Knowledge Transfer Network

Materials Security Innovation Opportunities

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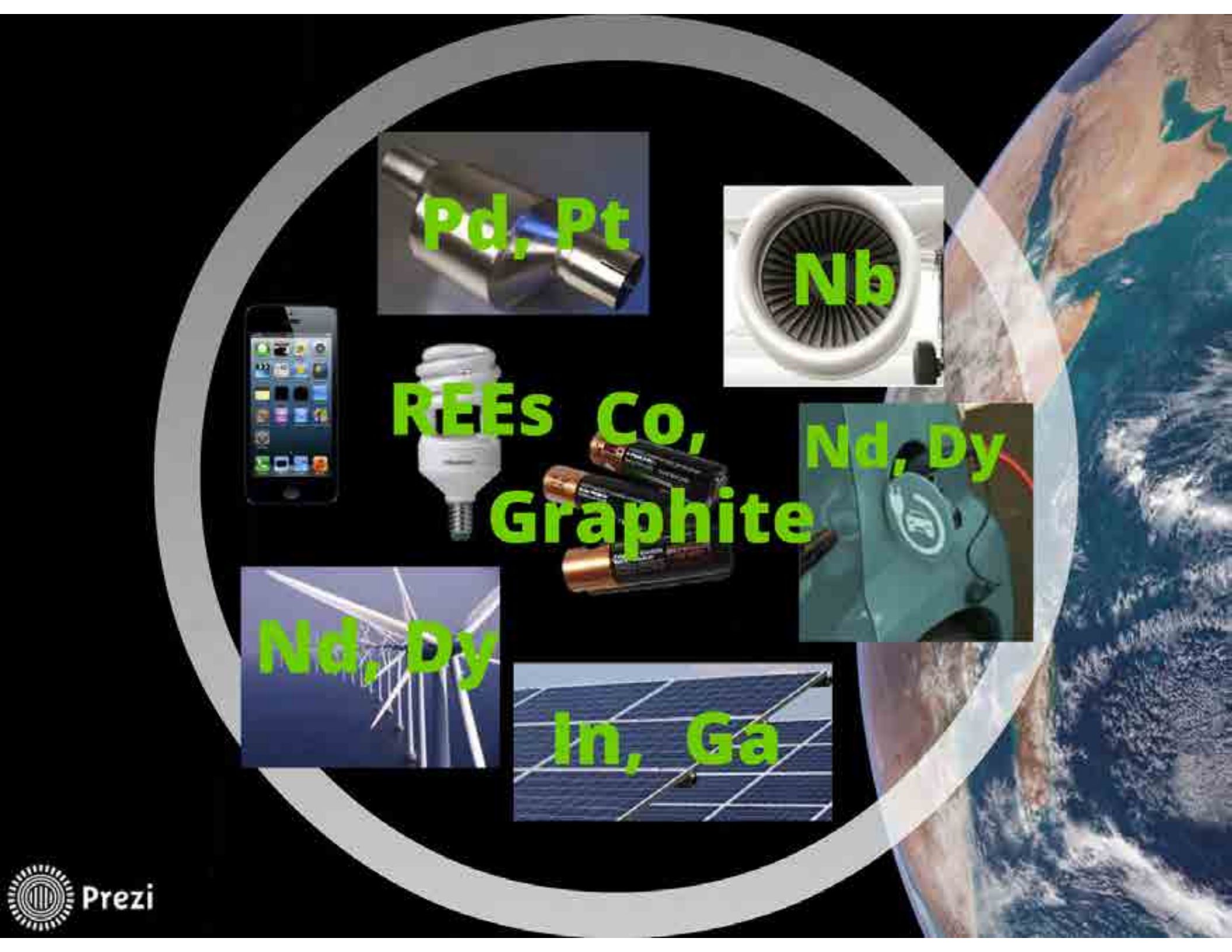
Prezi

Knowledge Transfer Network


>9 billion by 2050


3 billion new middle class by 2050


Pd, Pt
Nb
REEs Co,
Graphite
Nd, Dy
Nd, Dy
In, Ga
Prezi

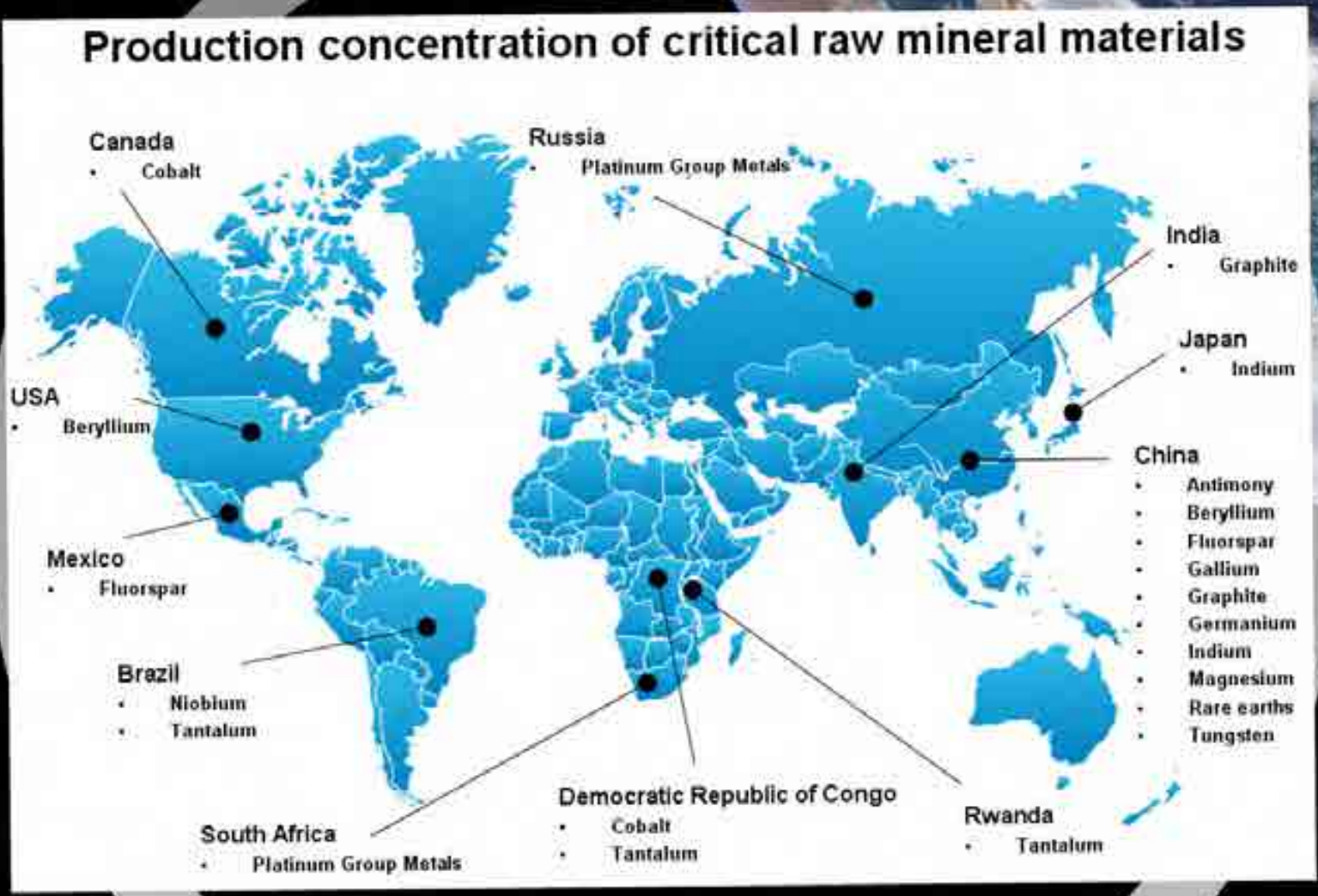
Cr
Towar
in the

Prezi


Prezi

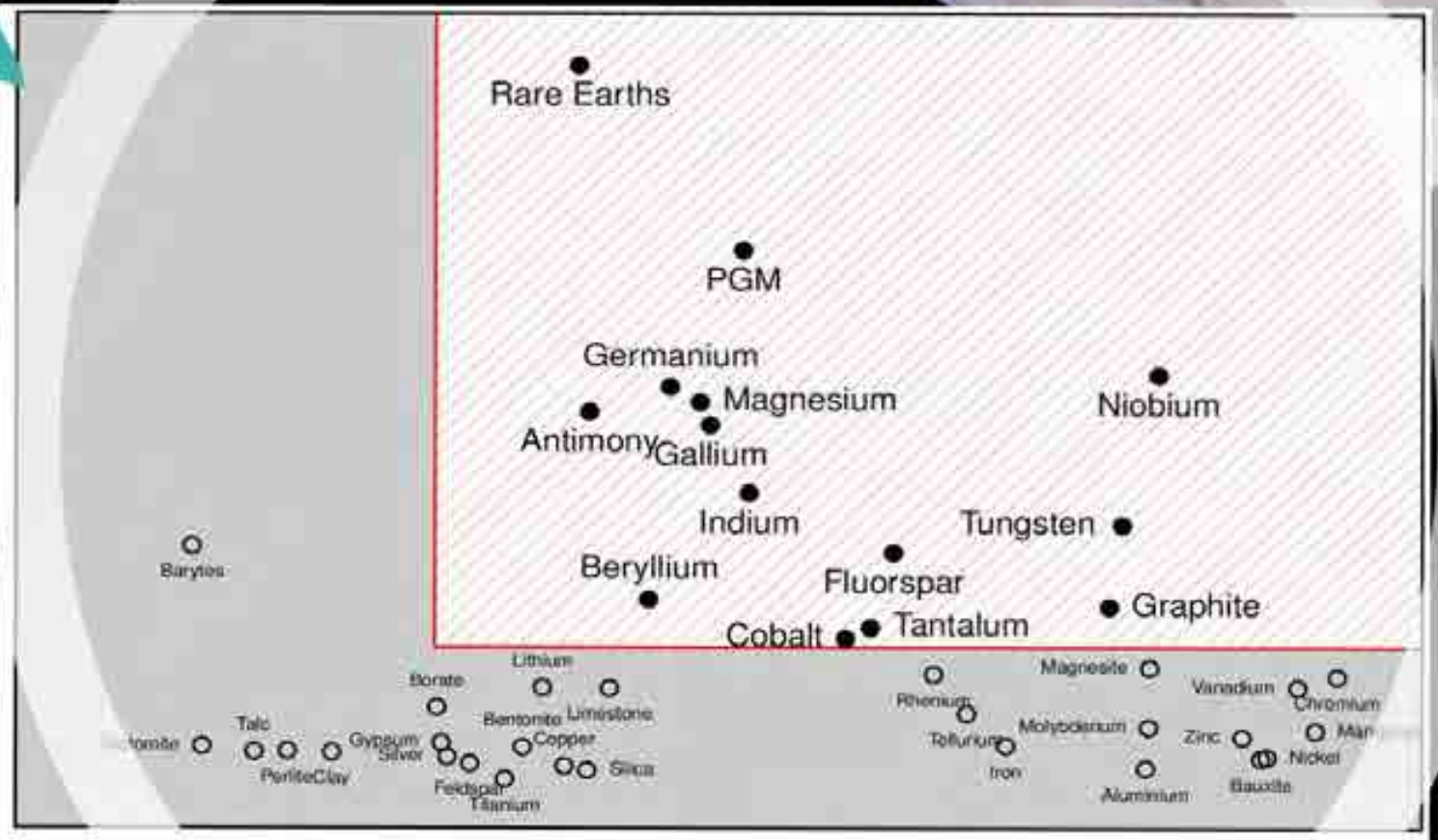

Au
2 m tonnes waste
691,000 litres water
141 kg cyanide
Kalgoorlie gold mine, Australia
Prezi

Production concentration of critical raw mineral materials



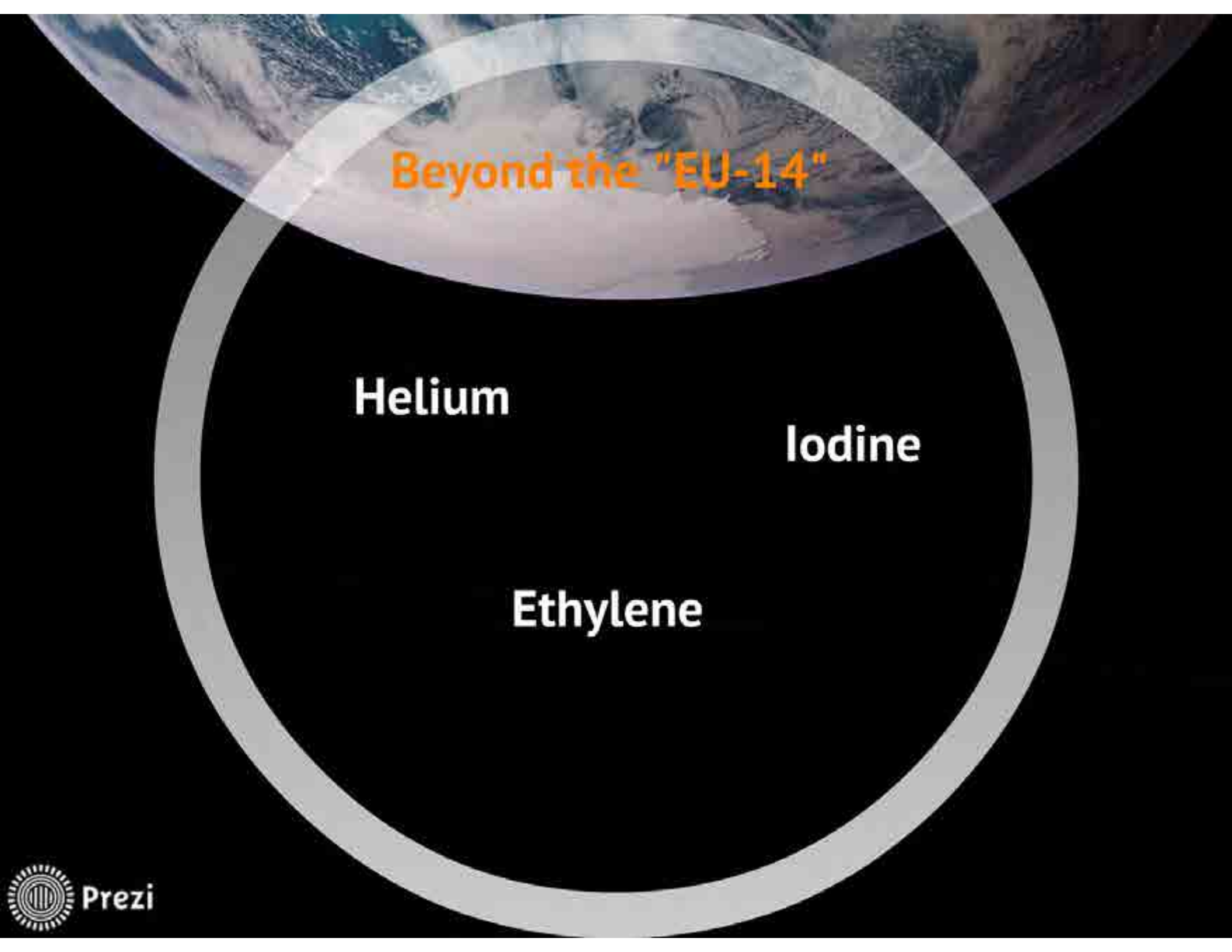
EU Raw Materials Initiative
June 2010

The "EU-14"



Supply Risk

Economic Importance


Beyond the "EU-14"
Helium
Iodine
Ethylene
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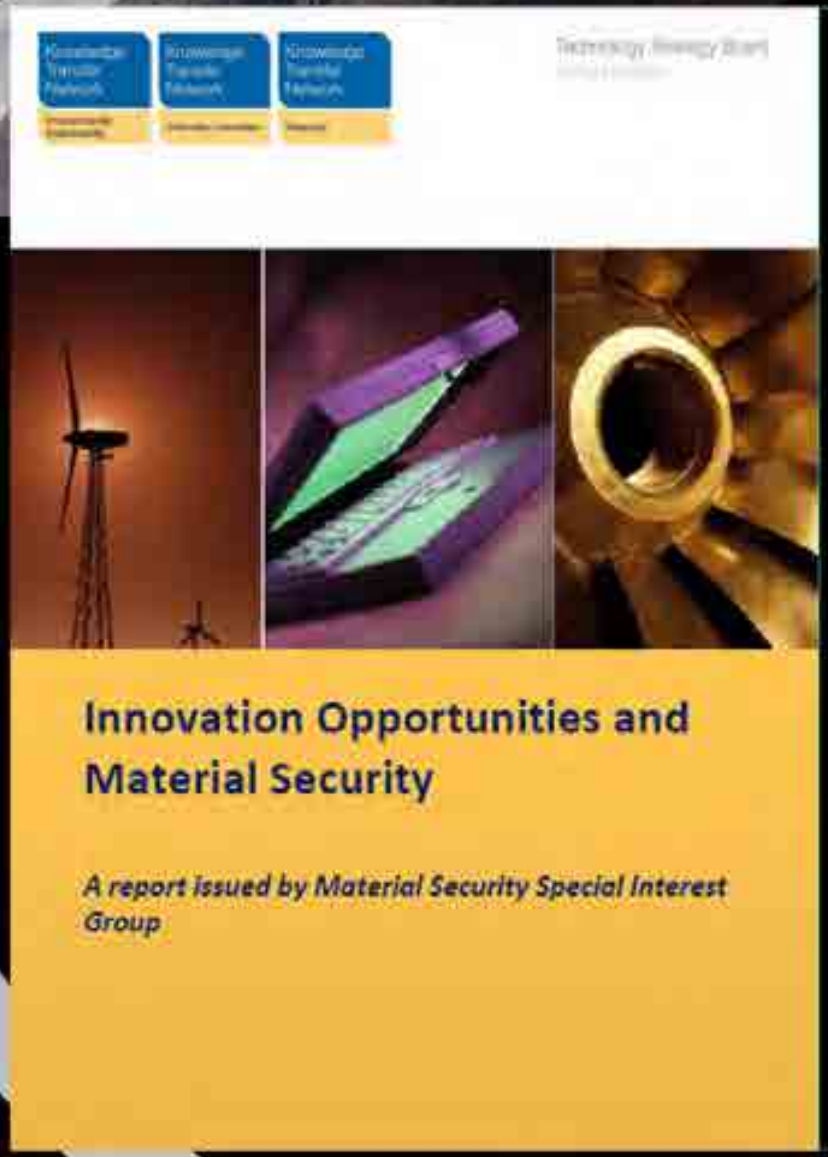
Innovation Opportunities
Reduce
• Dematerialisation
• Shared ownership
• Servicisiation
Recycle
• Recycle
• Upcycle
• Downcycle
4Rs
• Substitution
• Significant reduction
Replace
• Lifetime extension
• Repair
• Remanufacture
Reuse
Prezi

Innovation Opportunities



Energy generation

Transport

Healthcare

Food

Built Environment

Electronics

Case Studies

'Milking the Opportunity'
Closed Loop Recycling and the Dairy Supply Chain

'Setting the Tone-r'
Kyocera Document Solutions

'Orangebox office chair'
"Do-ing" more with less

'The PA12 Story'
A tragedy that inspired innovation

Funded projects - Permanent Magnets

- ROMEO - Replacement and Original Magnet Engineering Options
http://www.romeo-fp7.eu/romeo.htm

- NANOPYME - Nanocrystalline permanent magnets based on hybrid metal-ferrites
http://nanopyme-project.eu/index.php

- REFREEPERMAG - Rare-Earth Free Permanent Magnets
http://refreepermag-fp7.eu/

- MAG-DRIVE - New permanent magnets for electric-vehicle drive applications
http://cordis.europa.eu/projects/rcn/110008_en.html

- ARMEVA - Advanced Reluctance Motors for Electric Vehicle Applications
http://cordis.europa.eu/projects/rcn/110867_en.html

- VENUS - Switched/Synchronous Reluctance Magnet-free Motors for Electric Vehicles
http://cordis.europa.eu/projects/rcn/110532_en.html

- SYRNEMO - Synchronous Reluctance Next Generation Efficient Motors for Electric Vehicles
http://cordis.europa.eu/projects/rcn/110530_en.html

- NANOMAG - Magnetic Nanoparticles and Thin Films for Spintronic Applications and High Performance Permanent Magnets
http://cordis.europa.eu/projects/rcn/103404_en.html

- NANOPERMAG- High performance nanostructure permanent magnets
http://cordis.europa.eu/projects/rcn/95222_en.html


Raw Materials in
HORIZON 2020
Prezi

Raw Materials in Challenge 5

"Growing a low carbon, resource efficient economy with a sustainable supply of raw materials"

- New solutions for sustainable production of raw materials
- Innovative and sustainable solutions leading to substitution of raw materials
- Coordinating and supporting raw materials research and innovation

"Waste: A resource to recycle, reuse and recover raw materials"
Recycling of raw materials from products and buildings
Towards near-zero waste at European and global level - Secondary raw materials inventory

Raw Materials in Industrial Leadership

"Nanotechnologies, Advanced Materials and Production"
Novel materials by design for substituting critical elements

"SPIRE: Sustainable Process Industries"
Recovery Technologies for Metals and other Minerals


CRM_InnoNet
Substitution of Critical Raw Materials
Critical Raw Materials Innovation Network –
Towards an integrated community driving innovation
in the field of critical raw material substitution for
the benefit of EU industry.
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CRM_InnoNet Project Activity

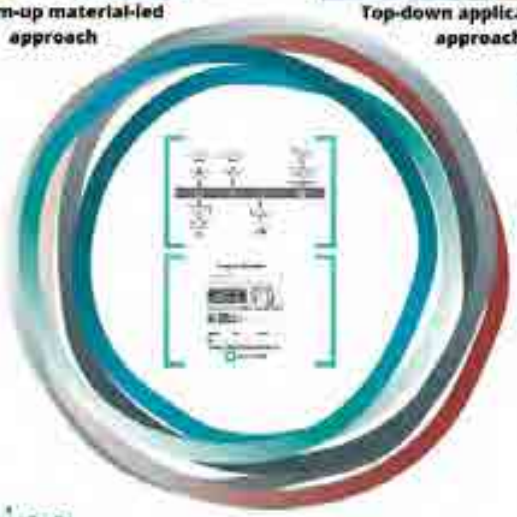
Mapping
current substitution technologies and initiatives

Bottom-up material-led approach

Top-down application-led approach

Policy
recommendations

- Current Policies
- International learnings
- Success criteria for substitution
- Vision
- Political requirements



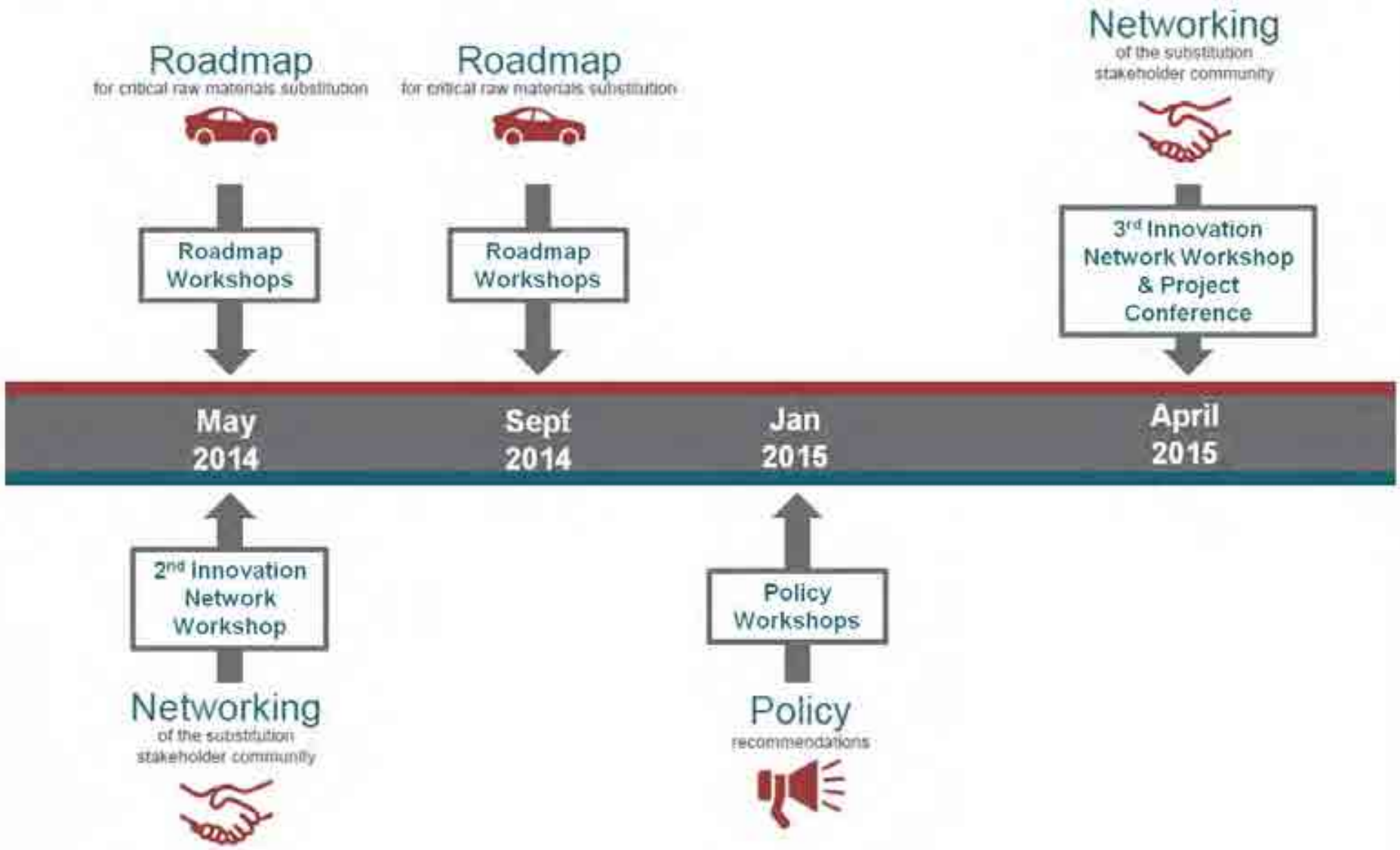
Prioritisation
of applications under threat

- Economic value to the EU?
- Position of EU in the value chain?
- Amount of CRM used in application?
- Expected evolution with time?
- Currently available substitutes?
- Status of substitution activities?

Networking
of the substitution stakeholder community

Roadmap
for critical raw materials substitution

- Substitution strategies for CRM in priority sectors and applications
- To 2030 (by exception to 2050)
- Technical and Non-technical barriers


Roadmap
for critical raw materials substitution
Roadmap
for critical raw materials substitution
Networking
of the substitution
stakeholder community
Roadmap Workshops
Roadmap Workshops
3rd Innovation Network Workshop & Project Conference
May 2014
Sept 2014
Jan 2015
April 2015
2nd Innovation Network Workshop
Policy Workshops
Networking
of the substitution
stakeholder community
Policy
recommendations

Project Website

www.criticalrawmaterials.eu

@CRM_InnoNet

European Rare Earths Competency Network

- Working Group I: Opportunities and road blocks for primary supply of rare earths in Europe
- Working Group II: Closing the loop: European rare earths resource efficiency, substitution and recycling
- Working Group III: European end-user industries and rare earths supply trends and challenges

UK Materials Security Special Interest Group

Aims:

- To build a recognised network for information and expertise on materials security;
- Facilitate new projects tackling materials security opportunities;
- Influence policy;

Join up for access to news on activity, funding and events!
https://connect.innovateuk.org/web/material-security

Achievments to date:

- Identified innovation opportunities and catalysed the first nuggets of business research;
- Increased awareness of the topic with a variety of stakeholders in Europe, UK government, industry and academia;
- Influenced policy in Europe and the UK;
- Developed new collaborations;
- Provided a "natural" home for multi-sector developments.

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Knowledge Transfer Network
Environmental Sustainability

Knowledge Transfer Network
Chemistry Innovation

Knowledge Transfer Network
Materials

‘Milking the Opportunity’
Closed Loop Recycling and the Dairy Supply Chain

Introduction

‘Closed Loop Recycling,’ a forward thinking SME in Dagenham, processes around six million plastic bottles a day, converting these materials that would otherwise be sent to landfill into pellets and flakes. The processed plastic can be re-sold and then re-moulded back into food-grade plastic containers, including milk bottles. This recycling plant fulfils a vital step in the milk packaging feedback loop essential to facilitating the UK dairy industry’s goal of significantly reducing its carbon footprint.

Background – An Absence of Synergy

Every year 120,000 tonnes of HDPE plastic milk bottles are disposed of in the UK (data from 2011).[i] A large variation in the types of plastic, tints and labels used in the production of these milk bottles has significantly contributed to rendering recycling processes technically unviable. An absence of recycled plastic has forced milk bottle manufacturers to source predominantly virgin material with a significantly higher carbon footprint compared with recycled material. However the Dairy Roadmap changed this.

Opportunity

- Reduce CO_2 emissions – tackle by addressing embedded carbon in packaging

Approach

- Collaboration – between collectors, processors, recyclers, manufacturers and suppliers to develop widely adopted materials standards

Impact

- Closed loop system enabled secure supply of recycled plastic material
- Reduced CO_2 emissions, as 15% recycled plastic incorporated into milk bottle
- Targets in place for further improvement
- Improved public image

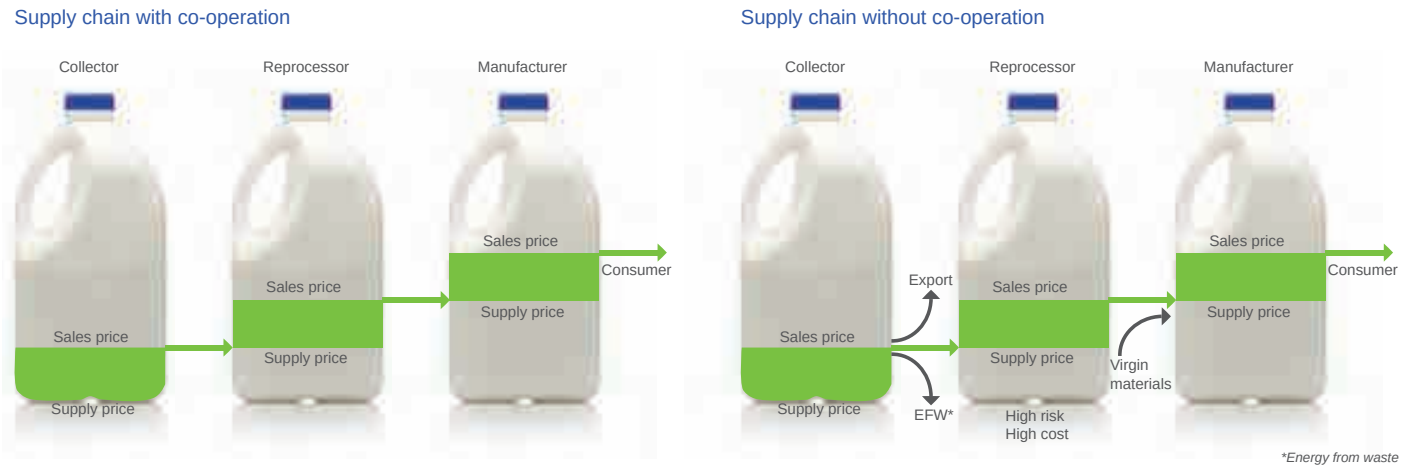

Figure 1: A supply chain without cooperation reduces the flow of materials from collectors to reprocessors, and then on to manufacturers. The availability of exit/entry points for materials at both ends of the chain creates risk and increases price. Collaboration between collectors and manufacturers of plastic milk bottles enabled Closed Loop Recycling (a reprocessor) to secure not only a supply of collected material but also a customer for their processed pellet product. This relationship helps to mitigate the effects that the recycling plant could feel from upstream and downstream supply chain disruptions and price fluctuations, and equally secures trade for the collectors and manufacturers. Collaboration strengthens the chain as a whole and also allows manufacturers to be less influenced by virgin material suppliers.

Image: Reproduced with permission from Closed Loop Recycling

Opportunity & Drivers

The dairy industry's ambition to reduce carbon emissions and thus improve its public image was the primary driver for changing its business models. Retaining as much as possible of the carbon embedded in the milk bottle plastic through recycling provided part of the solution to this problem; moreover light-weighting milk bottles would also reduce the cost of production per bottle, thus providing an economic incentive for change with the added benefit of simultaneously curbing carbon emissions.

Approach

The Dairy Supply Chain Forum's (DSCF) Taskforce (a group which brings together all parts of the dairy supply chain) enabled the industry to collaborate, compromise where necessary and agree on changes to reduce its carbon footprint. In 2008, with management of communications overseen by WRAP, the dairy industry took the initiative to instigate change that resulted in the creation of the UK Dairy Industry Roadmap. By creating an environment for communication and collaboration, a reliable and sustainable recycled plastic supply-demand relationship was established (Figure 1).

There were also technical hurdles to be overcome to make the recycling process commercially viable. Discussions between the reprocessors, manufacturers and retailers allowed increased understanding of the issues faced by reprocessors, leading to the development of widely adopted materials standards. For example, the bottle cap tint concentration was reduced and the bottle labels were redesigned to use glue that decomposes at a temperature that does not interfere with the recycling process. These tweaks to the product design not only prevent physical problems with recycling, but also allow the colour quality of the plastic to be maintained so as to still appear aesthetically pleasing to customers when used in the remanufacturing of new milk bottles.

Benefits & Impact

Collaboration successfully led to the drafting of a Roadmap for incorporation of recycled plastic in manufactured milk bottles, to which all major players agreed. The targets laid out in the Roadmap guaranteed suppliers and customers for Closed Loop Recycling's processes. Consequently, a circular system was formed that enables around 10% of the plastic from milk bottles collected in the UK to be recycled and remain in the national materials supply chain, while providing economic and material security benefits to the aforementioned portion of the chain.

From 2010, the UK has been successful in decreasing the weight of plastic milk bottles by 10% alongside incorporating at least 15% recycled high-density polyethylene (rHDPE) into all major retailer bottles.[ii] This has resulted in 12,000 tonnes of plastic being recycled to make new milk bottles and a CO_2 emissions saving of 27,000 tonnes in 2010 alone[ii].
ii Bottle manufacturers are now aspiring to increase the recycled component to 30% by 2014, as well as continuing to decrease bottle weight in order to further reduce greenhouse gas emissions. When the recycled element reaches 50% the carbon footprint per milk bottle will decrease by up to 25%.

Plastic milk bottles now bought from any wholesale supermarket can be easily recycled at plants similar to Closed Loop Recycling. The recycling plant itself has estimated that through the recycling of plastic bottles (a significant proportion of which are milk bottles) approximately 52,500 tonnes per annum of carbon dioxide is prevented from being emitted into the atmosphere.

Through instigating and creating change to standards that suit the industry's needs, the dairy chain has circumvented the imposition of Government legislation or regulation. Intra-industry collaboration has also empowered manufacturers to be less influenced by virgin materials suppliers.

The soft drinks industry is now following suit by utilising WRAP's guidance to help implement changes to improve its sustainability which likewise involves improving the recyclability of PET plastic drinks bottles.[iii] Closed Loop Recycling is once more proving a valuable resource to the industry in the execution of this mission by providing the technology to recycle collected bottles and generate recycled polyethylene terephthalate (rPET).

The dairy industry's pioneering agreement to collaborate exemplifies that developing a circular approach that improves materials security can also improve both the carbon footprint and the overall cost of a process to an industry. Utilising a synergistic approach has enabled the supply chain to implement changes with significant impact that benefits all members of its supply chain and the environment.

Image: Reproduces with permission from Closed Loop Recycling

This case study was produced by the Materials Security Special Interest Group.

i. http://www.wrap.org.uk/content/hdpe-categorisation-tool
ii. http://www.dairyco.org.uk/resources-library/research-development/environment/dairy-roadmap/
iii. http://www.britishsoftdrinks.com/pdf/roadmap%20signatory%20pack.pdf

KYOCERA
Document Solutions

Knowledge Transfer Network
Environmental Sustainability

Knowledge Transfer Network
Chemistry Innovation

Knowledge Transfer Network
Materials

‘Setting the Tone-r’
Kyocera Document Solutions

Introduction

Part of the global Kyocera group, Kyocera Documents Solutions (UK) Ltd are a leading manufacturer of monochrome and colour printers along with multi-functional products and software solutions. The company is celebrating 25 years of business in the UK, and have been pioneers of environmental business stewardship since their inception - and long before it became fashionable. Today, the company specialises in providing a broad range of customers with a fully managed print service that cuts costs for the customer while simultaneously saving valuable resources and generating both economical and environmental benefits.

Background

Around 47 million printer cartridges are sent to landfill every year in the UK. Companies which resell these scrapped cartridges do exist, however this cannot be repeated indefinitely and the cartridge is too complex to be easily recycled. This creation of around 50,000 tonnes of underutilised waste represents a loss of valuable materials and embodied energy from the supply chain.

The conventional method of replacing toner as part of a composite printer cartridge is laborious, extremely expensive and resource inefficient. The cartridge contains the majority of the moving parts of the printer and typically contains seventy separate components made from twelve different materials. Tracey Rawling Church, Head of Corporate Social Responsibility at Kyocera UK likens changing an ink cartridge to “replacing your engine every time your car runs out of fuel.”

Opportunity
- Dual opportunity for business to reduce waste and costs by moving to consumption based supply models

Approach
- Introduce a resource efficient product by redesign of printers:
  – Downsize number of parts from 70 to 5
  – Replace conventional drum with a durable amorphous silicon drum
- Offer a fully managed outsourced print service to facilitate transition from ownership to consumption-based supply models

Impact
- Reduction of carbon footprint by 55% per printer
- Reduction of waste by 85% per printer
- Reduction of cost by 54% per printer

Image from Kyocera Document Solutions

Image from Kyocera Document Solutions

Opportunity & Drivers

The conventional printing business model is based on selling cheap, loss-leading hardware to subsequently access a lucrative consumables market. However, the recent economic downturn has prompted businesses, particularly companies with large office spaces, to thoroughly re-evaluate their printing costs. Kyocera's proposition costs no more than conventional hardware but achieves lower overall costs throughout the lifetime of the printer as a result of cheaper ongoing consumable costs.

Approach

Kyocera's unique approach to competing in the documents solution market is two-fold, involving a resource efficient product which in turn enables companies to transition from a traditional model of ownership or product leasing to a competitive service solution business model.

In 1992, Kyocera introduced a radical redesign of the laser printer which eliminated the need for cartridges. The brand overhauled the entire printer design to replace drums made from organic photoconductive materials with significantly longer lasting amorphous silicon, as well as increasing the design life of other key components. This enabled the consumable to be drastically simplified, cutting down the number of components from seventy to five, all of which are made from either of two types of plastic.

Kyocera now offers a fully managed print service which enables customers to buy printing as an outsourced service charged for by the page. In order for customers to move to 'consumption based supply' models, Kyocera provides an assessment of the number of users per printer and the frequency of use by each user, as well as a study of document workflows. Kyocera can then provide a bespoke solution that takes advantage of document management software to reduce the quantity of printers a company requires and the number of pages it prints.

Benefit & Impact

By changing the drum material, all major components of the printer are then essentially built in, leaving the ink cartridge accessible and therefore simple to replace. A Kyocera drum lasts for between 100,000 and 1 million pages (depending on the duty cycle of the printer), in comparison to 10-40,000 pages for conventional printers. The highly efficient and simplistic redesign has enabled all five plastic parts to be easily identifiable and processable for recycling, allowing these materials to be retained in the supply chain alongside preventing the scrapping of materials that otherwise would have been incorporated into the cartridge design. These combined changes have enabled an impressive reduction of the carbon footprint, waste and total costs. In a recent independent study over 500,000 pages these factors were reduced by 55%, 85% and 54% per printer, respectively.[2]

The challenge still remains to recycle - not down-cycle - these new cartridge materials at their end of life stage. Although Kyocera printers are designed for facile disassembly, at present the majority of the plastic is shredded. Kyocera is currently involved in collaborative research and development to move towards economically viable collection and recycling models.

Kyocera would also like to see more companies shift towards outcome based tenders to further 'consumption based supply.' By evaluating and identifying the long term benefits of using the Kyocera service in comparison with the short term gain of buying (and then disposing) of cheaper printers, companies could experience long term savings as well as cut their materials waste.

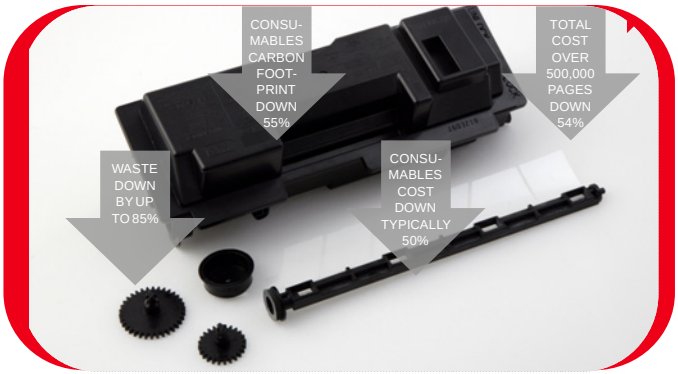

Image from Kyocera Document Solutions

1. http://www.green-alliance.org.uk/uploadedFiles/Events/Tracey%20Rawling%20Church%20speech.PDF
2. Buyers Lab International, January 2013

This case study was produced by the
Materials Security Special Interest Group.

Orangebox office chair “Do”ing more with less

Introduction

Orangebox, based in South Wales, design and manufacture office furniture. Though a small business, they create products that have a big impact. In fact, doing more with less is central to their approach. Their products aim to be more desirable, more pleasing to use, and more durable, whilst using less resources. They demonstrate that this is no conflict, rather that a strategy that integrates improved resource efficiency as a guiding principle can result directly in better products and, ultimately, better business.

Background

Orangebox is growing as a result of making great products in a market where Design is a key differentiator. A core aspect of their brand identity and their definition of good design, is sustainability - not least the efficient use of resources.

Opportunity & Drivers

When it came to developing a new office chair during 2011-12 Orangebox’s aim was to create a product that would succeed in further building market share by virtue of the quality of its design, defined by functionality, appeal, and sustainability. These were to be achieved through an approach based on simplicity and reduction, along with consideration of material supply, longevity, and end-of-life.

In addition this reduction approach has a direct and measurable impact on the balance sheet. Now that the business makes more than 50,000 chairs a year the sheer amount of materials required becomes very visible. The Orangebox design team believed there was a significant opportunity to reduce material content through careful design, which would yield very real cost savings. The majority of an office chair is plastic, and as polymer prices are starting to track closely the upward trajectory of oil prices, the business benefits of Orangebox’s philosophy are becoming ever clearer.

“Our environmental agenda is our business agenda - to ensure we achieve prosperity in a world of rapidly depleting resources.”

Approach

“We looked at every component and asked ourselves - why? (does it have to be there in the first place) until everything unnecessary has gone. We looked at every part and asked ourselves - how? (can we make it lighter, stiffer, stronger) until every gram has a purpose.”

Opportunity

- Grow market share through developing a better product and a better service
- Reduce costs by reducing material content and managing material at end-of-life

Approach

- Design philosophy based on “less is more”
- Developed take-back system and accompanying re-use/recycling centre

Impact

- New product is quickest selling in company’s history
- Uses 25% less material, which is also easier to recover at end-of-life
- Prestigious award recognising the quality of the design and ergonomics
- Demonstrates that approach based on resource efficiency can directly yield a better product and better business

Armed with experience from their previous office chairs, Orangebox first embarked on a process of benchmarking. This included Life Cycle Analysis (LCA) with the assistance of the Ecodesign Centre based in Cardiff.

Resource efficiency was a guiding principle throughout the ensuing design process, along with aesthetic, functional and ergonomic concerns. All opportunities were taken to reduce the number of parts. One particular coup was to realise a class-leading level of ergonomic adjustability, whilst reducing the number of mechanisms and levers, thus improving user experience. Material deployment was optimised for every component, achieving an appropriate balance of durability and weight reduction, with the assistance of computer models and prototype testing. In terms of material selection recyclable materials were utilised throughout, and indeed recycled materials where feasible. Furthermore the chair was designed for disassembly – for instance the seat, arms and back fabric simply clip on and off. This will make the chair easier to repair, refurbish, remanufacture or upgrade. The number of different materials was also reduced, and markings were designed in to identify material type, with a view to facilitating recycling.

Orangebox also worked hard with their supply chain, using local suppliers wherever possible and taking steps to drive their approach up the chain.

Image: Components of the "Do" chair are designed for disassembly

"We recognise that our supply chain and their individual activities collectively contribute in a much bigger way than us alone and that we must involve our suppliers every step of the way".

Taking ownership of the full life cycle, Orangebox are also taking steps to develop re-use, repair and refurbishment services. They have developed a take-back scheme and accompanying recycling centre along with the necessary waste carrier license and recycling permits, and in so doing have developed a new source of materials; one that is "closed-loop".

Image: The 'Do' chair encourages movement and support

Benefits & Impact

The "Do" office chair was launched in April 2012. It does more with less; delivering a better user experience whilst using 25% less material. Only months after its launch, Do became Orangebox's fastest selling chair. Later that year it won the prestigious FX international interior design award for workplace seating.

- Around 45% of the chair's component parts are manufactured within 10 miles of the factory and over 90% come from within mainland Europe.
- Orangebox's repair and refurbishment services are yielding an improved understanding of the customer, and help foster brand loyalty.
- Taking ownership of the materials across the life cycle means that Orangebox are better placed to realise value from those materials again and again.

"Any sustainability initiatives we've implemented have not only reduced our environmental impacts but they have saved us money and increased our business efficiency in the long term."

The business is now making further improvements to their office chair range with the help of funding from the Technology Strategy Board's "Design Challenges for a Circular Economy" competition, realised with the aid of the Materials Security Special Interest Group. Through their new "Chair for Life" project they are developing an even more refined design building on the same philosophy.

In parallel with this new design they are looking to stretch the business model even further, so that office seating can be provided profitably with even longer product life, incorporating a fully refined system of servicing, recovery, remanufacture and recycling.

With sustainability embedded fully into the brand and consistently applied in the way they do things, Orangebox look set to prosper into the future whilst some competitors leave themselves increasingly open to the risks associated with the finite nature of the world's resources.

Image: Orangebox's brochure gives more details of material content and closed loop approach

This case study was produced by the Material Security Special Interest Group

The PA12 Story
A tragedy that inspired innovation

Introduction

Tragedy struck at the Evonik plant in Marl, Germany, on the 31st March 2012 when two people were killed in a fire. The company took action to identify the causes of the fire by working with the authorities and launched their own internal investigation. Further down in the notice of the incident, the company also reported that the fire impacted on the production of a chemical called CDT (cyclododecatriene) and would therefore have potential impacts on the supply of the monomer laurolactam, which is used in the production of polyamide 12 (PA12), a key polymer for hose pipes in the automotive industry. The press release stated that Evonik thought that there would be some supply restrictions.

PA12 is a key component in automobile production (for the production of hose linings), the photovoltaic industry and in offshore pipelines, as well as other minor uses such as 3D printing.

Background - unforseen circumstances

Two weeks after the fire at the Evonik plant, on the 17th April 2012, major automotive executives from across the world, met in Detroit to discuss the global shortage of the supply of CDT and the consequent impact on the supply of PA12. Although the plant in Marl was one of the major producers of PA12, it was, in fact, the largest global producer of CDT. Serious concerns were raised over the impact on the supply of the material, which could potentially lead to the slowing of global car production as the PA12 was used for brake and fuel pipework. The BBC News website reported that following the meeting of 200 executives from companies including Ford, Volkswagen, General Motors and Toyota in Detroit, six technical committees were set up to assess the impact of the shortage and to seek alternatives.

Opportunity

- New products were required to replace the polymer PA12, the supply of which was seriously reduced due to a fire at a chemical plant in Germany

Approach

- Existing materials were tested for their use to replace PA12
- New materials were produced by extending the properties of known polymers
- New production routes for the precursor to PA12 were developed and pilot plants built

Impact

- New materials are now available that can be used in place of PA12 or new production routes to PA12 are available
- The new materials have been declared as having reduced environmental impact, or made from renewable resources

During the following months, a number of press releases and announcements were made from a range of companies to offer alternatives to PA12 that would provide a “drop-in” replacement for PA12 for a number of uses. The crisis appeared to be averted as alternative materials became available to replace the lost production of PA12.

Image: PA12 replacement in automotive hoses from Arnitel® (1)

Opportunity & Drivers

All seemed to be going well with the replacement strategy adopted by the automotive sector, and replacements were being used in the key sectors. However, one year on from the fire, Chrysler announced a number of recalls of their SUVs. In the three announcements made, one covered the recall of almost 30,000 vehicles due to a faulty hose that had been fitted.

Chrysler had used an alternative material to PA12 for a fuel hose that connected two sides of the saddle shaped fuel tank. The replacement material needed particular processing conditions to produce a final product, but due to changes from the PA12 requirement this had not been achieved, and the new fuel line could potentially cause the SUVs to stall. Chrysler attributed the change to the shortage of PA12 and the need to find alternatives.

It was clear that additional research and development was still required to find suitable replacements for PA12, and a number of companies were developing new products, as well as verifying the use of existing product lines.

Approach

The tragic incident that took place on the 31st March 2012 initiated a series of activities that had not been predicted. The fire caused a re-evaluation of many materials that could be used as an alternative to PA12, and major chemical companies either instigated or increased their research and development activity, or reassessed existing products for new uses. A few examples of some of the alternatives to PA12 are highlighted here.

Dupont developed solutions by extending the range of characteristics of their long chain polyamide product family, such that their properties began to match those of the higher chain length materials.

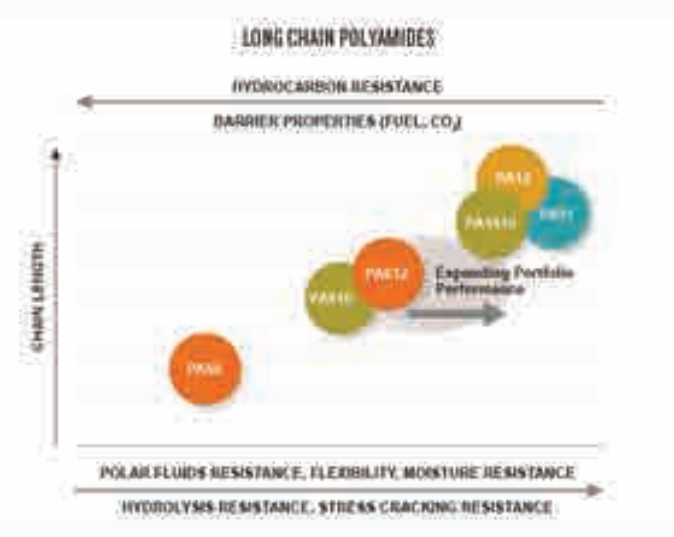

Image: Production of potential substitutes by DuPont (2)

DSM also offer their range of thermoplastic copolyesters, Arnitel™. The company state that the polymer provides the required performance, but it also has additional environmental and sustainability benefits. The product is plasticizer free, and is fully recyclable (3).

On the 30th July 2013, Evonik themselves announced that they had been operating a pilot plant for the production of ω-amino lauric acid since early 2013. This is a biobased alternative to the petroleum based laurin lactam monomer for PA12.

Benefits & Impact

The tragic incident that took place on the 31st March 2012 could not have been predicted, and the company investigated the causes. The aftermath of the incident resulted in global concerns over the supply of one specific material that, although only one component in a car, threatened to have cause huge disruptions to automobile production. This was averted by a number of rapid responses, although there were a number of additional consequences that resulted in product recalls.

Perhaps due to the realisation that the supply of a specific component relied on a very limited production base, significant effort went into identifying alternative products and precursors. A number of the alternatives identified actually purport to provide much better environmental credentials with, for example, elimination of plasticizers, recyclability and bio-based feed stocks. The new range of products now provide end-users with a much greater flexibility in supply and also access to products that have enhanced environmental performance.

Image: DSM vacuum tube made from Arnitel™ *polymer (4)*

References

(1) https://www.dsm.com/products/arnitel/en_US/cases/pa12-the-viable-alternative/pa12-replacement-automotive.html

(2) http://www.dupont.com/products-and-services/plastics-polymers-resins/thermoplastics/Articles/pa12-alternatives.html

(3) https://www.dsm.com/products/arnitel/en_US/cases/pa12-the-viable-alternative/pa12-replacement-industrial-tubes-and-hoses.html

(4) http://www.dsm.com/products/arnitel/en_US/cases/pa12-the-viable-alternative.html

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