United Nations Forum on Energy Efficiency
Seoul, 17-18th December

ENERGY EFFICIENCY IN PUBLIC BUILDINGS AND MUNICIPAL ENERGY PLANNING

The Experience of Bulgaria

EnEffect **Center for Energy Efficiency**

THE LEGISLATION SUPPORT OF THE ENERGY EFFICIENCY IN BULGARIA

- **EU Directives for Energy Efficiency (EE)**
- **State Energy Strategy (2002)**
- **Law for Energetics (2003)**
- **Law for Energy Efficiency (2004)**
- **Law for Renewable Energy Sources (2007)**
- **Related Regulation, Norms and Standards**
- **Buildings' Energy Certificate/Labels**
- **National Programs for EE in the Building Sector**

THE FINANCIAL SUPPORT FOR ENERGY EFFICIENCY IN BUILDING SECTOR

- **Fuels and energy prices policy/tariffs**
- **EU Programs for the New Member States**
- **State Subsidies for Public and Private Buildings**
- **Funds for EE and RES supported by WB, EBRD, others**
- **Local Bank Loans for EE**
- **UN and EU International Projects for Sustainable Development**
- **Public-Private Partnership Financing Schemes**

ENERGY EFFICIENCY IN BUILDING SECTOR

Example (1): Price Wise Policy Aproach:

The Biomass and the Natural Gas energy sources are the most attractive way for heating in the country

Current Fuel Prices Comparison, Bulgaria, July 2007

Fuel/Energy Type	Energy content kWh	Unit	Average Heating System Efficiency %	Fuel Price, euro/unit	Unit	Heat Production Cost euro/kWh	Monthly Heating Cost* euro	Rate %
Coal	4.1	kWh/kg	80	80	eur/ton	0.025	48	58.5
Wood	3.1	kWh/kg	85	32	eur/m3	0.026	51	62.2
Wooden chops	2.6	kWh/kg	85	60	eur/ton	0.028	55	67.1
Cherry/plum pits	3.4	kWh/kg	85	102	eur/ton	0.035	70	85.4
Wooden pellets	4.8	kWh/kg	85	166	eur/ton	0.041	81	98.8
Natural gas	**9**	**kWh/m3**	**90**	**336**	**eur/kilo m3**	**0.042**	**82**	**100.0**
Propane Gas (LPG)	12.8	kWh/kg	93	795	eur/ton	0.062	123	150.0
Electricity	1	kWh	98	0.075	eur/kWh	0.076	152	185.4
Light Fuel Oil	11.6	kWh/kg	90	953	eur/ton	0.091	181	220.7

ENERGY EFFICIENCY IN BUILDING SECTOR
Example (2): Price Wise Policy Aproach:

The purchase price of power produced from Renewable Energy Sources as photovoltaic, wind and biomass is attractive for the producers

Energy produced from RES – Purchase Prices Comparison, Bulgaria, 2007

> Hydro power …….. 41,03-43,59 eur/MWh
> Wind power …….. 61,54 eur/MWh (up to 10 MW, before 2006)
> Wind power …….. 80-89,74 eur/MWh (since 2006)
> Photo voltaic power ……. 368,21-401,03 eur/MWh (more/less than 5kW)
> Biomass power (1)……10,77 eur/MWh (up to 5 MW, wood waste)
> Biomass power (2)……83,08 eur/MWh (up to 5 MW, agriculture residues)
> Biomass power (3)……94,36 eur/MWh (up to 5 MW, wild plants residues)

For comparison: Electricity average price = 75 eur/MWh

ENERGY EFFICIENCY IN BUILDING SECTOR

Example (3): Environment Protection Policy Aproach:

The Electricity, the Coal and the Light Fuel used for heating are the worst CO2 polluters

Calculation of CO2 Emissions Reduction (ref.National Regulation)

>>>	INPUT DATA			>>> OUTPUT	
Type of fuel or power	Saved fuel or electricity kWh	Coefficient of losses %	Reference values of CO2 emissions gCO2/kWh	Reduced annual CO2 emissions kg/year	Rate of Eco Benefit
Fuel Oil	1 000	10	311	342	3
Natural Gas	1 000	10	247	272	6
Propane Gas (LPG)	1 000	10	272	299	5
Black Coals	1 000	20	439	527	2
Brown Coals	1 000	20	452	542	2
Wood	1 000	5	6	6	9
Wood chips	1 000	5	32	34	8
Wood pellets	1 000	25	43	54	7
Electricity	1 000	300	683	2 732	1
TOTAL =	9 000	-	-	4 808	

ENERGY EFFICIENCY IN BUILDING SECTOR

Example (4): Regulation and Standards Policy Aproach:

The Current Bulgarian Standards partially complies to the severe EU standards versus building heat losses protection and well behind from the listed Low/Passive Energy Buildings thermal performance

Comparison of Thermal Performance of Building Envelope

(U-values) for some EU regions, ref. EU Green Buildings

U values in W/(m2.K)				
Building Components:	Low/Passive Energy Buildings	Severe Standards (North&Mid EU)	Weak Standards (South EU)	Bulgaria, current standard
External Walls	U < 0.15	0.15<U<0.40	0.40<U<0.65	U<0.50
Windows/Doors	U < 0.70*	1.25<U<2.50	2.50<U<3.25	U<2.6
Roof/Ceilng	U < 0.15	0.22<U<0.45	0.45<U<0.90	U<0.30
Floor/Basement	U < 0.15	0.15<U<0.40	0.40<U<0.65	U<0.50
***For transparent elements (0.15 for opaque elements)**				

ENERGY EFFICIENCY IN PUBLIC BUILDINGS

(1) In general the public buildings are characterized by:

> intermittent demand for heating, therefore the building envelope and structure's thermal inertia should be respected by the adopted heat insulation system

> high internal gains (people, lighting, equipment), therefore more cooling is needed

> high glazing façade ratio (especially the newly constructed office buildings), therefore it needs less heating, but more cooling and also building orientation migh be an important energy saving factor for the whole building life

> high quantity of treated fresh air, therefore they needs more energy;

> some consume more hot&cold water, therefore they needs more energy;

ENERGY EFFICIENCY IN PUBLIC BUILDINGS

(2) In general the public buildings are characterized by:

> most are frequently visited, therefore more energy is needed to protect the entrances to eliminate the stack effect (with high rise buildings)

> high level complexity of the building services equipment, therefore reliable building or energy management system is needed

> higher noise level (people, lighting, equipment), therefore they needs more energy and efficient equipment, materials, and special systems for noise reduction

> higher rate of fire and safety protection, therefore more energy is needed

> higher demand for façade cleaning, therefore more energy is needed

ENERGY EFFICIENCY IN PUBLIC BUILDINGS

and:
> most are bigger urban polluters, therefore special attention as buildings and energy consumers is required

Conclusion:
The energy efficient design of new and renovation of existing public buildings is a complex process, which requires interdisciplinary aproach, specific knowledge, sofisticated tools, and widespread social awareness and support

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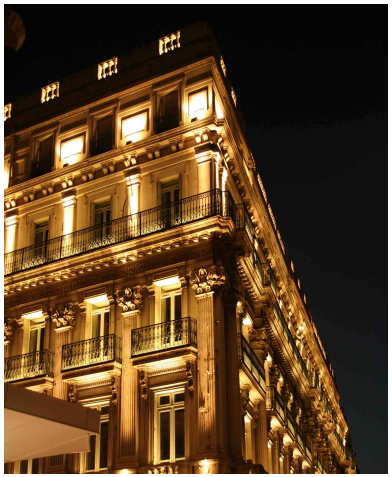
Municipal Energy Planning

Methodology



The Experience of Bulgaria

Why Municipal Energy Planning? (MEP)

Municipal Energy Planning -

Systematic approach for energy management at local/municipal level

Driving force and effective instrument to achieve the ambitious goals and objectives of common EU policy for sustainable development

Which are the main products of the MEP process?

Municipal Energy Strategy – MES (long-term)

Municipal Energy Programme – MEP (medium term)

Municipal Energy Action Plan – MEAP (short term)

Investment Programme - IP

What is Municipal Energy Programme?

Key component of the overall development strategy of the municipality

Political document outlining goals, objectives and frames of all local energy aspects

Energy programme or Energy Efficiency programme?

Tendency for energy sector decentralization and growing use of local renewable energy sources make Energy planning on local level possible

MEP for municipal property or MEP for the municipal territory?

All energy end-users and energy producers on the municipal territory make sense for sustainable local development policy (After all, we have only one – our municipality environment!)

What is Municipal Energy Database?

MEDB is a key prerequisite for successful energy planning and management

The establishment of MEDB is the first essential condition to ensure long term sustainable MEP process

MEDB should consists of data about municipal property and also data about all energy producers and energy end-users on the municipal territory

Which municipal functions are covered by the MEP?

Four basic municipalities' functions:

Consumer - Producer - Regulator - Motivator

What the 4 functions lead to?

Energy Consumer & Producer –
lead to: INVESTMENTS

Energy Regulator & Motivator –
lead to NON INVESTMENT ACTIONS

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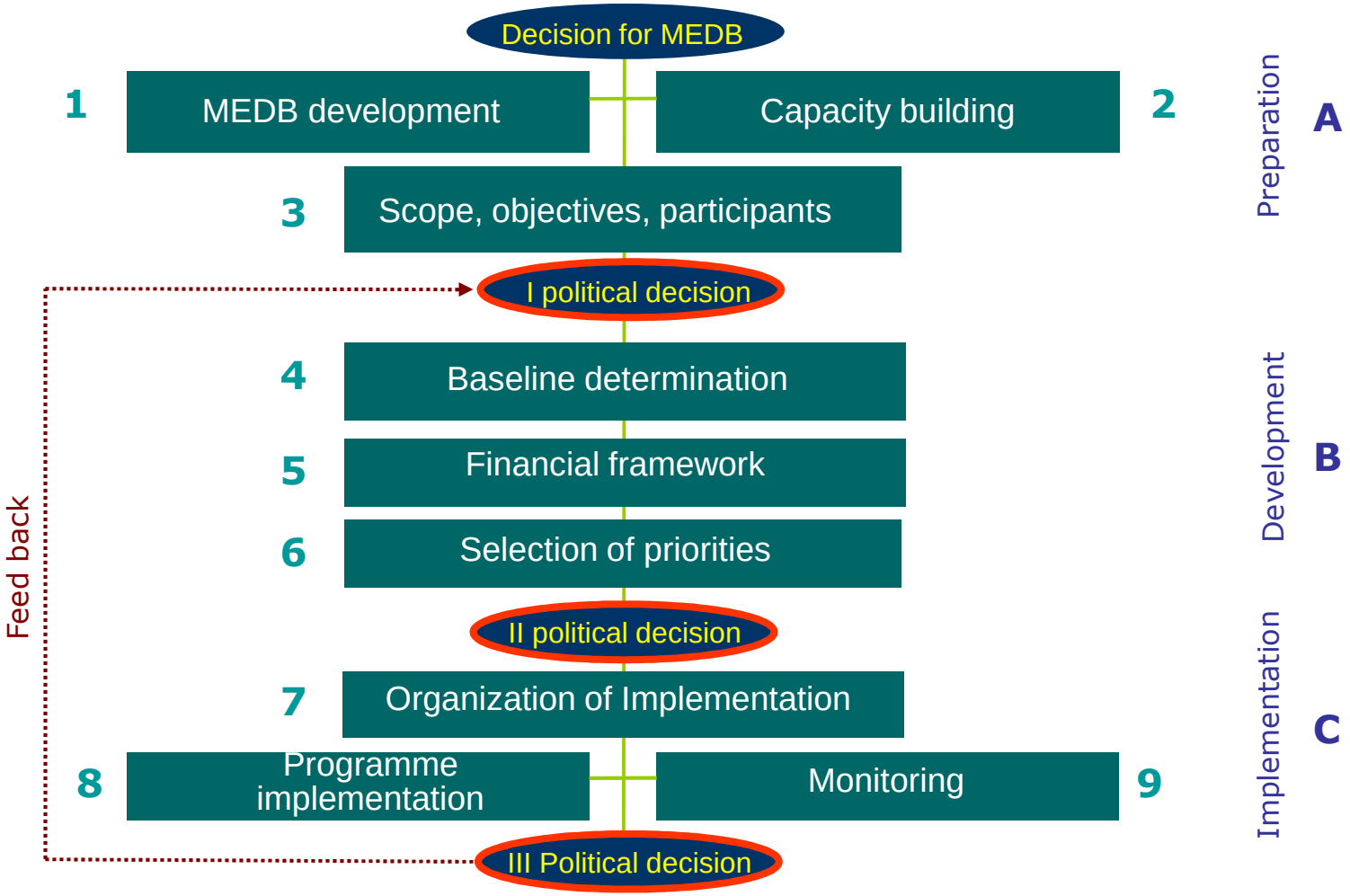

	PLANNED ACTIVITIES BY FUNCTIONS OF MUNICIPALITIES			
	INVESTMENT ACTIVITIES		NON-INVESTMENT ACTIVITIES	
	Municipality as energy consumer	Municipality as energy producer	Municipality as energy regulator	Municipality as a source of motivation
Sector: ……				
Project A: ……..	Measure 1 / Euro	Measure 1 / Euro	Activity 1 / Euro	Activity 1 / Euro
	Measure 2 / Euro		Activity 2 / Euro	
Project B: ……..	Measure1 / Euro	Measure 1 / Euro		Activity 1 / Euro
	Measure 2 / Euro	Measure 2 / Euro		Activity 2 / Euro
	Measure 3 / Euro			

Thank you very much for your kind attention!