

國立臺北大學自然資源與環境管理研究所

112 學年度第二學期『清潔生產與工業生態學』

課程進度(13)：生命週期評估：碳足跡、環境足跡與 EIO/LCA
Life Cycle Assessment: Carbon Footprint, Environmental Footprint and EIO/LCA

- SUSTAINABLE CONSUMPTION: Environmental Statements and Programmes for Products
 - Sustainable Consumption
 - ⇒ Downstream Stages of Products' Life Cycle
 - ⇒ Sustainable Production vs. Sustainable Consumption
 - ⇒ [Ecodesign for Sustainable Products Regulation \(ESPR\)](#) => Digital Product Passport
 - ⇒ [Sustainable Consumption - Directive on Empowering Consumers for the Green Transition](#)
 - [ISO 14020:2022](#) Environmental statements and programmes for products -- Principles and general requirements
 - ⇒ Communicating the environmental aspects and potential environmental impacts of products assists intended audiences (e.g. investors, purchasers, consumers) to make decisions on the selection and use of those products.
 - ⇒ Environmental Statements: Environmental aspects and environmental impacts of products
 - Self-declared environmental claims (**DEPRECATED**: Type II environmental label)
 - Ecolabels (**DEPRECATED**: Type I environmental label)
 - Environmental product declarations
 - Footprint communications
 - ⇒ Environmental Statement Programme: Rules and procedures for providing an environmental statement.
 - ⇒ Product Category Rules (PCR): Set of specific rules, requirements and guidelines for developing statements based on life cycle assessment for one or more product categories.
 - ⇒ Certification, Validation, and Verification of Environmental Statement
 - ISO 14020 Series
 - ⇒ ISO/WD 14021 Environmental statements and programmes for products -- Self-declared claims
 - ⇒ ISO/WD 14024 Environmental statements and programmes for products -- Ecolabels
 - ⇒ ISO/WD 14025 Environmental statement and programmes for products -- Environmental product declarations
 - ⇒ ISO 14026:2017 Environmental labels and declarations -- Principles, requirements and guidelines for communication of footprint information
 - ⇒ ISO/TS 14027:2017 Environmental labels and declarations -- Development of product category rules
 - ⇒ ISO/TS 14029:2022 Environmental statements and programmes for products -- Mutual recognition of environmental product declarations (EPDs) and footprint communication programmes
 - ⇒ [ISO 14021:2016 Environmental labels and declarations -- Self-declared environmental claims \(Type II environmental labelling\)](#)
 - ⇒ [ISO 14021:2016/Amd 1:2021 Amendment 1: Carbon footprint, carbon neutral](#)
 - ⇒ [ISO 14024:2018 Environmental labels and declarations -- Type I environmental labelling -- Principles and procedures](#)
 - ⇒ [ISO 14025:2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures](#)
 - ⇒ [標準檢驗局標準資料電子報--協助實踐永續消費之圭臬—ISO 14020 系列標準](#)
 - ⇒ ISO 14020:2022 產品的環境聲明和方案—原則和一般要求
 - ⇒ ISO/WD 14021 自行宣告的環境訴求 14024 生態標章 14025 產品環境宣告
14021:2016 第二類環境標誌 14024:2018 第一類環保標章 14025:2018 第三類環境宣告

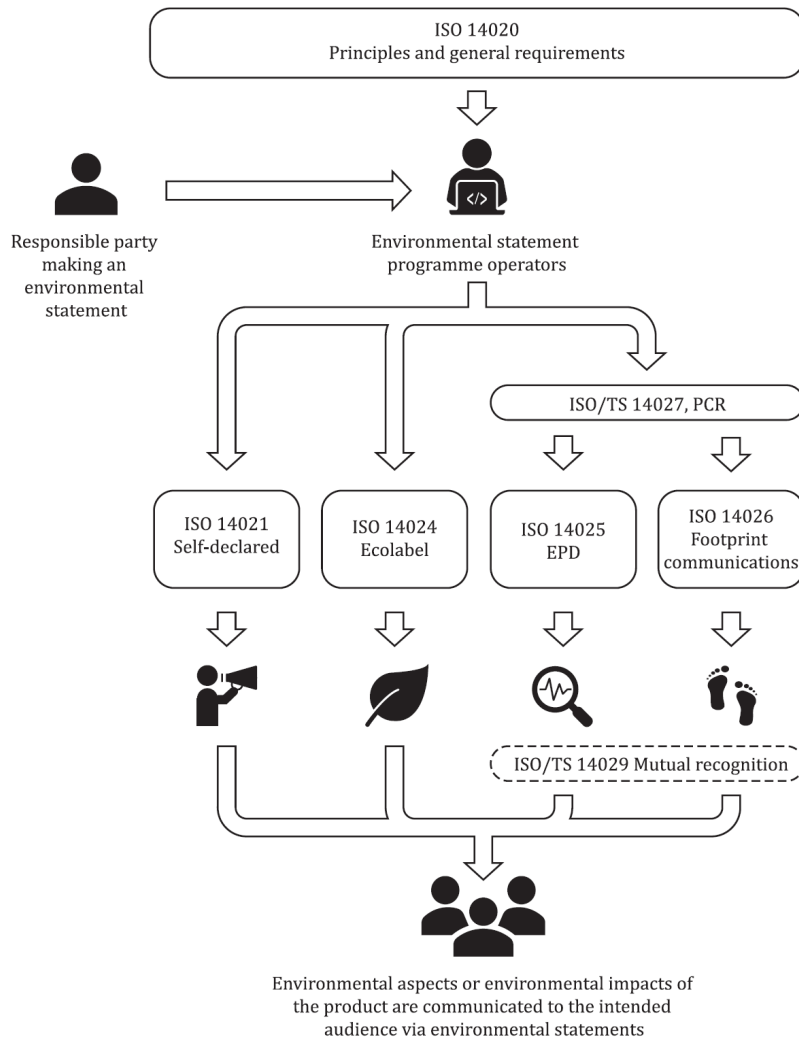
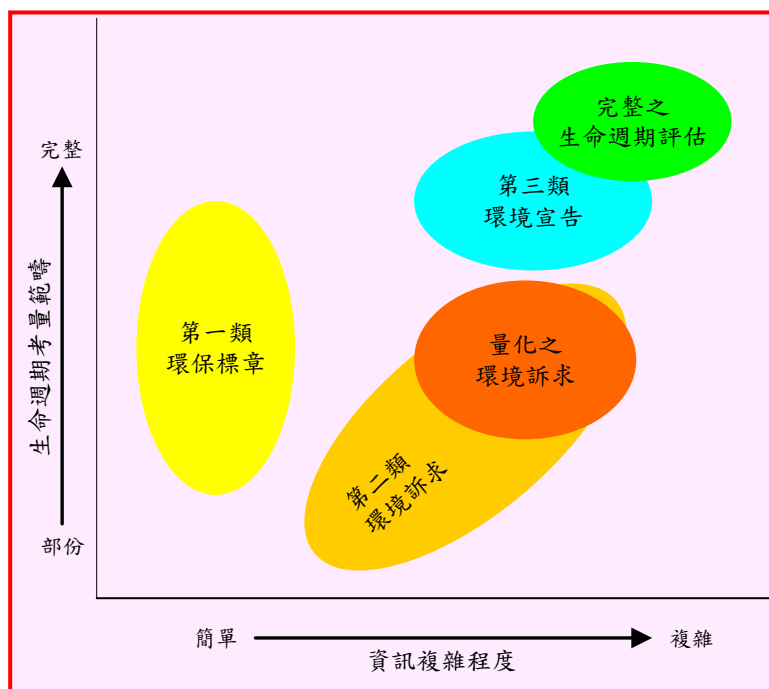


Figure 1 — Structure of the ISO 14020 family of standards



EL&D 及 LCA 之關聯特性 (待更新!)

● **PRODUCT ENVIRONMENTAL FOOTPRINT**

□ **Footprint:**

Metric(s) used to report life cycle assessment results addressing an area of concern

⇒ **Area of Concern:** Environmental topic defined by the interest of society.

(*c.f.* Area of Protection in LCIA)

- Climate change and ocean acidification
- Water scarcity and water pollution
- Land appropriation/availability
- Nitrogen use and pollution
- Particulate concentration of aerosols in the atmosphere
- Ozone depletion
- Material extraction
- “Plastics”
- Phosphorus use and pollution
- Biodiversity loss
- Chemical pollution

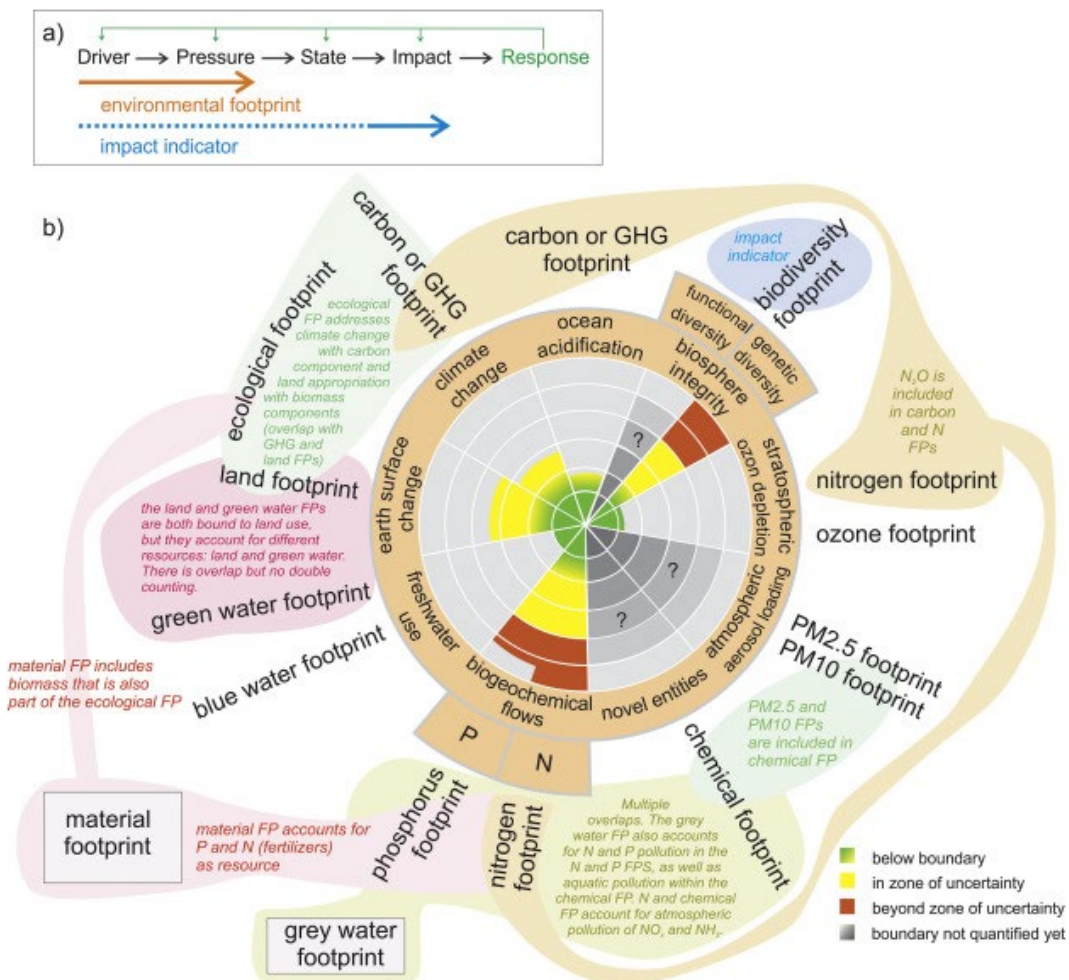
⇒ Carbon Footprint (Green, Blue and Grey) Water Footprint Ecological/Land Footprint Nitrogen Footprint Phosphorus Footprint Chemical Footprint Biodiversity Footprint Ozone Footprint PM_{2.5}/PM₁₀ Footprint => Plastic Footprint

□ **EU Commission Recommendation 2021/2279** on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations

□ **ISO 14067:2018 - Greenhouse gases -- Carbon footprint of products -- Requirements and guidelines for quantification**

□ **ISO 14046:2014 - Environmental management-- Water footprint -- Principles, requirements and guidelines**

□ **Plastic Footprint Network**

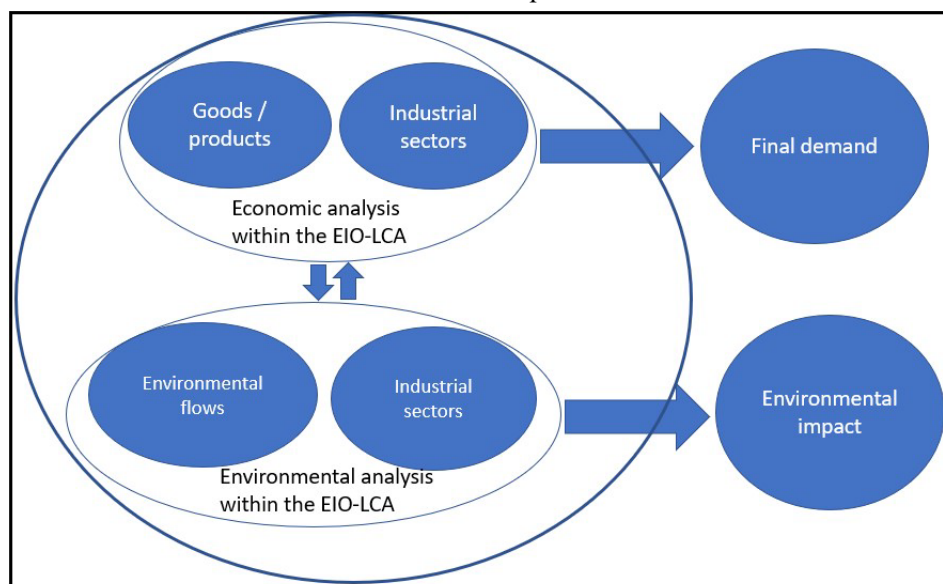


- ENVIRONMENTAL STATEMENT PROGRAMME AND PRODUCT CATEGORY RULE

- Product Category Rule
 - ⇒ ISO/TS 14027:2017 => set of specific rules, requirements and guidelines for developing ~~Type III environmental declarations and footprint communications~~ **statements based on life cycle assessment** for one or more product categories
 - ⇒ ISO 14050:2020 3.7.12: “statements based on life cycle assessment” replaced “Type III environmental declarations and footprint communications.”
 - ⇒ EPD-PCR => ES-PCR?
 - ⇒ CFP-PCR => in the case of carbon footprint product category rules
- Environmental Statement Programme (Scheme): Rules and procedures for providing an environmental statement.
 - ⇒ Conformity assessment => Responsible party
- EU PEFCR and OEFSR [The Product Environmental Footprint Pilots \(archive\)](#)
 - ⇒ Product Environmental Footprint Category Rules
 - ⇒ Organisation Environmental Footprint Sector Rules
- 國內產品類別規則資料庫
 - ⇒ [製造業產品環境足跡與資源永續資訊專區](#)
 - EPDPCR => <https://www.idbcfp.org.tw/DownloadSubDetail.aspx?id=4>
 - ⇒ [產品碳足跡資訊網](#)
 - PCFPCR => <https://cfp-calculate.tw/cfpc/Carbon/WebPage/FLPCRDoneList.aspx>
- CBAM => not include downstream “embodied carbon” => PCR?

- ECONOMIC INPUT-OUTPUT LCA (EIO-LCA) (Hauschild et al., 2018: Chp.14)

- Process-based LCA and IO-based LCA
 - ⇒ Environmentally Extended Input-Output Analysis (EEIO)
 - ⇒ IO-based Sustainability Assessment
- Relationship between Production and Impacts
 - ⇒ Linear: Attributional LCA
 - ⇒ Nonlinear: Consequential LCA
 - ⇒ Underlining Assumption of IO => Linearity
- Relationship between Production and Impacts
 - ⇒ Linear: Attributional LCA => Nonlinear: Consequential LCA



Graphical representation of the EIO-LCA evaluation method (Sherwood et al., 2017)