

The Green Economy and Alternative Building Technologies



4th Biennial Conference

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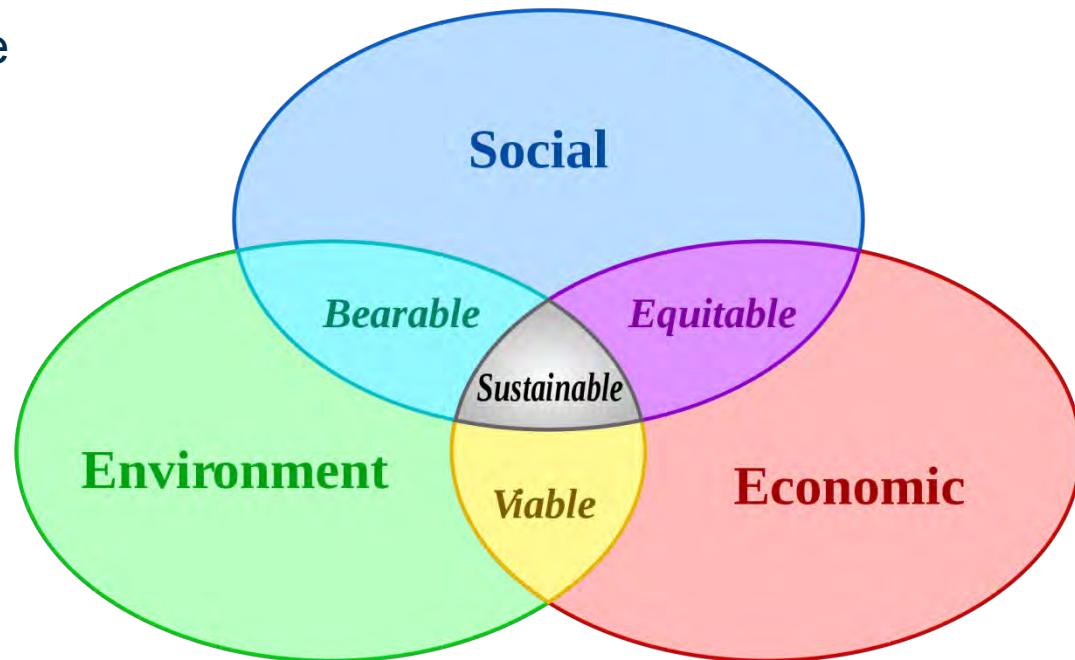
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Content

- The Green Economy in South Africa
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The Green Economy in South Africa

- “The Green Economy is one that results in improved human-wellbeing and social equity, while significantly reducing environmental risks and ecological scarcity” (United Nations Environmental Programme).
- Karl Burkart defines (www.mnn.com/) it as based upon 6 main sectors, namely:
 - Renewable energy
 - Green buildings
 - Clean transportation
 - Water management
 - Waste management
 - Land management



Alternative Building Technologies (ABT)

- The erection of buildings in South Africa is regulated by the National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977).
- The Act makes provision for 3 compliance methods, namely:
 - 1) Deemed-to-satisfy
 - 2) Rational design
 - 3) Agrément Certificate
- A narrow definition of ABT would be building technologies that do not meet the „deemed-to-satisfy’ requirement.
- A broader definition would include, inter alia,
 - 1) Building systems
 - 2) Other technologies that support the operation of a building
 - 3) Innovation
- For purposes of this presentation the broader definition is used.
- Research Question: **How, and in what way, can ABT support the Green Economy?**

CSIR Innovation Site

Benchmark
house

RDP house

CSIR house

LFSA house

EPSASA
house



CSIR Innovation Site

BASF House



Case Study 1: CSIR House



Roof assembly

Finishes

Super-structure

Services

Sub-structure

Case Study 1: Sub-structure



Continuously reinforced
thin concrete pavement

Case Study 1: Super-structure



Modular use of blocks

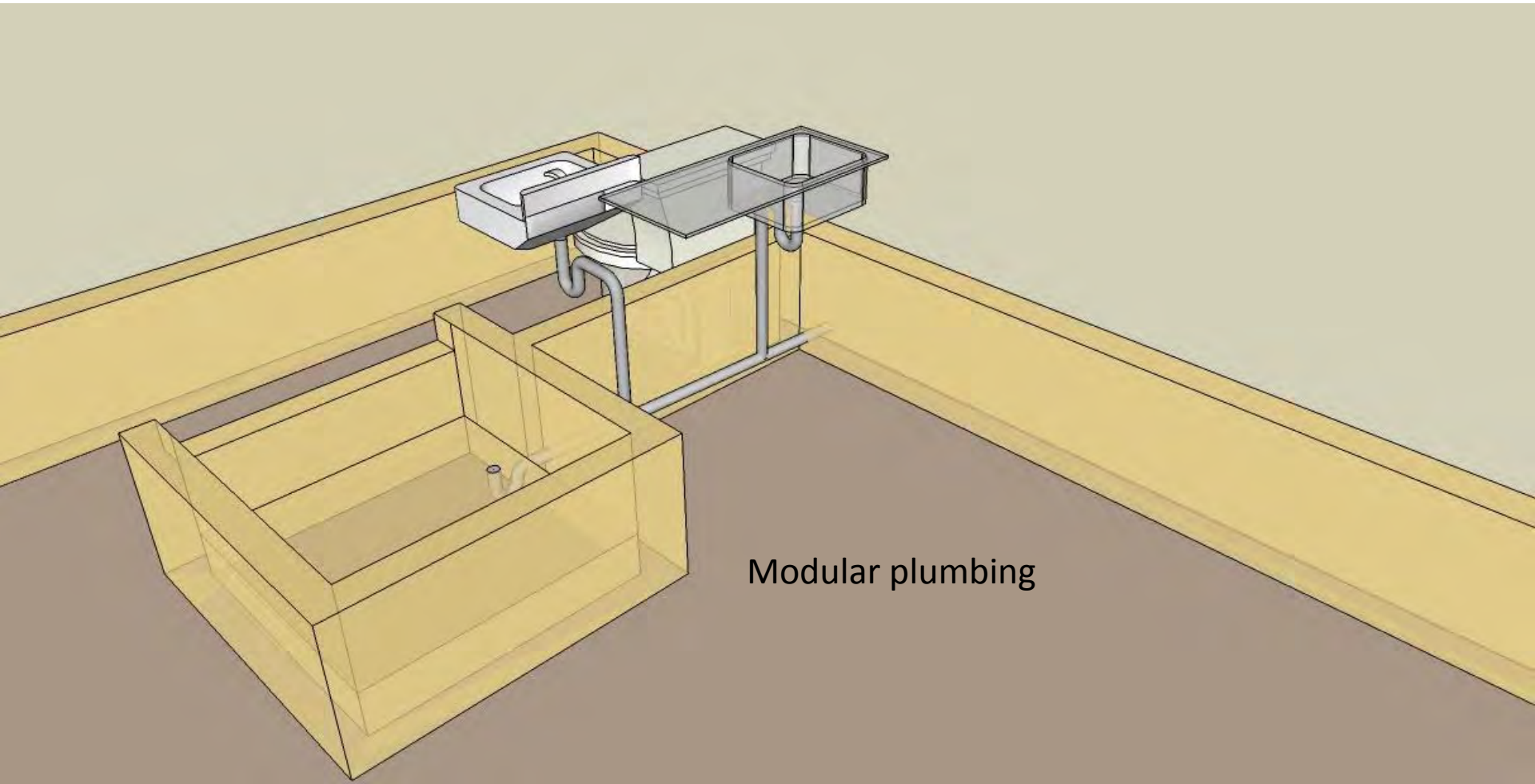
Case Study 1: Roof assembly



Re-oriented
roofsheets

Insulation board as a
ceiling

Case Study 1: Services



Case Study 1: Finishes



Thermally
enhanced plaster

Case Study 1: Results

Concrete – reduction of almost 1 ton

Carbon dioxide – reduction of almost 800 kg/equivalents

Water – reduction of 19.73 cubic meters in materials

Energy demand in use – reduction from 19.78 (GJ) to 8.66 (GJ)

Material mass – reduction of 18.8 ton



Implementation: Mdantsane, Eastern Cape



Implementation: Mthimkulu Village, Western Cape



Implementation: Kleinmond, Western Cape



Case Study 2: Mudén, KwaZulu-Natal



Muden Site



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Image © 2012 GeoEye

28°57'46.52" S 30°20'06.48" E elev 870 m

Google earth

Eye alt 1.62 km

173 m

Imagery Date: 3/11/2009

Case Study 2: Muden, KwaZulu-Natal

- Sustainable rural settlements:
 - Renewable energy (solar lights & cellphone charging)
 - Rainwater harvesting
 - Solar water heating
 - Off-grid water borne sanitation (not septic tank)
 - Thermally comfortable home
 - Energy efficient home
 - Reduced construction waste
 - Reduced construction water consumption
 - Reduced material mass
 - Reduced environmental impact (non-renewable resource minimisation)
 - Enhanced Quality of Life (QoL)
 - Reduced (nil) service charges

Case Study 2: Muden, KwaZulu-Natal

- Policy Implication: Is it possible to provide a level of municipal service even in the absence of bulk infrastructure (electricity, water, sanitation)



Findings

Innovative technology	Per house	National
Energy reduction (heating cooling)	11.12 GJ	23.3 million GJ
CO ₂ reduction	0.885 ton	1.94 million ton
Material weight reduction	18.8 ton	39.4 million ton
Water from materials	19.73 m ³	41.4 million m ³
Water, through tanks	22 m ³	46.2 million m ³
Electricity (SWH)	1762.95 kWh/annum	3.7 billion kWh/annum
Electricity (PV)	36 kWh/annum	75.6 million kWh/annum
CO ₂ reduction (SWH)	2.11 ton/kWh/annum	4.4 million t/kWh/annum
CO ₂ reduction (PV)	0.04 ton/kWh/annum	90 300 ton/kWh/annum

Conclusion

It is possible to construct and operate buildings that result in improved human well-being over the long-term, while not exposing future generations to significant environmental risks or ecological scarcities.



CSIR House Mark II

Thank you

