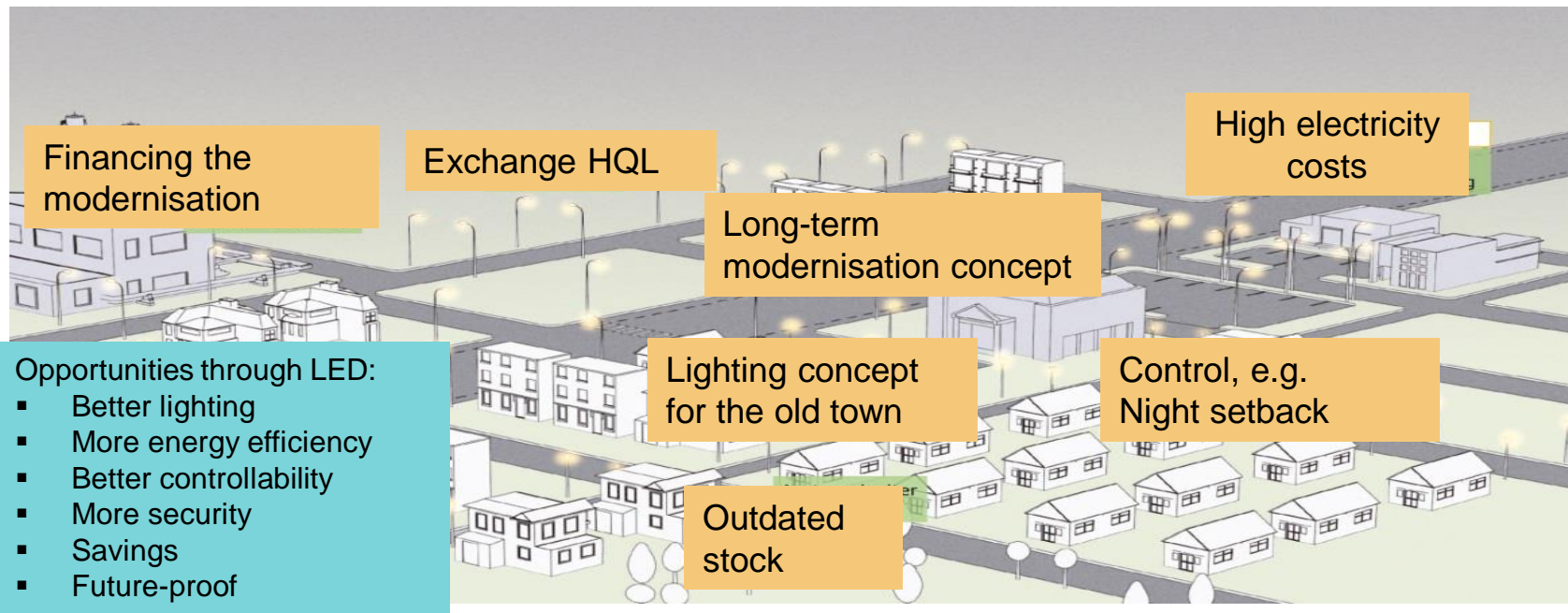


Name, date, place



**ROADSHOW ENERGY
EFFICIENT STREET
LIGHTING**

CHALLENGES AND OPPORTUNITIES FOR MUNICIPALITIES IN EN EFF STREET LIGHTING



STEP BY STEP OF MODERNIZATION BY LOCAL AUTHORITIES

➤ Analysis of street lighting

- Records of all lighting points according to type of lamp, connection power, hours of lighting

➤ Modernising plan and political decision

- Priority of certain streets, timetable, determination of technical issues
- Requirements of smart lighting technology

➤ Financing and profitability

- Lifecycle analysis into investigation of profitability
- Determination of type of financing: direct tender, PPP, ESCO-Model

➤ tender

PLANNING TASK ENERGY-EFFICIENT STREET LIGHTING.

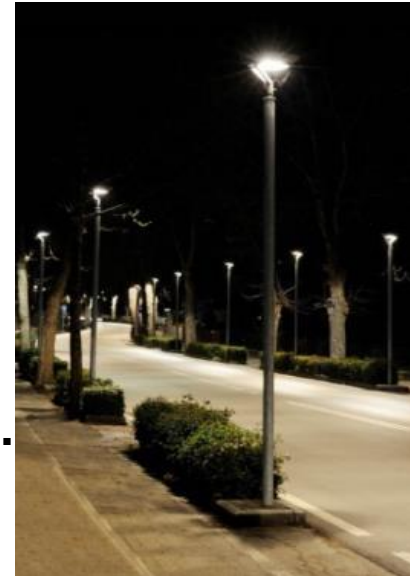
➤ The initial situation in municipalities is heterogeneous.

- Large cities usually have their own know-how.
- In small communities, street lighting is often organised "on the side" by the building yard.
- Know-how in lighting design for LED is rather rare.

➤ Good planning is a prerequisite for submitting funding applications in Germany to the National Climate Initiative.

- This is often supported by manufacturers and operators.
- The number of experienced independent consultants is limited.

➤ In Germany dena support municipalities with Checklists on typical consultancy tasks.



ANALYSIS (AUDIT) OF STREET LIGHTING



Information to existing street lighting system:

- accordance to legislation and norms
- Disturbance: how often, what?
- When lamps are changed: by time or in case of defect?



Measurement of electricity consumption

- Measurement is different and difficult in many cities
- Measurement in Germany was often done by calculation



Lighting points:

- Number of lighting points
- Type of luminaires and lamps
- Power consumption (and illumination level) from luminaires, lamps and ballast
- Edge and status from luminaires, lamps, ballasts and mast
- Type of controlling system



Finance resources and life cycle calculation

FINANCE AND OPERATE STREET LIGHTING.

- **Financing modernisation is often the biggest challenge for municipalities.**
- **Thanks to funding from support programmes in Germany, investments are usually amortised after 5 to 10 years.**
- **Operator models (contracting, operational management, etc.) include the opportunity for third parties to pre-finance the investments.**
 - Appropriate contracts are complex tasks.
 - Use of subsidies is sometimes difficult or not possible with operator concepts.



FUNDING OF STREET LIGHTING IN GERMANY

- Since 2011 Municipalities in Germany gets fundings for introducing LED street lighting
- About 1,800 cities or villages gets funds
- The money comes from German Climate Fund
- In result in every region of Germany you could find many projects of LED lighting



EXAMPLE OF ENERGY AND COST SAVINGS IN A SMALL VILLAGE

before

- 525 luminaires (HIT, LFL)
- Power consumption: 202,438 kWh/a
- Electricity costs 2012: € 40,487.60
- CO2 emissions: approx. 138 t/a

afterwards

- 526 luminaires (LED)
- Power consumption: 30,442 kWh/a
- Electricity costs 2014: € 6,088.41
- CO2 emissions: approx. 20.8 t/a

Source: Presentation, Dominik Böhlein, Energyvision Franken, 25.11.2014 to modernising streetlighting in the municipality of Oberelsbach

SUPPORTING LOCAL AUTHORITIES IN MODERNISING STREET LIGHTING



In Germany we have had a lot of activities to support modernising of street lighting:

- 15 roadshow street lighting events with 2,000 participants
- Dena brochure gives an overview to the subject
- Onlinetool for modernizing street lighting



Consultation through manufacturers and Lighting planners

- Specialised Information to LED-technique
- Involvement of Light planners & engineers



Model contract for contracting



Funding Programme



ROADSHOW ENERGY-EFFICIENT STREET LIGHTING.

- The roadshow addressed municipalities throughout Germany from 2014 to 2016.
- The aim was to motivate municipalities to systematically renew their street lighting.
- About 2,000 participants at 15 events.
- Accompanying trade exhibition
- Expert dialogues on selected topics
- Varied technical programme with practical examples from regions



REGIONAL EVENTS: PROGRAMME.

- **Legal issues of street lighting**
- **Financing options and operator models**
- **Technical contributions by the project partners on technologies**
- **Expert dialogues on key issues for the municipalities**
- **Reports from model projects in municipalities**
- **Supporting programme: Visit to the information and advice stands**



THE CHALLENGE OF CONTROLLING STREET LIGHTING.

➤ **Municipalities typically have a variety of lighting systems in use.**

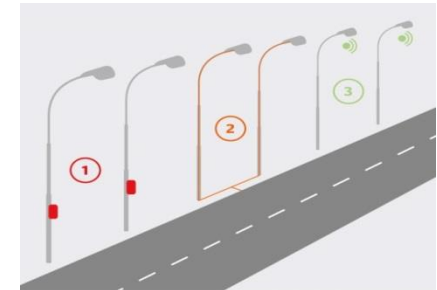
- Control of conventional luminaires limited, e.g. Half-night switching with corresponding luminaires


➤ **With the gradual use of LEDs, municipalities have significantly better control options.**


- Targeted night-time lowering (e.g. according to traffic flow)


➤ **In many states exists technical standards to be taken into account.**

➤ **The use of street lighting for smart city applications is expected in the medium term.**



① **Autarke Lichtsteuerung.** 
- Steuerung wird an jeder Leuchte direkt programmiert.
- Steuerung nur vor Ort möglich.
- Keine automatische Meldung von Lampenausfällen.

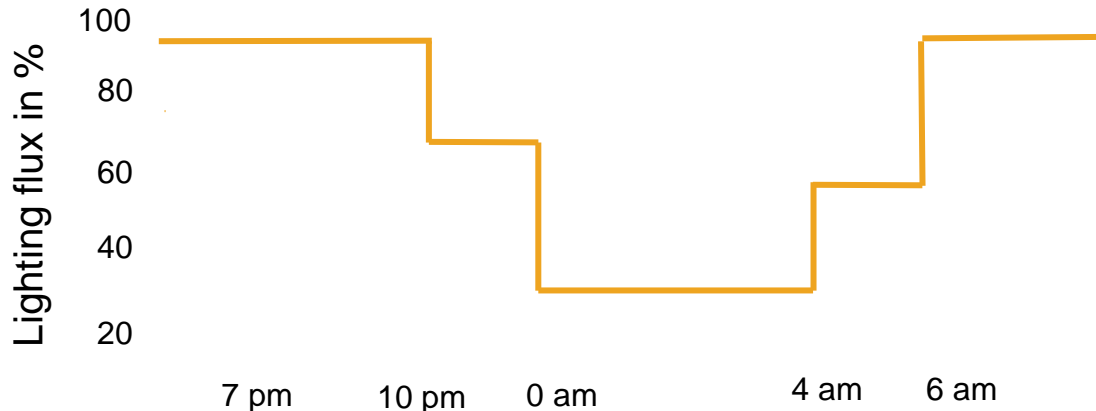
② **Lichtsteuerung über Powerline-Verfahren.** 
- Das vorhandene Stromnetz wird zur Steuerung genutzt.
- Automatische Meldung von Lampenausfällen möglich.
- Steuerung von einem zentralen Ort aus.

③ **Lichtsteuerung über Funk.** 
- Steuerungssignal wird per Funk übertragen.
- Signalverstärker in den Leuchten erweitert das Netz.
- Automatische Meldung von Lampenausfällen möglich.
- Steuerung von einem zentralen Ort aus.

ENERGYSAVINGS THROUGH DIMMING PROFILE AND INTELLIGENT CONTROL

➤ Additionally Energy savings of 30 % - 50 %

- Power reduction at times of low traffic (for ex. from 11 pm to 4 or 5 am)
- Adaptive light control is another chance
- Dimming profile depending on demand of the local authority
- Minimum lighting use (>25 %) also at night (safety for inhabitants)



QUALITY REQUIREMENTS FOR PLANNING AND CONSULTATION.

- **With the quality requirements, the focus is placed on planning and consulting for energy modernisation.**
- **Municipalities are to be motivated to seek support for the modernisation of street lighting.**
- **A distinction is made between technical-economic and legal-organisational advisory services.**
- **The checklists are concise and do not prejudge in-depth methods of the consultants.**
- **The quality requirements should remain manageable for municipalities and help them when commissioning consultants.**
- **They are available for download on dena's website.**

CHECK LISTS FOR CONSULTATION

- Initial consultation on energy-efficient street lighting
- Inventory of the existing street lighting
- Analysis and technical-economic evaluation
- Concept for the energy modernisation of street lighting
- Ongoing operation of street lighting, controlling
- Financing and economic efficiency of street lighting
- Organisation of street lighting, operator models, contracting
- Tendering/awarding of street lighting services, contracts



CONCLUSIONS

- **Modernising street lighting saves energy**
- **Simultaneous LED improves quality of light**
- **Pilot projects should show good practice**
- **Support by industry and light planners (engineers)**
- **Information and consultation**
 - Consultation on a regional level
 - Mutual exchange of experiences through municipalities

THANK YOU FOR YOUR ATTENTION.

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SMART LIGHTING IS STARTING POINT FOR A SMART CITY



➤ **Intelligent street lighting is already available**

➤ **Many applications could be based on street lighting system**

- Traffic control
- Managing parking space
- Base Stations
- Car2x-Applications
- Public WIFI
- City marketing