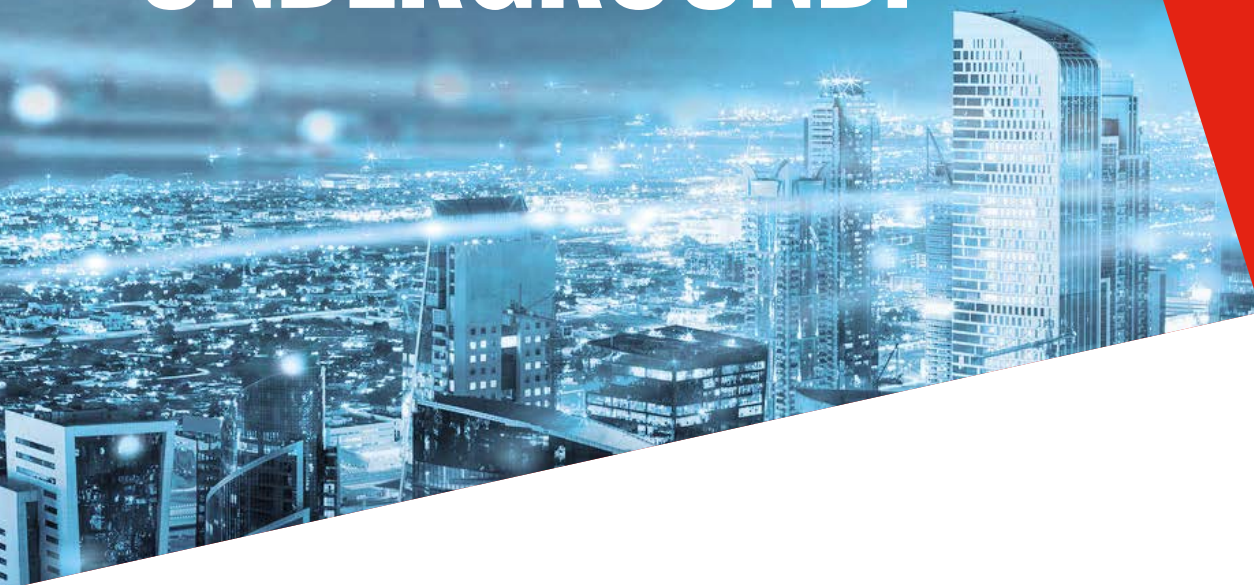


BELOW GROUND MEANS NEW PERSPECTIVES

EDGE COMPUTING UNDERGROUND!

BELOW GROUND MEANS NEW PERSPECTIVES

EDGE COMPUTING UNDERGROUND!



Our world is becoming increasingly digital, interlinked and intelligent. IoT, automation, 5G, robotics and artificial intelligence are opening up new applications and business models.

The volume of data produced will continue to grow exponentially. These data volumes have to be processed close to their source (edge computing) – due to, among other factors, efficiency and latency times. The metropolitan areas which arise at the nodes of the Internet are key locations for the rapid development of mini and micro data centres.

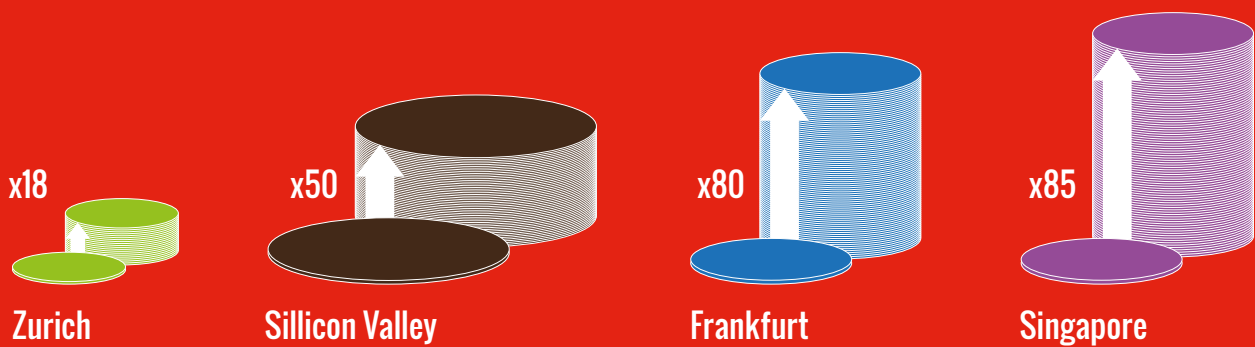
In tomorrow's ever more densely populated and connected "smart cities" this development will lead to spatial and energy density constraints because open space is scarce and energy stress will rise. Here, the concept of "Edge Computing Underground!" provides a space-saving, cost-efficient, secure and resource-conserving alternative.

LACK OF OPEN SPACE FOR DATA CENTRES

Increase of real estate prices

- **Increase in data volume** in the cloud leads to an **increase in required space**
- Additional space requirement arises at the Internet nodes in metropolitan areas
- As less and less open space is available, the **remaining land becomes more and more expensive**

Increase in space requirements 2020 to 2025 based on data traffic growth



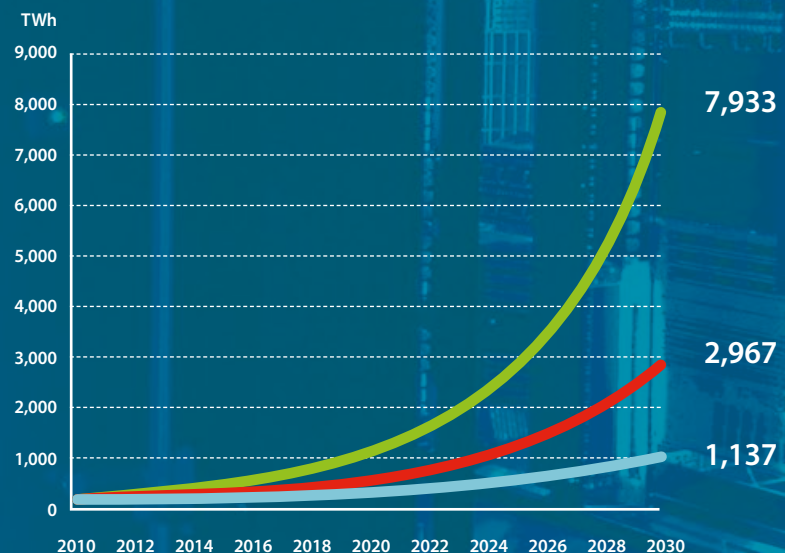
Growth factor based on estimated increase in data traffic.

DIRECT COUPLING OF THE REQUIRED AREA AND CO₂ EMISSION

Increases in energy requirements, cooling capacities, costs

- Not only is the demand for space increasing, but so is the **demand for energy**

- Data centres (best case)
- Data centres (expected)
- Data centres (worst case)



BELOW GROUND MEANS NEW PERSPECTIVES

WHY UNDERGROUND?



Land in urban areas is scarce and expensive



Such structures are feasible in a huge variety of soil conditions thanks to cutting-edge technology



Going underground offers space and flexibility



Reduced energy demand



The underground provides natural protection



Sustainable and resilient solution



Sensible use is made of derelict tunnels, basements and underground spaces



Cool and secure environment

"In 2017 about 10% of data were created and processed outside centralised data centre and cloud. By 2022 they predict this figure will reach 50%" (GARTNER)

**WHY "EDGE"
DATA CENTRES?**

OUR UNIQUE COOLING SOLUTION

results in a 20% reduction in energy consumption

- Today, data centres consume **3-8% of the world's electricity** accounting for **0.5% of global CO₂ emissions**
- **40%** of the electricity is used **for cooling**
- In 2030, data centres are expected to consume 21% of the total electricity demand!

Underground climatic conditions, efficient technologies and closeness to users enable 'smart cooling' solutions and reduced energy demand

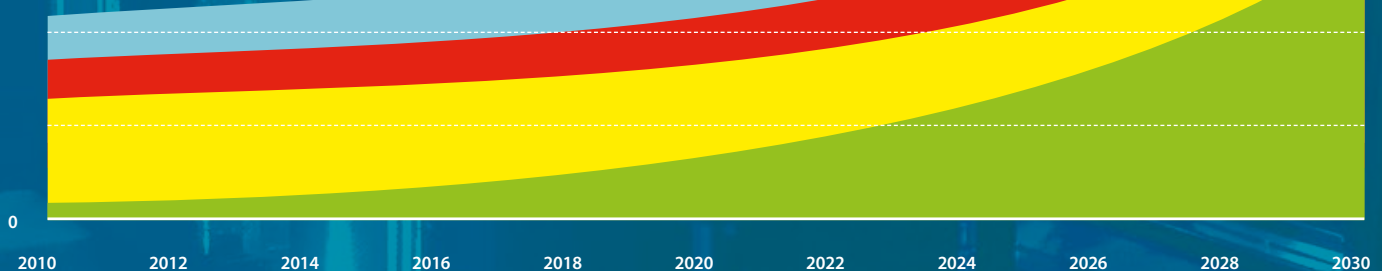
9,000 terawatt hours (TWh)

20.9% of projected electricity demand

ENERGY FORECAST

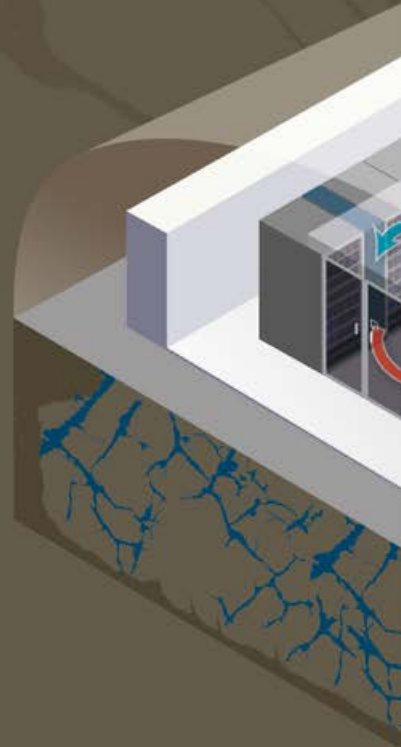
Widely cited forecast suggests that the total electricity demand of information and communications technology (ICT) will accelerate in the 2020s, and that data centres will take a larger slice.

- Networks (wireless and wired)
- Production on ICT
- Consumer devices (televisions, computers, mobile phones)
- Data centres



BELOW GROUND MEANS NEW PERSPECTIVES

OUR SOLUTIONS AND COMPETENCIES



Project management for your data centre

The Swiss Center of Applied Underground Technologies is a competence centre focusing on innovative concepts and solutions for the use of underground space and driving the development of new technology applications.



Engineering at its best

Space in populated areas is becoming ever more restricted; as a consequence, more and more infrastructure is being shifted below the earth's surface. Both large and small projects require proven technical expertise and a great deal of experience in engineering design, project and construction management. Amberg Engineering offers solutions for all underground design and construction activities – regardless of how demanding or complex they might be.



Data centre turnkey implementation and commissioning services

Datwyler IT Infra offers a comprehensive range of data centre infrastructure and data network services, which include sourcing and logistics, on-time delivery of hardware and software, technical execution planning (down to the level of layout, splicing, patching and power distribution), turnkey implementation of the physical installation/configuration by qualified specialists, professional and comprehensive digital documentation, testing and quality assurance.



Consult on early feasibility

(project planning, site investigation, zoning and permitting, alignment and layout, considerations and options, preliminary costs)



Upgrading to new use
Refurbishment
Decommissioning



Consult on feasibility

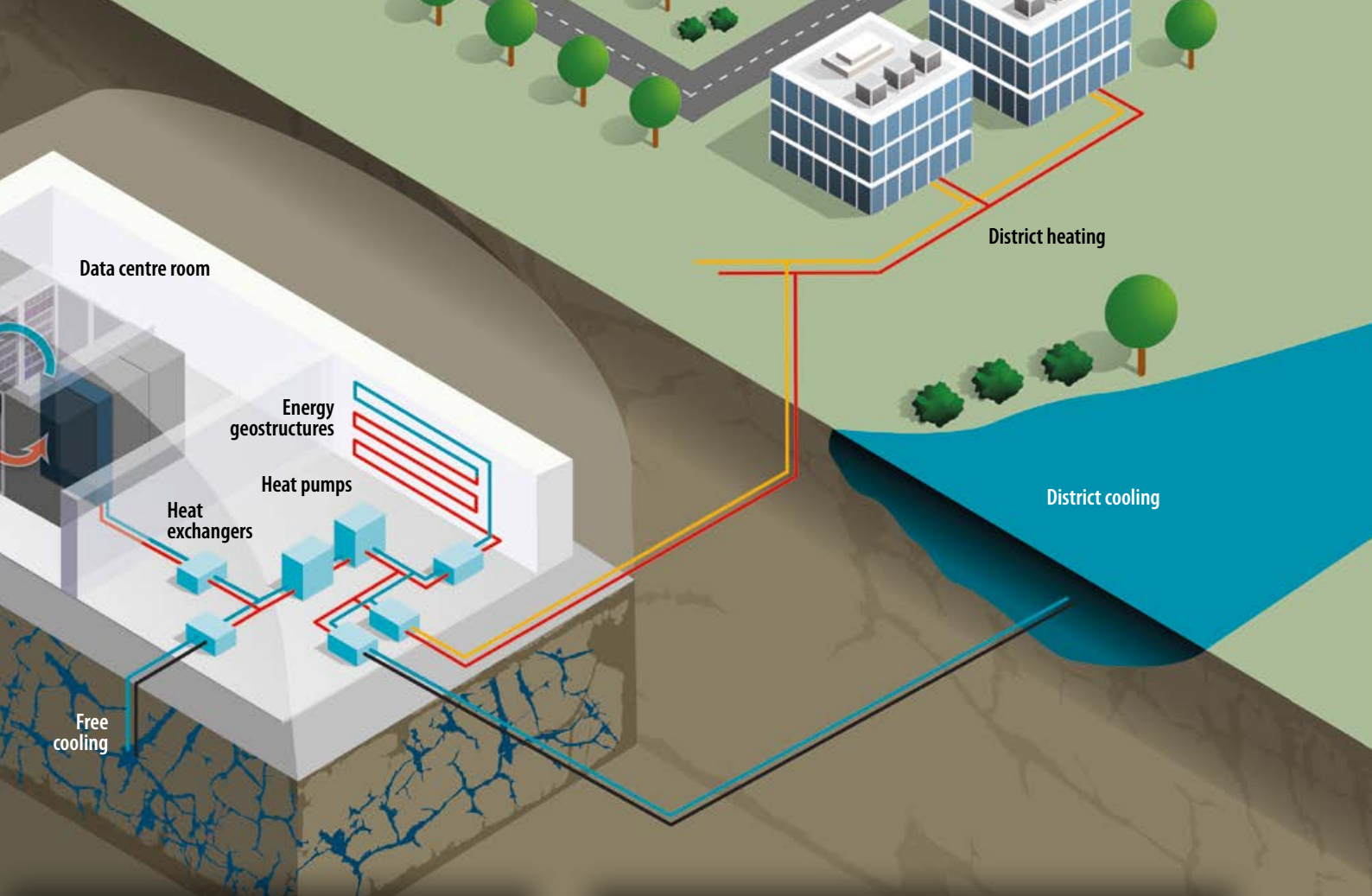
(technically, legally, financially, environmentally)



Design consultancy

(detailed concept focusing on best design alternatives)

End-to-end



Leveraging synergies for your data centre heat valorization.

With our unique know-how in underground environments and geo-energies, we rely on a comprehensive, multidisciplinary and integrated approach to facilitate a sustainable and collaborative use of energies for your data centres.

SIEMENS

Holistic safety, security, comfort and technology for energy distribution for your data centre

Future-oriented data centres planned with BIM rely on state-of-the-art and well coordinated safety, security, comfort and energy technology. With our unique know-how and extensive portfolio, we create the best conditions to make your data centre the best of its kind - securely, efficiently and with the necessary power.



Operation & Maintenance



Construction

data centre



Tendering

(preparation and evaluation of tender documents)



Audit & Validation

BELOW GROUND MEANS NEW PERSPECTIVES

EDGE COMPUTING UNDERGROUND!

We are the expert partners for all your
Underground Edge Computing ideas and projects.

Contact us if you are interested – or visit our
Demo Data Centre in the Hagerbach Test Gallery!



SIEMENS

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