



City of Light • Jyväskylä

THE NORTHERNMOST CITY OF LIGHT

Green Cities: Energy Efficient Street Lighting Conference
June 6th, 2013, Embassy of the United States, Helsinki

Annukka Larsen
Lighting designer
City of Light coordinator

LESSONS LEARNED

Jyväskylä balancing between lux and luxury!

JYVÄSKYLÄ

Jyväskylä is a youthful and lively city. It's known for its University, lakes, Alvar Aalto's architecture and green landscape.

The city is home to 132,000 inhabitants and approximately 174,000 people live in the entire Jyväskylä region.

Jyväskylä is the 7th biggest city in the country and one of Finland's centres of growth and a good living environment, which attracts new inhabitants. In year 2012 city celebrated its 175th anniversary.

Location: 3 hours by train and 45 min by airplane from capital city Helsinki!



View over the City of Jyväskylä

JYVÄSKYLÄ

Jyväskylä is the city of the world famous architect Alvar Aalto. He lived and attended school in Jyväskylä. The City of Jyväskylä has some thirty buildings designed by him, more than any other city in the world.



Lighting workshop on Alvar Aalto architecture at the University campus (2006)

CITY OF LIGHT IN FINLAND

STRATEGIC OBJECTIVES

In year 2003 the City of Jyväskylä named City of Light -project as one of the most important strategic development plans for the future.

“City of Light Jyväskylä” is a development project and a long-term process. Investments are being made in developing the city’s lighting system so, that the correct use of light creates security, is scenically valued and takes environmental effects into consideration.

City of Light team:

- Project lead: Deputy City Engineer Kari Ström
- Lighting design, construction and maintenance: Annukka Larsen, Martti Varis and Jukka Piispanen
- Light events and marketing: Jani Ruotsalainen
- International events and communications: Elli Räsänen

INVENTIONS

The city realized the great potential of lighting during the Lighting Master plan process in 1999-2000.

These inventions were listed:

- à There's no night-time architecture.
- à Safe and comfortable cityscape is done by illuminating the space.
- à Road lighting techniques are not valid in the city centre.
- à Luminaire glare should be avoided.
- à **Darkness is a possibility, not a problem!**

VISION

Jyväskylä is the forerunner in Finland in the field of urban lighting.



ACKNOWLEDGEMENTS

city.people.light award by LUCI and Philips

Jyväskylä was rewarded **the first prize in year 2009**. The award came for the whole City of Light -project as a result of good Master Plan and its implementation. The jury specially pointed out the fact, that the lighting is build for the inhabitants.



On the left Olivier Piccolin (Philips) and on the right Jean-Michel Daclin (LUCI). In the middle Pauli Partanen and Kari Ström, representing the City of Jyväskylä. LUCI AGM 2009 in Gwangju, South Korea

Illuminating Engineering Society of Finland

2011 Illuminated Person Annukka Larsen

2012 Illuminated Person Kari Ström

Finnish Association of Municipal Engineering (FAME)

2013 Municipal Engineering Achievement of the Year

FEEDBACK FROM THE PUBLIC

City of Light -project is highly appreciated by the public.
Urban Lighting Research and interview survey in 2009:

- 71 % I'm proud of my home town because they invest on good lighting.
- 90 % I like when architecture, art, bridges, trees, etc. are illuminated.
- 83 % Several illuminations support city imago as a modern and trendy city.
- 9 % Lighting of the city has gone way too far already.

(Interview survey for city centre residents (300 interviews), February 2009,
part of Anne-Marjut Rauhala's Master's thesis.)

LIGHT INSTALLATIONS



REMARKABLE AMOUNT OF BRILLIANT ILLUMINATIONS

- 68 light installations that represent high-quality architectural lighting style
 - 14 public art pieces where lighting has a role, a meaning
- à Half of the installations are built and maintained by local cooperators, the rest is owned by the city.

HIGHLIGHTS OF THE CITY OF LIGHT

JYVÄSKYLÄ – CITY OF LIGHT – Kuokkala Bridge



Kuokkala bridge (2003)
Design: VALOA Design Oy

JYVÄSKYLÄ – CITY OF LIGHT – Church park



Church Park (2002)
Design: VALOA Design Oy

JYVÄSKYLÄ – CITY OF LIGHT – Vesilinna water tower



Vesilinna water tower (2003)
Design: VALOA Design Oy

JYVÄSKYLÄ – CITY OF LIGHT – Tourula Rifle Factory



Tourula rifle factory (2003)
Design: VALOA Design Oy

JYVÄSKYLÄ – CITY OF LIGHT – Streets surrounding the city centre



Kiertokadut, Streets surrounding the city centre (2003-)
Design: VALOA Design Oy

JYVÄSKYLÄ – CITY OF LIGHT – Mäki-Matti Family Park



Mäki-Matti Family Park (2010)
Design: Ari Tiilikainen Lite-Designs Oy

JYVÄSKYLÄ – CITY OF LIGHT – Magnet, light art at Compass



Magneetti, light art at Compass by Jukka Korpipete (2010)

JYVÄSKYLÄ – CITY OF LIGHT – Trilofy of Light, light art installation on the Lyceum facade



Idea: Jukka Korpihete
Since Christmas 2009.

JYVÄSKYLÄ – CITY OF LIGHT – Kinakuja Bridge



Kinakuja bridge (2008)
Design: VALOA Design Oy

JYVÄSKYLÄ – CITY OF LIGHT – Sokos department store



Sokos department store (2010)
Design: Jukka Korpihete

JYVÄSKYLÄ – CITY OF LIGHT – Lohikoskentie flyover



Lohikoskentie flyover (2008)
Design: Annukka Larsen

JYVÄSKYLÄ – CITY OF LIGHT – Vaasankatu bridge



Vaasankatu bridge (2011)
Design: Annukka Larsen

JYVÄSKYLÄ – CITY OF LIGHT – P-Sokos Car Park, Kuokkala water tower



Car park building P-Sokos (2008)
Design: Jukka Korpihete



Water tower in Kuokkala (2008)
Design: Annukka Larsen

INSTALLATIONS FROM YEAR 2012

JYVÄSKYLÄ – CITY OF LIGHT – Äijälänsalmi old bridge



Äijälänsalmi old bridge (2012)
Design: Ari Tiilikainen Lite-Designs Oy

JYVÄSKYLÄ – CITY OF LIGHT – Kauppakatu pedestrian street



Kauppakatu pedestrian street (1995), Vuoden valaistuskohde –palkinto 1997, valaistuksen saneeraus 2012
Design: Sirpa Laitinen WSP Group

JYVÄSKYLÄ – CITY OF LIGHT – Moirislampi park



Moirislampi park (2012)
Design: Annukka Larsen, Ari Peltola AIRIX Oy

JYVÄSKYLÄ – CITY OF LIGHT – Korpilahti Höyrygalleria gallery and shop



Korpilahti Höyrygalleria gallery and shop (2012)
Design: Ari Peltola AIRIX Oy

JYVÄSKYLÄ – CITY OF LIGHT – Oikokatu pedestrian street



Oikokatu pedestrian street (2012)
Design: Ari Tiilikainen Lite-Designs Oy

JYVÄSKYLÄ – CITY OF LIGHT – City centre LED illumination



LED illumination on the streets of city centre (2012)
Design: Annukka Larsen

JYVÄSKYLÄ – CITY OF LIGHT – Satamakatu street and tunnel



Satamakatu street and tunnel (2012)
Design: Sito Oy

JYVÄSKYLÄ – CITY OF LIGHT – Harbour Pavillion



Harbour Pavillion (2012)
Design: Annukka Larsen

JYVÄSKYLÄ – CITY OF LIGHT – Korpilahti Church



Korpilahti Church (2012)
Design: Esko Lehtiö

ACTIVE DEVELOPMENT ON LIGHTING

THE DARK SIDE OF THE CITY?

...glare, excessive amount of light, poor maintenance, darkness, mercury lamps, obtrusive light, light pollution, too bright advertisements, double-layer illuminations, waste of energy...



à Inhabitants to join the fight against light pollution!



LED LIGHT FOR ILLUMINATED SITES

Seven installations are fully realized with LEDs, 13 only partly and the rest 62 sites mainly with conventional techniques!



Äijälänsalmi old bridge (2012)
Design: Ari Tiilikainen Lite-Designs Oy

LED LIGHT FOR SMALL SCALE AREAS

Lutakko in a new light!

LED Park project 14.9.2012-30.9.2014



LUTAKKO LED PARK

..is a project that showcases new energy-efficient LED technology in practice. The Lutakko residential area has been equipped with 60 new pylon, wall, post and roof LED lights that replace the existing units.

LUTAKKO LED PARK

WHY?

- Mercury lamp
- Promotion of the new technology
- Difficulty of choosing
- Suitability for housing area
- Glare
- Light quality
- Costs
- Energy efficiency
- Maintenance

TO WHOM?

- Designers
- Inhabitants
- House managers
- All decision makers!

HOW?

- Choosing
- Replacing
- Observing
- Promoting
- Evaluating

WHEN?

- Opened on 14th Sept 2012
- Ending on 30th Sept 2014

LUTAKKO LED PARK LUMINAIRES



Map and route Luminaire information Permanent light installations

Brochure available in English:
www.valonkaupunki.jyvaskyla.fi

The LED Park is a joint project launched and coordinated by the City of Jyväskylä in partnership with housing corporations and their management companies as well as lighting companies Alplilux, Elektroskandia, Fagerhult, Greenlux, Hedtec, iGuzzini, Innolumis, Lumilab and Philips.

LED park test luminaires

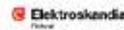
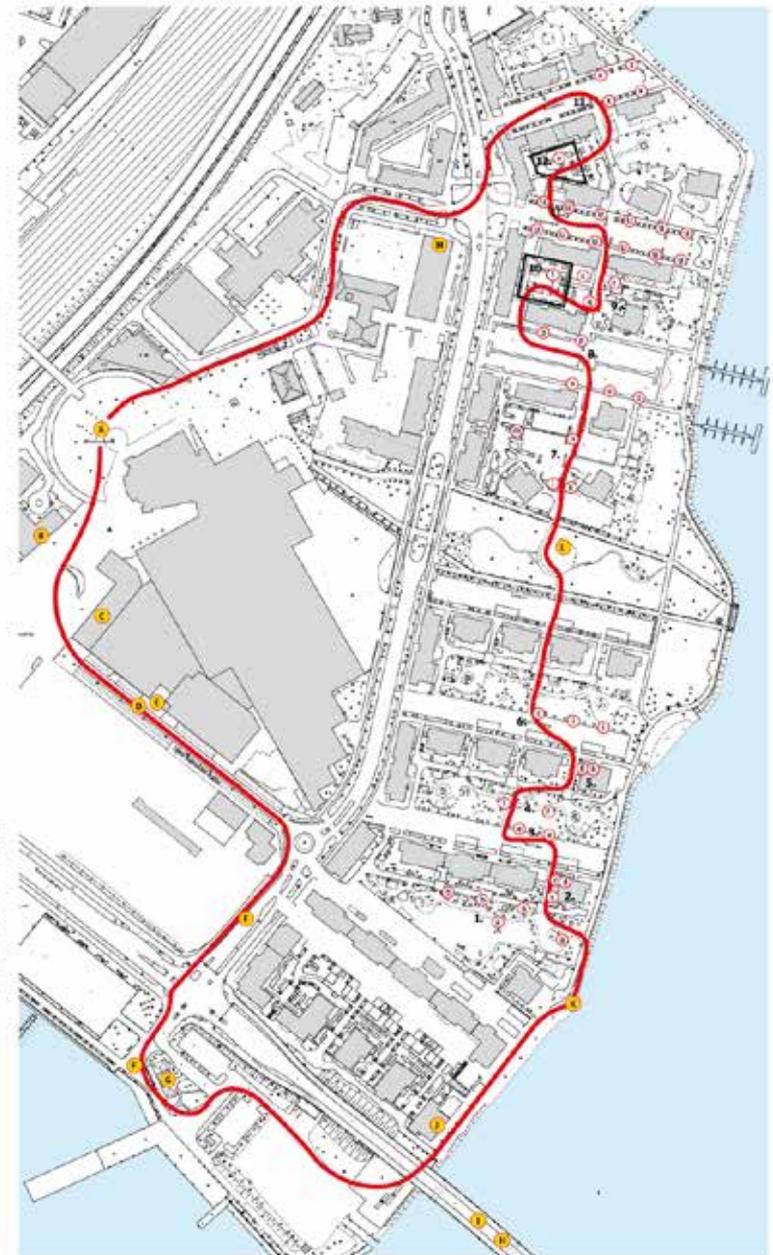
(luminaire (lmoor), luminaire manufacturer, photo, energy consumption (watt), luminaire power, colour rendering index and colour temperature)

- Perillas park area**
 - 1) 2 pcs Everlight, 150cm, 30W, 4000K, CR>90, 4000K
 - 2) 2 pcs Alplilux, 150cm, 30W, 4000K, CR>90, 4000K
 - 3) 2 pcs Alplilux, 150cm, 30W, 4000K, CR>90, 4000K
- Perillas 10 estate**
 - 1) 2 pcs iGuzzini, 150cm, 30W, 4000K, CR>90, 4000K
 - 2) 2 pcs iGuzzini, 150cm, 30W, 4000K, CR>90, 4000K
- Perillas parking area**
 - 1) 2 pcs Lumilab, 150cm, 30W, 4000K, CR>90, 4000K
- Sorvaamo park area**
 - 1) 2 pcs Fagerhult, 150cm, 30W, 4000K, CR>90, 4000K
- Sorvaamo 10 estate**
 - 1) 2 pcs Fagerhult, 150cm, 30W, 4000K, CR>90, 4000K
 - 2) 2 pcs Fagerhult, 150cm, 30W, 4000K, CR>90, 4000K
- Sorvaamo park area**
 - 1) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
- Valkokujan inner yard**
 - 1) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
 - 2) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
 - 3) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
 - 4) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
- Vaneritien parkin area**
 - 1) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
 - 2) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
- Vaneritien inner yard**
 - 1) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
 - 2) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
 - 3) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
- Vaneritien parking area**
 - 1) 2 pcs Alplilux, 150cm, 30W, 4000K, CR>90, 4000K
- Vorppojen parking area**
 - 1) 2 pcs Hedtec, 150cm, 30W, 4000K, CR>90, 4000K
- Lutako parking hall**
 - 1) 2 pcs Greenlux, 150cm, 30W, 4000K, CR>90, 4000K
- Kirjasto parking area**
 - 1) 2 pcs iGuzzini, 150cm, 30W, 4000K, CR>90, 4000K

ENERGY SAVING POTENTIAL IN THE LUTAKO AREA
The parking and park areas of Lutako are illuminated using 125-watt mercury vapour lamps. As a general rule we may say that employing LED lighting energy consumption can be at least halved with some increase in the amount of light produced.
The useful life of a LED light is approximately 50,000 hours or roughly 18.5 years (working on 2700 hours of darkness per year), and requires no change of lamps, with savings from time to time. Some manufacturers claim an operational life of 100,000 hours or 23 years. The useful life of a mercury vapour lamp is approximately 20,000 hours (2 years). As it ages it does not fail completely but gradually becomes dimmer, which may result in maintenance being neglected. The cost of acquisition is two or possibly three times that of a traditional lighting fixture. The payback time is difficult to calculate as relatively new technology is involved here. For further information please visit the project website.

Permanent City of Light installations

- A) Mestaron square
- B) Innova 2 office building
- C) Uudenkaupunki housing estate
- D) Uusi Tavolana city street
- E) Puhelinlaitos 2 parking hall
- F) Vaneritien pedestrian park along Lake Nykäjärvi
- G) Harbour Pavilion
- H) Puhkalan Dr. Ikon
- I) Selinger Sappo courtyard
- J) Herdönd high rise
- K) Oskariin, Kari A-kassa
- L) Lutako Park
- M) Bomster building



LED LIGHT FOR HOUSING AREAS

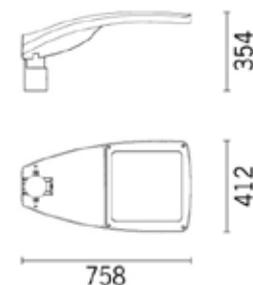
ÄIJÄLÄNRANTA AREA

Housing fair area summer 2014



REALIZATION OF PUBLIC LIGHTING

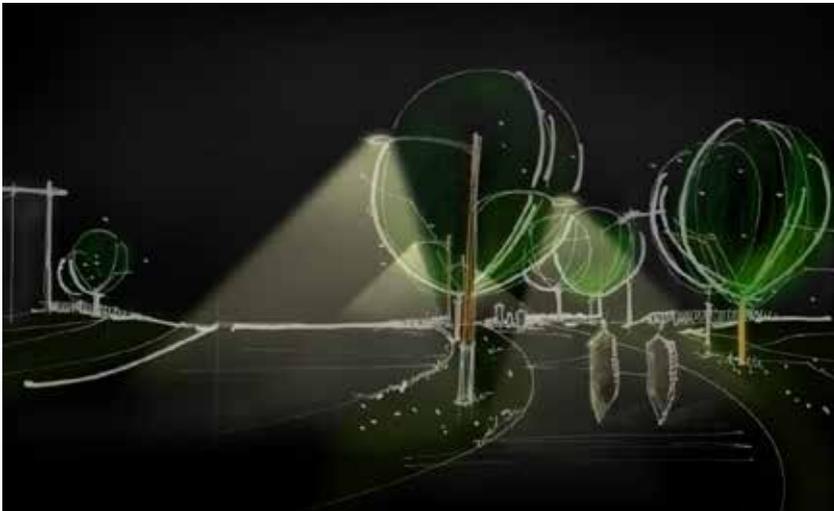
- First housing area in Jyväskylä to be illuminated totally with led-techniques!
- Light colour is neutral white, also on yards and parking areas of the apartment buildings.
- **Luminaire-based control system** for user-friendly management of lights.
- Non-glary, energy-efficient luminaire (90 pcs), iGuzzini WOW 83W (dimmed).



ÄIJÄLÄNRANTA AREA

REALIZATION OF PUBLIC LIGHTING

- Lighting level on main road ME4b, others ME5
- Energy consumption 50% less, comparing to sodium lamp (which would have been the normal solution)
- Wooden pole designed by Tehomet



PALLAS 8
Puinen valaisinpylväs
Pyöreä kartio, mänty liimapuu (GL28h)

Tyvi Ø168
tarvittaessa tehdään
jalustaan sopiva
tyviadapteri Ø140 mm

Sivuvarsi 6 metrin korkeudessa.

VÄRIT

PUU: Caramel
TERÄS: RAL 9007



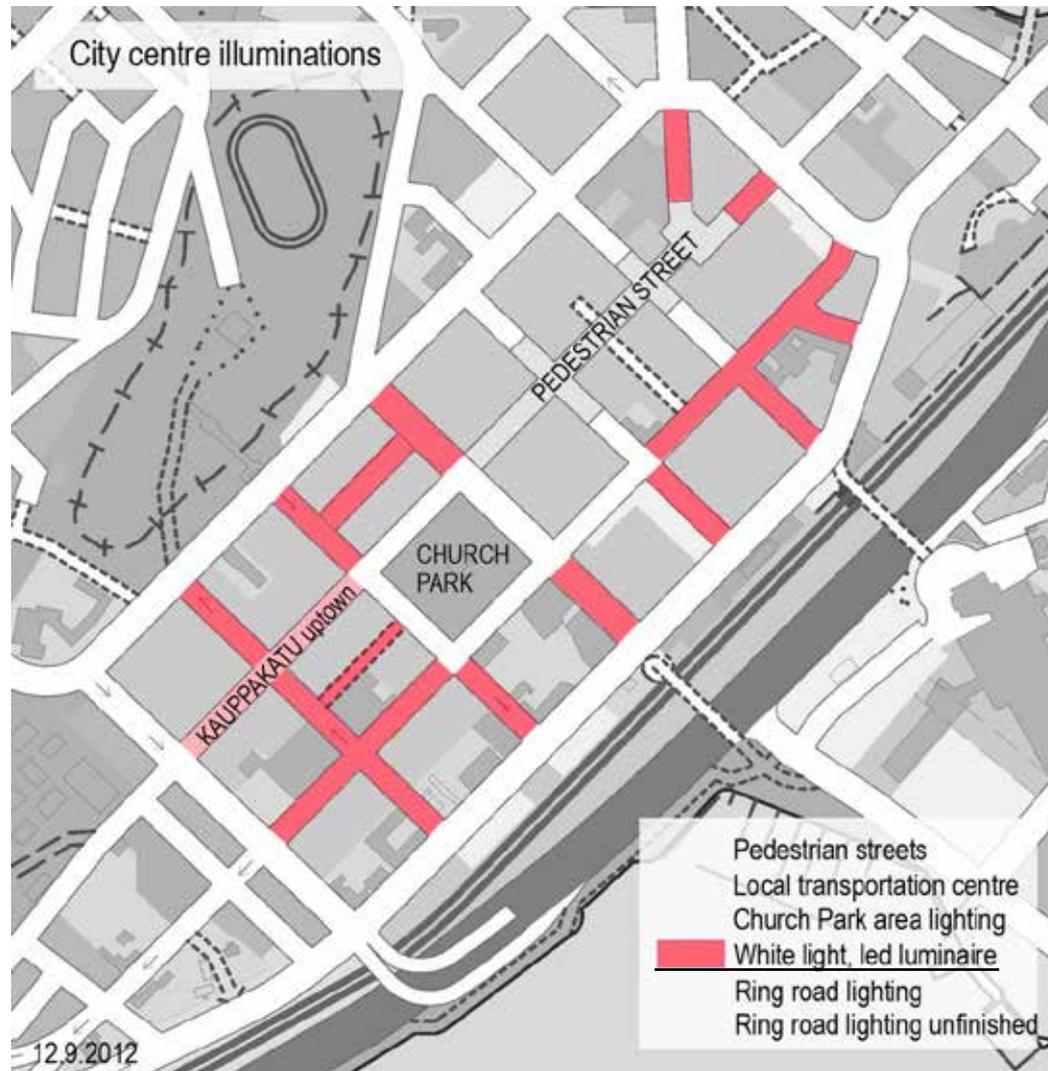
VALAISIN: iGuzzini WOW



VERSIO A
ÄIJÄLÄNRANNANTIE
23kpl

LED LIGHT FOR CITY CENTRE STREETS

CITY CENTRE STREETS

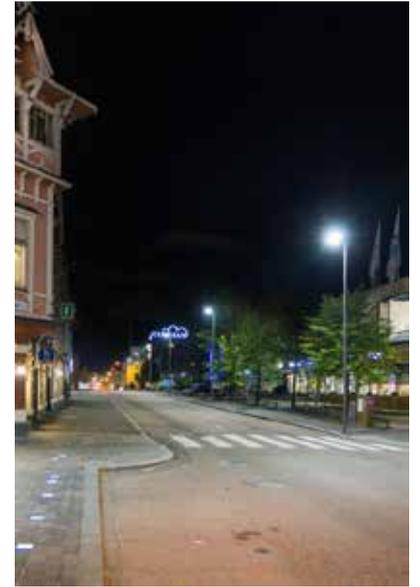


CITY CENTRE STREETS

- Aim: A discreet luminaire which would integrate well with those on the pedestrian street and in which both exterior features and light efficiency would be good.
- Since 2007: testing different options, making calculations
- Lighting class lower than required (due to white light quality)
- Choice: WOW led luminaire by iGuzzini
- Rebuilding started in 2012; 14 out of 93 luminaires installed



CITY CENTRE STREETS



PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

Aiming at: Saving **40 %** of the energy used by the outdoor lighting system, to enhance the illumination and cut the maintenance costs.

PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

SAVING THE ENVIRONMENT AND THE MONEY

The Pro-Environment Outdoor Lighting Project (phase II) was initialised in year 2009. The aim is to save **40 % from the outdoor lighting energy consumption**. Concurrently the illumination on the streets is enhanced and the amount of light pollution is decreased.

The saving will be **6 000 000 kWh/a** which is equal to yearly energy consumption of 300 family houses. In euros the total saving is one million per year.

HOW IS THIS DONE?

- 50% of the old street luminaires are replaced (14 500 kpl)
- The control system is renewed and a new control method is defined
- The electricity grid and substations are checked and optimized

PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

Street lights were changed into yellow in 1998-2002.



Old luminaires used 125W mercury, and were replaced in the end of the 90's with 110W HPS replacement lamp.

Old luminaires consume 127 % more energy!

White light is used only in the City centre, new housing fair area Äijälänranta, shopping districts, playgrounds, parks and some pedestrian paths.

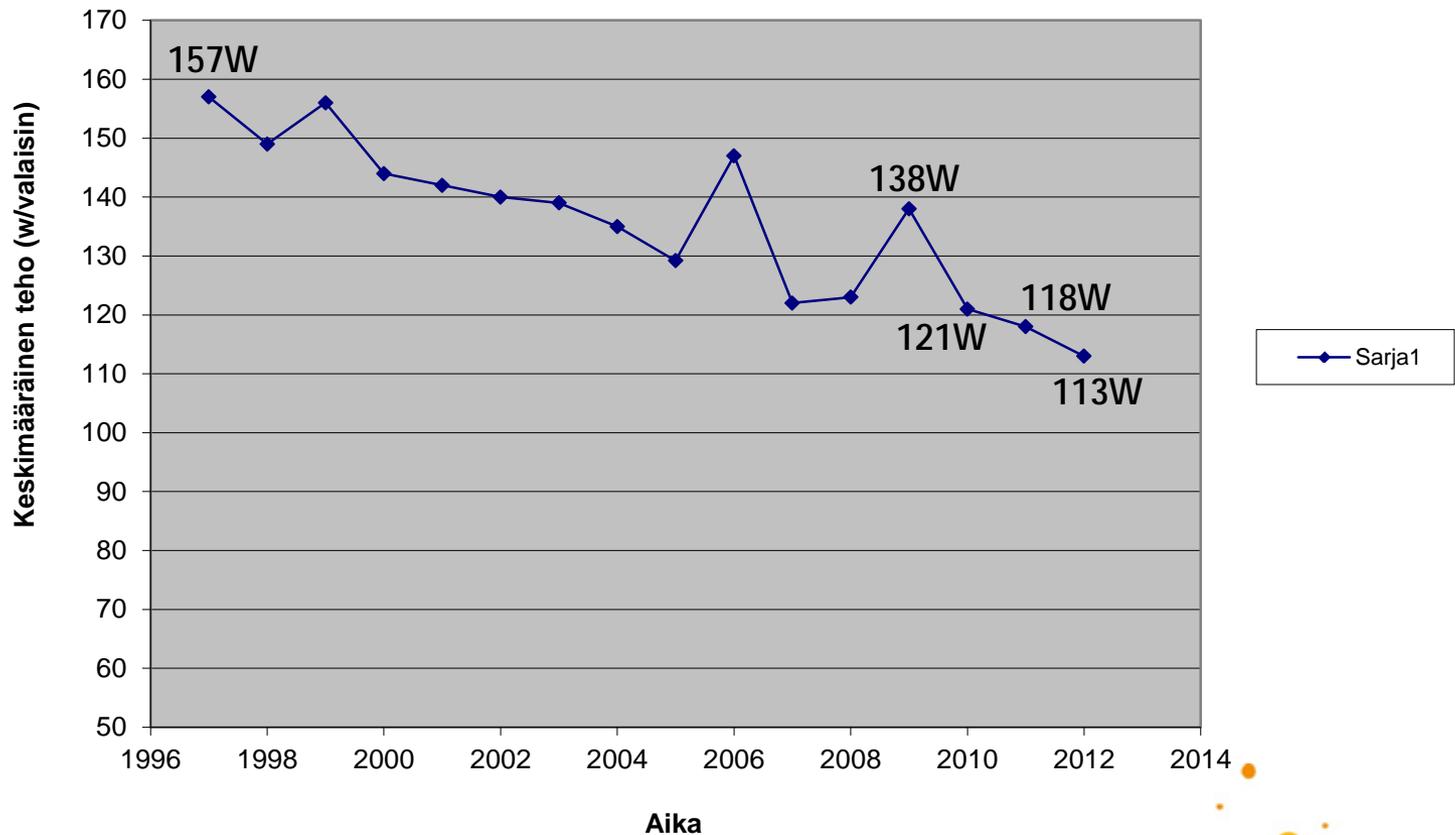


Replacing old ones into new non-glary luminaires with 50W HPS create the biggest saving. Poles are not changed.

The price for a luminaire this type varies 150-185 € (installed and equipped with a lamp).

PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

Development of average wattage per luminaire 1997-2012



2009: Merger of three municipalities.

- Suddenly from 19 000 light points to 30 000.

Since 2010: Pro-environment Outdoor Lighting Project

PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

CONTROLLING THE LIGHTS

Part of the project was to change lighting control system to intelligent. Provider for the system is C2 Smartlight Ltd. from Jyväskylä.

Switch off/on times are now accurate and the system allows different control methods.

Model for controlling

- Summer switch off
- Accurate switch off/on times
- Dimming and partial switch off's
- Some parks switched off for the night

à Fully operational in 2013 and visible in the savings after year 2014.

FEEDBACK FROM THE PUBLIC

Controlling the lighting was tested in autumn 2010 and the feedback from the public was quite clear: half of the people didn't notice any change, some people had noticed the new lighting being non-glary and almost all supported the project's energy saving aspect. (Phone survey for 852 persons)

Control system by:



PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

Situation in the end of year 2012 :

Light points	29 130
Energy consumption	11 811 MWh / year
Burning hours per year	3600 h
Maintenance costs	540 000 € / year 18,50 € / light point

Year 2009:

29 392
15 868 MWh / year
3914 h
691 000 € / year 23,50 € / light point

à Saving: 25,5 % = 4057 MWh / year

PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

FINANCIALLY PROFITABLE PROJECT

- Total cost **5 million €**.
- Energy subsidy from the Ministry of Employment and Economy (25-30%).
- Pay-back time **5 years** (calculatory).
- Pioneer financing model: Project financed with leasing contracts and later on with savings. No need for large fundings.
- **A bit over a million euros are saved** yearly because the maintenance costs decrease 460 000 € and the energy bill with 600 000 €.

FOR THE SAKE OF THE ENVIRONMENT

- Savings equal to **1665 tons of CO2-emissions**. That equals to driving a car around the globe 272 times (if that would make any sense).
- **Motiva** awarded Jyväskylä this spring because of these innovative and sustainable procurements.



PRO-ENVIRONMENT OUTDOOR LIGHTING PROJECT

CASE KORPILAHTI

Luminaire change in 2011

COSTS

- Unit price	183 €
- Unit amount	799
- Investment total	146 217 €
- Subsidy 25 %	36 554 €
- City finances	109 661 €

SAVINGS

- Energy consumption OLD	479,4 MWh/a
- Energy consumption NEW	237,4 MWh/a
- Saving in energy consumption	242,0 MWh/a
- New luminaires consume 50,4 % less energy!	
- Energy savings in euros	24 202 € / a

PAY-BACK

- WITH STATE SUBSIDY	4.5 years
- WITHOUT SUBSIDY	6,0 years

Extra savings from maintenance pause for next 4 years: 20 €/luminaire, total 16 000 €



CONTACT DETAILS

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www.cityoflight.jyvaskyla.fi

Welcome to Jyväskylä - the City of Light in Finland!



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