Princess Elisabeth Antarctica

The first Zero Emissions Research Station in the Antarctic

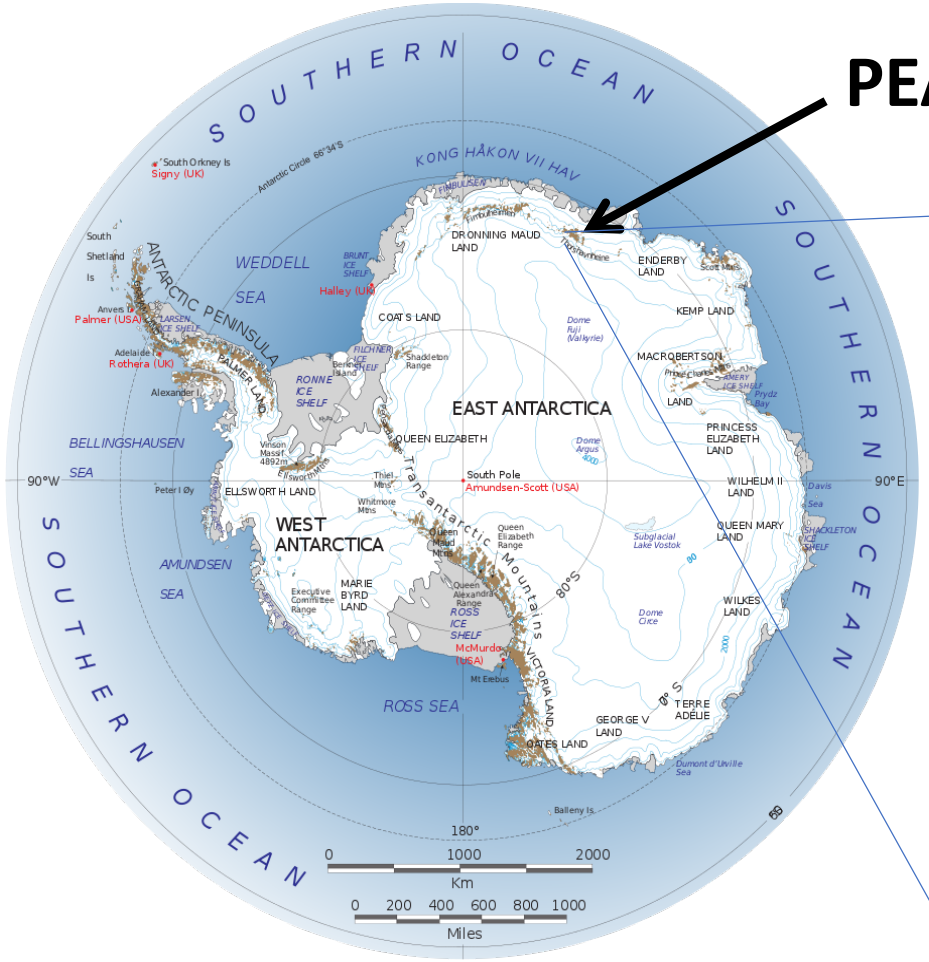
INTERNATIONAL POLAR FOUNDATION

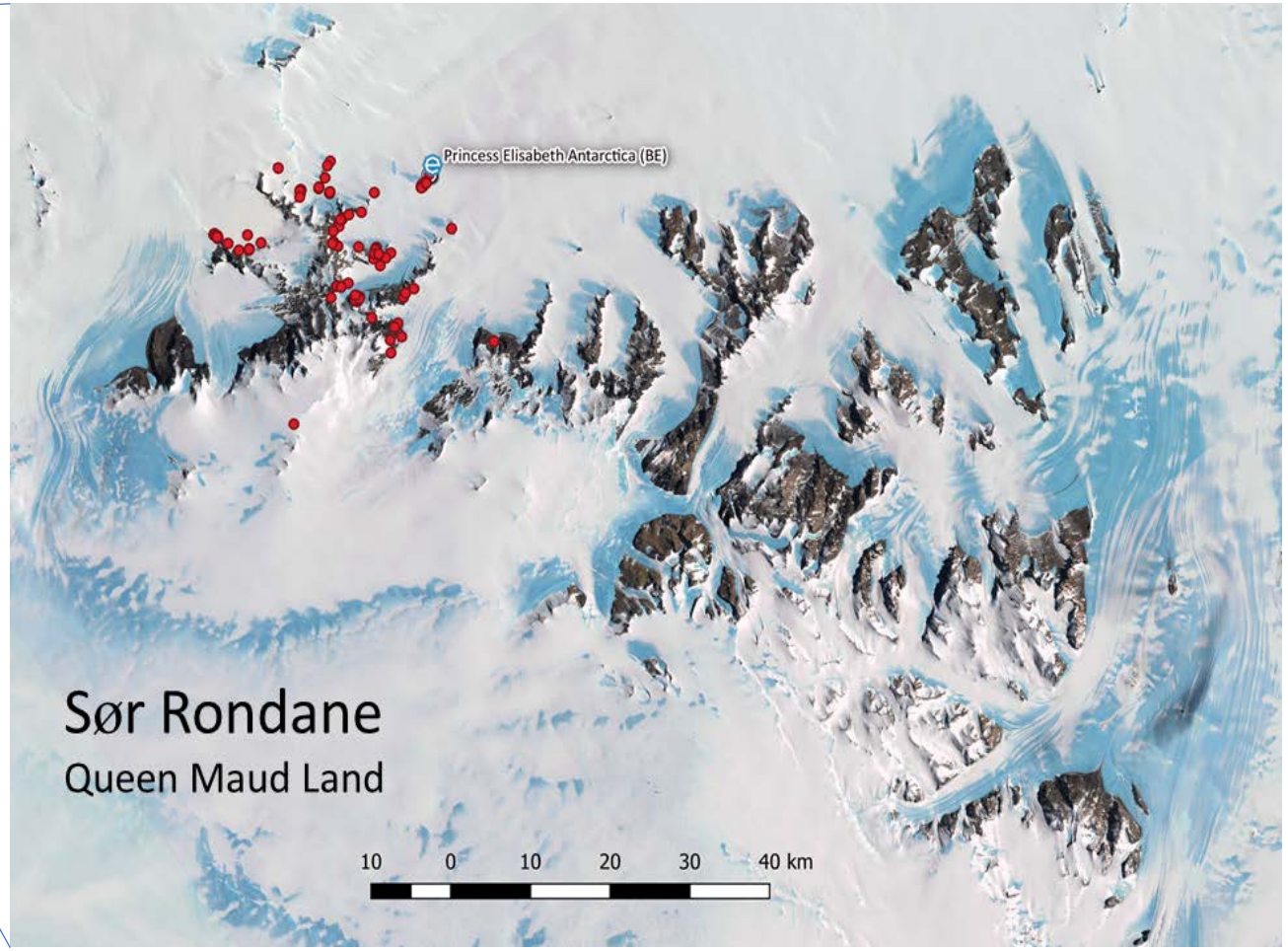
Why a new station in Antarctica?

- Long history between Belguim and the Antarctic
- Develop independant research programs
- Contribute to the Antarctic climate monitoring network
- International Polar Year 2007-2008 : a unique opportunity
- Education and awareness rainsing
- Platform for renewable energy

Geographical localisation of PEA

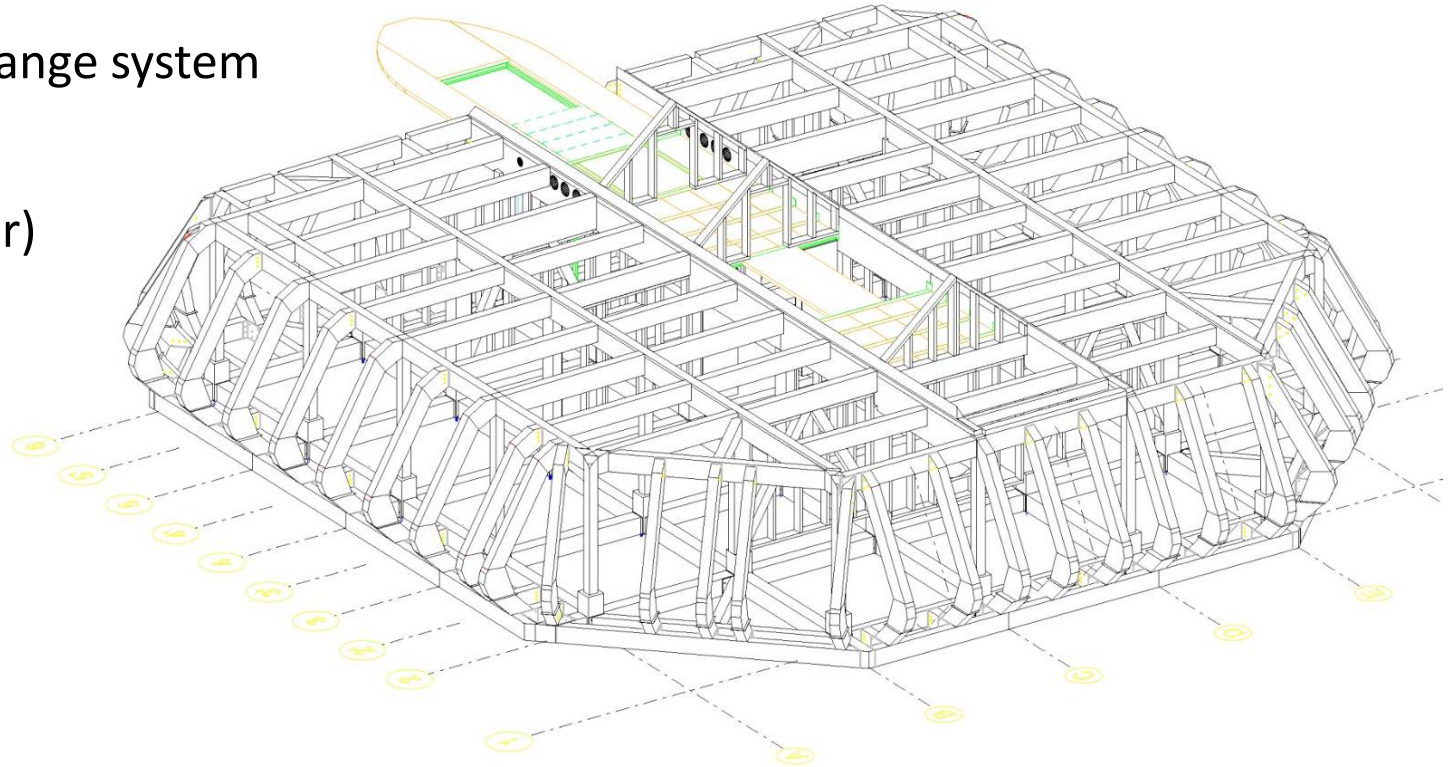
PEA (23°20'E 71°57'S)

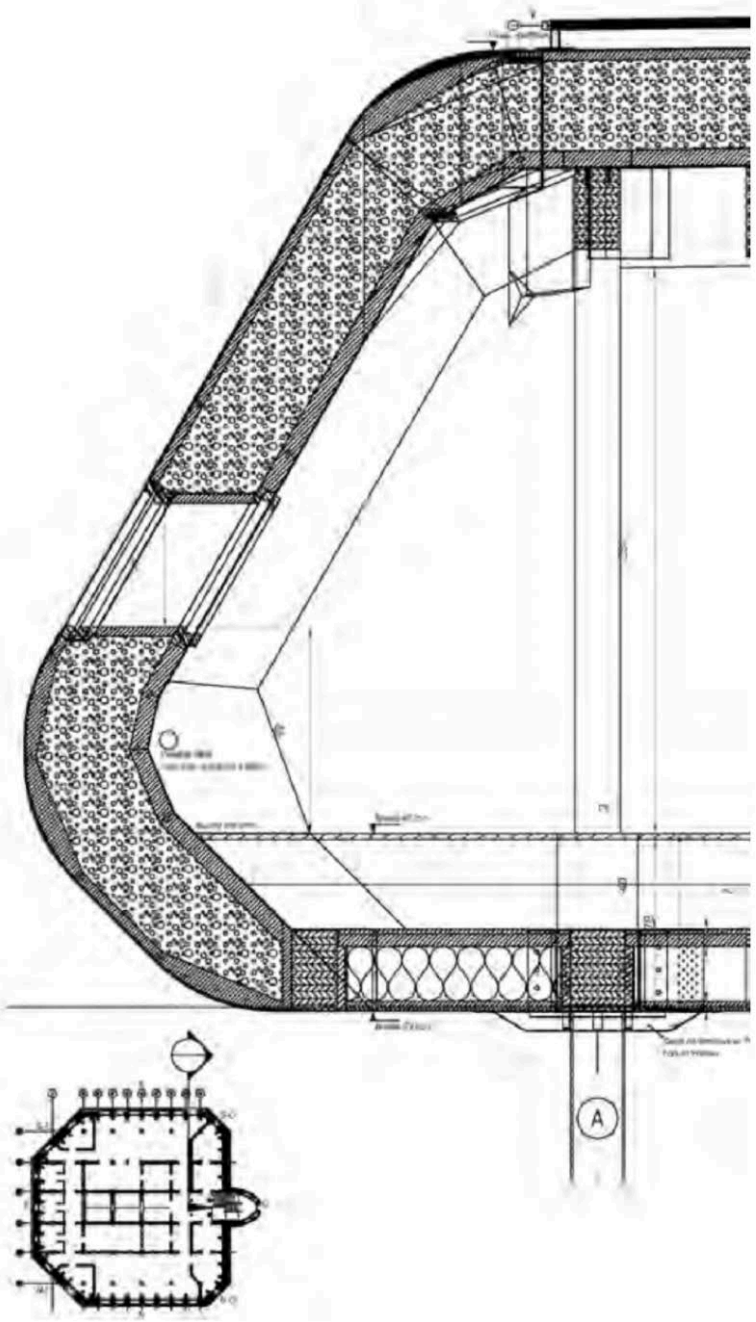




A Zero Emissions building – The concept

- Compact building
- Skeleton of PEA made of engineered wood
- Gain of passive energy (sun)
- High performance insulation
- Adapted ventillation and heat exchange system
- Renewable energy source
- Water production unit (snow melter)
- Water treatment unit





Beech wood panels

High density extruded polystyrene, flame retardant and doped with graphite

Stainless steel protection

EPDM membrane to prevent water infiltration

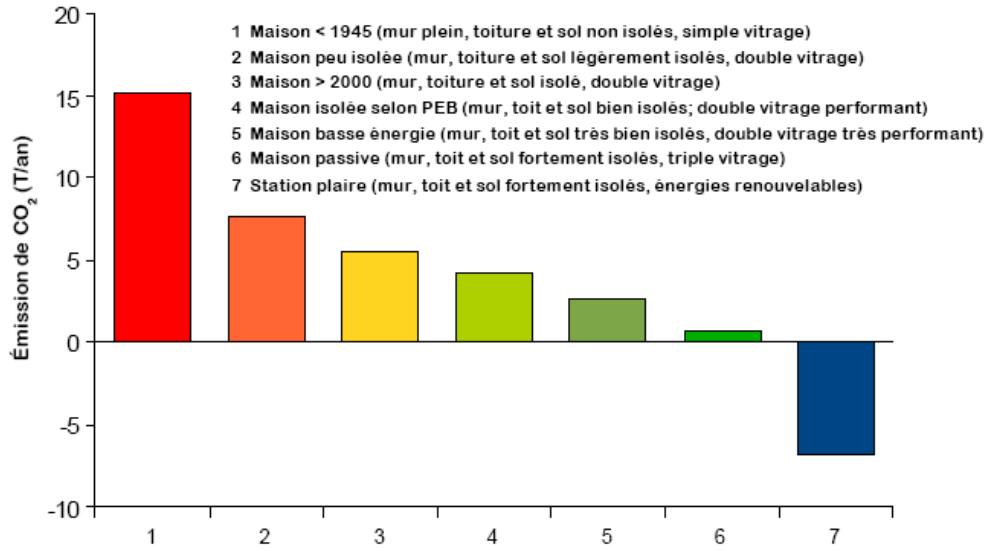
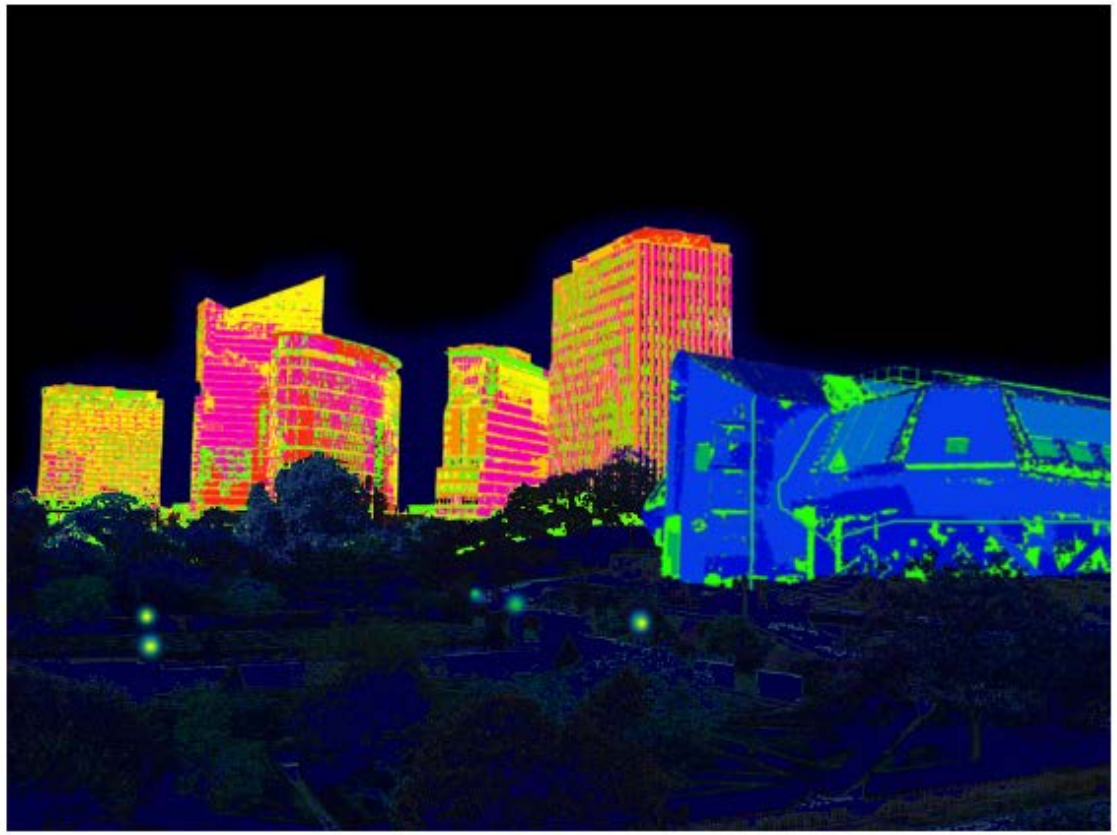
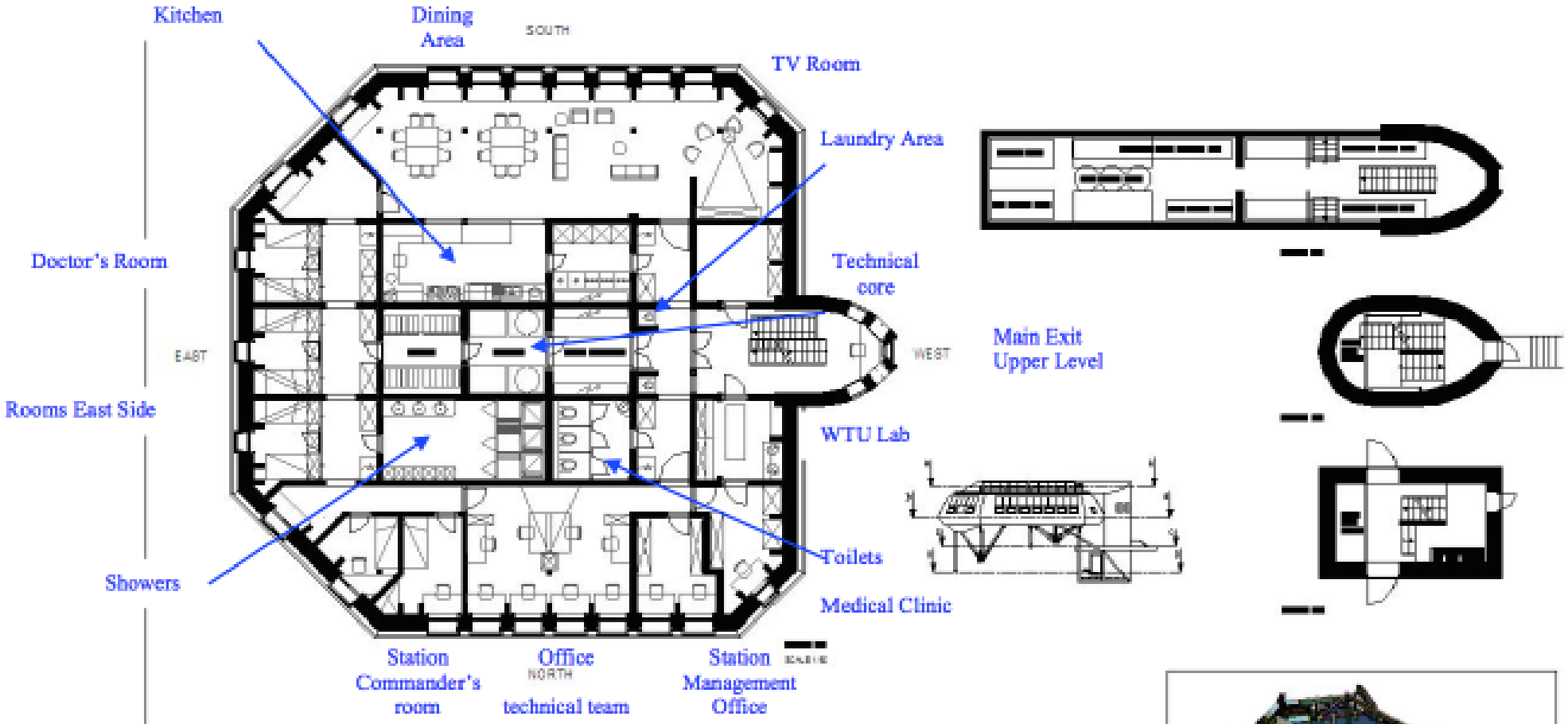
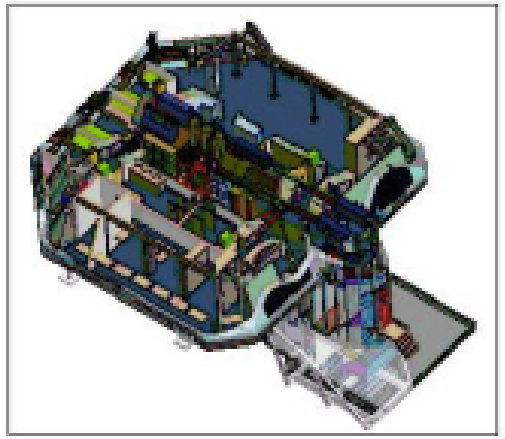


Figure 3 : Comparaison des émissions de CO_2 d'un bâtiment en fonction de ces caractéristiques au niveau du calcul de Niveau E - PEB.



(4) Station polaire à Bruxelles : (4) = (3) + Thermographie IR

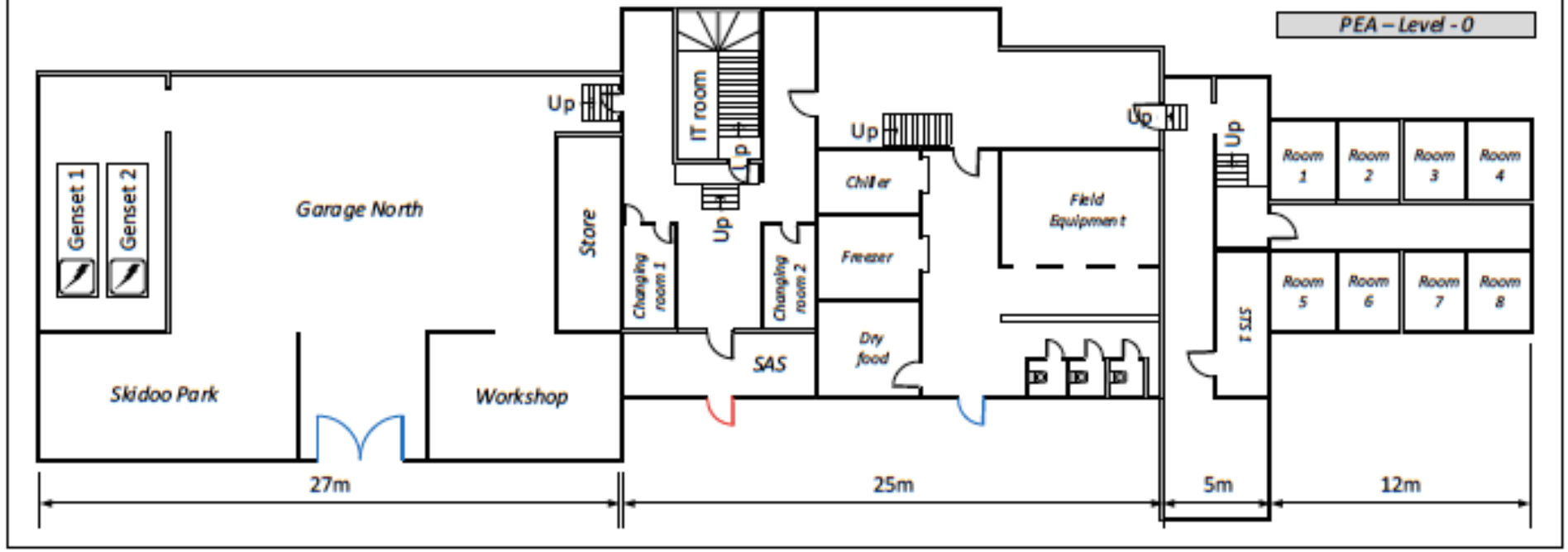


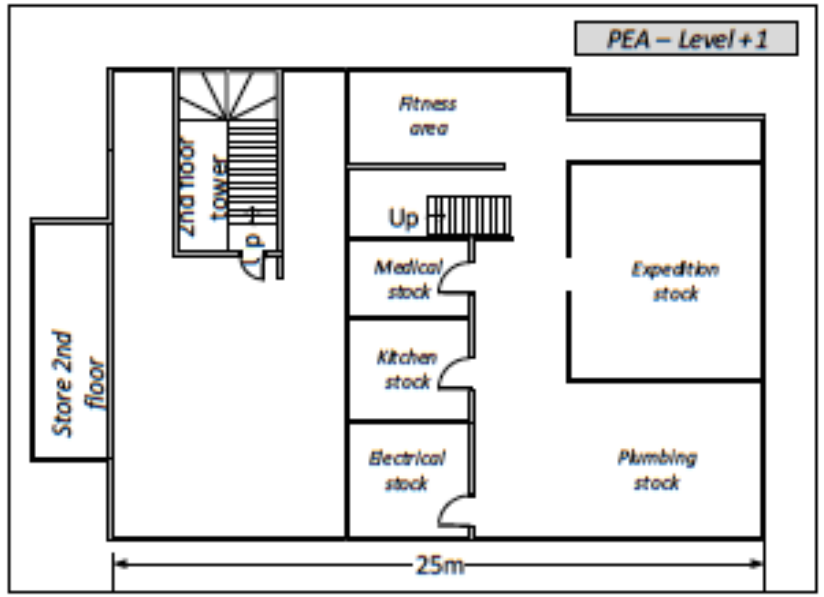


Princess Elisabeth Antarctica

The International Polar Foundation

Princess Elisabeth Antarctica	Building Layout	Season 2017 - 2016





STATION SOUTH ANNEX –
TEMPORARY to be updated

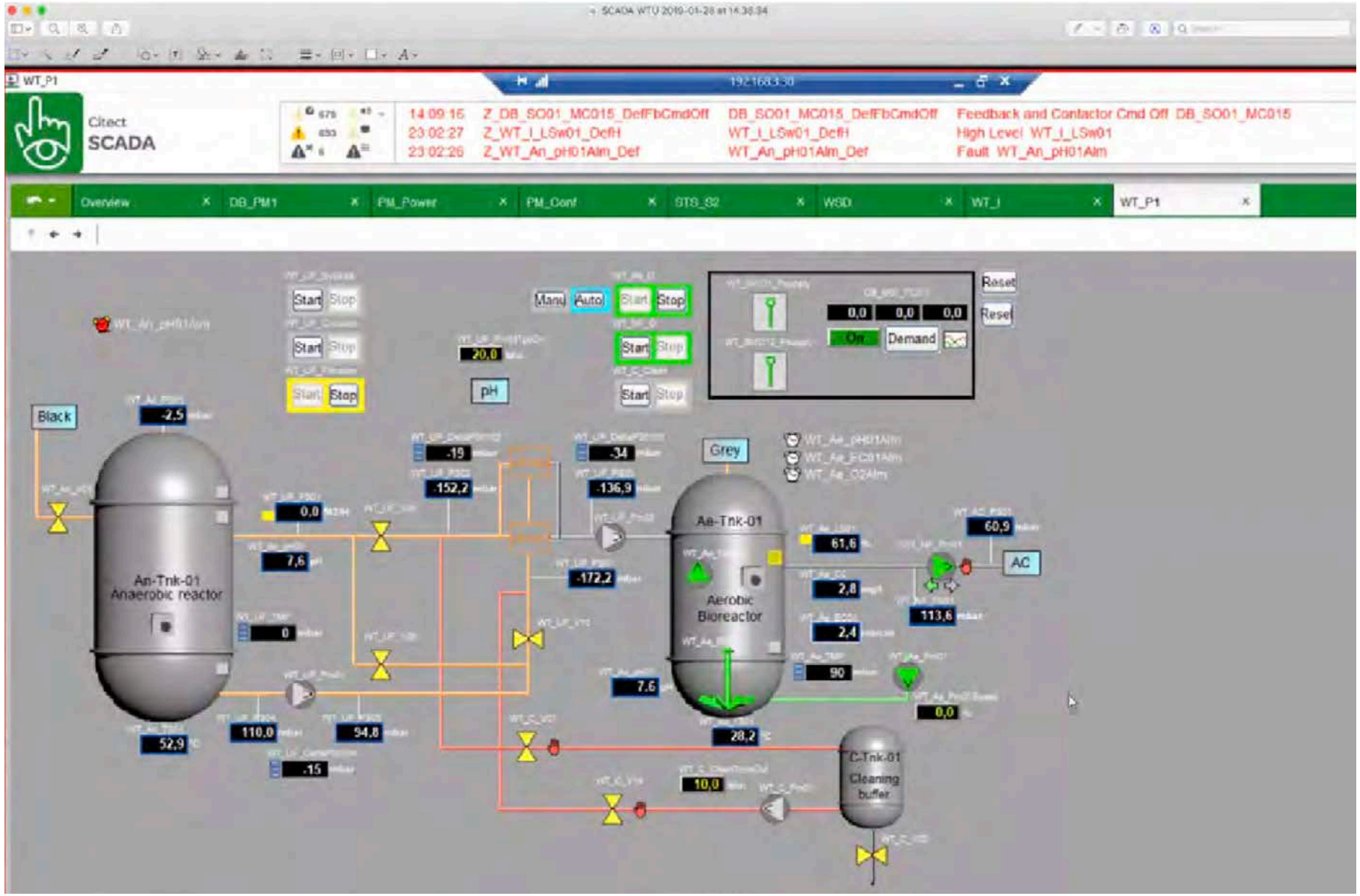
Renewable energy production

- Wind turbines
- Solar panels (photovoltaic and thermal)

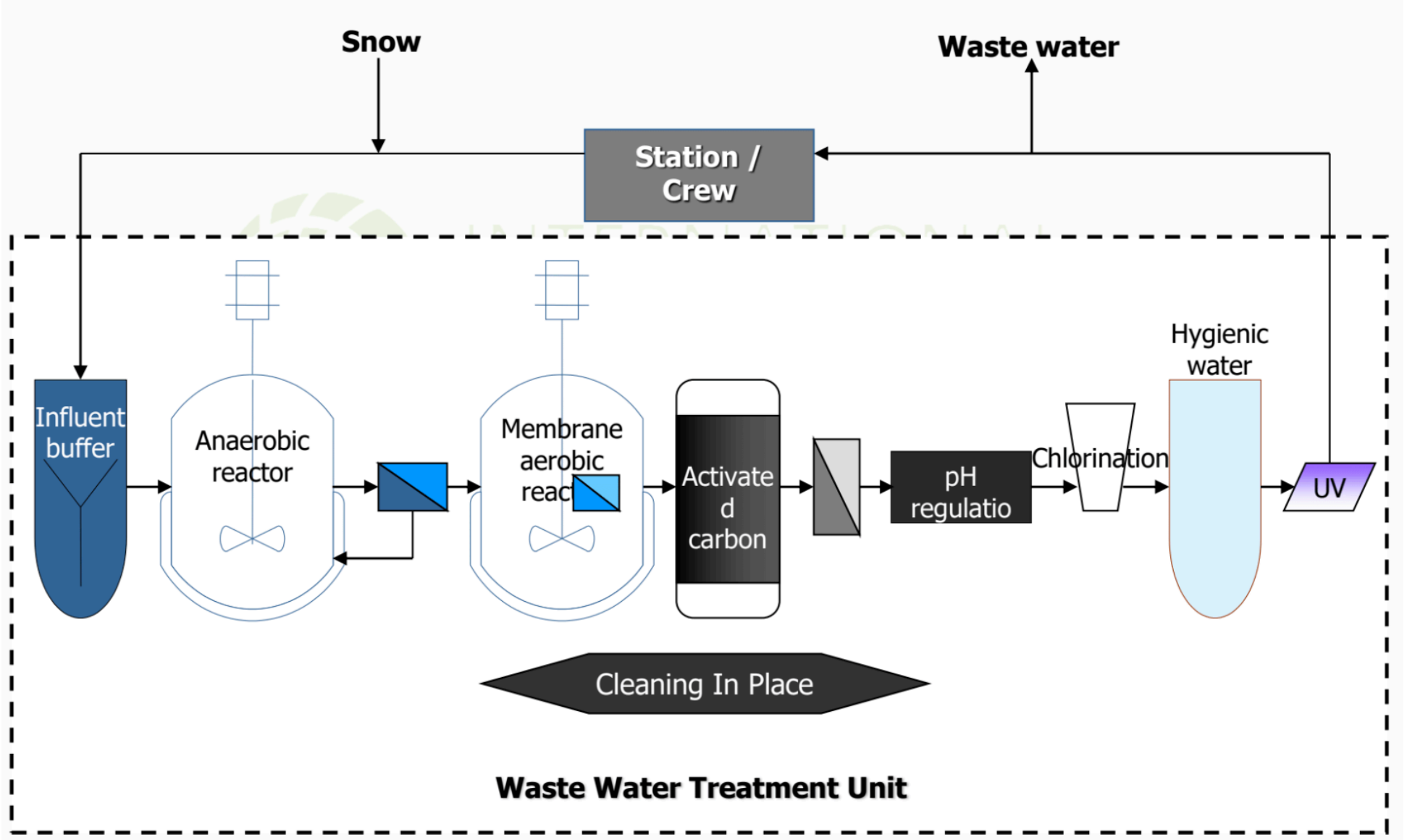
  - Heating
  - Lighting
  - Electricity
  - Water production (snow melting)

- Energy storage in large array of batteries
- Programmeable Logic Controller (PLC)

Energy management and automation interface – The SCADA



Water treatment unit



Relevant conclusions in the framework of INTERACT (1/2)

- Environmental impact reduction strategies are specific for each station
    - climate
    - topography
    - surrounding habitats
    - geological conditions
    - logistics for reaching the station
    - Type of activity

- Across-the-board impact reduction strategies require a case-by-case study for each station
    - audit for energy use
    - water use
    - water discharge

- Energetic customized solutions depends on the unique character of each site and its wind and solar potential

Relevant conclusions in the framework of INTERACT (2/2)

- Partnering with University engineering department = a very useful initiative
    - facilitate the process of finding technological solutions
    - freeing up research scientists and managers to carry on with their normal activities
    - interest in low wind wind-turbines grows
    - technologies of vertical axis wind turbines are developping

- New generation of diesel generator (cleaner and more efficient)

- Hydro-electric and geothermal power to limit the need of renewable energies or fossil fuels
    - building materials to reduce energy loss
    - system automation
    - building management using smart technologies to reduce energy use

- Re-examining activities to identify areas where energy can be saved/converted to less polluting methods of generation
    - i.e. autonomous observation stations reduce cost and energy use

Next step ?

- Set up an on-line platform for the Research Stations to:
    - share experiences with different technologies
    - raise awareness about available services
    - Facilitate the search for the ideal configuration
    - Reduce the risk of costly mistakes

- Use the platform to inform about potential funding sources to help the Stations to access funds that are becoming available, but may require significant resources to identify and obtain.

Thank you !

- www.polarfoundation.org
- www.educapoles.org
- www.sciencepoles.org
- www.explorapoles.org
- www.antarcticstation.org

La concentration en CO_2 augmente…

Est-ce un phénomène naturel ?

Source : Still Pictures/ UNEP

Talk outline

- Where are the Polar Regions?
- Key features of the Arctic and Antarctica
- What is climate change?
- Polar Regions as climate archive
- Early warning of climate change – melting ice