identified and quantified by science so it is logical to draw on science to define the amount by which the company needs to reduce its impacts to avoid the worst consequences. If Mars sets targets based on its initial internal assessment of capability, the company risks under-delivering on its potential for solving the problem and/or failing to solve the problem.

Connect small actions to a big purpose. Tying targets to science allows Mars to tell a story connecting everyday business decisions to the future not only of its business but the communities where it operates and the families of its Associates. Purpose drives motivation, which drives potential and results—making what seemed impossible possible. Science-informed targets build that bridge.

Have the right discussions. Most of the challenge in target setting is not choosing the targets but thinking through the implications of the actions required to deliver those targets. How long will it take? How much will it cost? Do we even know how to do that? Does anyone else? Taking science as a starting point for targets lets the company move to those more productive conversations more quickly. It is also more likely to drive new ways of thinking rather than relying on incremental change to business as usual.

Create a target structure recognizable to business. The current and historic trend in sustainability is that every issue has its own metrics and targets—certifications, ecolabels, reporting standards with hundreds of weighted metrics, and so on. This is unfamiliar to business which uses the same financial metrics across widely varying business units with complex and diverse supply chains. Financial metrics allow companies to focus on what matters most and look at the overall picture and optimize the system as a whole. Companies need something similar for environmental metrics.

METHODOLOGY

This section describes a four-step process for establishing a science-based target, along with questions that must be addressed by any organization undertaking this process.

Step 1. Establish and Understand the Scientific Foundation

Science is a meaningful anchor for corporate target setting because it provides an objective assessment of the magnitude of the problem and the required conditions to safeguard human needs and other considerations such as biodiversity. Existing peer-reviewed literature will most likely provide the most rigorous assessment but knowledge is constantly evolving, so the scientific basis for targets must be re-evaluated regularly.

For some impact areas, the scientific community has reached consensus and documented the scientific evidence in a single, credible source. For example, in the area of climate change, the Intergovernmental Panel on Climate Change (IPCC) is widely considered to be the most authoritative community for climate science.

In other impact areas, there is usually a variety of scientific sources on which to draw, in part because diverse issues are associated with the impacts. For example, land can encompass biodiversity, land-use change, soil health, land degradation, and deforestation. Each of these may have a body of scientific research tackling it from various perspectives. For example, one could review analyses of global land restoration opportunities, global yield gaps, or a carbon density analysis for different land-use classes.

Furthermore, many issues are not geographically homogenous (for example, impacts on land and water) so scientific knowledge tailored to a particular biome, watershed, country, or region will be required.

Questions to address when establishing and understanding the scientific foundation, include:

- Is there consensus among key stakeholders on the scientific foundation? If not, what would be a conservative approach?
- What are the sources of the best available science?
- Is the impact global or locally specific?

See Box 4 for information about the scientific foundation selected for Mars Incorporated's targets.

Step 2. Identify Impact Metrics

Metrics are a standard of measurement used to track progress toward a target. Different audiences will require metrics with different levels of granularity. For example, a senior executive may need to know the percentage by which GHGs have been reduced relative to a company-wide target, whereas a manager may need to understand emissions reductions in scope 1, scope 2, or scope 3.[15] Furthermore, information may be required to understand the source of emissions reductions within scope 3. For example, GHG emissions per kilowatt-hour, farm-level emissions per kilogram of product, or emissions per kilogram of packaging are examples of further granularity that can be helpful for business decision-making. Similarly, an executive may need to understand changes in total water withdrawals in water stressed areas, whereas a procurement officer may need to understand water demands for each commodity.

When managing more than one impact—for example, GHG emissions and deforestation—it may be useful for a company to identify whether one metric will be sufficient to measure both impact areas. For example, as part of a GHG inventory, if GHG emissions from land-use change and forestry are disaggregated from other emissions sources, this information could be relevant to inform the company's understanding of deforestation in its supply chain. This approach can help limit the number of metrics, which can be useful for manageability, however, care must be taken to ensure that relevant impacts are not inadvertently overlooked. For example, it may be important to the company or its stakeholders to understand whether deforestation is occurring in valuable areas such as old-growth forests or biodiversity-rich habitats. This information would not be discernable from GHG emissions data alone.

Box 4 | In Practice: Scientific Foundation Selected for Mars Incorporated Targets

GHGs: *The scientific foundation for GHG targets is the cumulative global carbon budget established by the Intergovernmental Panel on Climate Change (IPCC) as necessary to limit warming to no more than 2°C above pre-industrial levels.* Under the current trajectory of GHG emissions, global mean temperatures are projected to increase by 3.7–4.8°C by the end of this century, far beyond the 2°C of warming that the scientific and international community has identified as safe. The IPCC has identified a cumulative global carbon budget for 2010–2050. This can be used to establish a corresponding cumulative carbon budget for Mars Incorporated. The cumulative budget is the sum of the company's annual emissions over the target years.

Land: *The scientific foundation for land targets is the percentage of land that can be used for crop cultivation according to the Stockholm Resilience Centre's Planetary Boundaries research.* The land-system planetary boundaries have been, or soon will be breached. This projection assumes that no more than 15 percent of global land surface (excluding ice land surface) can be under crop cultivation if we are to ensure adequate intact landscapes, a limitation deemed necessary by Stockholm Resilience Centre research to remain in the "safe operating space for humanity."[a] As of 2010, approximately 13 percent (1.6 billion hectares) of ice-free land surface was already under crop cultivation[b] and the 15 percent threshold of 2 billion hectares is expected to be broken no later than 2020.[c]

Water: *The scientific foundation for water targets is based on renewable supplies of surface and groundwater available at the watershed and aquifer level and on the levels of nitrogen and phosphorus in freshwater bodies relative to local ecological boundaries.* Impacts on water resources can be related to water availability, water quality, the human right to water, sanitation, and hygiene (WASH), and water-related ecosystems.[d]

Understanding water availability requires knowledge of renewable surface and groundwater supplies (at a watershed and aquifer scale), and current and projected impacts from industrial, domestic, and agricultural water users. This information, along with environmental flow requirements, can inform both the severity of existing impacts on water availability, and the degree of curtailment in total water demands required to ensure long-term water availability.

Understanding water quality impacts, particularly in agriculture, requires data on the rate of nitrogen (N) and phosphorus (P) contributions to the biosphere and oceans relative to local ecological boundaries, and the extent to which untreated wastewater effluent is being discharged into the environment.

a Rockström et al. 2009.

b Ramankutty et al. 2008.

c Rockström et al. 2009.

d Impacts on the human right to WASH were part of a social impacts workstream undertaken by Mars Incorporated and thus excluded from this exercise. Impacts on water-related ecosystems are indirectly addressed when reducing deforestation and consequent impacts on water quantity and water quality.

Finally, central to the operability of metrics is the extent to which data are relevant, available, and reliable. While a metric may be considered ideal for capturing impact, if no reliable data exist to support that metric it cannot actually be implemented within an organization. For example, data on water availability in specific watersheds are ideal for tracking water scarcity in the supply chain, and data on the location of deforestation, reforestation, and afforestation are required to track forest health. Sometimes, however, the cost of acquiring data may be prohibitive or the data may simply not be available at a sufficiently granular level to develop adequate local metrics. In these cases, companies must rely on coarser data such as national-level data.

Questions to be addressed when identifying impact metrics, include:

- Who are the audiences for the metrics?
- What metrics and data are required (considering overlapping issues) and available to meet the needs of different audiences?
- Are the selected metrics actionable and meaningful for measuring progress and how frequently should they be measured?

See Box 5 for examples of metrics that Mars Incorporated could use to track progress toward their targets.

Step 3. Determine Company Allocation

Companies share natural resources with other businesses, communities, governments, and the environment. The shared nature of these resources and the associated risks mean that no single government, sector of society, or company can ensure a sustainably managed future on its own. A target informed by science is based on the premise of cumulative action by all. In other words, if all entities followed the same allocation approach to setting their targets—and achieved those targets—then the cumulative result would be that the air, land, and water resources would have been managed according to the parameters established by science. The allocation approach should also deliver the reductions identified by science regardless of business growth. Coordinated collective action will be needed to meet targets anchored in science and find new and innovative ways to protect natural resources.

Box 5 | **In Practice: Sample Metrics for Mars Incorporated**

GHGs

METRIC	Compound annual GHG reduction rate in line with the global 2 degree decarbonization pathway determined by the IPCC
SUBMETRIC	Absolute Scope 1, Scope 2, and all relevant Scope 3 category emissions, including emissions from land-use change

Land

METRIC	% of biomes meeting all agricultural land targets			% of biomes meeting all soil health targets		
SUBMETRIC	Land area used for agriculture relative to planetary boundary limits (ha)	Area of degraded land restored to natural state (ha)	Area of degraded land restored to production (ha)	% of agricultural areas meeting pH targets	% of agricultural areas meeting soil carbon targets	% of agricultural areas meeting available water capacity

Water

METRIC	% of watersheds meeting all withdrawal targets		% of watersheds meeting all water quality targets		
SUBMETRIC	Surface water withdrawals (m^3)	Groundwater withdrawals (m^3)	Untreated wastewater discharge (m^3)	N loading (kg per area)	P loading (kg per area)

A chart illustrating how these metrics support each other is shown in the Appendix.

Understanding whether a company is playing its part can be challenging, and science has only a limited role in informing this process. For many natural resources like water and land, there is no common or agreed upon method to determine an equitable allocation of responsibility between users. There are significant non-quantifiable variables that must be considered, such as the human right to water, and cultural and religious values attached to land and water sources. In many cases, the decisions about how to share the responsibility held by each resource user can be social and political rather than scientific. In the absence of a widely agreed approach to determining allocations for land and water, it is useful to review the allocation methodologies suggested for GHG emissions. As Figure 2 illustrates, the overall pie is the global GHG emissions budget. Disaggregation by sector or geography may be an option if an independent, credible organization has provided the necessary analysis and modeling. For GHG emissions, the International Energy Agency (IEA) provides sector-level carbon budgets for several sectors such as steel, cement, and aluminum.[16]

Questions to be addressed when determining company allocations, include:

- Which of the currently available allocation approaches is most appropriate for use by the company based on its sector and impact area of interest?
- What other political, economic, cultural, or rights-based issues should be considered?
- Will the allocation method adopted by the company be considered reasonable by key stakeholders such as other companies, other resource users, affected communities, NGOs?

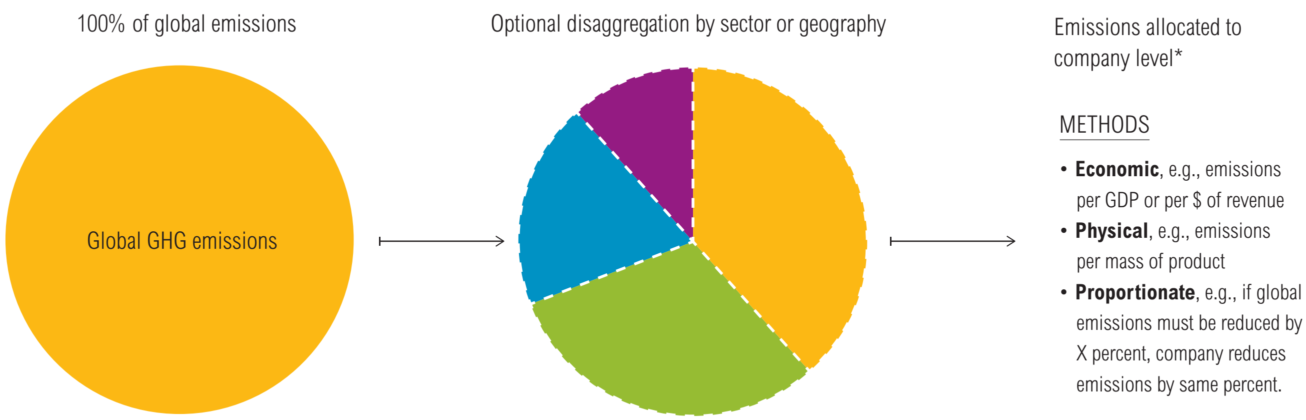
See Box 6 for information about how allocation was approached for Mars Incorporated's targets.

Step 4. Develop Targets

A target expresses the desired condition to be achieved. Accurately defining the desired condition is therefore the principal reason for looking to science to anchor targets. Science also informs the environmental boundary for the target. For example, for GHGs, the IPCC's most recent assessment report describes the global carbon budget for 2010–2050 based on an increase of no more than 2 degrees in the average global temperature; the budget can provide the basis for a GHG target. It should be noted that subsequent to the release of the IPCC's report, the international community agreed that a more ambitious target of limiting global temperature increase to no more than 1.5 degrees should be the collective ambition. For land and water, since impacts are location-specific, the boundaries will mirror the local focus of the science underpinning the target. Examples include watersheds, biomes, countries, or farms.

Once the environmental boundary for the target is understood, companies should assess their entire value chain, upstream and downstream of their operations, to identify their significant impacts. The next steps are to determine

Figure 2 | **Summary of Allocation Methods from the Science-Based Target Setting Manual**



* Allocation methods may be influenced by technological feasibility, economic viability, projected sector growth, historical emissions, and equity

Box 6 | **In Practice: Allocation Approaches for Mars Incorporated**

GHG emissions: All science-based target setting methods for GHGs are based on a global carbon budget and a global emissions scenario. Where target-setting methods based on sector disaggregation of emissions are available, the Science-Based Targets initiative recommends they are used. Where they are not available, companies can allocate the global carbon budget based on their economic contribution to GDP or simply track a global emissions scenario on an absolute basis. There is not yet a carbon budget for food processors and the agricultural sector. Mars Incorporated chose to track the 2 degree emission scenario from the Intergovernmental Panel on Climate Change's Fifth Assessment Report which requires a 41–72 percent GHG emissions reduction from 2010 to 2050[a] on an absolute basis. To align with the most conservative 72 percent mitigation pathway, WRI recommended a 67 percent GHG emissions reduction from 2015–2050.

Science-based targets for land and water are still in their infancy and there is less data and analysis on which to draw. Given this, WRI proposed the following approaches to inform high-level targets but recommends that these align with local public policy commitments, water management priorities, and other ongoing efforts when possible:

Land: Planetary Boundaries[b] research recommends that no more than 15 percent of global land be used for agricultural purposes. Data on total agricultural land use is out of date so it is possible that this limit has already been breached. Ideally, the 15 percent limit would be applied differently to each biome because of the differences in ecosystem values, however this analysis has not yet been completed. As a proxy, the recommendation to Mars Incorporated was that the company track the global limit and undertake no net land expansion for agriculture in any biome.

Water: For the purpose of this project, WRI recommended that total water withdrawals within a watershed should be at or below 40 percent of the annual average renewable available supplies as defined by the UN water stress scale.[c] Local engagement with government and river basin stakeholders is required to understand the specific targets for each watershed, and the percentage reduction for water users based on sector (e.g., domestic, industrial, agricultural). Once this has been accomplished Mars Incorporated (and other companies) can establish watershed targets to reduce the fraction of water withdrawals that are in excess of 40 percent of renewable supplies. Note that no allocations are needed for water quality because it is a weight per area metric for nitrogen (N) and phosphorus (P) and total reduction (100 percent) for wastewater.

a IPCC 2014.
b Rockström et al. 2009.
c UN/WMO/SEI 1997, Richey et al. 2015.

corporate boundaries for the target, the end year for the target, and if applicable, the base year. A company will also need to select a methodology for developing the target if more than one is available. For example, the Science-Based Targets initiative for GHGs lists seven methodologies, which use the economic, physical, or proportionate approach to allocate the global carbon budget of emissions down to the company level.

Complementary considerations can also inform targets. Aligning targets around global initiatives can help create greater momentum. For example, the UN Sustainable Development Goals issued in September 2015 provide a comprehensive set of global targets that cover many environmental and social issues that are relevant to companies. Aligning targets with the SDGs can bring a company's priorities into line with the priorities of the global development agenda. Similarly, there is broad agreement around the world that degraded land must be restored. This is enshrined in initiatives like the Bonn Challenge,[17] a global commitment to restore 150 million hectares of land around the world by 2020 and the New York Declaration on Forests,[18] which seeks to restore 350 million hectares by 2030. Aligning targets with initiatives like these helps companies to demonstrate solidarity with and commitment to global multi-stakeholder priorities. This strategy may also be useful in those instances where there is not an existing body of science in which to anchor a target.

The *Greenhouse Gas Protocol Corporate Accounting Standard*[19] and the forthcoming *Science-Based Target Setting Manual*[20] from the Science-Based Targets initiative are good sources of information about the different considerations and best practices for corporate environmental target setting.

Questions to address when developing targets include:

- In addition to scientific evidence, are there commonly agreed priorities, supported by the international community or civil society with which company targets should align?

Box 7 | **In practice: Sample Targets for Mars Incorporated**

GHGs	Reduce scope 1, 2, and 3 emissions 67% by 2050 from a 2015 base year in line with the cumulative budget
LAND	Ensure agricultural land in the value chain does not exceed the land boundaries for each biome Achieve healthy soils in all supplying land
WATER	Bring water withdrawals in the value chain in line with renewable surface and groundwater supplies in all watersheds Eliminate untreated wastewater discharge and reduce N and P inputs to levels within the planetary boundaries in all value chain watersheds

Note: The sample target for GHGs is described in more specific detail than the other sample targets because there is currently more scientific understanding of this impact area and because more comprehensive work has been undertaken on science-based targets for GHGs.

- Has a full assessment of the company's value chain been completed and all significant impacts included in the target?
- What end year (and base year if applicable) should be used for the targets? How will they be reevaluated when there are structural changes to the company or updates to the science?

See Box 7 for sample targets suggested for Mars Incorporated.

DISCUSSION

Using science as an anchor to establish corporate environmental targets holds the promise of catalyzing a step change in strategies to meet the urgency and scale of the environmental crisis facing the world. Momentum is building among companies to establish these types of target for GHG emissions reductions, and encouraging advances are now being made by companies interested in adopting the same approach for additional environmental impact areas such as land and water. The work described in this paper led to a number of high-level findings including:

- Using science to objectively assess the status of an environmental problem can help focus companies' attention on actions that need to be taken to solve the challenge, rather than limiting action only to those activities that are considered feasible based on present technologies and knowledge.
- Using science to anchor environmental target setting is an iterative process. Scientific knowledge, data availability, and data quality evolve and improve over time. Therefore, approaches that are developed must be revisited as these improvements occur.
- There is no one-size-fits-all approach to corporate environmental target setting. Using science as an anchor does not change this. Different issues are material to different companies depending on their industry, footprint, and geographic coverage.
- While methodologies for using science to anchor targets for GHG emissions reductions are mature, developing comparable methodologies for other environmental impact areas like land and water will require the engagement of many experts and practitioners to identify best practices and reach consensus on the best way forward. Until then, companies must make subjective decisions rooted in pragmatism and the company's target-setting objectives.
- To successfully develop environmental targets anchored in science, more data and research are needed, for example on how to allocate responsibility for reducing impacts on water resources across sectors.
- This approach is very top down, relying heavily on global data to inform local actions at a facility or supplier level. In the case of water and land, WRI recognizes that further research and validation will be required to fully align the recommended high-level targets with specific targets, actions, and interventions on the ground in order to support existing and ongoing policy initiatives and respond to the unique requirements of the social, economic, and environmental context at the local level.

ACTION STEPS FOR MARS INCORPORATED AND WRI

Mars Incorporated is leveraging this work to operationalize and publish its new targets over the course of 2016.

WRI continues to advance its work on target setting across all three impact areas in the following ways:

- Continuing to work with the Science-Based Targets initiative to refine existing target-setting methods for GHGs and reach consensus on a single approach, providing more sector-specific guidance, and mainstreaming the practice globally. To get involved, go to http://sciencebasedtargets.org/.

- Partnering with CDP Water, The Nature Conservancy, the UN Global Compact's CEO Water Mandate, and WWF to explore a multi-stakeholder process for how to develop a methodology for setting science-based targets for water.[21] To get involved, go to http://www.wri.org/our-work/project/aqueduct or http://ceowatermandate.org/.

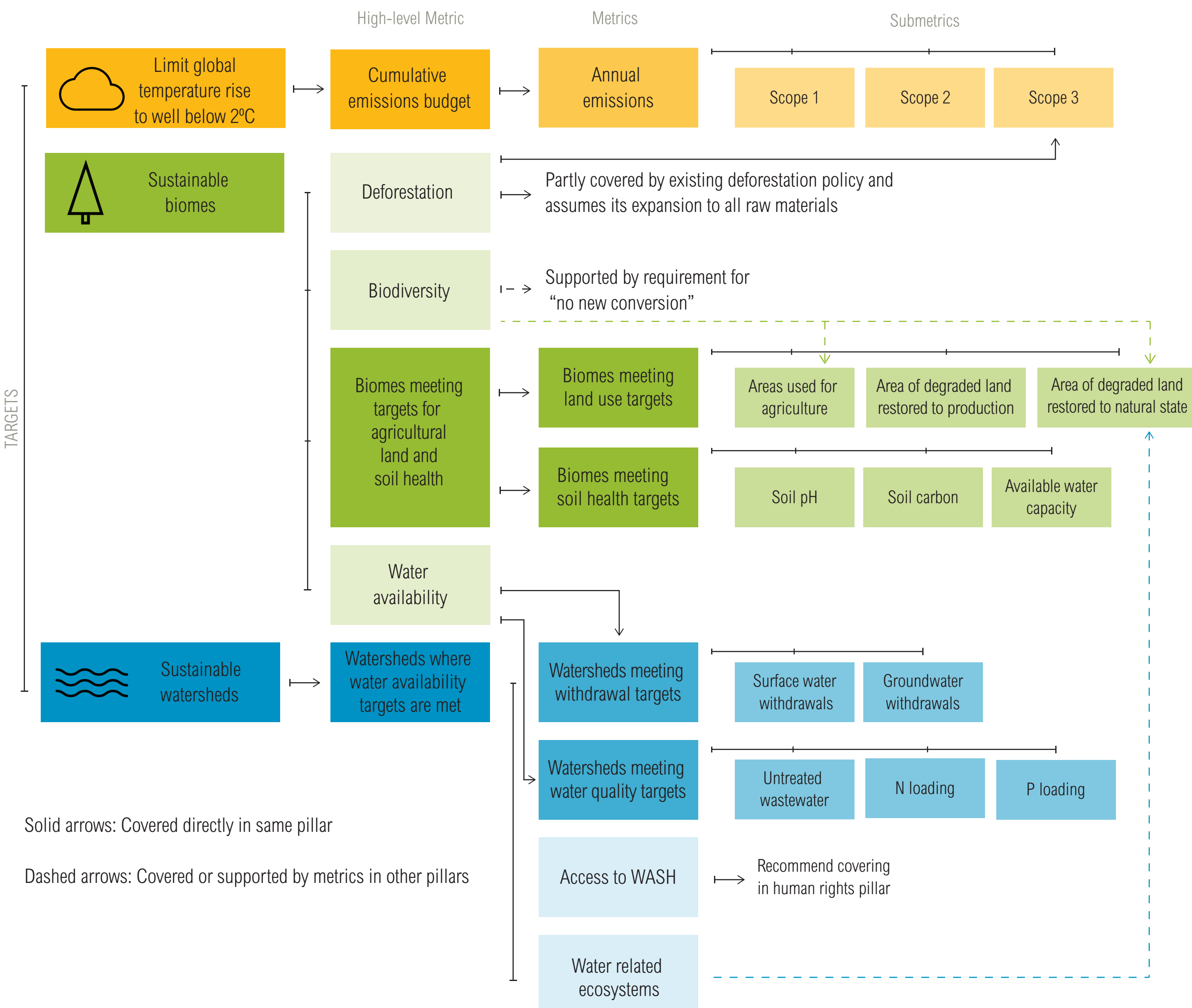
- Exploring broader interest in establishing a common methodology for establishing science-based targets for land, and the potential role WRI could play. Also initiating a project that investigates the changes in business practices and business models required for business to grow within environmental limits. For more information, go to http://www.wri.org/our-work/project/tomorrows-markets.

APPENDIX

In Practice: System of Metrics Proposed for Mars Incorporated

The chart below shows the system of metrics proposed for Mars Incorporated. Progress toward the company's targets can be measured by three high-level metrics: cumulative GHG emissions budget; number of sustainable biomes; and number of sustainable watersheds. These metrics can be used in a dashboard for senior executives. Underlying these metrics are submetrics that provide finer levels of detail for different users of the information. The chart also shows how the metrics system can be optimized by eliminating the need to gather data on issues that may be measured through another metric. For example, although deforestation is not tracked under the Land metric, the company would manage its contribution to deforestation through its tracking of GHG emissions from land-use change in Scope 3. Understanding the company's impact on the health of water-related ecosystems may be tracked through its measurement of the amount of degraded land it is restoring to a natural state.

Figure A-1 | **Ecosystem of Metrics: GHGs, Land, Water**



REFERENCES

Bjørn A., N. Bey, S. Georg, I. Røpke, M. Zwicky Hauschild. 2016. "Is Earth Recognized as a Finite System in Corporate Sustainability Reporting?" *Journal of Cleaner Production*. Available online 13 January 2016, ISSN 0959-6526, http://dx.doi.org/10.1016/j.jclepro.2015.12.095.

"Energy Technology Perspectives 2014." International Energy Agency.

IPCC, 2014: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Ramankutty, N., A.T. Evan, C. Monfreda, and J.A. Foley. 2008. Farming the Planet: "1. Geographic Distribution of Global Agricultural Lands in the Year 2000." *Global Biogeochemical Cycles* 22.

Richey, A. S., B. F. Thomas, M.-H. Lo, J. T. Reager, J. S. Famiglietti, K. Voss, S. Swenson, and M. Rodell. 2015, Quantifying renewable groundwater stress with GRACE. *Water Resour. Res.*, 51, 5217–5238, doi:10.1002/2015WR017349

J. Rockström et al. 2009. "A safe operating space for humanity." *Nature 461, 472-475*.

UN/WMO/SEI. 1997, Comprehensive assessment of the freshwater resources of the world. Paper presented at 5th Session of the UN Commission on Sustainable Development, UN/World Meteorol. Organ./Stockholm Environ. Inst., Stockholm.

ENDNOTES

1. http://sciencebasedtargets.org/. Viewed on August 5, 2016.
2. http://sciencebasedtargets.org/
3. http://www.iea.org/publications/scenariosandprojections/
4. http://www.wri.org/sites/default/files/WRI_Restoration_Diagnostic_1.pdf
5. http://www.un.org/waterforlifedecade/scarcity.shtml
6. More than 3,800 corporate sustainability goals can be explored in the Pivot Goals database found at http://www.pivotgoals.com/
7. https://g4.globalreporting.org/how-you-should-report/reporting-principles/principles-for-defining-report-content/sustainability-context/Pages/default.aspx
8. http://action2020.org/
9. Bjørn, 2016: 1–12.
10. GHG emissions included Scopes 1, 2, and 3. See *The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard* available at: www.ghgprotocol.org for full definitions.
11. The definition for land evolved during the course of this work. Land (specifically agricultural land) was defined as the area of cropland used for producing agricultural commodities, land used for raising livestock, land used to produce feed for livestock, and land used to produce feed for farm-raised fish. Land used for agriculture refers only to planted areas within farm areas, and does not include forest reserves, land banks, or undeveloped areas within the boundary of the farm. It includes land within the supply chain and land used for company operations, but not necessarily owned by the company.
12. For the purposes of this work, WRI defined water-related issues associated with water quality and water quantity. Access to WASH and human right to water will be addressed by separate work undertaken by Mars.
13. The Planetary Boundaries are the "safe operating space for humanity" defined by the Stockholm Resilience Centre. http://www.stockholmresilience.org/21/research/research-programmes/planetary-boundaries.html
14. https://www.greenbiz.com/article/how-companies-can-save-money-bolder-water-goals
15. Scopes 1, 2, and 3 are terms used by the GHG Protocol Initiative to delineate direct and indirect sources of GHG emissions (see *The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard*) available at www.ghgprotocol.org
16. IEA 2014
17. http://www.forestlandscaperestoration.org/topic/bonn-challenge
18. http://forestdeclaration.org/
19. http://www.ghgprotocol.org/standards/corporate-standard
20. http://sciencebasedtargets.org/wp-content/uploads/2015/09/SBTManual_PubComDraft_22Sep15.pdf
21. A discussion paper is available at: http://ceowatermandate.org/files/Context-Based_Corporate_Water_Target_Setting_Discussion_Paper-Provisional_Draft_8-22-16.pdf

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ABOUT WRI

WRI is a global research organization that spans more than 50 countries, with offices in Brazil, China, Europe, India, Indonesia, and the United States. WRI's more than 450 experts and staff work closely with leaders to turn big ideas into action to sustain our natural resources—the foundation of economic opportunity and human well-being.

ABOUT MARS INCORPORATED

In 1911, Frank C. Mars made the first Mars candies in his Tacoma, Washington kitchen and established Mars' first roots as a confectionery company. In the 1920s, Forrest E. Mars, Sr. joined his father in business and together they launched the MILKY WAY® bar. In 1932, Forrest, Sr. moved to the United Kingdom with a dream of building a business based on the objective of creating a "mutuality of benefits for all stakeholders"—this objective serves as the foundation of Mars, Incorporated today. Based in McLean, Virginia, Mars has net sales of more than $33 billion, six business segments including Petcare, Chocolate, Wrigley, Food, Drinks, Symbioscience, and more than 75,000 Associates worldwide that are putting its Principles into action to make a difference for people and the planet through its performance.