Using Sea Water as a medium for heating and cooling in Malta

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Temperatures in Malta

Malta's climate is typically Mediterranean, with hot, dry summers, warm and sporadically wet autumns, and short, cool winters with adequate rainfall.

The temperature is very stable, the annual mean being 18ºC and the monthly average ranging from 12º C to 31ºC.

Up to a few years ago air conditioning units were considered a luxury. Also space heating is minor.

No legislation regulting heating and cooling yet.

Summers are warm, dry and very sunny. The weather usually shows signs of warming up in April, heralding in a long spell of hot, dry weather. It rarely rains from April to August. July and August are Malta's hottest months with daytime temperatures usually above 30ºC and quite often also above 35ºC . The highest ever was in August 1999 when the temperature once went up to 44ºC in the shade at Luqa Airport. However, since humidity is rather high in Malta (due to the fact that Malta is an island) summer temperatures can feel quite irritating, thereby making it quite often unbearable to stay out in the sun. This is especially so in August and September, when a high humidity can make it quite unbearable at night. However, daytime temperatures in summer are usually mitigated by cooling sea breezes.

Winters

are mild with only rare occurrences of cold weather brought by north and northeast winds from central Europe. In fact, daytime winter temperatures almost never fall below 10ºC , while night-time winter temperatures never fall below 0ºC . It is usually mild in Malta during the winter, with plenty of sunshine, too, with daytime temperatures usually 15ºC or above and sometimes also around 20ºC.

Historical Measures taken in Buildings

- As heating / cooling requirements are smaller

Window Louvers

High Ceilings

Double Walls on the Outside.

The Hotel Sector

The Use of Sea Water to cool VRF systems.

Drilling sea water boreholes to pump up seawater. Used as a primary medium for cooling refrigerant cycle or process water cycle.

Use of Titanium Heat Exchangers

Previous expirences with Cu Ni disastrous

Upscale Apartments

As Hotel sector however the tenants have to

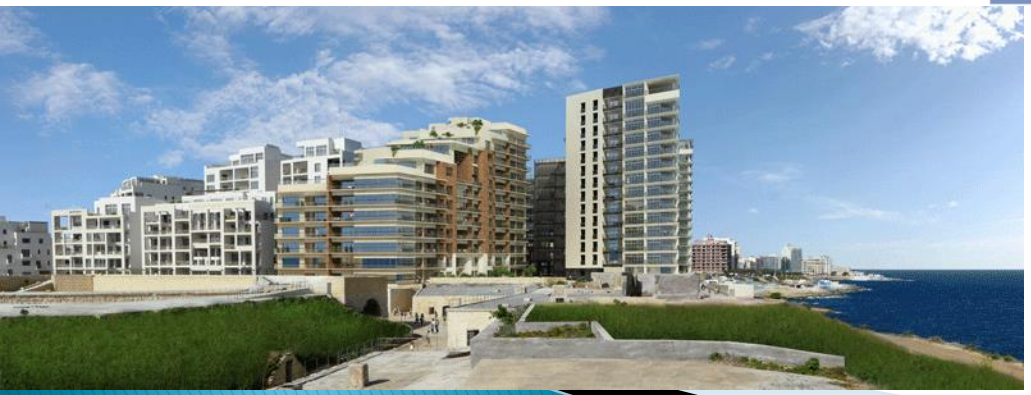
i) Pay fixed rates based on metered electricity for recirculating pumps
ii) Buy outdoor and indoor units as long as these fit with system.

Tigne Point Development

Developers of a unique, new, residential, office and leisure development at Tigne Point and on Manoel Island Buildings;

Joint Venture between Siemens S.p.A and Midi Plc.

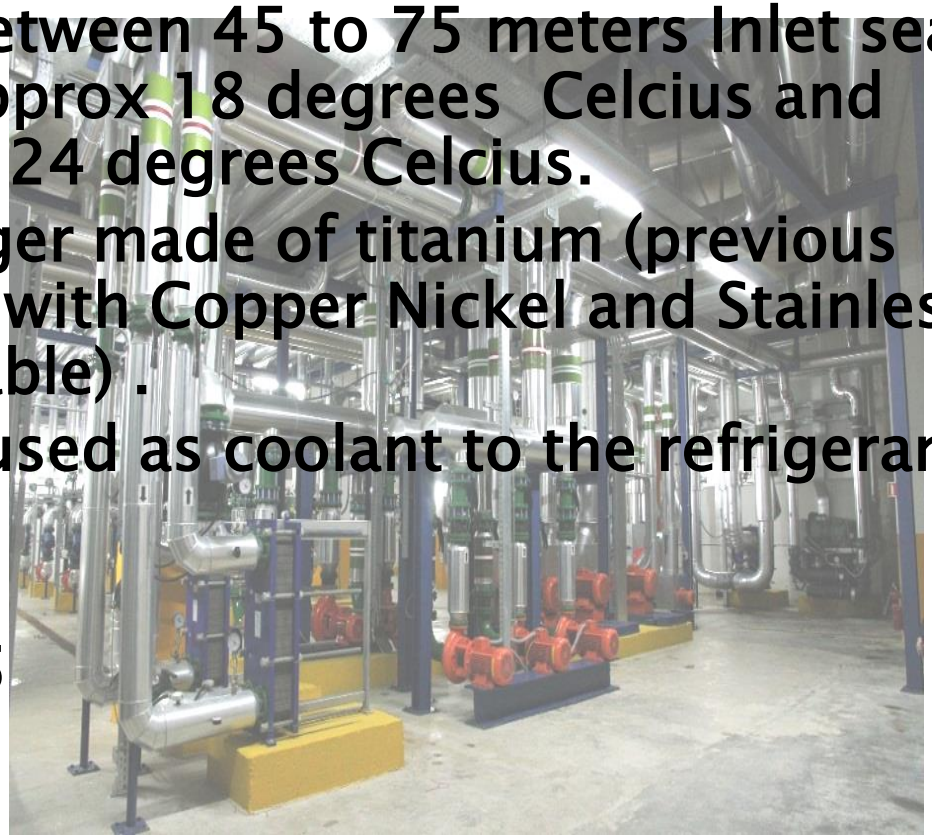
8 Buildings containing 210 apartments and a multipurpose building which includes a Shopping Mall. Commissioned in March 2010.



Buildings with 4 pipe system – 2 for cooling 2 for heating. All piping go into the fan coil.

Sea Water Use – Tigne Point Development

- Cooling – Sea Water use to cool the primary circuit in a chiller (4 installed approx 1 MW each).
- 6 sea water boreholes suctioning seawater from different depths in between 45 to 75 meters Inlet sea water temperature approx 18 degrees Celcius and outlet approximately 24 degrees Celcius.
- Primary heat exchanger made of titanium (previous national experiences with Copper Nickel and Stainless Steel proved not reliable) .
- Heating – Sea Water used as coolant to the refrigerant in a Heat Pump unit.
- COP between 3 and 5

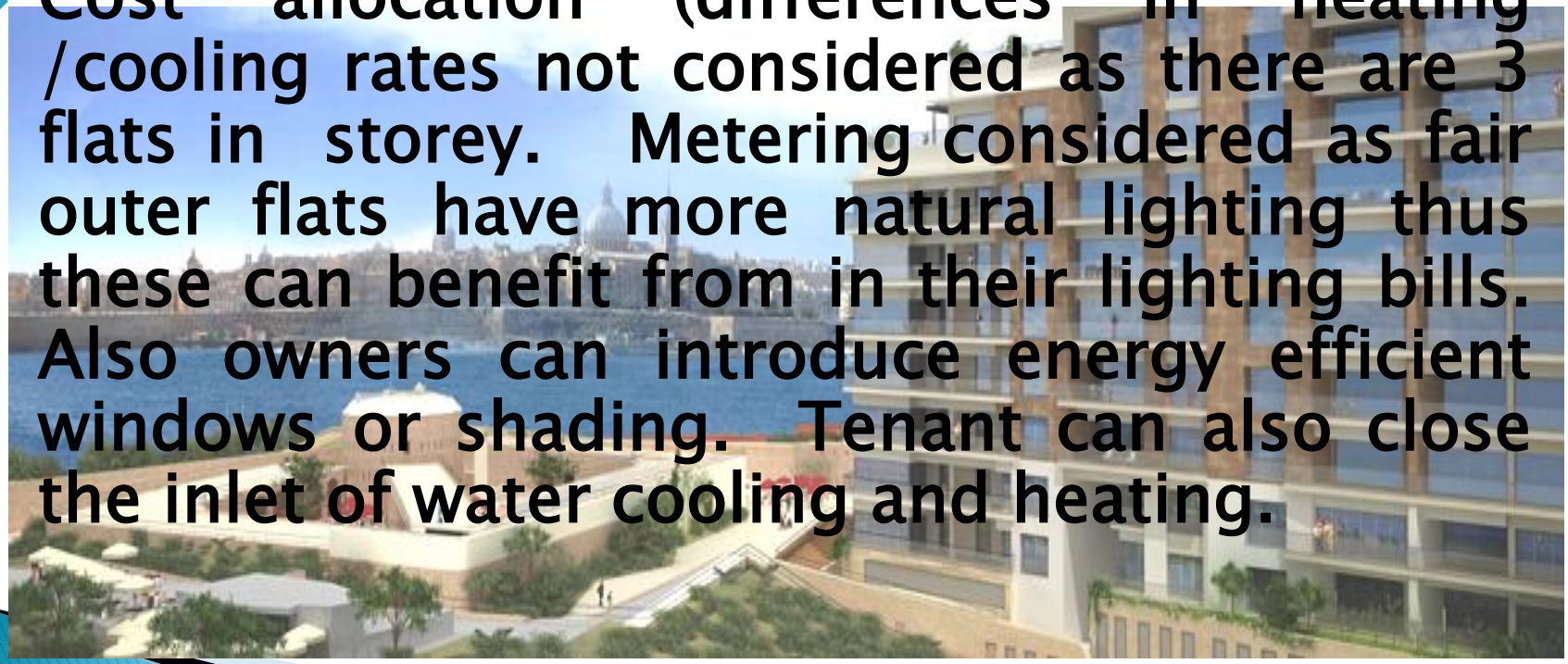


Temperature Control.

- Centralized heating and cooling systems supply distributed fan coils/air handling units. The centralization of heating and cooling leads to energy savings.
- Computerized control of the HVAC system from the Control Centre leads to substantial energy savings.
  - **Sensor on the return controlling water valves in fan coil**

Apartment Billing

- Billing. At the inlet of the apartment the cold and the hot pipes are both metered. Reading taken are i) flow and ii) ΔT.
- Cost allocation (differences in heating /cooling rates not considered as there are 3 flats in storey. Metering considered as fair outer flats have more natural lighting thus these can benefit from in their lighting bills. Also owners can introduce energy efficient windows or shading. Tenant can also close the inlet of water cooling and heating.



The Point Shopping Mall

- The Shopping Mall has two meters that read flow and ΔT and the Mall owners are charged for this amount of energy.
- Shops inside are billed according to submeters:
  - Common areas are divided between shops
  - Air Venting is billed per m2
  - Water for spatial heating per m2

Thanks