Illustrative list of G7 governmental and private actors' existing practices to measure and address the challenges posed by digital technologies in terms of resource efficiency

The following practices describe some of the initiatives undertaken both by governmental and non-governmental actors to measure and address the challenges posed by digital technologies in terms of resource efficiency. These practices are related to five areas of action: measurement methodologies and approaches; ecodesign requirements; water and energy efficiency of digital infrastructures; circular economy within the digital sector; and raising awareness strategy and long-term planification tools.

The following practices were gathered through a survey conducted between 20 March and 17 April 2025. They are illustrative in nature and carry no prescriptive dimension. They are intended as examples from which all interested stakeholders may draw inspiration.

First pillar: Measurement methodologies and approaches

- *Practice n°1: Adopting a harmonised set of performance indicators for data centers as a national evaluation framework integrated with mandatory EU reporting obligations under the Energy Efficiency Directive*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: data centers*
- *Practice n°2: Establishing an open-source framework for measuring and optimizing the energy consumption of GPU workloads, including AI training and inference*
  - *Countries of implementation: United States of America (academic)*
  - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°3: Creating cross-company data sharing platforms within the supply chain to strengthen the traceability of the Product Carbon Footprint, including digital technologies*
  - *Countries of implementation: Japan*
  - *Parts of the value chain: end-user devices and digital infrastructures*
- *Practice n°4: Measuring the overall resource efficiency of the digital sector at national level, by monitoring multiple standardised indicators (eg. energy and water consumption)*
  - *Countries of implementation: France (public agencies)*
  - *Parts of the value chain: end-user devices and digital infrastructures*
- *Practice n°5: Developing product category rules (PCR) aiming at providing rules and guidelines for conducting life cycle assessment (LCA) of digital technologies*
  - *Countries of implementation: France (public agencies), EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: end-user devices, digital infrastructures and digital services*
- *Practice n°6: Assessing the contribution of digital technologies to the improvement of resource efficiency within other economic sectors (eg. heating control using connected thermostats)*
  - *Countries of implementation: France (public agencies, with the support of businesses)*
  - *Parts of the value chain: end-user devices, digital infrastructures*

Second pillar: Ecodesign requirements

- *Practice n°7: Implementing mandatory ecodesign requirements meant to improve the resource efficiency of the digital sector (eg. common charger – USB Type-C – for several end-user devices; longer availability of operating system updates)*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: end-user devices and data centers*

- *Practice n°8: Developing a General policy framework for the ecodesign of digital services, upon which businesses can voluntarily build on to improve the resource efficiency of their digital services*
    - *Countries of implementation: France (public agencies)*
    - *Parts of the value chain: digital services*

Third pillar: Water and energy efficiency of digital infrastructures

- *Practice n°9: Implementing binding energy reduction targets for data centers through a tertiary sector energy efficiency decree, requiring operators to achieve progressive reductions in energy consumption by 2030, 2040 and 2050, or alternatively to meet minimum energy efficiency thresholds (PUE[1]-based)*
    - *Countries of implementation: France*
    - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°10: Introducing resource efficiency conditionalities linked to a reduced electricity excise duty rate for data center operators, incentivising energy efficiency improvements as a prerequisite for benefiting from favourable tax treatment*
    - *Countries of implementation: France*
    - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°11: Establishing mandatory reporting requirements for data center operators on energy and water consumption, with public disclosure obligations and minimum energy efficiency thresholds (PUE ≤ 1.3) for newly built facilities*
    - *Countries of implementation: Italy, Japan (excluding water consumption), EU countries (incl. France, Italy, Germany)*
    - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°12: Developing best practice guides for data center operators to improve energy efficiency, lower operating costs and optimise resource performance, integrating metrics and reporting frameworks as well as commissioning and continuous optimisation guidance*
    - *Countries of implementation: Canada*
    - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°13: Designing high-performance computing (HPC) infrastructure integrating advanced cooling technologies (warm-water cooling, adiabatic dry coolers) to significantly reduce energy consumption and eliminate traditional refrigeration cycles*
    - *Countries of implementation: Italy*
    - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°14: Developing open-source tooling for fine-grained measurement and automated optimisation of energy consumption of GPU workloads, including AI training and inference, alongside a public leaderboard enabling cross-model energy efficiency comparisons*
    - *Countries of implementation: United States of America (academic)*
    - *Parts of the value chain : digital infrastructures (cloud infrastructures/services)*
- *Practice n°15: Conducting a high-level standardisation study to assess "generation-beyond" approaches to data center sustainability, covering energy security, connection with local renewable energy sources and long-duration storage technologies*
    - *Countries of implementation: United Kingdom*
    - *Parts of the value chain: digital infrastructures (data centers)*
- *Practice n°16: Understanding net electricity demand from data centers by comparing energy use for the same computational task delivered with and without data centers infrastructure*
    - *Countries of implementation: United Kingdom*

[1] Power-usage effectiveness

- *Parts of the value chain: digital infrastructures (data centers)*

- *Practice n°17: Identifying AI inference use cases that could shift from data centers to edge devices and assessing their impact on electricity demand and the power grid*
  - *Countries of implementation: United Kingdom*
  - *Parts of the value chain: end-user devices, digital infrastructures*
- *Practice n°18: Promotion of all-photonics network technologies, which constitute an innovative information and communication infrastructure enabling low power consumption, low latency, and large-capacity transmission*
  - *Countries of implementation: Japan*
  - *Parts of the value chain: digital infrastructures (network, data centers)*

Fourth pillar: Circular economy within the digital sector

- *Practice n°19: Establishing mandatory EU-wide energy labels displaying, among others, battery endurance in cycles, resistance to accidental drops and splashing of water and repairability features*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: end-user devices*
- *Practice n°20: Establishing a policy framework aiming at strengthening recycling capacities of critical raw materials and ensuring a secure and sustainable supply of these strategic materials within the digital sector*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: end-user devices and digital infrastructures*
- *Practice n°21: Introducing a legal "repair bonus" intended to improve resource efficiency in the digital sector by motivating consumers to get defective devices repaired*
  - *Countries of implementation: France*
  - *Parts of the value chain: end-user devices*
- *Practice n°22: Establishing a minimum end-user devices annual collection rate, expressed as a percentage of the weight of devices placed on the market, to encourage reuse, recycling and other forms of recovery*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: end-user devices*
- *Practice n°23: Implementing public procurement criteria aiming at promoting resource efficient digital technologies (eg. setting targets to buy a minimum amount of refurbished products within public administrations)*
  - *Countries of implementation: France, Italy*
  - *Parts of the value chain: end-user devices*
- *Practice n°24: Introducing a legal definition of "refurbished products" to strengthen the legal framework of reuse practices and improve consumers' confidence in second-hand end-user devices*
  - *Countries of implementation: France, EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: end-user devices*

Fifth pillar: Raising awareness strategy and long-term planification tools

- *Practice n°25: Funding innovation to promote resource efficient digital technologies, including water and energy efficient digital infrastructures and specialized AI models*
  - *Countries of implementation: France, Germany*
  - *Parts of the value chain: end-user devices and digital infrastructures*
- *Practice n°26: Establishing an indicative and non-binding trajectory of resources usage within the digital sector to ensure the coordinated adoption and deployment of digital technologies and infrastructures*
  - *Countries of implementation: France*

- *Parts of the value chain: end-user devices and digital infrastructures*

- *<u>Practice n°27:</u> Establishing a mandatory EU-wide transparency and sustainability rating scheme for data centers, enabling comparability of resource performance across operators and supporting policy alignment with EU climate neutrality objectives*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: digital infrastructures (data centers)*
- *<u>Practice n°28:</u> Setting up an independent scientific expert committee on AI and Sustainability issuing recommendations to the German government on long-term policy levers for sustainable AI including on digital infrastructure development, targeted funding opportunities for specialised AI models with lower energy footprints, carbon pricing applicable to data centers, and independent lifecycle audits*
  - *Countries of implementation: Germany*
  - *Parts of the value chain: digital infrastructures, end-user devices and digital services*
- *<u>Practice n°29:</u> Advancing a legislative framework (Cloud and AI Development Act) integrating sustainability requirements — covering energy, water and circularity — into large-scale digital infrastructure deployment and AI capacity scaling, complemented by public co-financing instruments*
  - *Countries of implementation: EU countries (incl. France, Italy, Germany)*
  - *Parts of the value chain: digital infrastructures (data centers, cloud infrastructures/services)*
- *<u>Practice n°30:</u> Supporting awareness-raising of the public (citizens, businesses, local and regional authorities, etc.) on the issues related to resource efficiency within the digital sector, through communication campaigns and training tools*
  - *Countries of implementation: France (public agencies)*
  - *Parts of the value chain: end-user devices and digital infrastructures*

<u>Private sector initiatives</u>

- *<u>Practice n°31:</u> Implementing Product Carbon Footprint (PCF) initiatives quantifying greenhouse gas emissions for accelerated computing products using ISO-conformant, third-party-reviewed, cradle-to-gate methodologies*
  - *Private sector's country of implementation: United States of America (Nvidia)*
  - *Parts of the value chain: digital infrastructures (data centers)*
- *<u>Practice n°32</u>: Implementing a multi-layered approach to resource efficiency in digital services, combining the development of purpose-built, task-specific AI models with compute optimization techniques (quantization, distillation, pruning), the systematic evaluation of data center partners through energy and water efficiency metrics (PUE, WUE), and the integration of supply chain sustainability requirements through contractual obligations*
  - *Private sector's country of implementation: United States of America (Salesforce), France (Mistral AI and OVHcloud)*
  - *Parts of the value chain: digital infrastructures (data centers, cloud infrastructures/services) and digital services*