

UNDA PROJECT ON “PROMOTING RENEWABLE ENERGY INVESTMENTS FOR CLIMATE CHANGE MITIGATION AND SUSTAINABLE DEVELOPMENT”

UNDA PROJECT CLOSING WORKSHOP:

“Renewable Energy UNDA project conclusions and way forward”

13-14 December 2017, Beirut - Lebanon

Economic And Social Commission For Western Asia / United Nations Economic Commission for Europe

UNDA RENEWABLE ENERGY ESCWA PIPELINE PROJECTS



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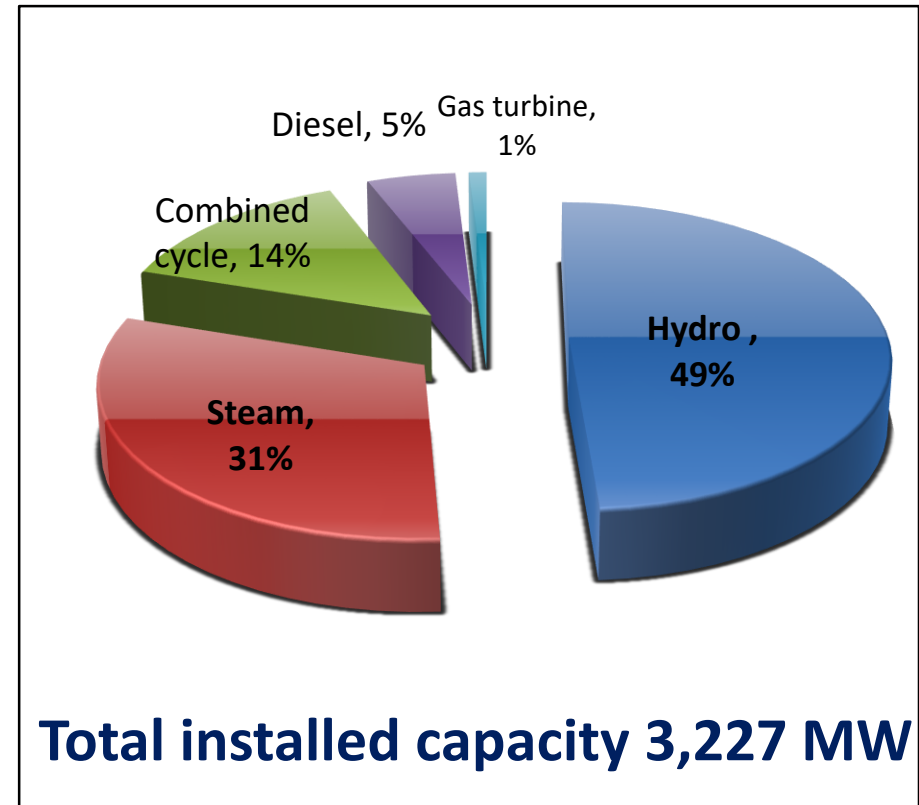
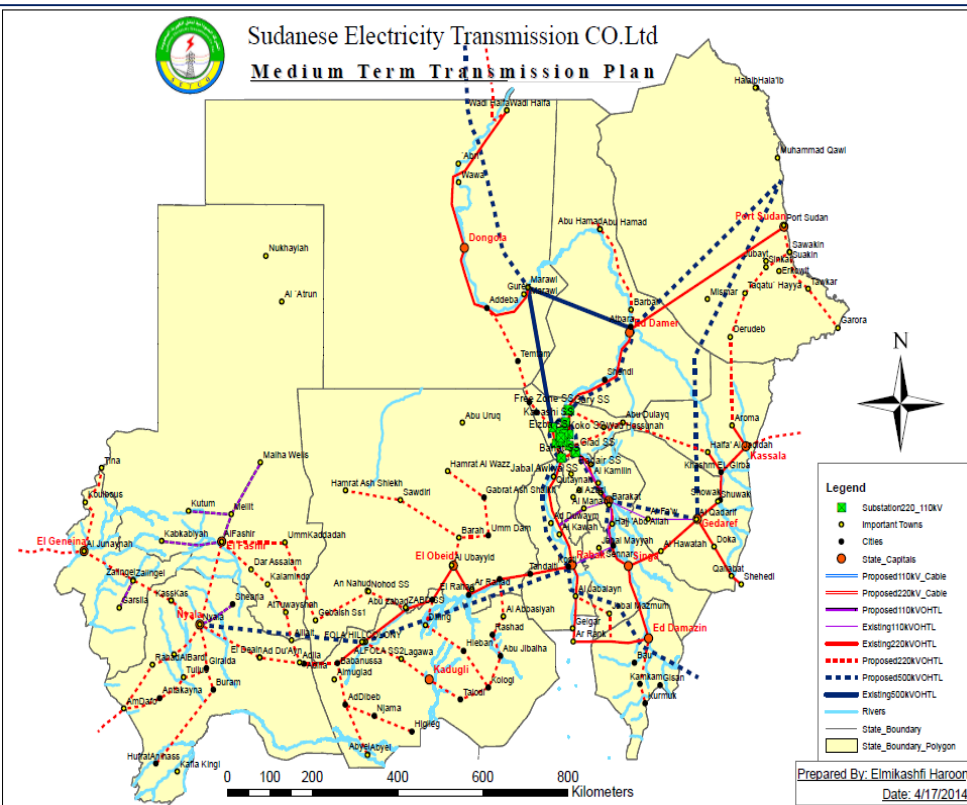
**Khartoum State Waste to Energy Plants
(5 WtE plants)**

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Sudan – Electricity Profile

Electrification rate about 35 - 40%

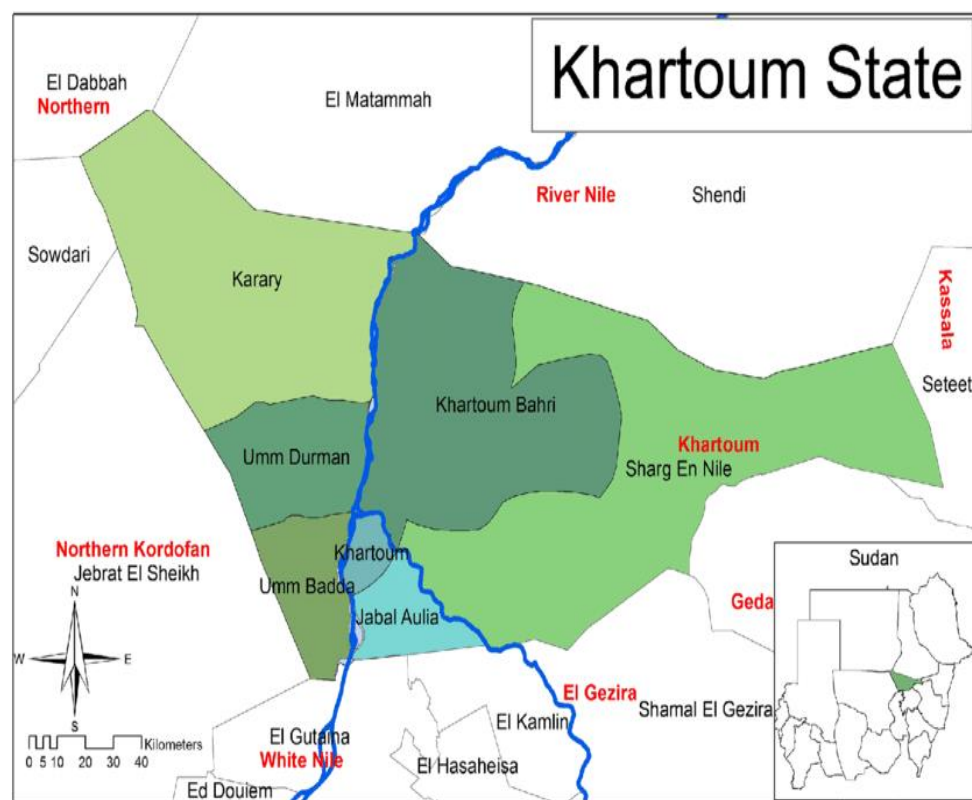


Production growth rate = 14%

Consumption growth rate = 26%/year

Khartoum State— Electricity Profile

Consume more than 50% of total electricity produced



Consumption: 1780
MW

Shortage: 600 MW

Industrial area: 5076
MW

Energy Consumption in Khartoum State

Month	Energy in MWH						Total KWH
	Residential	Industrial	Unified	Agricultural	Government	MEWR	
January	183,902	56,142	55,225	11,022	33,788	615	340,694
February	184,596	54,025	58,955	12,146	37,734	818	348,273
March	240,143	62,538	77,322	14,239	48,868	837	443,947
April	281,766	68,783	86,294	15,700	56,390	914	509,846
May	300,331	71,728	91,068	16,165	62,315	1,185	542,792
June	319,438	70,450	95,196	15,816	63,105	1,244	565,248
July	323,834	53,489	81,345	14,268	59,994	1,496	534,425
August	281,069	58,709	81,180	10,175	56,672	2,271	490,075
September	298,028	69,193	87,774	12,361	61,856	4,234	533,446
October	292,849	58,558	84,522	13,201	54,991	10,973	515,095
November	245,110	74,939	76,043	14,714	53,250	942	464,998
December	229,075	62,792	72,537	14,674	46,782	810	426,671
Total	3,180,141	761,346	947,461	164,480	635,746	26,339	5,715,512
Hours	8,760	8,760	8,760	8,760	8,760	8,760	8,760
MW	363	87	108	19	73	3	652
%	55.64	13.32	16.58	2.88	11.12	0.46	100.00

Project Proposed

Waste to Energy Plants of 52 MWe capacity each plant, and with potential for 5 plants (up to of 250 MWe) in Khartoum State, Sudan. The plants will be using 1.5 million tonnes/year of biomass fraction of municipal solid waste (~50%). Take-or-pay agreement with government electricity agency at set feed-in Indicative price of US\$120/MWh, sale of certified avoided CO₂-e emissions, contracted sale of distributed heat/ steam to neighbouring industry at US\$ 40/MWh.



Project Summary-Financial Indicators

Name	Combined Heat and Power Plants	
Country	Sudan	
Installed capacity	52.00	MWp
Annual production	374,711	MWh
Project cost	260,000,000	\$
Tariff \$/MWh	120.0	
LCOE \$/MWh	163.6	
Finance	scenarios	
	40% equity 60% loan 2%int	40% equity 60% loan 10%int
IRR on total investment	%13	%9
IRR on equity	%35	%25
Net cum disc cash @ year 20 in LC	172,797,389	109,115,326
min DSCR	4.17	1.99

Project Impacts

- ❖ A baseload source of electricity and of industrial heat.
- ❖ A way to greatly reduce the volumes of waste going to landfill by 80% or more
- ❖ A way to provide a far lower-GHG-emissions-form of energy than from fossil-fuelled sources
- ❖ A source of cheap low emission heat and steam for new and existing industries, including recycling/reprocessing industry and biofuels industry
- ❖ Significant job creation in construction and manufacture of buildings, pipelines, power lines and plant

Critical Success factors

Getting all stakeholders to agree to play their roles in this project, arranging long term financing and power and heat off-take agreements, and bringing the necessary partners in which have expertise and can carry out the engineering, equipment supply, and construction to the necessary high standards.

Getting a general agreement to the need for this project, and of the high environmental and energy benefits versus the low environment, economic and social risks.

More detailed business plan, including technical, fuel, environmental and legal studies are prepared and the stakeholder initiate discussions with potential PPP partners.

Link to UN DA project: <https://www.unescwa.org/node/94046>

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THANK YOU FOR YOUR ATTENTION