Total Energy Model for Connected Devices
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Introduction to the IEA-4E TCP and EDNA
Energy Implications of Device Connectivity

Energy Savings
- Digitalisation
- Intelligent efficiency
- Demand flexibility

Energy Cost
- Network standby
- Upstream energy
Overview of Total Energy Model (TEM)
Please Note

- The TEM was commissioned by EDNA and authored by EnergyConsult. Its results do not reflect the views of the IEA, 4E, EDNA or their members.
- The TEM is a desktop model, based on a wide range of assumptions, and therefore contains some uncertainty.
- The EnergyConsult team includes:
  - Paul Ryan
  - Anson Wu
  - Terence Smith
Context

- **Total Energy Model**
  - V1.0 finalised in 2019
  - V2.0 expanded on V1.0 and was finalised in 2020 (published in March 2021)

- **Scope, from 2010 to 2019, and forecast to 2030**
  - Network connected energy use:
    - **Downstream** - Energy used to create and maintain network connections, and stream video/audio
    - **Upstream** - Energy used in the data centres (DC) and wide area network (WAN)
Scope
The TEM Model

Upstream Energy

WAN/Core and Data Centres

Energy use model: Energy intensity (kWh per GB data)

Downstream Energy

Network Connected Devices

Energy use model: Bottom-up stock model (energy use per device)
Devices by Category and Group (sub-category)
Energy consumption categories

- **Downstream**
  - Network standby
  - Network active
  - Media Streaming

- **Upstream**
  - Media streaming
  - Non-media
Additional segmentation

- Regions x 8 (based on supplied shipment forecasts – sourced from Juniper Research)

- IP Global traffic type (as defined by CISCO)
Overview of Connected Energy Consumption
Demonstration of TEM Charts
Demonstration of TEM Charts

- Explain the chart items and features
- Examples of what can be examined for each of the chart tabs
  - Base Case
  - Scenarios:
    - Edge device network standby,
    - LAN,
    - Upstream