Energising the drops: Towards a holistic approach to carbon & water footprint assessment

by

Anthesis

Chris White, Paul McNeillis

Water Footprint Network

Ruth Mathews, Ashok Chapagain

Executive Summary

Businesses, governments, and local communities face growing challenges to their sustainability as resources like water and energy are constrained, populations grow and economic growth is sought. Addressing any one of these challenges is difficult enough but there is mounting evidence to suggest complex linkages between these issues. As a result it is increasingly recognised that responses to these sustainability challenges must be considered holistically.

The past few years have seen many publications on climate change related issues, including some concerning the risks related to water scarcity and others focussed on unsustainable energy supplies. Many of these have raised awareness, offered guidance, tools and case studies to encourage debate amongst stakeholders and move the agenda forward towards sustainable action. What has been missing is detailed consideration of the practical ways to align the methodologies and tools for measuring and managing what have often been regarded as very diverse issues. That gap is exemplified by the absence of a joined up approach to the consideration of carbon and water footprinting. It is almost as if two parallel but unconnected disciplines have emerged; along with separate measurement and management methodologies, tools and communities of practice.

As leaders in the fields of sustainability metrics and having made pivotal contributions to the field of footprinting, Anthesis (incorporating Best Foot Forward) and the Water Footprint Network have come together with a leading group of businesses to bring together good practices from these two parallel tracks, and to align them towards a more joined-up approach.

We developed this guidance by combining our expertise and grounding it in the experiences of the participating businesses through a series of discussions, starting with a face-to-face workshop and followed up by several consultations. In this way we feel we have synthesised several key elements for the first time:

- Firstly, the real challenges that businesses are facing in dealing with carbon and water sustainability;
- Secondly, the emerging good practices that leading businesses have applied to that challenge;
- Finally, our own insights into practical but robust ways to combine the formal disciplines and methodologies of carbon and water sustainability measurement and management.

The resulting framework for a holistic approach consists of five steps noted below which, while simple in principle, demand knowledge and insight to apply effectively.

STEP 1 **Prioritising where to work**

STEP 2 **Formulating response strategies**

STEP 3 **Assessing trade-offs & synergies**

STEP 4 **Developing a holistic strategy**

STEP 5 **Taking strategic action**

These five steps form a framework which provides guidance to companies seeking to address their carbon and water sustainability in a holistic manner. We present case studies which represent some of the ways that companies have initiated a move toward this holistic approach. Our goal is that this report and the framework will both encourage and support more companies to take on this challenge of addressing water and carbon in a holistic way in their sustainability strategy.

Content

1. Addressing the challenge

1.1 A call for holistic approaches to sustainability

As populations grow and economic development is sought, natural resource availability is increasingly constrained. This leads to businesses, governments and local communities facing a growing set of challenges. Addressing any one threat is challenge enough but evidence of the linkages between issues is mounting, leading to the recognition that sustainability must be considered holistically.

In this paper, we aim to provide an initial recommendation of such a holistic approach which focusses on the independently important but intimately linked issues of carbon (energy) management and the unsustainable use of water.

We explore this from the business perspective with the hope that the suggested approaches and considerations will prove a useful guide to others and across market sectors. The water footprint and the carbon footprint are well suited metrics for addressing water and energy issues holistically and provide the foundation for this exploration.

The idea of the "footprint" was elaborated by Nicky Chambers and Craig Simmons in 1997 in their seminal work "Sharing Nature's Interest" which focussed on ecological footprints. Shortly afterwards they founded Best Foot Forward (now part of Anthesis consulting group) as a vehicle for putting these ideas into practice and making a difference to sustainability on a global scale.

They went on to be leading contributors to the expanding field of carbon footprinting and its standards and have carried out the footprint of the Olympic Games, the NHS and many leading businesses.

The concept of water footprint was first introduced by Professor Arjen Hoekstra in 2002 following from the ecological footprint and is an indicator of humanity's pressure on freshwater resources measured in volumes of water consumed and polluted and may be developed for an organisation, a value chain, a particular product, and more. The water footprint[1] is used within a Water Footprint Assessment (WFA), which includes four phases:

1. Setting goal and scope;
2. Water footprint accounting;
3. Water footprint sustainability assessment; and
4. Response formulation.

The carbon footprint[2] is a measure of the environmental impact created from energy usage and greenhouse gas emissions and, like the water footprint, may be developed for an organisation, a value chain, a particular product, and more.

Together, the water footprint and carbon footprint assessments can help companies better understand their dependence upon water and energy resources, their contribution to water scarcity, water pollution,

and climate change; identify strategic actions to reduce their impacts and highlight potential synergies and/or trade-offs between reducing the water footprint versus the carbon footprint.

The difficulty so far has been that most businesses have tackled water and carbon independently, if at all and therefore have not understood the potential synergies and trade-offs that come from these intimately linked sustainability issues. The process of addressing water and carbon holistically is being hampered by many factors, such as; lack of a holistic framework of analysis combining these two approaches, lack of reliable data, poor understanding of the consequences of decisions or indecision and inertia, which can lead to a lack of prioritised strategic action.

Identifying appropriate solutions and responses to address risks to businesses that arise from unsustainable use of water and energy resources can only come from a holistic approach. Addressing such strains will require smarter thinking, technology advances and greater stakeholder engagement but, most importantly, it will require an effective holistic approach.

1.2 Contributors to this assessment

Anthesis and The Water Footprint Network have drawn upon a long history of expertise and leadership in footprinting techniques to produce this paper but we do not claim to have all the answers. We've brought together leading businesses to learn from their experiences and to get real world feedback on the challenges and the potential solutions. Together we hope to stimulate advancements in this area and to provide groundwork upon which others can build.

We are grateful to the contributions from the organisations that have debated the carbon –water nexus issue with us Table 1; both during a workshop held in London in May 2013 and subsequently via scheduled follow-up conference calls and email. Their insight is further presented through a number of case studies, setting out strategies adopted for a range of circumstances.

Table 1: Contributing organisations

Baxter Healthcare	GlaxoSmithKline
Boots UK	Nestlé
Buro Happold	Nokia
Coca Cola Enterprises	Sainsbury's
Crown Paints	Tata Cleantech capital Ltd
C&A	Tata Steel, Port Talbot
CLS Holding Plc.	University of Warwick
Duchy originals	

The differences in these case studies do not purely reflect differences in industry or business size, but also the position of the organisation within its journey of addressing both carbon and water sustainability issues. Hence we are able to present a succession of case studies starting from grappling with understanding the issues, right through to quite sophisticated implementation of solutions which taken together may suggest the beginnings of a roadmap for a holistic approach towards water, carbon, and a wider nexus of sustainability.

2. Motivation for change

2.1 Global trends and business awareness

In 2011, the McKinsey Global Institute pointed out that the correlation between resource prices is now higher than at any point over past century[3]. For example, the energy intensity of water is rising due to (1) lowering of the groundwater table in many parts of the world, resulting in more electricity used to pump water to the surface (2) from increased use of desalination and (3) as a result of mega projects for surface transfer of water as seen in the China south-north water transfer project.

Increasing demand for water could mean that parts of a supply chain could face significantly higher marginal costs to secure such supplies. In addition, small shifts in demand could create further volatility in prices.

The implications for industry are several and the report's recommendations included advice that companies need to pay greater attention to resource related issues in their business strategies and with particular regard to how such resources might "shape their profits, produce new growth, disrupt innovation opportunities, create new risks to the supply of resources, generate competitive asymmetries and change the regulatory context".

However the Carbon Disclosure Project's (CDP) Water Disclosure report 2011[4] revealed that whilst water was impacting many businesses, it was not nearly as high on the agenda as climate change and energy consumption. There was also quite a marked variation across different market sectors, with the energy sector paradoxically appearing to give the lowest visibility to addressing the water–energy nexus. Further, the survey showed that overall only 26% of companies were actively monitoring water related risks in their supply chain by requiring key suppliers to report water use, risks and management plans.

The CDP 2012[5] report illustrates, however, that awareness is evolving. Industry examples given the year before were showcasing best practices for water conservation; and although there would have most likely been gains in energy efficiency as a result, they were not mentioned. In contrast, the CDP 2012 report showcases examples where efficiency measures have been based on a consideration of both water and energy implications.

This is a timely progression, because reported trends[6] suggest that the goal to optimise both water and carbon efficiency in any decision making process is likely to become more difficult, and by this implication even more important.

The strain on this carbon-water relationship is likely to increase due to:

1. An increase in resource demand due to population growth;
2. Economic growth as people become more affluent and adopt lifestyles that are more energy and water intensive;
3. More energy intensive urbanisation;
4. Climate change leading to variability in precipitation and temperatures resulting in higher energy demands for water transport, cooling and heating; and
5. Policy changes that result from a desire to improve the environment through building more energy intensive wastewater treatment plants.

Addressing such strains is not going to be solved by businesses alone; it will require both individual and collective actions in river basins and at local, regional, national and international scales.

2.2 The influence of legislation and guidance

Legislation and regulation influence businesses at regional, national, pan-continental and global levels. It is often considered as both a business risk and conversely as an opportunity for those businesses that have the foresight to adapt earlier than others. It has become a significant driver and influence for developing sustainable approaches and importantly is continually evolving and therefore cannot be ignored.

This can be illustrated with reference to those whose markets are in Europe, following the publication of "A Blueprint to Safeguard Europe's Water Resources[7] " by the European Environment Agency (EEA) in 2012. The EEA also produced several supporting reports that discuss the current status and future challenges faced across Europe[8].

The challenges identified and possible policy solutions have wide implications to future evaluation of carbon and water footprint linkages. This will affect all stakeholders as policies move towards:

- Adopting new water allocation measures within river basins
- Consideration of new water pricing policies and water trading
- Improving water efficiency of business operations and consumers
- Improving wastewater treatment standards
- Reducing pollution to achieve the Water Framework Directive "good status"
- Implementing solutions to diffuse pollution problems and how farming methods may need to change, for example, adopting more natural solutions (i.e. green infrastructure approach, such as Natural Water Retention Measures)
- Further enforcement action

The EU is also backing the development of a Product/Organisation Environmental Footprint[9] (PEF/OEF) signalling a trend away from assessments using a single footprint only, such as carbon to a more inclusive and integrated approach. The PEF is defined as "a measure of the absolute environmental impact(s) over the full life cycle of the product (good or service) in a specified application". The EU is currently embarking on a three year piloting phase to assess a range of challenges including combining multi-metrics to achieve comparable assessments.

The purpose of the PEF is to consider different footprints in combination "to reduce the possibility of unintended burden shifting; shifting of the environmental impact burden from one stage in a supply chain to another, from one impact category to another, between impacts and resource efficiency, and/or between countries".

The European Food Sustainable Consumption and Production Round Table released the ENVIFOOD Protocol, the first harmonised methodology for the environmental assessment of food and drink products in Europe and beyond.

This is just a few of the regulations and guidance that are being developed in support of more focus on environmental sustainability as well as taking a more holistic approach to individual issues.

3. Developing the carbon-water relationship

3.1 Comparing the dynamics of carbon and water footprints

At a generic level there are similarities of approach between both types of footprint; both use a quantitative approach to assessing sustainability impacts; both can be applied to various scopes from in-house operations to across entire value chains and life-cycles; both can be approached at varying levels of data analysis, from high level hotspots to meticulous accounting standards; and both provide insights into the impacts of organisations in order to highlight challenges and evaluate options for improvement.

The carbon footprint uses the familiar Scope 1-3 progression as follows:

1. Direct GHG emissions owned and controlled by the Operator
2. Indirect emissions from power generation, etc. purchased by the Operator
3. Indirect GHG emissions from sources not owned by the Operator (e.g. supply chain)

The water footprint has two distinct parts: direct and indirect. The direct water footprint aligns with Scope 1 and the indirect water footprint with Scope 2 and 3 of the carbon footprint progression as listed above.

There are of course fundamental differences between the two footprints. The water footprint is an indicator which measures the volumes of freshwater consumed or polluted. It is specific to the water source, i.e., the green water footprint (rainfall) and the blue water footprint (surface and groundwater). The grey water footprint is a measure of the assimilation capacity of freshwater used by the pollutant load coming from the productive activity.

It is important to understand that the water footprint has a geographic and temporal specificity in addition to its size. Hence a water footprint must be analysed within the local context to understand the full impact of water use and its sustainability. It is necessary to know where and when water use is occurring in addition to how much. For a water footprint to be sustainable it should pass two tests:

- Firstly, it should be sustainable with respect to water use and availability and water pollution levels within the local catchment or river basin.
- Secondly the process itself needs examination with respect to global and local benchmarks to check whether the water footprint can be avoided altogether at a reasonable societal cost.

The carbon footprint, on the other hand, does not need to be identified by the location of the source or the impact, since all GHG emissions affect the

global atmosphere in the same way irrespective of their location of emission. With the carbon footprint, a lower number is always better, as it would reflect lower GHG emissions, whereas with the water footprint, the size is not the only point of importance, its sustainability must also be assessed before the final interpretation is made.

These differences lead to two main divergences: 1) in the interpretation of the water footprint, one must place it also within the local context whereas for the carbon footprint the location has traditionally been considered unimportant because of the expression of impact purely through tCO_2e; and 2) in designing response strategies, water footprint reduction must occur in the same place and time as the water use whereas carbon footprint reduction or offsetting can occur at any location.

3.2 Moving toward a holistic approach to water and carbon footprints

In recent years, there has been an increase in the number of companies considering water related business risk and incorporating water into their sustainability strategies. To support these efforts, NGOs and others have developed tools[10] (e.g., Water Footprint Assessment Tool, Water Risk Filter, Aqueduct, Global Water Tool) and guidance[11] (e.g., Water Footprint Assessment Manual, Draft Standard ISO 14046 Water Footprint, CEO Water Mandate, Alliance for Water Stewardship) to assist companies on the water stewardship journey.

A useful framework has been proposed by the CEO Water Mandate in August 2012[12]. This has been called the Water Stewardship Maturity Progression (WSMP) and it has a similarity with the approach to Water Footprint Assessment and carbon footprint by firstly considering impacts at an operational level before venturing further afield. This five-step process comprises:

1 Improve operational water performance
2 Understand how the company interacts with river basins
3 Develop a comprehensive water strategy
4 Leverage improved performance in the value chain
5 Advance sustainable water management and collective action

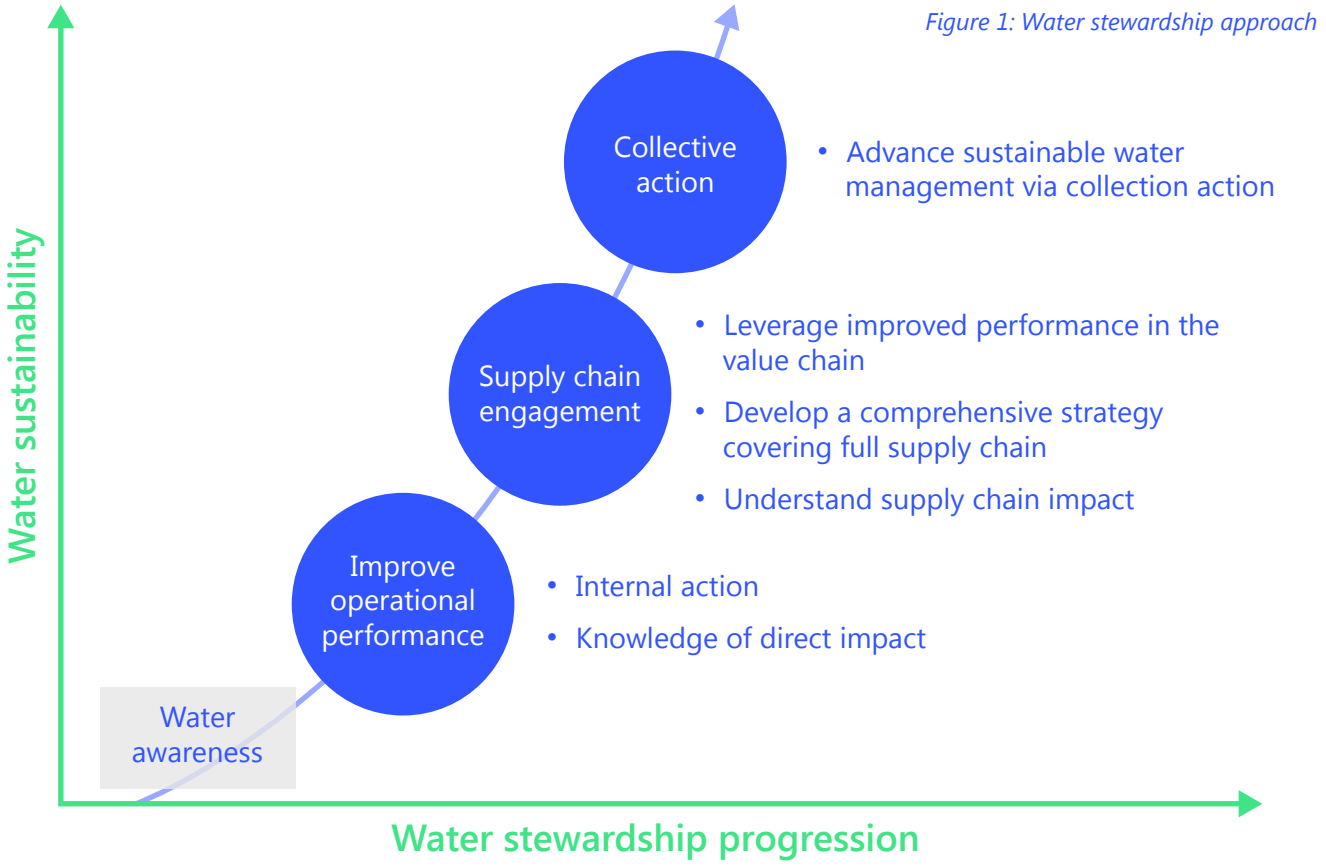


Figure 1: Water stewardship approach

The framework aligns well with Water Footprint Assessment: calculate the direct (1) and indirect (4) water footprint, conduct the sustainability assessment (1, 2, 4) and formulate responses (3, 5). The carbon footprint aligns with (1) and (4).

Actually achieving a holistic approach to improving the sustainability of water and energy use will require several key questions to be answered: Where to start? - What to consider? -How to move forward? Considerations which must be recognised are:

- There are a number of strategic reasons to connect energy/carbon and water assessments. These include gaining a more informed understanding of risk and the impact of any mitigation on each factor, also the promotion of smarter water and energy management;
- Risk and mitigation will be evaluated in a similar geographical context, whether local, regional or global. This may influence what is measured, leading to a better understanding of operational and supply chain performance;
- Greater awareness of energy/carbon and water issues can lead to the adoption of tried and tested or newly innovative ideas;
- It is important to maintain a candid approach where many initiatives are unlikely to be completely win-win situations. There will be trade-offs and choices to be made.
- Legislation and standards (some in the process of being written and piloted) also set the path for where any journey might be heading and how any longer term strategic direction might be influenced;
- There are many questions that are common across market sectors when considering how to approach the challenges of improving operational efficiency; analysing data that is meaningful;
- The approach to answer these questions can draw on the experience of many businesses and organisations (whether within the same market sector or outside) which are addressing this complexity, thereby ensuring that any business performance influenced by energy/carbon and water will have been addressed in a logical and justifiable way.

Ultimately the objective is to develop a smarter approach which integrates environmental issues into business decisions.

4. Building a holistic approach to carbon & water sustainability

4.1 Creating a road map for a holistic approach

A workshop held in London during May 2013 brought together 15 different organisations from 6 distinct market sectors (food & drink, retail, healthcare, manufacturing, heavy industry and property management) to discuss the realities of managing carbon and water holistically and where companies are on this journey. The practicalities of their approach differed for a number of reasons, including the type of organisation, number of products sold and the nature and complexity of their supply chains.

Through these workshop discussions and follow up consultations, a number of steps were identified that can help businesses consider water and energy resource use holistically*, culminating in a suggested "road map" comprising the following five steps listed in Figure 2.

Case studies are presented to illustrate each step of the road map. The key points are summarised in this chapter, whilst the full case studies are presented in Annex 1.

Figure 2: Suggested road map for addressing energy and water holistically

**While developed for addressing water and carbon footprint in a holistic way, other sustainability metrics can also be combined within this framework.*

STEP 1: Prioritising where to work

Many organisations have developed environmental targets to reduce carbon and water footprints from a consideration of energy and water consumption and have been successful at achieving goals set against a specified baseline. Achieving company target reductions within a specified timeframe does not however necessarily make the use sustainable or remove risk, particularly in relation to freshwater availability on a localised scale.

Small and large businesses all face limited resources to invest in improving their environmental performance and increasing the sustainability of their business; prioritising where investments will result in the greatest positive impact is a critical first step on the sustainability journey.

It is also not necessarily the case that higher water users will have the greatest environmental impact. It all depends on cumulative water consumption within a river basin relative to water availability, the water pollution levels and various other factors that guarantee sustainable use of freshwater.

In a Water Footprint Assessment (WFA), once the green, blue and grey water footprints have been quantified and mapped with respect to time and space, the sustainability of these water footprints is assessed following two lines of investigation: 1) hotspot check: is the water footprint component located in a hotspot with respect to environmental criteria and 2) benchmark check: does the water footprint component exceed the benchmark for the production process? In the hotspot check, the sustainability of that component is most commonly assessed using blue water scarcity[13] and water pollution levels[14] at the river basin scale. In the benchmark check, the efficiency of individual components of a water footprint for the operations and/or supply chain is checked against global or local benchmark values and the percentage deviation from benchmark values is determined for each location. Table 2 presents one such example of a hypothetical company with the blue water footprint of its supply chain located in 10 river basins worldwide. A similar exercise needs to be done with respect to its grey water footprint using water pollution level and respective benchmark values.

The results of the water footprint accounting and sustainability assessment are used as a basis for prioritising the catchments to work in. While it may be argued that a business must ensure sustainability

Table 2: Sustainability assessment of water footprint components in a globally distributed supply chain using Water Footprint Assessment, a hypothetical example

		Sustainability with respect to benchmark check			Sustainability with respect to hotspot check			
River basin	**% of the company's blue WF located in the basin**	**Product WF (m^3/t)**	**% deviation from benchmark**	**Sustainable with respect to benchmark check?**	**Number of months per year under blue water scarcity**	**Is the catchment a hotspot?**	**Sustainable with respect to hotspot check?**	**Overall sustainability**
R1	27.7%	212	66.0%	No	0	**No**	**Yes**	No
R2	9.3%	145	13.3%	No	4	Yes	No	No
R3	5.1%	124	3.4%	**Yes**	0	**No**	**Yes**	**Yes**
R4	4.1%	239	87.0%	No	4	Yes	No	No
R5	3.2%	222	73.4%	No	4	Yes	No	No
R6	2.1%	563	339.8%	No	0	**No**	**Yes**	No
R7	0.7%	149	16.6%	No	0	**No**	**Yes**	No
R8	0.7%	264	106.6%	No	7	Yes	No	No
R9	0.7%	141	10.2%	No	7	Yes	No	No
R10	0.4%	331	158.7%	No	0	**No**	**Yes**	No

Note: The global benchmark used in this example is total green and blue water footprint = 128 m^3/t.

in all locations where their water footprints are located, this is an infeasible starting point. To assist a company in taking targeted action where it could have the most benefit and where it will help the company manage its water related risk associated with its operations or supply chain, a prioritisation of river basins with respect to a water footprint component can be made based on the combination of the water footprint accounting – what is the share of the company's total blue or grey water footprint located in the river basin of concern, and the sustainability assessment – is the river basin a blue water scarcity hotspot, is the river basin a water pollution level hotspot and/or does the water footprint exceed the benchmark for that production process?

These three sustainability perspectives can be combined to select a set of river basins as priorities for either blue water footprint reduction, grey water footprint reduction, or both. For the example shown in Table 2, the priority river basins to initiate taking action to reduce the water footprint and to work toward improving the basins' sustainability are R1, R2, R4, R5 and R6 because they do not meet one or more of the sustainability criteria and more than 1% of the company's water footprint is in these basins.

For carbon footprinting initial prioritisation is often simpler than with the water footprint as there is no requirement to consider location but simply to consider the relative size of the contribution to the carbon footprint. The elements of the overall product lifecycle that make the greatest contribution to the overall carbon footprint are typically considered the "hotspots". An initial hotspot analysis using secondary data is often enough to identify the areas of greatest impact.

Initial hot-spotting can take place for any scope of activity or system; from a single product, product category, brand or entire portfolio, to a business processes right through to an entire business operation, or supply chain. Various methodologies have been tried and tested for this approach including the use of secondary process based data and the use of financial data converted using input output analysis. These approaches are well documented in existing standards for organisational and product carbon footprinting, published by the GHG protocol[2]. For more accurate analysis of specific drivers of carbon emissions it is often necessary to obtain primary date but since this often requires considerable effort it is usually recommended to undertake a high level hot-spot analysis first to direct limited resources to areas of most effect.

More recently new techniques have been developed which allow the scaling up of these same principles of identification of hotspots to the level of whole product portfolios. These methodologies are commonly known as product portfolio footprinting[15, 16] and while there are no formal standards as yet in this area the techniques have been applied to large complex businesses to powerful effect. These techniques allow organisations to scale up what have often been pilot level or single product studies to a level that has a material impact across their entire product portfolio. In the context of aligning carbon and water footprinting product portfolio techniques can allow both carbon and water hot-spotting to be carried out on the same large scale portfolio of products at the same time. This brings an obvious benefit that a variety of possible business scenarios at any stage of the products' lifecycles can be modelled to examine both carbon and water impacts. These scenarios might include: the sourcing of a key ingredient, the design or formulation of a product, the choice of manufacturing process or location, and the options for a product's use and disposal or eventual recycling or re-use. These scenarios can be modelled at the product level, the product category level, brand level or indeed at the level of the whole organisational product portfolio. This enables organisations with large complex product portfolios to examine key decisions at a variety of levels prior to making key investments of time and money.

Whichever specific methodologies are applied the result of Step 1 is a list of priorities for water and carbon (through energy use) footprint reduction, considered independently.

This approach can provide a better overall balance and it also becomes relevant if one particular factor is dominant. To take a simple case, GlaxoSmithKline provided an illustration of an inhaler for asthma control. In this case greenhouse gas release was the overriding factor; water or any other factors were minor in comparison.

For this paper, the focus will remain on the sustainability of water and energy use and water and carbon footprint; however the same principles can be applied to an expanded list of sustainability factors. In developing a comprehensive corporate sustainability strategy, it may be important to go beyond carbon and water footprint to consider and

develop response strategies for a full range of sustainability factors. Boots UK and Nestlé, to take two examples, look at comprehensive factors in their environmental sustainability assessments, including biodiversity, ecosystem quality, water use, non-renewable energy consumption, land use and climate change.

The next step in considering water and carbon footprint together is identifying the response strategies for each of these priorities.

The big data challenge

Obtaining meaningful representative data is often the biggest single challenge during the prioritisation stage and it is vital that organisations have a well-designed data strategy. This strategy should leverage the appropriate level of effort required to gather data that is meaningful and fit-for-purpose for the desired outcome, but does not aim at an inappropriately detailed level before this is required.

Prioritising where to work has implications on the type of data needing to be collected and analysed. In part this depends on the type of organisation, the number of products sold and the nature and complexity of its supply chains, all of which will influence the type of data desired for any assessment and the quantity of data that can reasonably be collected and processed. Hence an organisation manufacturing few products with a small supply chain may develop a strong focus and considerable involvement with its suppliers.

An organisation whose brand expands across several hundred or more products and has globally complex supply chains will, through necessity, develop a corporate overview before identifying how and where it is going to work to meet its obligations and goals. In either case, data will be needed to measure the water and carbon footprint.

In many cases secondary data appropriately selected and applied will be sufficient to inform an initial hot-spotting or prioritisation. At later stages primary data, for example from suppliers, may need to be gathered to characterise specific processes and their hotspots. It is recognised that the challenge of a lack of data is often present; however, this should not lead to inertia as there are tools (e.g. Water Footprint Assessment Tool) and global databases (e.g., WaterStat, World Food Life Cycle Assessment Database) available to help in this regard. Recent advances in software tools have permitted data, once gathered, to be leveraged much more effectively and hence somewhat addressing the cumbersome but thorough paradox of traditional life cycle approaches.

Often the best starting point for determining what data is meaningful to collect is by benchmarking what you already know[11]. This may include a factory water & energy balance and may also include various efficiency measures that have already been implemented. Further information should be available, for example, from a review of invoices for water and power consumption.

Once baseline carbon and water footprints are established it is important to have in place a monitoring programme to measure footprint reduction in order to measure progress, maintain business resilience and a social license to operate. It may also be important to understand security of water and energy supply on a basin or country basis, possible scenarios of future climate change impact, regulatory impact, etc., that might influence business expansion, contraction, acquisition or divestiture.

STEP 2: Formulating Response Strategies

With the water footprint and carbon footprint priorities identified, response strategies for reducing these footprints must be formulated. These response strategies can target a number of different areas. For example, they can address direct operations or focus upstream or downstream within the value chain. A wider approach may include engagement in the local catchment or addressing policy and/or regulations. A corporate facing approach might require board level oversight and the setting of quantitative goals and targets.

The response to business risk and opportunities from limited water and energy resources has been variable across market sectors. Corporate reporting (most notably by the Carbon Disclosure Project) provides some evidence for the response strategies formulated by companies, either specifically to address carbon and water footprint together, or reduction of either carbon or water (which in many cases is likely to have shown a reduction in both had it been reported). The various response strategies could be captured in the following categories:

- Technology (new investment) and improved practices
- Efficiency (resource use reduction)
- Strategy & due diligence (footprint reduction across operations, supply chain / value chain)
- Stakeholder engagement (governance, reputation, incentivisation)
- Knowledge sharing & education (single sector or cross sector collaborations)
- Innovation (developing opportunities)

All of these response strategies contribute to future proofing the business.

Examples for each category are presented in **Table 3** and show a range of possible choices companies have identified to reduce their carbon and water footprints. Some show and imply benefits or carbon-water trade-offs that have been necessary in making such choices. This reflects the fact that if a holistic approach to water and carbon is adopted when developing strategic solutions, they may not be perfect, but they are much more likely to be the best possible and most resilient approach for the longer term.

There can be overlap between categories and some case examples will fit more than one category. However the categories of response would appear to not necessarily have a market sector basis, but reflect differing challenges faced by companies as a result of focus, i.e., improving resilience at an operational, supply/value chain, strategic level and/or dictated by the geography of its market.

Further, according to the McKinsey Global Institute[3], to enable companies to fully engage in developing productivity improvements through savings in water and energy, they will firstly require the removal of more than $1trillion of subsidies on these very resources. These subsidies are considered to maintain artificially low prices, which in turn encourage the inefficient use of such commodities. An example would be the subsidy of electricity used in pumping groundwater in Punjab, India[17] resulting in overexploitation of the groundwater resources.

Though inefficient use of resources may arise from subsidies, price restructuring is a complex process for something that is considered both as a commodity but also as a basic human right. However whilst water remains undervalued for industrial usage (because the cost of water resource depletion and environmental degradation are not included) the poor return on investment results in water efficiencies being a low investment priority compared to energy and wastewater charges.

Table 3: Sample response strategies

Category	Response strategy
Technology (new investment)	• Installed refrigeration and air conditioning systems that utilise rainwater harvesting • Installed effluent recycling and other technologies • Cooling tower upgrades, improved water treatment, use of low-flow fixtures • Satellite-controlled smart irrigation systems • Enhanced recycling to reduce wastewater treatment • Application of free air cooling technology
Efficiency (cost reduction)	• Introduced new practices that did not need a water intensive wash • Lower water use; decreasing utility costs for both water and energy and also reducing compliance and reputational costs; • Working with tenants to reduce their water use, installing water efficient appliances, using recycled water, harvesting rainwater, implementing black-water recycling plants
Strategy & due diligence	• Launched global water strategy that addresses water management at each facility and extends outside operations to include watershed protection • Choosing a new production site is subject to an assessment of the sustainability of water resources • Investigating the impact of climate change on its business • Prioritising water-related actions based on the absolute water use of each location
Stakeholder engagement (governance, reputation, incentivisation)	• Initiatives aimed to provide safe drinking water to communities • Reducing water withdrawals and engaging communities • Investment in upgrading municipal wastewater treatment facilities and supplying drinking water to certain schools and neighbouring communities • Protecting soil moisture by investing in water harvesting systems, efficient irrigation practices and agricultural science research • Groundwater recharge scheme working with the local community, environmental NGOs, farmers, and agricultural cooperatives • Introduced company incentives for all senior managers that are linked to sustainability targets

Knowledge sharing & education (single sector or cross sector collaborations)

- Set up of The Sustainable Apparel Coalition (supplier engagement and the development of the "Higg Index" to measure sustainability and environmental impact across the industry's supply chain taking into account water and energy use, waste, chemicals and toxicity)
- Working with stakeholders to expand and promote scientific knowledge on the topic of persistent pharmaceuticals.
- Membership of Field to Market developed an online tool for growers to assess their own operations and identify areas of improvement
- Help consumers to better understand the environmental performance of their choices.
- Provide training to farmers on better farming practices
- Engage with stakeholders to combat food wastage

Innovation (developing opportunities)

- Rethinking water-intensive manufacturing processes, and using advanced treatment and filtration techniques
- Site process water recycling and recycling of sewage water from nearby communities
- Established an energy team to analyse and identify water and energy savings simultaneously
- Investment in water management projects that generate heat from cooling waters
- New business models creating incentivisation
- Assess the true cost of water, hence put forward a more robust business case
- Examination of water flow, heating, wastewater and use
- Focus on research to increase yield and stress resistance of plants

STEP 3: Assessing trade-offs and synergies

In Step 3, the response strategies for each of the prioritised locations need to be evaluated for their potential water footprint/ carbon footprint synergies, or trade-offs.

Energy consumption reduction, water conservation and wastewater treatment have been drivers for cost efficiency at factory or field level for decades. However, until recently energy and water metrics have largely been evaluated in isolation and perhaps by different parts of a business. Hence potential benefits and trade-offs have not been identified to the extent that they might. There are several reasons for this that relate to some fundamental challenges faced by many businesses, namely:

- How are carbon and water footprints measured/monitored and how they can be used to full benefit (either separately or combined)?
- Identifying what data is meaningful to collect?
- How to overcome barriers such as the cost of sub-metering that enable adequate quantification and analysis?
- How to develop business cases to show that benefits balance investment?

Connecting the assessment of both water and energy use during such evaluations can create benefits such as: avoiding inappropriate technologies; lowering performance risk; setting tariff affordability; setting joint targets that encourage reductions in both water usage and energy demand[18].

There are linkages between water and energy which need to be examined. An example of a positive relationship is the move to coke dry quenching at a steel mill which reduces both the carbon and water footprints. On the negative side a move to desalination which would reduce the water footprint would increase the energy consumption, and thus the carbon footprint.

When assessing trade-offs and synergies between water and carbon footprint reduction, it must be understood that hotspots for the water footprint will need to be addressed even if there is an increase in GHG emissions because these locations are unsustainable. This highlights the importance of conducting the assessment of water and carbon footprint reduction at the portfolio level. In the case that a required water footprint response strategy results in a higher total carbon footprint, GHG reductions will need to be found elsewhere so that overall goals of reduction are met.

Opportunities for footprint reduction can often be found where sub-metering allows water and related energy consumption to be measured and converted into water and carbon impact hot spots within particular processes and to then be able to identify where any mitigation measure will result in the greatest benefit.

Other benefits could be realised, such as the potential to develop new business models that consider energy (carbon), water and other sustainability factors together and link adaptation with opportunities; steering longer term investment; to understanding the bigger picture; developing common approaches and taking operational excellence to a new level.

It is important to first recognise that the challenge may often be felt across various company departments, from operations and into the supply chain and that risks may be viewed differently depending on a department's perspective and targets. Any solution therefore requires that expertise within a company be brought together (from engineering, factory floor, procurement to senior management) to identify the full range of energy and water issues that could impact a company's ability to achieve its objectives, and to also get buy-in to deliver a solution. The ultimate goal will be to empower different facets of the business to ensure that risks are properly assessed and neither grossly over nor under estimated through lack of quantified and accurate data or insufficient expert analysis.

Through a company-wide collective approach there is a greater likelihood of identifying where "hotspots" may occur. Risks and opportunities related to energy /carbon and water consumption could be viewed in terms of "triggers and effects"; in other words what is the likelihood that the risk/ opportunity could occur and what is the likely magnitude of its impact on the business?

The water footprint of US electricity, for example, was reported by the US River Network[19] in 2012, which also revealed that 13% of the annual total US electricity consumption is used to transport, treat and heat water. This report also illustrated how the water footprint varied depending on type of power plant, generating efficiency, cooling technology, climate, geography, etc.

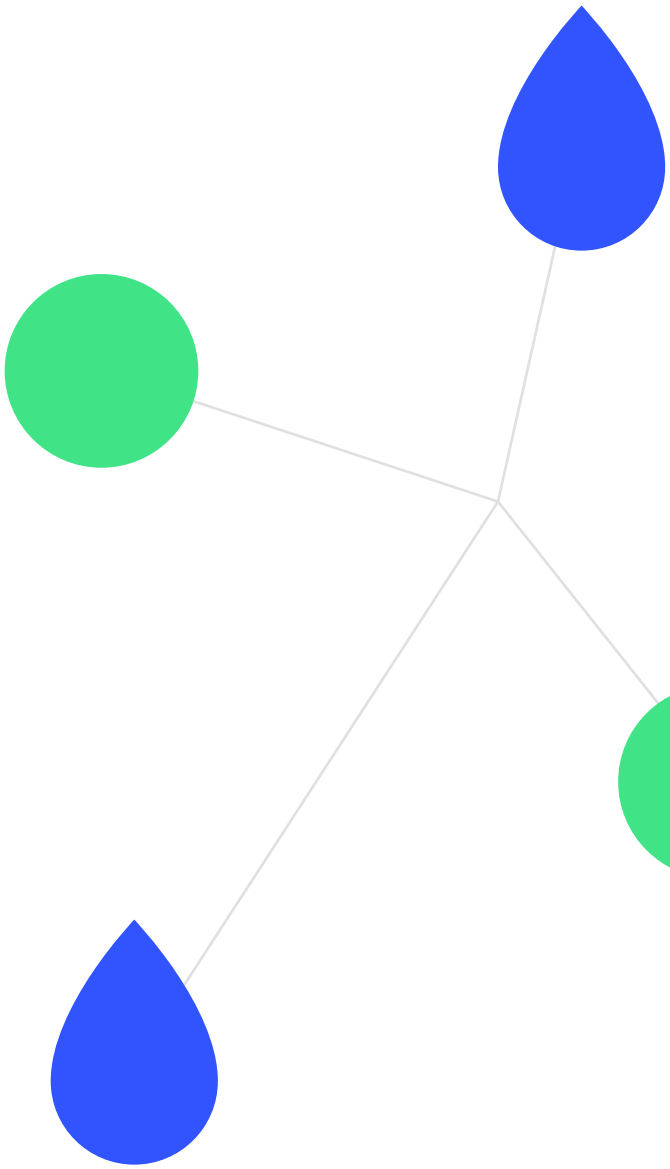
The US organisation, ACEEE[20] has also produced a "Blueprint for Action & Policy Agenda" in May 2011, which called for a need to achieve a deeper understanding of the energy embedded in water and vice versa, and from which best practice could be replicated. The ACEEE has also produced an International Energy Efficient Scorecard in 2012.

Geography also plays a part in the water / energy relationship[21]. For example, 30% of Africa's power plants are located in areas of significant water stress, and this is likely to increase to 40% by 2025. There is similar documented evidence for China because the energy intensity of water supply[18] is increasing rapidly as the transportation of water increases (particularly given the country's south-north water transfer project), and as energy-intensive water treatment becomes more widely used in the delivery of potable water for municipal and industrial systems.

From an industry perspective, there are numerous case studies describing the effect of droughts creating debilitating power cuts. For example, droughts in Brazil in 2001[22] (where 80% of its energy is generated through hydropower) resulted in rationing of energy with estimated financial losses of USD20 billion or 2% of total GDP. Similarly droughts in France 2004[22] created insufficient availability of cooling water resulting in the temporary closure of a substantial portion of its nuclear power stations responsible for supplying 75% of the nation's electricity.

As biofuels gain popularity for reducing the carbon footprint and dependence upon oil, there are impacts to water resources used in crop production. While this shift to biofuels may be seen as positive for a GHG emissions standpoint, it results in an increased water footprint for those who use this as their energy source.

Risks and opportunities should be categorised in order to understand and visualise any pattern due to type of production, different geographies etc. This could also support business decision making by considering how within any category, risk mitigation or opportunities could be effectively anchored into the business, taking account of existing management systems.



STEP 4: Developing a corporate sustainability strategy

Having achieved an understanding of possible priorities, synergies and trade-offs, a holistic approach to addressing the sustainability of energy and water use must be integrated into business strategy.

Securing adequate energy resources at reasonable cost is now an established business priority and therefore energy and related carbon impacts are often integrated into business decisions on a number of levels.

Similarly with growing competition for water, increasing uncertainty around its availability and quality and concerns over water related business risk, water is becoming a major issue in business decision-making whether that be on product design, the location of production facilities and supply chains or in the strategic choice of long term business models.

During the workshop and subsequent discussions it was clear that, regardless of sector, a number of common challenges existed to being able to make any business decision through some means of quantification of environmentally related issues. These included:

The need to

- Prioritise and effectively direct limited corporate resources onto the areas of greatest impact
- Avoid overwhelming suppliers with multiple requests for data
- Collaborate with others to make a real difference
- Create positive value-added messaging, as opposed to the classic 'doom and gloom' associated with climate change and sustainability
- Make a business case with financial benefits but without monetising everything and being able to value societal and wider systemic benefits; addressing the gap between water value and water price

How to

- Create a common level of understanding and to communicate this across an international context
- Communicate the complex and seemingly inconsistent "story" of water to audiences, both inside corporations and outside as effectively and simply as the carbon/energy and climate change story
- Set workable targets for water impact reduction
- Co-ordinate & collaborate with multiple local stakeholders in a given water-stressed geography to achieve the optimal overall usage of limited water resources in that specific location
- Educate consumers about energy/carbon and water; the tension between a need to account and measure for transparency versus the need to drive change and focus on results and making a difference
- Make suppliers accountable

The challenge of

- Making the business case for a whole value chain approach to sustainability
- Limiting the influence of single players across such a value chain
- Identifying near-term and long-term risks
- Actually addressing these risks efficiently through effective and coordinated actions

Building a quantifiable business case for tackling these issues centred on connecting several specific business case threads around risks avoided, opportunities created and the measurement of value.

Risks avoided

- Security of supply including both quantity and quality
- Long term business model vulnerability
- Water and energy resource based limits to growth
- Reputational crises
- Licence to operate in specific markets

Opportunities and value created

- Reconnecting people with the origins of the goods and services they purchase
- Conservation of resources & resource efficiency
- Building trust with consumers through shared values, creating loyalty

- Building trust and capability with suppliers
- Creating better long term outcomes for organisations
- Building trust with investors

Whilst one size does not fit all, it is essential to identify and prioritise the specific scenarios and issues of value to an organisation and to focus on these. Some benefits, such as resource efficiency leading to costs savings, are simple to translate into near term financial outcomes, making the business case for budgets to implement these easy.

However, not all benefits can be monetised in the short term and more strategic considerations such as long term viability of the business model, interruption of supply, reputational damage and impact on share price need credible evaluation. Also categories, such as the risk of losing one's licence to operate, need to be subject to a realistic probability analysis to quantify their impact.

Benchmarking, sector guidelines or best practice are recognised as useful tactics for navigating an otherwise complex theme of proving the value of addressing short and long term issues.

CERES[23] noted that many companies still manage water as an environmental issue rather than as a significant business asset with an economic value, contrary to energy consumption. To go beyond managing water as an environmental issue, companies will need to look at water and energy from a variety of perspectives to be able to address the strategic, operational and supply/value chain implications. Many of these issues are described below.

Strategic considerations for a holistic approach

- To identify and quantify the relationship between water and energy usage (we consume vast amounts of water to generate energy and we consume vast amounts of energy to extract, process and deliver clean water. There is also the challenge of increasing competition for water resources and increasing pollution, both requiring increasing energy use);
- Reducing uncertainty. Much of the uncertainty comes from traditional thinking of making forecasts based on history and practice, which are now showing significant departures from reality with, for example, the recent changing global weather patterns experienced. Water is dynamic; availability is often too much or too little or too poor in quality, and moreover is often unpredictable. Hence there is a need to move away from historically informed practice to a more performance-based approach;
- Developing new business models that link resilience with mitigation; adaption with opportunities. This will require a significant shift in thinking from short (1-5 years) to longer term (perhaps 10-30 years). The challenge now is to work out what works and what doesn't; what comes first and what influences what down the value chain;
- Predicting to what extent risk and future business strategy will be influenced by energy and water pricing, tightening regulations, physical risks, security of supply or competitiveness;
- Identifying where and to what extent there will need to be changes in business outlook/strategy to adapt to changes in water or energy supply;
- Understanding the potential long-term risk on a business unit's capacity /utilisation, related to water scarcity - both as a resource, but also from its influence on energy supply production;
- Steering longer term investment decisions from insight into how key risk factors may influence business through to product development and potentially influence its sales in different parts of the world;
- Address the many pertinent questions related to business risk and opportunities, from which targets and priorities may be identified, redefined or confirmed;
- Enable business to put a true value on water;
- Encourage the promotion of smart water and energy management.

Operational considerations for a holistic approach

- Achieve a better sustainability performance through the integration of water with energy and carbon management.
- Understand operations in the local, regional and global context (as applicable) of business risk through linking energy/carbon and water footprints;
- Ability to set goals and measure reduction in both carbon (via energy use) and water footprints, starting in areas prioritised through hot-spotting and benchmarking and determining any trade-offs;
- Identify potential cost saving measures related to the water and energy usage in the product life cycle.

Supply/value chain considerations for a holistic approach

There is increasing recognition that an organisations' sphere of influence on sustainability through their supply chains is orders of magnitude higher than through their direct operations; for example a typical retailer may have a carbon footprint of up to 80% in its supply chain and a beverage may have over 90% of its water footprint in its supply chain.

The Carbon Disclosure Project has noted a subsequent rise in reporting of scope 3 carbon emissions and more recently water footprint data, as investors take an interest in the formerly hidden carbon and water risks and opportunities in the supply chain. Formulating a strategy to act on sustainability "beyond the four walls" of the organisation has become a new benchmark of best practice, however ensuring these efforts are truly strategic has met with limited success to date. To ensure robust alignment the following should be considered:

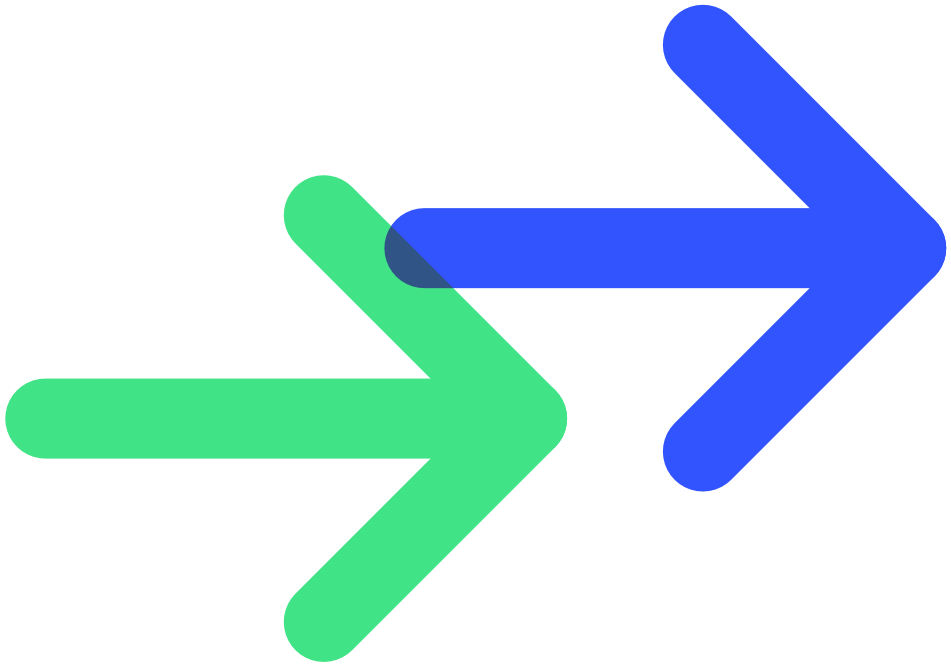
- Ensuring that processes like eco-design of products and sustainable procurement are not limited to a carbon focus but include water and other sustainability impacts determined by a prioritisation assessment;
- Creating a collaborative rather than a compliance dynamic with suppliers to stimulate and incentivise win-win situations and unlock the investments required;
- Engagement on the ground, ensuring that the local context is understood and engaged with. This is where water sustainability provides a springboard to a more localised approach "beyond supplier codes of conduct";
- Consideration of the "use phase" by customers or consumers and the impacts on water and carbon during their use of the product or service
- Multi-stakeholder engagement, noting that whereas energy/carbon alone may be within the hands of a single stakeholder to control, water resources are typically a shared resource. This can lead to an initially more complex challenge but is also more likely to lead to a more holistic solution.

STEP 5: Taking action

Our collective experience tells us that few organisations are following exactly the same linear path towards a holistic approach to water and carbon and each has unique priorities that will be reflected in its strategy. Many have carried out a carbon footprint and are now looking to take action on water and grappling with how to do this. Others have been focussing on product design using techniques such as life cycle assessment but are struggling as to how to make such detailed approaches cope with scaling up to multiple metrics and a product portfolio of thousands of individuals stock keeping units.

Still others are looking at very specific raw material based issues and wondering how to engage at the beginning of the supply chain with farmers to change entrenched local practices. There is, therefore, no one way to start the journey of taking action, nor one way to implement it.

The diverse case studies from participants, presented in the following section, reflect this and give a sense of how in a very practical way companies have taken steps to address the issue and move towards a more holistic approach. The cases stand on their own considerable merits and need little commentary however to add value for readers we have subsequently extracted what we regard as individual best practices in Appendix 1 so that other organisations can see a way of taking specific points of actionable learning and applying them in their own unique context.



5. Case studies

Crown Paints

Tata Companies

Nestlé

Tata Steel

Baxter Healthcare

CLS Holding plc

Nokia

C&A

Boots UK

5.1 Crown Paints – developing a road map approach and risk assessment

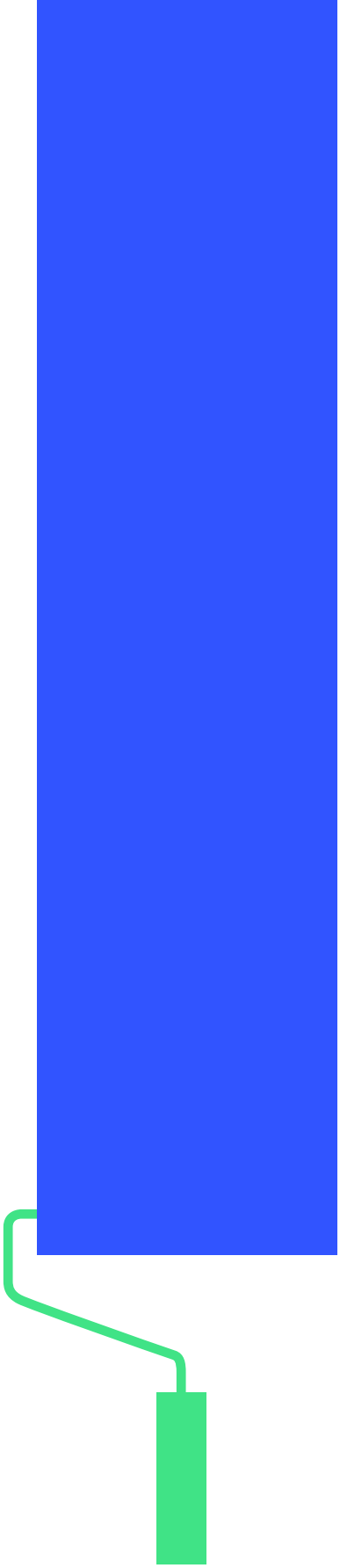
Getting started began by developing a "wish list" for what Crown Paints would like to achieve in an ideal situation. Much has been publicised on identifying risks and what metrics could be recorded to monitor and mitigate risk, but the practicalities of gathering meaningful data and the practicalities of risk management raised a number of questions, such as:

- Where do we set our boundaries?
- What data do we really require?
- How do we engage with our suppliers on this issue?
- How do we request this information, in what format and without over burdening suppliers?
- If our suppliers do not have the information, are there reliable sources of generic information?

The starting position is probably familiar to many companies who have undergone the journey of firstly developing a carbon footprint, and who wonder if developing a water footprint is similar and used in the same way? Water however appears to be more complex than carbon; familiar for decades with regard to water conservation, but now with a new learning curve introduced which needs an understanding of:

- What is good or bad for a given water process?
- How should meaningful water targets be set?
- What resources and help are available?
- Are their examples from our peers that explain a course of action, including the pitfalls as well as the successes?

Developing a water footprint strategy clearly goes beyond just factory water efficiency, including the identification of any "hot spots" from water scarcity in our supply chains that could affect business continuity etc. From a business perspective, looking at water in terms of a key resource and in a similar vein to energy has raised a common awareness internally across many business departments that treating water and carbon together (rather than separately) can help.



5.2 Tata Companies and The Water Footprint Network – building capacity for sustainable energy and water use

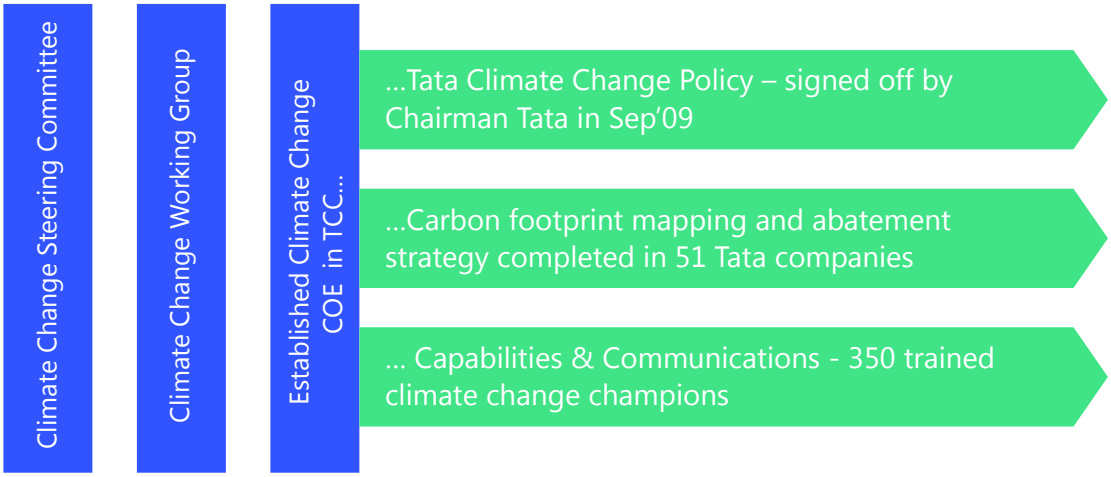
The Tata Group sustainability journey began by considering how the development of a business case might vary depending on the type of business, i.e. Tata Steel, Tata Chemicals, Tata Motors and Tata Power.

2007 will be known as the year when the Intergovernmental Panel on Climate Change (IPCC) stated with 90% probability that that most of the warming we've seen since the mid-20th century had been caused by human activity—primarily fossil fuel combustion and changes in land use, such as deforestation. Thus IPCC concluded "warming of the climate system is unequivocal".

The senior management of the Tata Group was following these events with keen attention. At the Annual Tata Business Excellence Convention in December 2007, it was suggested that our companies play a responsible role in combating the menace of global warming, keeping in line with the Tata brand promise. They should examine their respective positions and aspire to become "leaders" in their respective industry's drive towards a low carbon world.

A Steering Committee (SC) of Senior Tata Executives was set up to guide the climate change effort across Tata Companies. Dr. JJ Irani was the Chairman of the SC and the members comprised other Tata Sons board members and CEOs of large Tata companies e.g. Tata Power, Tata Chemicals, and Tata Industries. The SC decided on a governance structure. The key action areas with progress to date are as given in the figure below:

Figure 3: Tata Group climate change strategy



After about 3 years in mid-2011, the progress toward sustainability was reviewed and the scope of the climate change group was enhanced to embrace the far more over-arching concept of business sustainability. In this revision, the decision was made to undertake a similar exercise to estimate the water footprint of the largest Tata companies.

Four companies of the Tata Group - Tata Steel, Tata Chemicals, Tata Motors and Tata Power - together with Tata Cleantech capital Ltd (TCC) have partnered with the International Financial Corporation (IFC) to develop a corporate water sustainability framework and promote sustainable water use at eleven plants across India. Through Water Footprint Assessments based on the Water Footprint Network's globally recognised methodology, the collaboration was aimed at developing a water sustainability roadmap for the Group to identify necessary responses to India's pressing water challenges.

In this Water Footprint Assessment eleven diverse facilities of the 4 companies situated in different parts of the country were covered. In keeping with the ethos of building internal capability, 60 Water Champions have been trained. Furthermore this exercise has led to a better accounting for water footprinting inside the facility and in the supply chain, and offered response strategies to manage the sustainability of their water use in the context of the local watershed.

As in the case of carbon footprinting, the Water Footprint Assessment was extended to the vendor base of Tata Motors, who see this as further evidence of Tata companies' commitment to sustainable business operations.

5.3 Baxter Healthcare – in-house hot spot analysis using a lean audit approach

This case study describes how a Medical Products Manufacturer combined carbon and water footprint reduction in a 'lean audit' process, due to a recognised strong linkage between energy and water footprint (measured as blue water consumption in this case).

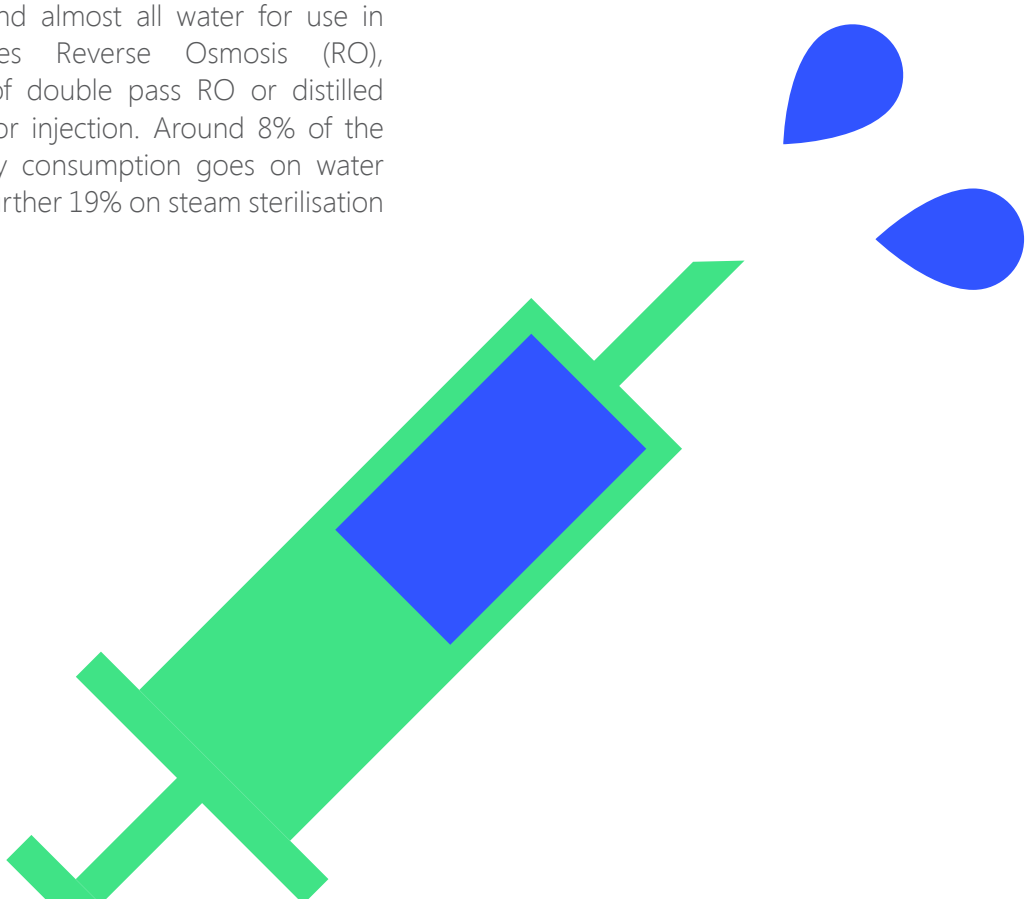
As a manufacturer of Intravenous Solutions, water is integral to many of Baxter's products and manufacturing processes. The company considers water conservation and re-use to be key focus areas and has worked to better understand the impacts of its water use across the value chain. It now implements conservation and efficiency projects at its manufacturing facilities to improve operational performance.

Strategically, Baxter is committed to reducing water consumption by 35% indexed to revenue by 2015, compared to 2005. In 2012, the company used 14 million cubic meters of water, a reduction of 34% compared to 2005 indexed to revenue. This is an absolute decrease of 5%, and on target to meet their 2015 goal.

Benchmarking has shown that 80% of Baxter's water consumption is in process-related operations including cooling towers, chillers, steam boilers, sterilisers and water purification. In addition a supply of highly purified water is vital for the manufacture of medical products and almost all water for use in products undergoes Reverse Osmosis (RO), including the use of double pass RO or distilled water in products for injection. Around 8% of the company's electricity consumption goes on water purification, with a further 19% on steam sterilisation processes.

Due to the strong link between energy usage and water consumption in processing, optimisation of water use remains a key focus of the company's facility energy assessments. In 'lean audits' carbon and water footprints are considered together. Additionally Baxter integrates lean manufacturing principles and tools such as Value Stream Mapping with water management to help facilities identify areas for additional conservation.

In 2012, Baxter's facility in Lessines, Belgium implemented a series of projects to capture and reuse clean hot water previously discarded with the site's wastewater. On an annualised basis, these projects helped reduce water consumption by nearly 85,000 cubic meters, energy usage by approximately 12,000 gigajoules, and carbon dioxide equivalent (CO_2e) emissions by more than 600 metric tons, while saving approximately $US 300,000 in energy and water.



5.4 Tata Steel (Port Talbot Steel Plant) – in-house operational footprint development showing strong linkage between water and energy cost

The Tata Steel, Port Talbot plant in South Wales, assessed the economic benefits of connecting water and energy usage. From originally developing a site carbon footprint, it realised that a significant amount of its energy use was being used to transport water around the site. This has now led to a natural progression towards understanding the site's water footprint and locating where the water/energy consumption hotspots are.

In steel plants, water is looked upon as a relatively inexpensive utility when compared to energy, natural gas and other fuels. This general understanding is based on what the company might be paying to regulatory bodies for licences to abstract water. Depending on the grades of water used onsite, the prices ranged from a few pence per cubic metre for untreated river or seawater to over £1 for a cubic metre of demineralised water.

However what is not often considered is the cost to pump the water onto and within the site to the points of treatment or use and subsequently the cost of water treatment before use. Typically of the total cost spent on water as a utility, the cost of pumping water is approximately 45-55% while the cost of treating it is about 25% of this total.

By looking at the carbon/ water nexus, a major opportunity has now been realised to reduce costs by implementing efficient pumping and improving treatment technologies. Projects such as installing Variable Speed Drives on delivery pumps, upgrading and automating water/effluent recovery treatment plants are being looked into with more attention.

Benchmarking of its water uses with additional metering has been a very important exercise as steel industry operations are vast and varied. It has given a better understanding of how much water is being used and where in each process. It is also helping to understand the efficiency of the process and will help initiate the right projects to improve water management and increase plant availability for product manufacture in the future.

Once all the baselines and targets were established, it was important to have the key stakeholders involved in developing the right projects and practices. This included biweekly meetings and workshops between process engineers, utility engineers, optimisation engineers and water treatment contractors. A new platform has also been introduced wherein the employees can pitch in their ideas on saving water which is reviewed and incorporated into the list of projects being worked on.

Projects are also being undertaken on a larger scale to develop a more efficient water distribution system. The benefits or payback would not only be in reduced energy spend but by providing the right blend of water quality it would ensure reduced maintenance expenses due to corrosion and increased plant availability for production.

We have also tried to establish which integrated steel works within the Tata Steel organisation have better water management and use, to see if there are opportunities to intra-organisational transfer of best practices. For example, Tata Steel in Jamshedpur, India has consistently reported specific water consumption figures that are 16-20% of Port Talbot's water use per tonne of steel produced and are looking to reduce it further with more improved treatment technologies.

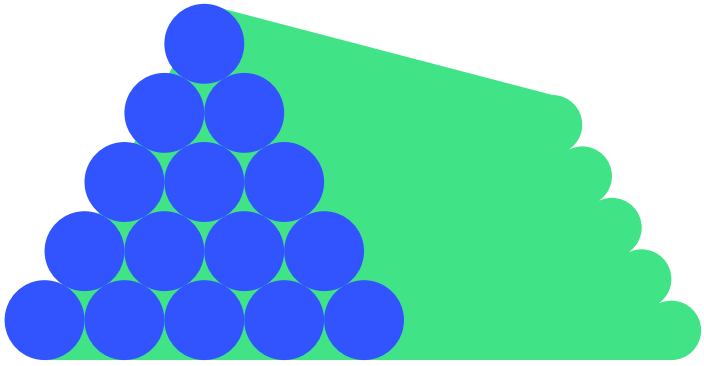
The site's aspiration is to reach 'zero discharge'. Tata Steel Long Products in Scunthorpe, UK has also reported similar figures. The common factor between the two sites is that they are fed by one main source and Tata Steel Scunthorpe also uses rainwater harvesting to provide for its requirements. Since both sites have limited availability of water, it has been more essential for them to improvise and tactfully manage their water.

Arcelor Mittal in Dunkerque has also reported figures that are less that 7% of Port Talbot's specific water consumption. They use cascading effluents as feed water for processes requiring lower quality of water.

Regulations have influenced the level of focus on water consumption. The regulatory drivers in Jamshedpur (India) are much stricter because of limited water resources in the region. The river that supplies water to the steel works also supplies water to the city of Jamshedpur, hence there is significant competition for a finite resource. This also fuels a sense of responsibility to manage this utility ably and not create any adverse effect on the surrounding environment.

Similarly in the UK, Tata Steel Scunthorpe draws its water just from the River Trent and from sumps that are used for rainwater collection. In comparison Tata Steel Port Talbot is located at the mouth of the river Afan, is next to the sea and has several surface water sources to abstract from. Water resource availability therefore varies due to location and geography and to which has historically influenced the degree and focus on water consumption.

Part of our journey for continuous improvement has, therefore, been to firstly make the link between the consumption of water and energy; and secondly to identify best practice by being able to make comparisons with peers in the same industry, through looking at innovative ideas used to cope with particular circumstances and what has been practically implemented.



5.5 Nestlé – improving the environmental performance of its activities – beyond GHG emissions and water consumption

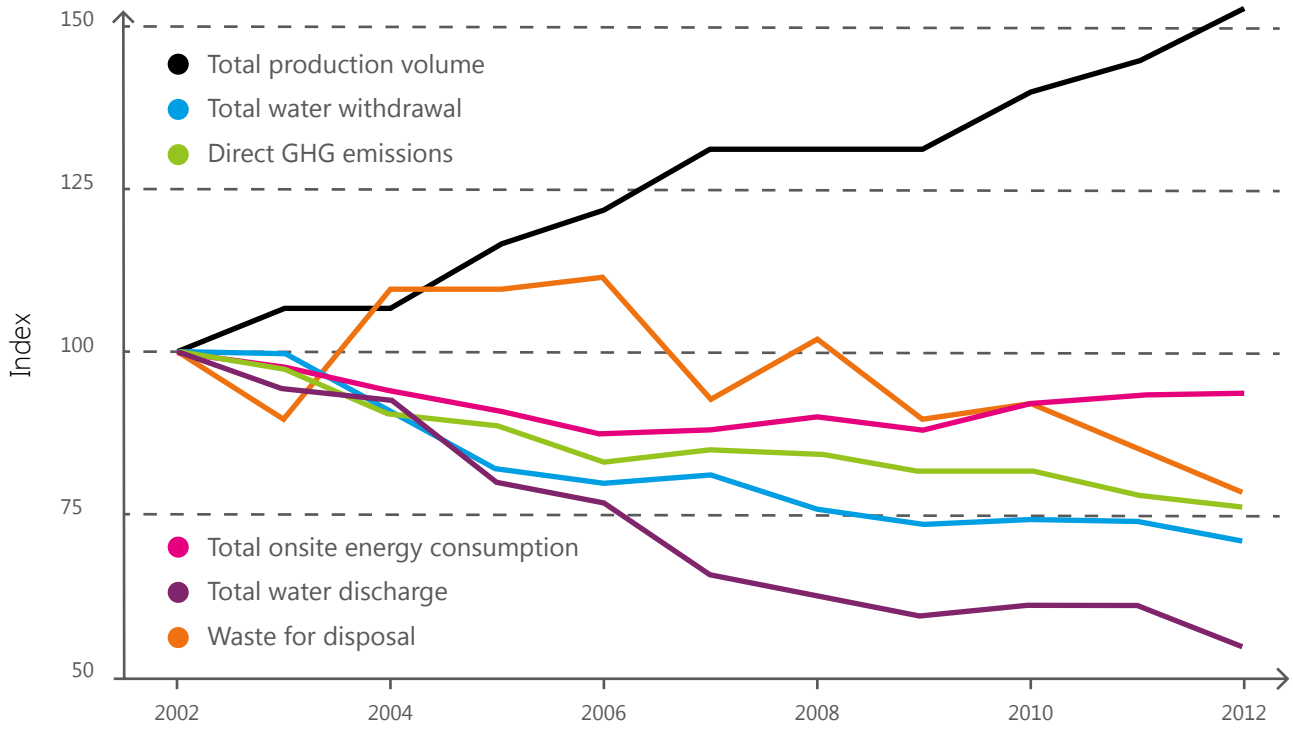
Since 2002, Nestlé has halved its water withdrawal and direct greenhouse gas emissions per tonne of product (**Figure 4**). Nestlé has embraced new technologies, such as using spent coffee grounds as a clean source of renewable energy and advanced filtration to recycle water within its factories, especially in regions where water is scarce.

The Nestlé Environmental Target Setting Initiative completed 16 projects, during which more than 379 projects were identified and with a total investment of about CHF 86 million. These projects have resulted in an annual energy saving of about 8 million GJ and a reduction of approximately 191 000 tonnes of CO_2 equivalent. This has resulted in reduction in water withdrawal by 2.6 million m^3 and a saving of CHF 41 million in return.

In Mexico, Nestlé has an agreement with a wind energy company that has led to 85% of the total electricity consumed by its factories in the country now being supplied by wind power. Estimates show that this will reduce greenhouse gas emissions equivalent to taking 39,000 small cars off the road annually.

In France, factories in Challerange, Rosières and Herta St. Pol have all installed wood-fired boilers that use woodchips from certified forests. The factory in Challerange is meeting 96% of its fuel needs with its boiler, saving about 8,000 tonnes of CO_2 equivalent per year.

Figure 4: Comparison of total production volume with associated water use and GHG emissions



5.6 CLS Holding Plc. – in-house operational footprint development to manage and reduce water usage in buildings

CLS Holdings Plc. is a commercial property investment company with assets in London, France, Germany and Sweden, which has been listed on the Main Market of the London Stock Exchange since 1994.

In 2011, CLS appointed a dedicated Sustainability Manager and adopted its "Green Charter". The fundamentals of sustainability were already well reflected in core business values, largely due to the Group's Swedish founder and chairman. However a necessity to proactively manage resource usage was recognised in order to keep tenant cost of occupation competitive.

Up until 2011 water usage was monitored for billing purposes only and reduction measures were carried out on an ad-hoc basis. It was clear that a thorough audit was required taking into consideration factors such as:

- consumption by area and occupancy
- consumption compared to other buildings
- which processes occur that impact on water usage (cooling towers, adiabatic cooling, showers, kitchens etc.)
- special events such as building works and major changes in occupancy

This process created a baseline, ensuring meters were calibrated, long-term leaks identified and rectified, as well as identifying where excess usage and waste was occurring.

The primary aim of the management team at CLS is to facilitate quiet enjoyment of its tenanted offices at a minimal cost to occupiers. Flooding and leaks from drains, condensation, toilets and plant rooms impacted on this aim as well as undermined efforts to reduce actual usage and engage with the building users on a range of sustainability issues.

An audit highlighted a raft of complementary drivers from various stakeholders which went beyond purely cost and efficiency. This enabled a more informed and proactive approach leading to the development of several schemes, which previously would usually have been reactive only to support service charge recovery.

Schemes have included

- Ensuring satisfactory drop on horizontal drainage pipe runs (these can become convoluted with successive alterations and additions)
- Introducing systems for leak detection and improving containment (bunds)
- Removing potential causes of blockages such as paper hand towels, which are replaced by more energy efficient hand dryers
- As a minimum, all new toilet fittings comply with criteria required for a Gold Standard using the SKA sustainability assessment method for fit-outs
- "Waterless" urinals are being trialled in a small number of buildings
- Automatic meter readers (AMR) and remote monitoring software
- Quarterly "Energy Report" given to all tenants and discussed at the same interval. This covers water, gas, electricity and waste
- A strategic decision to phase out and avoid use of cooling towers and adiabatic cooling systems
- Phasing out of bottled water usage in our own offices

Collectively these measures have reduced the Group's water consumption (measured as water supplied to the buildings) in UK managed buildings from a 2010 baseline of 2.16 m^3/m^2 down to 0.72 m^3/m^2 of lettable floor area per annum for the 2012-2013 reporting year. This is a 66.7% improvement that has resulted in tenants benefitting from a reduced service charge.

5.7 Nokia – raising awareness throughout a complex supply chain

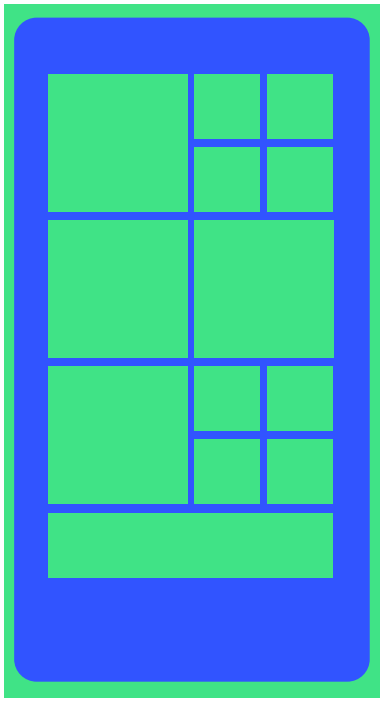
Part of NOKIA's solution has been to raise awareness throughout its complex supply chain. Even though Nokia's operations are not considered as water intensive, water has strategic importance in the supply chain and it is a necessity for the surrounding communities. The challenges that Nokia has faced have been to understand and identify water risks within a very large supply chain. This has currently been achieved to a Tier two supplier level. Tier one consists of Nokia's own production factories.

Suppliers have been requested to report on annual water use and water recycling rate, the same way they report on energy use, greenhouse gas emissions and waste. Together with the help of external water analysis tools, these metrics have enabled Nokia to identify the supplier factories located in water scare areas and component types that use more water during production.

Nokia's strategy is to:

- Increase awareness of water scarcity in the supply chain through workshops and training.
- Working towards improved water efficiency by cooperating with suppliers operating in water scarce areas and follow-up on water use and reduction targets

In January 2012 Nokia arranged its first water workshop in the Beijing Xingwang business park. The Xingwang business park is located in the high-risk Hai He water basin and where both Nokia and Nokia partners have factories located. A high basin risk indicates that factories are situated in an area where external management issues are of concern. Companies will need to work with other stakeholders to improve the state of the river basin as their risks cannot be reduced on their own. The outcome of the workshop has increased overall awareness, sharing of best practices and the initiation of a local water action plan.



5.8 C&A – identifying response strategies to reduce the footprint of cotton

Cotton is a major raw material for the textile industry. Nonetheless, cotton farming, like many other agricultural practices, is well known to have major water and carbon footprints (through use of pesticides, land use change and ability to store carbon). Cotton uses 11,000 litres of water on average for each kilogram of cotton produced. Moreover, cotton farming is processed in regions where water scarcity sometimes already exists, and where no attention is paid to the quality of soils and its degradation.

C&A, as a fashion retailer, is at the end of the garment manufacturing supply-chain, and thus had no direct contact with the farmers. Moreover, little data existed on water and carbon footprints of cotton organic vs. conventional farming activities, to measure the baselines and the potential best practices.

Another challenge faced to improve the situation was the variety of geographical regions where cotton is farmed, with different languages, culture and ways of working.

C&A, through its Foundation, decided to partner with relevant stakeholders (Water Footprint Network, Better Cotton Initiative, Textile Exchange), to measure the water footprint and improve its supply-chain water footprint (carbon footprint was not central at that stage).

In 2010 C&A funded a study conducted by the Water Footprint Network to compare pollution levels (grey water footprint) from organic and non-organic cotton farming in India. Sampling a total of 480 organic and non-organic cotton farms, their research found that organic cotton farms' impact on water resources was dramatically less than on non-organic farms.

For example, the grey water footprint of non-organic farms was 266.042 m^3/t, which is about five times as high as for organic farming, which is around 53.257 m^3/t. The strength of their findings led the researchers to conclude, "the results clearly favour a wider implementation of organic agriculture."

Another finding is that organic cotton farming uses less energy and healthy organic soils store more CO_2, which allows a reduced carbon footprint of cotton farming. Organic cotton farmers are doing their bit to combat climate change. By eliminating the use of manufactured fertilisers and pesticides and reducing nitrogen inputs, organic cotton growing produces up to 94% less greenhouse gas emissions.

By maintaining their health, organic practices turn soils into a carbon 'sink', removing CO_2 from the atmosphere. Organic soils soak up and hold more water so they can better cope with floods and drought. By engaging the necessary stakeholders, this leveraged several positive impacts from this C&A initiative.

In its Water Footprint Strategy project for 2013 – 2015, capacity will be built to reduce and manage the water footprint of C&A by working with the Water Footprint Network on the following four initiatives:

1. Developing the guidance, training and tools necessary for cotton farmers to reduce and manage their water footprint;
2. Developing guidance, training and tools necessary for Washing, Dyeing and Finishing (WDF) mills to reduce and manage their water footprint;
3. Evaluate the sustainability of non-cotton raw materials and conduct comparative analysis of different fabric types; and
4. Embed the goal of sustainable, efficient and equitable water use throughout C&A business activities.

5.9 C&A – tackling water scarcity in supplier countries by reducing pollution from dyeing textiles

Water scarcity can also manifest itself through pollution of freshwater. Within the apparel industry there is a major concern of massive water pollution created by wet process dyeing, particularly in China[24] and Bangladesh. In addition to improved efficiencies, part of the solution[25] lies in chemical usage reduction and substitution of toxic and persistent chemicals leading to improved (lower cost) wastewater treatment and eventually to the benefit of local eco-systems.

As many textile mills are shared by a number of brands, one solution to connect across complex supply chains and introduce mitigation measures has been for major retailers, manufacturers, trade organisations etc. to join in partnership.

Bangladesh's textile sector is a major contributor to water availability and pollution issues. The sector includes 1,700 garment washing, dyeing and finishing units, in and around the Dhaka metropolis, and impacts the lives of 12 million + inhabitants, with consumption on average of 300 litres per kg fabric and significant pollution of surface and groundwater. Bangladesh is an important area for C&A sourcing activities.

As this situation displays transversal issues (water, energy, chemicals, economical), and has systemic root causes, it was decided that a multi-stakeholders approach was necessary. The Partnership for Cleaner Textile (PaCT) Program aims at transformation of the Bangladesh textile sector through positive social, environmental and economic impact creation, through four objectives:

- Reduction of water usage (from average 300 l / kg fabric to best practice of 50 l /kg fabric)
- Reduction of wastewater use/ quality improvement
- Reduction in energy consumption and GHG emissions (estimates suggest adoption of low-cost/ no-cost cleaner production measures by the sector's 1,700 wet processing units will result in savings of 600,000 MWH of electricity and 1.3 billion m^3 of gas
- Improvement to Occupational Health Safety (OHS)/ wash conditions

C&A, together with other international brands such as H&M and Inditex, and NGO (Solidaridad) joined the Programme, sponsored by the Dutch Government, with 3 steps planned:

- Awareness Building/ Installation of Meters
- Low-cost/ No-cost Cleaner Production
- Technology Investments/ Management Diagnostics

By engaging and leveraging the resources from various stakeholders and deploying existing best practices at cluster level, the aim is to improve the situation at a regional level. Water Footprint Assessment will be central to driving improvements within the mills by linking together the international brands, the local communities and the mills through the common language of water footprint. The multi-stakeholder funding is approximately 11 Million EUR.

A recent NY Times article described some of the outcomes of the programme, by describing one specific textile mill operated by company DBL. They invested $US 80,000 to make simple but powerful upgrades to equipment such as boilers, dyeing and rinsing machines, as well as implementing simple fixes such as insulating steam pipes and fixing leaks. Before the changes, DBL used 120 litres of water to produce a kilogram of cloth; now it uses 60 litres (in Bangladesh, many factories use as much as 170 litres of water to make one kilogram of cloth).

Those measures save not only water but also the electricity and gas used to pump, filter, heat and treat water, which translates into total savings of $US 500,000 each year for DBL.

5.10 Nestlé – a multiple indicator approach towards sustainable milk production

As the world's largest milk company, it's important for Nestlé to take positive steps to address its sustainability issues. Milk purchasing, especially directly from farmers, is a shared value activity that has been undertaken for more than 140 years. We have always understood that if we want a constant supply of high-quality, fresh milk, we need to work in partnership with our farmers. In exchange for this, we offer our farmers access to market and regular demand for their product, as well the support for them to grow together with our business.

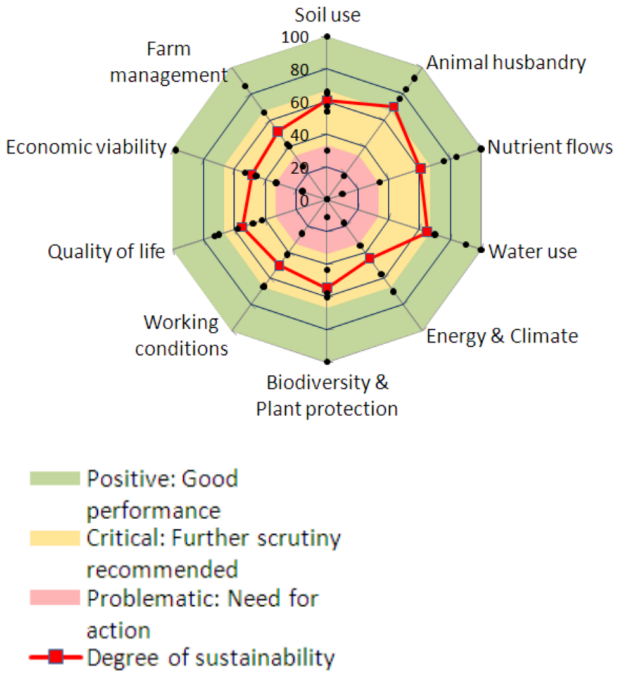
RISE (Response Inducing Sustainability Evaluation, Figure 5) is an indicator and interview-based method for assessing the sustainability of farm operations across economic, social and environmental dimensions developed by the School of Agriculture at Bern University in Switzerland. We use RISE in dairy farming to assess long-term sustainability issues at farm level. This helps us to assess security of supply going forward, both in terms of quality and quantity. It also helps the farmers to understand where there are potential issues, which can be addressed jointly by the farmer and us.

Environmental issues considered as part of the RISE assessments include soil use, nutrient flows, water use, energy use and our impact on climate change and biodiversity and plantlet production.

We have carried out RISE assessments for 10 years and during this time we have assessed different farming systems in 18 countries, including four new countries in 2012.

Based on these assessments we have a broad range of activities that differ from country to country. They include, among others, veterinary services, support to feeding / silage production / pasture establishment, water treatment and management, improved milk collection (e.g. solar panels at chilling stations), animal fertility checks, support to silvopastural farming, biogas digesters and systems (where appropriate), and incentive schemes for environmentally friendly farming practices.

Figure 5: RISE 2.0 sustainability polygon of a mixed Swiss farm



5.11 Boots UK – Developing a holistic approach to product sustainability using a web-based assessment tool

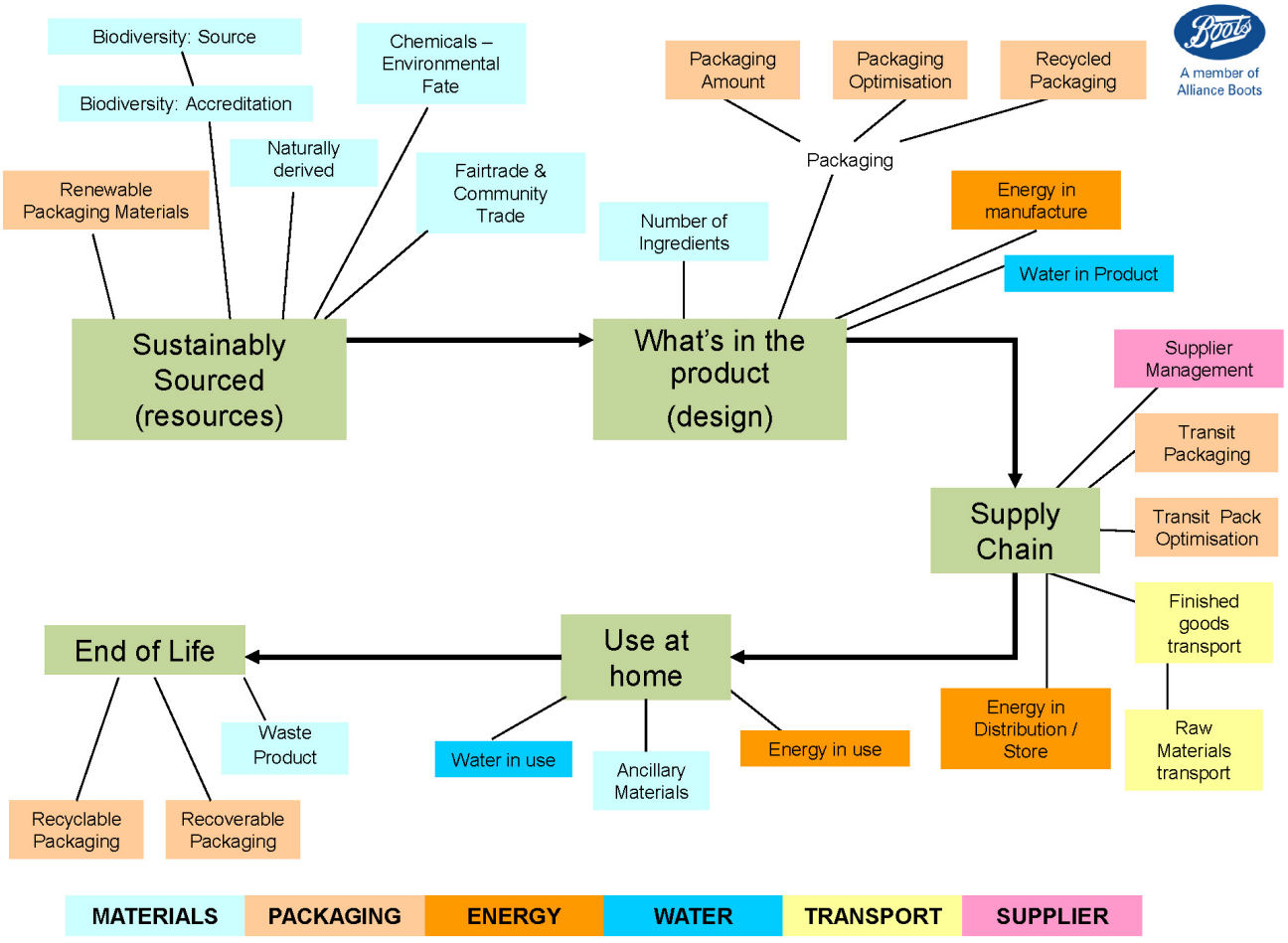
Boots UK is a member of Alliance Boots, a leading international, pharmacy-led health and beauty group delivering a range of products and services to customers. Its focus is on growing its two core businesses: pharmacy-led health and beauty retailing and pharmaceutical wholesaling and distribution, while increasingly developing and internationalising its product brands. At 2012/13, Alliance Boots has a presence in more than 25 countries and employs over 108,000 people.

Boots UK has successfully incorporated sustainable product development into its New Product Development programme. The initiative is driven by strategic themes including resource scarcity, brand protection and the need for new business models.

To understand and manage the impact from a large supply chain to consumer use, the approach undertaken by Boots UK has been to develop a web-based 'product sustainability assessment model' that assesses the lifecycle of an individual product.

This tool enables Boots UK to quickly and simply analyse and score 24 sustainability indicators across the lifecycle of an individual product, including but not limited to, water and energy use. These indicators are shown in the accompanying figure. Carbon footprint is not considered as a separate indicator as the climate change impact is incorporated into the individual indicators listed.

Figure 6: Boots UKs' product assessment initiative



The key features of the sustainability tool have enabled Boots UK to:

- Create a sustainability profile 'footprint' of a product to compare relative performance and identify 'hotspots'
- Set improvement targets by product type or by brand
- Manage a database of sustainability performance data for understanding risks, opportunities, reporting and analysis, at an individual product or brand level

The data can then be used as part of brand planning to identify any sustainability 'hotspots' and identify which might be the key sustainability objectives for individual products. These can then be filtered against feasibility, cost and brand value, for use by product development teams and others.

The analysis can be focused on a particular topic such as water footprint. Shampoo is an interesting example, where the greatest water consumption is in fact by the consumer rather than within the supply chain or manufacturing.

For the re-launch of the Boots Botanics toiletry brand in summer 2012, Boots UK utilised this product sustainability assessment tool process to define sustainability objectives for both product and packaging. As a result the new products have been launched with significant improvements in their sustainability footprint.

Figure 7: Typical shampoo product water footprint

5.12 Soft Drinks Sector (UK) and Anthesis – building a road map for an industry sector

Anthesis has been working with the UK government and the Soft Drinks Sector to tackle water use as part of a wider project to create a sustainability roadmap for the industry. The project is steered by Defra, WRAP (the Waste and Resources Action Programme) and the British Soft Drinks Association.

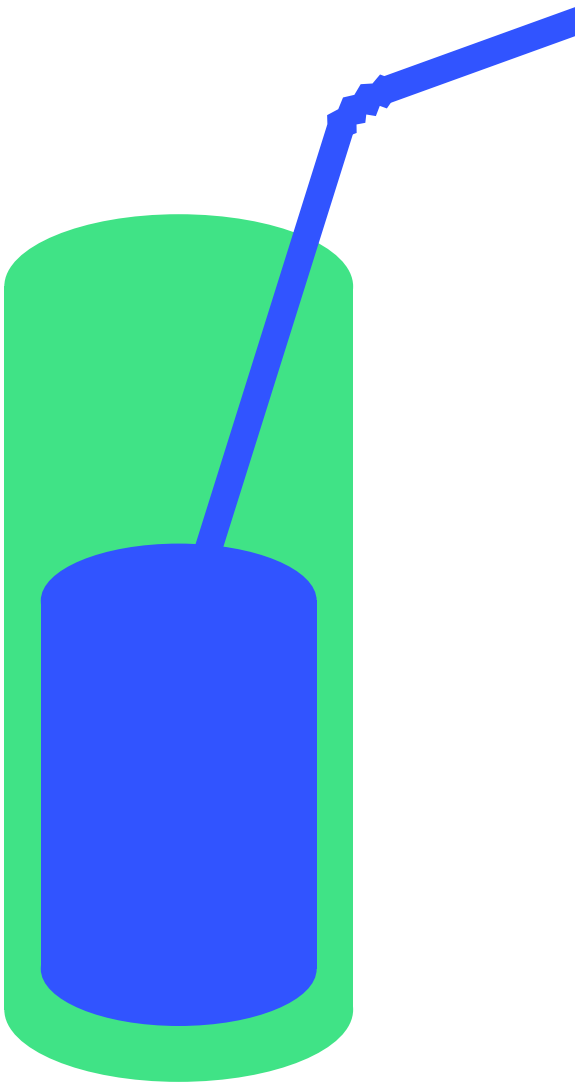
Water is the key ingredient for the beverage sector and is also used in huge quantities in its associated agricultural (e.g. sugar crops) and manufacturing processes. The sheer volume of water consumed by the drinks sector is recognised as an issue when compared to finite supplies of freshwater globally and the existence of water stressed areas in the supply chain.

The challenge for the sector has been to:

- Reduce water internally with a focus on benchmarking and setting targets of water consumed per litre of product
- Develop adequate information about the volume of water it consumes, particularly by drinks category. It also needed data split by water used as an ingredient versus water used in processing
- Identify reduction opportunities and where to focus efforts

To be able to implement a solution, Anthesis provided an assessment of the water volume consumed by the sector, including detailed mapping of water consumption from farm or water source (rainwater, rivers or aquifers) through to the consumer. This gave the industry an understanding of where water consumption arises in the supply chain for different soft drink categories. We then benchmarked different soft drink categories in terms of their water to product ratios.

The project is now producing evidence about hotspots in the supply chain so that the industry can focus on areas that have the greatest impact, and from which a sound basis can be developed to identify opportunities for water use reduction as part of the developing sustainability roadmap. This collaborative and trade association approach has been an efficient way for many organisations to develop a standardised approach to setting targets and benchmarking their progress.



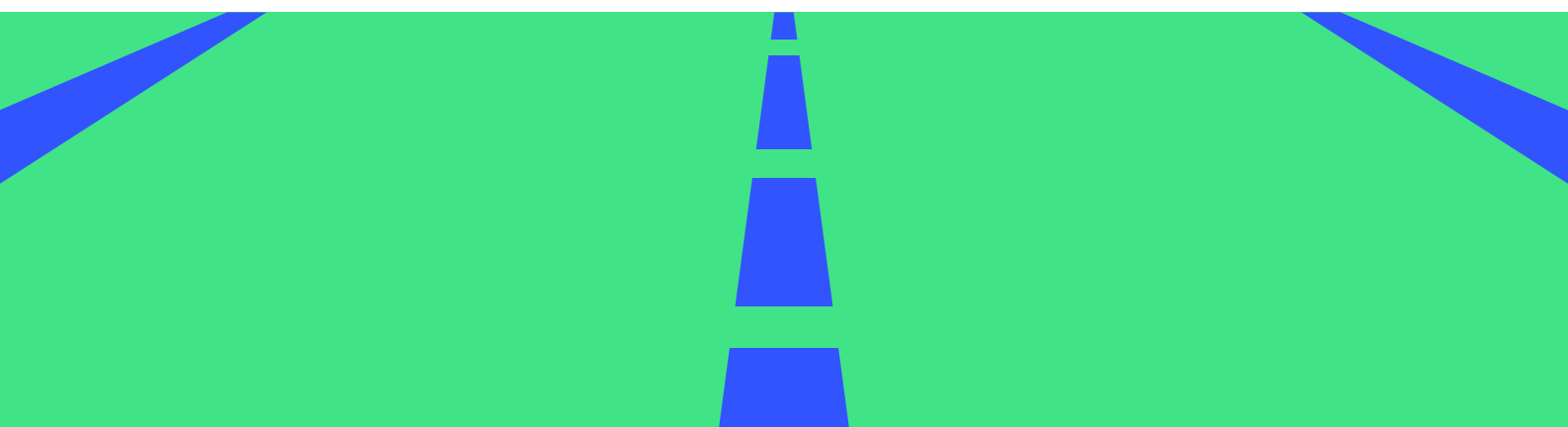
6. The road ahead

In considering the global challenge of sustainability and the limitations of individual actors we need to scale up our collective efforts. This can only be accomplished through a holistic approach which is integrated with the core business processes we deploy in our organisations every day.

In doing this, we face multiple challenges:

- the need to harmonise definitions, methodologies and tools that, while intended to be helpful, often create confusion and indecision;
- the need for fast followers to pick up on the case studies of the leaders and to aim to better their efforts;
- the need to find new and agile ways to collaborate within supply chains and value chains often across geographical and cultural borders;
- the need to continue to mobilise diverse stakeholders to provide a multi-pronged set of drivers and to take effective action together;
- the need for smart data strategies that provide insight and evidence base for decision making at the level of detail most appropriate;
- the need to have a consistent and coherent policy agenda supporting sustainability objectives and providing a level playing field of incentives in key markets and globally.

We recognise that these and other challenges will need further innovation and action if they are to be overcome but we hope that with this report we have achieved at least two fundamental pre-conditions of success: to bring together the leading thinking and the practice in two areas of acute relevance to the sustainability agenda; and to provide compelling examples of efforts to start down this road. We trust that the report will encourage, inspire and enable others to join this step change by adopting a holistic approach to sustainability.



About the authors

Chris White

Water Management Specialist, Associate

Anthesis

Chris White has over 30 years experience as an environmental expert, particularly in sustainable water management, environmental due diligence, environmental risk, groundwater contamination and international project management.

Chris currently uses his water management expertise for developing commercial, strategic and sustainable solutions related to freshwater scarcity (www.watersecurity.co.uk).

This includes supporting companies at both a strategic and operational level; factory and river basin scale; from data analysis through to corporate water disclosure. He also leads a research project on optimising catchment water management with Cardiff University, Tata Steel and the regulator, Natural Resources Wales.

Chris has also authored "Developing a Water Footprint for Business Resilience" published by the Institute of Food Science & Technology

chris@watersecurity.co.uk

Ruth Mathews

Executive Director

Water Footprint Network

Ruth Mathews has two decades experience in working with the private and public sectors, NGOs, academia and international organisations around the world to improve the sustainability of water use. She has participated in multi-stakeholder dialogues on the allocation of freshwater resources within river basins and brings a mix of technical, policy and socio-economic perspectives. As Executive Director of the Water Footprint Network she is a thought leader on the development and application of Water Footprint Assessment and during her tenure has rapidly increased the organisation's global impact.

R.E.Mathews@utwente.nl

Paul McNeillis

Solutions Director

Anthesis

Paul McNeillis joined the Board of Anthesis in January 2012, bringing around 15 years' experience in the development and implementation of sustainability strategy. Paul has held a number of Director level posts and has experience in professional services, sustainability software and sustainable procurement. Paul works with many blue chip clients in many sectors including: Healthcare, Retail and Apparel. He has chaired the Sustainable Supply Chain Round Table at Green Mondays, and contributed to the development of Sustainable Procurement Standard: BS 8903. He holds a PhD, MBA and DBA and is a frequent speaker and author, involved in both academic research and practical implementation. His current areas of practice include: sustainability strategy, carbon and water sustainability integration, collaboration, and sustainable supply chains.

Paul.McNeillis@bestfootforward.com

Ashok Chapagain

Science Director

Water Footprint Network

Ashok Kumar Chapagain is Science Director at Water Footprint Network. He has been working in the field of water resource management for more than 24 years. He holds a PhD in the field of Water Systems and Policy Analysis, and an MSc degree in Water and Environmental Resources Management. He helped develop the concept of Water Footprint since its inception, first as a PhD researcher in 2002, and later as a postdoc researcher in 2006. He has a strong publication portfolio on the subject of Water Footprint including the 'Water Footprint Assessment Manual' used globally as the foundation document in this field. In his previous professional carrier, he worked for WWF-UK for six years on both UK and international freshwater and sustainable consumption issues, supporting WWF's external engagement with companies, government organisations and the research community to help influence policy and practice on water stewardship and water security.

At WFN Ashok acts as a network point of excellence, providing advice to WFN partners and maintaining scientific rigour in applying Water Footprint Assessment. He leads global trainings, e-learning courses and various other knowledge sharing activities. He helps multinational businesses understand their global water dependences and associated risks, and encourages them to address the environmental impact of their water footprint by developing the case for them to support a stronger public policy for water management.

Ashok.Chapagain@waterfootprint.org

Acknowledgement

We would also like to acknowledge Dr. Kurt Unger's role in the first phase of this working group while working as a Project Officer for the Water Footprint Network. Max Tam (BFF) for his design skills and creativity in producing the graphic content and layout of this white paper. Nick Roberts (BFF) for project managing this paper and seeing through to completion.

Annex 1: Emerging good practices

The process of industry engagement in this assessment has resulted in a suggested five step approach to carbon-water (or wider sustainability) integration of:

1 Prioritising where to work
2 Formulating response strategies
3 Assessing trade-offs and synergies
4 Developing a corporate sustainability strategy
5 Taking strategic action

The following table adds further detail around these five steps through the identification of specific good practices that have been derived from the range of initiatives currently being undertaken by the participating organisations in this study. The approach and level of applicability will no doubt differ given that few organisations are following exactly the same linear path towards integration and each has unique priorities that will be reflected in its strategy. However it should form a good basis from which to consider and plan for the future.

Table 4: Emerging best practices connecting a holistic approach for carbon, water and other sustainability factors

Best practice	With an operational excellence focus
Benchmarking	What do you already know and measure? Which aspects of your internal and external environment are significant to the business, from an economic, environmental and social perspective?
Set Goals	Confirm company environmental and sustainable management goals. This is likely to be a collective approach through consultation of a number of both internal and external stakeholders, whilst taking on board business type and operational requirements. These goals may also be developed through comparisons with peers and guidance offered via a number of organisations, including footprint methodologies, use of risk management tools etc.
Data collection	Selecting what quantified data is required / desirable to measure progress against set goals and which offer business decision support. Undertake a gap analysis to determine what additional quantifiable data is desired that is not captured from the earlier benchmarking.
Hot spotting (operational excellence)	Analyse data to understand the risk and potential impact to operational excellence. This may include sensitivity analysis to understand and appreciate how a business could be affected by a change to the environment.
Scenario modelling (operational efficiencies)	Develop a higher level of analysis to understand potential impacts through asking questions "what if"? "Will a course of action create a carbon /water trade-off"? etc.

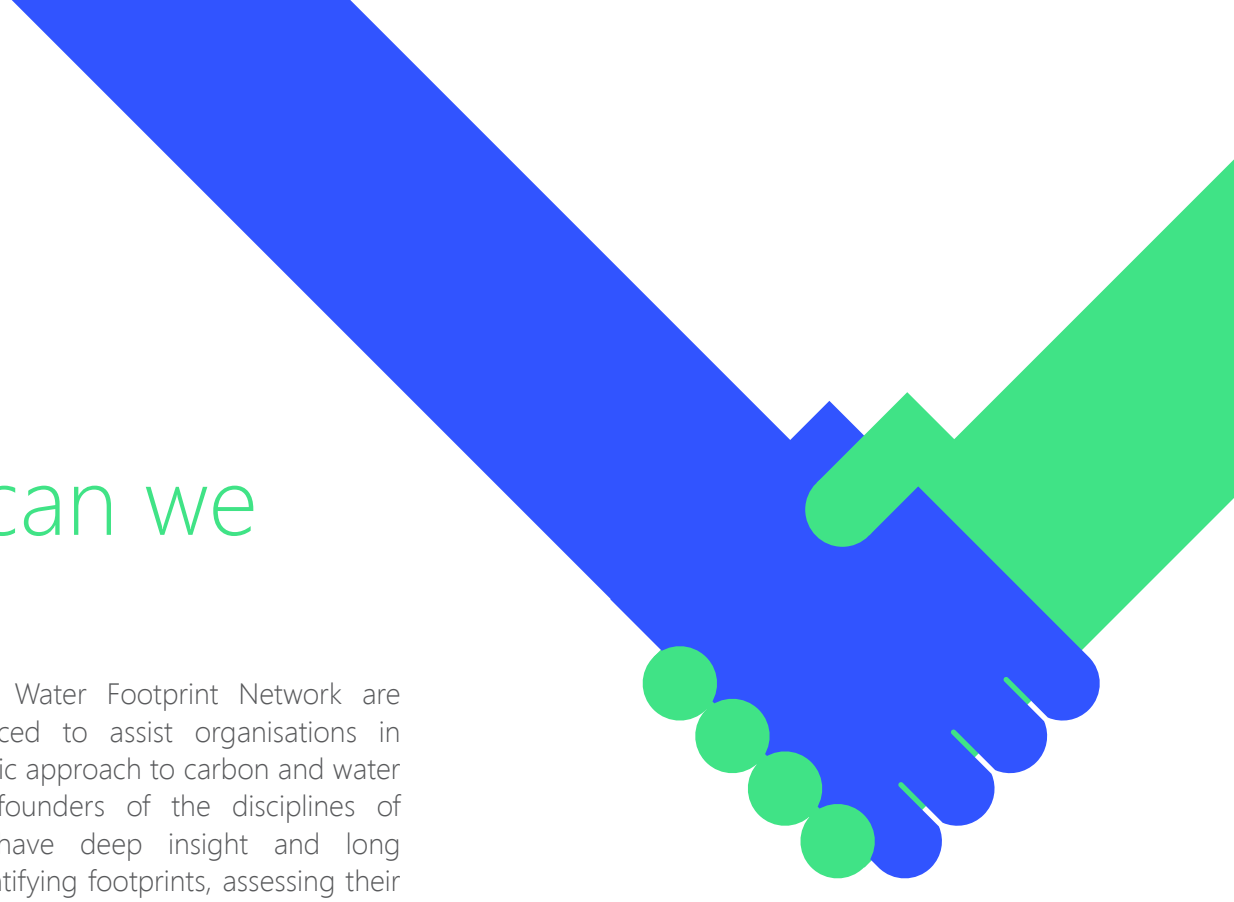
Additional milestones for data acquisition and assessment with a Group /Corporate dependency approach

Hot spotting (product portfolio scale)	Identify the hotspots across your product portfolio for carbon, water and other key impacts like waste and biodiversity, which are material to the life cycle of your products and their constituent raw materials. Over time add to your granular understanding by building out more data in each hot spot at deeper and deeper levels wherever the potential benefits outweigh the costs of gathering that data and insight.
Scenario Modelling (product portfolio scale)	Focussing on your hot spots - Model scenarios at a variety of levels that present real options for reduction of impacts, for example: substituting one raw material for another; light-weighting packaging; altering logistics; changing use phase characteristics; changing a sourcing location or introducing a new design of product with new life cycle characteristics.
Smart data strategy	Secondary data – can be appropriately selected and applied for hot spotting and for scenario modelling. Further data gathering could include gathering primary data from suppliers, which can be prioritised around those products and raw materials with greatest overall impacts.
Supplier engagement	Suppliers can be engaged on the basis of a progressive agenda: (1) education on sustainability as a balanced set of systemic issues (i.e. not just carbon) (2) awareness of the opportunity and the business case for action (3) how to gather data - secondary data as a benchmark to raise awareness and then invited to develop and share their own data over time as their capacity and understanding grows (4) driving improvement – understanding what best practices exist and how to improve (5) consequences of each scenario using multi-metric analysis including impacts on carbon-water, biodiversity, cost and so on.
Procurement /buyer briefings	Develop concise and meaningful audit questionnaires for buyers in selected categories. These should highlight: areas of concern and impact in this category; what good and bad practice look like on these issues; opportunities for win-win improvements; key specific questions to ask suppliers.

Reduction options	Model and evaluate options for reduction including cost benefit analysis. Benefits should include strategic factors not juts financial, for example reduced risk, reputational value, value to stakeholders and so forth. Select and prioritise those scenarios that offer synergy and strong overall benefit. Avoid or resolve those scenarios that present trade-offs between impacts.
Aligned implementation	Look for opportunities for aligned implementation on carbon and water issues using shared information systems, business processes & infrastructure for example: using the same IT platform to measure, monitor and gather data for carbon, water and other impacts; using the same business processes to engage suppliers; brief buyers and roll out implementation; using the same budget and planning cycle to align impacts under shared business agenda's for example improving efficiency in carbon and water; enhancing brands using sustainability including carbon, water and other key indicators.
Evaluation and improvement cycle	Gather data on improvements; create knowledge sharing hubs amongst suppliers; benchmark performance in supply chain using multi-metrics. Identify specific opportunities for improvement and take shared challenges to knowledge exchange forums to seek solutions.
Consumer communication	Helping consumers better understand and improve the environmental performance of their choices.

Annex 2: References

1. Hoekstra, A.Y., Chapagain, A.K., Aldaya, M.M., Mekonnen, M.M; The water footprint assessment manual: Setting the global standard, Earthscan, London, UK, 2011
2. PAS 2050 Carbon Footprint standard 2008; The Greenhouse Gas (GHG) protocol, 2011
3. Mckinsey Global Institute; Resource Revolution- Meeting the Worlds Energy, Materials, Food & Water Needs, Nov. 2011
4. CDP Water Disclosure Report; Raising Corporate Awareness of Global Water Issues, 2011
5. CDP Global Water Report; Collective Responses to Rising Water Challenges, 2012
6. United Nations World Water Development Report 4 (WWDR4) Volume 2 Knowledge Base, 2012
7. European Commissions; A Blueprint to Safeguard Europe's Water Resources, Nov. 2012
8. European Environment Agency; Current Status and Future Challenges, Nov. 2012
9. European Commission; Product Environmental Footprint (PEF) Guide, July 2012
10. WBCSD Water, Sustainability, IUCN; Water for Business; Initiatives guiding sustainable water management in the private sector, August 2012
11. White C. C. Developing a Water Footprint for Business Resilience; The Institute of Food Science & Technology Journal, Vol 26 Issue 1, March 2012
12. The CEO Water Mandate: Corporate Water Disclosure Guidelines, Towards a Common Approach to Reporting Water Issues, August 2012
13. Hoekstra, A. Y., Mekonnen M. M., Chapagain A.K., Mathews R.E., Richter B.D. "Global Monthly Water Scarcity: Blue Water Footprints versus Blue Water Availability." PLoS ONE 7(2): e32688-e32688; 2012.
14. Liu, C., Kroeze C., Hoekstra A.Y., Gerbens-Leenes W. "Past and future trends in grey water footprints of anthropogenic nitrogen and phosphorus inputs to major world rivers." Ecological Indicators 18(42-49); 2012.
15. McNeillis P., Pecnik G., Demaine R. Product Portfolio Footprinting: The new and easy way to gain actionable insights into the sustainability performance of your product portfolio. Ecochem Conference, Basel, 29th November 2013
16. Schreiber, W., Sheane, R., Stentiford, C. From toothbrushes to power drills: using representative LCAs to inform UK economy impact reduction strategies for electrical products. SETAC LCA Conference, Rome, 2013
17. Nelson H., Roe T., Smith R., Leon Barido D. P., Foufoula-Georgiou E. The Shadow Value of Groundwater in Punjab, India. Institute on the Environment, University of Minnesota; October 2013
18. United Nations Environment Programme Finance Initiative; Financing water risks and opportunities, 2006
19. Wilson W., Leipzig T., Griffiths-Sattenspiel B. Burning Our Rivers, The Water Footprint of Electricity, US River Network Report, April 2012
20. The American Council for an Energy Efficient Economy (ACREE) and Alliance for Water Efficiency (AWE); Addressing the Energy-Water Nexus, A blueprint for action and policy agenda, May 2011
21. Hoff H. Understanding the Nexus; The Water, Energy and Food Security Nexus –Solutions for the Green Economy, Bonn2011 Conference, November 2011
22. EIRIS Water Risk Report, [citing report by United Nations Environment Programme (UNEP) 2003], June 2011
23. Barton B., Berkley A., Hampton D., Lynn W. A Framework for 21st Century Water Risk Management, CERES Aqua Gauge, October 2011
24. Greenpeace; Dirty Laundry –Unravelling the Corporate Connections to Toxic Water Pollution in China, November 2012
25. Greer L., Keane S. E., Lin Z. Ten Best Practices for Textile Mills to Save Money and Reduce Pollution, Natural Resource Defence Council, February. 2010



How can we help?

Anthesis and the Water Footprint Network are uniquely well placed to assist organisations in developing a holistic approach to carbon and water sustainability. As founders of the disciplines of footprinting we have deep insight and long experience in quantifying footprints, assessing their sustainability and prioritising strategic actions. As partners to businesses that lead sustainability practice we have broad experience of what works, common pitfalls and how to achieve outcomes that produce wins for business and wins for sustainability.

This project has brought our teams together around specific tools and techniques making us ready to offer highly effective engagement on all aspects of our roadmap including:

- Building holistic approaches to corporate sustainability (including the design of holistic water and carbon strategies)
- Goal setting, benchmarking, data collection
- Joint hot-spotting and scenario modelling to quickly identify the biggest wins
- Supply chain programs that combine high level insights with detailed actions
- Business process integration including product design and sustainable procurement
- Selection and evaluation of impact reduction options
- Risk management and contingency planning
- Advice on implementation and remedial action programs

We warmly invite engagement from those seeking to integrate a holistic approach to sustainability in a strategic way within their organisations regardless of sector or current status or level of advancement.

Anthesis (incorporating Best Foot Forward) is a global specialist consultancy which believes that commercial success and sustainability go hand in hand. With operations in the US, UK, Europe and APAC, our aim is to create business value for a better world. Our committed and passionate professional staff have deep sustainability expertise and support clients in future-proofing their businesses and brands. With a track record for the delivery of metrics and evidence exceeding 17 years, we inspire and enable organisations to deliver ambitious sustainability strategies that reach all the way from supply chain to consumer brand. We work with multinational corporates, government departments, the third sector and everyone in between.

9 Newtec Place
Magdalen Road
Oxford
OX4 1RE

+44 (0) 1865 250818

Paul.McNeillis@anthesisgroup.com
www.anthesisgroup.com

The Water Footprint Network (WFN) is a multi-stakeholder network committed to the transition to fair and smart use of the world's freshwater. WFN published the Global Water Footprint Assessment Standard in 2011 and advances the use of Water Footprint Assessment through sharing knowledge, demonstrating solutions and linking communities. WFN maintains the world's most comprehensive water footprint database, WaterStat, and launched the Water Footprint Assessment Tool v 1.0 in 2013. Founded in 2008 by University of Twente, UNESCO-IHE, International Finance Corporation, World Business Council of Sustainable Development, Netherlands Water Partnership and Water Neutral Foundation, it currently has hundreds of partners worldwide.

Water Footprint Network
Horst Building, room HR-W114.
P.O Box 217
7500 AE Enschede
The Netherlands

+31 (0) 53 489 5383

info@waterfootprint.org
www.waterfootprint.org