

EIE-05-157 E-Street project Financial Instruments - Work Package 6

Manual for “Street-Lighting”- software development:
Calculation model for evaluation of economic efficiency



Intelligent Energy  **Europe**

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Manual for “Street-Lighting”- software development: Calculation model for evaluation of economic efficiency

1 Basis

The financial situation of the street-lighting can be positively influenced by using the replacement or relamping situation or the normal replacement of equipment in combination with the implementation of Telemanagement. The calculation method of the present software will show technical measures and the direct effect to the payback- period of the investment; in other words: Is the project profitable or not?!

The software programmed in MS Excel 2002. To reach the aim, it was better to choose calculation software, than database software.

This report is written as a guideline or reference book, most there are used listings. A main aspect is, to find the information in an easy way.

Most of illustrations are described as a comment in the work-sheet!

The basis parameters are recorded in chapter 3.

The Enlight- report describes further information's in detail:

- main terms lighting engineering:

www.energiekonsens.de/Downloads/Projekte/Enlight-Zwischenbericht.pdf

The software development conforms to requirements of deliverable D6.2. The Investitionsbank Schleswig-Holstein is not liable for defects of the software and for their consequences and also not liable for damages.

2 Work steps

In the majority of cases the software products are strictly subdivided into

- data input
- calculations and
- data output.

In our case it is important, to lead the user through the worksheet. So it makes a difference to classic software-models. In this “street-lighting”- work-sheet the user can see directly the results and the effects after the data input.

There will be very different kinds of the potential software- users with different know-how, like planning offices, ESCO´ s and municipalities, who are the decision makers for reconstruction of street-lighting.

2.1 Technical planning software for street-lighting-reconstruction

The results from planning software are the input data for the work-sheet:

- Technical parameters from lamps, ballast, luminaries, control equipment, etc. for the reconstruction of street-lighting and
- Basic economic data like investment costs of the measure.

2.2 Static calculation for first results about economic efficiency

After the technical planning of the street-lighting the work-sheet can be used:

Input parameters

- From 2.1
- Data from the electricity bill
 - Three different possibilities for basic input: costs for
 - electric work,
 - luminaire wattage
 - and taxes
- Data about operation mode of street-lighting

Output parameters

- Savings by (technical) measures
 - Electric power consumption and costs
 - Power
 - Maintenance costs
- Efficiency (static calculation)
 - Investment costs
 - Payback period
 - Average useful life of reconstruction

2.3 Financing of reconstruction by annuity- credit

An annuity credit / annuity loan is a loan, which is paid back in constant rates. Usually an annuity credit is used for real-estate credits. The rate which can be paid is called annuity and is the sum of interest payment and amortization payment. Since by the repayment the credit sum decreases, also the interest which has to be paid becomes lower, thereby the repayment part (amortization payment) in annuity rises.

Input parameters

- From 2.2: investment costs
- Credit
- Rate of interest
- Repayment rate
- Date of out- payment

Output parameters

- rest- capital
- Interests
- Paying back
- annuity
- Payment (End-user)

2.4 Financing of reconstruction by contracting

It is possible to simulate a contracting:

Investment for new installation = credit (from sight of ESCO)

- Investment costs for refurbishment
- Running costs for processing contracting, risk sharing, etc.

The annuity = contracting rate of End-user

3 Work-sheets and usage

Please prepare the worksheets from left to right.

Green fields = input

Grey fields = output, results

3.1 Basics (red sheet)

The main theme is the electricity bill, the main output the averaged electricity tariff, which is also used for the calculation after reconstruction.

Input parameters

- parameters of the project (project, acronym of project, agreement N°, municipality and the object)
- currency
- data from the last electricity bill
- VAT

Output parameters

- total electric work = energy consumption
- total costs for electric power (excl. and incl. VAT)
- averaged electricity tariff (excl. and incl. VAT)

3.2 Actual (yellow sheets)

Consumption

The luminaire wattage of the system depends on the lamp wattage and the kind of ballast. It helps, to use the work-sheet “data lamps”

Input parameters

- lamp information (description, type, number, luminaire wattage)
- operation method of the existing installation (operation hours, reduced power)
- cable loss
(If using a segment controller, choose a higher percentage. There are 3 Watt loss, 24 h a day)

Output parameters

- total electric work (calculated value):
Compare with the total electric work from the electricity bill!

Maintenance costs

Input parameters

- price per lamp (material) and labour costs for an exchange (incl. costs for manpower, cleaning and waste management)

Output parameters

- total exchange costs for the installation

Electric power and total costs

Output parameters

- electric power costs (calculated value)
Compare with the electric power costs from the electricity bill (incl. VAT)!
- sum cost (maintenance and el. power)

3.3 New (green sheets)

The work-sheets “New consumption”, “New maintenance costs” and “New el. power & Total costs” are used like the “Actual...” work-sheets, with the exception of:

Consumption

With the input “reduced power” different new situations (reconstruction) can be simulated, for example

- lowered light-time lighting,
- Telemangement,
- etc.

For Telemangement can be used following values for the “reduced power”:

- original installation 80 % (= 20 % savings)
- improved installation 60 % (= 40 % savings)

Maintenance costs

Input parameters

If the reconstruction is combined with a lowered light-time lighting or telemangement, the additional maintenance costs must be added to the labour costs for an exchange:

- manpower,
- cleaning,
- waste management and
- lowered light-time lighting, telemangement, etc.

3.4 Savings (summary) (blue sheet)

Input parameters

The investment costs include the costs for the complete reconstruction (lamp exchange, luminaire exchange, etc.), also costs for lowered light-time lighting or telemangement. For the efficiency- calculation the investment costs are costs for saving measures.

In the work-sheet there is the possibility to put in one summarized value.

Output parameters

- Saving of electric work and power
- Cost-saving by maintenance
- Cost- saving by electric work and power reduction
- Total cost savings
- Efficiency (static calculation)

3.5 Financing of reconstruction (purple sheet)

- Annuity- credit
- Simulation of Contracting

3.6 Diverse diagrams (orange sheets)

3.7 Data lamps, currency, percentage (grey sheet)