

# JRP 9: Metrology for Solid State Lighting



## Social and economic drivers

Solid State Lighting (SSL) is evaluated as most efficient lighting technology:

- Annual reduction of 80 TWh electrical energy by replacing incandescent lighting
- Reduction of green-house gases: 32 million tons of CO<sub>2</sub> emission per year
- Economic savings worth 11 billion Euros a year
- More freedom to shape appearance and perception of lighting to suit community
- Strengthen intercontinental competitiveness of 17 billion European lighting industry

Energy commissioner Andris Piebalgs:

“... By replacing last century lighting products by more performant technologies, European homes, buildings and streets will keep the same quality of lighting, while saving energy, CO<sub>2</sub> and money. ...” (press release IP/09/411)

## Present state of the art

- Lighting responsible for 19% of worldwide electricity consumption
- Inefficient incandescent light bulbs effectively removed by 2012
- No extensive program to assure market acceptance of energy saving alternatives
- No unambiguous data on SSL with existing photometric guidelines
- No (inter)national fact-based policy making in sustainable lighting infrastructure
- No metrological framework support for successful widespread SSL implementation
- More than 110.000 people employed in innovative European lighting industry

## Metrology challenges

Metrological framework in Europe for unambiguous and reliable SSL characterization:

- New measurement methods, guidelines, awareness and field survey programs
- Characterization facilities for uptake of innovative next generation SSL technology

## JRP objectives

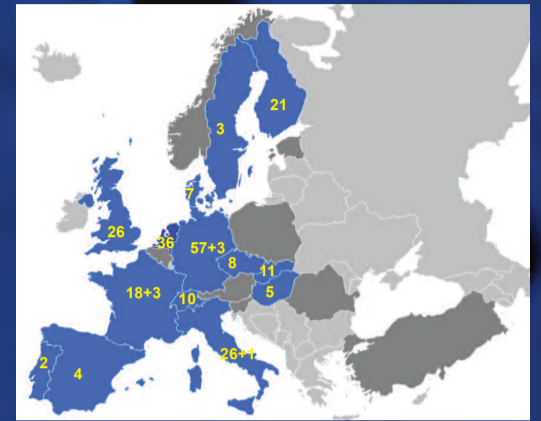
Implementation of three-legged metrological framework, to support successful introduction of SSL in European society, industry and in innovative research based on:

- Unambiguous information, based on new technical guidelines and methods for SSL
- Fact-based policy, provided through metrological platform on SSL in Europe
- Awareness of the peculiarities and possibilities of SSL

## Quality and efficiency of the implementation and management

EU harmonized consortium: 17 partners from 14 European countries

- Large unique specialized contributions from each NMI without effort duplication
- Broad implementation and surveys through 14 governments and 14 NMIs.
- Critical mass of participants in each area to ensure shared knowledge and results
- Specialized input of 3 research institutes
- Feedback of user community and manufacturers through Stakeholders committee, 14 user groups and internet forum



- Strong active support: EA, harmonizing accreditation for SSL measurement in EC CEN, enhanced dissemination of SSL standards CIE, harmonised implementation of mutual developed methods

Effective management (14.5 PM) through detailed deliverables, annual meetings, progress reports.

## Scientific and technical excellence

Metrological framework to identify quality metrics of SSL products that also includes:

- combined spatial and spectral resolved intensity distribution
- high-speed wideband electrical power up to 200 kHz
- junction-temperature dependent luminous intensity profile
- pulse width modulation dependent characterisation
- near-field and ray file measurement of non-point sources
- colour measurements and mesopic vision perception studies
- energy saving through spectral mesopic adaptation of street SSL
- field/laboratory assessments of street, domestic and adaptive lighting including identification of ‘signature’ quality metrics

## Relevance to the objectives of the EMRP

This proposal is in full compliance with the call SRT-09 “Metrology for SSL”

### WP 1: TRACEABILITY 9 partners, 81 PM

- Pulsed efficacy and colour
- Spectral spatial distribution
- Near-field geometry and color rendition
- Environmental conditions



### WP 3: PERCEPTION 4 partners, 30 PM

- Color rendition
- Visual comfort
- Mesopic vision and adaptive lighting

### Successful implementation of SSL technology in EU

Harmonised approach to unambiguous, traceable and reliable characterization of SSL products

European network of accredited institutes for SSL characterization

Validated methods, quality metrics and field assessments

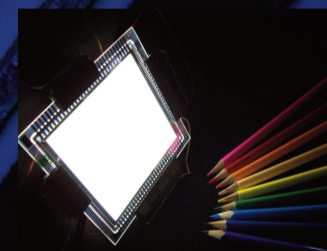
Peer-reviewed papers

### WP 5: IMPACT 14 partners, 23 PM

- Awareness programs in 14 countries
- Metrological platform for SSL characterization
- Quality metrics for specification of SSL
- Feedback through user and forum groups
- Stakeholders committee, CEN, EA, CIE

### WP 2: METHODS 14 partners, 53 PM

- Electrical power upto 200 kHz
- Efficacy, including RH, T and pulsed
- Goniometrical spectral aspects
- Metrology basis for lifetime prediction



### WP 4: SPECIFICATIONS 8 partners, 32 PM

- Framework for quality metrics concept
- Measurement equipment
- Quality metrics for various applications

“... we will make use of the results ..”, PLDA

“... we are happy to collaborate to support EC regulation ..” EA

“... strictly essential that the metrological foundation is updated ...”, CEN

“... support research to address shortcomings in the measurement infrastructure ...”, CIE