A Low-Cost Ceiling System for Low Cost Housing

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Overview of presentation

- Background and motivation
- Ceiling Insulation
- Ceiling Concept
- Installation and Cost
- Results
- Conclusion
Background and Motivation
Background

- 20 years = over 2.8 million new houses
- Many housing units are energy inefficient
- Lack of ceilings contributes to energy inefficiency
Motivation

• Past simulations show winter heating reduced by 74% with ceiling
• Large energy savings are available merely with ceiling installations
Ceilings
Ceilings

- Proper ceilings:
  - Provide insulating effect
  - Reduce infiltration of air in/out of room
  - Reduce effect of stratification
  - Reduce effect of radiative losses via roof
Ceilings

- Study in 2006 quantified electrical energy reduction in houses with ceilings versus without

<table>
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<td>Upington</td>
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Ceiling Concept
Ceiling Concept

• Commercial ceilings available but not often installed
  – Expensive (R130 - R145/m²)

• Previous low cost concepts
  – Ceiling fastened to wall
  – Suffered from sagging
Ceiling Concept

- End batons
- (Roof trusses)
- Ceiling membrane
- Overlap baton
- End baton
Installation and Cost
Installation and Cost

- Small installation teams
- Low skill level
- Materials in installation packages
- Materials commercially available (any membrane)
Installation and Cost

- Easy to transport
- No painting requirements
- Final cost = R27/m² (Ideal membrane)
Results and Conclusion
Results

• Ceiling concept achieved similar savings as a conventional ceiling
• 250 – 400 MW savings nationwide
• Between R100 and R350 per year homeowners savings during winter
• Payback period = 3 - 10 years
Other Benefits

• Temperatures reduced by up to 4°C during summer
• Lower dust accumulation in living space
• Aesthetically pleasing
Conclusion

• Ceilings have a large impact on energy savings

• Large amount of low-cost housing is without ceilings

• Presents opportunities for large energy savings
Conclusion

• Low-cost ceiling system a viable option

• 3 - 10 year payback period = outside financing required
Questions?