

Sykies Municipality:

Green Build Questionnaire about sustainability measures for new or existing buildings and urban development areas.

Development in Green City Building project based on previous developed "Green Global 21" point system from GCB partner Cenergia Energy Consultants.

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Test results by using the questionnaire on Sykies GCB urban pilot area
(Shows total points by adding for all houses investigated. Only houses fulfilling some of improvements get points, so rest get 0 point. Here 5 houses have some improvement regarding A. Water).

Guidelines for the use of the questionnaire

When energy and environmental points are attached to the questionnaire, then the achieved number of energy and environmental "points" in 6-7 different areas can be used to specify the performance of the project.

The questionnaire is filled in by ticking off the questions which [are intended] / [will be fulfilled]. For example regarding energy savings: If the energy consumption is below for example 60 kWh/m² all 3 lines should be ticked off as shown below:

- Energy consumption for heating and cooling is below 90 kWh/m²
- Energy consumption for heating and cooling is below 70 kWh/m²
- Energy consumption for heating and cooling is below 60 kWh/m²

In other words: The fully filled in questionnaire will be a picture showing the degree of agreement between the original intentions and real facts in the project that will be realised.

Green Build questionnaire, including suggestion for "energy and environmental points" []

A) Water, rainwater and sewage

- 1. Water saving toilets with differentiated flush is installed (3/6 litre) [2]
- 2. Measures that minimise amount of rain water collected by the sewage system are carried out (permeable pavements, rain water ponds etc.) [2]
- 3. Washing- and dishwashing machines with minimised water consumption are installed [2]
- 4. Thermostat-mixing taps of a type which can be serviced without the installation is opened is installed [1]
- 5. "Grey" wastewater is utilised ¹⁾ [5]

Building owner's suggestions for other measures within " Water, rainwater and sewage":

B) Indoor air climate

- 1. Air tightness²⁾ of the building is measured to be less than 0.6 ach [2]
- 2. Noise from installations is kept below 25 dB. [3]
- 3. Passive solar energy design is applied. How the problems with overheating are coped with so the indoor temperature is not exceeding 28°C. Is documented [2]
- 4. In-door materials with in-door climate certification is applied, if such is available for the material type in question [1]
- 5. There is a minimum air exchange rate of m³/h per person. The mechanical air exchange rate is at least 0.4/h and it is possible to have 0.6/h extra air exchange rate by manual opening of windows [2]
- 6. Balanced ventilation, exhaust and inlet air [2]

Building owner's suggestions for other measures within " Indoor air climate":

C) Materials and constructions

- 1. Water installations without PVC is applied [1]
- 2. Cable work and related installations are without PVC [1]
- 3. Only building components totally free of PVC are applied [1]
- 4. Foam materials using CFC and HCFC is totally avoided [1]
- 5. As flooring materials are only applied wood, natural stone or ceramic tiles [1]
- 6. Insulation materials of recycled organic origin is applied (for example flax and paper granules) [1]
- 7. Surfaces are treated with materials that are indoor-climate certified [1]
- 8. Low "not renewable" energy consumption materials, 200 MJ/m² or less [3]
- 9. Use of bricks in interior walls [2]
- 10. Natural materials in walls [3]

- 11. Natural materials in flooring [3]
- 12. Natural materials in roofs [3]
- 13. Natural materials in ceilings [3]
- 14. Recycled materials in insulation [3]
- 15. Special care so constructions are protected against the local weather conditions, e.g. using extended eaves [2]
- 16. Documented use of glass and windows to obtain a maximum utilisation of daylight [3]
- 17. Documented use of glass and windows so overheating in the summer is avoided (less than 28°C -30°C in a Greek climate) [2]
- 18. Use of built-in solar shading design [2]
- 19. The building is designed to utilise natural and cross ventilation in the summer [2]
- 20. The building is made with a documented level of thermal mass as basis of storage of solar gains [1]
- 21. A building design is used which avoids the need for air condition/cooling systems [2]
- 22. Areas with a high amount of "free heat" gains is designed for natural or hybrid ventilation [2]
- 23. A detailed calculation programme is used as basis of achieving an optimised building design with respect to heat and cooling demand and comfortable temperatures [2]

Building owner's suggestion to other measures within "Materials and constructions"

D) Waste

- 1. Space for composting container is included in the garden plot [2]
- 2. Appropriate containers for fractionated waste disposal is built in both in kitchen and in the out door disposal place [2]
- 3. The waste from the construction phase is sorted in as many fractions as the municipality can find an outlet for [2]
- 4. At each main plot of land space is reserved for "waste-islands" where the waste can be disposed off in fractions as paper, cardboard, metal, electronic waste etc [1]

Building owner's suggestion to other measures within "Waste"

E) Energy

- 1. User controlled mechanical ventilation with heat recovery of outlet air is installed. The thermal efficiency rate must be at least 80% and the electrothermal ratio ³⁾ must be at least 1:8. Power consumption max. 40 W and noise level from the installation must be below 25 dB [5]
- 2. Individual consumption displays are installed [2]
- 3. Main meters are placed at the entrance of each main plot of land, so losses from the distribution system can be monitored [1]

- 4. Energy consumption for heating below ⁴⁾ 90 kWh/m² is documented [2]
- 5. Energy consumption for heating below ⁴⁾ 70 kWh/m² is documented [2]
- 6. Energy consumption for heating below ⁴⁾ 60 kWh/m² is documented [2]
- 7. Energy consumption for heating below ⁴⁾ 35 kWh/m² is documented [2]
- 8. A solar collector for domestic hot water is installed. Sized for 100% coverage in the summer period [3]
- 9. The housing design is performed in a way that maximises the contribution of passive solar energy without reducing the comfort in periods with high solar exposure [1]
- 10. Use solar walls as an alternative to conventional façade solutions - for example for preheating of ventilation air [1]
- 11. Integrated solar protection is installed where passive solar energy is utilised [1]
- 12. Both hot and cold water taps are installed at washing and dishwashing machines [3]
- 13. All white goods must be certified as "low-energy" types⁵⁾ A. (As white household electrical appliances goods is understood freezers, refrigerators, kitchen range, washing- and dishwashing machines and tumbler drier [3]
- 14. Low-energy basic lighting is installed. Supplied with user-activated specific lighting [1]
- 15. Only low-energy bulbs are applied [1]
- 16. Solar cells as power supply for circulation pump in the solar heating system is installed [2]
- 17. Grid-connected solar cells are installed [3]
- 18. Movement-activated lighting is installed [1]
- 19. Low energy lighting is installed in all common areas [1]
- 20. Low temperature floor heating [3]
- 21. Energy management system survey [2]
- 22. Energy optimised windows, U-value of total window below 3.0 W/m²°C [3]
- 23. Heat pumps with COP over 3.0 [2]
- 24. Local CHP plant [3]
- 25. As a mean solar energy irradiation to buildings should not be reduced by more than 20% because of shadows, orientation and topography [2]
- 26. Shading of glazing (windows) is achieved during the summer period [2]

Building owner's suggestion to other measures within "Energy"

F) Building and urban development area. Methods for sustainable development and sustainable urban management

- 1. A "Use & Maintenance" manual is delivered and/or planned for each housing unit. This describes all the types of building materials and technical devices with information about maintenance and relevant supplier information, etc. [2]
- 2. Use of technical installations are done according to the manual mentioned under item 1 [2]
- 3. The building is optimised according to a total economic lifecycle costs assessment

(assessment of investments where operation and maintenance costs are taken into consideration). [2]

- 4. The design is planned for an easy access to technical installations [2]
- 5. The building project is placed in the existing terrain [1]
- 6. Existing vegetation is saved and protected in the construction phase [2]
- 7. Unheated additions are connected to the main building (porch, garage etc.) [1]
- 8. Extra protection of façades is instituted by means of extended eaves (minimum 700 mm) [1]
- 9. All fittings in piping systems are easily accessible (non-destructive inspection) [1]
- 10. Only few modifications are needed to change the housing unit for disabled/older people [1]
- 11. Differentiated protection of wood is performed (functional wood-protection), dependent of how it is exposed to the weather [1]
- 12. Joining methods and construction principles are chosen so reconstruction/additions/reuse will be less problematic [1]
- 13. Technical installations in house blocks are placed in a noise core ⁶⁾ [2]
- 14. A green common area is included in each main plot of land [1]
- 15. Energy efficiency of realised building project will be assessed by comparing a monitored energy signature, e.g. by help of an energy management system, with a reference energy signature calculated prior to the realisation phase [2]
- 16. A quality and performance verification process is started already in connection to the design work. Here performance demands and performance indicators are identified [2]
- 17. A quality assurance procedure is performed both in connection to design and realisation by help of "specialist" companies (check of design and tender material, inspection procedures and performance tests as part of the building process) [3]
- 18. Check of cold bridges, air tightness, ventilation design, solar energy systems, heating systems, electrical appliances, water systems and waste handling systems as part of performance check procedure [4]

Building owner's suggestion to other measures within " Urban development area and sustainable urban management"

0-15 =poor | 16-40 =acceptable | 41+ =great

Appendix

- 1) Grey waste water is defined as water from sink and shower.
- 2) Air tightness is performed after the finishing of the building.
- 3) The electrothermal ratio for heat recovery systems is the ratio between the electricity consumption and the savings in heat consumption (documented)
- 4) Energy consumption amounting to e.g. 90 kWh/m² means that the consumption must be maximum 90 kWh per m² floor area per year
- 5) Info about the energy label of the household appliances you may find at the following website: <http://www.defra.gov.uk/environment/consumerprod/energylabels/energylabel.pdf> .
- 6) Noise core is defined as a shaft, which ensures that noise from technical installations is not exceeding the values given in the Danish building regulations.

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