Realising the business value of circularity in semiconductor vacuum systems

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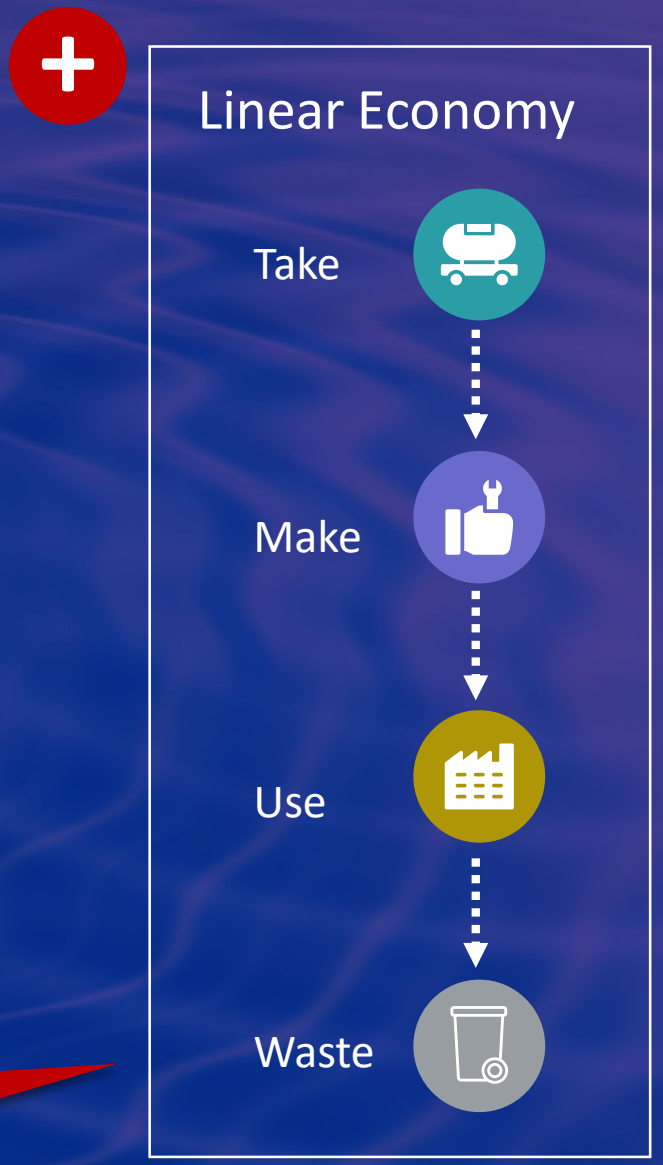
Why do we need the circular economy?

We often hear of the environmental benefits from the adoption of a circular economic model that reduces waste and conserves energy. But what is overlooked is the value the approach delivers to achieve business objectives.

In a traditional linear model – characterized as **take, make, use, and waste** – resources are taken and used to make a product. The product is used for its normal life, then it becomes waste, typically destined for landfill.



A linear economy is not a sustainable model. Each time we create a new product from scratch, resources and energy are wasted.

What is the circular economy?

A **circular model** transforms the linear approach by considering any and **all waste to be an input back into the system**. Today, companies in the semiconductor industry are taking steps towards a circular model.

Take Make Use Recycle

What is the business value from circularity?

The circular business model must deliver real business value.

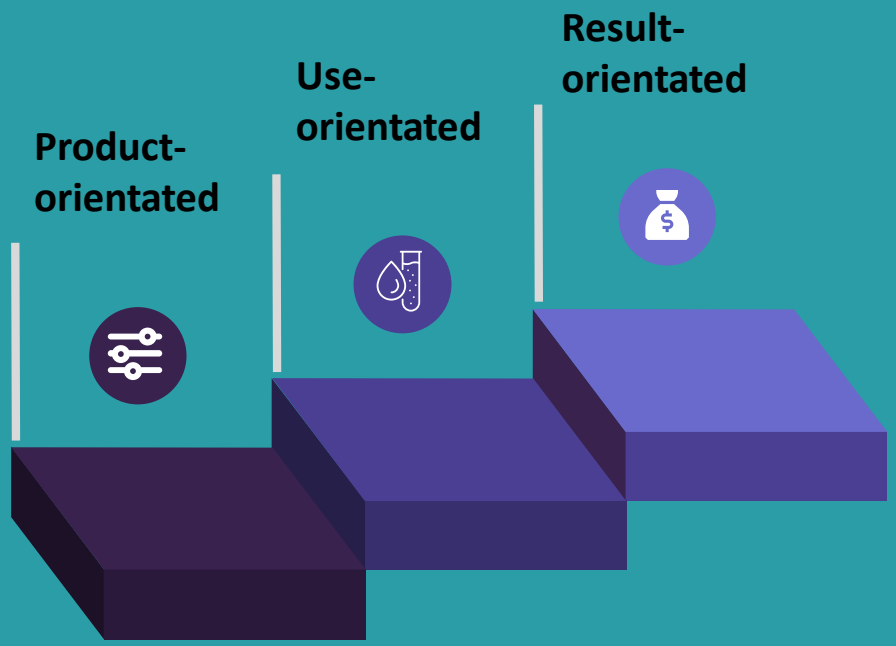
Sourcing - The direct financial value derived from reducing costs, eliminating waste and entering new markets.

Environmental - becomes a business value only when it is communicated to stakeholders; shareholders, customers, institutions, and employees. It then increases brand value, customer loyalty, and employee satisfaction and retention.

Customer - value can be generated by new products or services that better meet the customers' requirements. Buy-back programs that give the customer a financial incentive to recycle also add customer value.

Information - is the value of the data and knowledge gained in a circular system, from interactions with the customer and from analysis of the products. This leads to a better understanding of customer needs and to products that better fit those requirements.

Business models must evolve to results-orientated models



To deliver business value, business models must evolve from the traditional, product-orientated sales model, to use-orientated and results-orientated models.

A **product-orientated model** is where the supplier focuses on the sale of a particular product or services and the value that product delivers.

In a **use-orientated model**, rather than paying a single price for a product or a service, the customer pays a regular fee for access to that product. Product ownership and responsibility for managing the asset remains with the manufacturer. This incentivizes the manufacturer to make products that are longer lasting, more reliable, and more repairable.

A **result-orientated model** goes one step further as the customer pays for a given outcome or result. This links the customers' goals and objectives even more intimately to the suppliers' goals and objectives.

The business value of results-orientated models

When a result-orientated model is applied, there are 3 key areas of business value:

Reduce risk and disruption during manufacturing through a sharing of common goals and objectives with the customer and a sharing of risk. If we avoid catastrophic failure, there is less disruption and loss in the customer's process. Once the risk is controlled, inefficiencies in other aspects of the process, like spare part inventories can be reduced.

Full use of assets before repair or remanufacture. One of our customers achieved a 25% increase in pump lifetime, by transitioning from a time-based maintenance schedule to a condition-based maintenance plan, that integrated equipment monitoring with predictive maintenance (PdM) and remaining-useful-life (RUL) technologies. Key to their success was Edwards Operational Excellence approach, which combines predictive analytics with specific domain knowledge.

Guarantee access to the most robust, reliable and energy efficient products and processes that meet the customers' exact performance requirements as performance has a direct impact on the supplier's bottom line. This brings customers closer to meeting their corporate social responsibility (CSR) objectives.

The opportunity for semiconductor manufacturing

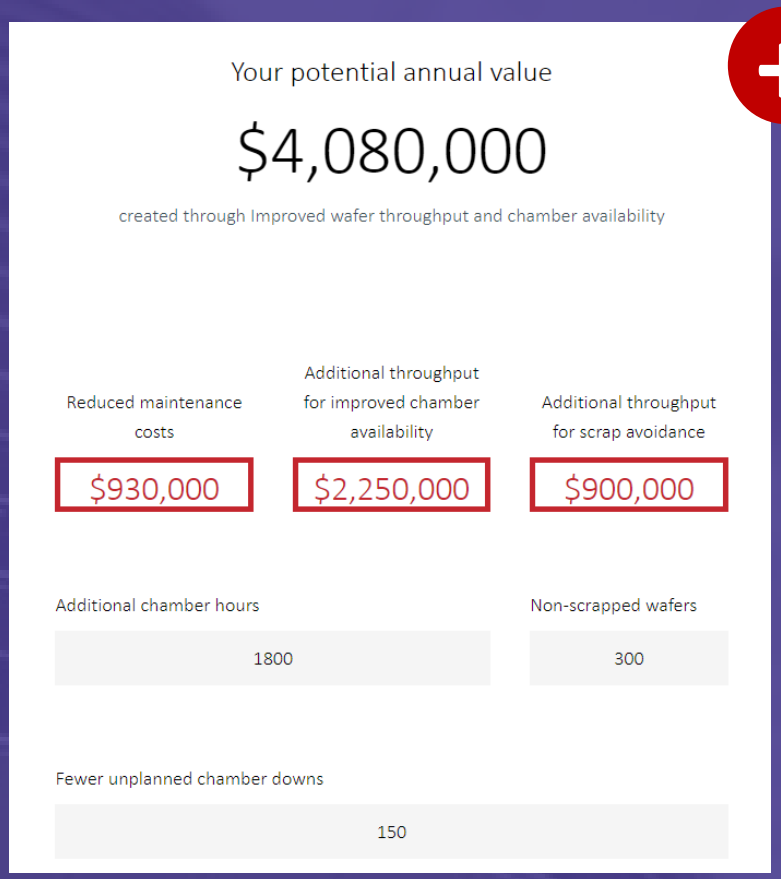
Revenue Impact

Being result-orientated means focusing on key Fab performance metrics – **wafer loss**, **throughput** and **total cost of ownership** – this simple calculation estimates the opportunity for customers.

We support our customers to get the best performance and results through an approach of Operational Excellence in both the cleanroom and the SubFab

READY TO REVEAL THE POTENTIAL VALUE IN YOUR SUBFAB?

Learn more with the Value Calculator



This calculation is based on typical values for a 300mm, 40k WSPM fab with ~2k vacuum pumps and assumes that we can eliminate unscheduled downtime through our operational excellence approach.

Key capabilities required to leverage the circular economy

These core capabilities are vital to implementing a circular business model. Design for circularity prolongs product life through remanufacturing, reusing and recycling. A data driven approach to innovation underpins it all.

FURTHER LEARNING RESOURCES

Turning Data into Actionable insight