

IEEE BITS Goa, Lumini '21

## Green Compute & Storage: Why Does It Matter & What is In Scope ?

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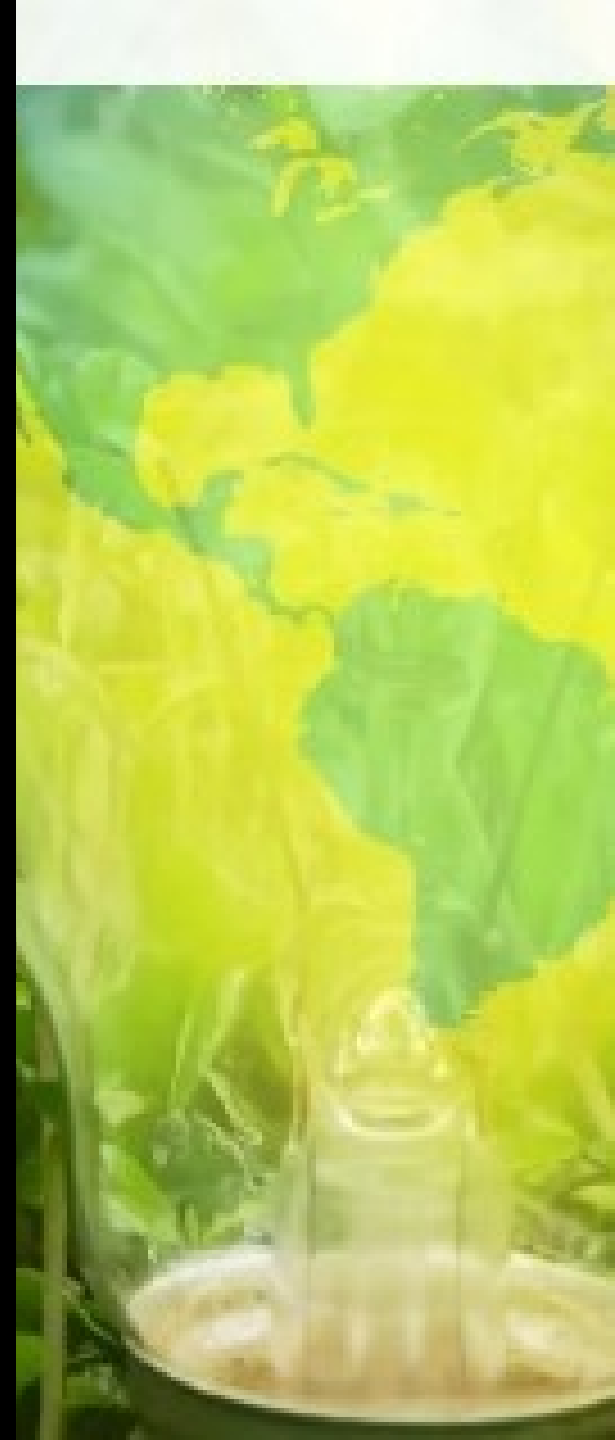
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**IEEE Bangalore & IEEE Computer Society Executive Committee Member,  
Co-Chair Humanitarian Technologies & Climate Action**

**LinkedIn: <http://www.linkedin.com/in/cnsubramaniam>**

**WebSite: <http://www.Climate350.com>**



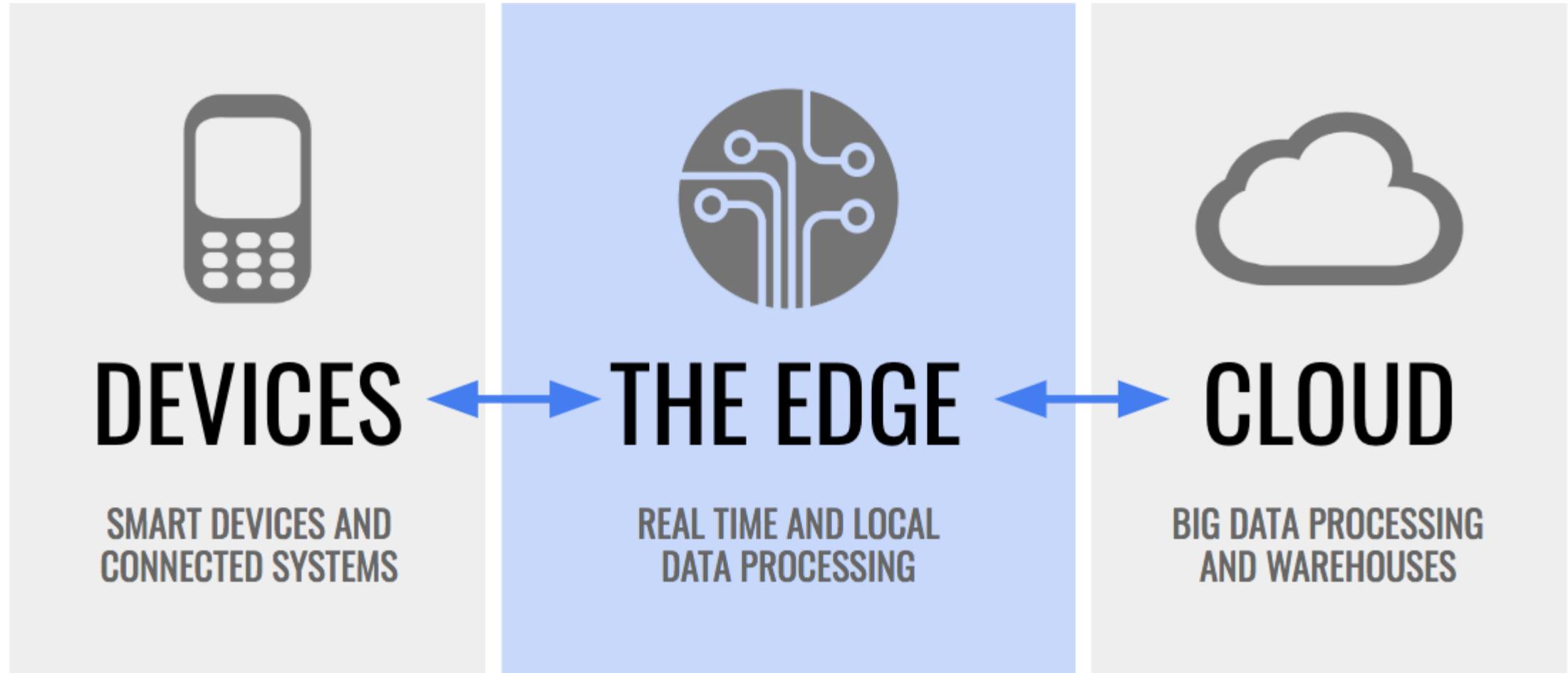
# The Internet Data Explosion - Sources



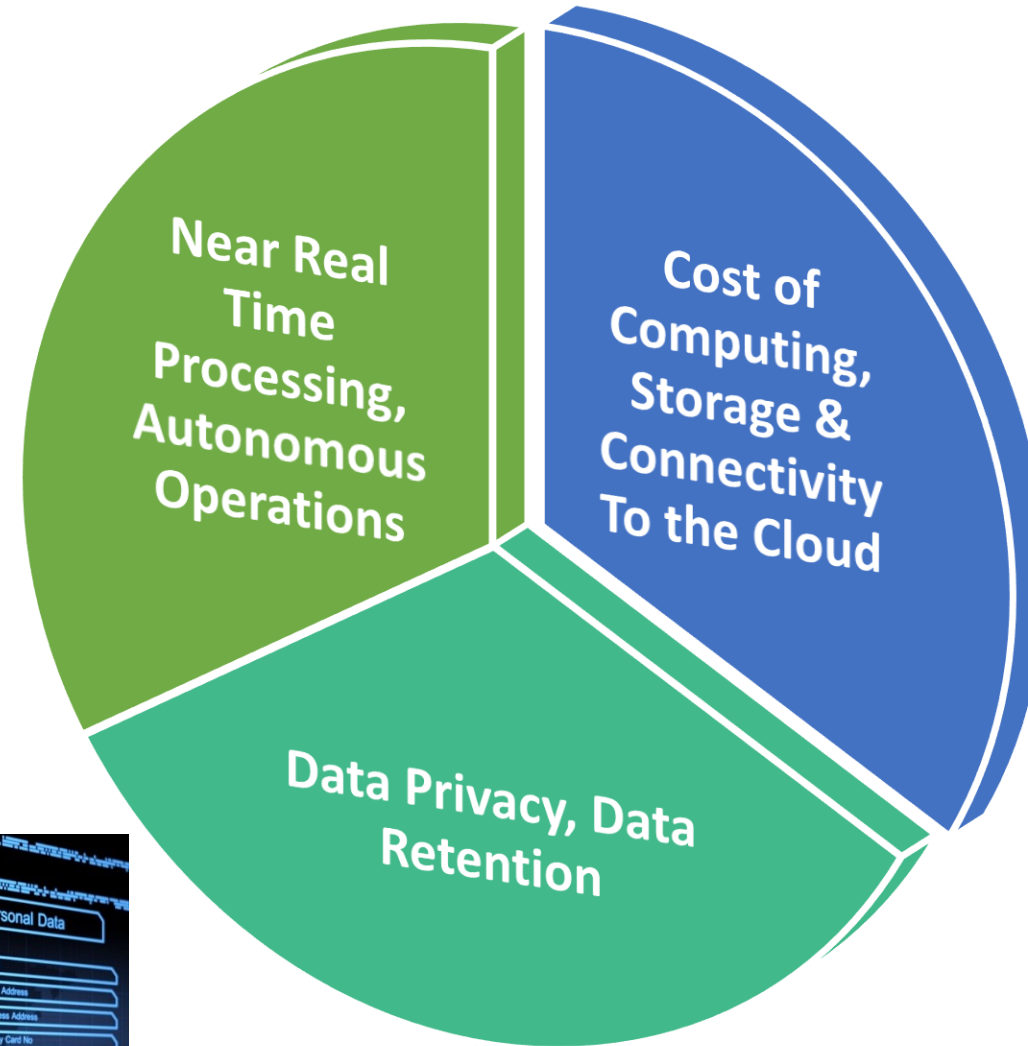
# The Internet Data Explosion – Sources (cont'd)



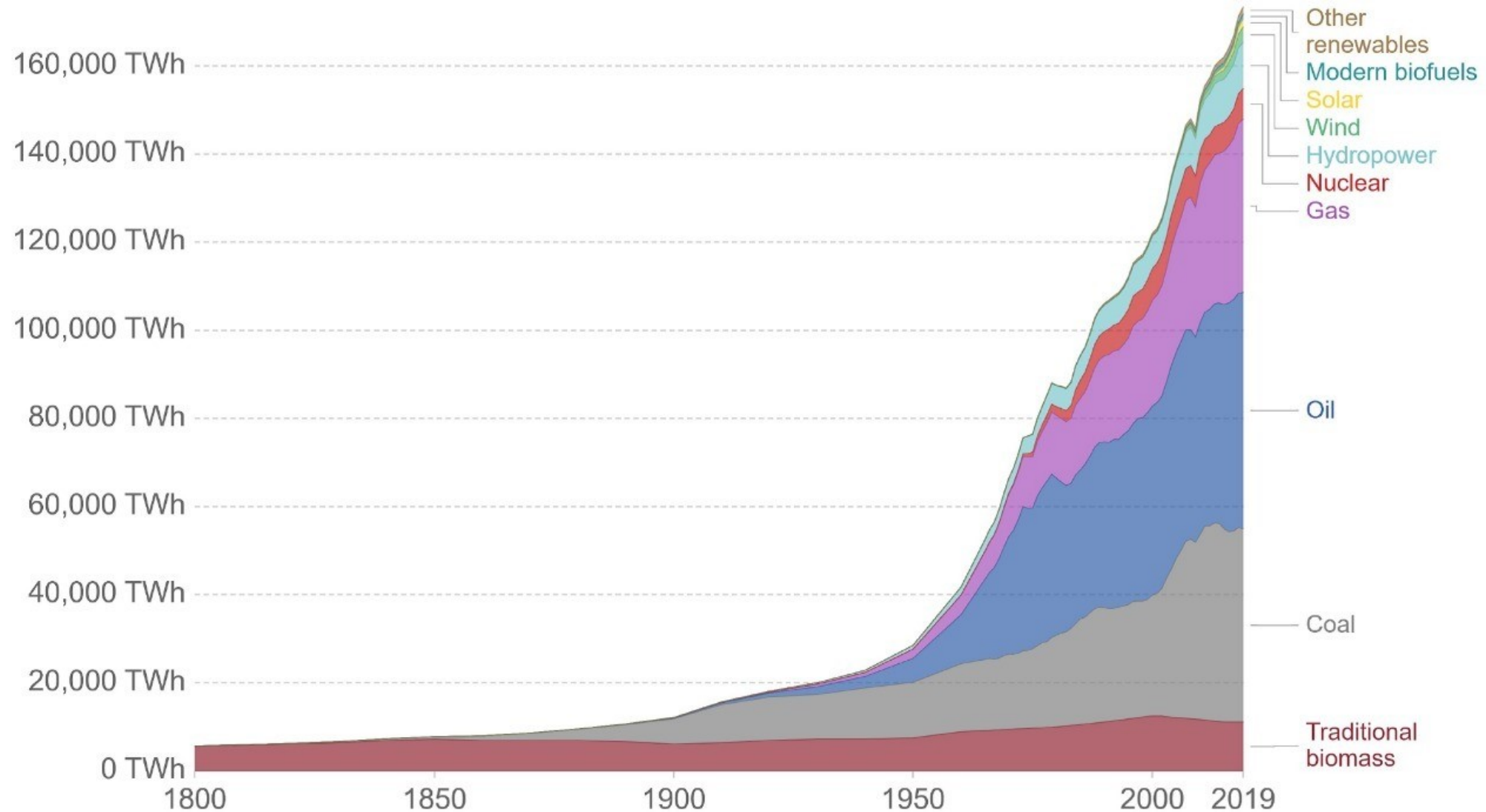
# The Internet Data Explosion - Key Participants



# Internet Compute & Data – Key Design Considerations

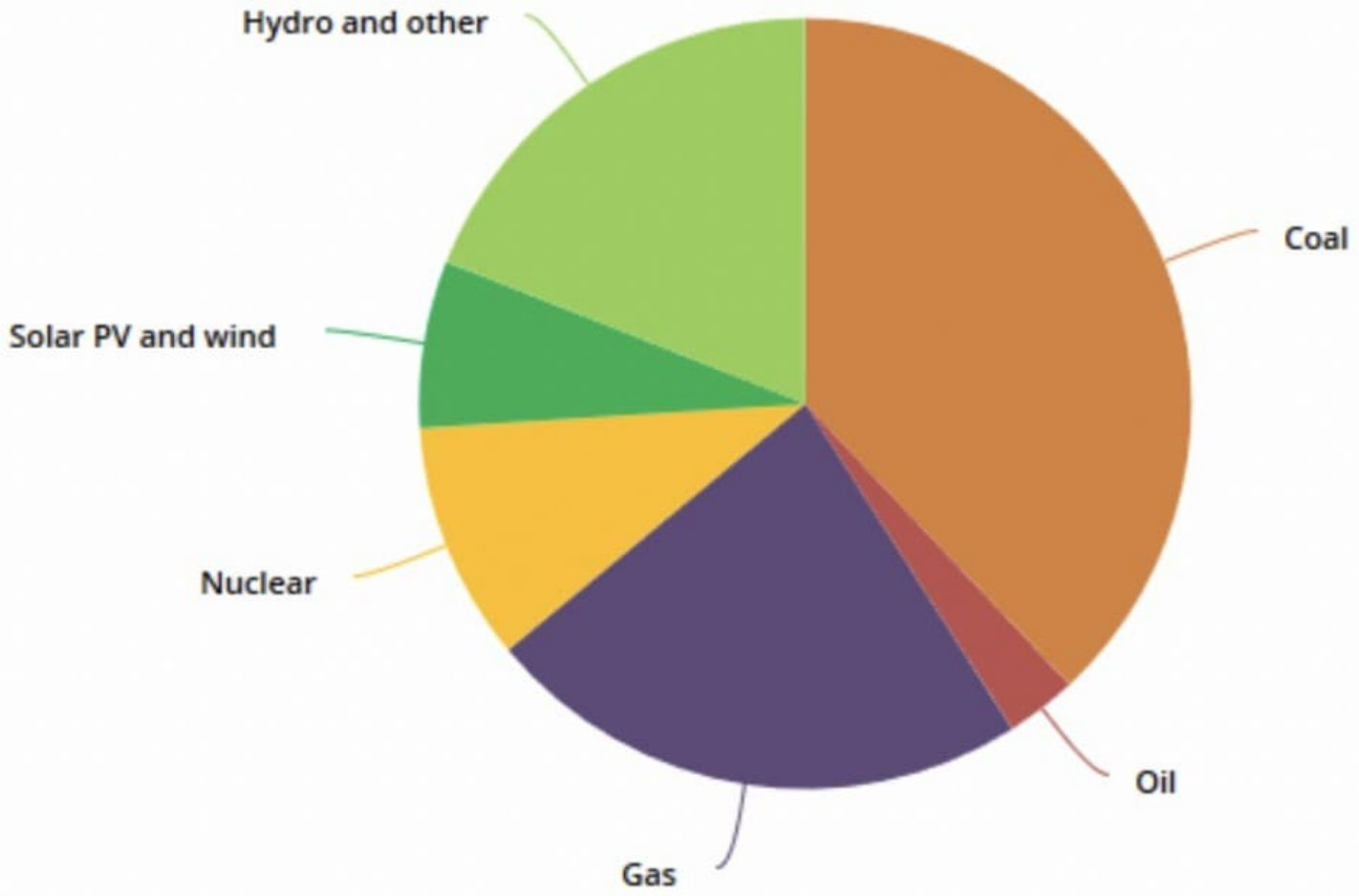


# Energy Sources to Meet Exponential Human Demands



# Energy Sources for Electricity Generation

Electricity generation mix, 2018  
26 700 TWh



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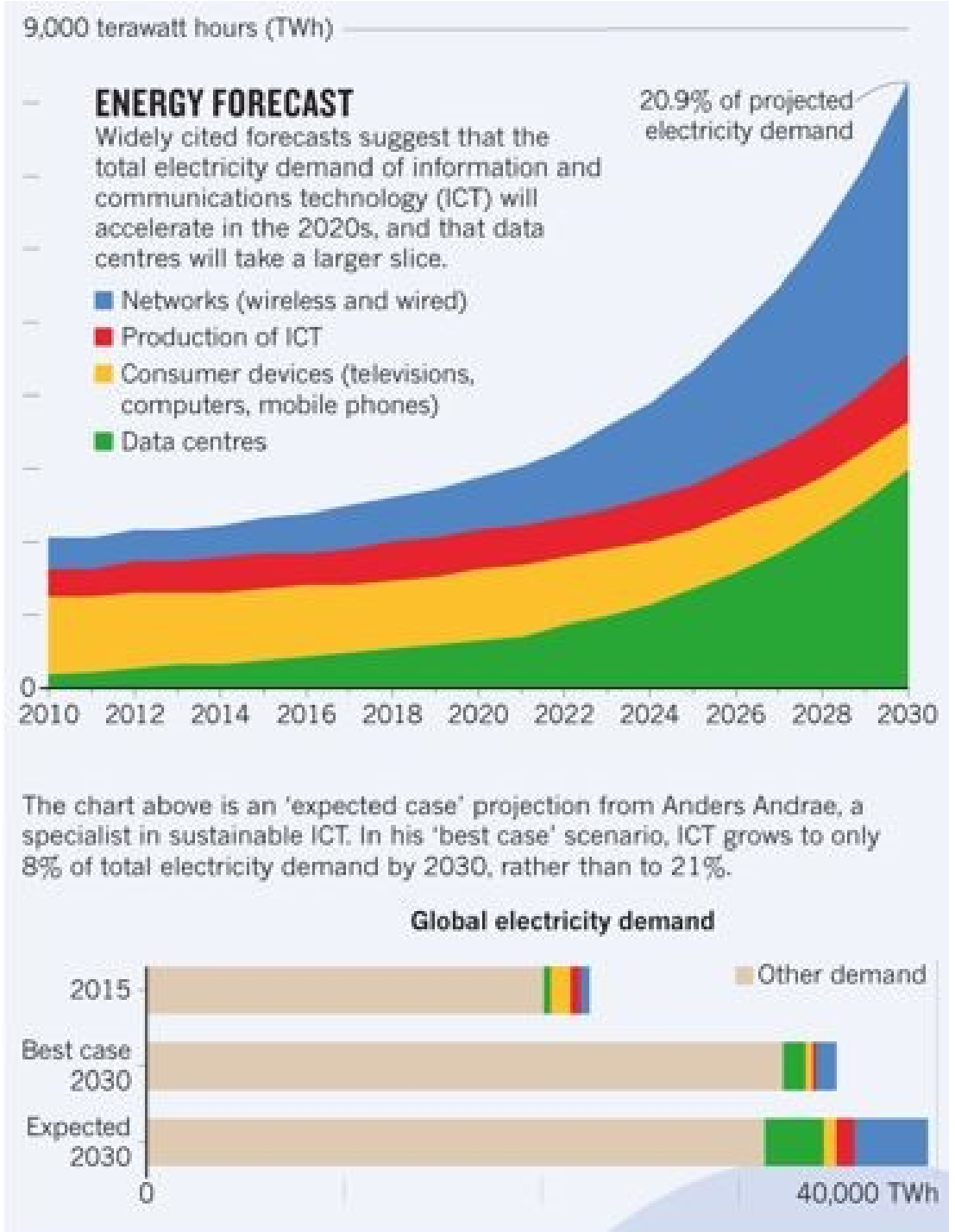
Credit: <https://oilprice.com/Energy/General/How-The-Internet-Is-Killing-The-Planet.html>

# Internet Energy (Imbalance) Forecast

**Unsustainable Appetite for Video, Voice, Images had led to an Explosive (& Wasteful) Amount of Data being transmitted, stored and processed increasingly by energy hungry AI/ML algorithms**

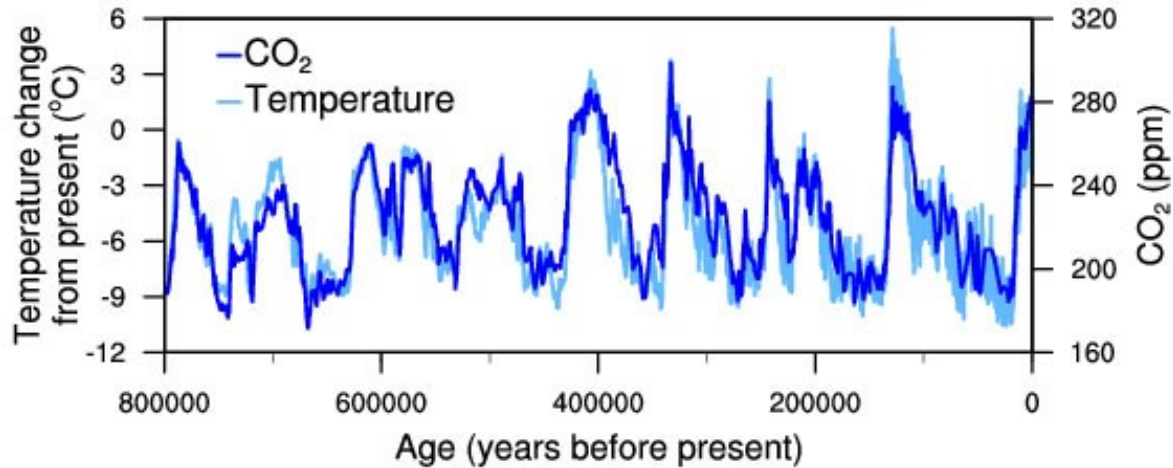
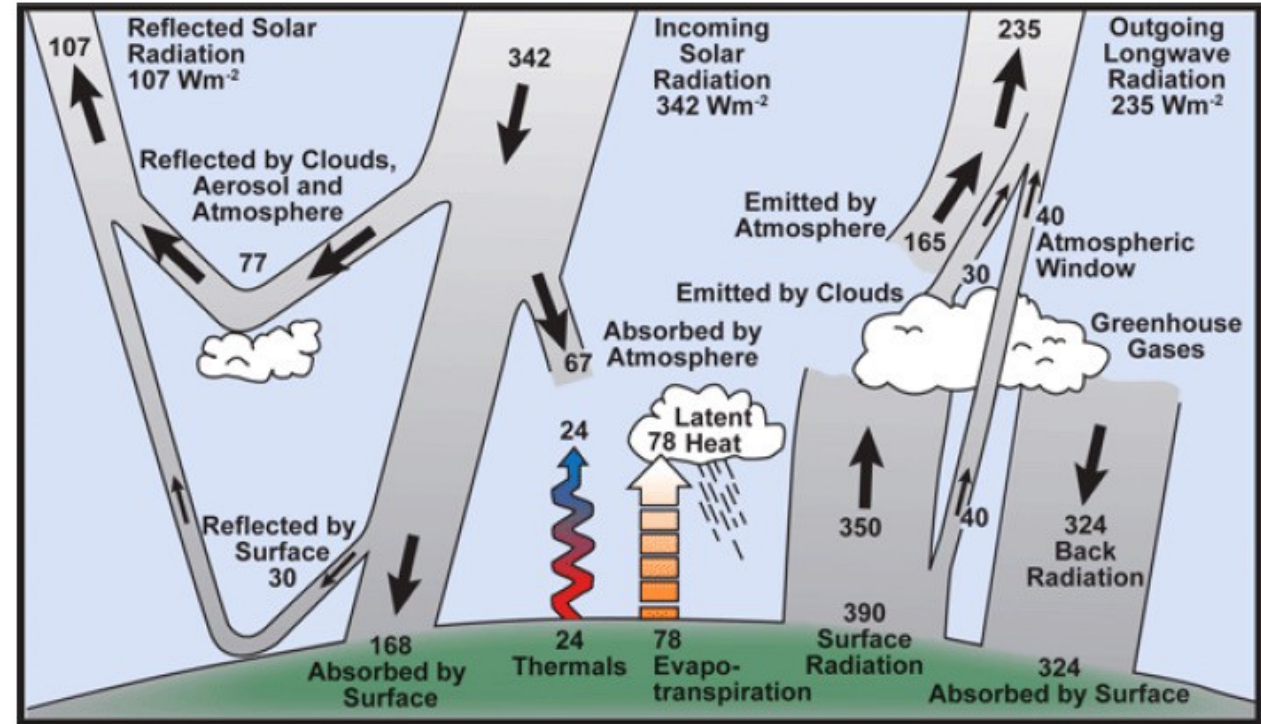
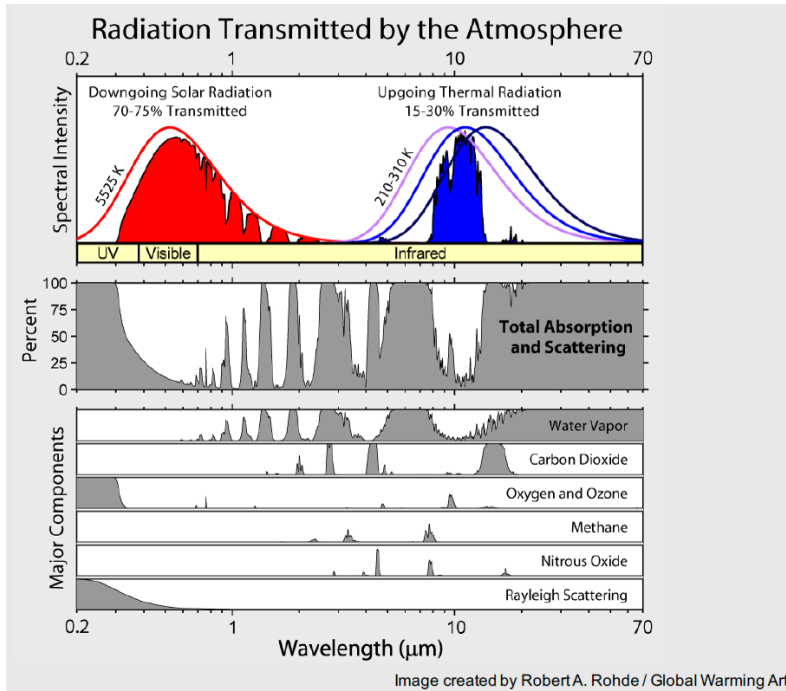
**Imagine the future with 5G, IoT, Always Connected Devices Everywhere**

**WE NEED TO ADDRESS THIS GROWING ENERGY IMBALANCE IN THE INTERNET**





# The Disruption: Earth's Overall Energy Balance

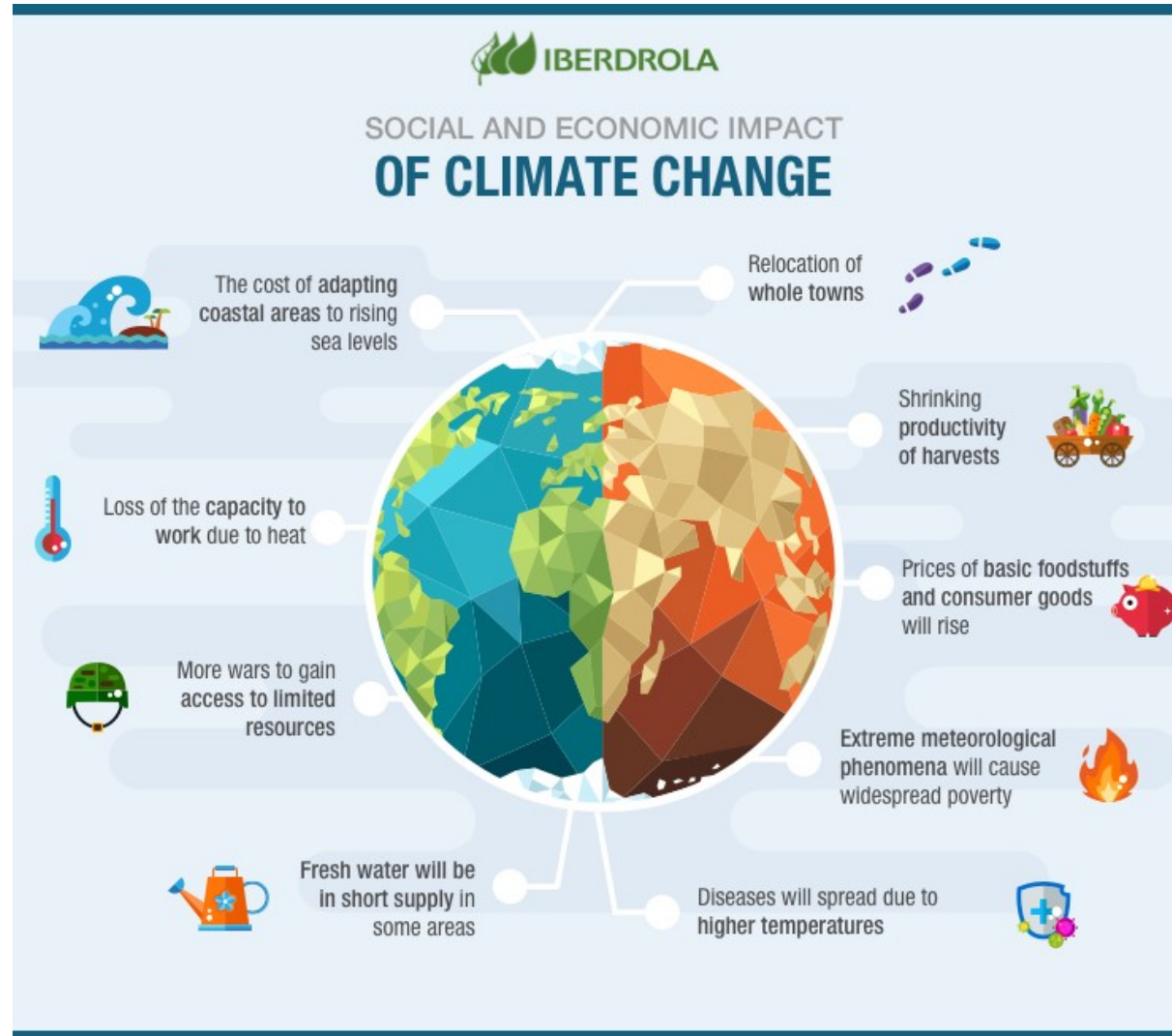


| GHG              | GWP for 100 years |
|------------------|-------------------|
| CO <sub>2</sub>  | 1                 |
| CH <sub>4</sub>  | 23                |
| N <sub>2</sub> O | 296               |
| HFC - 23         | 12 000            |
| HFC - 134a       | 1 300             |
| SF <sub>6</sub>  | 22 200            |

Source: IPCC Third Assessment Report (2001).

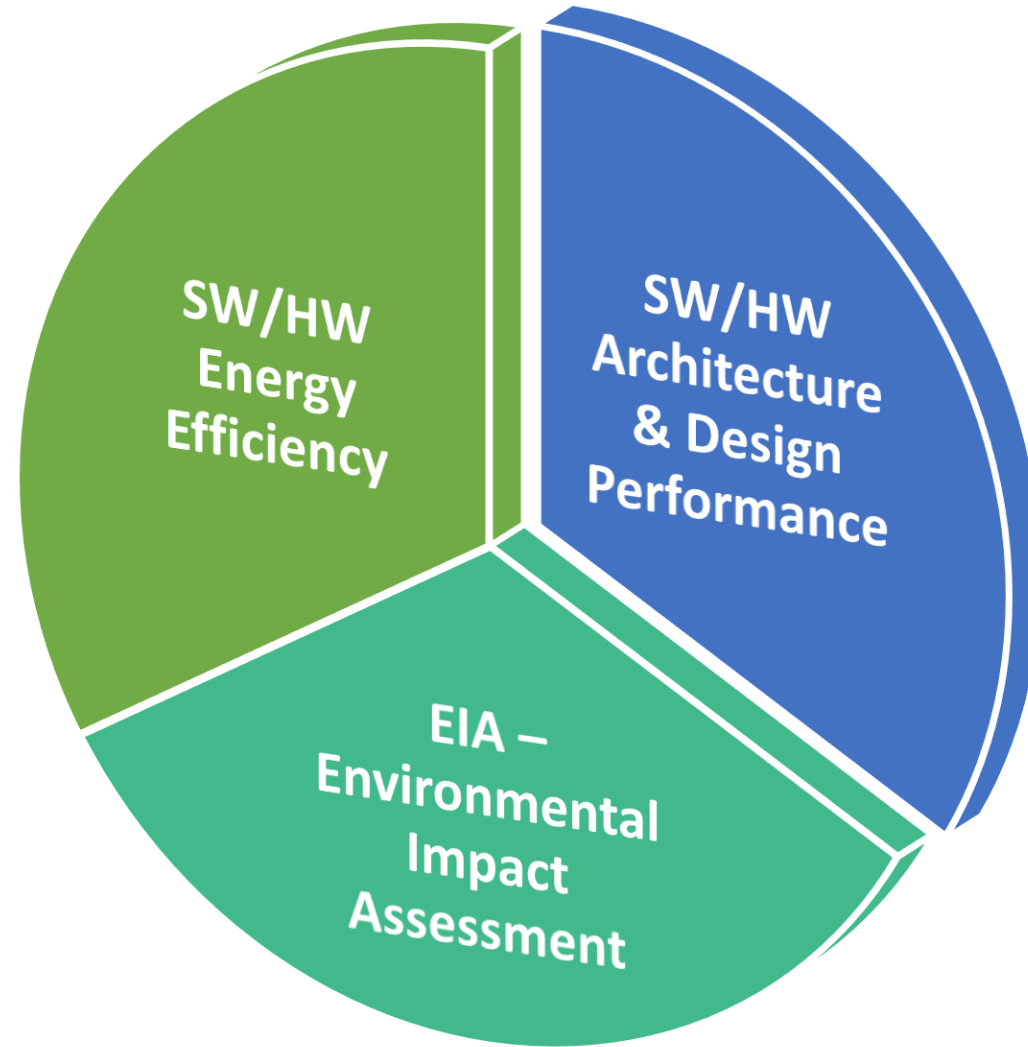
**GWP == Global Warming Potential**

# The Disruptive Consequence: Climate Apocalypse

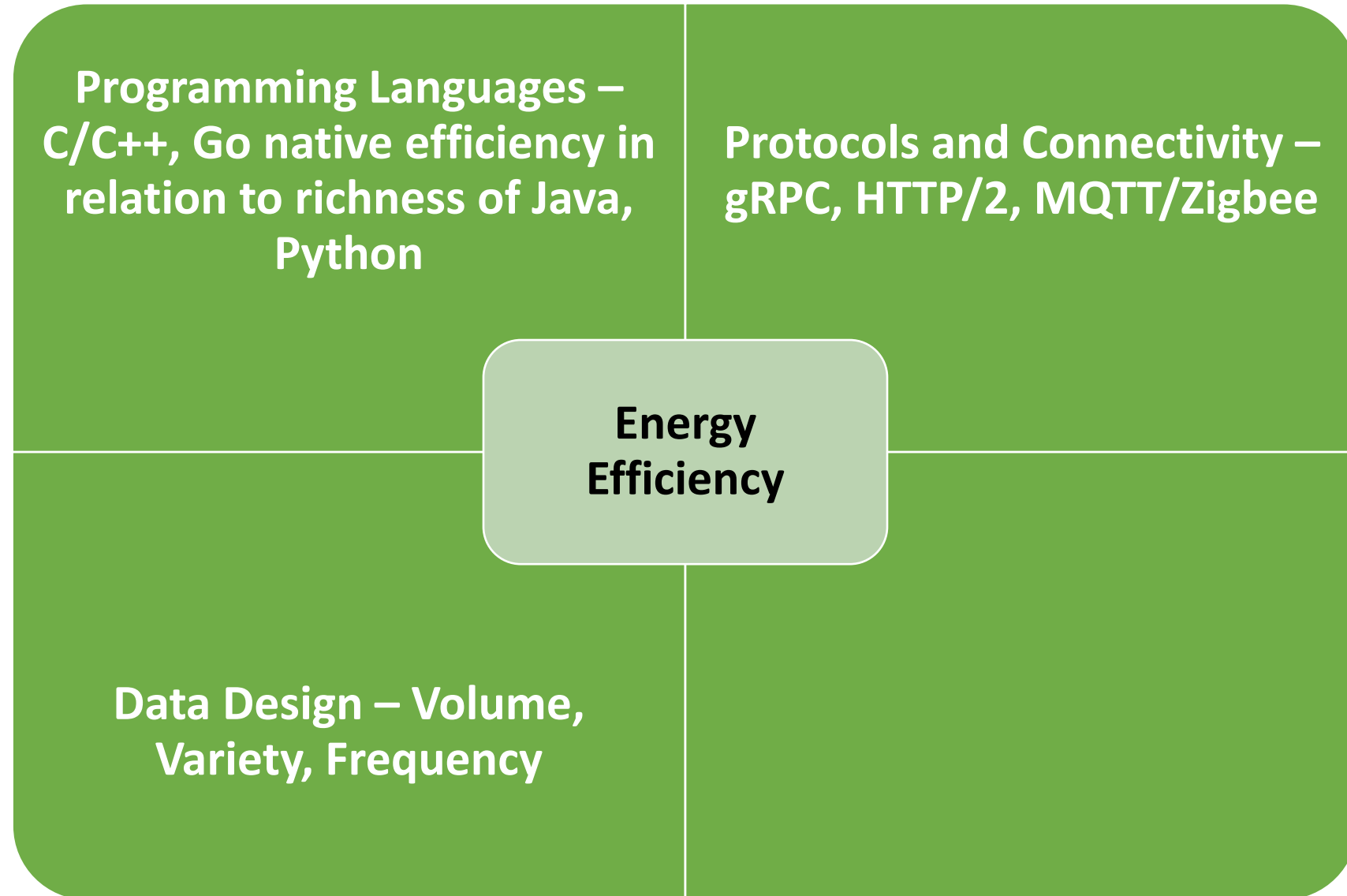


**Climate Change: Globally Pervasive, owing to Human Induced Energy Imbalance, resulting in the Unnatural Extinction of Species with Unnatural “Landscaping” of the Environment**

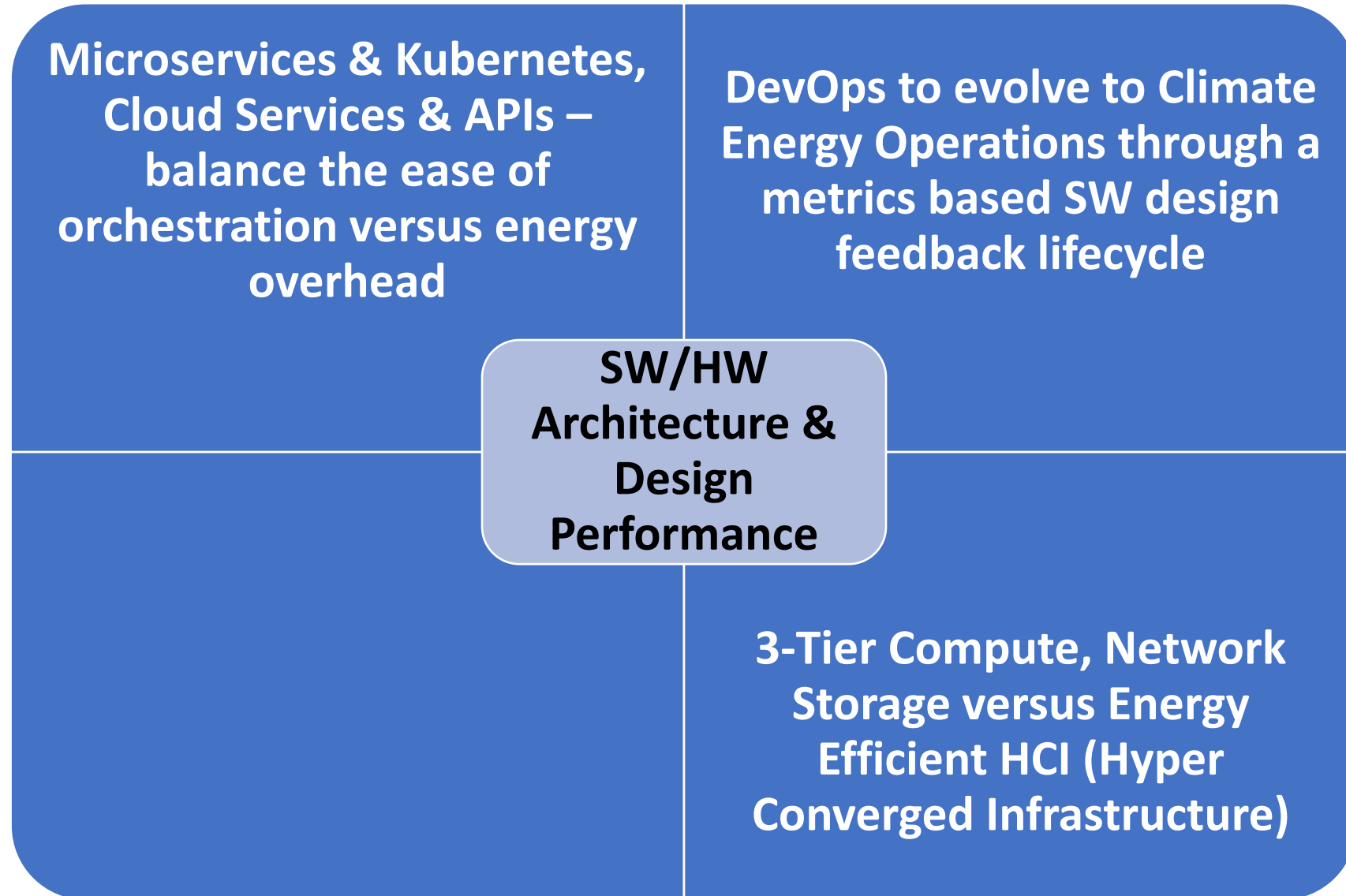
# Green Compute & Storage



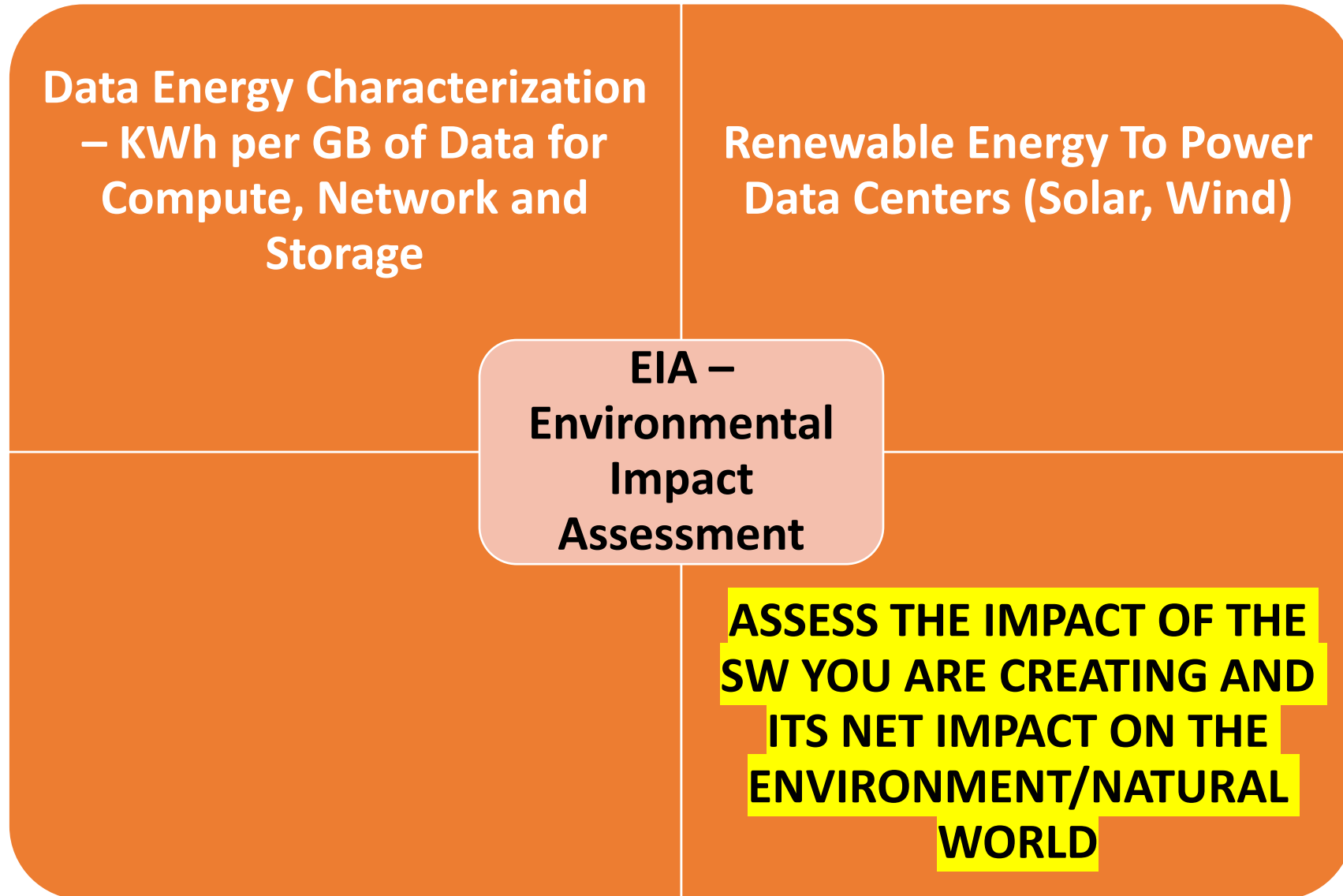
# Green Compute & Storage (cont'd)



# Green Compute & Storage (cont'd)



# Green Compute & Storage (cont'd)



# An Engineer's Ethos: Ethics, Ethics and Ethics

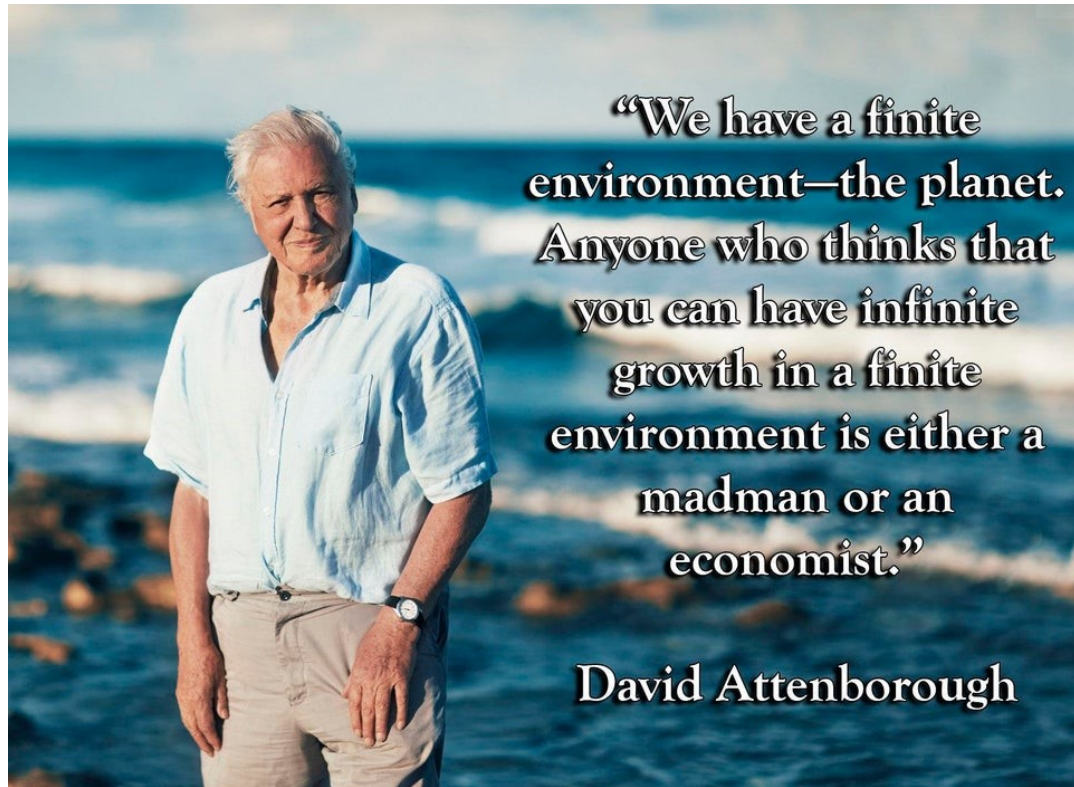


## IEEE Code of Ethics

( <https://www.ieee.org/about/corporate/governance/p7-8.html> )

1. to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, to protect the privacy of others, and to disclose promptly factors that might endanger the public or the environment;

# Lumini '21: A Call for Technology In Harmony with the Planet



**Hope and Consequent Action is a Great Thing. Let Us Get to Work !**



**THANK YOU !**

**Narayanan Subramaniam**

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