



BUTK
Bottom Up to Kyoto

BERLINER **energie** AGENTUR

**Project „Bottom up to Kyoto – ButK“
EIE/06/010/SI2.443504**

***WP 2: Indoor lighting system of 60 schools in Riga -
data collection and potential analysis (diagnosis)***

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Data collecting, data entry form

inspection of data availability of the lighting systems, data collecting

- Acquisition of the data base, completion of data entry form (forms distributed by BEA)
- Following data should be collected by municip. Partners (street and/or indoor lighting):
 - General data (list of objects/systems, type of streets, number of installations, contact address)
 - Specific data (number of luminaires, type of lamps, wattage, ballast, periods of usage; street lighting: additional service time h/a, exchange cycle/a)
 - Detailed data of utilisation with planned changes (e.g. extensions/reduction of installations)
 - Energy consumption and cost data of last 3 years
 - Electricity meters
 - Control and special use (e.g. depending on daylight, movement sensors)
 - Operating and monitoring systems
 - Standards
 - Total lengths of street lighting network, distance from nearest medium voltage station (also of the buildings for indoor lighting)
 - Power factor ($\cos\varphi$) only for indoor lighting



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Data collecting, data entry form

National laws, rules, and directives which are orientated at the European standard EN 12464 are valid for lighting at different working places (also schools)

Results data collecting Riga

Riga

- First submitted street lighting data were incomplete & not in the format requested (only information on number, construction year of lighting points, additional on the cables), data entry form was not used and submitted (50.511 lighting points, among other 6.828 with year of construction 1960-85)
- Because Riga was in the process of running a parallel procurement process for street lighting driven by the new municipal Government it was decided between Riga and ELC/BEA to focus only on indoor lighting
- data entry forms for a pool of 60 schools were prepared by subcontracted company Ekodoma and sent end of January 08 to BEA

Results data collecting Riga

- **Total electric work 3.956.888 kWh** (calculated as total sum for all lamps in the 60 public schools - have different operation times per day/year)
- **In total 52.592 lamps:**
 - ➔ 12.172 inefficient bulbs (incandescent lamps),
 - ➔ 186 spotlights,
 - ➔ 471 halogen lamps,
 - ➔ 9.445 T5 fluorescent lamps, 8.425 T 12 fluorescent lamps, 20.789 T 8 fluorescent lamps - (among all approx. 6.000 with electronic ballast)
 - ➔ 990 compact fluorescent lamps/energy saving lamps
 - ➔ 114 other lamps (e.g. emergency lights)
- **Total effective area of the 60 public buildings: Approx. 164.000 m²**



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Potential analysis, pre-selection of lighting systems

Preliminary audit: based on results of data collection the potential analysis including preliminary audits were conducted (parallel/together with drafts of feasibility studies in WP 3)

Steps of preliminary audit

step 1: first survey of lighting system and collected data

Step 2: key figure formation, comparison with actual specific consumption and specific values from other municipalities and standards (first analysis)

Step 3: For determination of the potential savings: suggestion of energy efficiency measures, calculation of new electric work and cost savings

Preliminary Audit Riga (1)

Step 2: specific indicators indoor lighting

Riga (747.200 inhabitants, total effective area of the 60 schools: 164.000 m²):

- The energy consumption indicator for the sum of the public buildings (60 schools) in Riga is **24,13 kWh/m²*a**
- the target value from the AGES - table (mixture of standards from Germany, Switzerland) is for school rooms between 3 - 9 kWh/m²*a

Preliminary Audit Riga (2)

Step 3: energy efficiency measures

Following energy efficiency measures are suggested:

- exchange of bulbs with compact fluorescent lamps, of inefficient T 12 fluorescent tubes with T 5 fluorescent tubes, of all inefficient conventional electromagnetic ballasts with electronic ballasts

Possible savings

New total sum of luminaire wattage (as system) (kW)	Total electric work savings (kWh/a)	Percentage of electric work savings (%)	Cost savings (electric work and power) (€/a)	Percentage of cost savings for electric work and power (%)
1.378,1	1.562.911	39,5	129.096	39,5