

# Test & Measurement Coalition - Circular Economy

January 2020

## Introduction to the T&M Coalition

The Test & Measurement Coalition represents an ad-hoc group of companies active in producing test & measurement industrial type products. The Coalition includes leading companies in the sector including Agilent Technologies, Fluke Corporation, Keithley Instruments, Keysight Technologies, National Instruments, Thermo Fisher Scientific and Tektronix. We estimate the coalition membership represents over 60% of the global production of industrial test and measurement products and other industrial equipment including chemical analysers.

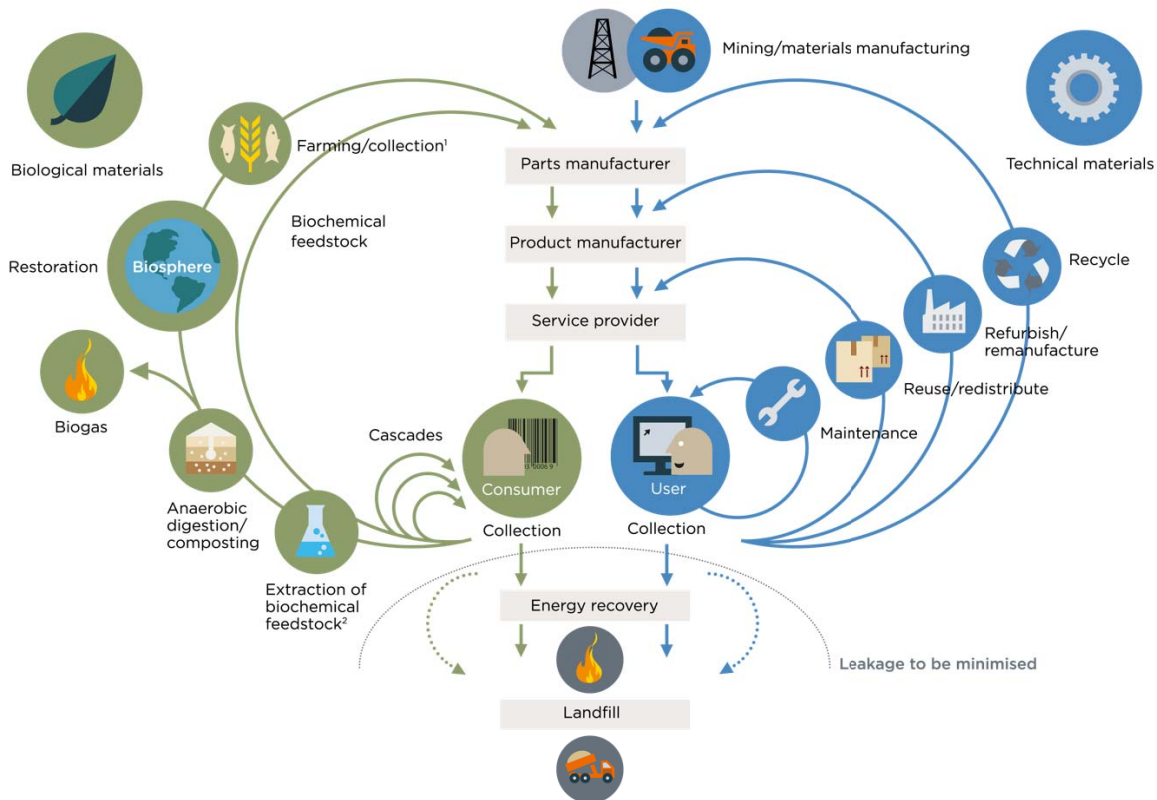
Products include a wide range of sophisticated electronic instruments such as signal generators, logic analysers, oscilloscopes, spectrum analysers, digital multimeters, electron microscopes, chemical and biological analysers, complex chromatography systems and their detectors, etc. The instruments are used in Research, Quality Control and Testing laboratories (including field testing) in Universities, Manufacturing facilities and by Governmental Agencies (for conformance verification and environmental testing). They are essential to the good functioning of electronic communications networks, heavy industrial processes such as steel manufacturing, the testing of vehicles for compliance with emissions standards, and the monitoring of complex and critical systems of all types.

The whole of the monitoring and control category of equipment represents by weight 1.8% of the total Electrical and Electronic Equipment (EEE) put on the EU market and 0.7% of the total Waste EEE (WEEE) collected in the EU (EU official figures, Eurostat 2016.) Industrial Test & Measurement instruments, a subset of monitoring and control category, therefore only represent a fraction of these values: an insignificant contribution to the waste stream as compared to other EEE categories.

## Logic of the Circular Economy

The aim of the industrial sustainability transition is to move in a **strategic shift from a linear (“take, make, dispose”) to a circular economic model (“reduce, reuse and recycle”)**, in which consumption of scarce resources is limited and negative climate and environmental externalities are reduced as much as possible, at all stages of the value chain. A circular economy favours activities that preserve value in the form of energy, labour and materials. This means **designing for long-lasting use, reuse, remanufacturing, and recycling to keep products, components, and materials circulating in the economy.**

The circular economy—an industrial system that is restorative by design



ELLEN MACARTHUR FOUNDATION

### Circular Economy model

(Ellen MacArthur Foundation 2013 – adapted from Cradle to Cradle Design Protocol by Braungart & McDonough)

## Circular Economy model for Test & Measurement instruments

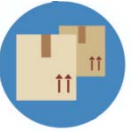
The core loops of the Circular Economy model for technical materials are: maintain, reuse, refurbish and recycle. How are they translated for industrial test & measurement instruments?

In regards to the Circular Economy principles, industrial test & measurement instruments are very different from high-volume consumer products which are frequently re-designed to follow consumer trends (every 1.5 year on average). **Industrial test & measurements instruments are intentionally designed for long useful lifespans with high reliability.** Test and measurement instruments (category 9 under the RoHS Directive) are designed: exclusively for professional and industrial use; to meet high performance requirements in critical applications; and last up to 40 years (10 years typical first life). Redesign is not frequent and happens every 7 years on average after which they typically enter a long-term customer support period.

The main focus of the test & measurement sector within Circular Economy is therefore on the use phase and how to prolong it.



- **MAINTAINING**: Our instruments are expected to provide repeatable and accurate results throughout their lifetime. With a typical first use of ten years and an overall life of up to forty years; great care is taken during design and qualification to assure these stringent performance and rigorous reliability requirements can be met, as well as incorporate design for serviceability. To extend availability, instruments can be leased or rented; directly or through brokers; helping SMEs avoid capital expenditure and improve utilization. We provide periodic calibration services to assure the quality and traceability of instruments measurements are sustained year after year.



- **REPAIRING**: While our instruments are designed for long term reliability, failures do occur over such an extended use period. Our repair services help minimize any instrument down-time and customer disruption. Equipment is typically supported for a minimum of five years after market withdrawal. Towards the later stages of useful life, specific parts and sub-assemblies no longer available on the open market may be recovered from end-of-life equipment specifically to extend the support period.



- **REFURBISHING**: Technology does not stand still, and enhancements and upgrades are made available to extend the useful life of equipment. When a newer piece of equipment is finally required, substantial trade-in discounts are offered to customers to reflect the residual asset value of the instruments. This provides a steady supply chain of equipment for refurbishment. Extended life via resale is of great economic and environmental benefits. **Secondary markets (refurbishment and resale)** are significant in this sector as they often account for 4-5% of producer turnover for test & measurement producers.

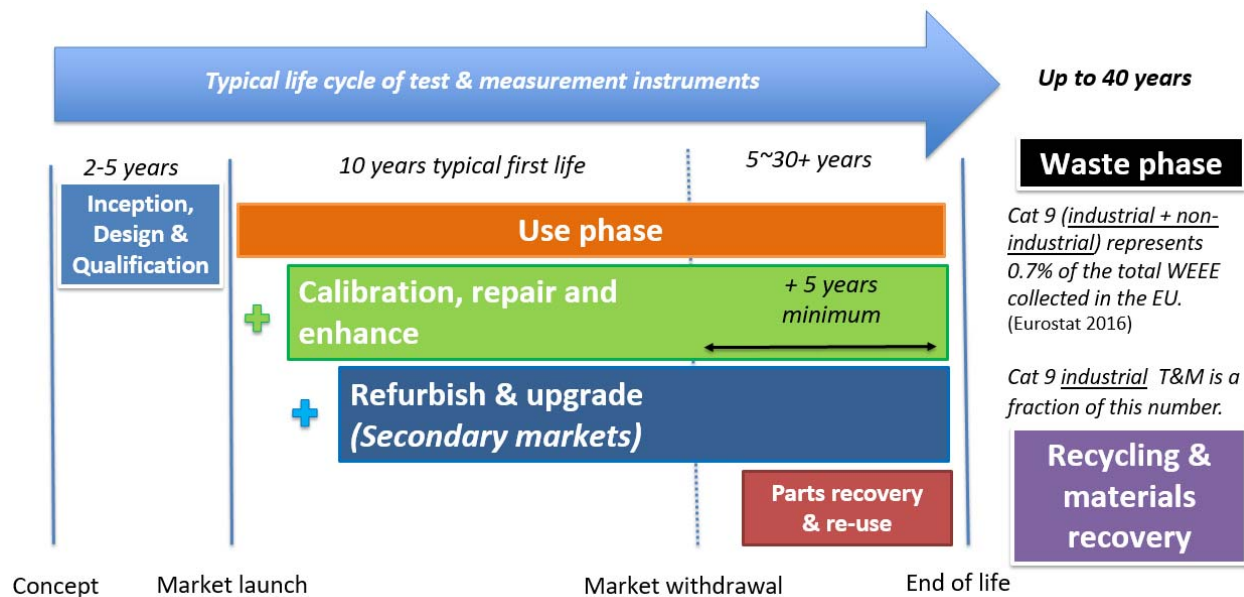


- **RECYCLING**: Equipment only enters the waste stream many decades after being placed on the EU market. Our contribution to the stream of waste electrical and electronic equipment (WEEE) is insignificant (< 0.7% by weight of EU WEEE<sup>1</sup>.) WEEE is collected exclusively through business to business – B2B schemes.

This strong focus on maximizing the use phase is completely in line with the first loops of the Ellen McArthur Foundation Circular Economy model, which is at the heart of the European Commission's ongoing discussions on the regulatory framework for a Circular Economy 2.0 in the European Union.

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<sup>1</sup> Eurostat: [WEEE Data 2016](#) – no distinction between industrial and non-industrial equipment



The specificities of the test & measurement sector is also translated in **specific challenges** in the field of the Circular Economy, which need to be understood by policy-makers, especially in the framework of debates on the tracking of certain substances, or possible future restrictions of certain substances:

- **Feasibility challenges in tracking substances:**

- Traceability is challenging **given the extreme complexity of Test & Measurement products**: 25 - 35% of the components used in Test & Measurement products are custom-designed for instruments. Member companies of the Test and Measurement Coalition have supply chains that can exceed 100 000 suppliers for the quarter of a million parts used to produce our equipment; with portfolio scale of up to 5000 active products from any one producer. Traceability will therefore pose significant feasibility challenges for the sector.
- As a result of their long product life, some instruments may only enter the waste stream up to 40 years after they are placed on the EU market. Taking into account the **constant evolution of the list of substances of concern – especially over the course of several decades** – this raises questions on the value of this information for the recyclers.

- **Need to assess the cost-effectiveness of restricting substances in products:**

- Test & measurement members **proactively started to work on redesign** before entering the scope of the RoHS Directive, and it took them 12 years to be RoHS-compliant. **Substitution is very challenging** as test & measurement instruments have to guarantee very high long-term reliability criteria during an extended lifetime.
- **The impact on innovation** for the users of test & measurement products would also need to be assessed. This **includes SMEs** which would be critically impacted in their ability to develop/ test new products if access to equipment is removed or availability of second-hand / refurbished products is made more difficult.

- **After detailed risk assessments, a number of exemptions were granted** to test & measurement companies to be able to use minimal quantities of certain substances of concern in very specific applications, under sectoral legislation. These exempted applications are essential for ensuring the performance and long-term reliability of test & measurement products during their entire lifetime. The **overall long-term benefits from circular use in these cases outweigh the health and environmental concern** related to these substances, where the use is made in close loop professional systems with appropriate controls, or where use is possible without raising environment and health concerns.
  - **A cautious approach is therefore needed, taking into account the cost-effectiveness and impact of potential restriction measures.**
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