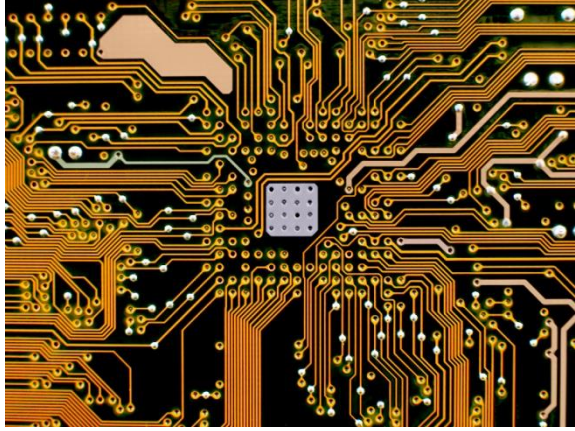


Accelerating Material Circulation and Prolonging Product Lifecycles: IEC/ISO Perspectives and Insights from WRI's recent SCL Circular Economy System

Walter Jager,

Principal Consultant, ECD Compliance

Vice-chair, IEC/TC111 (Environmental Standardization)

wjager@ecdcompliance.com

Agenda

- **Introduction**
- **ISO Standards on Circular Economy**
  - ISO 59020 Measuring and Assessing Circularity
- **Systems Change Lab (SCL) Circular Economy System**
  - Tracking global progress on Circular Economy
- **IEC/TC111 Circular Economy Standards**
  - Ecodesign for circularity
  - Measuring circularity
  - Communicating data for circularity assessment

ISO 590XX Series of Circular Economy Standards

What does Circular Economy (CE) mean?

- **Final approval of the Circular Economy standards on April 16, 2024**
  - ISO 59004 Circular economy – Vocabulary, principles and guidance for implementation
  - ISO 59010 Circular economy – Guidance on the transition of business models and value networks
  - ISO 59020 Circular economy – Measuring and assessing circularity performance

- **CE has different meaning to different people, organizations, countries**

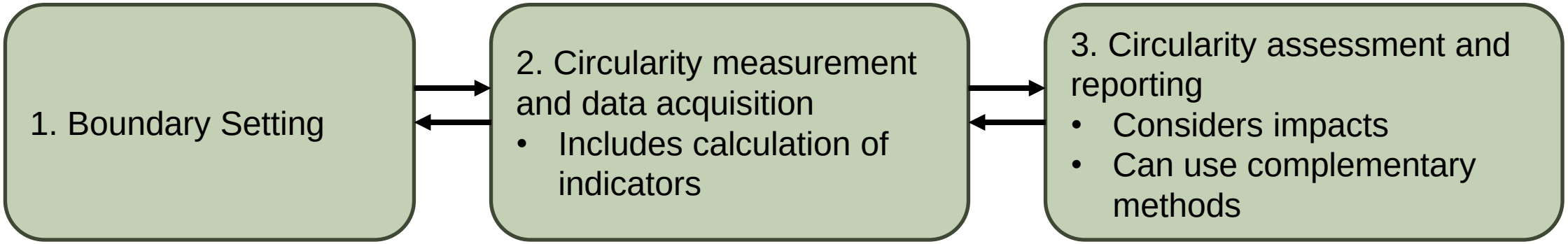
3.1.1 circular economy
economic system (3.1.2) that uses a systemic approach to maintain a *circular flow of resources* (3.1.6), by recovering, retaining or adding to their *value* (3.1.7), while contributing to *sustainable development* (3.1.11)
Note 1 to entry: *Resources* (3.1.5) can be considered concerning both stocks and flows.
Note 2 to entry: The inflow of *virgin resources* (3.3.2) is kept as low as possible, and the circular flow of resources is kept as closed as possible to minimize *waste* (3.3.6), *losses* (3.3.7) and *releases* (3.3.8) from the economic system.
Source: ISO FDIS 59004

ISO 59020– Measuring and Assessing Circularity

- **Measuring the circular performance of a product or system is described in the upcoming ISO 59020 standard.**
- **The standard identifies five categories of circularity indicators for measurement:**
  1. resource inflows;
  2. resource outflows;
  3. energy;
  4. water circularity; and
  5. economic.
- **Resource outflows account for product lifetime (reliability, lifetime extensions, etc.) and end-of-life recovery**

Framework for Measuring Circularity

- **Measuring circularity is similar to conducting a Life Cycle Assessment (LCA).**



- **Circularity assessment can account for environmental and social aspects and impacts**

Core Circularity Indicators in ISO 59020 (1)

- **Resource Inflows**
  - A.2.2 Average reused content of an inflow (X)
  - A.2.3 Average recycled content of an inflow (X)
  - A.2.4 Average renewable content of an inflow (X)
- **Resource outflows**
  - A.3.2 Average lifetime of product or material relative to industry average
  - A.3.3 Percent actual reused products and components derived from outflow (X)
  - A.3.4 Percent actual recycled material derived from outflow (X)
  - A.3.5 Percent actual recirculation of outflow in the biological cycle

Some difficult topics to address:

- definition and specification of renewable resources
  - definition of renewable materials
  - biological resources
  - regeneration of nature

Core Circularity Indicators in ISO 59020 (2)

- **Energy**
  - A.4.2 Average percent of energy consumed that is renewable energy
- **Water**
  - A.5.2 Percent water withdrawal from inflow circular sources
  - A.5.3 Percent water discharged in accordance with quality requirements
  - A.5.4 Ratio (onsite or internal) water reuse or recirculation
- **Economic**
  - A.6.2 Material productivity (MP)
  - A.6.3 Resource intensity index (RII)

Circularity Measurement

- **Circular indicators should be selected based on significance.**
- **Combination of Indicators selected should cover the full circular loop**
  - Circular indicators from Annex A; can be supplemented by additional indicators
- **Measurement is conducted based on system boundary that is selected**

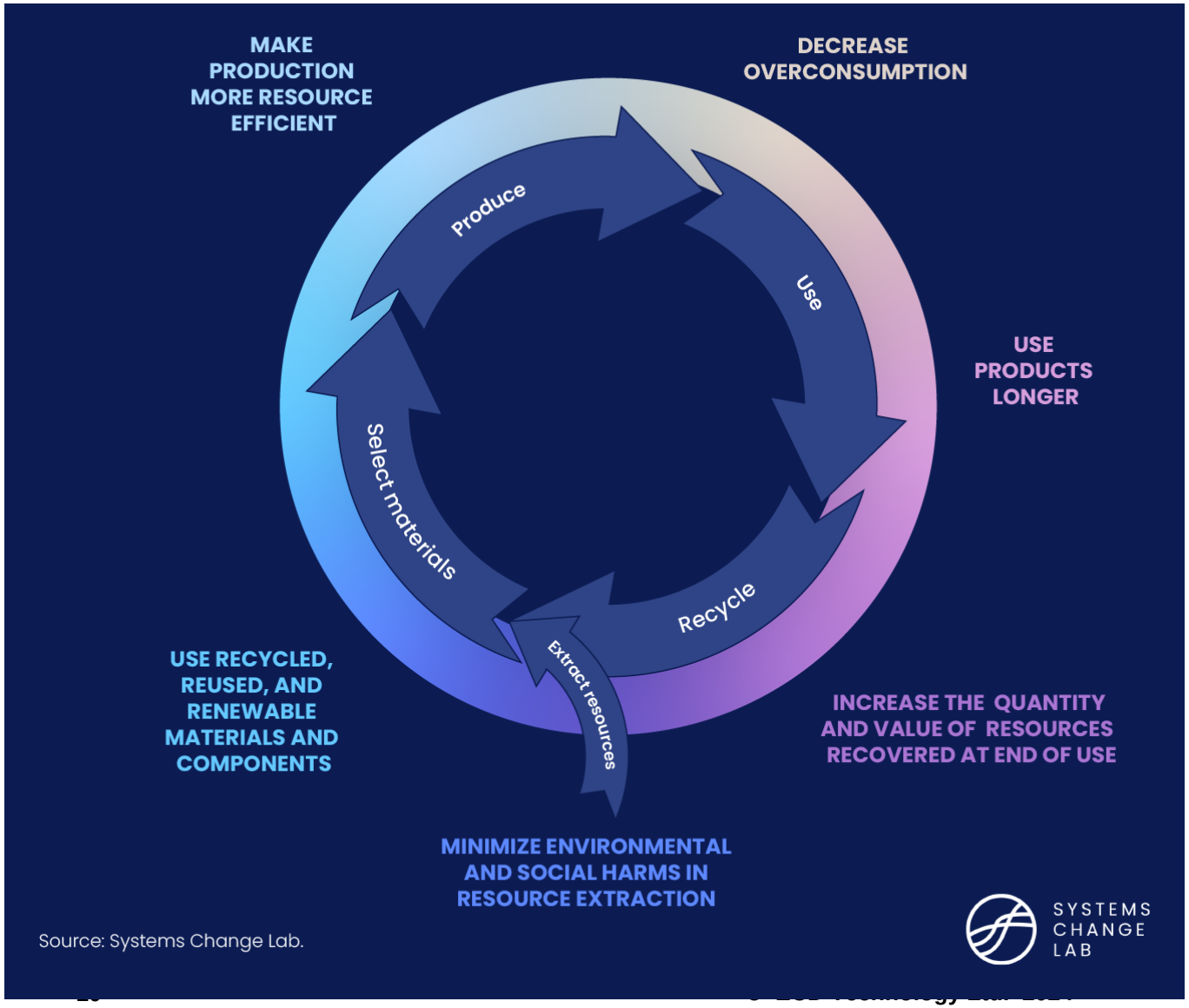
Systems Change Lab (SCL) Circular Economy System

- **The SCL CE System was launched on April 2, 2024**
  - Accessible at: https://systemschangelab.org/circular-economy
  - Launch webinar is April 23, 2024
- **Intention is to track global progress on circular economy**
  - Identify metrics, targets, enablers and barriers
- **Significant data gaps were identified**
  - Differences in interpretation create challenges when comparing data

About Systems Change Lab
Systems Change Lab is a collaborative initiative that aims to spur action at the pace and scale needed to tackle some of the world's greatest challenges: limiting global warming to 1.5° C, halting biodiversity loss and building a just economy. Convened by World Resources Institute and the Bezos Earth Fund, Systems Change Lab supports the UN Climate Change High-Level Champions and works with key partners and funders including Climate Action Tracker (a project of Climate Analytics and NewClimate Institute), ClimateWorks Foundation, Global Environment Facility, Just Climate, Mission Possible Partnership, Systemiq, University of Exeter, and the University of Tokyo's Center for Global Commons, among others. Systems Change Lab is a component of the Global Commons Alliance

SCL Circular Economy System

- **Six shifts identified as important for CE**
  - Reduce overconsumption
  - Use reused, recycled, and renewable materials and components
  - Minimize environmental and social harms in resource extraction
  - Make production more resource efficient
  - Use products longer
  - Increase the quality and value of resource recovered at end of use



ECD Compliance

CE Enablers and Barriers

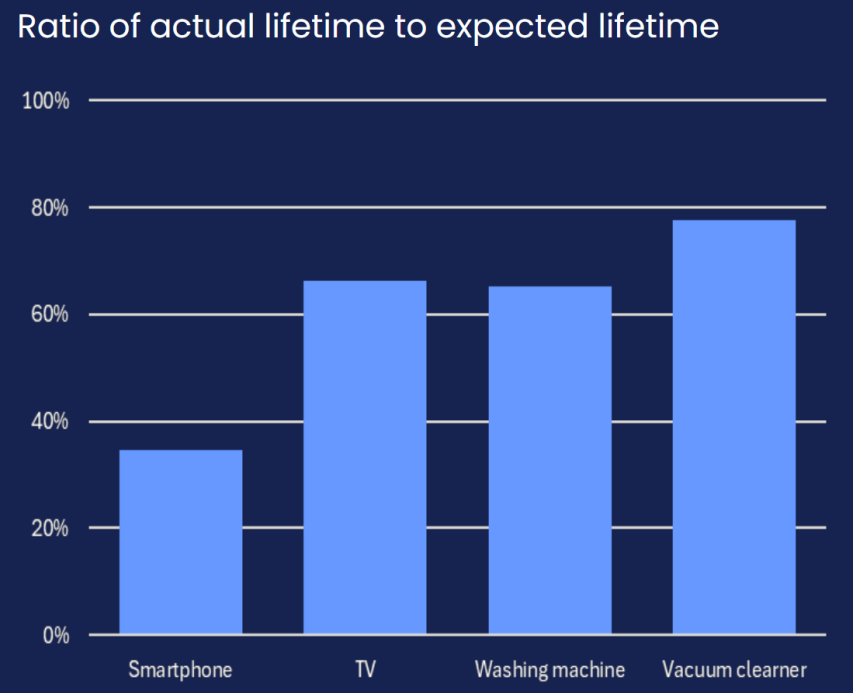
- **The system identifies 33 enables and barriers to change**

ECD Compliance

Use Products Longer

- **Products need to last longer and users need to use them longer.**
  - Reliability, maintaining usefulness, and ease of repair are important factors
- **Enablers and barriers**
  - Regulations that require product durability information
  - Growth of repair sector
  - User behavior
  - Product reuse
- **In general, global data is limited**

- **Actual lifetime still falls short of consumer expectation.**
  - European data



Source: European Environmental Agency (2020) Europe's consumption in a circular economy: the benefits of longer-lasting electronics. The graph made by SCL.

The lifetime of products can be extended by a combination of changes to product design, consumer behavior and support services. The product needs to be designed for durability, including maintenance, repair and upgrades. For some products, easy access to repair services is an important enabler. Consumer behavioral changes to use products longer and more frequently repair and reuse products are also needed.
Source: SCL CE System

IEC TC 111

Environmental standardization for electrical and electronic products and systems

- **IEC = International Electrotechnical Commission**
- **IEC/TC111 develops horizontal environmental standards for the electrical and electronics industry**
  - 38 countries (27 P / 11 O)
- **Circular Economy standards have become a priority for globally harmonized standardization**
  - Regulatory requirements
  - Voluntary initiatives and procurement requirements

ECD Compliance

13

IEC TC 111
Environmental standardization for electrical and electronic products and systems

- **Environmental Aspects Being Addressed**
  - Chemical substances and materials in EE Products
    - testing, management, communication, and documentation
  - Environmentally Conscious Design (ECD)
  - Circular Economy,
    - incl. use of circular materials and waste management of EEE
  - Greenhouse Gas (GHG) emissions, reductions, and avoided emissions
  - Life Cycle Assessment (LCA)
    - Product Category Rules (PCR)
  - Environmental performance assessment of products

ECD Compliance
14

Circularity Economy (1)

- **Six areas of standardization for Circularity Economy**
  - Circular Economy terminology (TC1/WG2)
  - Ecodesign for Circular Economy
  - Circularity of Resource Inflows (reused, recycled, renewable)
    - Assessment methods for circular content used in making EE Products
  - Durability and lifecycle extension assessment methods
  - Circularity of Resource Outflows
    - WEEE Management
    - Assessment methods and guidance for end-of-life material recovery – recycling, recyclability
  - Communication of circularity information through value chains

ECD Compliance

15

Eco-design – Circular Economy

- **ISO/IEC 62430: Environmentally conscious design (ECD) — Principles, requirements and guidance**
  - Edition 2.0 published by JWG ECD with ISO/TC 207 in October 2019
  - Can be integrated into an ISO 14001 Environmental Management System
- **IEC TS 63428 - Guidance on material circularity considerations in environmentally conscious design**
  - Focus on optimal and efficient use of material within products to help enable the circular economy
    - Material circularity principles
    - Considerations for material selection, manufacturing, distribution and installation
  - Extending product life
    - durability: reliability, maintenance, repairability, upgradability)
  - Trade-offs in designing for circularity

ECD Compliance

16

Ecodesign for Material Circularity and Product Lifetime (IEC TS 63428)

- **Considers concept, manufacture, use, and end-of-life phrases**
- **Guidance for improving product use phase (5.2)**
  - Framework for durability
  - Product reliability
  - Ability of products to be dis-assembled and re-assemblec
  - Ability of products to be maintained
  - Product reparability
  - Ability of products to be updated and upgraded
  - Design of products so that they can be reused and refurbished
- **Clause 6 discusses importance of trade-offs between different ecodesign measures**
  - Ecodesign opportunities cannot be considered in isolation
  - Interactions and trade-offs need to be considered
  - Opportunities and trade-offs should be data driven

Ballot was launched April 22, 2024

Circularity Economy (2)

- **Circularity of Resource Inflows**
  - Assessment methods of circular content used in manufacturing EE Products
    - This ties into the ISO 59020 core circularity indicators
  - IEC 63333: General method for assessing the **proportion of reused components** in products (published 2023)
  - General method for assessing the proportion of **recycled content** (short term plan)
  - General method for assessing the Proportion of **renewable content** (long term plan)

Circularity Economy (3)

- **Durability and lifecycle extension**
  - Framework for durability assessment from a circularity perspective (taking into consideration reliability, maintenance, reparability, update, upgrade, refurbishment and product reuse) (planned)
  - General methods for the assessment of the ability to repair, upgrade, and reuse parts of products (planned)

Circularity Economy (4)

- **Circularity of Resource Outflows and WEEE Management**
  - IEC 63395 - Sustainable management of waste electrical and electronic equipment (e-waste)
    - Expected publication 2025
  - IEC 62635 - Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment
    - Expected publication 2026

Material Declaration

- **IEC 62474 (2018): Material declaration for products of and for the electrotechnical industry**
  - Specifies the requirements for reporting the substances and materials used in electronic and electrical products
  - Parts of the standard are in a Database (SDB) -- updated on a regular basis
  - Update to the Data Exchange Format (DXF) to include circularity information to be published in May 2024
- **ISO/IEC 82474-1 Material declaration – Part 1: General requirements**
  - Cross-sector material declaration standard
  - CDV/DIS Approved in both ISO and IEC; publication is expected in late 2024
  - Leverages IEC 62474 as a starting point and adds Process Chemical Declaration, Reference List formats, web services to S2S data exchange.
  - Extensive support for circular economy

Supply chain management

ECD Compliance

21

IEC 62474 - Material and Substance Declaration

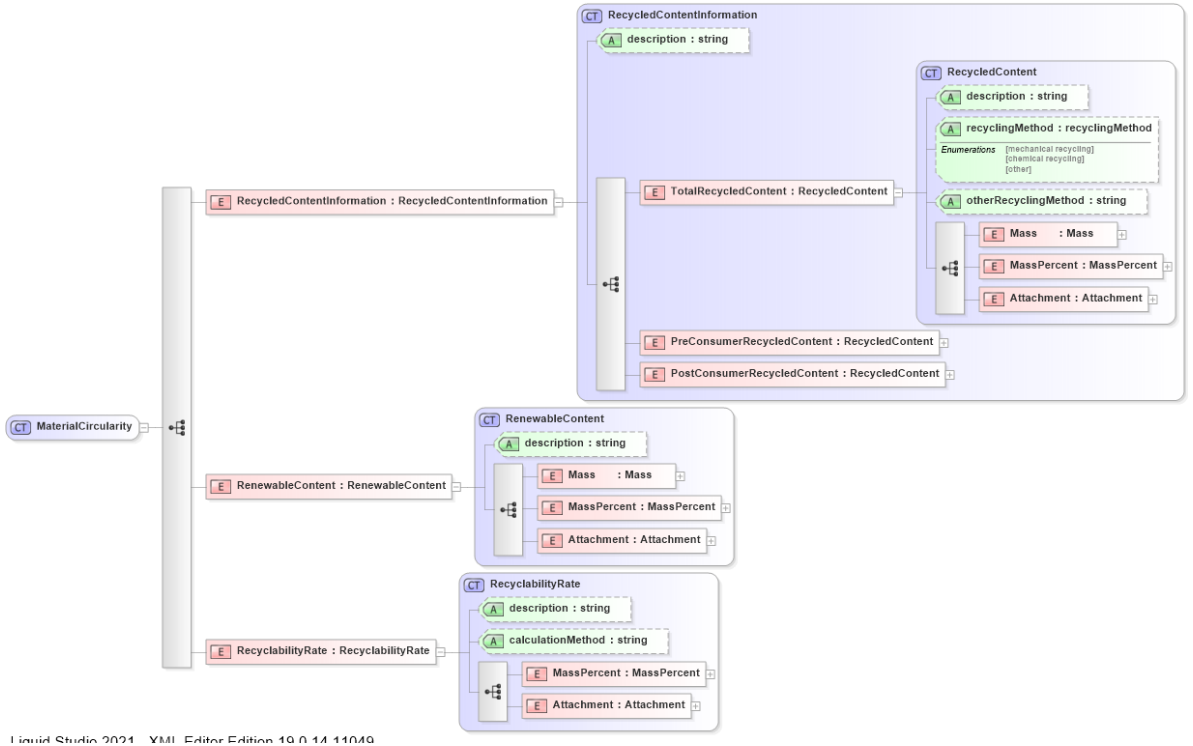
International Electrotechnical Commission

- **Growing connection between Materials declaration system and Circular Economy**
  - Emerging Circular Economy (CE) requirements are driving members of value networks to communicate information on circularity characteristics of materials, components, and products.
    - Material declaration systems already provide material and substance information down supply chains
    - Data from supply chain is needed for all circularity indicator categories
    - IEC 62474 circularity economy update approved; to be published in May 2024.
    - ISO/IEC 82474-1 cross-sector material declaration standard will further expand the ability to communicate material and product circularity information.
    - It also adds a declaration module for process chemicals.

Circularity information through supply chain

- **IEC 62474 and ISO/IEC 82474-1 include data fields at both the product and material level for:**
  - recycled content (pre-consumer and post-consumer)
  - Recycling method (mechanical vs. chemical)
  - chain of custody information being considered
  - reused content (per IEC 63333), and
  - renewable content.
  - recyclability rate (IEC 62635)
- **Reparability and other durability information is being discussed**
  - Harmonized assessment methods are needed to ensure consistency of interpretation
- **Context of data is needed to prevent misleading claims.**

Data structure for Material Circularity

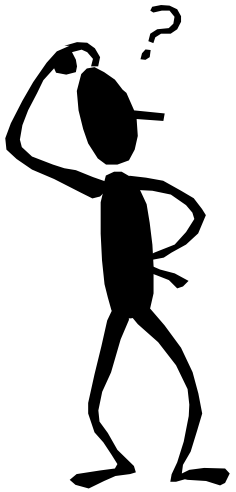


ECD Compliance

23

Support for Critical Raw materials (CRMs)

- **Importance of recycling CRMs growing as regulators' mandate information about CRMs in products,**
  - CRM information also needs to be passed down the supply chain and eventually make its way to recyclers.
  - Cobalt and neodymium were added to the IEC 62474 DSL in 2021 to reflect the EU reporting requirements for servers and storage products.
  - Simplified approach to declare CRM information using predefined CRM statements in a query list declaration being added to IEC 62474.



Thank you

Walter Jager
ECD Compliance

wjager@ecdcompliance.com

About ECD Compliance

- **Consulting and technical support on global environmental regulations**
  - Global regulatory and technical compliance
    - EU REACH, RoHS, SCIP, TSCA, ….
  - Impact on products and markets
  - Education and training seminars
  - Development of compliance programs
- **Environmental Product Declarations**
  - EPEAT
  - Carbon Footprint of Product / Life Cycle Assessment (LCA)
- **Environmentally Conscious Design (ECD)**
  - Ecodesign Directive (ErP/EuP)
- **International environmental standards**
  - Representation and consulting
  - IEC/TC111 – Environmental Standardization for Electrical/Electronic Products
  - ISO/IEC JTC1/SC39 – Sustainability by and for IT
  - ISO/TC323 – Circular Economy