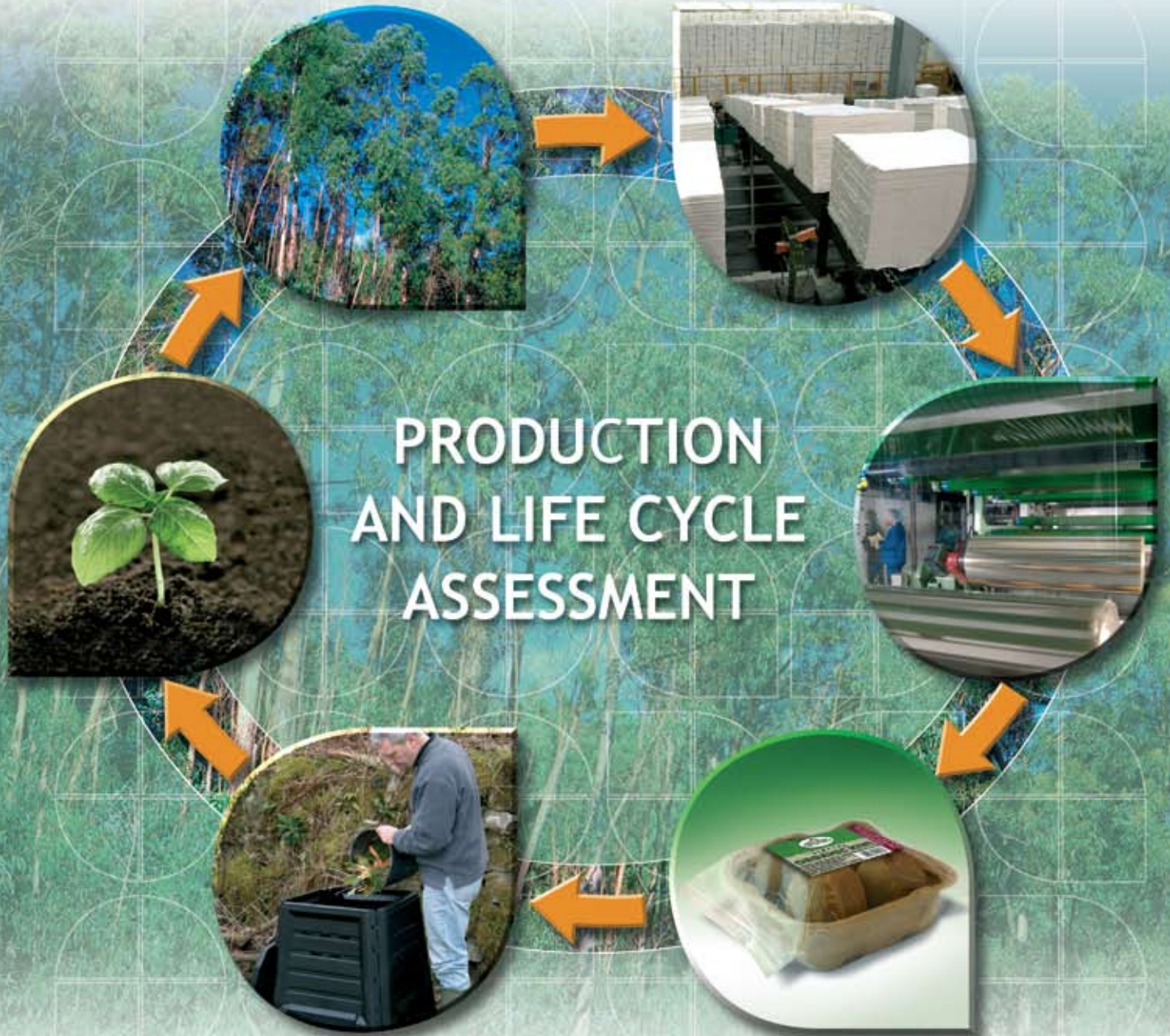


NATUREFLEX™



packaging from nature,
packaging for nature...

Production



- The wood pulp arrives in sheet form which is loaded onto automated storage conveyors that are computer controlled to feed a constant supply of raw material 24 hours a day, 365 days a year.
- The pulp is mixed with caustic soda solution in a pulper to produce a slurry with a consistency similar to that of oatmeal.
- Different chemicals are added in order to further break down the chemical structure of the cellulose. The result of this further processing is the formation of a bright orange thick liquid, referred to as viscose.



From forest to pulp

- NatureFlex™ films are produced from wood pulp, sourced from managed plantations. The suppliers who manage these plantations either have, or are working towards Forestry Stewardship Council (FSC) or similar certification.
- Innovia Films' wood pulp suppliers conform to the environmental management standard ISO 14001.
- It requires approximately 3lb. of wood for every lb. of wood pulp used. The wood components that are not required are used by the pulp manufacturer in other applications.



Film regeneration

- Computer control ensures that the entire process is closely managed and monitored.
- The viscose is carefully filtered and re-filtered in order to maximize the purity of the material to ensure consistent film quality.
- The viscose is extruded through a flat die into the casting bath where it is regenerated into a cellulose film.



- Just prior to the extrusion, there is the option to inject inorganic pigments into the viscose in order to cast white or colored films. In the majority of cases the film is cast as a transparent film.
- As the film progresses down the casting line it is cleaned and softened in order to ensure the right optical and mechanical properties for the customers' applications.

Finishing and applications

- At the end of the casting line, the film is conditioned, dried and wound into large mill rolls.
- For films that do not require coating, the film is slit to the customer's required size.
- In most cases, the mill rolls undergo an off-line coating process in order to provide heat-seal and moisture barrier properties tailored to the requirements of the product being packaged.



- In many cases Innovia Films supplies large rolls to 'converters' who print, laminate, perforate and reslit the film to meet their end-customers' requirements.
- NatureFlex™ films are successfully used in horizontal form, fill & seal (HFFS), vertical form, fill & seal (VFFS), twistwrap, overwrap, and bag-making applications.

Waste Management

Compostability

- NatureFlex™ is suitable for composting in industrial composting facilities, such as windrow and in-vessel.
- NatureFlex™ is certified as compostable in all key biodegradation situations (Industrial, Home & Waste-water).

Incineration

- NatureFlex™ has the same energy value as wood and can be safely disposed of in modern incineration plants to recover this energy value.



'Windrow' type, Industrial Composting Site Photo: Composting Association.

Recycling

- NatureFlex™ is recyclable through organic recycling (composting) in accordance with the standards detailed in ASTM D6400. However, NatureFlex™ is not a thermoplastic material and is therefore not suitable for standard thermal recycling.

Certification

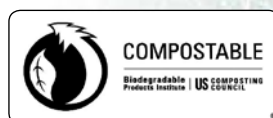
- NatureFlex™ films are certified to both the American (ASTM D6400) and European (EN13432) norms for compostable packaging. They can therefore carry the certification marks of the Biodegradable Products Institute (BPI), Din Certco and AIB Vinçotte.
- In addition, NatureFlex™ is certified to the 'OK Compost Home' scheme, confirming its suitability for use in a home composting environment.

Disposal of Waste

NatureFlex™ film waste can successfully be diverted away from landfill by composting at a managed composting facility.

Quality Standards

Innovia Films conforms to the quality standard ISO 9001:2000, the environmental management standard ISO 14001:2001 and the BRC/IOP Global Hygiene Standard for Packaging.



The Road to Sustainability

- There is increasing awareness that the current model of development in the world is unsustainable and that our consumption patterns are having a negative effect on the environment and the climate.
- Oil is a finite resource that cannot be replenished within a human timescale. Conventional plastics are derived from oil, a non-renewable resource.
- Biopolymers can be produced from renewable raw materials such as corn, potatoes and wheat. NatureFlex™ films are based on cellulose which is the most abundant of all naturally occurring organic compounds.
- NatureFlex™ films have been shown to have a renewable content of approximately 95% according to ASTM D6866 for biobased content as measured by carbon dating.



Process Improvements

- The NatureFlex™ manufacturing facility has had a Climate Change Agreement (CCA) in place since 2000, which commits it to energy efficient targets and continual improvements. These targets were surpassed in 2006. In addition, significant reductions have been made in carbon emissions. NatureFlex™ films are manufactured with a combined heat and power unit to maximize fuel efficiency.
- The site is regulated by the UK Environment Agency and has an improvement program agreed.



- The plant is part of the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) which is the main mechanism for reducing the emission of greenhouse gases in Europe. For phase 1 the emissions were within the specified limits. Phase 2 commenced in 2008.
- Significant investments have been made in high efficiency processing and recovery systems.

Life Cycle Assessment

Introduction

The environmental impact for materials should be based on a Life Cycle Assessment (LCA), which provides a methodology for considering each stage of a product's life from extraction of the raw materials, through manufacture and construction to use and disposal.

An LCA affords a 'snap-shot' in time of any one process. Hence comparisons of different LCA's are not really feasible unless they have been carried out at the same time and are based on identical assumptions. In addition, the functionality of the material should also be considered, as this can significantly affect the true environmental performance of the material.

At Innovia Films, a 'cradle to gate' Life Cycle Assessment of NatureFlex™ has been carried out in

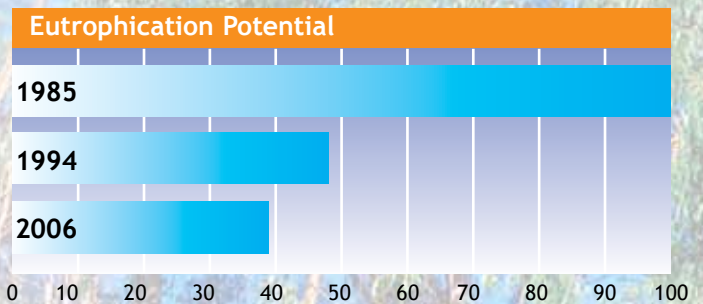
conjunction with an external consultant in order to evaluate the impact of each stage of the process and to highlight key areas which have the biggest environmental impact. 'Cradle to gate' refers to the scope of the LCA, which in this case encompasses raw material manufacture to finished film.

The results from the Life Cycle Assessment have indicated the current situation in terms of a range of indicators. Process improvements made during the last 25 years and the improvements which are scheduled to be completed in 2009 have also been analyzed to determine their environmental effects.

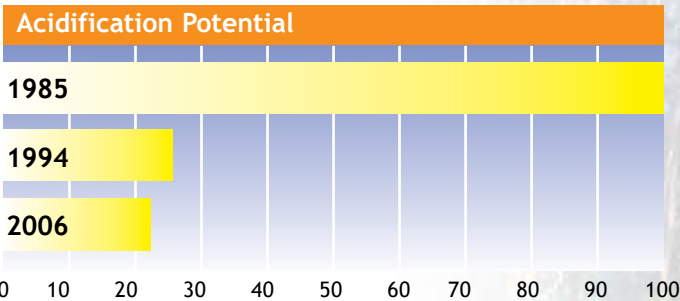
Eutrophication Potential (EP)

- Eutrophication potential has decreased by 61% since 1985 due to the reduction of chemical oxygen demand (COD) emissions, which is the main contributing factor.
- In 1994 an effluent treatment plant was installed which significantly reduced the eutrophication potential. Conversion of the combined heat and power (CHP) unit from coal to gas also had a positive effect on this indicator.

The enrichment of nutrients in a certain place (aquatic or terrestrial) is known as eutrophication. In water, eutrophication leads to accelerated algae growth, decreasing oxygen concentration which leads to fish dying and anaerobic decomposition, which eventually destroys the eco-system.



The transformation of pollutants into acid leads to a decrease in the pH of rainwater, fog and groundwater. This damages eco-systems, as it causes forest die-back, amongst other effects.



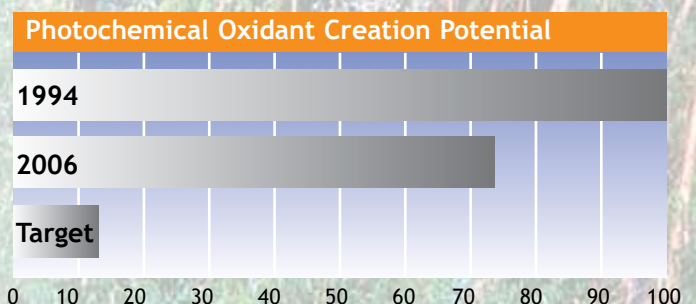
Acidification Potential (AP)

- Acidification potential has decreased by 78% since 1985; this is in the main due to the installation of a water effluent treatment plant.
- Further reductions in acidification potential were realized with the conversion from coal to natural gas as the fuel for the CHP unit.

Photochemical-Oxidant Creation Potential (POCP)

- The photochemical oxidant creation potential has decreased by 26% since 1994 due to improvements in site energy generation, the main factor being the CHP conversion from coal to natural gas.
- Alternative technology currently being considered could reduce the photochemical oxidant creation by a further 61%.

In the stratosphere, ozone plays a protective role, but at ground level it is classified as a damaging trace gas. Photochemical ozone production in the troposphere, also known as summer smog, is suspected to damage vegetation and material.

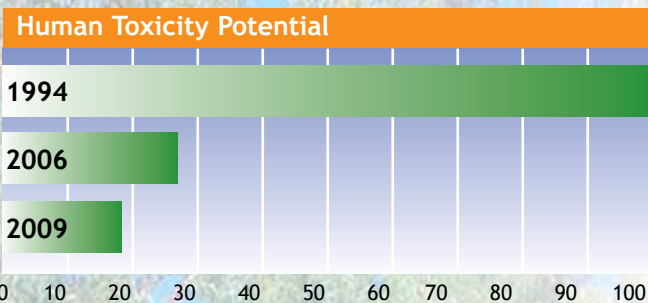


Note: Early data refers to historical Cellophane manufacture. 2006 onwards reflects NatureFlex™ manufacture.

Primary Energy Consumption

- There has been a 30% reduction in fossil fuel use since 1985 due to improvements in site energy requirements and improvements at raw material manufacturers.
- In 1985 the CHP unit was installed, which significantly improved the energy efficiency. Subsequent conversion from coal to natural gas further increased conversion from fuel to energy efficiencies.
- By 2009 full processing aid recovery will be implemented on all production lines and a new, more efficient production line will have replaced older equipment, creating further energy efficiencies.

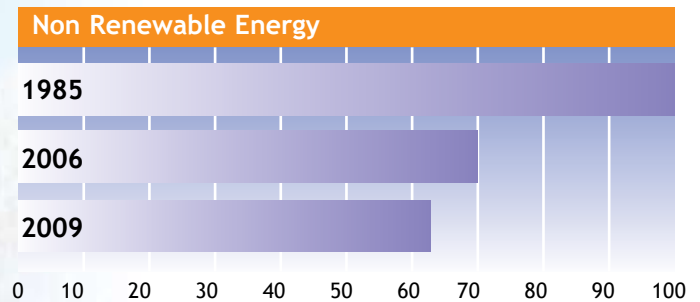
The human toxicity potential assessment aims to estimate the negative impact of, for example, a process on humans. The method for this assessment is still under development.



Global Warming Potential (GWP)

- A significant reduction in global warming potential occurred when the CHP was converted from coal to natural gas.
- Raw material changes also contributed to a 58% reduction in GWP since 1994.
- A further reduction of GWP will be achieved by 2009 as a result of the extension of the processing aid recovery system, and with the installation of the new, more efficient production line replacing older equipment.

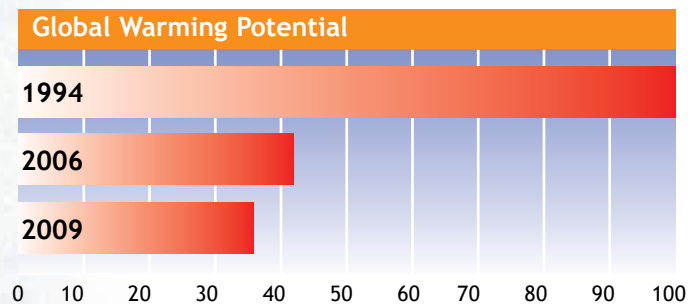
The total 'Primary Energy Consumption (non-renewable)', given in MJ, relates to the gain from 'fossil' energy sources such as natural gas and crude oil, which are used for energy production or as material constituents, e.g. in plastics.



Human Toxicity Potential (HTP)

- Key impact areas for the human toxicity potential are site energy and raw materials.
- Human toxicity potential has decreased by 73% since 1994 due to the conversion of the CHP unit from coal to natural gas and the installation of a processing aid recovery system.
- Further reductions by 2009 are due as a result of the extension of the processing aid recovery system with the installation of the new, more efficient production line.

An increasing amount of carbon dioxide (and other greenhouse gases) in the atmosphere leads to increasing absorption of radiation energy and thus to an increase in temperature, known as global warming. The main contributors to global warming are CO₂, N₂O & CH₄.



Key Improvement Summary:

	Reduction	(%)
Fossil energy demand (non-renewable energy)		30
Human toxicity (negative impact of a process on humans)		73
Eutrophication (enrichment of nutrients causing algae growth)		61
Acidification (air pollution leading to acid rain)		78
Photochemical oxidant creation (summer smog)		26
Global warming (greenhouse gases causing temperatures to rise)		58

Reducing our Carbon Footprint

Information from the Life Cycle Assessment of NatureFlex™ has afforded a clear picture of our carbon footprint. Ongoing process improvements are reducing our carbon emissions each year, and the Life Cycle Assessment has identified the areas to target, but any manufacturing process will inevitably produce a level of emissions. From January 2008 NatureFlex™ films will be carbon neutral, as the residual emissions will be offset by investing funds in projects such as sequestration or re-forestation and energy efficient projects, which either absorb or prevent the release of a tonnage of carbon dioxide equivalent to our carbon footprint.



About Us

Innovia Films is a major producer of specialty Biaxially Oriented Polypropylene (BOPP) and Cellulose films with production sites in the UK, USA, Belgium and Australia.

We hold a leading global position in the markets for labels and security films, high performance coated packaging, tobacco overwrap and biodegradable and compostable films.

Our technical expertise and market-driven development process is the key to our position at the leading edge of advances in these markets.

Research and Development is at the heart of our business and we work closely with customers, suppliers, academics and commercial partners to ensure speed of delivery of new ideas and products.

We prioritize quality of service and support alongside product quality and have teams in place across the world to maintain the highest possible level of responsiveness to the needs of our customers.

www.innoviafilms.com
 email: natureflex@innoviafilms.com
 ™Trademark of Innovia Films Group

Innovia Films Inc
 290 Interstate North Cir SE
 Suite 100, Atlanta
 GEORGIA 30339-2401
 USA
 Tel +1 877 822 3456
 Fax +1 770 818 3001

Innovia Films Ltd
 Wigton
 CUMBRIA
 CA7 9BG
 UNITED KINGDOM
 Tel +44 16973 42281
 Fax +44 16973 41452

Innovia Films (Asia Pacific) Pty Ltd
 PO Box 341, 19 Potter Street
 Craigieburn, Melbourne
 VICTORIA 3064
 AUSTRALIA
 Tel +61 3 9303 0600
 Fax +61 3 9303 0670

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