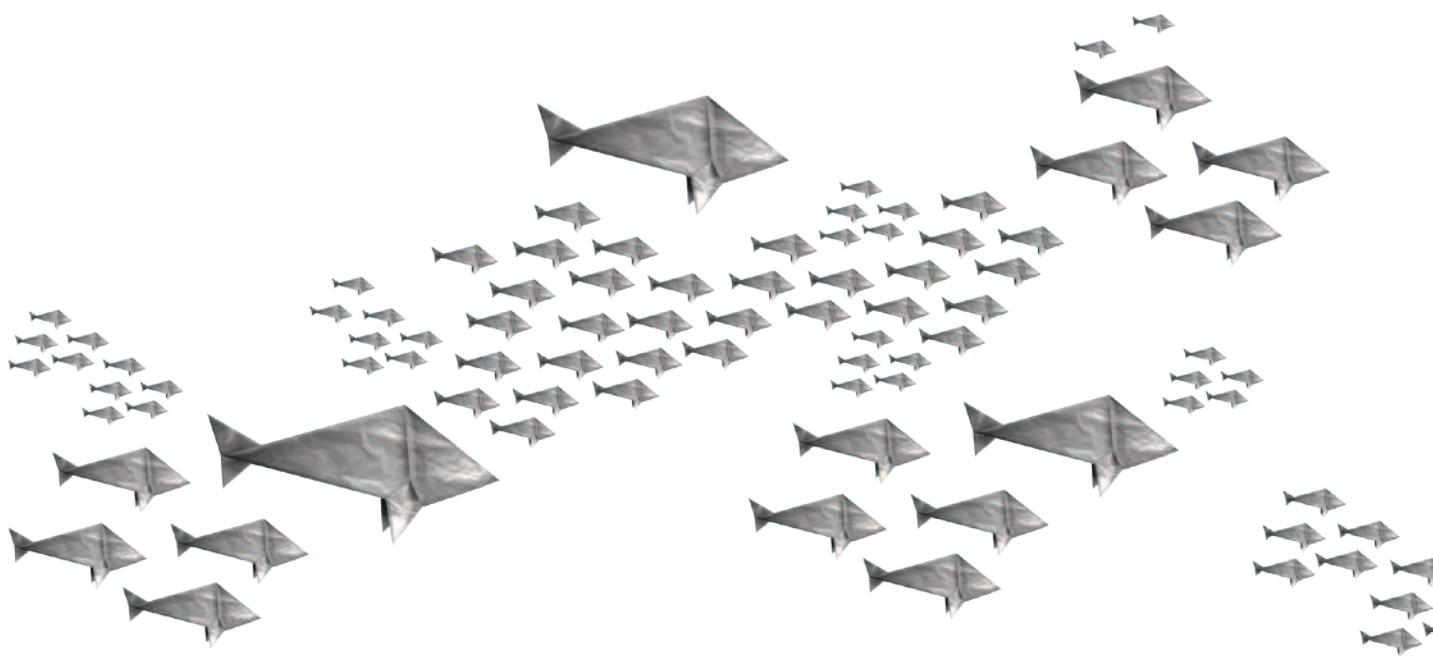


MORE IS LESS

BETTER PROTECTION SAVES RESOURCES





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Executive Summary

Aluminium foil has been used in packaging solutions for almost a hundred years. As a material it is both efficient and effective in protecting and preserving its contents. However, the packaging world has evolved dramatically over the last century. The packaging industry now faces a number of sustainability challenges. This report demonstrates that a 'More is Less' vision for packaging, in which more appropriate packaging means less wastage of resources, is a compelling argument that manufacturers, packagers and, last but not least, consumers need to engage with.

Much attention has been focused on defining 'sustainable packaging' in terms of the materials used; how they are sourced and either recycled, recovered or disposed of. But this approach does not address the fact that smart packaging solutions are vital for the efficient supply of goods, minimising spoilage and wastage of valuable food and therefore contributing to major resource savings.

Definitively 'sustainable packaging' simply does not exist. This is despite efforts to define it through its effectiveness at protecting product contents and the material efficiency through which this is achieved. In fact, too much emphasis has been placed on the materiality of packaging itself, and not enough on the relatively small role it plays in the overall lifecycle of the packaging and contents combined. More appropriate packaging provides better protection to valuable food products and ultimately saves resources. The sustainability of packaging can only be measured against its effect on the wider lifecycle of the product that it has

been designed to contain. Moreover, in such a rapidly changing world, 'sustainability' must be a journey, not simply a destination. Ultimately, more 'sustainable packaging' means that there is less wastage of resources and that fewer greenhouse gases are produced. This directly subverts the established environmental mantra of 'less is more'.

As a result of this complexity, consumers are confused. They are concerned about 'over packaging' and its perceived link with environmental issues such as climate change. The increase in this kind of systems thinking has helped fuel the recent growth in ethical consumption. However, a lack of awareness about the role packaging plays in the food chain, before it reaches the consumer, has reinforced a picture of unnecessary and unsustainable packaging. While only a small minority of consumers worry about the amount of food they waste, most people are worried by the amount of packaging they are forced to dump.

Yet consumer demand for convenience culture, specialist gourmet foods and unseasonal produce often necessitates more packaging. Currently, very few consumers link up their concerns with their purchasing decisions; a tension that can only be bridged by a greater awareness of the meaning of 'sustainable packaging'. It is important that consumers begin to appreciate the real and tangible environmental benefits that appropriate packaging delivers. Only then might better-informed consumers realise that more packaging, that cuts food waste, is actually a good thing, not simply an

unnecessary environmental burden. And this really matters. Up to 50% of food production in the developing world is lost due to poor preservation and deterioration. But the developed world also faces challenges. Food wastage along the supply chain, and in particular at household level, is a critical issue in Europe, and is responsible for significant economic and environmental impacts both directly and indirectly. European households alone waste 71 million tonnes of food each year at a cost of €90 billion. Or, to put it in a climate change context, eliminating food waste in the UK, for example, would have the same impact on greenhouse gas emissions as taking one in five cars off Europe's roads. In addition, almost half of all European water consumption is attributed to food production. By looking at the overall lifecycle of the environmental impacts of food and its packaging together, and not just simplistic footprints of one or the other in isolation, it is clear that relatively modest packaging interventions can generate astonishing savings, both environmentally (in terms of embodied carbon and water) and financially (through reduction of expensively produced food waste). This is a fundamental yet simple conclusion that emerges from an insightful analysis of this complex issue.

Aluminium foil applications, from direct foil wrappings and household foil to semi-rigid containers and laminated foil lids and pouches, offer a versatile range of solutions to these challenges. The physical qualities of aluminium foil, such as the absolute barrier effect, lead to more protection and longer shelf-lives for product contents, as well as preserving their nutritional and health benefits. This results in less food wastage

and spoilage, with all the concomitant environmental and economic savings outlined previously. The diversity of aluminium foil applications also allows manufacturers to provide other consumer benefits, such as appropriate portioning of product for dietary optimisation or convenience. Plus, the various recovery options (recycling and energy recovery) of aluminium foil, as a material, are an added bonus with respect to the materiality of the packaging lifecycle.

It is therefore abundantly clear that aluminium foil packaging and other applications like household foil have a major role to play in addressing the environmental challenges of the wider packaging industry, both today and tomorrow. Better packaging efficiency ultimately saves resources, and this 'More is Less' vision is the conclusion of this report.



The Debate: Packaging & Sustainability

“WHAT DO YOU MEAN THERE’S NO SUCH THING AS SUSTAINABLE PACKAGING?”

As both corporate and consumer awareness and engagement on sustainability continues to rise and mature, the debate over what constitutes appropriate packaging has become increasingly polarised. On the one hand, there is a simplistic view that packaging is generally bad: that the only ‘sustainable’ types of packaging are those seen as easily recyclable or compostable.

This report demonstrates that, in absolute terms, there is no such thing as ‘sustainable packaging’. ‘Sustainable packaging’ must be considered in context, as it does not exist in its own right; it actually exists only in the context of the product for which it has been conceived. There is very poor understanding of the contribution of smart packaging to sustainable consumption and production in the food chain – particularly regarding packaging’s role in reducing food waste.

Tensions therefore exist between an instinctive, one-dimensional view of packaging that focuses largely on the materiality of the packaging itself, and a more sophisticated perspective. The latter view sees it as a key instrument of sustainability in the whole lifecycle of both packaging and contents. In seeking to push towards greater sustainability, it is vital that all stakeholders along the food value chain, from agriculture to end consumers, appreciate the nuances of this debate. Otherwise, there is a very real danger of opting for simplistic and isolated solutions that may ultimately increase the overall environmental impact of the supply chain.

Whilst the packaging trade itself is becoming much more aware of these complexities, the public debate is over-simplified, and it is here that most misunderstanding occurs. A few programmes, such as the UK Waste Resources Action Programme (WRAP)’s ‘Courtauld Commitment’, have taken a more comprehensive view by aiming to reduce waste from both food and packaging. This acknowledges that less packaging does not necessarily automatically equate to less waste, especially when food waste is considered. WRAP’s work aims to raise awareness amongst and directly influence consumers, as well as engaging with suppliers and retailers.

Non-Governmental Organisations (NGOs) understand the importance of traceability and ethical sourcing. However, their focus has been on the materiality of the packaging itself, not the contents inside nor the full lifecycle (including the use and disposal phases). From this material perspective, what is vaguely addressed as the market of ‘sustainable packaging’ seems to be growing faster than the mainstream. Indeed, most trade respondents identified it as a major focus¹.

This market is predicted to grow in the coming years, and at a significantly faster rate than the packaging industry as a whole, as recent research indicates².

¹ PIKE RESEARCH, 2010
² SUSTAINABLE PACKAGING COALITION
& PACKAGING DIGEST, 2008



“The sustainable packaging market is growing much faster than the overall packaging industry, and is expected to double in size from \$88 billion in 2009 to \$170 billion in 2014. The global packaging industry will grow at a slower pace, reaching \$530 billion in 2014, up from \$429 billion in 2009.”

PIKE RESEARCH, 2010

“73% of 1,255 respondents who are involved in packaging reported that their companies had increased their emphasis on ‘sustainable packaging’. The largest number of respondents were from the Consumer Product Goods companies (CPGs), followed by materials manufacturers, converters, machinery manufacturers, packaging services and retailers.”

SUSTAINABLE PACKAGING COALITION
& PACKAGING DIGEST, 2008

The Problem with Defining 'Sustainable Packaging'

“IT’S A JOURNEY... NOT A DESTINATION”

‘Sustainable packaging’ in its own right does not exist. It is important to consider how it contributes to sustainable consumption and production: in this sense, the underlying principle for sustainability is that it is a continuous process.

The European Organisation for Packaging and the Environment (EUROPEN) and the Efficient Consumer Response Europe (ECR Europe) have applied this principle in a collaborative approach to position packaging in the sustainability agenda³.

This is because packaging makes a valuable contribution to economic, environmental and social sustainability by protecting products, preventing waste, enabling efficient business conduct and providing consumers with the benefits of the products it contains.

KEY ELEMENTS OF 'SUSTAINABLE PACKAGING'

1.

Effectiveness of packaging that “adds real value to society by effectively containing and protecting products as they move through the supply chain and by supporting informed and responsible consumption.”

2.

Efficiency of packaging that uses “materials and energy as efficiently as possible throughout the product lifecycle. This should include material and energy efficiency in interactions with associated support systems, such as storage, transport and handling.”

JAMES ET AL, 2005

³ ECR -EUROPEN, 2009



This addresses the role of packaging in the sustainability of the food chain itself. True sustainability must be about the effectiveness of the packaging perfectly fulfilling its mission/role and the resource efficiency with which it can achieve it, which is highly dependent on the capabilities of the material used.

Focusing on the effectiveness and efficiency of packaging will result in more effective product protection, more efficient transportation and less customer wastage. 'Sustainable packaging' provides the foundation for a sustainable food chain.



Consumer Perspectives and Expectations

“SO THE PACKAGING ISN'T USELESS AFTER ALL”

European consumers are concerned about ‘over packaging’ – or, more precisely, they perceive packaging waste as a driver of environmental degradation and excessive land filling of rubbish. This concern may depend on the reality of ‘over packaging’ in different European markets, consumer perception and understanding of the role of packaging. What consumers and decision-makers often perceive as ‘over packaging’ is what seems not to be essential for their direct relationship with the product. However, they would probably think differently if they considered the full lifecycle of the product and understood the impacts at each phase.

Consumers label any packaging that appears useless to them as ‘over packaging’. Showing the consumer what role the packaging has played before it reaches them would prevent the perception of ‘over packaging’ and enable the customer to engage with the idea of the product’s lifecycle.

Cultural factors are also a consideration. German consumers, for example, having been familiarised with recycling and the recovery of packaging materials after almost twenty years of the Green Dot Scheme, perceive the problem of packaging recycling and recovery to be under control.

This scheme requires manufacturers to contribute to the costs of recycling and recovery, thereby incentivising the avoidance of ‘over packaging’; it is also an essential requirement under EU law, which explicitly rules out ‘over packaging’.

The recent results of a study on consumer concerns show modest levels of concern in Germany (32%) compared with the UK (60%), where ‘over packaging’ has been the subject of media attention and NGO campaigning: a fact supported by another piece of research, which found that 82% of UK consumers were concerned with the impact of packaging and 79% thought goods were over packaged; this is up from 68% in 1997⁴.



4 INCPEN, 2008
5 WRAP, 2008

FIGURE 1.1

PROPORTION OF CONSUMERS CONCERNED ABOUT 'OVER PACKAGING'

GERMANY	32%
ITALY	38%
NETHERLANDS	43%
FRANCE	50%
SWEDEN	51%
SPAIN	52%
UK	60%

DATAMONITOR, 2009

Some believe that the rise of the so-called 'convenience culture', where half of consumers now claim to eat 'on-the-go' with no prior thought given to where their next meal is coming from, may

necessitate additional packaging⁵. In addition, the growth in food knowledge among customers, used to the notion of buying exotic and seasonal foods all year round, means that often more packaging support is required to keep these products in excellent condition. This is not simply about lobbying for more packaging per se; rather that demand for flexibility, convenience and year-round availability of produce requires it. So, whilst consumers are sceptical and sometimes concerned about 'over packaging', consumer demand and a growing convenience culture, coupled with campaigns for healthier nutrition, are driving an increased need for packaging support. This requires smart packaging solutions as the industry responds to this need. Similarly, consumers also want to take environmental issues seriously and incorporate them into their decision-making process.

There is therefore a societal challenge on how to inform consumer perceptions about how best to reduce environmental impacts. These lie not only in the lifecycle of the packaging itself but in the positive role that smart packaging can play in the whole lifecycle of the product, which includes both the packaging and contents.

In this context, the perception of 'over packaging' becomes a tricky knot to untie. Supermarkets are the 'front line' for consumers on packaging, and they are increasingly vocal about their customers' demands. These demands tend to be for less packaging and more sustainable practice, without acknowledging the potential conflict between these competing aims. There is little public understanding of the role packaging plays in minimising food waste, or indeed how serious the food waste problem actually is. The right use of the appropriate material packaging can make a huge difference to food wastage.

Where clear benefits of packaging are demonstrated, consumers better understand the value that these materials bring. There is good evidence to demonstrate that strategic use of packaging options can bring particular health and shelf-life benefits to products.

Researchers at the University Miguel Hernández in Alicante and Murcia's San Antonio Catholic University found that a beverage carton with a thin layer of aluminium foil maintains the quality of orange juice for more than 90 days, whereas the equivalent carton without aluminium had a shelf-life of only 54 days.

BELTRÁN-GONZÁLEZ ET AL, 2008

"That green message should be very clear and visible on the product itself, for immediate and unflinching acceptance. It pays to be eco-obvious and the reward is market share."

DENNIS SALAZAR, 2009



6 DATAMONITOR, 2007
7 NIELSEN, 2008
8 INCPEN, 2008

Packaging is also integral to boosting perceptions of safety, and will therefore be an important part of more concerted efforts to sustain consumer trust in food products⁶. Only about 30% of global consumers surveyed would abandon packaging meant to keep food clean and untouched by other shoppers, or with labels that, for instance, held instructions for cooking and use⁷.

There is a section of consumers who want packaging that can be recycled, but who do not fully understand the relationship between recycling and the recovery of waste packaging. UK research in 2008 found that the same percentage (42%) of respondents thought recycling was as important in reducing the impact of packaging as reducing the amount of packaging they used⁸. The same study found that whilst 39% said they always took re-usable bags with them to the store, only 9% avoided buying products with too much packaging.

Finally, convenience has been a key element for consumers and retailers with regard to packaging, especially in terms of handling, transportation and storage. Consumers are now used to being able to have seasonal produce all year round, which often requires high-tech packaging. Consumers want lightweight, easy-to-store packaging with easy-opening and resealing mechanisms, and there is also a growing trend for packages that can be used in cooking (for example, microwaveable or oven-proof packs). Consumers also want the resulting 'waste' to be low quantity and compressible.

Incentivisation can be a key driver of change, and industry awards offer a chance to motivate innovation and demonstrate excellence to both competitors and customers. The Alufoil Trophy awards annual prizes to the packaging industry, but there are few other awards to drive innovation in the field. It is therefore vital that the strategic case for intelligent packaging interventions, to effectively increase overall resource efficiency, is made more assertively.



Ethical Purchasing

“IT’S IMPORTANT TO ME THAT I FEEL I AM DOING THE RIGHT THING”

Across Europe, consumer concern and action towards ethical purchasing is increasing. ‘Doing the right thing’ has become a key lifestyle priority, and influences shopping decisions and behaviours.

Figure 2.1 shows that consumer understanding of what constitutes ‘ethical’ purchasing goes beyond simple environmental issues to include social factors such as fair trade and animal welfare. Ethical consumption is a big and growing market: the UK’s ethical spend, for example, has grown from £15 billion to £40 billion over the last decade⁹.

But does this burgeoning ethical concern translate into direct action or behavioural change with regard to packaging?

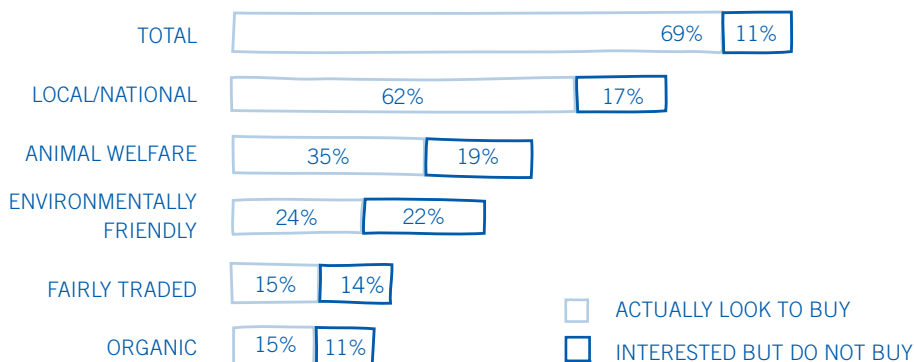
Whilst it’s perhaps not yet a ‘deal-maker’ or ‘deal-breaker’ in terms of customer purchasing decisions, packaging is growing

in terms of its relative importance to shoppers. 41% of consumers think about packaging at home, while 19% think about it in-store¹⁰. Findings on consumer segmentation and trends in ethical shopping produced the analysis in figure 2.2. It shows the different views on ethical consumerism and the differences between European countries¹¹.

“Although sustainable packaging is not yet a primary motivator of purchases, it is becoming a consumer expectation, and is one of a growing number of consumer issues driven by ethics, economics and environmentalism.”

DATAMONITOR, 2009

FIGURE 2.1
SEVEN IN TEN EUROPEANS BUY ETHICALLY



9 CO-OPERATIVE BANK, 2009
10 INCPEN, 2008
11 IGD, 2008

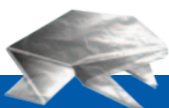
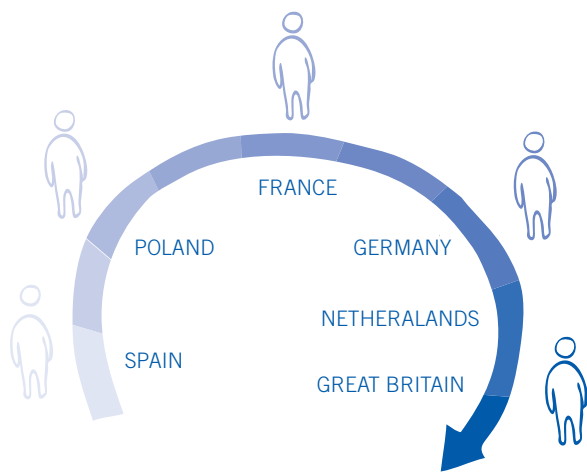


FIGURE 2.2
**THE CURVE OF CONSUMPTION
 TOWARDS ETHICAL EVANGELISM**



- **Conscious Casuals:** Show little or no interest in ethical shopping
- **Blinkered Believers:** Their concern is focused on one ethical dimension in particular
- **Aspiring Activists:** They express interest in many more ethical areas than they currently buy into
- **Focused Followers:** They have made several steps into ethical shopping, but pick and choose their areas of interest
- **Ethical Evangelists:** They actively buy across the broad spectrum of ethical issues

Whilst not an official hierarchy, this diagram shows the diversity of consumers across Europe. It illustrates the complexity of attitudes towards ethical purchasing; of which packaging is a factor.





Shining a Light into the Darkness

“I HAD NO IDEA THIS WAS SO COMPLICATED”

There is an important link to be made between the rise in ethical consumerism and the aforementioned consumer confusion. Ethically-minded consumers and stakeholders trying to do the right thing can easily be misled in their pursuits. In an industry that progresses often and quickly, consumers are not always up to date with the latest knowledge and technological developments.

Despite mounting evidence to the contrary, consumers still have divergent opinions on appropriate packaging and the real and potential benefits of the right packaging.

Consumers are not the only ones who have a lack of understanding; other stakeholders and key influencers, such as the media, often confuse the potential of packaging.





“Led astray by the philosophical corner-cutting of popular opinion-formers, people didn’t understand that seemingly ‘excessive’ shelf packaging allowed manufacturers to cut back on transit packaging and so make overall savings. Neither, in their urge to be angry, did they take account of improvements in hygiene, bulk handling and storage, extended shelf life and reduced food waste.”

RICHARD GIRLING
(THE SUNDAY TIMES), 2009

“There’s no doubt that well-designed packaging has a role to play in helping consumers to reduce the amount of food they throw away. We’re not on the side of The Independent and The Daily Mail in saying that the only good packaging is no packaging; we’re taking the more intelligent approach towards encouraging optimisation.”

ANDREW PARRY
(PACKAGING NEWS), 2010



The Bigger Picture: The Problem of Food Waste

“I SHOCK MYSELF WITH HOW MUCH FOOD I THROW AWAY”

Food waste is a serious issue in the EU. Across Europe, food waste from households reaches approximately 71 million tonnes a year, at a cost of €90 billion in wasted food alone (not including disposal costs). In the UK, for example, nearly seven million tonnes of household food waste is produced every year, with consumers throwing away up to a third of the food they buy. Four million tonnes of this waste also represents food that could have been eaten; nearly two thirds of it is from ‘left and unused’ food¹².

It is important to consider this wider picture of resource wastage when assessing the environmental impacts of packaging. As figure 4.2 shows, packaging is just one part of the food cycle.

Throughout a product’s lifecycle, packaging plays an important role in reducing environmental impacts through functions such as preventing spoilage, creating convenience, regulating portions and reducing waste.

The energy ‘pay-back’ of investment in packaging is entirely favourable. In the UK, for example, each household’s annual purchase of products weighs nearly three tonnes, and requires 110 gigajoules of energy to produce. Less than 200 kilogrammes of packaging is required to maintain these food products, and the energy used to make that packaging is just seven gigajoules – or one fifteenth of the energy used to produce the goods originally¹³. This is clearly a sensible investment.

This wastage is not just a food problem. In the context of climate change, the food and drink sector accounts for around 25% of Europe’s

greenhouse gas emissions, and avoidable food waste is associated with the generation of millions of tonnes of greenhouse gases¹⁴.

For example, on average, every tonne of food and beverage waste generates 4.2 tonnes and 1.5 tonnes of greenhouse gas emissions, respectively¹⁵. This includes the direct emissions caused by food waste (through transportation of waste and its decomposition, which releases methane), but not the far bigger ‘embodied’ greenhouse gases emitted in the production, processing and distribution of the food itself.

FIGURE 4.1



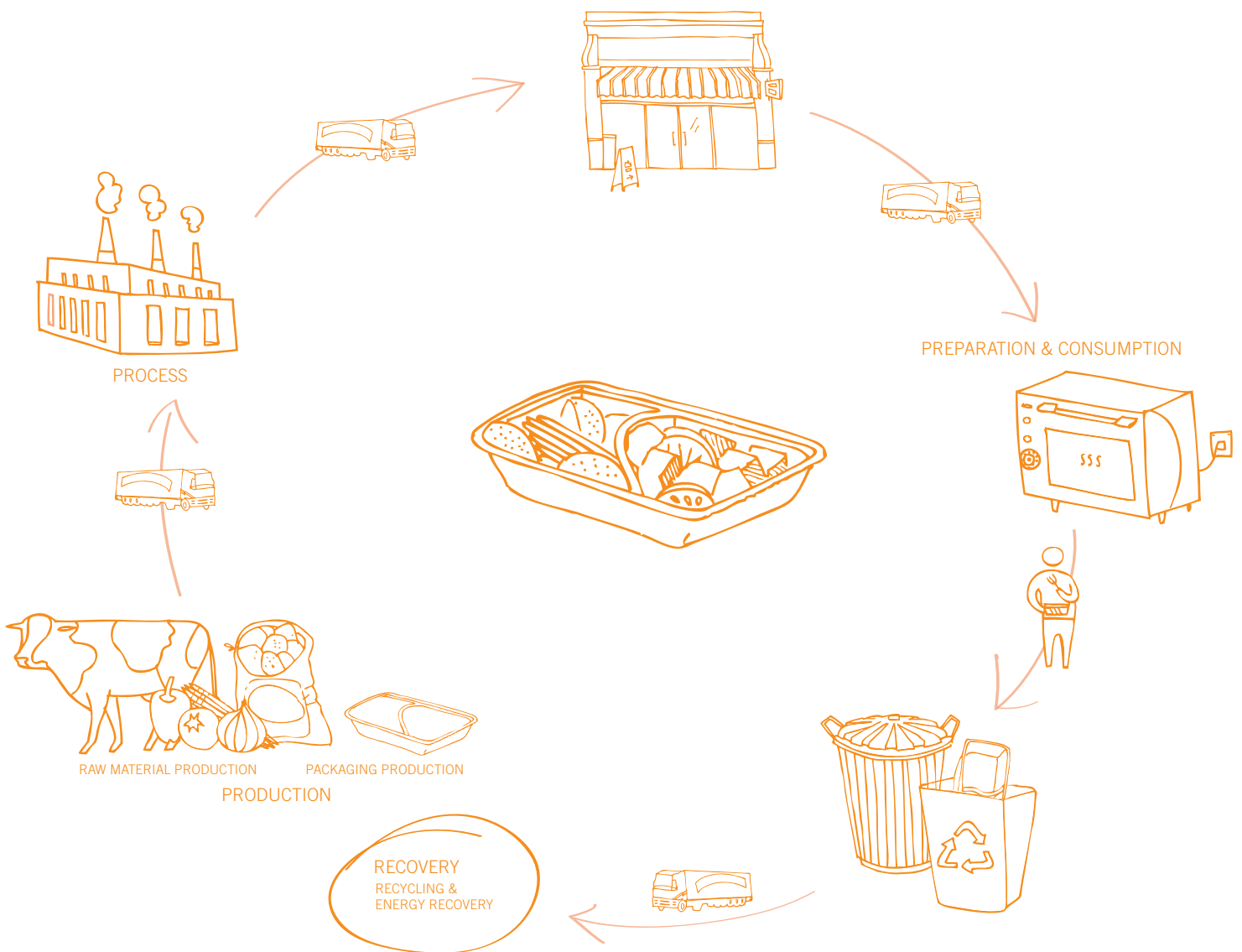
12 WRAP, 2007

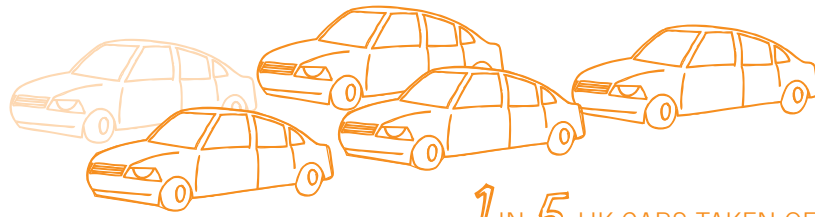
13 ADVISORY COMMITTEE ON PACKAGING, 2008

14 EIPRO, 2006

15 WRAP, 2008

FIGURE 4.2
PACKAGING AS PART OF THE LIFECYCLE OF FOOD





1 IN 5 UK CARS TAKEN OFF THE ROAD

Cutting just the direct waste as an example, in the UK this would have the same climate change benefit as taking one in five cars off the road.

But greenhouse gas emissions are not the only impact from wastage. The amount of water embodied in wasted food is also significant and problematic in an increasingly water-stressed world. Conservative estimates of water losses caused by food loss and wastage by the World Economic Forum, indicate that about half of the water withdrawn for irrigation is lost. According to a European Science and Technology Report, food contributes to nearly half (43%) of water usage (non-animal-related food contributes to 33%, animal-related contributes to 10%) in Europe. So if we can reduce food waste, we can dramatically reduce the waste of embodied water too¹⁶.

“In the UK the recent Love Food Hate Waste initiative has largely identified misuse of product rather than application of packaging as the principal cause for concern. UK households dump an estimated 6.7 million tonnes of uneaten food in the bin per annum; 40% of which is fresh produce worth £3 billion. With the war on waste extending to the home front, the capability of packaging to prolong active life is taking on a revitalised resonance.”

WRAP, 2007

Up to 50% of the world's food grown or produced for consumption is lost and wasted along the value chain ‘from field to fork’. This represents a massive set of inefficiencies and resulting opportunities for all stakeholders along the value chain in terms of water, energy, land use, and wasted calories as well as a significant contribution to global greenhouse gas emissions. Developed and developing countries face different challenges in this area based on differences in consumer behaviour, food storage, distribution infrastructure, packaging, and transport practices, with more waste downstream from the consumer in the industrialized world and more spoilage upstream in the developing world.


WORLD ECONOMIC FORUM, 2010

16 EUROPEAN COMMISSION, 2009

17 PORTER, 2002

18 ADVISORY COMMITTEE ON PACKAGING, 2008





One source indicates that there is a highly negative correlation between the amount of packaging and the amount of food waste. Porter, in *The Economics of Waste*, draws on the examples of Alter and Palli, as well as research done by the World Health Organisation, which claims that in the developing world, between a third and a half of food decays before reaching the consumer. Porter's own research states that in the developed world, this figure is between 2% and 3%, largely due to smarter packaging and refrigeration¹⁷.

Sensible packaging is an inherently rational solution that can dramatically reduce the senseless waste of precious food, and the embodied carbon and water it contains. Therefore, one way to potentially decrease the amount of food wastage is to increase the use of appropriate food packaging, running contrary to conventional wisdom.

So, why should this be the case? The answer is surprisingly simple: food waste has at least ten times the environmental impact of packaging waste, and that's before taking into account the impact of methane from decaying food¹⁸. This is not to say that packaging is the single solution to food waste; however, a modest investment in the right packaging can lead to major environmental savings through reducing food waste. We can save more

valuable food through appropriate packaging applications. Once again, this is not necessarily about more packaging, but better packaging, and more appropriate protection that ultimately saves resources.



The Holistic View

“WHEN YOU LOOK AT IT THIS WAY — THE SOLUTION BECOMES CLEAR”

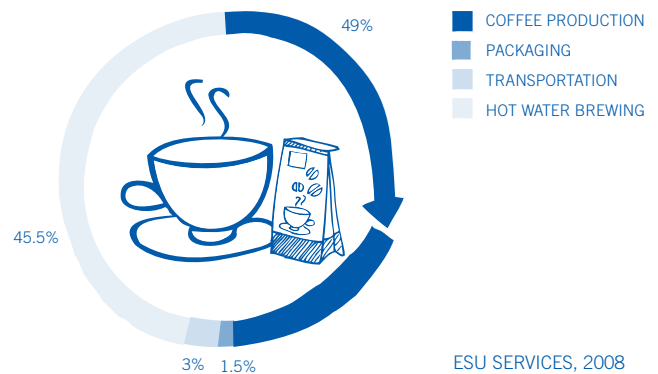
‘Footprinting’, as a concept, helps to translate the direct and indirect impacts of a product or service on our environment and natural resources into a single, highly symbolic number. Due to its simplicity it has become popular in environmental circles. We are increasingly being cajoled by scientific methodologies into measuring our personal ‘carbon footprints’ as a topical and immediate approach to addressing climate change. Governments, businesses and NGOs appeal for us to become more carbon numerate in order to reduce our emissions as the latest research suggests that drastic changes are required.

Water footprints address a different impact, raising awareness and responsibility for a natural resource which is under stress and becoming scarcer with the growth of the world’s population. However, whilst the seriousness of climate change and water supply should never be underestimated, footprinting has its limitations, in particular when the scope is too narrow. This is especially true in the context of packaging, where a simplistic view of the footprint of the packaging excludes the direct benefits it may have; for example, in mitigating waste, which has been explored in previous chapters.

In order to account for these wider benefits, we need to take an approach that considers the full product lifecycle, accounting for all impacts ‘in the round’ and not merely in a compartmentalised and reductive fashion. This approach has to take into account all aspects, in terms of environmental impacts, along the full lifecycle of a given product, as fairly as possible. A good example to illustrate this lifecycle approach is a simple, single cup of coffee.

The following diagram shows the climate impacts for ground black coffee and the different contributing factors in CO₂-equivalents.

FIGURE 5.1
LIFECYCLE GREENHOUSE GAS EMISSIONS
FOR A CUP OF COFFEE BREWED WITH GROUND BLACK COFFEE
(TOTAL 95.5 GRAMMES CO₂-EQUIVALENT)



The diagram represents the impact of foil-based flexible packaging in relation to its wider role in the protection of the resource it holds. As the diagram shows, only a small percentage of the total impact comes from the packaging. The majority impact comes from the boiling of the water and the production of the coffee itself. A proportionately small investment in packaging saves a large amount of greenhouse gas emissions in the context of the overall product lifecycle.

For coffee, the full lifecycle comprises the growing, sorting, roasting and further processing up until retail. It also includes the brewing impacts, such as transportation and electricity. This makes it clear that the production of the coffee itself has the highest share of all considered environmental impacts. In the illustration, only the greenhouse gas emissions are shown; however, the observations are backed up by all relevant aspects.

The illustration also reveals that the biggest greenhouse gas contribution of the finished product is the boiling of the water, not the production or roasting of the beans themselves. Perhaps counter-intuitively, the greenhouse gas emissions from transportation and packaging are very small. Whilst there is still clearly a need for packaging to develop and continue to evolve, this demonstrates the need to focus on the impact of the food itself, along its full lifecycle, as well as the packaging in which it arrives¹⁹.

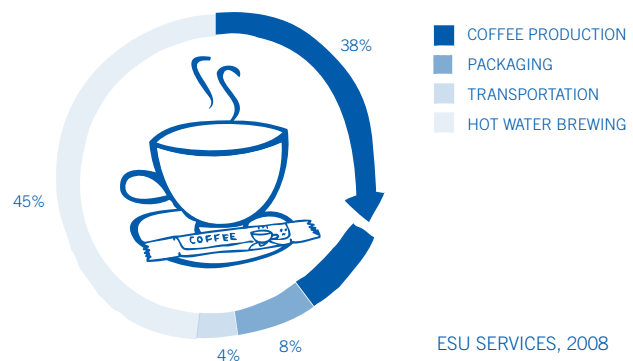
In addition, we can illustrate another important packaging dilemma: portion packs. Portion packs can be very effective in avoiding wastage;

in this case, from preparing too much coffee. Portion packs can save a lot of resources and increase sustainable consumption, representing a major efficiency benefit in the way the product is used. Using the same scale as the previous diagram, the following diagram shows the percentage impacts from a single-serving stick pack of black coffee.

FIGURE 5.2

LIFECYCLE GREENHOUSE GAS EMISSIONS

FOR A CUP OF COFFEE BREWED WITH INSTANT BLACK COFFEE
(TOTAL 91 GRAMMES CO₂-EQUIVALENT)



The share of packaging within the total greenhouse gas emissions has increased, in this case from 1.5% to 8%. The fact that the overall impact remains about the same is explained by a different process step in the coffee production. The role packaging plays in regulating portion sizes reduces the impact of the coffee consumption by preventing waste, thus generating a far more significant saving than the absence of packaging would create²⁰.

Foil for the Future

“I HAD NO IDEA ALUMINIUM FOIL WAS SO VERSATILE”

We are faced with the challenge of a more sustainable form of development. In light of this, aluminium foil is an ideal candidate to contribute to improvements in the design and materiality of packaging to save more resources at the end – effective and efficient. A single answer to the packaging debate will not be good enough for today’s concerned consumer. Instead, a holistic approach is needed, looking at foil’s physical material properties and their position within the whole lifecycle.

Unique Properties

Aluminium foil is a versatile and effective material, involved in many applications – in particular for packaging. It can easily be combined with other materials to limit the overall packaging material input to an absolute minimum. It is also flexible, adaptable and malleable and can be wrapped around unusually shaped products or pressed into semi-rigid containers. Aluminium foil also has unrivalled absolute barrier properties – preserving and protecting product contents with regard to taste, nutrition and shelf-life in a way that, weight for weight, no other packaging material can compete with.

Aluminium foil packaging provides optimal protection properties by offering an impermeable barrier to light, ultra-violet rays, water vapour, oils and fats, oxygen and micro-organisms. For sensitive products such as pharmaceuticals or food, aluminium foil packaging is a hygienic, non-toxic, non-tainting barrier. This retains the product’s flavour and keeps the contents fresh by protecting them from external influences, thus guaranteeing a long shelf-life.

Aluminium foil is by far the lightest ‘complete barrier’ packaging material. Alufoil, only six one-thousandths of a millimetre thick, effectively protects contents against the quality-reducing effects of oxygen, light, moisture, micro-organisms and unwanted aromas. Just 1.5 grammes of alufoil in a laminated beverage carton weighing 28 grammes, enables one litre of milk to be stored and transported for several months without refrigeration. Aluminium leads the way in ‘doing more with less’ for source reduction in packaging, saving both raw materials costs and energy resources.

Aluminium foil’s hygiene properties, its heat conductivity and resistance, as well as its ability to be used in a microwave oven, make it a perfect material for the production of ‘ready meal’ containers and other modern applications. Contrary to popular belief, one can safely microwave aluminium foil trays.



Increasing Convenience: The role of alufoil containers

Using semi-rigid aluminium foil containers for either chilled or frozen ready-meals can have significant environmental benefits. The analysis of the lifecycle demonstrates that the packaging makes a very low contribution to the overall environmental footprint of the meal, considering all phases from manufacturing and retail, to shopping, to transportation, to storage and preparation in the household. Moreover, the specific properties of foil containers contribute to product conservation, easy and efficient heating or cooking as well as looking good on the table.

Frozen ready meals offer efficiency in all areas of the supply chain and are competitive when compared to meals that are self-prepared in the home. The footprint of an aluminium container is negligible in comparison to the footprint of a self-prepared meal when transport, food waste and cooking are taken into account.

ESU SERVICES, 2009



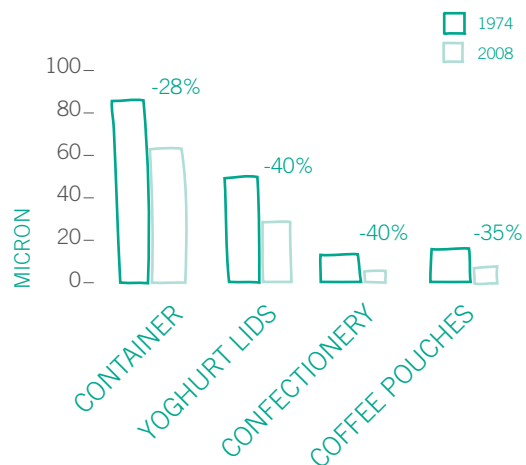
Throughout the supply chain and during disposal, aluminium remains a versatile resource. For aluminium packaging (packaging with aluminium as the dominant material, e.g. beverage cans or alufoil containers), the estimated average recycling rate in Europe is above 50%²¹. However, the amount of aluminium packaging that is effectively recycled depends greatly upon individual national requirements, the specific application and the efficiency of the collection schemes; because of these factors, national rates vary from 30% to 80% or more across Europe.

Aluminium foil applications which are not collected for recycling are increasingly processed in incinerators. The thin laminated foil fraction is oxidised and recoverable energy is released. The remaining non-oxidised fraction can be collected from the bottom ashes of the incinerator and subsequently used for recycling purposes. Recycling of aluminium in either way requires up to 95% less energy and subsequent greenhouse gas emissions without any loss of quality.

The use of aluminium foil over the years has seen major leaps in efficiency of application and significant material optimisation, including increasing use thinner layers. For any given packaging type or application, this reduces the amount of aluminium foil required to obtain the same results. Figure 6.1 shows material optimisation for four types of aluminium-based packaging and the progress that packaging technology has achieved.

As the graph shows, a far smaller amount of material is needed in 2008 than was required in 1974 to perform the same role, with both yoghurt lids and confectionery obtaining a significant 40% reduction in packaging material. This is due mainly to the progression of packaging technology and the increased use of smart materials such as aluminium foil.

FIGURE 6.1
DOWN GAUGING:
MATERIAL OPTIMISATION FOR SAME FUNCTION



EAFA, 2008

These factors make a strong case for the contribution that aluminium foil can make for sustainable production and consumption as the overview on the right shows.

FIGURE 6.2

THE PHYSICAL PROPERTIES OF ALUMINIUM FOIL

PROPERTY	PACKAGING EFFICIENCY	INCREASING RESOURCE EFFICIENCY
BARRIER FUNCTION	Acts as an absolute barrier to light, gases and moisture and therefore provides perfect preservation of aroma and product characteristics.	Extends the viable life of products for many months – even years – at room temperature. This prevents spoilage and provides energy savings as products can be preserved for long periods without the need for refrigeration.
MECHANICAL	Uniquely light yet strong, foil's 'deadfold' characteristics allows it to wrap products tightly and without any glue or other sealants.	Mechanical properties like deadfolding allow for continuous preservation, minimising the need for sealants. Food waste is prevented through portioning, portability and preserving leftovers.
SURFACE STRUCTURE	Can efficiently be laminated with other materials, thus combining the complementary properties of the flexible packaging substrates for improved overall performance and making thinner laminates possible.	Thin laminates, rather than bulky packaging, save valuable raw materials while less weight means a more efficient supply chain during and after use. Space efficiency in storage and display further enables cost savings.
LIGHTNESS AND SPACE ECONOMY	Highly efficient weight: the function ratio for provision of barrier effect (e.g. 1.5 grammes of aluminium per one litre fruit juice carton).	Efficiencies in transport and storage result from lightness. Less weight to transport means a more efficient supply chain – both during use and after use. Space efficiency in storage and display further enables cost savings.
HEAT CONDUCTIVITY	Conductive of heat and able to withstand extreme temperatures, foil is ideal for autoclaving and heat-sealing processes. This protects product quality by minimising sealing times and evening-out the temperature gradient.	The minimisation of processing, chilling and re-heating times enables energy savings. Foil's properties also facilitate retortability, which increases resource savings during packaging and filling.
RECYCLABILITY	100% recyclable infinitely, without any loss of quality.	Recycling process requires 95% less energy than primary production, equating to enormous emissions savings. In cases when not recycled, incinerated, oxidised foil releases energy that can be recovered while any non-oxidised parts can be recycled.
ELECTRICAL CONDUCTIVITY	High electrical conductivity enables high-precision, contact-free sealing, thus widening the application range for efficient and fast filing technologies.	As thermal conductivity ultrasonic sealing helps to save materials by minimising the seaming area and energy.
REFLECTIVITY	Reflects up to 98% of light and infrared heat.	Low heat emissivity saves energy for cooling or heating in both technical insulation and the insulation of prepared food.
MULTI-MODE HEATING OR COOKING	Allows food to be cooked or re-heated by convection, microwave or fan oven or in 'bain marie' systems.	Helps save time and resources during preparation.
HYGIENE AND SAFETY	Foil is sterile – it does not harbour or promote bacteria – thanks to high-temperature annealing. This makes it safe for use with foodstuffs and an ideal protection against tampering.	Food lasts longer as well as retaining nutritional quality.

The savings that the physical properties of foil can create are exemplified in the use of light alufoil packages for beverages instead of rigid and heavy packaging like glass bottles. Transport emissions are reduced significantly, with drinks companies able to transport almost twice as much product per truckload. This results in less fuel consumption, less traffic and less burden on roads and infrastructure.

Flexible packaging is delivered on rolls to the food manufacturer, and is usually formed during the filling process into the final packaging format. This saves extra resources in transportation before the packaging process, avoiding the expensive and unnecessary transportation of air.

Figure 6.3 shows the difference in impact from packaging and beverage in the total weight when a drinks company uses a foil pouch rather than a glass bottle.

In this instance, when a laminated pouch is used, the weight impact of the packaging drops from 52% to 6%. The weight impact relates directly to increased efficiencies in transportation and storage. This results in an overall improvement in environmental performance.

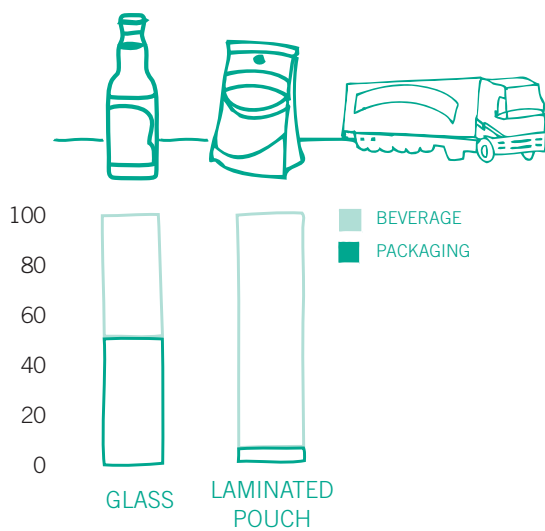
Reducing Food Waste: The role of household foil

It's not just the physical properties of aluminium foil that help to increase resource efficiency in manufacturing, transportation and packaging; it's the role they can play in the wider impact of the food chain. At its simplest, this is through the use of foil as a wrapping material to preserve leftovers in the fridge and thus reduce plate-waste. At its most complex, this is foil's role in minimising food waste in the overall food chain. Aluminium foil brings into play its properties and proven efficiencies to help increase the proportion of the product that reaches the consumer in the desired condition.

Aluminium household foil is often used to wrap and preserve meal leftovers to extend fridge-life and reduce wastage. The dead-fold properties of foil, combined with its



FIGURE 6.3
**TRANSPORT EFFICIENCY SAVINGS
 THROUGH LIGHTWEIGHTING**
 FOR FRUIT-BASED DRINK - 0.2 LITRES



DEUTSCHE SISI WERKE, 2002

high barrier effect and its non-reaction to foodstuffs, make it effective as a food wrapping to avoid spoilage and cut the waste of resources embodied in the production, storage, distribution and cooking of the food. This is especially true for highly processed foods, such as roasted meats.



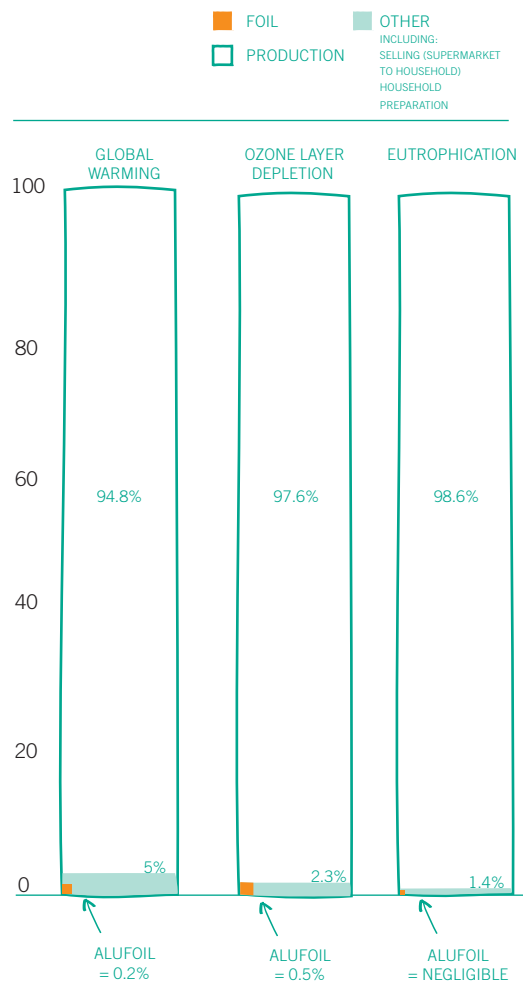


Figure 6.4 shows the potential impact of aluminium household foil in relation to the roast pork it prevents from being wasted. It uses three environmental indicators: Global Warming [kilogrammes CO₂ eq.], Ozone Layer Depletion (ODP) [kilogrammes CFC-11 eq.], and Eutrophication [kilogrammes PO₄³⁻ eq.]. It also shows a third category that represents further impacts from the distribution and selling, transportation, preparation and storage in the household.

As the graph clearly shows, the impacts of aluminium household foil in comparison to the resources it protects are tiny. The environmental impact of our food, through the use of water, fertilisers and intensive agriculture and preparation, is significantly larger than the environmental impact of the household foil itself. Efficient and appropriate use of aluminium foil is the essential link in a sustainable food chain, minimising waste, reducing spoilage and increasing efficiency²².

FIGURE 6.4

THE COMPARATIVE IMPACT OF ALUFOIL IN RELATION TO THE RESOURCES IT PROTECTS



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23 ESU SERVICES, 2008

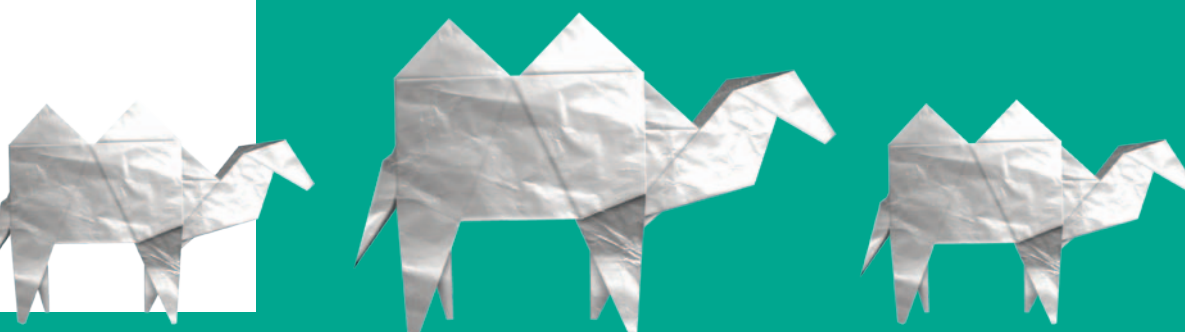


Resource efficiency: The role of aluminium foil in butter consumption

According to various lifecycle analyses, large potential environmental impacts are associated with the production of butter as a typical dairy product. These include harvesting of grain or fodder, the cow's own methane emissions, the energy used in the mechanical process of milking and butter production itself. Further impacts then come from the subsequent refrigeration and transportation.

Family packs (250 grammes) are wrapped in foil laminate, a packaging solution that brings many advantages. Firstly, the foil acts as a barrier against light, oxidation, moisture loss and nutritional deterioration; secondly, its 'dead-fold' properties allow easy and efficient packing, and the butter can be rewrapped. An individually wrapped 15 grammes 'pat' of butter may seem an unnecessary and avoidable piece of packaging. However, if you take a lifecycle perspective, a very different picture emerges.

Even in comparison to a family pack (0.3%), the relative contribution of the packaging to the overall impact of the small butter pat is only 0.8%²³ (global warming potential). When this is considered in the context of what is potentially being saved by individual wrapping (all the embodied energy and carbon, correct portioning and use, reduced spoilage), you can quickly see how a strong case can be made for 'appropriate' packaging that protects the high-impact product and ensures it is used most efficiently. This is especially true for the catering industry for which these individually wrapped portions were developed.



The 'More is Less' Vision

MAKING SENSE OF SUSTAINABILITY IN PACKAGING

There are huge challenges ahead:

- A public concerned about a perceived rise in excess packaging whilst simultaneously becoming more environmentally conscious
- A Europe-wide scenario in which food production continues to have a large environmental footprint and high levels of wastage

It is critical to position foil-based packaging as an effective and intelligent packaging solution for efficient protection and resource saving.

So, what might we achieve through a wider roll-out of effective and appropriate foil packaging? What is the business case? What might the real, tangible benefits be in terms of food wastage avoided, and water and carbon saved? What might our 'More is Less' vision look like?

By 'More is Less' we are not saying 'more packaging simply means less waste'.

The argument is actually stronger and more nuanced. Foil-based packaging ensures effectiveness in a very efficient way. Foil-based packaging solutions offer 'more performance', which leads to less use of resources in the context of overall product lifecycles:

- More preservation (through the absolute barrier effect) means a long shelf-life at room temperature and less use of energy for transportation and storage
- More barrier effect means less loss of the nutritional and health benefits of food
- More barrier efficiency and capability means less use of packaging material
- More mechanical properties (like dead-folding) means less use of secondary packaging or glues and inks
- More electrical conductivity means less sealing or seaming energy and material
- More convenience (through portability and portioning) means less food wastage



- More heat conductivity means less use of energy for food processing and cooking
- More recycling means less use of virgin resources

Overall it is clear that whilst 'over packaging' may have more of a public profile, 'under packaging' is just as much of an issue, due to its implications for wasted energy and resources from ruined goods. Foil-based packaging prevents food waste in the first place.

The challenge is obvious. We must use smarter packaging interventions to cut food waste, save water and reduce greenhouse gas emissions. Packaging that delivers more protection, preservation, convenience and physical flexibility really can mean less waste in this context. What this report shows is that, regardless of whether aluminium foil is used directly to wrap food, as semi-rigid containers or as part of composite flexible packaging solutions, it has a major role to play in enhancing the overall sustainability of the food chain. As products change and evolve, foil's adaptable qualities will be a key tool in

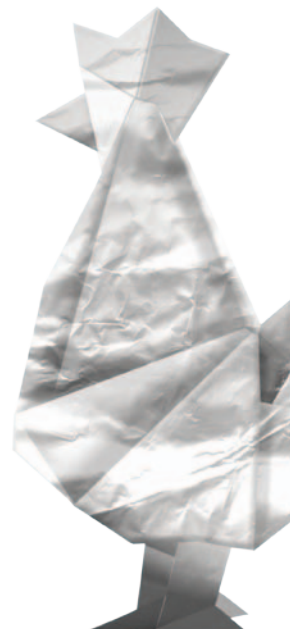
helping producers and packagers to continue innovating.

Aluminium foil packaging has already demonstrated its longevity, and its potential application for helping solve the packaging challenges of the future is enormous. More can indeed be less, and better protection saves resources.



References

- Advisory Committee on Packaging (2008): *Packaging in Perspective*.
- Beltrán-González Felipe et al (2008): *Effect of packaging materials on colour, vitamin C and sensory quality of refrigerated mandarin juice*. Wiley Periodicals Inc.
- Co-operative Bank (2009): *The Ethical Consumerism Report*.
- Datamonitor (2007): *Consumer Attitudes Towards Packaging: New Insights and Future Perspectives*.
- Datamonitor (2009): *Sustainable packaging trend gathering pace*.
- Deutsche SISI-Werke with IFEU (2002): *LCA fruit juice drinks laminated pouch 0.2l, returnable glass bottle, and beverage carton*.
- EAA (2009): *Activity Report*.
- EAFA (2008): *Gauge Reduction*.
- ESU Services (2008): *The LCA of packed food products: The function of flexible packaging: Coffee, spinach and butter*.
- ESU Services (2008): *The LCA of Roast stored in Aluminium Household Foil*.
- ESU Services (2009): *The LCA of ready-to-serve Lasagne Bolognese Packed in Aluminium Foil Based Packaging*.
- European Commission (2009): *The World in 2025, Rising Asia and Socio-ecological transition*.
- European Science and Technology Observatory (2006): *Environmental Impact of Products*.
- Europen (2009): *Packaging in the sustainability agenda*.
- Girling, R. (2009): *Eat Me... And Save the Planet*. The Sunday Times.
- IGD Consumer Unit (2008): *Consumer Segmentation and Trends in Ethical Shopping*.
- IGD (2008): *Ethical Shopping in Europe*.
- INCPEN (2008): *Public Attitudes to Packaging*.
- James et al (2005): *Sustainable Packaging: How do we Define and Measure It?* IAPRI Symposium.
- Metal Packaging Manufacturers Association (2007): *Marketing Managers Survey*.
- Nielson (2008): *Britain's Ethical Shopper: Which way now?*
- Parry, A. quoted in King, D. (2010): *Fresh Produce: Bare Necessities*. Packaging News.
- Pike Research (2010): *Environmentally Responsible Packaging for Consumer and Industrial Markets: Market Analysis and Forecasts*.
- Porter, R. (2002): *The Economics of Waste* Washington: RFF Press.
- Salazar, D. (2009): *Is Your Green Packaging 'Eco-Obvious'?*
- Sustainable Packaging Coalition & Packaging Digest (2008): *Member and Subscriber Survey*.
- World Economic Forum (2010): *Driving Sustainable Consumption, Value Chain waste*.
- WRAP (2007): *Understanding Food Waste*.
- WRAP (2008): *Food We Waste*.



Further Reading

Alter, H. (2006): *The Origins of Municipal Solid Waste: The relations between residues from packaging materials and food*. Washington: US Chamber of Commerce.

Boyleston, S. (2009): *Designing Sustainable Packaging*. London: Lawrence King Publishing.

Cone LLC (2007): *Cause Evolution & Environmental Survey*.

DEFRA (2005): *The Validity of Food Miles as an Indicator of Sustainable Development*.

DEFRA (2009): *Making the most of packaging: A strategy for a low carbon economy*.

DuPont (2008): *DuPont Solutions to Today's Trends for Sustainable Packaging*.

Euractiv (2009): *Towards a recycling society*.

European Aluminium Association (2009): *Recycling*.

European Commission (2004): *Food for thought – using the unusable*.

European Commission (2004): *Impact Assessment on the Thematic Strategy on the prevention and recycling of waste and the immediate implementing measures*.

ICIS (2008): *Sustainability Drives Packaging Growth*.

INCPEN (2003): *Packaging Reduction: Doing More with Less*.

INCPEN (2004): *Packaging: The Facts*.

INCPEN (2007): *Under-packaging is 10 times worse than over packaging*.

Jedlika, W. (2009): *Packaging Sustainability: Tools, Systems and Strategies for Innovative Package Design*. New Jersey: John Wiley & Sons, Inc.

Kemp, P. (2006): *Over 100 years ago, nearly all the food we ate came from less than a 20 mile radius of our homes. What a different story today*. Headcorn Sustainability Group.

Kooijman, J. (1996): *Environmental Impact of Packaging Performance in the Food Supply System*. Journal of waste management and resource recovery.

Stonyfield (2009): *So why did we blow our cover?*



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