

# Climate Change, Resource Efficiency and Sustainability

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**Abstract** Nestlé has developed numerous strategies along the years to address climate change, resource efficiency and other long-term challenges within a sustainability framework. These strategies have given the company the opportunity to innovate towards more environmentally sustainable and science-based products and services. Nestlé has successfully and continually improved resource use efficiency in water, energy and materials in a perspective of reducing exposure to risks of disruption. The Group championed the use of clean and renewable energy, as well as reducing waste at all stages of production and other parts of the value chain it can influence. The implementation of the sustainability framework has, among other things, resulted in significant reduction of greenhouse gas emissions.

## 1 Introduction

At Nestlé, we take the risks of climate change very seriously. This is not only because of Nestlé's strong commitment to its responsibilities as a global enterprise, but also because of the risks and impact climate change could have on Nestlé's business in the future. Rising global temperatures will cause sea levels to rise and alter local climate conditions, which may also affect forests, agricultural productivity, water supplies, human health, animals, and many types of ecosystems (Olesen and Bindi 2002; McMichael et al. 2006; Fischer et al. 2007; Allen et al. 2010).

A sustainable development strategy framework led by Nestlé relies on systemic coordinated solutions. We address possible solutions in several ways. One of them is resource efficiency. We believe that the efficient and scrupulous use of natural resources—including energy, water and materials, and the use of more renewable and clean energy—lie at the heart of climate change mitigation. Some research carried out on this topic has provided us with supportive evidence, in-depth analysis, and even inspiration on feasible methods (Barrett and Scott 2011; Abdullah et al. 2014).

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By recognizing the importance of resource efficiency for mitigating climate change and maintaining sustainability, Nestlé has moved towards resource efficient, renewable energy-oriented and ‘zero waste’ production. In the past decade, our efforts to improve resource efficiency, utilize clean and renewable energy and reduce waste have contributed to reducing greenhouse gases (GHG), strengthening nature’s resilience and facilitating adaptation to climate change.

## **2 Nestlé’s Strategies and Perspectives as the World’s Leading Nutrition, Health, and Wellness Company**

### ***2.1 Nestlé’s Strategies and Perspectives on Resource Efficiency***

As the world’s leading Nutrition, Health, and Wellness company, we use resources as efficiently as possible in our food manufacturing process. At this stage we can directly manage and improve our resource performance. Resource efficiency is aimed both at mitigation and adaptation/increased resilience.

Our strategies on resource efficiency focus on the following aspects:

At Nestlé, in support of the ISO 14001 certification that focuses on environmental management, we use the most efficient technologies and apply the best practices to optimize our manufacturing process, reduce energy and water consumption, minimize waste generation, utilize sustainably-managed renewable energy sources, recover value from by-products and control, and eliminate emissions including greenhouse gases.

In the packaging process, we optimize the weight and volume of our packaging and lead the development and use of materials from sustainably-managed renewable resources, while considering packaging and product performance requirements. Furthermore, we support initiatives to recycle or recover energy from used packaging, and use recycled materials when appropriate and where there is an environmental benefit.

At the distribution stage, we optimize distribution networks and route planning across all our operations, and also explore opportunities to improve transportation efficiency and reduce air emissions. We have expanded our driver training both from a safety and environmental efficiency perspective, and use telematics and the latest technology on our vehicles where practical, recommending the same to our suppliers (Nestec Ltd. 2013).

To achieve sustainable development, besides the continuous improvement of resource efficiency in Nestlé’s food production process, we are exploring opportunities to improve resource efficiency in the upstream part of our supply chain, such as in crop cultivating and harvesting and pre-processing processes. We are also doing this in the downstream part of our products’ value chain in the retailing and food consumption processes, among other things. This is due to the fact that energy consumption in the manufacturing process of our products actually only

accounts for a relatively small proportion of energy used in the entire food value chain from farmers to consumers (Nestlé CSV Report 2013, p. 233). Upstream, “our work in agriculture involves cross-sector partnerships, where we marry our technical expertise and research in crop optimization with our partners’ local community knowledge. In the process, we help farmers increase their productivity and help ensure access to high quality crops for our business.” (Brabeck-Letmathe 2006). Downstream, on one side, Nestlé brings together specialists and researchers to innovate and optimize the design of its products in order to help consumers achieve higher resource efficiency during the consumption of products. Nestlé is also dedicated to train its suppliers, consumers and employees with the skills of reducing waste and using resource more efficiently.

Resource efficiency alone, while absolutely essential, is not the only solution. It has been noted that technological improvements to increase the efficiency of a resource could lead to an increased consumption of this resource in the industry (Jevons 1957). Twentieth-century economic growth theory has also shown that technological change is the main cause of increased production and consumption (Alcott 2005). At Nestlé, while improving resource efficiency, we are also pursuing total resource consumption reduction in our food manufacturing and delivering processes. This certainly will be a bigger challenge for us since our production volume is increasing steadily.

Nestlé has an integrated and holistic approach towards climate change and resource efficiency because energy, greenhouse gas emission, water and materials are all interlinked in this context. Considering GHG emissions in isolation may have a detrimental impact on other environmental aspects, such as water. Water and energy are interactive—improving the efficiency of one will have an impact on another. Although recycling is efficiently helping to reduce resource consumption and GHG emissions, recycled materials do not always have an environmental benefit over virgin material. With a deep understanding of this energy-water-material-emission relationship, and by taking steps to manage these resources in a more holistic and strategic manner, we are able to improve resource efficiency in an integrated framework, rather than the efficiency of any specific resource.

We would also like to point out that the criteria of sustainability are dynamically developing and changing over time. In order to achieve sustainable development, we carefully monitor, evaluate and communicate regulatory developments so that they are timely reflected in our corporation strategies. We are also proactively engaging with regulators and other relevant stakeholders long-term to foster environmentally efficient and effective laws and regulations, and favour the harmonization of environmental laws, regulations and standards in order to define, implement and evaluate solutions to the complex environmental challenges we are facing (Nestec Ltd. 2013).

We will continue to implement these strategies of resource efficiency and environmental sustainability so that Nestlé’s products are not only tastier and healthier, but also better for the environment along their value chain. We believe in the future, in the highly competitive food and beverage market, more environmentally friendly and sustainable food products are more attractive to consumers

and will gain further loyalty from them. Nestlé's efforts to promote environmental sustainability also means delighting its consumers by giving them more reasons to trust our company, enjoy our products, and live up to employees' and external stakeholders' expectations about our environmental responsibility and practices.

## 2.2 *Creating Shared Value*

Although climate change brings challenges to our business, at Nestlé we see climate change as an opportunity to innovate towards more environmentally sustainable and science-based products and services, rather than perceive it as a threat. Through continuous innovation we are improving efficiency at every stage of our food production process, reducing our material and energy consumption, and in turn, achieving lower costs for our products, which are giving us more competitive advantage in the food market. We believe that over the long-term, we create value for our shareholders and for society as a whole. We call this 'Creating Shared Value' (CSV).

As Kramer (2006) said: "CSV is a very different approach to Corporate Social Responsibility (CSR) because it is not focused on meeting a set of standard external criteria, or philanthropy. Rather, we are talking about creating social and environmental benefit as a part of making a company competitive over the long-term. ... Business can help societies progress and all sectors can help business improve and flourish." Shared value is not about 'sharing' the value already created by firms as a redistribution approach, but about expanding the total pool of economic and social value—a new way to achieve economic success. It is not on the margin of what companies do, but at the centre (Porter and Kramer 2011).

CSV is at the heart of Nestlé's development strategy that goes beyond corporate responsibility to obtain a win-win for our shareholders and society. In the lowest tier of CSV, we ensure compliance with national laws and relevant conventions, as well as with Nestlé's own regulations. Beyond compliance in the second tier of CSV, Nestlé's business operation is based on sustainability to ensure that our activities today preserve the environment for future generations. While at the top of the CSV hierarchy, this goes further beyond both compliance and sustainability. Nestlé believes that businesses can finally create value for both its shareholders and society through its activities when they have far-sighted visions, and follow environmentally sustainable principles in the long-term.

Nestlé's CSV strategy is not only recognized within the Nestlé family but also by academic researchers. Porter (2011), a leading researcher in business strategy and a professor at Harvard Business School, commented on our 'Ecolaboration' initiative by Nespresso, a programme built on Nestlé's approach to CSV: "Nespresso's innovative programme, which helps farmers achieve higher prices, better yields, and greater environmental performance and sustainability, is not driven by charity but by creating value. Nespresso will benefit strategically from the quality improvements that farmers achieve and coffee supplies that will be far more

sustainable over time. It is this alignment between corporations and social challenges, not a mind-set of separation and trade-offs, which is the key to both economic and social progress.”

### **3 Nestlé’s Efforts to Improve Resource Efficiency and Approach Sustainability**

#### ***3.1 Improving Energy Efficiency***

Over the past decade, Nestlé has made considerable efforts to innovate techniques and improve energy use efficiency in its factories, plants and even in its offices. Our goal is to become the most efficient energy user among food manufacturers. We would like to share some of our achievements:

- Nestlé Waters has invested CHF 51.8 million to build a new factory in Buxton, United Kingdom, which is one of the most innovative and efficient bottling facilities in the world. This new bottling and warehousing plant has enabled our water business to significantly lower its energy consumption and to cut packaging by an average of 25 % across the *Buxton* and *Pure Life* ranges (Nestlé CSV Report 2013, p. 216).
- In 2013, Nestlé optimized more than ten distribution networks globally to cut gasoline consumption and CO<sub>2</sub> emissions. The redesign makes better use of space in our vehicles, avoiding unnecessary miles and using more efficient modes of transport (Nestlé CSV Report 2013, p. 248).
- Nestlé’s new employee centre in the state of Chiapas in Mexico became the first building in Latin America to be certified with the prestigious LEED Platinum standard. We have invested more than CHF 800,000 in the building. It can save about 50 % of energy and 80 % of water use compared to a conventional building (Nestlé CSV Report 2012, p. 175).

In 2012, 850 energy-saving projects were launched, comprising a total investment of about CHF 82 million. Annual energy savings of about two million gigajoules and a reduction of approximately 173,000 tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>eq) are expected from these projects (Nestlé CSV Report 2012, p. 172).

We aim to continue to pursue energy efficiency in our factories. Nestlé has globally achieved total energy consumption reduction by 22.6 % per tonne of product since 2005, as summarized in Table 1 (Nestlé CSV Report 2013, p. 233).

At Nestlé, we not only focus on improving energy efficiency in our manufacturing processes, but we also try to help consumers improve their energy use efficiency during the consumption process of our products. Guided by this strategy, Nestlé has brought together specialists from internal research and development teams and manufacturers to design more innovative, high performing and energy-efficient coffee machines. Our innovative designs have helped our consumers to improve water and energy efficiency and save total resource use during

**Table 1** 2013 energy use per product category

Product category	Energy (GJ/tonne)		
	2005	2013	Variation (%)
Powdered and liquid beverage	17.8	10.03	-41.3
Water	0.39	0.24	-38.8
Milk products and ice cream	4.93	3.09	-37.3
Nutrition and healthcare	10.7	7.35	-31.3
Prepared dishes and cooking aids	3.93	3.5	-10.9
Confectionery	5.89	4.45	-24.3
Pet care	1.81	1.82	0.5
Total Group	2.42	1.87	-22.6

the consumption process. For example, a standby function has been introduced in the CS professional machine range for our business customers in Europe, which can be activated automatically after a time delay chosen by the customer. During standby mode, the energy consumption of the CS220 machine is less than 0.5 W. This is over 20 times lower than when the machine is switched on and in ‘ready to use’ mode (Nespresso).

Through continuous improvement of energy use efficiency, we are able to keep the total consumption of energy in our food production almost unchanged in comparison to 2003, even though our production volume has had a steady increase over the past decade. Between 2003 and 2013, our energy consumption increased only by 3.5 %, while our production volume increased by 53 % (Nestlé CSV Report 2013, p. 232). Considering Nestlé’s total energy consumption of 97.7 billion mega joules on-site in 2013, this achievement brings significant benefits to our business operation, and to the global environment.

The “energy use efficiency” for Nestlé is calculated based on annual sales as the total energy use per dollar of sales, which was 0.98 mj/dollar in 2013. In comparison with other major food and beverage companies, such as General Mills, Nestlé has relatively higher energy consumption per dollar of sales, implying it could further improve its energy use efficiency, although energy consumption is also related to the products portfolio.

### ***3.2 Greenhouse Gas (GHG) Emission Reduction: Cleaner and/or Renewable Energy***

Besides improving energy use efficiency, our approach to air emission reduction includes switching to sustainably-managed clean fuels and renewable resources (Nestlé CSV Report 2013, p. 265). Over the past ten years, enormous efforts have been made towards the increase of renewable energy percentage in Nestlé’s factories and plants worldwide. Below are some examples of our recent renewable energy initiatives:

- In Italy, Nestlé Waters replaced its oil-powered boiler with a biomass boiler, producing 100 % renewable energy at the Pejo plant. Wood production and waste wood chips from within 40 km of the plant are being used to operate the boiler. The Pejo plant has a long-term goal of providing enough energy to connect nearby towns to a network grid that utilizes renewable energy from the biomass boiler (Nestlé Waters CSV Report 2011, p. 57).
- In Mexico, 85 % of the total electricity consumed by our factories is now supplied by wind power following a power purchase agreement with the Mexican wind-turbine company CISA-GAMESA, which will reduce air emissions, including GHGs, by an estimated 124,000 tonnes of CO<sub>2</sub>eq annually. This is comparable to taking 39,000 small cars off the road. Nestlé is the first food company in Mexico that consumes nearly all the electrical energy needed for its manufacturing operations from a renewable source (Nestlé CSV Report 2012, p. 193).
- In Chile, Nestlé has already invested CHF 5 million to install and convert factory equipment in its Osorno, Cancura and Llanquihue milk factories by switching from coal and fuel oil to natural gas. It is projected that 30 % of GHG emissions across the three sites will be reduced and an annual cost of CHF 1 million at Llanquihue will be saved in the future (Nestlé CSV Report 2013, p. 235).

In 2013, the share of renewable energy consumption reached 13.3 % of the total energy consumption on-site at our factories. This ratio was the result of an increase from 12.2 % in 2012 (Nestlé CSV Report 2013, p. 265) and 11.6 % in 2011 (Nestlé CSV Report 2012, p. 265). By investing in renewable sources, improving energy efficiency and switching to cleaner fuels, Nestlé has reduced a total of direct GHG emissions by 45 % since 2003 per tonne of product. It has also cut CO<sub>2</sub>eq by 15 % to four million tonnes, while increasing production by 56 % (Nestlé CSV Report 2013, p. 20). Although indirect GHG emissions, which come from purchased energy increased by 23 % to 3.8 million tonnes since 2007, a reduction of 3 % of indirect GHG emission per tonne of product was achieved (Nestlé CSV Report 2013, p. 266).

According to the sustainability report by PepsiCo in 2013, its total direct and indirect GHG emissions for legacy operations in 2013 were a little bit more than four million tonnes of CO<sub>2</sub>eq, which represents a decrease of 2 % versus 2012 (PepsiCo Sustainability Report 2013, p. 39). The GHG emissions levels were constant from 2008 to 2012 (PepsiCo Sustainability Report 2011/2012, p. 24).

The General Mills Global Responsibility 2014 Report shows that General Mills gradually reduced its GHG emissions from 1.04 to 0.97 million metric tonnes in the past five years (General Mills Global Responsibility 2014, p. 40).

The American food company Tyson has highlighted in its Sustainability Report (2013) that its absolute GHG emissions were 5.22 million metric tonnes in 2012, which is slightly higher than in 2011 and 7.4 % lower than the level in 2010.

The “so-called” specific CO<sub>2</sub>eq emission, defined as the total GHG emissions (both direct and indirect) per dollar of sales, was 0.08 kg/dollar for Nestlé in 2013. Compared to other food and beverage companies, such as General Mills, PepsiCo

**Table 2** Specific CO<sub>2</sub>eq emission comparison

Company	Item	2010	2011	2012	2013
General Mills	Sales (billion dollar)	14.64	14.88	16.66	17.77
	CO <sub>2</sub> emissions (million metric tonnes)	1.03	1.01	0.96	0.97
	Specific CO <sub>2</sub> efficiency (kg/dollar)	0.07	0.07	0.06	0.05
Nestlé	Sales (billion CHF)	93.02	83.64	89.72	92.16
	CO <sub>2</sub> emissions (million metric tonnes)	7.12	7.03	7.09	7.81
	Specific CO <sub>2</sub> efficiency (kg/dollar)	0.08	0.07	0.07	0.08
PepsiCo	Sales (billion dollar)	57.84	65.88	65.49	66.42
	CO <sub>2</sub> emissions (million metric tonnes)	4.22	4.22	4.22	4.14
	Specific CO <sub>2</sub> efficiency (kg/dollar)	0.07	0.06	0.06	0.06
Tyson	Sales (billion dollar)	28.4	32.25	33.3	n.a.
	CO <sub>2</sub> emissions (million metric tonnes)	5.64	5.2	5.22	n.a.
	Specific CO <sub>2</sub> efficiency (kg/dollar)	0.2	0.16	0.16	n.a.

Data is extracted from General Mills Annual Report (2013), Nestlé Annual Report (2011, 2013), PepsiCo Annual Report (2011, 2013), 10-K Annual Report 2013—Tyson, 10-K Annual Report 2012—Tyson, General Mills Global Responsibility (2014), PepsiCo Sustainable Report (2011/2012, 2013), Nestlé CSV Report (2011, 2012, 2013), Tyson Foods Sustainability Report (2013/2014), annual average exchange rate is sourced from <http://www.ozforex.com.au/>

and Tyson, Nestlé has achieved one of the best-in-class in terms of level of specific CO<sub>2</sub>eq emissions as shown in Table 2.

Over the past two decades, carbon intensity has been significantly reduced in many countries especially in developing countries such as China and Russia. Figures 1 and 2 show the historical trends of carbon intensity in a few major developed and developing economies in the world (data is extracted from United States Millennium Development Goals database).

### 3.3 Improving Water Use Efficiency

Water use efficiency and sustainability cannot be addressed in isolation, but together with other stakeholders. This is the approach of the international 2030 Water Resources Group, also active in India, a group that I am chairing. But there are also efforts at corporate level for effective water use. We recognize that this critical natural resource must be used efficiently at our factories and distribution centres. In 2013, we approved 38 million water-related investments and implemented 171 programmes in our factories to reduce and reuse water resources, which have saved 3.6 million cubic metres of water (Nestlé CSV Report 2013, p. 183). We have set robust water efficiency targets up to 2015, which continue to drive improvement programmes across all of our operational sites. Some of the programmes that we implemented in 2013 to improve water use efficiency in our plants and factories are listed below, demonstrating our tremendous efforts in this crucial area.



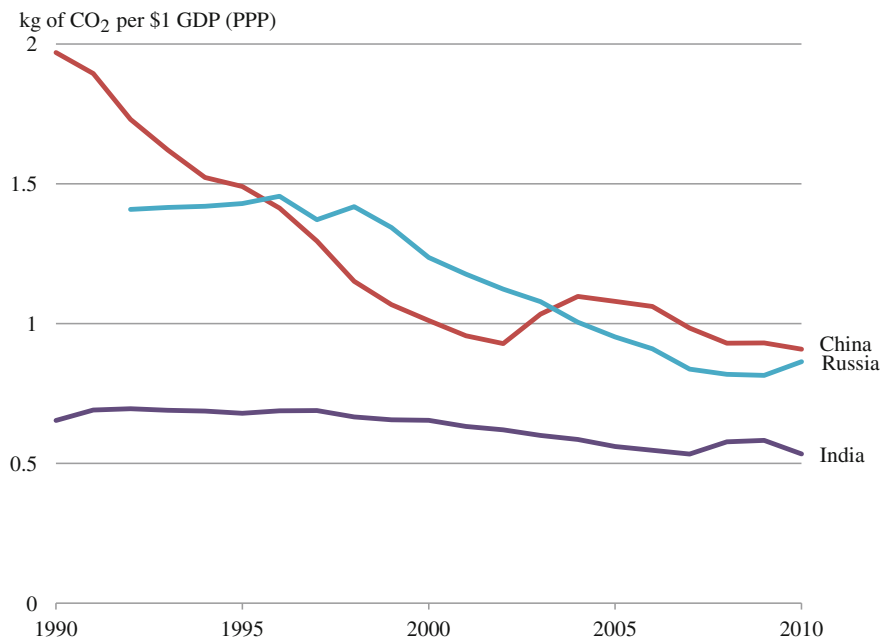


Fig. 1 Carbon intensity of developing economies

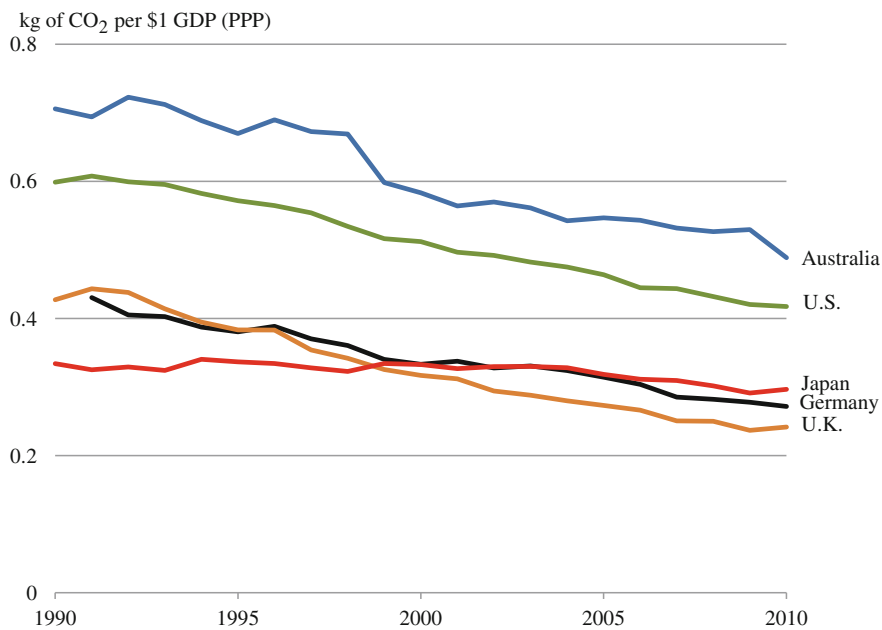


Fig. 2 Carbon intensity of developed economies

**Table 3** Water withdrawals per product category (Nestlé CSV Report 2013, p. 183)

Product category	Water withdrawals (m <sup>3</sup> /tonne)		
	2005	2013	Variation (%)
Powdered and liquid beverage	22.91	9.85	−57.0
Water	1.96	1.58	−19.4
Milk products and ice cream	8.33	4.77	−42.7
Nutrition and healthcare	19.34	11.02	−43.0
Prepared dishes and cooking aids	7.12	4.22	−40.7
Confectionery	9.22	4.7	−49.0
Pet care	1.44	1.05	−27.1
Total	4.41	2.92	−33.8

- In northern Spain, Nestlé’s confectionery factory at La Penilla brought together a multidisciplinary team of employees to identify opportunities of water conservation. With a CHF 1.2 million investment, the regulation of water flow through our milk evaporators was modified and one million cubic metres less water is used every year. In less than 12 months, water use per tonne of product was reduced by 60 % without increasing energy consumption or greenhouse gas emission at the factory (Nestlé CSV Report 2013, p. 182).
- Our recent initiative, Zéro Eau (zero water), has been implemented in water-scarce areas to help improve water availability in the community. In Mexico, Phase One of the project involving the recovery and use of condensation from the milk evaporation process has been completed. Along with various saving initiatives, it delivered annual water savings of 373,300 m<sup>3</sup> in 2013. When the project is completed, the factory will become self-sufficient in water consumption—zero consumption of fresh water (deep well) during normal production (Nestlé CSV Report 2013, p. 183).

In recent years, improvement in water use efficiency is substantial at Nestlé. Between 2005 and 2013, direct water withdrawals in every product category have decreased and an overall reduction per tonne of product of 33.3 % since 2005 was achieved (Nestlé CSV Report 2013, p. 183) (Table 3).

We have also significantly reduced water discharge per tonne of product by 60.1 % since 2003 and total quantity by 37.2 %. We recycled or reused 6.7 million cubic metres of water in our operations during 2013.

Table 4 shows Nestlé’s water discharge in total and per tonne product, average quality of water discharge and water reused data from 2010 to 2013.

While improving water use efficiency at our factories and distribution centres, we are also exploring opportunities to improve water use efficiency in our upstream supply chain—in the farmers’ production process.

In 2010, a three-year study began which aimed to measure consumptive use of water at farm level, develop best practices and disseminate recommendations to improve water use. Different scenarios of combinations between groundwater and rainfall used for irrigation were made based on climatic data and interviews with

**Table 4** The indicators of water discharge (Nestlé CSV Report 2011, 2012, 2013)

Indicator	2003	2008	2009	2010	2011	2012	2013
Total water discharge (million m <sup>3</sup> )	145	96.1	91	94	93.9	84.2	91
Total water discharge (m <sup>3</sup> per tonne product)	4.36	2.34	2.22	2	2.08	1.77	1.74
Average quality of water discharge (mg COD/l)	n.a.	95	90.8	78	68.6	93.7	76.2
Water recycled or reused (million m <sup>3</sup> )	n.a.	n.a.	n.a.	n.a.	7.8	6.9	6.7

over 300 coffee farmers. As a result, recommendations from the study may result in more than 50 % water savings versus conventional practices (Nestlé CSV Report 2013, p. 175). The farmers who supply to us benefit from the practice and guidance from various Nestlé sustainable studies with help of thousands of Nestlé agronomists (Nestlé CSV Report 2013, p. 227).

Besides helping farmers improve water use efficiency on irrigation in the upstream supply chain, Nestlé works together with local farming associations and non-governmental organizations to build central mills for coffee farmers in order to use water more efficiently during the coffee cherries processing process. In the central mill built by Nespresso and partners in Jardín, Colombia, 63 % of water usage is saved compared to home processing and waste water is 100 % treated thanks to better milling techniques. On average, it saves 27 l of water per farm and potentially helps to increase farmer profitability by 30 % (Project News Report; Nespresso).

In the meantime, downstream the value chain of our products, we are helping consumers to improve water use efficiency and reduce water consumption during their consumption process through innovations. Two of the examples are provided below:

- The newly designed ‘eco-mode’ function for our *Nescafé Dolce Gusto* Melody coffee machine helps consumers cut water consumption by 25 % when making a 120 ml cup, compared to the first model launched in 2006 (Nestlé CSV Report 2013, p. 199).
- *Maggi* So Juicy chicken recipe mixes enable the chicken to cook in its own juices inside a specially-designed cooking bag. This design aims to help consumers reduce the amount of water and chemicals required for oven cleaning (Nestlé CSV Report 2013, p. 254).

The issues of water and energy are highly interactive and inextricable. Manufacturers use significant amounts of energy to pump, purify, heat and clean the water that flows through their many operations. Equally, energy use frequently requires large amounts of water, such as for cooling in industrial processes. As a result, improving the efficiency use of one has an impact on another.

Nestlé has estimated the water footprint for dairy products produced at Nestlé Colombia’s Florencia and Bugalagrande sites. The results demonstrate that in 2012,

**Table 5** Water withdrawal efficiency comparison

Company	Item	2010	2011	2012	2013
Danone	Sales (billion Euro)	17	19.3	20.9	21.3
	Water withdrawal (million m <sup>3</sup> )	56.25	57.33	58.71	60.63
	Water withdrawal (litre/dollar)	2.49	2.13	2.18	2.14
Nestlé	Sales (billion CHF)	93.02	83.64	89.72	92.16
	Water withdrawal (million m <sup>3</sup> )	144	143	138	152
	Water withdrawal (litre/dollar)	1.61	1.51	1.44	1.53

Data is extracted from the Nestlé Annual Report (2011, 2013), Nestlé CSV Report (2011, 2012, 2013), Danone Annual Financial Report (2013), Danone Sustainability Report (2010, 2012), Annual average exchange rate is sourced from <http://www.ozforex.com.au/>

58 % of the consumed water at the plants is related to the dairy farms, while 35 % is related to electricity and fuel consumption. After actions were taken to improve water use efficiency, the water withdrawal at the Florencia plant was reduced by 44 %, from 4.9 to 2.7 m<sup>3</sup> per tonne of dairy product. During the same period, electricity consumption per tonne of product has also been reduced by 35 % (Nestlé CSV Report 2013, p. 180).

Since 2003, Nestlé has succeeded in reducing the total amount of water in its manufacturing processes. Its total water withdrawal has decreased by 21.2 % despite a 56 % increase in its production volumes between 2003 and 2013 (Nestlé CSV Report 2013, p. 19).

According to the 2013 annual report by the French food company Danone, its total water withdrawal from all sources was 60.63 million cubic metres in 2013, which is 3.3 % more than its 2012 water withdrawal (Danone Annual Financial Report 2013, p. 176).

Table 5 shows a comparison of the water withdrawal efficiency from Danone and Nestlé, based on annual sales value from 2010 to 2013.

### 3.4 Improving Materials Use Efficiency

The packaging of Nestlé products is crucial to guarantee our high quality standards and to prevent food waste. Our strategies on improving packaging material efficiency focus on two dimensions: reducing material demand through innovative and optimized designs, and recycling packaging materials.

In 2012, Nestlé Waters represented around 48 % of Nestlé's overall packaging reductions. Packaging innovation and optimization is particularly important for Nestlé Waters. Through its innovation and optimization programmes, Nestlé Waters has developed a new generation of lightweight bottles, caps and labels, which reduced packaging weight per litre by 17 % across its operations globally between 2007 and 2012 (Nestlé CSV Report 2013, p. 237).

Below are some of our achievements on packaging innovations:

- In Brazil, Nestlé Waters launched a new 0.5L polyethylene terephthalate (PET) bottle in 2012 that is 20 % lighter than the previous version. Today, it is the lightest bottle in the bottled water market in Brazil (Nestlé CSV Report 2013, p. 237).
- In 2010, *Nescafé Gold* launched a new jar in five countries in Europe. Packaging lines were upgraded to minimize collisions, leading to lower breakage rates and reduced noise level. Since then, 650 tonnes of glass per year have been saved. This initiative not only cuts waste during production, but also improves the safety of our employees (Nestlé CSV Report 2013, p. 237).
- In 2013, Nestlé Thailand reviewed the design of its small format *Nestlé Pure Life* and *Minere* PET bottles, which included replacing the 0.5L bottle with a new 0.6L bottle. This resulted in an average weight saving of 10 % for the 0.6L and 1.5L formats. An overall 850 tonnes of PET was saved (Nestlé CSV Report 2013, p. 244).

In 2013, Nestlé saved 66,594 tonnes of packaging material by weight in comparison to 47,000 tonnes in 2012, equivalent to a cost saving of CHF 158.5 million. We have now saved more than half a million tonnes of packaging materials since 1991, and achieved a CHF 1 billion saving milestone in 2012 in packaging costs since 1991. This contributes significantly to the environmental benefits: over the last five years, we have saved over 490,000 tonnes of CO<sub>2</sub> eq thanks to savings in packaging material—that's the equivalent to taking more than 106,000 cars off the road for a year (Nestlé CSV Report 2013, p. 237).

While improving material use efficiency and reducing material demand, the recycling rate increase of materials during the packaging process is also a focus for Nestlé. We use recycled content in our packaging such as paper, cardboard, PET, glass and tinplate while making sure that the safety and quality of the product is not compromised.

- Nespresso has been focusing on recycling of its aluminium capsules for more than 20 years. More than 14,000 dedicated capsule collection points were installed across 27 countries, plus a home collection service is now active in 15 countries. In June 2012, it achieved 76.4 % capacity with its collection systems, which surpassed its 2013 target of 75 % recycling capacity (Nestlé CSV Report 2013, p. 242).
- Nestlé Waters has also improved its packaging material use efficiency by recycling used materials. In 2013, Nestlé Waters created a new 'ReBorn' 0.5L water bottle for its *Arrowhead* water brand, made from 50 % recycled plastic (Nestlé CSV Report 2013, p. 244).

Annually between 2011 and 2013, 38.9 % of materials for packaging were renewable and 27.1 % of recycled materials were used for packaging purposes in Nestlé factories and plants worldwide. Table 6 shows the indicators regarding packaging material use and recycling at Nestlé since 2008.

**Table 6** Indicators of material use efficiency (Nestlé CSV Report 2011, 2012, 2013)

Indicator	2008	2009	2010	2011	2012	2013
Materials for packaging purposes (million tonnes)	n.a.	4.2	4.59	4.58	4.8	5.3
Packaging materials against production volume (tonne/tonne)	n.a.	0.1	0.11	0.1	0.11	0.11
Packaging source optimization (1000 tonnes saved)	58.6	59	70.8	39.3	47.1	66.6
Cost saving (million CHF)	n.a.	n.a.	n.a.	65	94	158.5
Renewable packaging materials (% of materials for packaging purposes)	n.a.	n.a.	n.a.	38.9	38.9	38.9
Total % of recycled material in our packaging (% of materials for packaging purposes)	n.a.	n.a.	n.a.	27.1	27.1	27.1

Although recycling used material is an effective measure to reduce GHG emissions and costs, its environmental performance is not always better. Recycled materials do not always have an environmental benefit in comparison to virgin material. For example, in some instances we would need a heavier weight of recycled materials to guarantee our packaging standards. Therefore when we implement recycling strategy at Nestlé, we adopt a holistic and integrated approach to evaluate the environmental benefit, rather than focusing only on one indicator.

### 3.5 Zero Waste

In a world that faces an increasing constraint of natural resources, we recognize the importance of reducing waste and using our resources efficiently. ‘Zero waste’ for disposal was therefore established as one of the goals in Nestlé’s operations, aiming to recover and reuse materials to create additional values—from energy recovery to animal feed. No factory waste will go to landfill or be incinerated without energy being recovered from the process. For example:

- At Nestlé’s Fawdon factory near Newcastle in the UK, we piloted an on-site anaerobic digestion system. The facility turns liquid and solid waste into energy and reduces discharge going to the sewer. A full size digester was installed in 2013, which enables us to make better use of waste, and cut the factory’s electricity consumption by 8.9 %, resulting in a 3 % reduction in total energy (Nestlé UK).
- Nestlé Malaysia started a project in 2013 to achieve zero waste to landfill in five factories by 2016. Activities include recycling laminates to make table tops and roofing, and using microbial conversion to transform sludge—a by-product of wastewater treatment—into fertilizer (Nestlé CSV Report 2013, p. 258).
- In 22 Nescafé factories worldwide, energy from the coffee grounds resulting from the manufacturing process was recovered as a source of renewable energy.

Product losses were processed so they can be added to farm animal feed. Other materials such as metals, plastics, paper, cans and cardboard are processed by contractors and traded as commodities. Any remaining material that does not currently have a viable recycling option is sent for incineration, with energy recovery as a first option (Nestlé CSV Report 2013, p. 260).

In line with Nestlé's 'zero waste' strategy, since 2008 we have strongly reduced waste for disposal per tonne of product by 51 % down to 4.9 kg per tonne, and we have cut the total waste for disposal by 37.3 % to 257,000 tonnes at Nestlé.

Between 2011 and 2013 our hazardous waste, such as detergents, oils, fuels and grease, has been reduced from 55,000 to 32,000 tonnes, which accounts for only 1 % of the waste for disposal at Nestlé. The generated hazardous waste is managed and treated in accordance with local regulations and standards worldwide (Nestlé CSV Report 2013, p. 258).

Up to 2013, we have increased our waste and by-product recovery rate to 85 %, meaning that we reused and recycled 85 % of the waste we produced in 2013. Of the waste we disposed of, 86 % went to landfill, 4 % to incineration and 10 % to other methods of disposal (Nestlé CSV Report 2013, p. 256).

In 2013, 61 Nestlé factories, which accounts for 12 % of total factories, achieved zero waste for disposal. The objective we set in 2012 was achieved two years early (Nestlé CSV Report 2013, p. 207).

Between 2008 and 2013, the ratio of waste for disposal against raw material we used for production was reduced from 1.92 to 1.08 %. Table 7 presents the indicators regarding waste for disposal at Nestlé since 2008.

In comparison with the waste in the food manufacturing process, the amount of food waste generated in the early stages of the supply chain and consumers' consumption process is shocking. According to the Food and Agriculture Organization (FAO) report, each year about one-third of food produced for human consumption is lost or wasted globally. In medium and high-income countries, consumption stage is where food is wasted to a significant extent, while in low-income countries most of the food losses occur at the early stages of the food supply chain (Gustavsson et al. 2011).

**Table 7** Indicators of material use efficiency (Nestlé CSV Report 2011, 2012, 2013)

Indicator	2008	2009	2010	2011	2012	2013
Waste for disposal (1000 tonnes)	410	359	370	343	315	257
Waste for disposal (kg/tonne product)	10	8.7	8.45	7.59	6.6	4.9
Hazardous waste (1000 tonnes)	n.a.	n.a.	n.a.	5.5	4.1	3.2
Waste and by-product recovery rate (%)	73	79	79	81	82	85
Number of zero waste factories	n.a.	n.a.	n.a.	n.a.	39	61
Raw material used (million tonnes excluding material for packaging purpose)	21.4	21.2	23.27	22.9	22.5	23.9
Waste ratio in production (%)	1.92	1.69	1.59	1.50	1.40	1.08

This issue is complex and involves various stakeholders at different stages. Nestlé carefully examined this issue and has adopted a holistic and collaborative approach to tackle this. At the early stage of the supply chain, Nestlé helps farmers reduce waste and loss during food harvesting and transportation processes. For example, in developing countries, we have provided cooling facilities to dairy farmers. These facilities have helped farmers cut milk lost between the farm and factory stage so huge amounts of water, energy and GHG emissions and money have been saved. In the district of Renala in Pakistan, more than half of milk losses have been saved at the early stage of the milk supply chain with the help of Nestlé (Nestlé CSV Report 2013, p. 258).

In Central and West Africa, contamination due to the humid environment conditions and poor drying and storage practices caused up to 30 % of cereal crop losses. The ‘Grains Quality Improvement Project’ was launched by Nestlé to help farmers in Ghana and Nigeria reduce mycotoxin contamination, in which 60,000 African farmers were trained in 2012 to produce grains with mycotoxin levels within Nestlé standards. The combination of toxin-reduction strategies such as good agricultural and storage practices, and capacity-building training sessions by Nestlé agronomists achieved a 60 % reduction in crop losses. (Nestlé CSV Report 2013, p. 259).

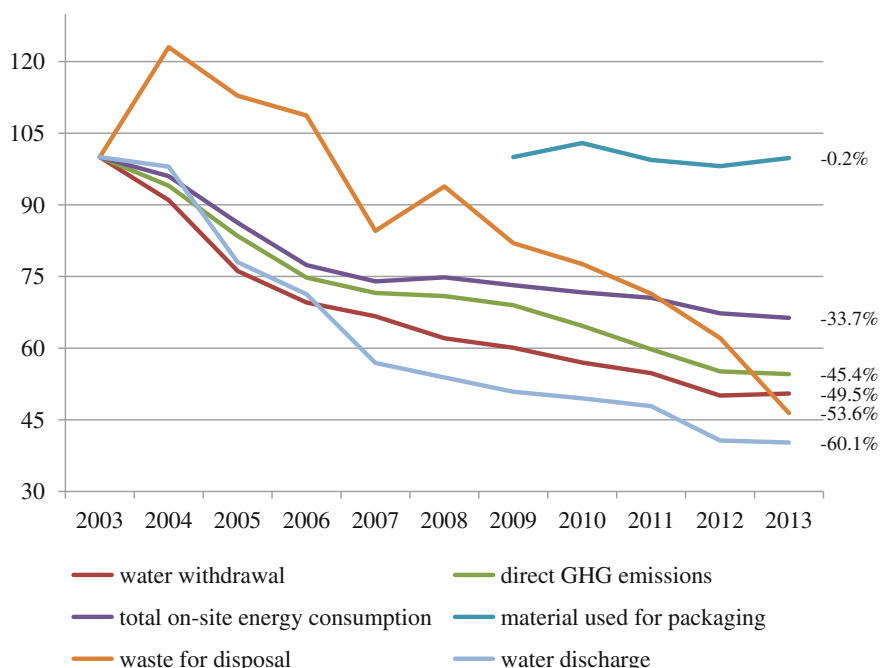
Downstream in the food value chain, Nestlé helps consumers reduce food wastage in the consumption process. For example, we have been developing creative solutions to help consumers make the most of leftovers. These include a range of different dough (pizzas, pasties, etc.) that can be filled with leftover food from their fridge, *Maggi* in France has brought out a smartphone app full of top tips and recipes on how to use leftovers (Nestlé CSV Report 2013, p. 260).

### ***3.6 Resource Efficiency and Total Resource Consumption***

To continue its efforts, Nestlé has achieved considerable success to improve its resource efficiency over the last decade. As shown in the Fig. 3, since 2003 Nestlé has reduced waste for disposal per tonne of product by 53.6 %, water withdrawal per tonne of product by 49.5 %, water discharge per tonne of product by 60.1 %, direct GHG emissions per tonne of product by 45.4 %, and total on-site energy consumption per tonne of product by 33.7 %. We have also reduced material use for packaging purpose per tonne of product by 0.2 % since 2009. Figure 3 shows Nestlé’s resource use efficiency between 2003 and 2013 (data for material used for packaging is only available from 2009).

Due to our success in improving resource use efficiency, during the past ten years we have steadily decreased the total value of a few resources while increasing our production by 56 % in the same period. Our total water withdrawal has decreased by 21.2 %, water discharge reduced by 37.2 %, waste for disposal cut by 27.6 %, and direct GHG emissions fell by 14.9 %. We have kept our energy consumption almost unchanged in comparison to 2003. Figure 4 shows Nestlé’s





**Fig. 3** Resource consumption and waste disposal per tonne product 2003–2013

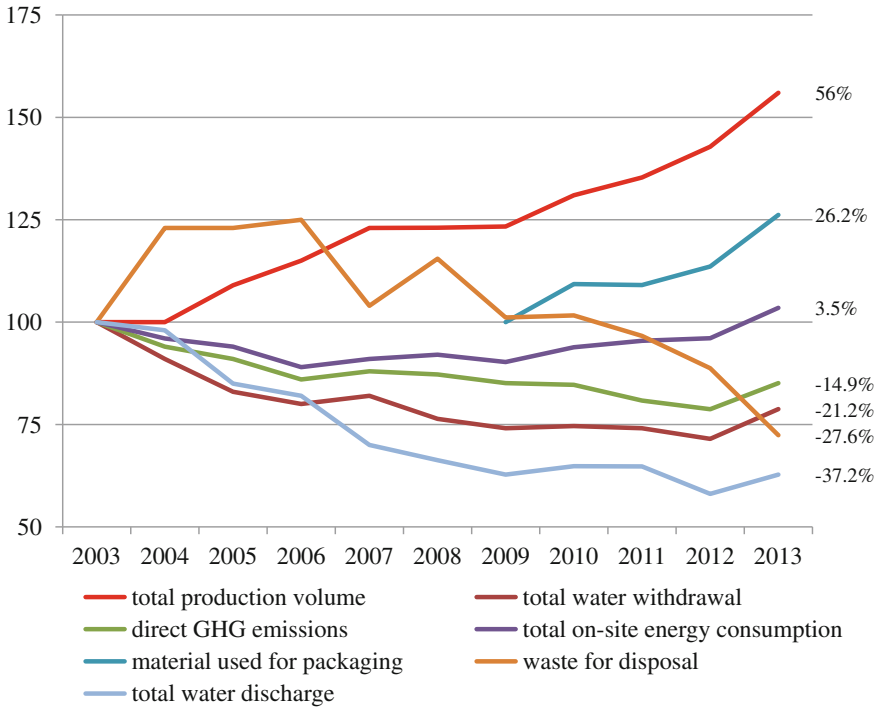
total resource consumption between 2003 and 2013 (data for material used for packaging is available only from 2009).

Besides what is highlighted in Fig. 4, biodiversity, deforestation and lifecycle analysis are also important aspects to consider helping improve resource efficiency. More information on the efforts that Nestlé has made on these aspects can be found in Nestlé's CSV reports and corporate websites.

## 4 Conclusion

Within our core strategy framework of CSV, Nestlé has put tremendous and continuous efforts on improving resource efficiency over the last decade and steadily decreased its resource use, direct GHG emissions and waste for disposal, along with a steady increase in its manufacturing production.

This has resulted in a significant contribution to environmental sustainable development, and helping to protect the local and global environment. By improving efficiency and reducing waste and resource consumption, we have lowered the costs in our production to strengthen Nestlé's products competitiveness in the market.



**Fig. 4** Resource consumption and waste disposal vs production volume 2003–2013

Within the CSV framework, in the future we will continue to implement our strategies on environmental sustainability with an emphasis on energy efficiency at our factories, increase our use of cleaner fuels, invest in renewable energy sources such as solar and wind energy, improve material and water utilization efficiencies, reduce total waste for disposal, and increase the number of factories with zero waste for disposal. We will aim to do more to help farmers and consumers save resources both upstream and downstream in the value chain of our products. We will also continue to actively contribute to national and global partnerships to eliminate edible food wastage by addressing the perspectives of all stakeholders in the food chain.

While traditional resource-intensive growth is the ultimate root cause for the world’s environmental problems, products with better environmental performance can be a significant growth driver for Nestlé’s business. We strongly believe that our CSV strategy will bring a bright perspective to Nestlé’s future development, benefiting both our shareholders and global sustainable development.

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