

White paper



Exploring how sustainable development can be good for business

September 2018

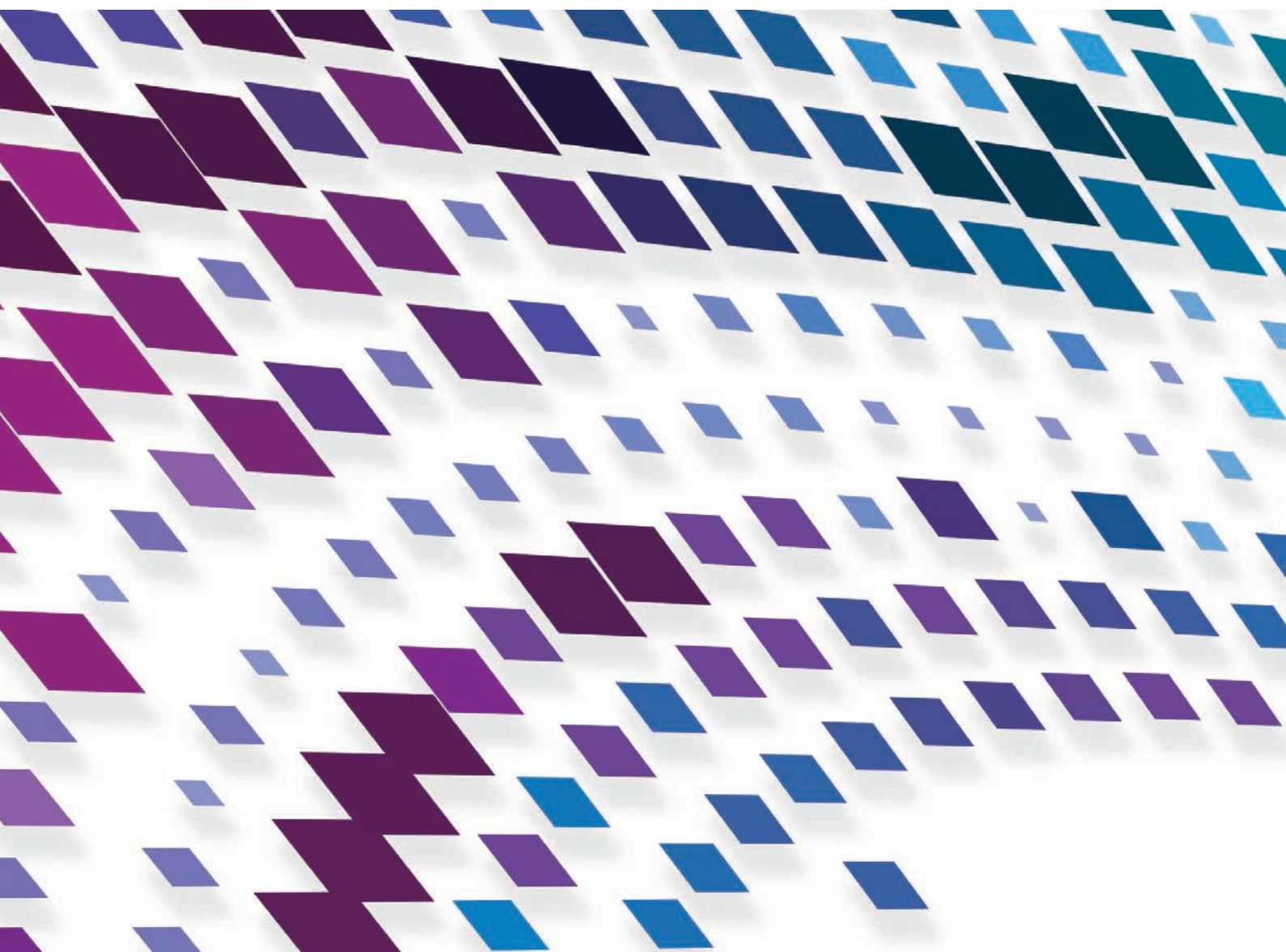


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INTRODUCTION

Considering the rapid rate at which natural resources are being exhausted, there has long been a need for businesses to adapt their working practices to become more sustainable. However, in many cases, there has been a reluctance to do so as it was seen as a nice-to-have ambition which was too expensive to be practical.

This white paper will show how sustainability initiatives are now more profitable than ever before and demonstrate that aligning sustainability principles with existing business objectives can lead to a range of significant short- and long-term gains. By facing sustainability issues head-on, companies can improve their brand image and financial performance while at the same time helping the environment and creating a more equitable and enjoyable working atmosphere.

Illustrated with examples from Markem-Imaje's own sustainability efforts, readers will see how incremental changes to products, processes, facilities and customer care can lead to economic gains and green credentials in line with the United Nation's (UN) sustainable development agenda.¹



CHAPTER 1

Climate change is here to stay



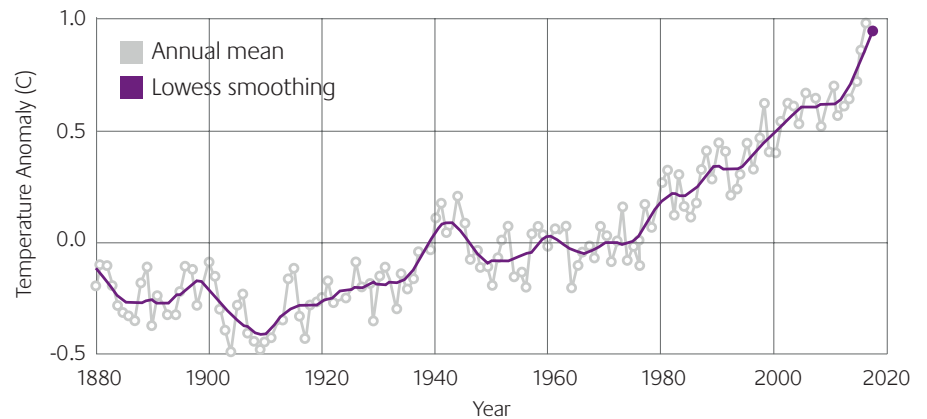
UN sustainable development goals (SDGs)

1. End poverty in all its forms everywhere
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- 3. Ensure healthy lives and promote well-being for all at all ages**
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- 5. Achieve gender equality and empower all women and girls**
- 6. Ensure availability and sustainable management of water and sanitation for all**
- 7. Ensure access to affordable, reliable, sustainable and modern energy for all**
- 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all**
- 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**
- 10. Reduce inequality within and among countries**
11. Make cities and human settlements inclusive, safe, resilient and sustainable
- 12. Ensure sustainable consumption and production patterns**
13. Take urgent action to combat climate change and its impacts*
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

*Acknowledging that the United Nations Framework Convention on Climate Change is the primary international intergovernmental forum for negotiating the global response to climate change.

Climate change is a phrase associated with consuming less, cutting back and reducing production. But does this really need to be the case?

Overwhelming scientific evidence shows oceans have warmed, sea levels have risen and the average global temperature is increasing. If greenhouse gas (GHG) emissions continue at the current rate the global temperature will increase by 1.5°C. By the year 2100, sea levels may have risen to a point where countries like the Maldives will be totally submerged.



Graph 1: The dramatic change in global surface temperature since records began: 17 out of the last 18 years have been the warmest, with 2016 being recognized as the hottest on record. Source: NASA/GISS²

In 2015, the United Nations (UN) launched its 17 Sustainable Development Goals to achieve global sustainable development by 2030. A number of these goals directly point at private industry involvement. Business leaders have been called upon to consider the impact that their decisions make, not only on economics, but also on environment, health and social development.

The areas highlighted in purple within Table 1 are where Markem-Imaje is particularly focusing its efforts to contribute to the UN's SDGs.

Table 1: UN sustainability goals to achieve by 2030. Source: un.org³

CHAPTER 2

The role of government and business



Governments and businesses are under intense scrutiny to lower CO₂ emissions, embrace energy efficiency, take better care of their employees, and promote fairness across many dimensions including gender and country of origin. Directives and legislation have become commonplace to ensure compliance. Customers demand more eco-friendly products and expect the quality to remain the same. Journalists are keen to report transgressions.

And, while governments have a major part to play to create effective incentives, businesses have a role too.

Events, such as the United States leaving the Paris Agreement⁴ in 2016, may have damaged the faith some have invested in government. Now is the time for businesses to stand up and take the lead.



There is a huge opportunity to drive growth by reforming the way products and services are manufactured and delivered in an eco-friendly way. By doing this, companies can create sustainable benefits for their customers, the environment and society, while enjoying financial rewards. Investment in sustainability initiatives can be good for business.

A 2012 research study carried out by Deutsche Bank, for example, found that 56 companies who were rated highly for environmental, social and governance (ESG) policies had a smaller cost of debt and equity. In addition, 89% of companies surveyed with high ESG ratings were found to outperform the market in the medium term (3 to 5 years) and the long term (5 to 10 years).⁵

Additionally, McKinsey research shows that the potential impact from sustainability issues is substantial. See figure 1. Along with those findings, McKinsey also highlighted work done by Harvard and London Business School economists comparing 90 matched groups of 90 companies which found that those who made substantive, long-term investments in sustainable initiatives delivered significantly better return on assets and return on equity than those who did not.⁶

Sustainable profits are now more attainable than ever

Sustainable initiatives have not always been popular or simple to achieve as they tended not to be profitable in and of themselves. They often required big subsidies to encourage uptake and were typically only within reach of global multinationals. Circumstances have now changed.

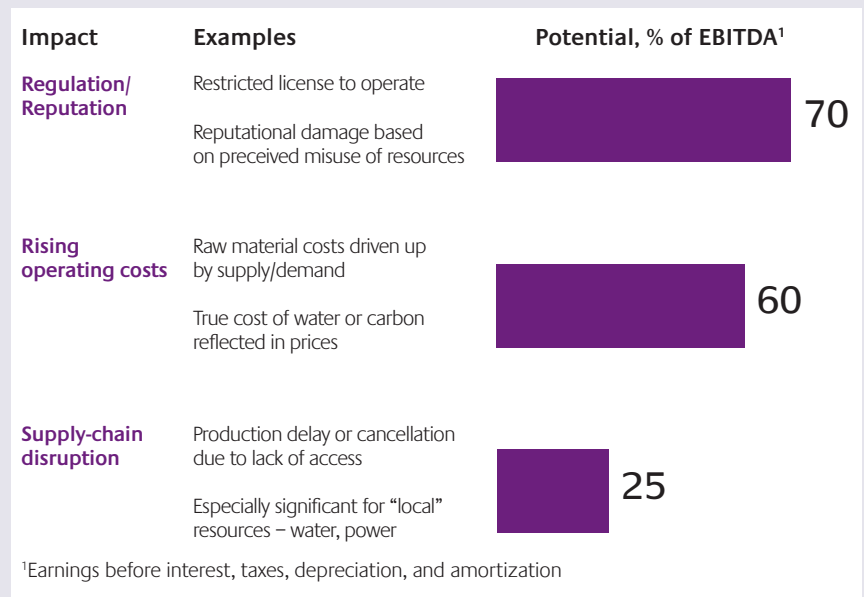
Renewables have matured to the point they are often competitively priced with fossil fuels –and in some cases cheaper– making sustainability more affordable. A decade ago producing the same amount of power via solar was roughly 6 times the cost versus coal and natural gas. Since then, solar costs have plummeted 83% to reach parity with fossil fuels. The same electricity generated via wind is even less.

“Renewable energy has reached a tipping point – it now constitutes the best chance to reverse global warming,” according to Michael Drexler, Head of Long Term Investing, Infrastructure and Development at the World Economic Forum. “Solar and wind have just become very competitive, and costs continue to fall. It is not only a commercially viable option, but an outright compelling investment opportunity with long-term, stable, inflation protected returns.”⁹

This is consistent with Markem-Imaje’s experience. The return on investment (ROI) from its installation of photovoltaic panels in one of its facilities in India has fallen to just four years without any subsidy.

Even small and medium companies are ready to capitalize on the potential ROI an eco-friendly approach can yield. A research study by HSBC Commercial Banking in 2017 surveying 1,400 decision makers at medium-sized businesses across 14 countries revealed “...almost two thirds believe that sustainable business practices will improve growth and profitability.”¹⁰

Figure 1: Potential impact from sustainability issues



Source: Profits with purpose - How organizing for sustainability can benefit the bottom line, McKinsey & Company.⁶

This notion of embarking on eco-friendly measures to help boost environmental well-being, profits and brand image has been demonstrated by Unilever. Unilever is in the process of reducing the environmental impact of all its brands but a certain few brands are leading the way. These brands – Ben & Jerry’s, Hellman’s and Dove – have grown more than 50% faster compared to the rest of their business. Remarkably, these ‘Sustainable Living’ brands also accounted for 60% of Unilever’s growth in 2016.⁷

Furthermore, pursuing sustainable policies can help companies insulate themselves from regulation and reputational issues, rising operating costs and supply chain disruption with significant financial benefits.

Further evidence that supports the notion that sustainable development is good for business comes from the World Wildlife Fund (WWF) and the Carbon Disclosure Project (CDP). Their in-depth analysis shows that, if US businesses were to reduce their emissions by as little as 3% per year, a saving of up to USD 190 billion could be achieved by 2020. Looking at CO₂ levels from 2010, the total reduction of GHG emissions by the same year would be equivalent to 1.2 gigatonnes.⁸

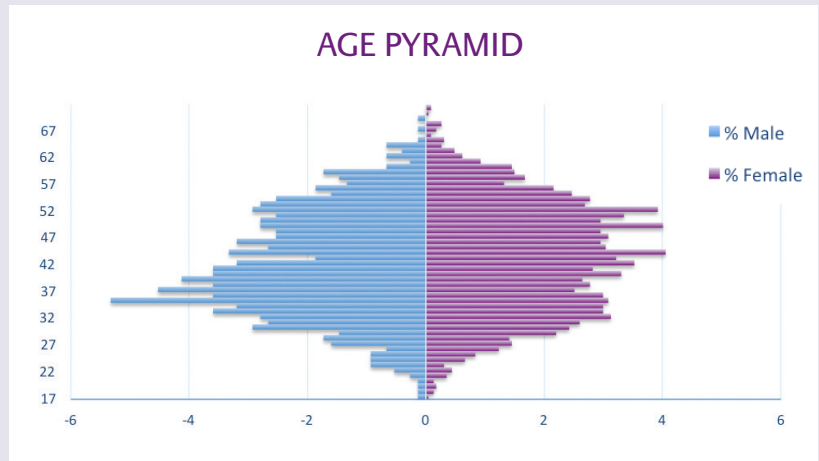
“World governments have moved far too slow to address the climate change threat and people are looking for leadership from the brands they trust to take concrete actions now,” says Carter Roberts, President and CEO of WWF. “These numbers provide a glimpse into the future – where smart companies slashed emissions, increased profits and helped secure a better future for all of us.”¹¹

Another area in which companies can lead the way relates to promoting equality across different groups of people. This can be along gender or nationality lines, to name but a few areas. A diverse workforce which is empowered and motivated through equitable treatment can also be extremely good for business. With a broad talent pool companies can leverage a wider range of skills to potentially come up with better or more innovative approaches to business issues.

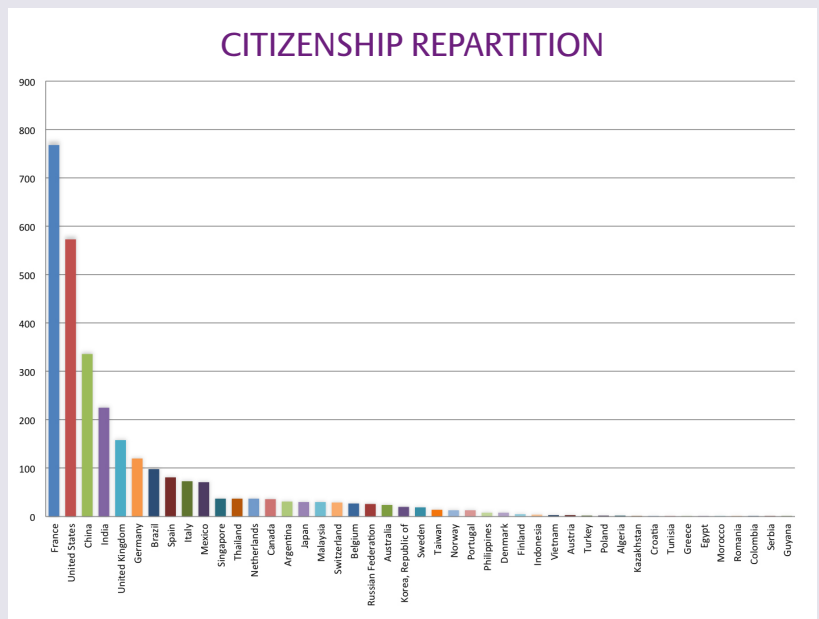
A study by economists from the Massachusetts Institute of Technology (MIT) and George Washington University published by The Journal of Economics and Management Strategy statistically analyzed eight years of survey results and revenue information from a professional services firm. The company had over 60 premises in the US and abroad with a range of all male, all female or mixed gender offices. The research found that going from an office with a homogeneous gender makeup to one more evenly split was associated with a revenue gain of 41%.¹²

Diversity and equality at Markem-Imaje

A gender equality charter at Markem-Imaje guarantees that women are well-represented throughout the organization and in all positions:



Likewise the company has international workforce – all of whom are treated equitably throughout.



Source: Markem-Imaje internal records.

CHAPTER 3

Developing effective sustainability programs



What is ISO 14001?

ISO 14001 is a voluntary international standard that provides a guide to assist organizations with creating an effective environmental management system. It offers a checklist to follow rather than strict requirements that must be adhered to.

ISO 14001 highlights areas in which to improve the environmental standing of a business, such as reducing waste, creating a sustainable supply chain and a healthy environment for staff.

3.1 An effective sustainability program requires focus

There are many ways in which companies can become more sustainable. It is important to remain focused and come up with realistic, manageable goals which you can deliver. Without a clearly defined framework, the execution of environmental, health and safety (EHS) policies can hit problems, even with complete buy-in from top executives.

A lack of objectives can create mismanagement and wasted effort. The need for clear, concise identification of the most pressing issues is crucial to success. Having 4 or 5 well-structured priorities is preferable over a shopping list of 20 ideals that will more than likely never come to fruition.

To create a structured framework, Markem-Imaje focuses on key areas such as environmental impact, social commitment to its staff and local communities, reducing the environmental footprint of coding and marking solutions and ISO 14001 compliance.

3.2 Objectives must be aligned to global policies with measurable objectives

For companies that want to integrate sustainable development into their day-to-day routines, an EHS policy is essential. It is needed to obtain formal certifications, such as ISO 14001, but also vitally important as a communication tool which helps staff to understand what the organization is trying to achieve, what is expected of them and how they can contribute. In addition to ISO 14001 certification, Markem-Imaje complies with other international standards such as OHSAS 18001, a widely recognized health and safety management system.

Markem-Imaje has four such key objectives, manifesting as:



Less emissions

...released by identifying alternative supply chain activities from production through transportation.



Less energy

...usage through effective personnel training, consumption monitoring and product design considerations.



Less waste

...generation through proactive identification of alternative activities and practices within the waste stream process.



Less water

...consumption through innovative recycling standards implemented within the manufacturing process.

However, to deliver on any agreed objectives, it is important to understand and identify the biggest concerns via in-depth internal analysis. Once an internal appraisal has taken place, clear goals and objectives can be systematically drawn up and integrated into any business. All facilities of an organization should not escape this level of scrutiny, as eco-friendly changes can be made just as easily throughout office spaces as in manufacturing areas.

To support and help its sustainability goals, in 2013 Markem-Imaje created an online reporting structure which facilitates energy consumption tracking for their manufacturing facilities and 20 office sites. To ensure these policies are implemented and kept at the forefront of the business' overall objectives, regular meetings are held to drive these policies forward through to completion. In addition, consolidated monthly reports help Markem-Imaje calculate GHG emissions and the company's energy footprint.

And, although product compliance has been at the heart of the Markem-Imaje business for over 10 years, a specific product compliance team was established in March 2017. Its aim is to ensure Markem-Imaje's products have as small an environmental impact as possible throughout the entire lifecycle.

Having a specialized department helps raise the profile of sustainable development internally and accelerates the integration of sustainability within overall product design. The department helps optimize all business units, processes and external partners by pursuing a collaborative approach that helps Markem-Imaje to continue making progress towards sustainability excellence in line with the strict targets the company has imposed on itself.

3.2.1 SMART objectives

Organizations need to create SMART objectives: Specific, Measurable, Attainable, Relevant and Timely. Using SMART, Markem-Imaje set a target of reducing GHG emissions by 20% by 2020. In actual fact, this was accomplished in 2014 - much earlier than planned.

To help it achieve its key sustainability objectives, and given the complicated and ever-changing world of compliance, Markem-Imaje has partnered with one of the leading global providers for environmental, health and safety consultancy services.

Also, to improve profitability, safeguard compliance and ultimately monitor and achieve its goals, Markem-Imaje regularly measures the energy consumption and gas emission intensity of its Top 20 sites. Over time, Markem-Imaje has almost exceeded its annual targets for

energy, emissions, water use and waste reduction across all of its main manufacturing sites and repair centres. The results can be seen in the table below.

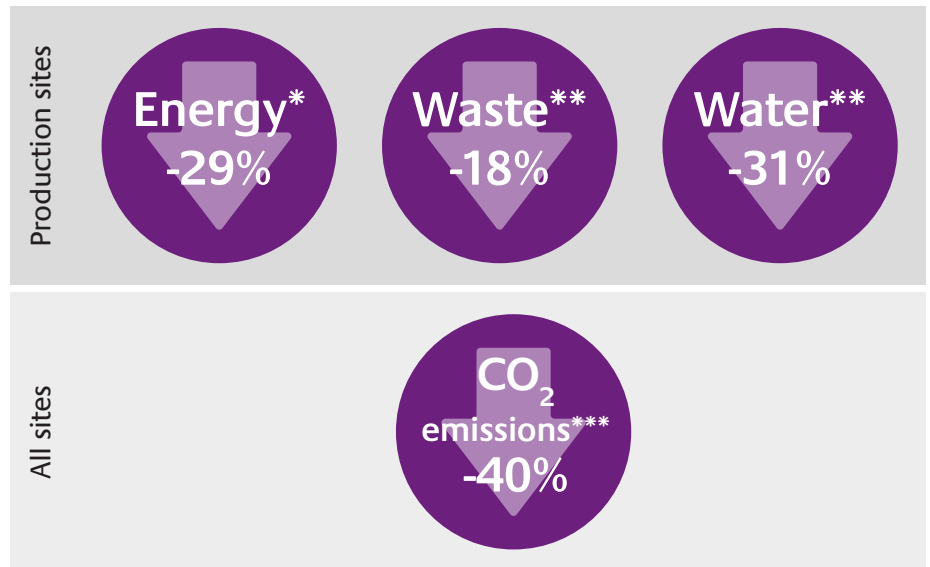
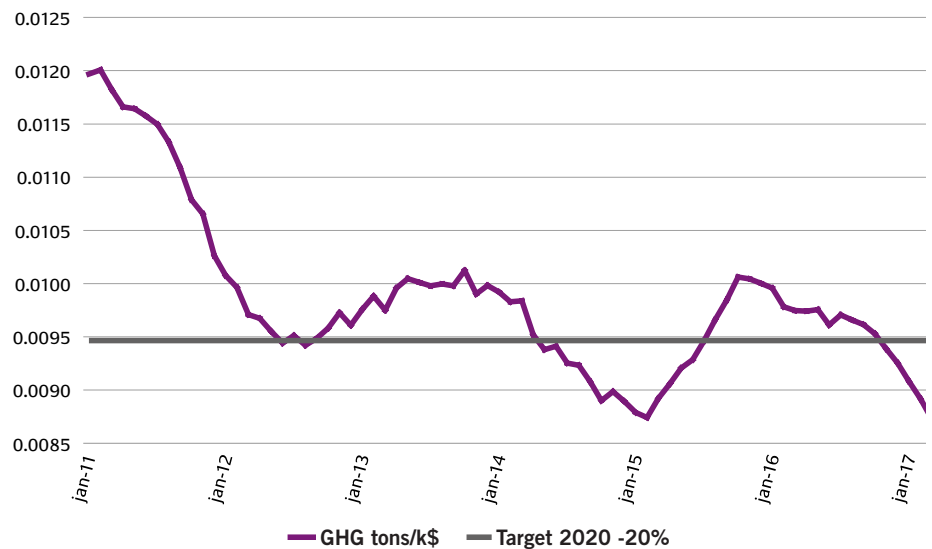


Table 2: Markem-Imaje facilities energy, emissions, waste and water 2017 performance vs 2010
Source: Markem-Imaje internal records.

*Metrics are based on production activity (tonnage shipped) and building footprint (square meters occupied)

** Metrics are based on production activity (tonnage shipped)

***Metrics are based greenhouse emissions divided by company revenue. The idea is to provide a balance between the evolution of GHG emissions versus the impact on sales.



Graph 2: Markem-Imaje greenhouse gas emission intensity - Tons per k\$
Source: Markem-Imaje internal records

What is OHSAS 18001?

OHSAS 18001 is a voluntary international standard to help guide organizations in the creation of an effective health and safety management system. Much like ISO 14001, it provides a framework to follow rather than stringent rules that must be implemented.

It discusses ways to improve health and safety within the workplace such as workplace hazards, improving accident reporting and ensuring the wellbeing of all staff.

Additionally, in line with the Occupational Health and Safety Assessment (OHSAS) 18001 certification, as well as ISO 14001, Markem-Imaje has local management teams that conduct Lean Safety Walks to analyze issues, monitor progress and identify any trends. To ensure action is taken from previous reviews, these walks are ongoing and are conducted on a frequent basis (a minimum of one per quarter per area is expected).



Lean Safety Walk Rules

OFFICE AREAS	INDUSTRIAL AREAS		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Smoking rules must be defined and respected	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Firefighting equipment must be in good condition, accessible and properly maintained	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	For equipment and electrical panels – no energized / live part must be exposed	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Wires and cables must not create a trip hazard	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Waste must be properly disposed of in the appropriate container and emptied on a regular basis	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Department must be cleaned on a regular basis. Corridors and exits must not be blocked	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Light level is good	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Noise level is acceptable	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EHS instructions and signage must be visible, up-to-date and respected	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Employees must understand the emergency response process in case of injury or fire	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	No hazardous or risky behavior permitted	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Combustible material must be isolated from ignition sources	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Grounding pliers must be connected and in good condition	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Chemical ventilation system must be operational, properly used and properly maintained	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazardous chemicals must be stored in fire cabinet or in containment. Minimum quantity allowed at the workstation	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Chemical containers must be properly labeled	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Eye washing station or kit must be made available within chemical area and in good condition	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Chemical spillage must be immediately cleaned up	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Appropriate PPE must be used, in good condition, and be made available to employees	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Racks / shelves must be in good condition and secured to the floor or the wall	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Materials must be stored in a stable manner and properly wrapped if located high in a rack	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Handling equipments are in good condition, properly maintained and used in a cautious manner. Load must be stable	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	No food or drinks permitted	

E&S-STD014 Safety Walk poster-Appendix 2

Redefine the possible™

Well-defined rules per type of area exist for safety walks to ensure nothing is overlooked.

A handy by-product of allocating resources and having clear identifiable goals, with regular reviews means accountability is created. Having policies written down, committees set up and an understanding from all staff of what is expected, hugely increases the chance of success and is in keeping with the ISO recommended ‘**Plan – Do – Check – Act**’ model.

- **Plan:** establish environmental objectives and processes to deliver results
- **Do:** implement the plan
- **Check:** monitor performance against the plan and report the results
- **Act:** engage in continuous improvement

3.3 Go beyond bare minimum compliance and consider sustainability from the design stage onwards

With manufacturing industries under pressure to create high quality products while eliminating the use of hazardous substances and subsequent waste, several different directives and legislation exist to curb harmful effects to humans and the environment.

Key directives such as the Restriction of Hazardous Substances (RoHS), the Waste Electrical and Electronic Equipment Directive (WEEE), as well as Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), make it essential for businesses to understand how to be compliant. By understanding and embracing the regulations to go beyond minimum compliance, companies lessen their risk of heavy fines and reputational damage – now and in the future – from failure to meet regulations. This is in addition, of course, to the wider benefits for the environment and society as a whole.

Much of Markem-Imaje’s development work that focuses around new technologies and products not only incorporates this legislation but also goes a step further to consider where the regulations are headed. This ensures the company is not caught off-guard by tightening legislation which could force it to make costly adaptations in the future.

For example, in anticipation of and because of RoHS, the company’s OGB (Orange Grey Black) list is one step ahead. The OGB list stops Markem-Imaje from using restricted items while also preventing it from using permitted items which are not good for the environment and which will likely become restricted items going forward. In this way, all new products are developed in conjunction with the RoHS requirements and the internal OGB list in mind. By using this self-imposed list and with no legislative obligation to restrict itself in this way, Markem-Imaje leads the way for safer product development.

Markem-Imaje OGB list: a step ahead

Though not required by law, Markem-Imaje established a self-imposed, pre-emptive list of prohibited and restricted substances and helps safeguard future compliance should any new directive be introduced. The OGB list is constructed to pay attention to consumables designed and marketed by Markem-Imaje which include inks, additives, ribbons and labels. The raw materials used are classified accordingly:

Orange list (O)

The substances included in this list are not subject to lawful restriction at the moment but are continuously monitored. The substance may be subject to changes in regulations, standards and customer requests.

Grey list (G)

This list indexes the chemical substances and products concerned by lawful restriction, normative and/or resulting from customers. The use of a grey list chemical substance, over the internal limit, is forbidden except under internal derogation.

Black list (B)

The black list contains all chemical substances that Markem-Imaje refuses to use in the formulation of its products but are not subject to any lawful restriction.

To the best of our knowledge, Markem-Imaje is the only company in the product identification and traceability solutions industry to have created such a list.

It is this forward-thinking approach to sustainability that led Markem-Imaje to create fully RoHS compliant inks that contain no cadmium, lead, mercury, and hexavalent chromium.

The focus of Markem-Imaje innovation is being 'safe by design' – products compatible with a clean material cycle using less harmful chemicals. Cooperative partnership among internal business units is at the heart of Markem-Imaje's strategy to guarantee continual improvement. Working with research and development (R&D), a merged product compliance and EHS team helped the company choose less hazardous and more recyclable solvents to create MEK-free ink. This has improved the reduction of volatile organic compound (VOC) emissions. VOCs are precursors to the creation of ground level ozone and particulate matter which help create smog. Smog is known to have adverse effects on human health and the environment and is an air pollutant governments are trying desperately to reduce.

Reducing VOC emissions of its products supports health benefits for Markem-Imaje's customers as well as their employees who handle these types of consumables. In fact, Markem-Imaje offers VOC-free marking solutions for each of its technologies: continuous inkjet (CIJ), drop-on-demand valvejet, Touch Dry®, print & apply and thermal transfer.

Where RoHS restricts the use of hazardous materials in the manufacturing of electrical and electronic equipment, the WEEE directive dovetails this standard to encourage the design of electronic products with safe collection, recycling and recovery targets in mind. Due to quicker product innovation and shorter life cycles, electrical and electronic equipment waste going to landfill sites is dramatically rising and the demand for more responsible manufacturing is ever-present.

To support the WEEE directive, Markem-Imaje has created partnerships with local waste service companies to guarantee compliance and take responsibility for the safe disposal of harmful waste. Not only is this good for the environment but also working with local organizations boosts the economy of the local area. This helps maintain a better standard of living for those residents close to a Markem-Imaje facility. In turn this helps meet the company's EHS goals.

As well as improving local resident's lives, manufacturers of electrical and electronic equipment and associated consumables have a duty to ensure product marketability and compliance. REACH is one such directive that promotes the development of alternative methods for the assessment of hazards of substances to ensure a high level of protection of human health and the environment, as well as the free movement of substances.

Markem-Imaje has developed a comprehensive plan that aims to promote product compliance and business continuity for its customers.

This initiative helps to encourage, and in certain cases to ensure, that substances of high concern are eventually replaced by less dangerous materials or technologies where suitable economically and technically viable alternatives are available.

Additionally, all products manufactured by Markem-Imaje must adhere to a strict sustainable design template agreed with departments such as marketing, supply chain and R&D. All specifications are monitored and any future product developments must retain the original environmentally-friendly credentials.

3.4 Put manufacturing processes under a microscope of sustainability

Embarking on sustainable manufacturing is no longer a ‘nice-to-have’ objective; it is essential for any proactive, forward-thinking business. Increased costs for raw materials and energy, the introduction of stringent compliance and directives, plus expectations for green products from customers are now a reality for private industry.

Being green can now pay for itself not only in terms of reputation but also in decreased costs. Throughout every stage of the manufacturing process there are simple yet effective ways to improve energy efficiency and reduce waste all the while maintaining a safe and healthy workplace for employees and the wider community.

Earlier we presented some of the measurable results Markem-Imaje is achieving by having a robust global policy with well-defined goals. Here we outline some of the company’s best practices for pursuing sustainability improvements. All of these initiatives have performance targets set against them which are aligned to the company’s key objectives, and deliver a solid return on investment in terms of efficiency savings versus cost. This list is by no means exhaustive, yet it serves as useful starting ground for other companies to follow when planning their own sustainability journeys.

3.4.1 Sourcing

Like the stringent design template described, Markem-Imaje has also introduced contract sourcing templates to ensure any future partnerships are ethical, sustainable and safe. For instance, well in advance of the June 2018 deadline for REACH registration, Markem-Imaje conducted a wide survey to make sure that its chemical suppliers fulfilled their obligations with respect to the REACH regulation.

3.4.2 Facilities

To be certain that all products are created via eco-efficient means, Markem-Imaje works tirelessly to ensure its manufacturing sites, processes and offices meet the highest environmental standards. This applies across

all of its key facilities worldwide, not just those in developed countries where regulations are the most stringent.

One of Markem-Imaje's objectives, set out in its global sustainable development program, is to implement the international environmental management standard, ISO 14001, at each of its manufacturing sites around the world. At present, all but one site used to design and manufacture Markem-Imaje's products are certified to this standard. The Indian factory near New Delhi is the only exception but it is expected to adhere to this directive in the coming years as well as the OHSAS 18001 certification.

Energy efficiency gains are rapidly advancing and the idea of doing the same with less is an attractive and viable option for many manufacturing sites. One straightforward tactic is to replace older lighting technologies, such as incandescent, halogen and compact fluorescent bulbs, with LED ones. LEDs can consume up to 85% less power than incandescent bulbs, which helps drive down power costs and energy consumption. Further financial savings can be achieved thanks to LEDs' long lifespan, which dramatically reduces maintenance and replacement costs.

Markem-Imaje recognizes this huge benefit and expects that swapping to LEDs will contribute significantly to the company's overall energy reduction goals by cutting the energy consumed by lights by 60%. It is currently focused on replacing old, incandescent lighting at its two largest manufacturing sites: Keene, US and Bourg-lès-Valence, France. Combined, these two locations cover over 40,000 meters squared (m²) and consume the most energy across the business. The French facility has already reduced its energy consumption by 30%. This swap-out initiative will continue throughout Markem-Imaje's existing manufacturing facilities, and there is now a ruling in place that LED lighting is to be included in all new building design specifications.

3.4.3 Renewable energy

To further improve energy efficiency there are other existing and proven technologies that are cost-effective, practical and straightforward to implement. Solar energy, for example, uses photovoltaic (PV) cells which absorb sunlight and converts it directly into electricity. Two of Markem-Imaje's manufacturing sites are embarking on this source of renewable energy by installing carports and sheds with solar panels or putting them on the roof. 2,000 m² of solar panels have been installed in Bourg-lès-Valence in 2018. The Indian factory will follow soon after in 2019 to cover 20% of its local needs. Other production sites are also being investigated for solar panel installation.

Additionally, the large manufacturing plant in Bourg-lès-Valence is working on a project whereby unused solar energy, which builds up over the weekend, will be shared with their local community.

Creating one's own sustainable supply of renewable energy is highly commendable but not always possible to replicate due to limited space or available capital. However, there is an alternative.

Switching to renewable energy providers can be incredibly cost-effective and relatively easy to implement. As of 2016, Markem-Imaje's huge manufacturing site in France became a certified consumer of 100% renewable energy supplied by the French multinational electric utility company, Engie.



Markem-Imaje is not alone in its pursuit of renewable energy options.

Since 2008, Unilever, for example, has saved more than €490 million of energy costs via eco-efficiency.¹³ The brand has reduced CO₂ emissions by 47% and total waste sent for disposal by 98% per tonne of production.¹³ By 2030, it plans to be a 100% renewable energy powered company.¹⁴

Another company on the path to use 100% renewable energy is BMW Group. In 2015, the company made a pledge to reach its goal by 2020. At present, BMW is already half way there with over 50% of purchased electricity coming from renewable sources.¹⁵ Between 1995 and 2017, BMW has also managed to reduce emissions of their European fleet by 42%.¹⁶ And, its BMW i3 is made manufactured with 100% energy from renewable sources and the company has achieved a 95% recyclability target for this vehicle.¹⁷

To further cement its commitment towards 100% renewable energy use, BMW Group is a member of the RE100, a group headed up The Climate Group in partnership with the CDP. Joined by 100 of the world's largest and most influential organizations, including HSBC, Facebook, Google, Unilever and Nike, the aim is to promote and commit to becoming 100% renewable energy efficient by 2020.¹⁸

Building monitoring systems

An effective way to reduce energy consumption across a whole manufacturing plant for both environmental and financial gain is to install an automated building monitoring system (BMS).

A BMS is a computer control system that monitors a building's mechanical and electrical equipment –heating, ventilation, cooling and lighting, for example.

Effective operational monitoring allows the plant to run at peak efficiency by only using energy when necessary to reduce consumption as a whole.

Real-time data supports plant optimization and can become the center for an operational strategy which helps cut operating costs and energy consumption.

In addition, automated systems can increase staff productivity by consolidating data in one centralized location, improving reporting mechanisms and data management. This information can inform operational decision-making and generate facility-wide insights to maintain an efficient, eco-friendly plant or office space.

With a view to cutting its fuel energy consumption by 30%, Markem-Imaje is linking the air handling units of its main factories to BMS systems. This has been completed in its main manufacturing sites in France and China with its Keene, US facility not far behind. There are plans for one in India too. The company is installing local displays, linked to the BMS, into all fan coil units (FCU), to enable better control of running hours and temperature with a view to driving down FCU energy consumption 15 to 30%. In a similar bid to cut energy use, heating and cooling recovery systems are at various stages of installation.

3.4.4 Water use and heat recovery

Minimizing water use by recycling and reusing water is another way to improve sustainable development for large manufacturing plants. One way in which Markem-Imaje is doing this is through the installation of automated sensors. These ensure no overflow occurs and water used is kept to necessary amounts.

This idea of recycling water can also be beneficial to employees and supports the sixth point of United Nations Sustainable Development goals, 'Ensure access to water and sanitation for all.' This is most evident at Noida, India, where Markem-Imaje has restructured the entire manufacturing plant to ensure safe water and clean facilities are on offer to all employees.

Like the reuse of water, recycling heat from machinery can dramatically reduce energy consumption and improve working environments for operators. By re-using heat and air through a balanced ventilation system and air handling units, particularly in areas where controlled chemicals are being used, Markem-Imaje utilizes the efficient transfer of fresh air to create safer working environments. This significantly contributes to the building's energy efficiency and carbon emissions reduction.

To further offset its carbon footprint and help reduce GHG emissions, Markem-Imaje in France has introduced electric cars which can be used for business meetings.



Sample of Markem-Imaje factory initiatives across the world



Bourg-lès-Valence, France

A 20,000 m² manufacturing plant located in Bourg-lès-Valence has a powerful 18,000 m³/h ventilation system with energy recovery, double the amount of insulation compared to conventional standards and low-energy LED lighting. Additionally, the company has installed heat pumps across 20% of the plant. Automated controls for lighting and water consumption further ensure that energy is only used when needed and water usage is regulated. The site will also reduce its reliance on traditional sources of power thanks to solar panels installed across 2,000 m². Completed in 2018, these panels will provide up to 17% of all the facility's consumption. In terms of optimizing energy efficiency during production itself, variable frequency motors have been integrated into the compressed air system.



Keene, USA

The Keene manufacturing facility in the United States reaffirms Markem-Imaje's journey towards sustainable development by switching to the use of propane gas and away from heavy polluting fuel. By making this change, greenhouse gas emissions have been dramatically reduced. The facility has also nearly completed the installation of a BMS to optimize the energy performance of the site's air handling unit. In fact, each time the facility undergoes building work, sustainability-related improvements are undertaken. For example, as roofs and windows are updated, the site increases its insulation. Additionally, lighting is being upgraded to a more efficient LED style. There are also awareness campaigns in place to help adapt employee behaviors by encouraging them to recycle and turn off lights.



Shanghai, China

Markem-Imaje's facility in China has a range of energy-saving initiatives underway or complete. In addition to having an energy recovery system and a fully operational BMS monitoring its fan coil and air handling units, the company has invested in extra wall and roof insulation as well as high grade windows to minimize the level of heating and cooling required. It has also finished installing heat pumps whose goal is to decrease heat consumption by up to 60% and it has completed a plan to use solar heaters to heat water. The company is also rolling out a plan to use variable frequency motors to improve the energy efficiency of key plant equipment. Carbon filters to catch MEK vapours on exhaust are also being installed with a target of producing air exhaust of less than 50 particles per million.

3.5 Build sustainability solutions into after sales support

Markem-Imaje is working to increase the modularity of its designs. For example, its latest inkjet printer -the 9028- has five critical parts, such as the printhead, ink circuit (including the pump and filter system), user interface, the cabinet and the sensor.

This simple design does not hinder the consistent coding provided by a Markem-Imaje printer but it does help with sustainability if breakdowns occur. Thanks to its modular configuration only the problematic parts need to be exchanged and discarded. Similarly, it also means users can often upgrade their printer by only changing a few parts, rather than having to throw the entire product away.



The modularity of Markem-Imaje's 9028 continuous inkjet printer helps with sustainability objectives.

To reduce GHG emissions and combat electrical and electronic equipment waste going to landfill, Markem-Imaje's printer design allows 80% of repairs to be done over the phone, thereby reducing the number of engineers driving on the road.

- If a printer cannot be fixed over the phone then the broken part can be sent back to Markem-Imaje as part of its 'Repair and Return' service. Here, the part is repaired to perfect working order and sent back to the customer, again reducing the amount of waste going to landfill as the printer's life is extended.
- In another drive to reduce waste, Markem-Imaje offers a second repair option called 'Advanced Service Exchange'. This involves the customer receiving a replacement and sending the original part back to Markem-Imaje. The faulty item is sent back within the box the replacement part arrived in, helping to reduce the amount of

paper/card being used and broken parts ending up as landfill waste. Throughout this whole process there is no paperwork. Markem-Imaje processes orders digitally in an effort to increase recycling, save energy and decrease the amount of unnecessary waste.

3.6 Pursue sustainable solutions during regular operations and at the end of consumable or product life cycle

Over time equipment will inevitably wear out and need to be recycled or, more commonly, be sent to landfill. Manufacturing the replacement machinery consumes energy and raw materials. Similarly, during operations, resources are used and waste is created, except here the latter is in the form of consumable materials which need to be disposed of post-production.

For example, in thermal transfer applications for flexible film used at the primary (consumer unit) level, there are ribbons to discard. At the secondary and tertiary packaging level (boxes and pallets) print and apply solutions are common and require the disposal of label rolls and ribbons.

Markem-Imaje has developed its equipment and consumable solutions with sustainability in mind, evidence of which can be seen throughout the company's product portfolio.

Its thermal transfer ribbons, for example, are 50 to 83% longer than the industry standard ribbons which means changing them less frequently, generating lower roll waste and reducing energy consumption by offering up to 80% more prints per roll.

In print and apply, Markem-Imaje's label rolls and ribbons are of a matched length which means there is no waste when changing these consumables. When unmatched rolls and ribbons are used, companies either shut their lines down twice or they protect downtime by changing both at the same time and throwing away the excess.

Additionally, its solutions are compatible with recyclable label liners, and so, do not contribute as much to landfill waste as other options.



Label MI ribbons used with Markem-Imaje's 2200 Series print and apply equipment, minimize scrappage and double printhead life, meaning less waste and hardware go to landfill.

Printer technologies explained

Continuous inkjet (CIJ)

Here, a high pressure pump directs liquid ink through to a nozzle which creates a continuous stream of ink droplets. This allows very consistent, high speed printing, as in Markem-Imaje's 9450 printer.

Drop-on-demand inkjet (DOD)

By using piezo-electric elements, a series of electro-valves individually drive hundreds of nozzles to print 7- or 16-dot characters on one or two lines. DOD, as in Markem-Imaje's 5000 series, is the simplest and most cost-efficient printing option for high resolution contact-free marking on cases, cartons and non-porous surfaces such as plastic films or sheet metal.

Thermal transfer overprinting (TTO)

Thermal transfer overprinting, as done by the SmartDate X40 printer, is a digital method of printing developed to be able to print directly onto a flexible material. A clear code is printed onto the package by melting a coating of ribbon, which is glued onto the packaging material. This is in contrast to direct thermal printing where no ribbon is used.

Print and apply

In print and apply content is printed onto a label and then applied to the relevant packaging surface, as done by the 2200 Series, which has interchangeable applicators making it compatible with a number of applications.

It is also worth noting that its Series 2200 range is the lowest power consumer in its print and apply equipment category. In standard operation it typically uses 35 watts (W) of power and only a little over 100 W at maximum capacity. It was also designed with environmental considerations in mind. When the time comes for disposal, 95% of the equipment and its stand can be recycled.

The combination of using Markem-Imaje printers with Label MI ribbons brings additional environmentally-friendly advantages. The innovative back coating of the company's Label MI ribbons minimizes the friction and drag between a thermal transfer ribbon and a printhead. This doubles the life of printheads compared to other manufacturer's ribbons which offer non-coated base layers. The base layer coating on Markem-Imaje's Label MI Ribbons reduce the build-up of electrostatic which can damage a printhead and other printer components – as well as avoiding dust from labels and the wider printing environment from migrating onto the ribbon. This leads to higher print quality for a longer period as spotting and streaking become less likely, meaning lower scrappage which is good for the environment. Additionally, printhead life is extended meaning less hardware needs to go to landfill and, of course, less recycling and replacement costs for the user.

Sustainability is also very important at the product design stage. For example, Markem-Imaje's continuous inkjet printers were developed with automated cleaning systems. This means jet stability remains perfect when machines are started, thereby reducing unnecessary waste related to ineffective start-up prints.

In the label-free arena, the company's Touch Dry hot melt inks are particularly sustainable since the product consumes itself entirely during the printing process. Solid at room temperature and immediately dry after printing, this ink offers no contamination risk and generates no waste to discard once consumed by the printing process.

Of course, even consumables which minimize the waste created and prolong equipment life, eventually must be thrown away. For example:

- 20% of CIJ consumables become waste: 13% hazardous and 7% cartons waste
- Over 95% of TTO become non-hazardous waste creating many tons of rubbish to be discarded
- 100% of extractor filters in laser applications become hazardous waste

Another way Markem-Imaje helps its customers to reduce waste in ongoing printing operations is through its CoLOS[®] software print management solutions which help ensure that the correct content is printed every time. Available in a variety of modules to suit customer

requirements, the use of CoLOS software reduces manual intervention making printing and coding mistakes less likely. Plus, its Mark & Read option, which has a seamlessly integrated camera from leading camera supplier Cognex, can check every print to ensure everything is as it should be. Since problem prints are identified early, scrappage and rework is minimized thereby decreasing energy consumption and waste to landfill.

While companies have various options they can consider at the end stage of a production process, as part of its focus on sustainability, Markem-Imaje has tried to make it easy for its customers to be eco-friendly here too.

To maintain compliance and remain environmentally responsible, a waste recovery and disposal solution has been implemented in France to help the company's customers. Essentially Markem-Imaje has entered into partnerships with local waste disposal companies who pick up its customers' waste at prices more competitive than many customers would be able to achieve on their own. This is because Markem-Imaje has negotiated discounts based on aggregated volume. In France, this solution has been available for over 10 years with approximately 250 customers signed up.

This same customer offering is being steadily introduced across Markem-Imaje in countries depending on the level of local interest. While its particularly large customers have little need for this service as they have solutions of their own in place, many small and medium enterprises (SMEs) find this 'one-stop shop' service invaluable.

Safely disposing of hazardous materials helps Markem-Imaje's SME customers easily comply with waste regulations and reduces the amount of landfill tax they would have to pay. And, of course, with less waste going to landfill, there is an extra, positive effect on the environment as well, as it helps cut the amount of methane and GHG emissions.

As important as it is that Markem-Imaje offers this extra level of service to its customers, it is committed to high standards of disposal for its own waste. For example, Markem-Imaje has taken on board local partner proposals for better material segregation. Actions have included separate recycling for stainless steel and aluminium, and improved storage for certain electrical items that would breach the WEEE directive due to harmful chemicals being contained within that equipment.

CONCLUSION

As has been demonstrated, businesses of all sizes can make changes that will benefit the environment as well as their bottom line.

Markem-Imaje hopes to set an example and is committed to ensuring its future is sustainable, bright and green. The company has put sustainability at the heart of everything it does and has provided a case study showing how this can not only be economically viable but also generate a competitive advantage. Through regular performance analysis, target-setting and focus, business decisions can, in fact, be made to improve green credentials without negatively affecting profits. In other words, the blessings offered by sustainability can be realized without it being an unwieldy, impossible burden.

By striving to reduce the health and safety hazard of their inks and optimizing raw materials, Markem-Imaje has produced better products which are safer to use and more environmentally friendly, helping to reduce waste to landfill and GHG emissions. This is good not only for the environment in abstract terms but also for the health of its customers and its employees. It is also good for the company's brand image which, in turn, can have a knock-on effect on share price.

There are long-term cost benefits as well. Simple changes to manufacturing facilities, such as solar panel installation and improved insulation, not only reduce dependency on fossil fuels but also cut energy consumption and associated costs. The return on investment period on such initiatives has been accelerating over time as sustainability investments gain traction.

Working with sustainable partners has helped Markem-Imaje improve both internal and external recycling procedures, with economies of scale enabling Markem-Imaje to make additional savings for both itself and its customers.

In anticipating future market trends, organizations can gain competitive advantage by implementing sustainable practices ahead of official legislation imposition. The OGB list that Markem-Imaje introduced in 2007 does just this. By removing harmful chemicals from its products whenever possible, Markem-Imaje is safeguarding against future compliance should any new regulations be introduced. Companies not taking such a forward-thinking approach will likely need to play catch-up. And, implementing late stage eco-friendly strategies could harm their competitiveness with adaptation efforts often being more expensive and time consuming to implement than had the issues been addressed at the outset.

Markem-Imaje has demonstrated that many measures can be taken to make meaningful improvements, even for a company that by the nature of its industry deals with harmful substances. Perfection for any company is difficult, but the key thing is to try.

As Dr Pablo Munoz, a lecturer in Business and Sustainable Change at the Sustainability Research Institute at Leeds University, succinctly puts it, "...if companies don't show a commitment to sustainability they are simply out of the game."¹⁹

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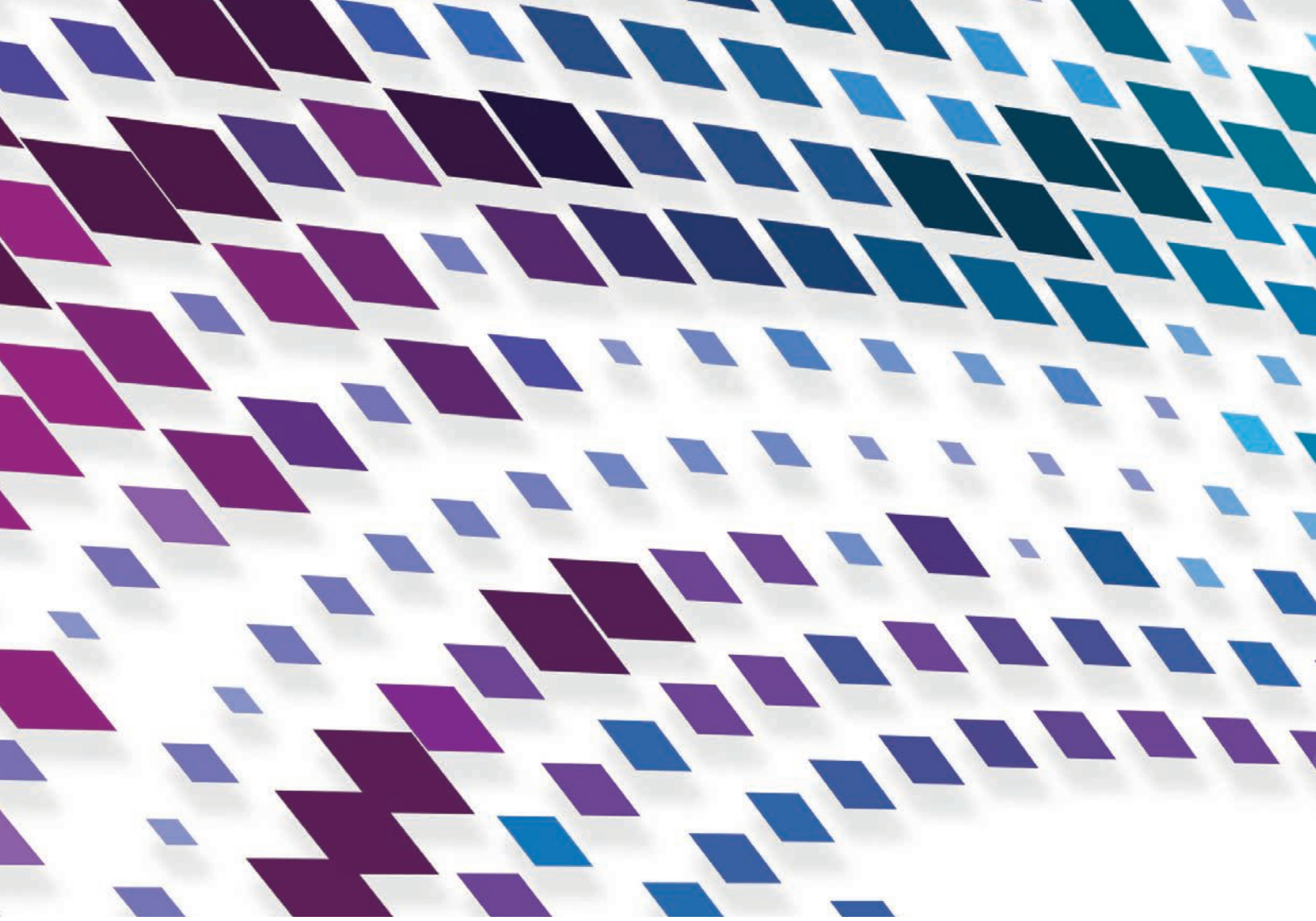
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