



Foto: FONA/photothek

# Das Kopernikus-Projekt ENavi

## Financing models for energy efficiency in public infrastructure

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# Aims and tasks

## Aim

- Assist local governments on financing energy efficiency and low carbon upgrades of
  - Street lighting
  - Public buildings

## Tasks

- Extensive overview and analysis of financing models used to finance the upgrade of the public infrastructure.

# Review of identified models

## Self-financing

- Budget allocation
- Intracting
- Revolving fund

## Debt-financing

- Concessional loans
- Commercial loans
- Bonds
- Institutional investors

## Financing by a private contractor

- Simple contracting model
- Contracting with forfeiting and waiver of defence

## Financing through energy savings (EPC)

- Guaranteed savings model
- Shared savings model
- Other energy performance contracting

## Leasing or concession to a private partner

- Leasing
- Leasing or concession to a private partner

## Project finance

- Special purpose vehicle (SPV)

## Financing by utilities

- Energy Efficiency Obligation Schemes
- On-bill financing

## Financing by citizens

- Crowdfunding

# Self-financing

## Revolving funds



# Intracting

## Architecture

- Internal organisational units act as contracting partners
- Municipal establishes a fund or trust from own funds
- Fund/ trust finances projects without interest rate or additional costs

## Other features

Projects financed by this model:

- Municipal infrastructure projects, e.g. buildings or street lightning

Jurisdictions that applied this model:

- Conceptualized in Germany, now started throughout EU (France, Italy, Croatia..)

## Advantages

Municipalities:

- can reuse capital
- do not need external capital
- cooperate within their units
- pay no interests on capital

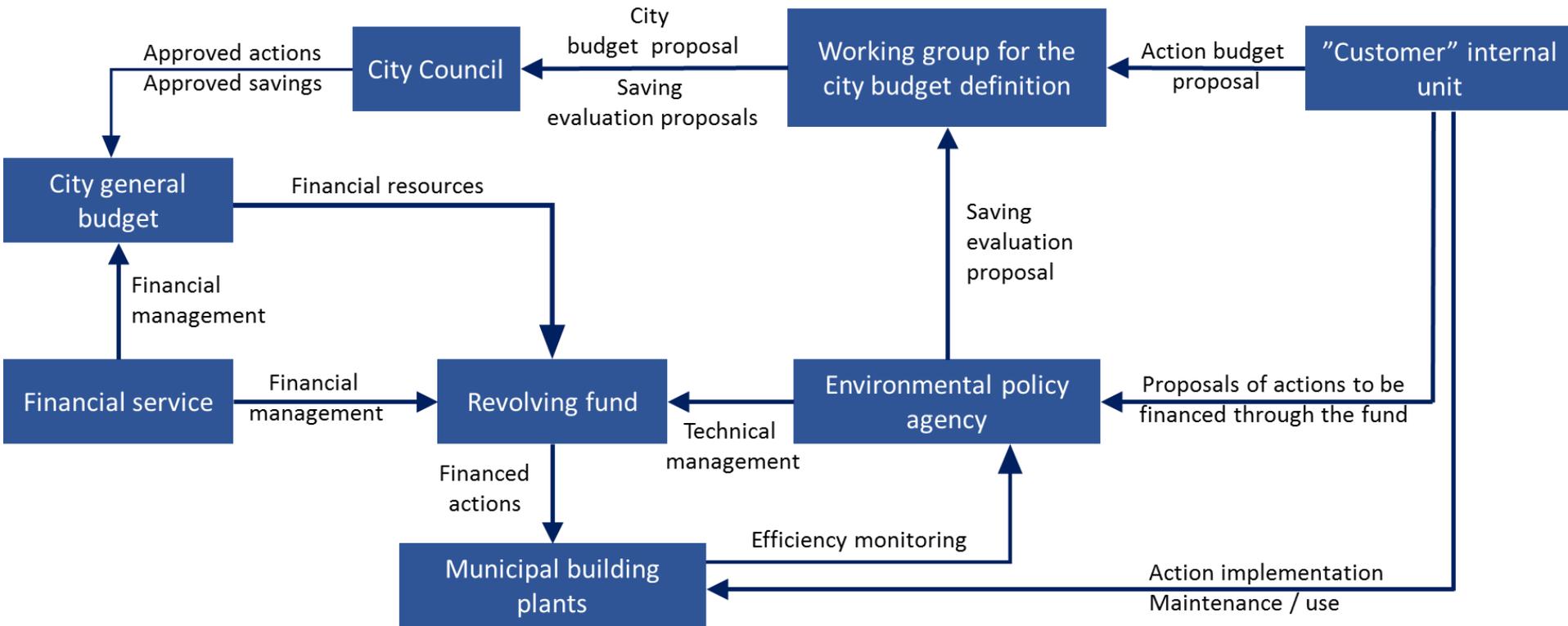
## Disadvantages

Municipalities:

- carry fully up-front cost
- bear all project risks
- may face lower project efficiency vs when the upgrade is delivered by private actors

# Udine (2014-...)

- Initial funding of 32 kEUR by the city
- Energy savings from funded projects are also redirected to the fund



# Debt-financing

## Bonds



# Issuing bonds

## Architecture

- Municipal bonds are issued by the local government or their agencies
- Bonds can be certified as *green bonds* by an independent institution

## Other features

Projects that can be financed by this model:

- Any project, if the municipal has access to a bond agency

Jurisdictions that applied this model:

- Gothenburg (SWE) & Varna (BGR)
- Not common in Europe

## Advantages

Municipalities:

- Can issue bonds autonomously or in cooperation with bond agency
- Get low interest rates compared to commercial bonds or loans

## Disadvantages

Municipalities:

- Need to prepare extensively and costly
- Need a good credit rating, if acting autonomously

# Gothenburg's Green Bonds (2013-...)

## Project overview

- Gothenburg implemented its Green Bond Program in 2013
- Raises capital for climate change and environmental projects

## Project scope

- Eligible projects include: mitigation, adaptation/ resilience and environment
- Projects are selected by the city office and approved by the city executive board

## Financing structure

- Bonds are issued on the capital market, any mainstream investor can buy them
- 1<sup>st</sup> bond issued accounted for 56 mEUR
- Total capital raised 0.46 bEUR in 2016

## Implementation & outcome

- Gothenburg was the first city to issue green bonds
- Since 2013, 11 projects have been funded

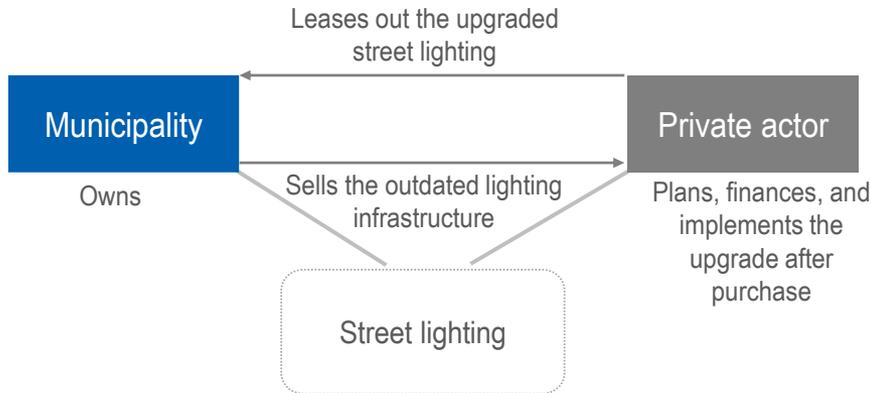
# Public-private partnerships

EPC, leasing, concession, project finance, etc.



# Leasing

## Architecture



## Advantages

### Municipalities:

- Spread financial risks and costs over time
- Outsource technical risks to the private sector
- No debt increase but new infrastructure

## Other features

### Projects that can be financed by this model:

- Suited for projects with high initial investment and high budget restrictions

### Jurisdictions that applied this model:

- Not very common in EU, applied in Italy

## Disadvantages

### Municipalities:

- Suffer higher costs in the long-term compared to self-financing
- Have no direct control over the assets

# Cesena (2015-2027)

## Project overview

- Its objective is to decrease energy consumption by 30-40%
- All existing and new street lights shall be upgraded to LED

## Project scope

- Out of the 21 k luminaries ownership of 15.8 k was transferred to the contracting partner in 2010, renewed in 2015
- The contractor is responsible for maintenance, control and management of the network and upgrading it

## Financing structure

- The municipal pays a leasing fee to the contractor, which in turn upgrades the street-lighting infrastructure
- At expiry ownership is transferred back

## Implementation & outcome

- The municipal has created an investment plan together with the contractor
- In 2010-2017, 2.3m EUR were spent to upgrade the oldest 4.9 k luminaries

# Financing by citizens

Financing by citizens, crowdfunding, etc.



## Architecture

- Crowdfunding means raising funding online on platforms where investors and project developers meet
- Investors can freely pledge their money to projects they like to support
- Different models are possible, including lending-based or reward-based

## Other features

Projects that can be financed by this model:

- In principle any project can be crowdfunded as long as it can raise enough attractiveness and hence funding
- Jurisdictions that applied this model:
- Crowdfunding grows fast in the UK, France and Germany

## Advantages

Municipalities:

- Attract more investors via crowdfunding
- Build a community around their project
- Freely decide on what return investors should get
- Split their finance in regular ways of funding and crowdfunding

## Disadvantages

Municipalities:

- Need to attract enough investors to fulfill their funding goal
- May suffer issues of responsibility to a vast amount of small investors
- Have no guarantee that investors stick to a project throughout the funding phase

# Financing by Citizens | Crowdfunding study: Bettervest crowdfunding platform

## Project overview

- A Germany-based crowdfunding platform for climate change mitigation projects
- Different projects of different size and target sector are promoted on it
- People are free to invest from 50 EUR upwards

## Project scope

- Project sizes vary from 5,000 EUR to 600,000 EUR
- Bettervest reported in 2017 that all their projects reached their funding goal
- Among these, there have been also some focusing on lighting upgrades

## Financing structure

- Investors can pick between a range of possible projects to invest
- If the funding goal is reached, projects are implemented and investments are made

## Implementation & outcome

- A public school in Szeged, Hungary has raised 46,400 EUR for energy efficiency upgrades from 92 investors
- A contractor was found for a leasing agreement with the school
- The lessee has to payback the investments of the crowd within 7 years

# Financing by utilities



## On-bill financing



# On-bill financing

## Architecture

- The utility provides a loan to the municipality, which pays it back through its energy bill - based on energy savings
- The municipality can oversee and require specific technology use for upgrades

## Other features

Projects that can be financed by this model:

- In principle easy to implement and set up for small to medium investments

Jurisdictions that applied this model:

- Not common in the EU

## Advantages

Municipalities:

- Can easily set up and implement an on-bill repayment model
- Repay their loan via their energy bill, not suffering additional administrative costs

## Disadvantages

Municipalities:

- Need to repay their loan long-term, having it on their own balance-sheet

# California, USA (2004-ongoing)

## Project overview

- The utility Pacific Gas and Electric (PG&E) provides zero interest rate loans to municipalities in northern California
- Southern California Edison (SCE) has a similar scheme for southern California

## Project scope

- PG&E and SCE each provides loans between 5-250 kUSD to public institutions
- To qualify for a loan, estimated savings have to be enough to repay it

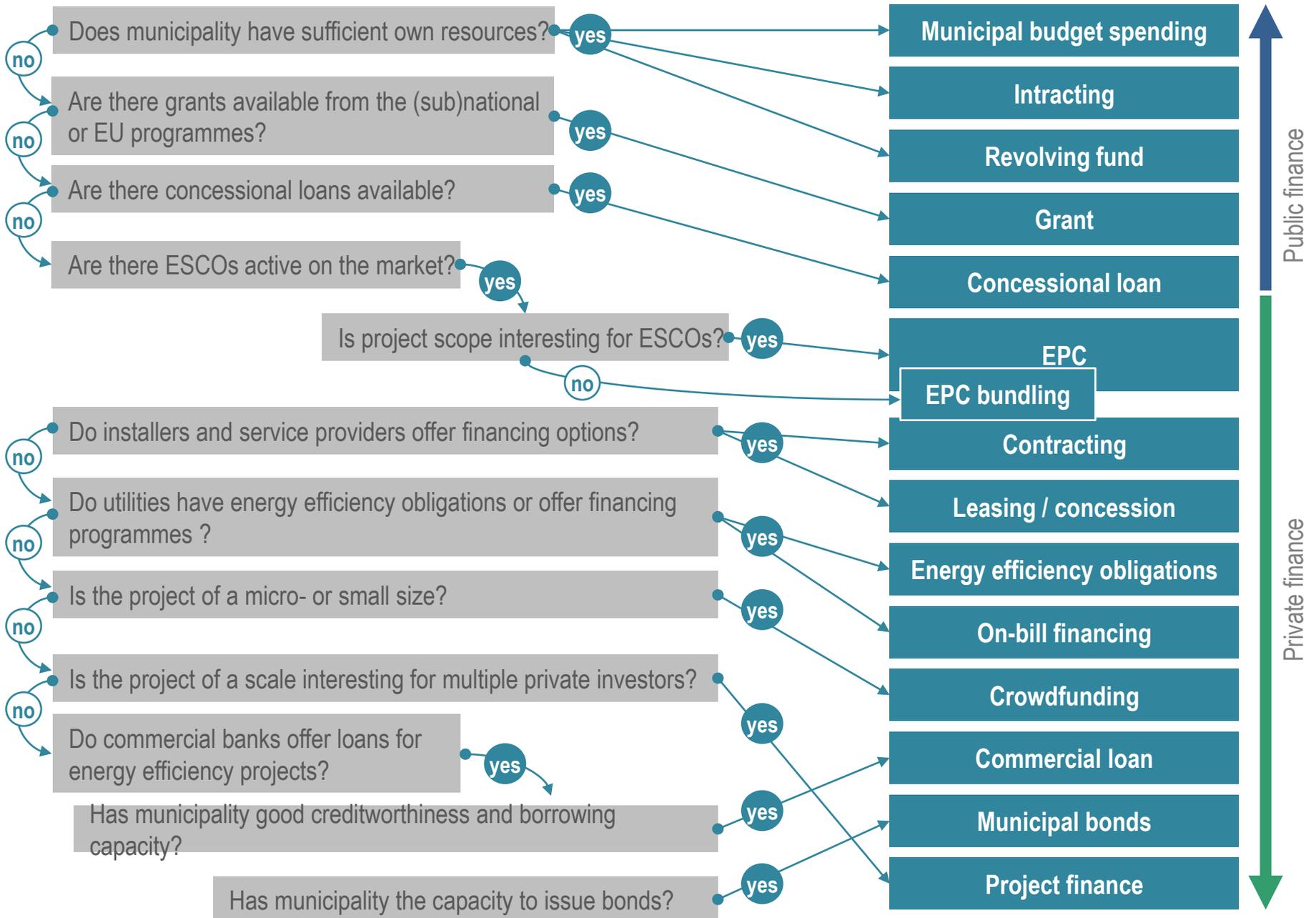
## Financing structure

- Loans are payed back monthly via the energy bill
- Loans are refinanced by estimated energy savings by the efficiency measures

## Implementation & outcome

- As of 2016, several hundred projects have been realized
- More than 180 k luminaries were upgraded by on-bill financing of PG&E

# Conclusion



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