Annex 4 / a – Specific Investment for Rehabilitation of DH Systems

A. FOR THE HEAT SOURCE (Combiner Heat and Power or Boiler House)

A1. ENVIRONMENTAL MEASURES

Item	*Unitary value*	*Comments*
1. Compliance with SO2 requirements **Alternatives:**		
a) Change fuel (usually switch to natural gas). The consultant will give price indications for the following investments: • gas pipe to connect the plant to the gas supplier, • pressure regulation and flow metering stations as required, • any modification / transformation of the existing boiler(s) and stack(s), • dismantling of coal supply existing facilities + land recovery, dismantling of slurry evacuation facilities + closure of existing ash and slag deposits		N.A
b) Close down the unit and build a new unit, with higher energy efficiency and lower SO2 emissions. The consultant will give price indications for: • new, modern, highly efficient power stations or boiler house, upon case • dismantling / demolition of existing plant + land recovery • land purchase, if required.		N.A

c) Switch to a BAT combustion process (boiler). The consultant will give price indications for the modification / transformation of the existing boiler(s) and its accessories		N.A
d) Add Flue Gas Desulphurisation equipment to existing boilers. Give price indications for FGD's and any modification / transformation of the existing boiler, as required by the project and stack(s)	23000000	Boilers 3 x 100 t/h lignite.
2. Compliance with NOx requirements		
Installing new burners, low NOx. The investment will refer to: • new lignite burners and air distrib • new gas/HFO burners • the dismantling of the existing burners with their afferent accessories • any other modification of the existing boiler(s) and stack(s) etc., as required by the project. -post comb grid for lignite -SNCR installations for lignite boiler -overhaul of some heat exchanegrs -automation gas boilers -automation lignite boilers	 7000000 500000-1000000 250000-300000 650000 600000 600000-900000 250000 750000	[price correlated with boiler capacity]. 100 t/h 50-100MW 50-100MW 100 t/h 100 t/h 50-100MW 50-100 MW 100 t/h
3. Compliance with dust requirements		
Add electrostatic dust precipitators or modernise the existing ones.		N.A
4. Compliance with slurry evacuation requirements (semi-dense evacuation)		

Semi-dense evacuation of ash and dust. Although this is not a BAT, it is imposed by Romanian secondary legislation. The price indications will consider the new, semi-dense evacuation system as well as any modification / transformation of the existing equipment, as required		N.A
5. Closure of existing ash & slag deposits		
Give price indications for closure of existing deposits + site / landscape rehabilitation		N.A

A2. ENERGY EFFICIENCY MEASURES

6. Reducing GHG emissions thorough increase of EE		
There is a wide range of measures that can be applied to increase EE at heat source. Depending on the case, the consultant will give price indications for: • change fuel or build a new plant, as specified at A.1.1 • replacing pumps • replacing fans (air, flue gas) • installing VSDs • replacing shell and tube heat exchangers with plate heat exchangers • replacing valves • replacing the A&C • re-insulate the pipes etc. Give also price indication for dismantling / demolition of existing plant + land recovery +	 100000-120000 100000-180000	 N.A. 1000-1300 t/h, 10 bar N.A 400-700 kW N.A N.A [prices per unit] N.A

land purchase, if required.		

B. FOR THE TRANSMISSION NETWORKS

Item	*Unitary value*	*Comments*
Replace the underground transmission pipes (placed in underground channels]		N.A
Replace the above ground transmission pipes		N.A.
Replace the supports trestle bridge, holders etc.		N.A
Metering for each transmission branch, at the heat source		N.A

C. FOR THE DISTRIBUTION NETWORKS

Item	*Unitary value*	*Comments*
Replace the underground transmission pipes (placed in underground channels), usually with preinsulated pipes		N.A
Replace the above ground transmission pipes		N.A
Replace the supports trestle bridge, holders etc.		N.A

D. FOR HEAT DISTRIBUTION SUBSTATIONS

Item	*Unitary value*	*Comments*
Replace the pumps (distribution, recirculation etc.)		N.A
VSD's for distribution pumps, including electric distribution panels		N.A
Replace shell and tubes heat exchangers with plate heat exchangers. Prices will include the new heat exchangers as well as dismantling of existing ones and demolition/transformation of existing foundations		N.A
Modernise A&C in the substations, including everything related to flow / pressure regulation		N.A
Metering for each distribution branch, in the substation		N.A
Replace the underground transmission pipes (placed in underground channels)		N.A
Replace the above ground transmission pipes		N.A
Switch from 4 pipe system to 2 pipe system. Prices will include: • new pipes • local substations • additional works in the substation and at end-user, as requested		N.A
Replace the supports, trestle bridges, holders etc.		N.A
Repair / consolidate / modernise the substation building		N.A

Annex 4 / b – Operating costs for DH Systems

A. FOR THE HEAT SOURCE (Combiner Heat and Power or Boiler House)

Item	*Value*	*Comments*
a) Variable expenses. The consultant will give the values for the following items: • fuel 1 (main) • fuel 2 (main), • fuel 3 (back-up) • other variable expenses (no need to give details)	6700000 51000000 3000000 10000	[all in €/year]
b) Fixed expenses. The consultant will give the values for the following items: • depreciation of assets • repairs and maintenance • other fixed expenses (no need to give details)	1.500.000 1600000 2000000	[all in €/year]
c) Labour	4100000	[€/year]
TOTAL YEARLY O&M COSTS = a + b + c	69910000	[€/year]

REMARK: No need to refer to the replacement of assets during the project life cycle, as this cost is already included in item b), at “repairs and maintenance” position

B. FOR THE DH PIPE SYSTEM (transmission network + heat distribution substation + distribution network)

Item	*Value*	*Comments*
a) Variable expenses. The consultant will give the values for the following items: • power (electricity), • process water • make-up water • heat looses • other variable expenses (no need to give details)	 2700000 3000 36000 14500000 10000	[all in €/year]
b) Fixed expenses. The consultant will give the values for the following items: • depreciation of assets • repairs and maintenance • other fixed expenses (no need to give details)	 1000000 3000000 800000	[all in €/year]
c) Labour	3500000	[€/year]
TOTAL YEARLY O&M COSTS = a + b + c	25550000	[€/year]

REMARK: No need to refer to the replacement of assets during the project life cycle, as this cost is already included in item b), at “repairs and maintenance” position

C. FOR FGDs (for the case of installing an FGD to an existing CHP or BH)

Item	*Value*	*Comments*
a) Variable expenses. The consultant will give the values for the following items: • chemical reactive (limestone or other) • process water • utilities (power, compressed air) • other variable expenses (no need to give details)	883000 12000 300000 5000	[all in €/year]
b) Fixed expenses. The consultant will give the values for the following items: • depreciation of assets • repairs and maintenance • other fixed expenses (no need to give details)	0(grant) 100000 5000	[all in €/year]
c) Labour	22000	[€/year]
TOTAL YEARLY O&M COSTS = a + b + c	1322500	[€/year]

REMARK: No need to refer to the replacement of assets during the project life cycle, as this cost is already included in item b), at “repairs and maintenance” position.

Annex 4 / c – Expected lifespan for equipment and works related to DH Systems

NOTE: In Romania, the expected lifespan of various equipment is detailed in Government Decision 2139 / 2004, therefore the data in the table hereinafter is a selection of this document

Item	*Lifespan [years]*	*Item*	*Lifespan [years]*
Industrial buildings	60	Fossil fuelled Power Plants (CHPs or Condensing)	35
Water works	30	Smoke stacks	35
Boiler Houses and Heat distribution substations	40	Cooling towers	35
Loading ramps	30	Steam turbines, gas turbines	22
Railroad constructions	30	Reciprocating engines	10
Bunkers for coal, limestone etc.	30	Compressors	15
Metallic tanks and reservoirs	30	Transforming stations	12
Overhead power networks, on concrete or metallic pillars	35	Centrifugal pumps	12
Underground power networks	18	Electric engines	18
Water pipes	35	DH pipes, over ground or in underground channels	30
Gas transmission pipes	30	Underground DH pipes	20
Gas distribution pipes	18	Sludge and ash capturing and evacuation installations	25