Gestione di risorse e tecnologie dell’informazione – workshop SeCSI e CSI

Il calcolo del consumo energetico dei siti web
Le prossime linee guida per la sostenibilità dei siti web

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I siti web – come tutti i servizi digitali – consumano energia & energie (tempo, attenzione):

- una pagina web non dovrebbe pesare più di 1.5MB

- un video di 30 secondi pesa circa 3MB

- un terzo del peso dei siti web è dovuto alle immagini

Il sito del Comune di Torino è 10 volte meno energivoro di quello di Milano, perché?

Perché è più vecchio! ☹

Un approccio di calcolo condiviso: Ecograder, Websitecarbon, Ecoping (sustainablewebdesign.org)

Our goal: *to help anyone interested in designing digital carbon calculation tools*—like Website Carbon, Ecograder, or Ecoping.Earth, for instance—*a methodology that provides consistent results.*

- Tom Greenwood	Wholegrain Digital
- Tim Frick	Mightybytes
- Rym Baouendi	Medina Works Medina
- Dryden Williams	EcoPing
- Chris Adams	The Green Web Foundation

Wholegrain Digital and Mightybytes – creators of www.sustainablewebdesign.org – collaborated with Medina Work, EcoPing, and the Green Web Foundation to define new open standards for estimating carbon emissions from digital products and services.

Un approccio condiviso - 1

Calculating greenhouse gas emissions from digital products and services isn't easy. If you consider a product's *entire life cycle*, things quickly get complicated:

- How do you include the embodied energy and materials required to produce a product or service?

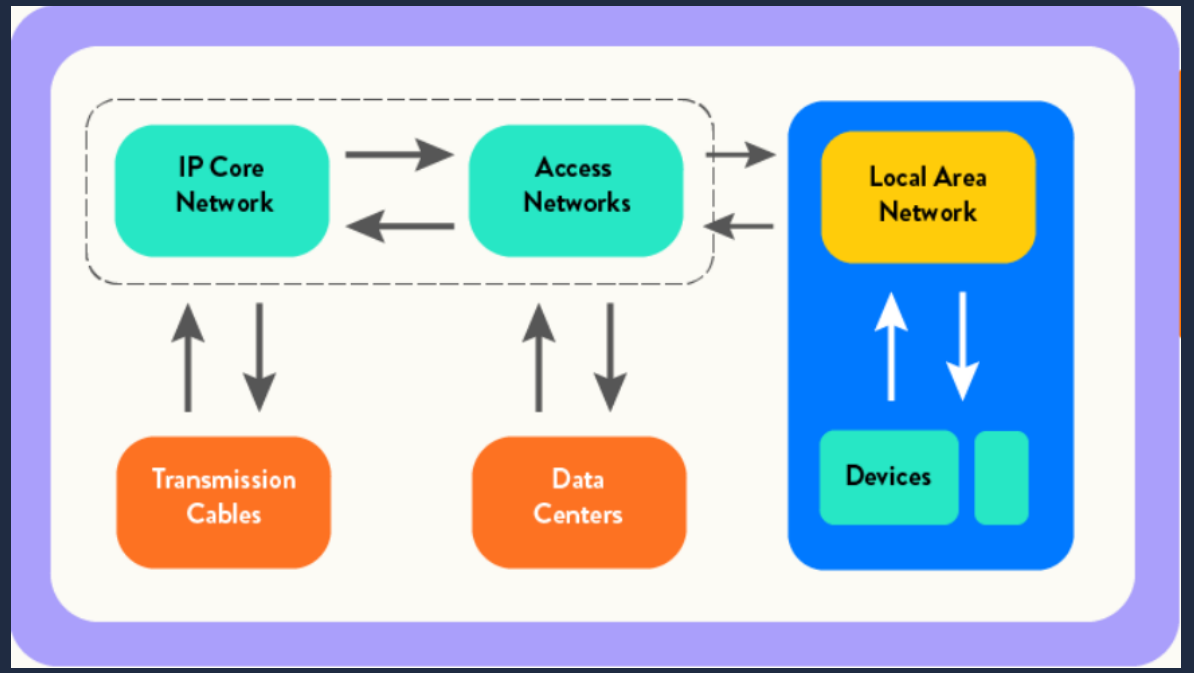
- What about the energy required to host a product across servers, cloud containers, and content delivery networks?

- How do you measure the energy requirements of end-users interacting with your product or service across devices over time?

Un approccio condiviso - 2

These aren't easy questions to answer.

Digital products and services have many components across multiple (often closed) systems, each of which have their own energy and resource requirements.



Finding a blanket *one-size-fits-all* solution is elusive.

Un approccio condiviso - 3

Network system boundaries make it challenging to define accurate digital emissions calculations.

For our needs, we defined the widest system boundaries available to represent a comprehensive carbon footprint, but segmented the impact for each sub-system to provide greater insight.

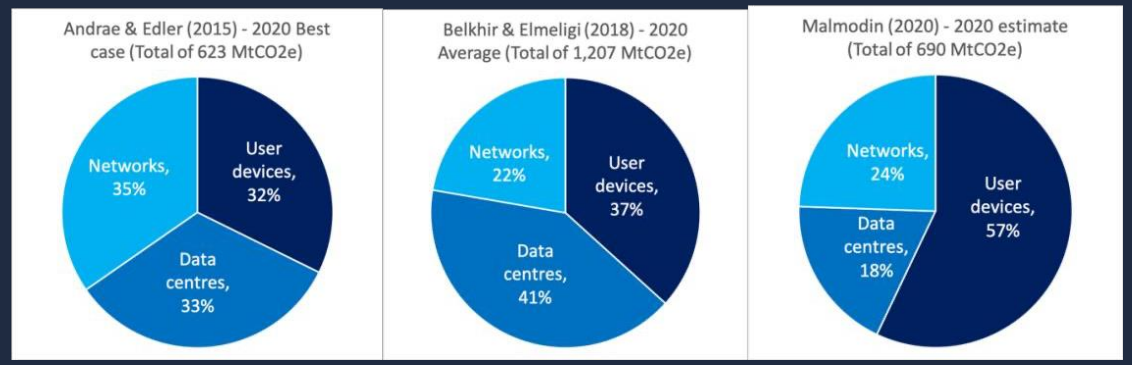
Un approccio condiviso: i segmenti del sistema

Consumer device use: end users interacting with a product or service. This accounts for an estimated 52% of the system.

Network use: data transferred across the network. This accounts for an estimated 14% of the system.

Data center use: energy required to house and serve data. This accounts for an estimated 15% of the system.

Hardware production: embodied energy used in the creation of embedded chips, use of data centers, use of networks, and the use of consumer communication devices. This accounts for an estimated 19% of the system.



Un approccio condiviso: ipotesi dietro le formule - 1

This methodology is a standardized approach and does not account for all variables of any digital product or service.

As an open methodology, this may be adapted to incorporate factors relevant to a specific product or service.

The Key Metric. We chose kWh/GB as the key metric on which to calculate the carbon footprint, as this metric is feasible to measure for most web services and is the unit of measurement used by the majority of studies on this topic.

Energy Consumption. Data used for calculating energy consumption is derived from the raw data for the "Expected 2020 scenario" from *Perspectives on Internet Electricity Use in 2030*, Anders S.G. Andrae, June 2020.

Carbon Intensity. The default figure used for carbon intensity is the global average carbon intensity of electricity (442g/kWh), which is pulled from the CO2 intensity dataset for "World" of Ember's Data Explorer.

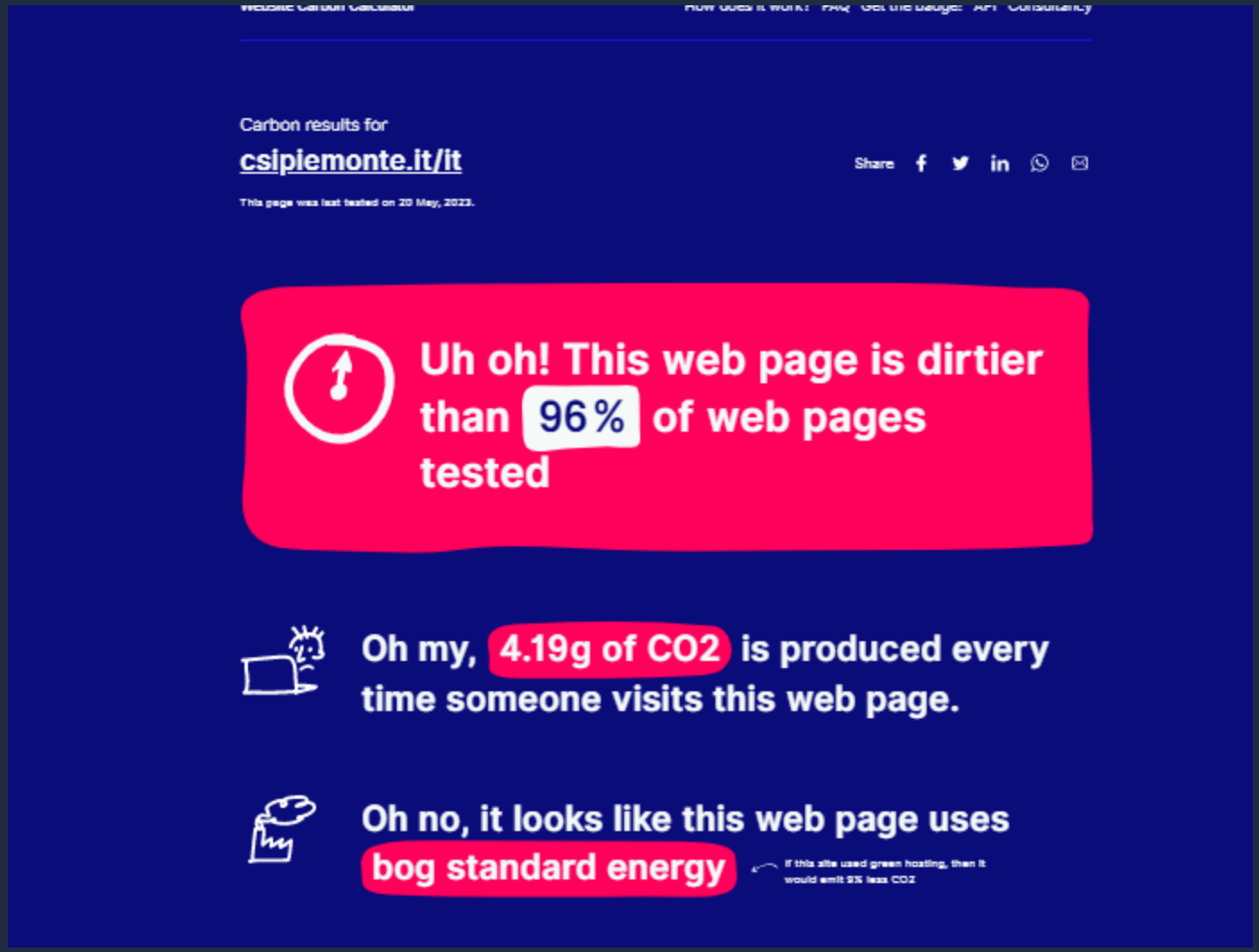
Un approccio condiviso: ipotesi dietro le formule - 2

Data Center Energy. The methodology assumes that data traffic “within data centers” and “between data centers” are sub-processes of the work that needs to be done to operate web services for end users. Data transfer to end users is the basis of the calculations.

Specific Data Points. We used these data points to define the calculations below:

- Annual Internet Energy: 1988 TWh
- Annual End User Traffic: 2444 EB
- Annual Internet Energy / Annual End User Traffic = 0.81 tWh/EB or 0.81 kWh/GB
- Carbon factor (global grid): 442 g/kWh
- Carbon factor (renewable energy source): 50 g/kWh

Websitecarbon e CSI



Ecograder e CSI

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The WC3 group – the committees

UX Design

Web Development

Hosting, Infrastructure, Systems

Analytics, Measurement, Reporting

Business Strategy, Product Management

The WC3 group – next steps

- We have already completed 113 guidelines (132 pages)

in Draft Version 1

- Draft Version 2 (ReSpec): GitHub Issues / Slack / Email list (Feedback)
- Migrating guidelines to Sustainablewebdesign.org
- Road to TPAC

Design e UX

Il bisogno informativo deve essere soddisfatto nel minor tempo possibile.

Questo non è solo un vantaggio per chi naviga, ma anche per l'ambiente, perché navigare meno significa consumare meno energia.

In pratica: rimuovere l'eccesso, praticare il degrowth sia nei contenuti che nella programmazione.

Design e UX

Semplificazione della user experience

- Immagini: WebP, AVIF, Base64
- Icone: Sprite CSS, SVG
- Font: Woff2, rimozione glifi, impostare fallback con font di sistema
- Colori: colori caldi, o implementare «energy mode»
- Video: video controllati dall'utente, MP4
- Javascript: sostituire quando possibile con CSS (animations, transitions, ecc.)

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Ottimizzazione delle performance

Performance: soprattutto peso pagina e velocità di caricamento

Perché le performance sono correlate alla sostenibilità:

- riducendo il peso riduco la quantità di dati gestiti e il consumo del dispositivo
- aumentando la velocità aumento la accessibilità
- riducendo peso e lentezza riduco il consumo energetico

Tecniche per ottimizzare le performance del sito web

- Aspetti generali
  - page cache
  - Jamstack
  - PWA
  - CDN

- Bot e scansioni

- Compressione del codice

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