

EnerKey Module 3: Buildings and Settlements



Module meeting, Johannesburg

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Objectives of the Module

- This module focuses on projects that support ***energy efficiency in the built environment at a building and urban district scale.***
- The project investigates ***design and management options***, as well as ***technologies and assessment methods*** that support energy efficiency.
- Dissemination of the project findings will be done through ***websites, conferences, seminars, meetings as well as through the development of guidelines, software, research papers, advocacy and training*** in order to ensure that the project has an impact.



EnerKey Context

- Climate change
- Current energy shortages
- Eskom demand side management programmes
- DME plan of action
- Municipal bylaws and incentive schemes
- SANS 204 and building regulation updating process
- Assessment tools: SBAT, Greenstar
- Continuing Professional Development (CPD) being implementing
- Current capacity shortages
- Interest from manufactures in developing and verifying more sustainable / energy efficient products and technologies



Method of Working

- Alternate monthly meetings (Provisionally at CSIR)
- Invitation to interested and relevant parties to attend (Municipalities, National/Provincial Departments, Banks, Developers, Property owners, Building users, Universities, Donors, Technical / Research agencies / Professionals)
- Skype / Internet meetings / video conference
- Presentations on relevant topics / updates on projects
- Email updates
- Feedback / comments / decisions by email
- Joint progress reports
- Joint progress presentations linked to EnerKey programme
- Exchange of students / personnel



Projects Identified

Existing

- Green Building Conference annually
- Retrofitting seminar every six months
- Retrofitting Project Award
- City of Tshwane Sustainability Incentives and Bylaws
- City of Joburg Energy Efficiency Guidelines
- Interaction with developing new SANS 204 Standard
- Transnet Offices involvement

Potential

- Sustainable Settlement Investments
- Inner City Retrofitting
- Training Courses
- Software
- Energy data collection from monitoring and evaluation



WP1

Schools and Administrative Public Buildings

WP1: Schools and Administrative Public Buildings *(Contribution to Module 7: Implementation and Pilot Actions)*

Objective:

Evaluation of two new schools and two administrative public buildings; Implementation of Best Practise-Example into the Energy Concept Adviser

Description of work package:

The two already started school projects and five more Best Practise examples will be implemented in the ECA. Two new schools and two administrative public buildings will be evaluated (current state and development of retrofit concept).

- Include private sector i.e. commercial office, industrial parks, service stations
- Include Thuba Makote Schools

Expected Results:

Fundamentals for work package 4.



WP2

EnerKey Adviser (Fundamentals & data collection)

WP2: EnerKey Adviser – Fundamentals and data collection

Objective:

Analysis of buildings, supply side systems and urban districts

Description of work package:

- Setting up building register for chosen districts or quarters
- Identification and description of typical buildings out of building register
- Identification of characteristic values for energy consumption in typical buildings (heating, cooling, lighting)
- Distribution of typical buildings in districts and identification of typical forms of urban areas
- Identification of characteristic values for energy consumption in typical urban areas (heating, cooling, lighting)
- Analysis of supply side systems
- Total analysis, system of characteristic values for energy consumption, Energy Certificate for quarters or districts
- Access existing consumption and building stock information from cities and module partners
- Monitoring and evaluation (data collection)

Expected Results:

Fundamentals for work packages 3 and 4.



WP3

EnerKey Adviser (Collection & Development of Measures)

WP3: EnerKey Adviser – Collection and Development of Measures

Objective:

Development of measures for new and existing buildings, supply side systems and urban districts.

Description of work package:

- Measures for new buildings (typical buildings)
- Retrofit measures for existing buildings (typical buildings)
- Measures for new urban districts and supply side
- Retrofit measures for existing urban districts and supply side
- Analysis of influences and selection of qualified combinations
- Identification of characteristic cost values for measures and energy sources
- Identification and prioritisation of key interventions for different building types inc inner city upgrading project

Expected Results:

Fundamentals for work package 4.



WP4

EnerKey Adviser (Model and Tool Development)

WP4: EnerKey Adviser – Model and Tool Development

Objective:

Development of the EnerKey Adviser

Description of work package:

- Development of tool for benchmarking and performance rating
- Development of description format to describe typical buildings and settlements for use in ECA and Times
- Adaptation of existing tools to South African Conditions (DIN V 18599)
- Development of main frame program 'EnerKey Adviser'
- Numerical calculation of energy demand for typical buildings and settlements
- Implementation of measures as extensible Plug-In
- Validation and Calibration of ECA based on consumption data

- Explore linkage with CSIR's Kronos / Arcsim work
- Application of SANS 204
- Energy audit templates and assessment tools

Expected Results:

EnerKey Adviser.

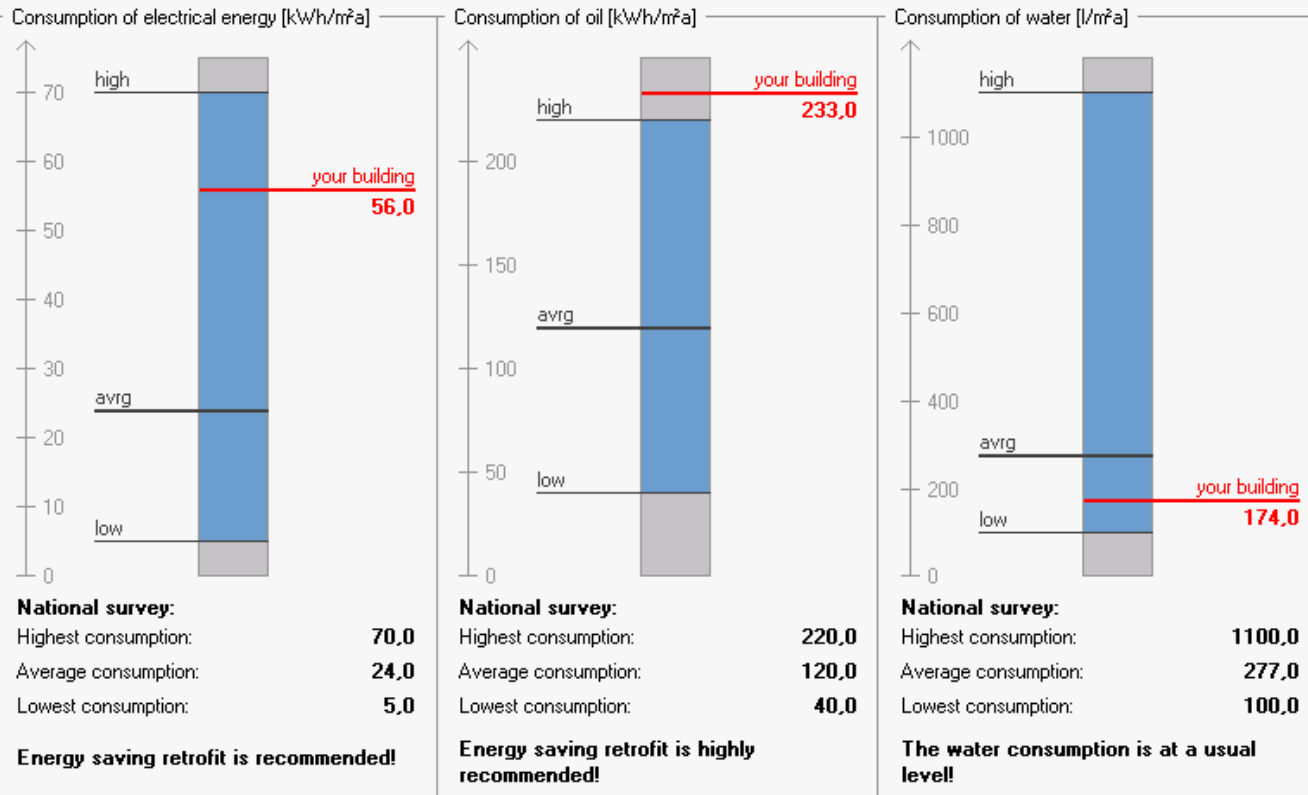


EnerKey Adviser

Consumption of water: _____

Unit of the consumption: Consumption

Attention! All energy consumptions are shown in kWh/m²a resp. water consumption in l/m²a.



Source: ECA, FIBP

Your consumption is compared to the results of a survey of Annex 36 about the energy consumption of educational buildings!



EnerKey Adviser

Describe the existing building ? -

How to use this part -

The building, for which the possibilities for a energy efficient should be analysed, is defined in this section.
By choosing the basic values, a default building is created.
This building can be further defined in the lower part of this section
If there was already a further definement, changes in the basic parts sets all the values back to default!

Define key values for a default building

Basic Data

Building Type: school

Construction year: pre 1950

Type of Roof: pitched (heated attic)

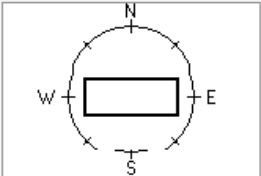
Type of basement: slab on ground

Total floor area [m²]: 6180,00

Number of storeys: 3

Orientation:


Click on diagram to select orientation



Example buildings

Typology: multi-storey school

Click on picture to have a look at the case study!



Wausau West High School, Wisconsin
USA

Consumption of heat energy:

Energy source: Oil

Consumption: 374,00 kWh/m²a

Further Refinement of the building -

Source: ECA, FIBP



EnerKey Adviser

Select a retrofit measure

1 internal insulation with 6 cm polystyrene, vapour barrier and gypsum board (mind thermal bridges, follow-up costs and sp

improved U-Value: Investment costs: €/m²
 Maintenance costs: €/m²a

Select this measure as chosen retrofit measure for this element

2 external insulation with 12 cm mineral wool and plaster

improved U-Value: Investment costs: €/m²
 Maintenance costs: €/m²a

Select this measure as chosen retrofit measure for this element

3 external insulation with 20 cm mineral wool and plaster

improved U-Value: Investment costs: €/m²
 Maintenance costs: €/m²a

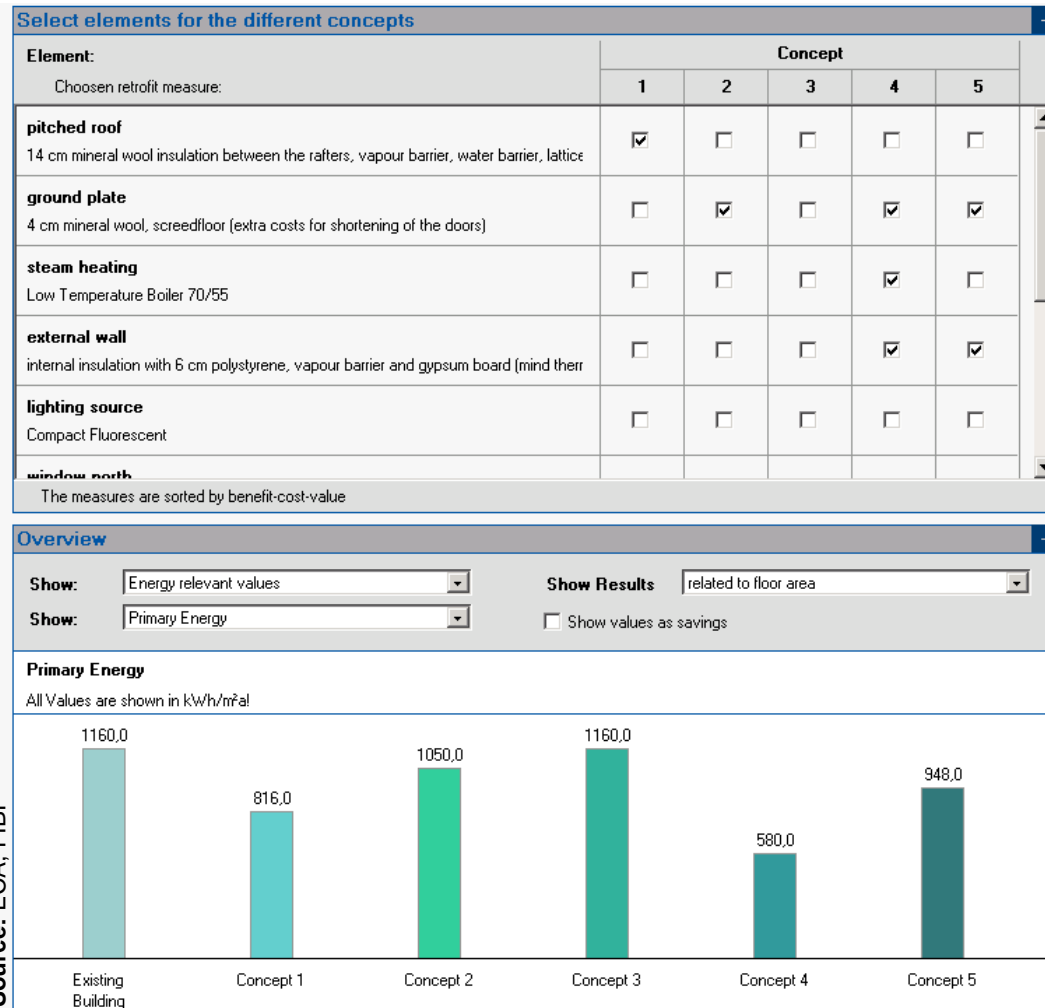
Overview

Retrofit Measures:	Heat Energy demand:	Capital Expenditure:	Cost Benefit Value:
Existing Building	1160,0 kWh/m²a		
1 internal insulation with 6 cm polystyrene, vapour barrier and	1060,0 kWh/m²a	197000 €	0,30 €/kWh/m²a
2 external insulation with 12 cm mineral wool and plaster	1040,0 kWh/m²a	316000 €	0,40 €/kWh/m²a
3 external insulation with 20 cm mineral wool and plaster	1030,0 kWh/m²a	395000 €	0,50 €/kWh/m²a
4 external insulation with 12 cm polystyrene foam and plaster (mind	1040,0 kWh/m²a	276000 €	0,30 €/kWh/m²a
5 external insulation with 20 cm polystyrene foam and plaster (mind	1030,0 kWh/m²a	336000 €	0,40 €/kWh/m²a

Source: ECA, FIBP



EnerKey Adviser





WP5

EnerKey Adviser (Feasibility Study)

WP5: EnerKey Adviser – Feasibility Study (*Contribution to Module 7: Implementation and Pilot Actions*)

Objective:

Test the recommendations given by the EnerKey Adviser.

Description of work package:

- Test of recommendations on the basis of a test settlement/quarter
- Description of experiences / tips for users

- Identify an urban quarter ascertain location low cost / affordable housing, CBD location
- Modelling of different interventions
- Evaluation of options
- Baseline audit
- Post intervention monitoring and evaluation

Expected Results:

Experience using the EnerKey Adviser

WP6: Roadmap to Improve Building Stock (for a quarter/district)

Objective:

Identify feasible targets for an energy plan and assemble it with recommendations to a Roadmap to Improve Building stock for a quarter/ district.

Description of work package:

- Identification of feasible targets for an energy plan
- Development of an energy plan
- Political control and implementation methods
- Roadmap to Improve Building Stock

- Identify local mechanisms including management, design, technologies that could be used to achieve goal

Expected Results:

Roadmap to Improve Building Stock of a quarter



WP7

Education and Training

WP7: Education and Training *(Contribution to Module 7: Implementation and Pilot Actions)*

Objective:

In this work package three conferences are carried out:

- Energy Efficiency in Buildings
- Retrofit measures for existing buildings and settlements
- Settlement energy planning

An additional training session on the EnerKey Adviser will be held.

Description of work package:

- Participation and carrying out 3 Conferences and Workshops
- Training EnerKey Adviser

- Green Building Conference (August 2008)
- Greenbuildings.co.za
- Regular Module 3 meetings and presentations
- International conference papers SB08, SASBE09
- Training programmes

Expected Results:

Greater awareness on energy efficiency measures



Timeframes:

Priorities for the next 18 months

- **Establish working group (including all Cities – contacts in place with CoT and CoJ)**
- **WP1**
 - Administrative Building needed for evaluation
- **WP2**
 - setting up building register
 - values for energy consumption in typical buildings (heating, cooling, lighting)
 - characteristic values for energy consumption in typical urban areas (heating, cooling, lighting)
 - structure of supply side systems
- **WP4**
 - Exploring links with CSIR's Kronos / Arcsim
- **WP7**
 - Establish EnerKey as a widely known resource on energy efficiency for built environment stakeholders (through media such as Green Building Conference and Exhibition, FIB FM Training, CSIR Municipal capacity development)



Coordination / Communication

Thank you, Questions?

Coordination / communication

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