VEOLIA

Resourcing the world

Living Circular: Transforming Circular Thinking into Sustainable Business Models

Forbes McDougall

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Why go circular ?

In today's linear economy, we are missing opportunities to create new products and clean energy from consumed materials

Circular Economy thinking is being driven by:

Increasing global population, especially the middle class

Increasing raw materials price volatility

Increasing signs of resource depletion and scarcity

What is circularity ?

As our resource consumption and dependence continue to rise and our growth threatens to negate our production efficiency efforts, governments and companies have started looking at the circular model not only as a hedge against resource scarcity but as an engine for innovation and growth.

"Towards The Circular Economy" report,
commissioned by the Ellen MacArthur Foundation
and compiled by McKinsey & Company, 2013.

How does circularity deliver value?

- New businesses
- New technology
- New jobs

>$1 trillion

of untapped value globally (McKinsey 2013)

$600 billion

in net savings and up to 2 million jobs by 2030 (European Commission 2014)

£29 billion

(1.8%) of GDP in the UK and 175,000 jobs (Veolia 2015)

In a resource-constrained world, value creation moves towards the owners of resources

Circularity saves resources

- Repair and maintain
- Redistribute
- Refurbish
- Remanufacture
- Reuse parts/products
- Recycle - closed loop (higher value)
- Recycle - open loop (lower value)

- Services instead of products
- New design
- Infrastructure
- Public acceptance
- Cost
- Time

5 business models enable circularity

10 transformational technologies drive circular business models

TECHNOLOGIES THAT DRIVE CIRCULAR BUSINESS MODELS

Digital

1. Mobile
2. M2M
3. Cloud
4. Social
5. Big data analytics

Hybrid

6. Trace and return systems
7. 3D Printing

Engineering

8. Modular design technology
9. Advanced recycling tech
10. Life and material sciences

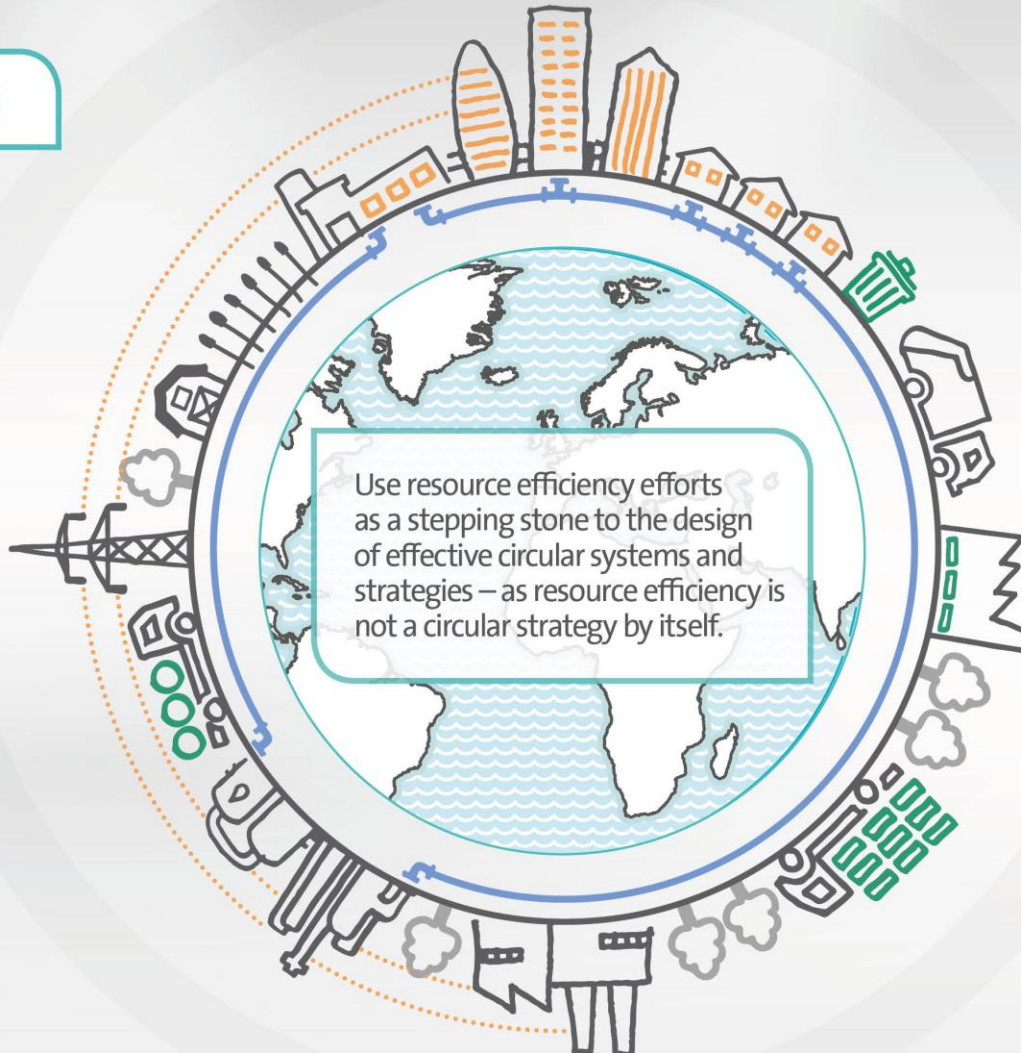
Efficient versus Effective systems

Whole System Design or systems engineering is an approach to drive effectiveness in a circular economy (EMF 2013).

This means rethinking the entire system to deliver effective products and packaging not just efficient products and packaging.

A move from "less bad" to "more good" will require:

- New materials and product design
- New technology/infrastructure
- New manufacturing and distribution systems
- New consumer behaviour
- And...



Get your house in order (be less bad)

Develop appropriate goals and strategies

WATER

Go zero water discharge by 2025

WASTE

Go zero waste to landfill by 2020

ENERGY

Go 100% renewable by 2050

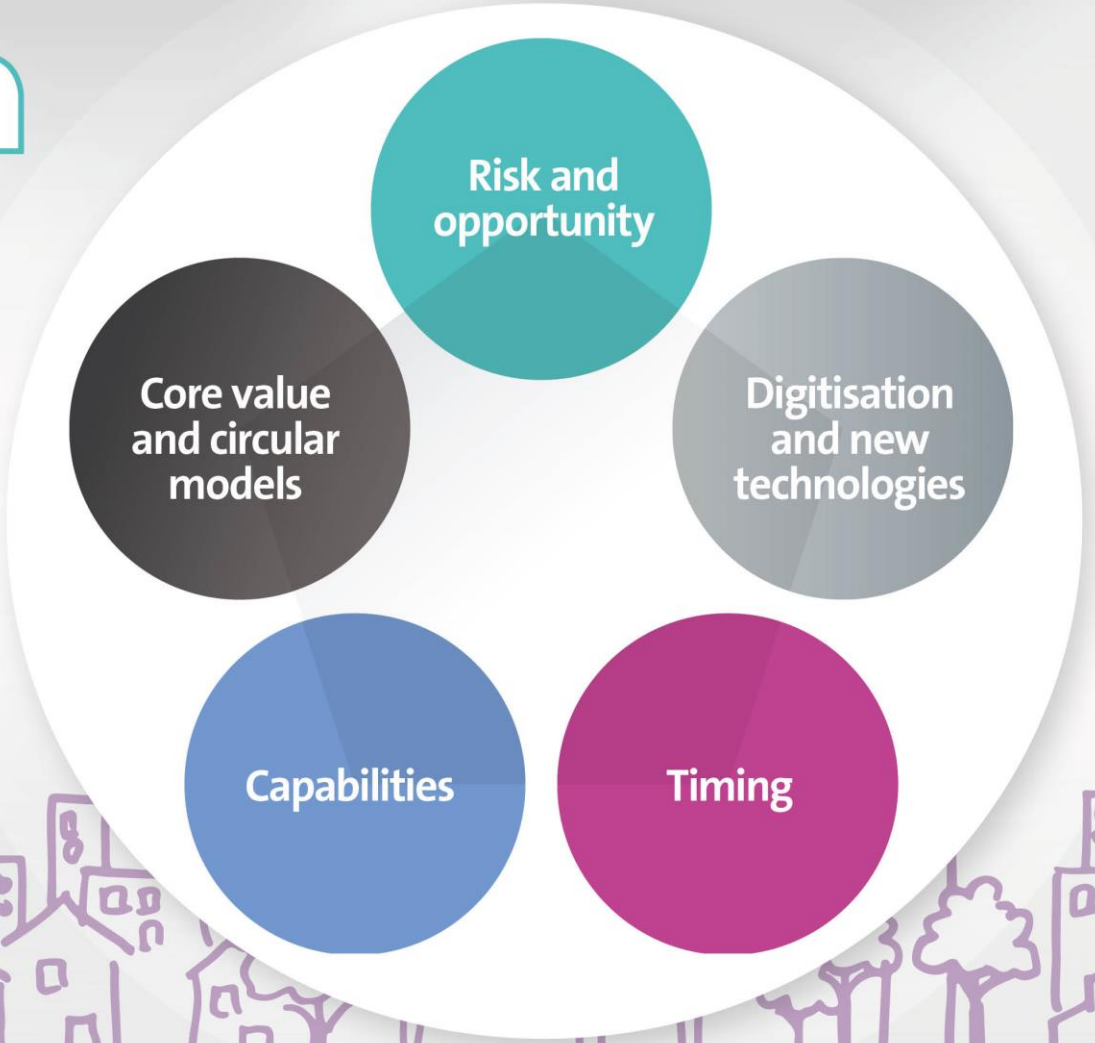
And/or

- Reduce material intensity per unit
- Reduce energy/water consumption per unit

- Reduce carbon footprint per unit
- Reduce waste generated per unit

- Reduce packaging per unit
- Increase recycled content per unit

How to go circular



Veolia has embraced a CE business model globally

Veolia can:

- Secure material (waste) input and material output streams via strategic partnerships with industrial, commercial and municipal clients.
- Produce materials in line with industrial standards (quality & quantity) required by the clients.
- Propose innovative business models leveraging synergies across waste water and energy that move Veolia from a contractor to a supplier and business partner.

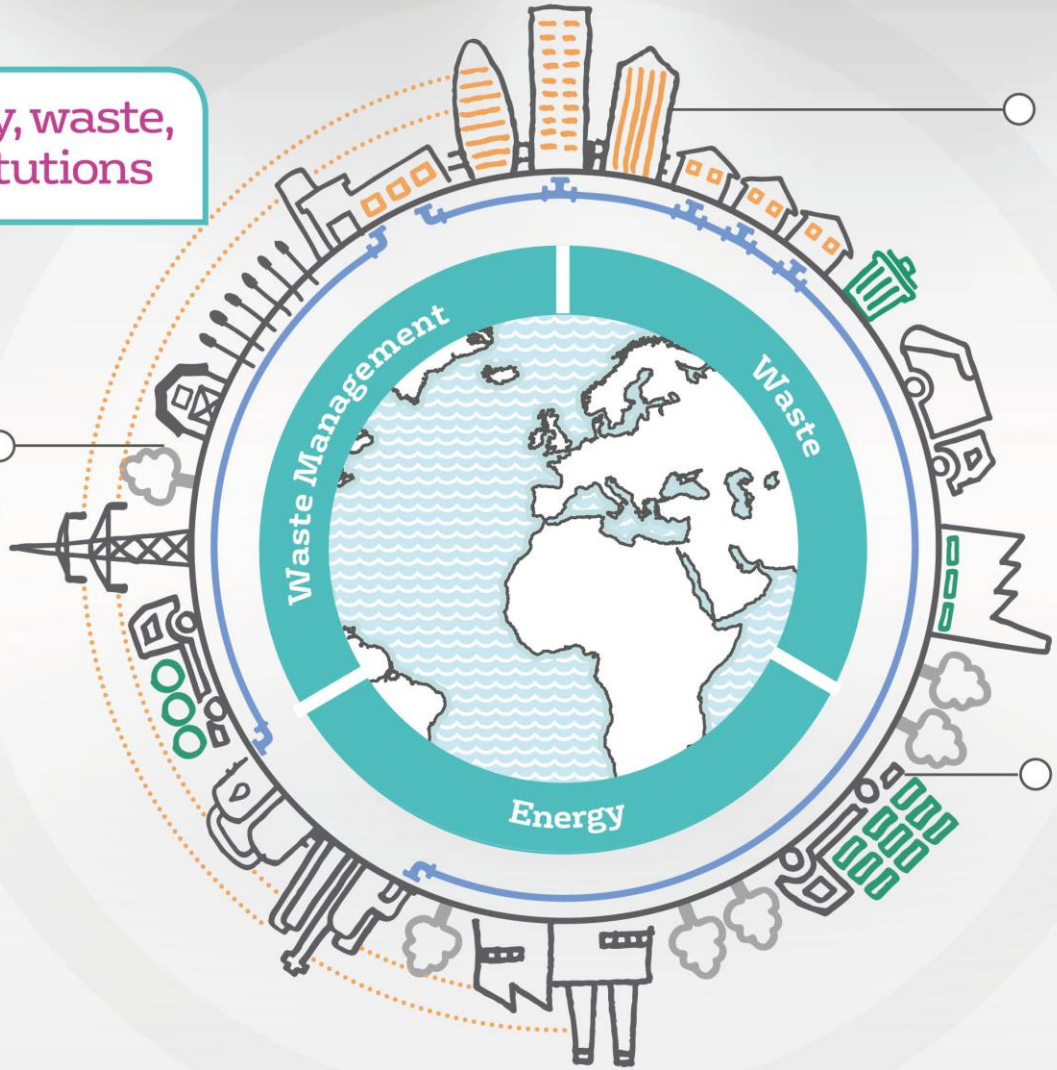
So that our customers are able to:

- Recirculate or recover valuable materials or components - save costs, generate revenues and secure supply.
- Reduce environmental liabilities - reduce risk.
- Support corporate sustainability commitments - enhance image.

Circular energy, waste, water and solutions

Water

- (Efficiency)
- Monitoring/Optimisation
- Leak detection
- Treatment technology
- Biosolid treatment, disposal and recycling
- Cost reduction
- Service improvement
- New technology and innovation
- Environmental performance improvement



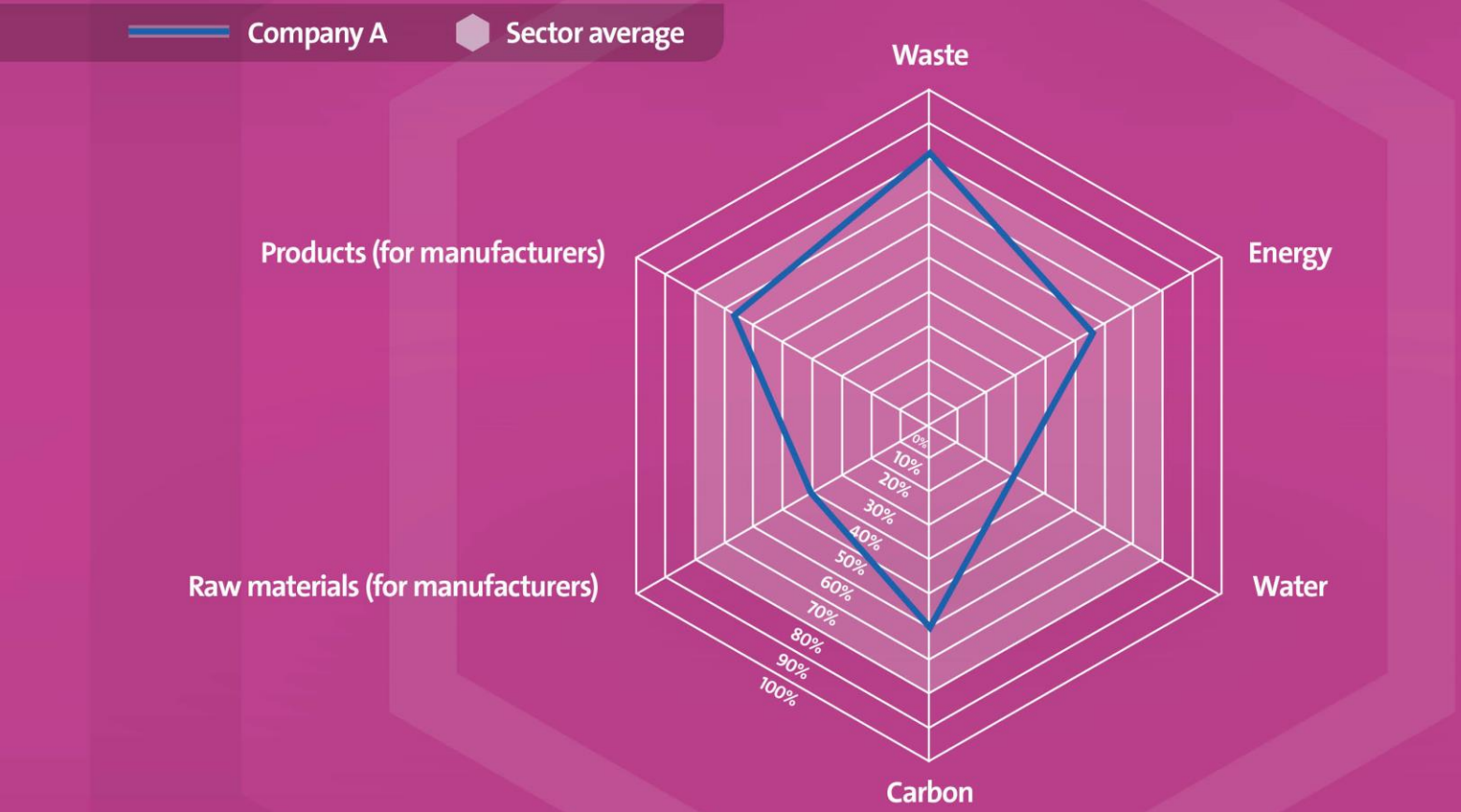
Waste

- Reuse/Resale
- Closed loops
- Alternative use
- Conventional materials recycling
- New recycling technology (rare earth/precious metals)
- Biorefining
- Manufacture of green products

Energy

- (Efficiency)
- Cleaner energy production
- Smart grids
- Renewable energy / low carbon technology
- District heating/private wire
- Monitoring/Optimisation

Enabler – Circular Economy Indicator Tool



Veolia now a manufacturer

Bag 2 Bag

Filling plastic bags with potential

Working alongside local authorities, we offer a closed-loop environmental solution by recycling used plastic bags into refuse sacks.

ReNu

Creating profitable phosphate fertiliser

We are currently trialling a project to unlock the commercial potential of biomass ash produced by remanufacturing it as a phosphate-rich fertiliser.

Green Clean

Cleaning up in partnership with Procter & Gamble

Working alongside Procter & Gamble we have repackaged waste detergent into a new, high performance auto wash.

Distilling Bio-energy

Whisky-powered renewable energy

Working with Diageo's Cameronbridge Distillery, we have developed new technology to recover energy from the by-products of whisky production.

A more detailed write up of these current Veolia case studies that demonstrate the value in recovery and transformation of waste is available here: **www.veolia.co.uk/circulareconomy**

Veolia is now a manufacturer of circular products

Pro-Grow

A greener solution for gardeners

Pro-Grow is our range of soil and lawn conditioners made from composted green waste. It's an environmentally friendly alternative to peat-based garden products and imported chemical fertilisers.

Catalyst Recycling

Mining catalysts for precious metals

Working with Veolia colleagues across Europe and the United States, we are developing innovative technology to recover valuable metals from disused industrial catalysts.

Landfill Ammonia

The hidden value of landfill leachate

Using specialised technologies we are harvesting ammonia from landfill leachate and using it to reduce emissions at our High Temperature Incinerator (HTI) at Ellesmere Port.

Paint Recycling

A new look for old paint

We have introduced Community RePaint schemes at our recycling centres. We collect reusable, leftover paint and redistribute it to community and voluntary groups, charities and individuals


Putting the Circular Economy into practice
Burying the **take-make-dispose** model
Focusing on quality of recycled materials
Allowing **better supply chain pricing**
Developing **customer partnerships**
Restoring **natural balance** of resources

Evolution of Veolia

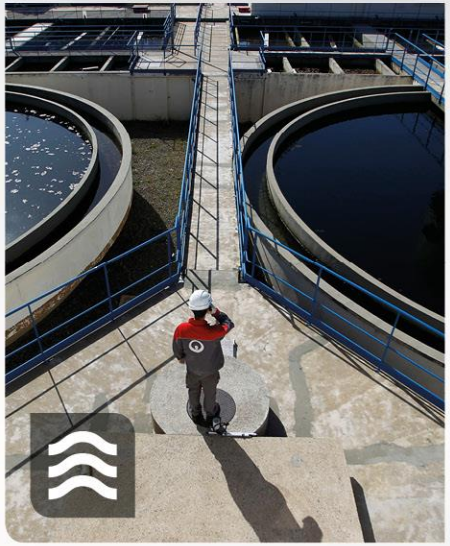
Over

of our business is circular

2016:

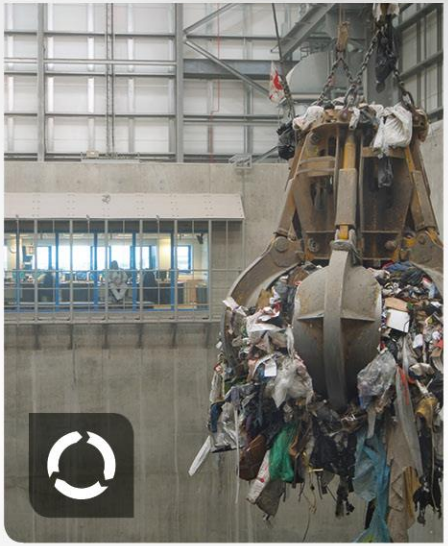
£3 million

development CapEx budget in hazardous waste



WATER

Management of the global water cycle, from production and distribution of drinking water to the collection, treatment and recycling of wastewater.



WASTE

Liquid and solid non-hazardous and hazardous waste management

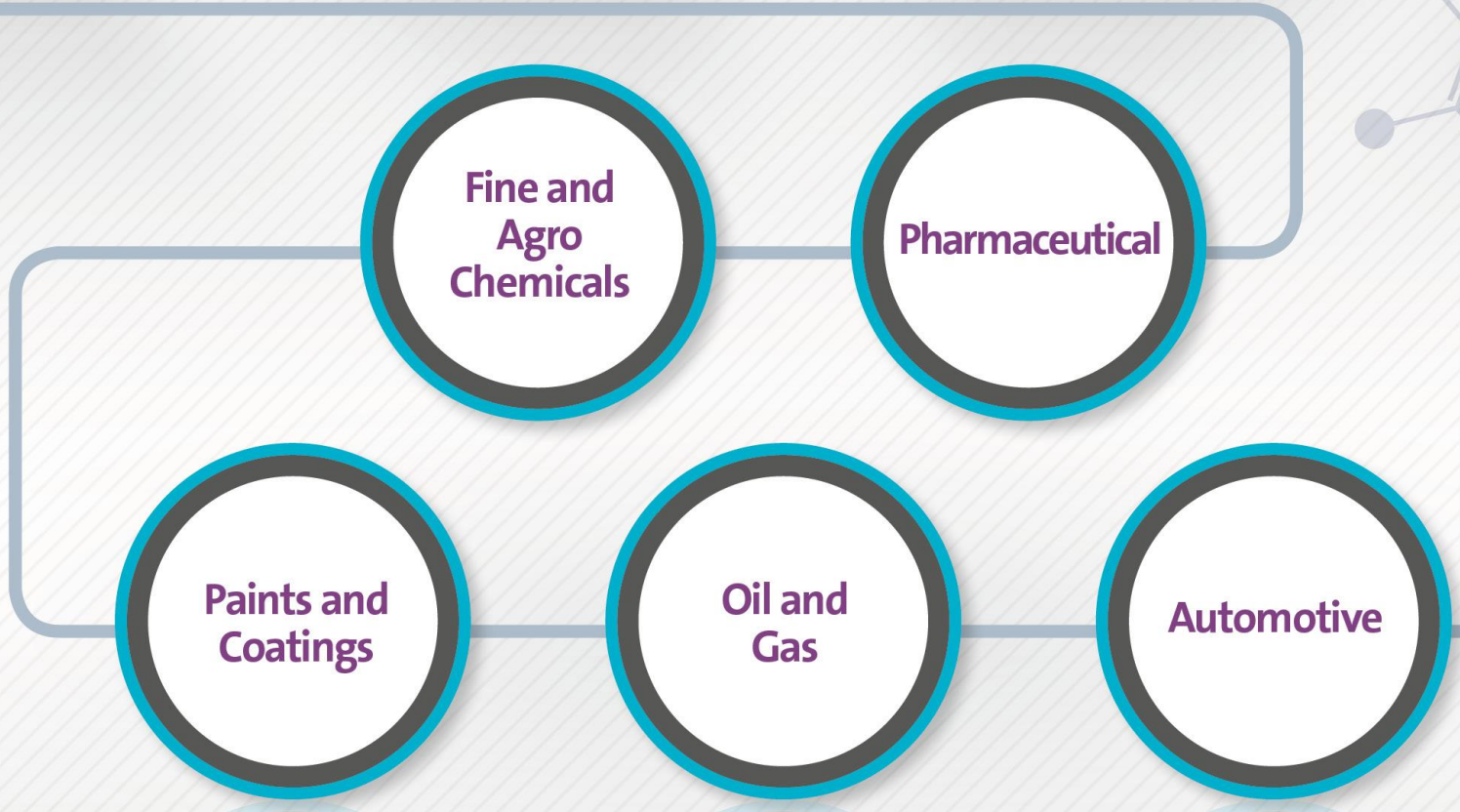
Our expertise covers the entire waste life cycle from collection to recycling, leading to the final recovery of waste as materials or energy.

ENERGY

Energy efficiency, efficient management of heating and cooling systems, green energy production, all unique expertise for a sustainable world.

Garston

Industry Sectors for Solvent Recovery



Recovered Solvent Applications

Paints/Varnishes

Paint Stripper

Adhesives/Glues

Paint Thinners

Printing Inks

Screen Wash

Anti-bacterial Cleaner

Nail Varnish & Remover

Solvent Cleaner


Case Study
The Challenge
The Process
The Results
Next Steps

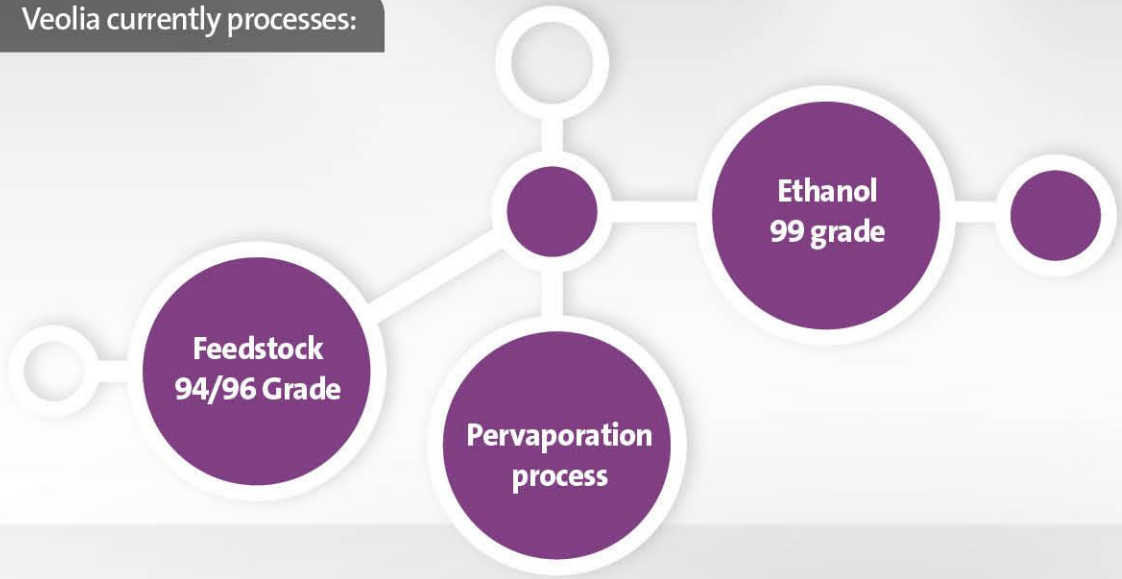
Maximising Solvent Recovery values

Accurate forecasting information allows:

- % Yield Improvement
- Best available rates as prepare and enable the market for a recovered product.
- Ability to link waste rebate purchase prices to ICIS pricing index.
- Ebids may not always be the best option for a particular stream – a "snapshot in time" only and do not allow transparency in the customer/supplier relationship

Investment in new technology

Veolia currently processes:



As a business we have fully explored 99% grade market and feel that the demand is secure and not subject to the same market fluctuations as the lower grades, in turn this we feel allows us to offer a higher purchase rate (For crude Ethanol) to our customers.

Customer/Industry Journey

Next steps

Get going

Thank you
Q&A