Check–list for the Design of Sustainable Housing

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The design of *Sustainable Housing* requires some special attention to energetically and ecologically aspects, considering also economic solutions. On the basis of criteria's both the members of the design team and the owner have to be encouraged as well as convinced about the design strategies and solutions. Using the *Check-list* all actors can better understand the manifold possibilities to realize sustainable housing with all their benefits.

A design tool for the assessment of housing concerning "Sustainability" was developed in co-operation with planners and architects in the province of Carinthia/Austria; iff-Tool "Sustain". The check-list tool is used for housing competitions as well as for certifications of housings by architects/planners.

The *steps for the assessment* are:

- selection of the site,
- building construction,
- heating system,
- building installations,
- operation,
- demolition at the end of the life cycle.

The *overall criteria* are:

- resource use,
- environmental impacts,
- functionality,
- comfort,
- cost-efficiency

The *sectors for scoring* are:

- the building environment
  (net area of land used, change in ecological value, optimal housing area)
- the building construction material
  (retention of existing building, use of recycled materials, re-useable materials, recyclable materials)
- the heat demand (space heat and hot water)
- the primary energy demand for space heating
- the electricity demand for appliances and lighting
- life quality
  (indoor climate air quality, lighting - including daylight, thermal comfort, acoustic, functionality, flexibility, maintainability, integration in urban context)
- share of renewable energy sources
- energy relevant CO_2-emissions
  (environmental loading CO_2 -emissions from construction, annual CO_2 -emissions from operation)
- economics
  (construction cost, annual operation and maintenance cost; life-cycle cost).

The criteria's for the assessment are documented in Table 1. Most of it are defined in standards (heat demand, characterization of building construction materials, electricity demand for appliances and lighting), other criteria's (especially live quality, mobility) have to be scored by the actors.

The results of the assessment are documented in Tables and Graphics; Table 2 and Figure 1a to Figure 1c.

The center of the star usually designates the minimum score for each criterion. The outer unit polygon represents the maximum score of 10 fore each criterion. Maximal and minimal scores are related to the "state of the art" of technologies.

Although the star diagram may be used to give an indication of the overall performance of the building.

Table 1:
BUILDING QUALITY ASSESSMENT
CATEGORIES AND CRITERIAS

CATEGORIES	CRITERIAS	ASSESSMENT (Maximal Score)
(A) Building envelope	*(1) heat insulation*	10
	(2) materials/building construction	10
	(3) space heat demand	10
(B) Heating system	*(4) primary space heat demand*	10
	(5) carbon dioxide emission	10
(C) Building installation	*(6) hot water, appliances, lighting*	10
(D) Living quality	*(7) site, infrastructure*	10
	(8) building-use	10
	(9) mobility	10
(E) Economy	*(10) additional investment costs, fuel /electricity saving for space heating , hot water, appliances, lighting*	10
Maximal Score		**100**

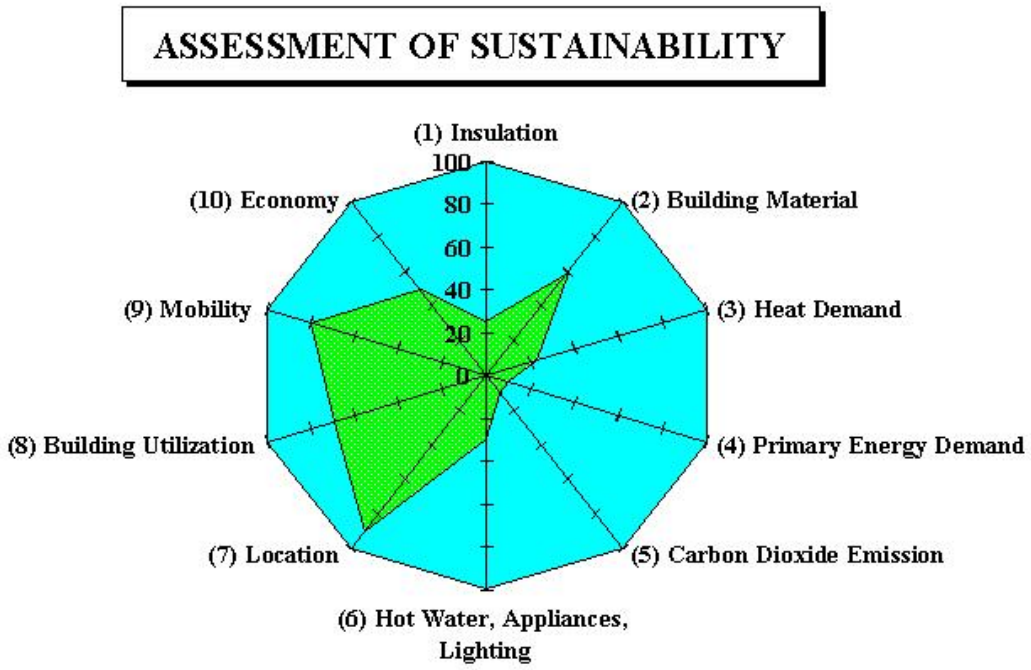
Table 2:
BUILDING QUALITY ASSESSMENT

Example: Detached House

CATEGORIES	CRITERIAS	ASSESSMENT Score		SUSTAINABILITY Score / %	
(A) Building envelope	*(1) heat insulation*	*7,5*	*21,0*	***74,5***	***69,8***
	(2) materials/building construction	*8,0*		***80,0***	
	(3) space heat demand	*5,5*		***55,0***	
(B) Heating system	*(4) primary space heat demand*	*4,6*	*14,6*	***46,0***	***73,0***
	(5) carbon dioxide emission	*10,0*		***100,0***	
(C) Building installation	*(6) hot water, appliances, lighting*	*8,0*	*8,0*	***80,0***	***80,0***
(D) Living quality	*(7) site, infrastructure*	*10,0*	*28,0*	***100,0***	***93,3***
	(8) building-use	*9,0*		***90,0***	
	(9) mobility	*9,0*		***90,0***	
(E) Economy	*(10) additional investment costs, fuel /electricity saving for space heating , hot water, appliances, lighting*	*7,0*	*7,0*	***70,0***	***70,0***
TOTAL ASSESSMENT		***78,6***		***78,6***	

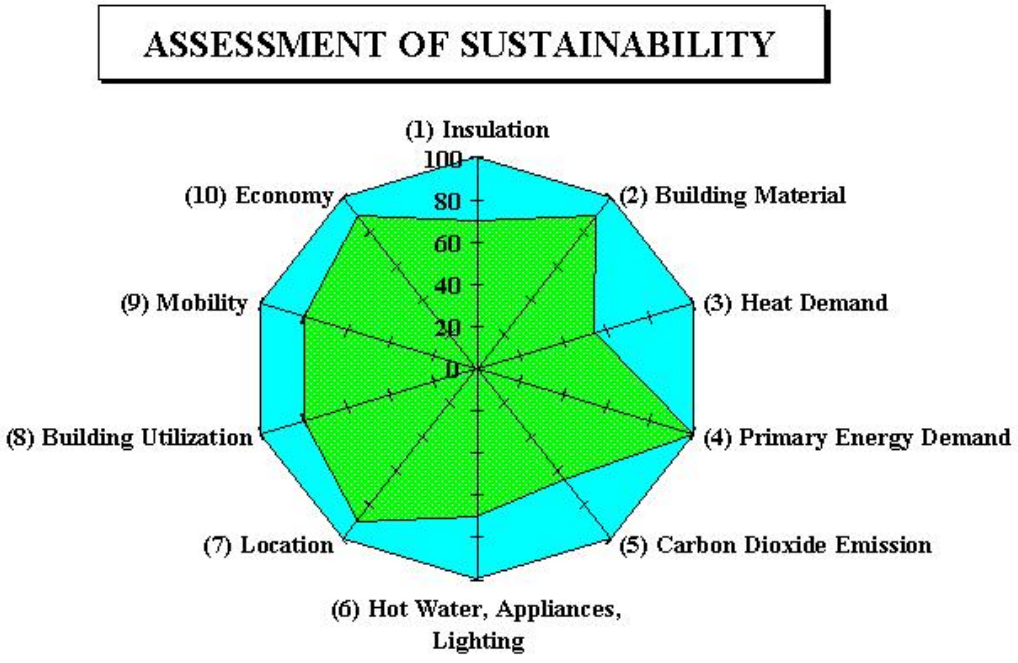
More information:

www.iff.ac.at
www.iswb.at
www.energytech.at.



Standard-House, oil boiler

Fig. 1a: Assessment of housing (1)



Low Energy House, biomass heating system

Fig. 1b: Assessment of housing (2)

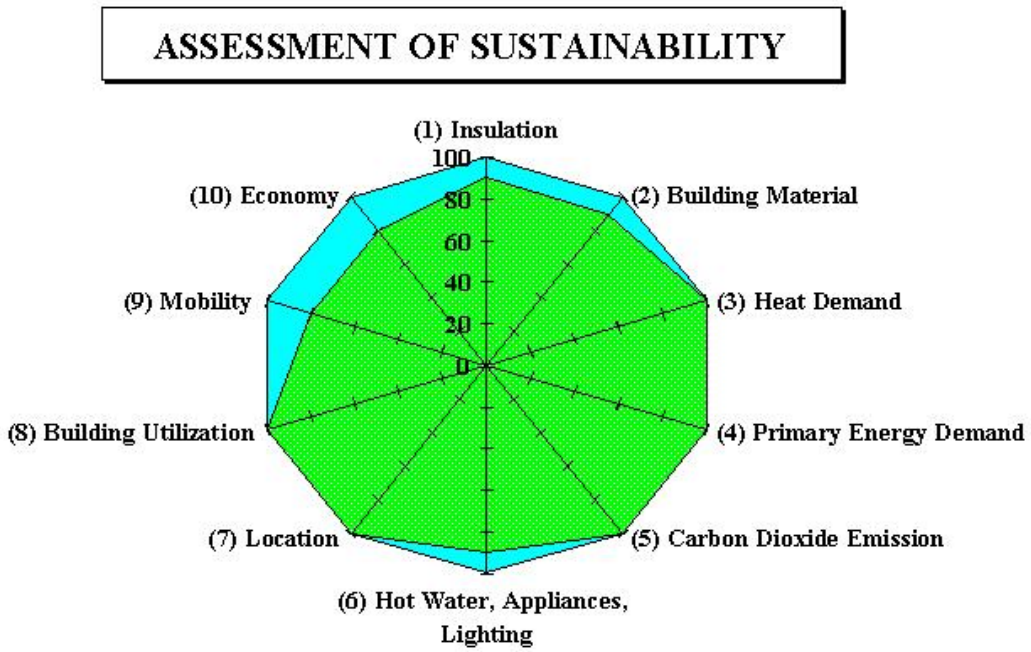


Fig. 1c: Assessment of housing (3)