Financing Modernization of DH Systems: Lessons Learned Internationally

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**Installed DH Capacity, 2009**

994,800 MWth

**Trench Length of DH Pipeline System, 2009**

327,706 km

**Investment need estimate (up to 2020)**

$70-100 Billion

**Estimated Annual Energy Savings**

1,500,000 TJ and 10,000 GWh

**Estimated Annual GHG Reduction Potential**

115,000,000 tons CO2e

*Selected countries in ECA and EAP (excluding Central Asia and Mongolia)*

**IFC Projects**

- Timisoara - Municipal investment, Romania (IFC ~$34.6 M)
- Botosani – Municipal investment, Romania (IFC ~$7.7 M)
- Bucharest – PPP project, Romania
- KKS – Private DH company, Russia (IFC $18.2M equity, $7.7M loan)
- Mytischi - Municipal investment, Russia (IFC $8.4 M)
- A number of advisory projects

**IBRD Projects**

- Ukraine
- Bulgaria
- China
- Croatia
- Russia
- Lithuania
- Poland
- Serbia
- Belarus (biomass-based DH)
- Large number of advisory projects: e.g.
- Moldova (Chisinau)
- Regional Balkans Biomass DH
Success Factors

Political commitment

Financing

Regulatory framework
Regulatory Framework

**Heat Tariffs**
- Full cost-recovery (CAPEX / OPEX) for all customers
- Predictable and stable, politically independent
- Adjustment for fuel price
- Incentives for EE

**Affordability/ Payment Discipline**
- If properly designed, DH should be least-cost
- Targeted safety-nets/ pro-poor subsidies
- Heat payments spread throughout the year
- Good collection mechanism

**Consumption-Based Billing**
- A minimum standard of building-level heat meter
- Heat-cost allocators
- Heat meters
- Legal base for CBB

**Concessions Ownership/PPP**
- Clearly defined property rights and concession terms
- Duration, tariff structure, payment terms (billing cycle), security, inflation, dispute res.
- Termination and buy-out terms

**Co-gen Incentives**
- Access to the power grid
- Co-gen bonus for highly efficient CHPs
- Verification process
- Cost-allocation methods
- GHG regulation

**ETS / GHG Regulation**
- Appropriate level of carbon dioxide prices...
- Adequate allocation of allowances

**Fuel price Incentives**
- Often times cross-subsidized between residential and industrial tariffs
- Clear contractual obligations (price, amount (MCQ), duration, dispute res., etc.)
DH in Romania

Romanian DH Market Main Features

- Serves 4.4 million people, 1.5 million households.
- Around 100 DH companies operating (only two companies are privately operated).
- Tariffs significantly below full cost. Subsidies are provided at municipal level.
DH in Romania is quite expensive..

..largely subsidized by municipalities
DH in Romania, cont’d

Regulatory Framework, Highlights

• Acceptable regulatory environment
  ▪ ANRSC - methodology for heat tariff for heat-only boilers and T&D network;
  ▪ ANRE – methodology for heat and electricity generated at CHPs;
  ▪ Municipalities approve final end-user heat tariffs and related subsidies.

• Cost-plus method (allows for 5 percent profit) is used for heat tariffs.

• Co-generation bonuses for eligible high-efficiency CHPs.

• EU Regional Operational Programs gave a substantial boost for DH rehabilitation – however some municipalities experience difficulties securing their share of financing (bonds, commercial banks).
Botosani DH Rehabilitation

- Client: Municipality of Botosani
- DH Company: Modern Calor (heat sales 140,000 Gcal)
- IFC financing €7.6 million. Total project cost is €45.7 million (50% EU ROS).
- Technical design prepared by JASPERS

Technical details

- Construction of a new cogeneration plant and Heat-only Boilers
  - 2 x 4MWe gas-engines
  - 2 x 52MWth Heat-only boilers
- Upgrade of the heating T&D network
  - Installation of ~25 km of T&D network and rehab of 15 GHS
- Re-connection of 21 large consumers
- EE in Buildings Pilot
**Botosani DH Results**

- **Heat Losses, %**
  - DH Benchmark: 8%
  - Botosani DH 2007: 51%
  - Botosani DH 2013: 31%
  - Botosani Expected: 15%
  - DH Moldova: 24%

- **Electricity Consumption**
  - DH Benchmark: 5 kWh/Gcal
  - Botosani DH 2010: 90.37 kWh/Gcal
  - Botosani DH 2012: 54 kWh/Gcal
  - Botosani Expected: 17 kWh/Gcal
  - DH Moldova: 20 kWh/Gcal

- **Network Breakdowns**
  - DH Benchmark: 0.1 breakdowns per year per km of network
  - Botosani DH 2010: 8.6 breakdowns per year per km of network
  - Botosani DH 2012: 4.7 breakdowns per year per km of network
  - Botosani Expected: 0.5 breakdowns per year per km of network
  - DH Moldova: 1.8 breakdowns per year per km of network

- **Make-up water**
  - DH Benchmark: 2 litres replaced water relative to network volume per annum
  - Botosani DH 2010: 44 litres replaced water relative to network volume per annum
  - Botosani DH 2013: 12 litres replaced water relative to network volume per annum
  - Botosani Expected: 6 litres replaced water relative to network volume per annum
  - DH Moldova: 20 litres replaced water relative to network volume per annum
Continuous support through Advisory Services

**DH Affordability Advisory**

- Following investment, IFC supports the Client in improving operational efficiency through:
  - **Capacity building** for DH company
  - Identification of technical and non-technical opportunities to reduce the cost of heat-supply
    - **Technical**: operational modes, CHP/HoB load optimization, EE investments, etc.
    - **Non-technical**: staffing, organizational set-up, admin costs, etc.

**Fuel costs**
- Fuel price
- Fuel consumption
- Fuel transportation (for solid fuels)
- Fuel mix
- Other fuel-related costs

**Personnel costs**
- Manpower
- Salaries
- Other social benefits costs

**Other operational costs**
- Operation and Maintenance (O&M) costs
- Outsourcing costs
- Administration costs
- Other costs (including rents and leases, debt service, etc)

**Depreciation**
- Planned depreciation
- Normal depreciation

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Hungary
- Fuel: 20%
- Personnel: 15%
- Depreciation: 10%
- Other: 5%

Poland
- Fuel: 30%
- Personnel: 20%
- Depreciation: 15%
- Other: 10%

Finland
- Fuel: 25%
- Personnel: 20%
- Depreciation: 10%
- Other: 10%
Results from DH rehab projects internationally

- **Heat consumption reduction**: 12-20%
- **Fuel consumption reduction**: Up to 20%
- **Heat losses reduction**: Up to 35%
- **Make-up water savings**: Up to over 50%
- **IRR**: 19.5 – 146.3%
Unlocking the Potential for Private Sector Participation in District Heating

• Croatia
• Serbia
• Bosnia and Herzegovina
• Kosovo
• Possibly China and Mongolia
Review of Institutional and Regulatory Framework
- Ownership, concessions, tariffs
- Barriers to private sector
- Recommendations (broader World Bank Group)

International best-practice business and financial models
- **PPP options**: selected private minority equity, private equity via stock exchange, majority private ownership (with municipalities retaining minority stake, etc.)
- **Fully privatized models**: including majority private equity, selected private minority equity, SPV, etc.
- **Heat entrepreneurship** model, etc.

Identification of investment opportunities for the private sector
Thank you!

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Annex Slides
**IFC: Part of the World Bank Group**

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- Loans to middle-income and credit-worthy low-income country governments
- Interest-free loans and grants to governments of poorest countries
- Solutions in private sector development
- Guarantees of private sector investment’s non-commercial risks
- Conciliation and arbitration of investment disputes

**Solutions in private sector development**

- Equity/Quasi-Equity
- Long-term Loans
- Debt mobilization
- Risk management
- Advisory Services
Fiscal Year 2013 Highlights

Investments: 612 new projects in 113 countries

Advisory services: $232 million in program expenditures

$24.8 billion in financing: $18.3 billion for IFC’s own account, $6.5 billion mobilized

$49.6 billion committed portfolio

IDA countries account for almost half of IFC projects overall: $3.5 billion invested in Sub-Saharan Africa