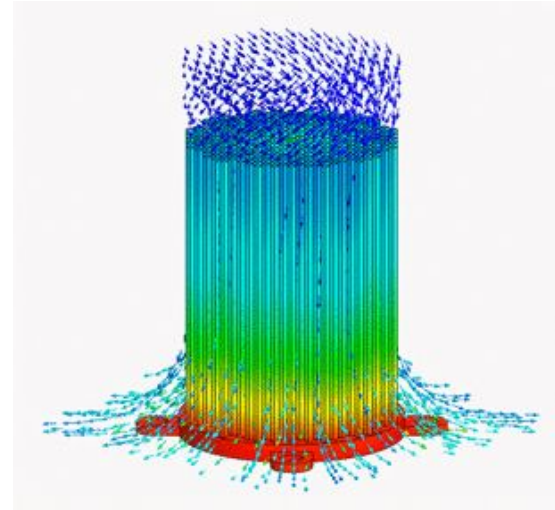


# Combined Heat & Compute Unit

A conceptual approach for a fully-integrated & sustainable digital  
infrastructure for the digital economy.

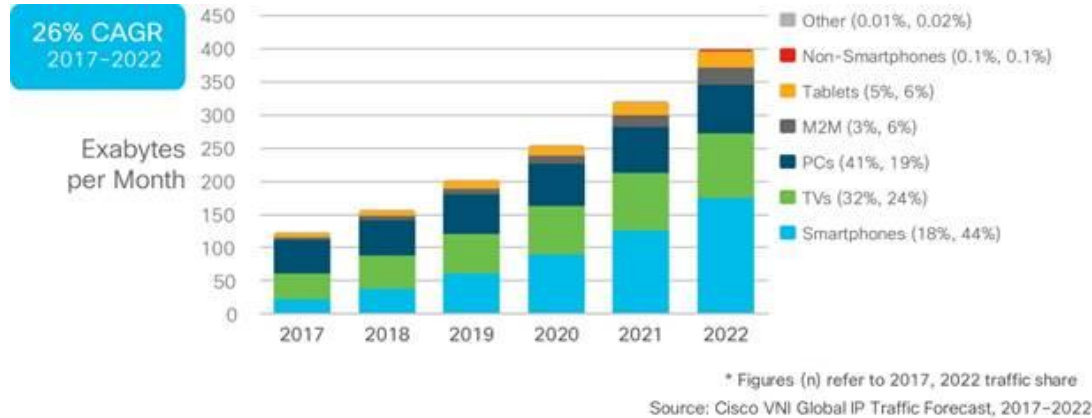
Sustainable Places 2019, 06<sup>th</sup> of June 2019

# Silicon chips generate a lot of heat (~100% of input power)

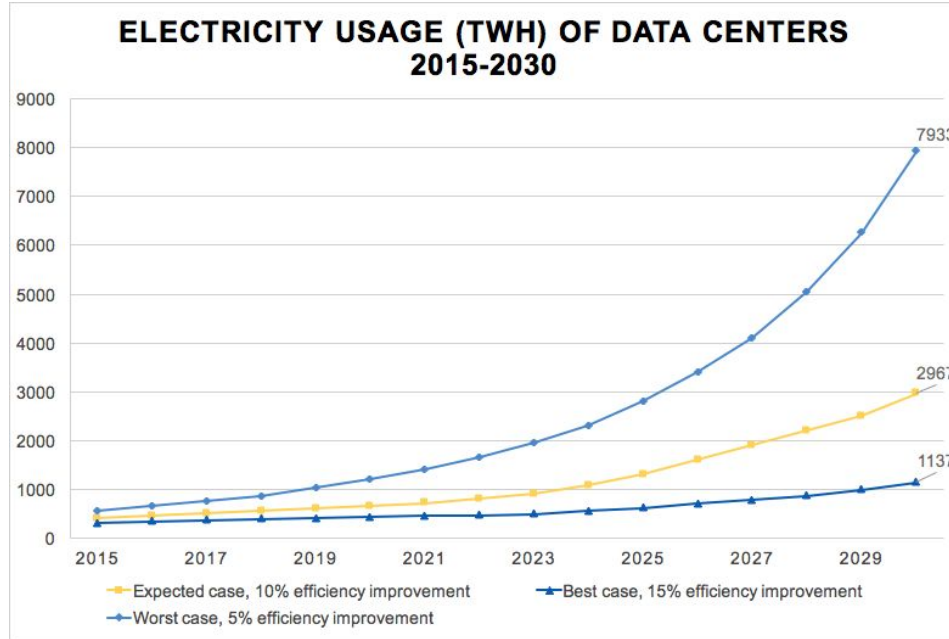




# Mobile networks (4G, 5G) generate so much traffic, that compute must be as close as possible to the antenna



# Digital Infrastructure will attribute for 4-6% of total global power consumption by 2030



*Huawei, Sweden - 2015*

# At the same time, cities, utilities & building owners are looking for sources of CO2-free heat

*Electricity from Renewable Energy – an alternative?*



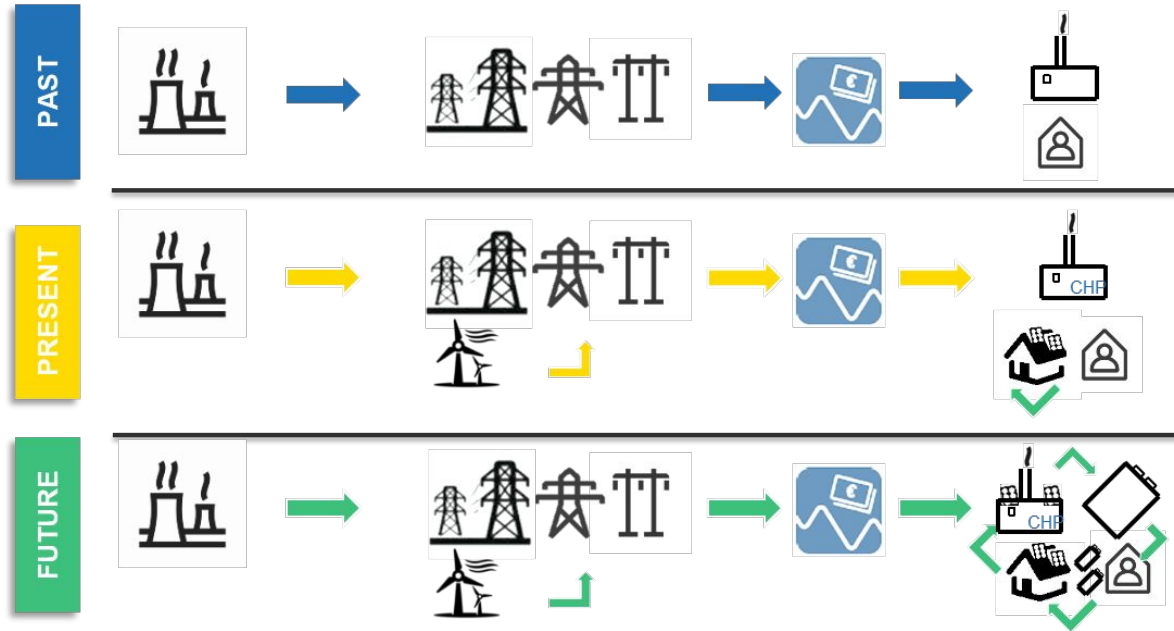
*“The city officials strive to ensure that Amsterdam remains a healthy, liveable, and forward-thinking city – a place that we can proudly pass on to our children and grandchildren. **Which is why the city council decided to phase out natural gas by 2050.**” – City of Amsterdam*

*“The EU’s Energy Performance of Buildings Directive (EPBD) mandates that member states must implement changes within their building regulations in order to achieve the requirement for ‘all new buildings to be early zero-energy by the end of 2020. All new public buildings must be nearly zero-energy by 2018.’” – European Commission*



Waste-water heating system in Berlin

# And the energy system is transitioning from centralized to decentral energy systems



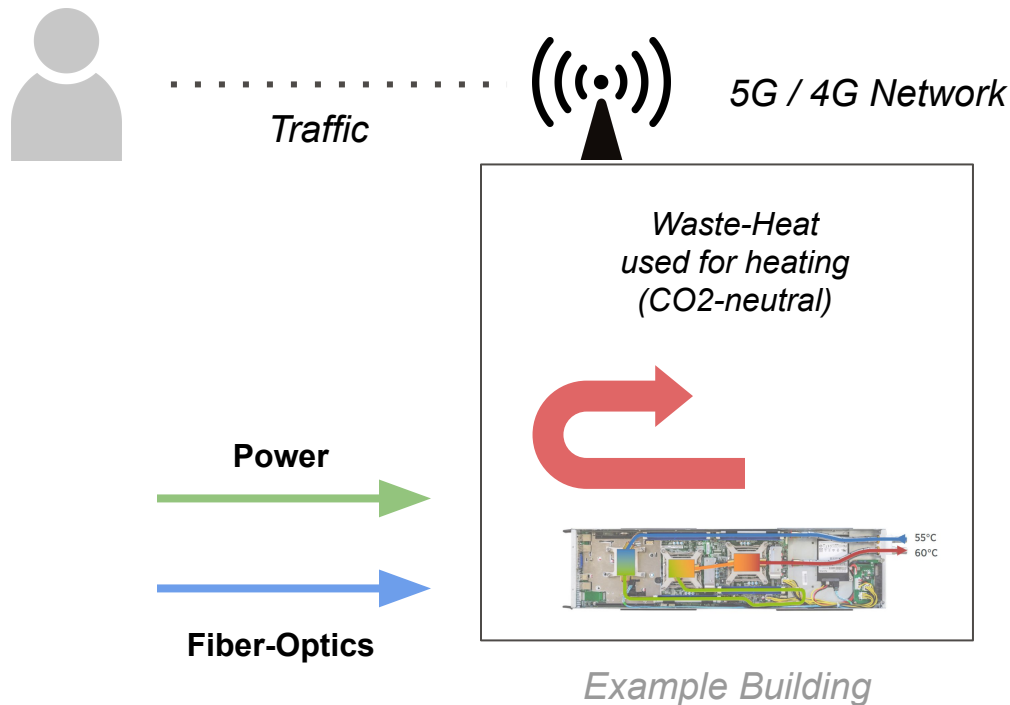
# With liquid-cooling technology heat can be extracted from data centers at up to 60°C



*Example: Water-cooled Megware Supercomputing Blade*



# CHC: Combining these trends into a building-integrated micro-data center, delivering heat





# Just an idea? It's reality already, but we need to take it further.



**Stockholm:** SDIA Member (Top 5 utility) is building a large-scale CHC connected to district heating.



**Frankfurt:** Previous European Central Bank Tower is now heated by an integrated data center (SDIA Member)



**Amsterdam:** Actively promoting the CHC as a solution to phase-out gas from as the primary fuel for heating

# So, what are looking for?

1

**Research Partners** that would like to take the concepts further, develop new technologies & IP based on the concepts and collaborate with industry partners to bring it to life.

2

**Even more industry partners** that want to contribute their existing technology & expertise as well as benefit from the new concepts & business cases.

*The Sustainable Digital Infrastructure Alliance (SDIA) e.V. is a not-for-profit organization acting as a catalyst between various industries in the digital infrastructure sector: Data Centers, Telco's, Utilities, Municipal Energy Companies & IT companies.*



# Thank you! Questions?