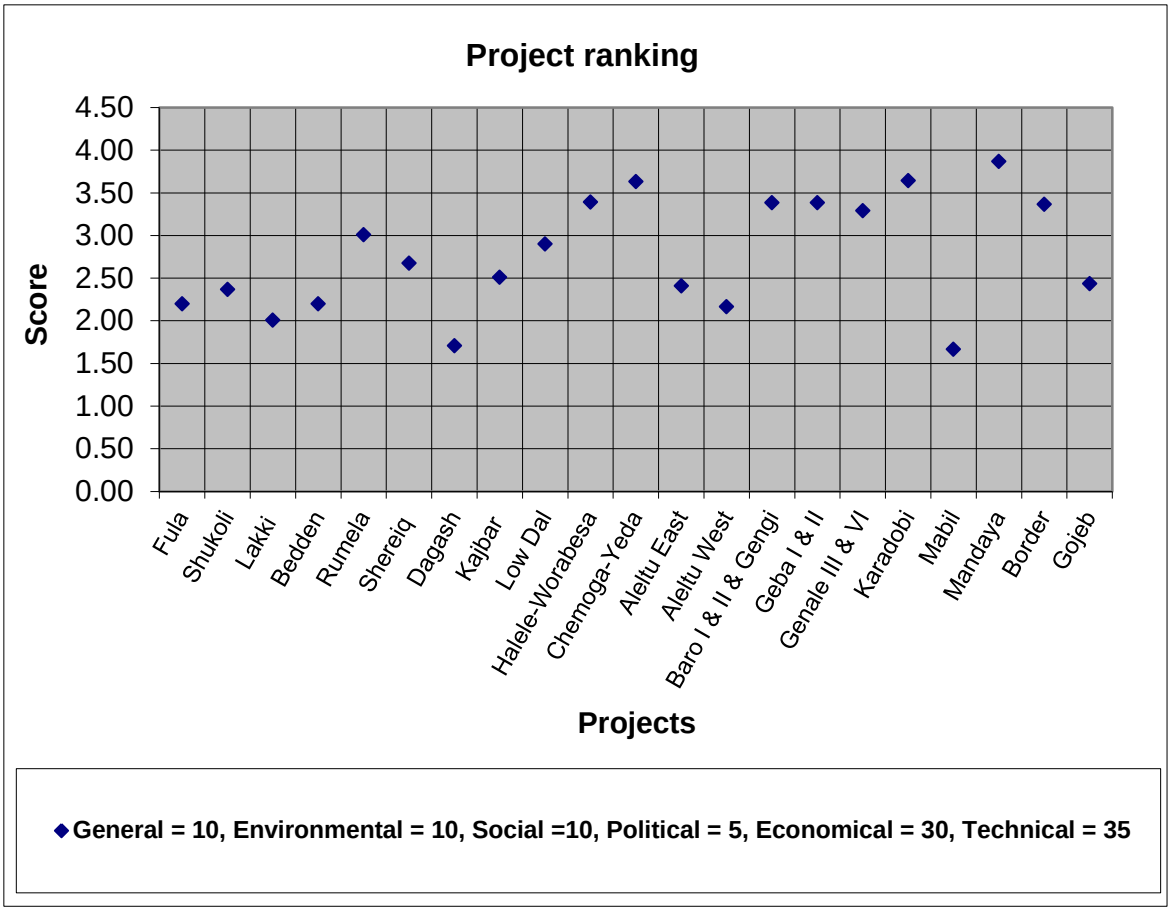
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Lakki
Bedden
Rumela
Shereiq
Dagash
Kajbar
Low Dal
Halele-Worabesa
Chemoga-Yeda
Aleltu East
Aleltu West
Baro I & II & Gengi
Geba I & II
Genale III & VI
Karadobi
Mabil
Mandaya
Border
Gojeb
Projects
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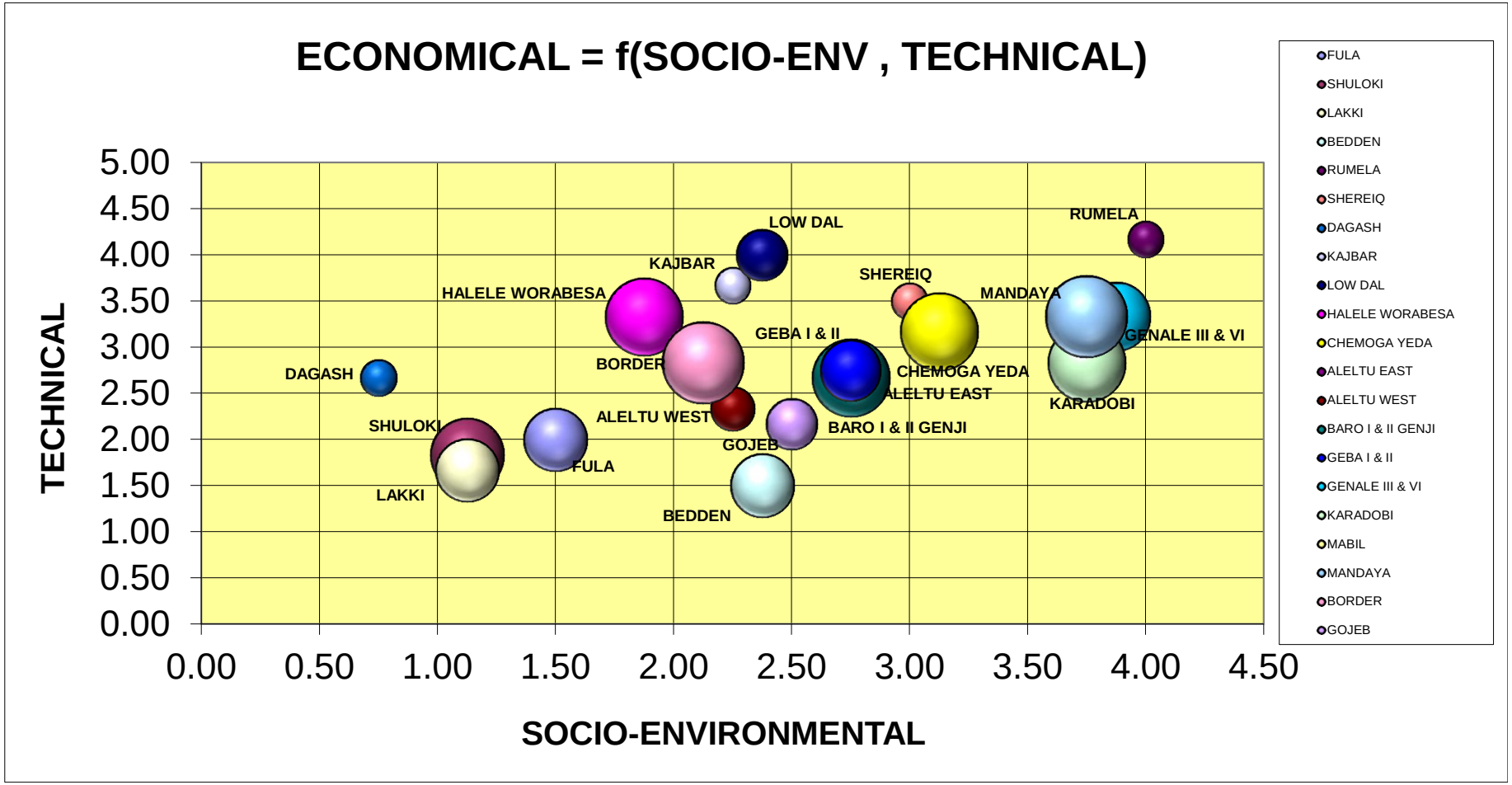
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GEBA I & II
BORDER
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SHULOKI
LAKKI
ALELTU WEST
FULA
GOJEB
BEDDEN
SHEREIQ
CHEMOGA YEDA
ALELTU EAST
BARO I & II GENJI
RUMELA
MANDAYA
GENALE III & VI
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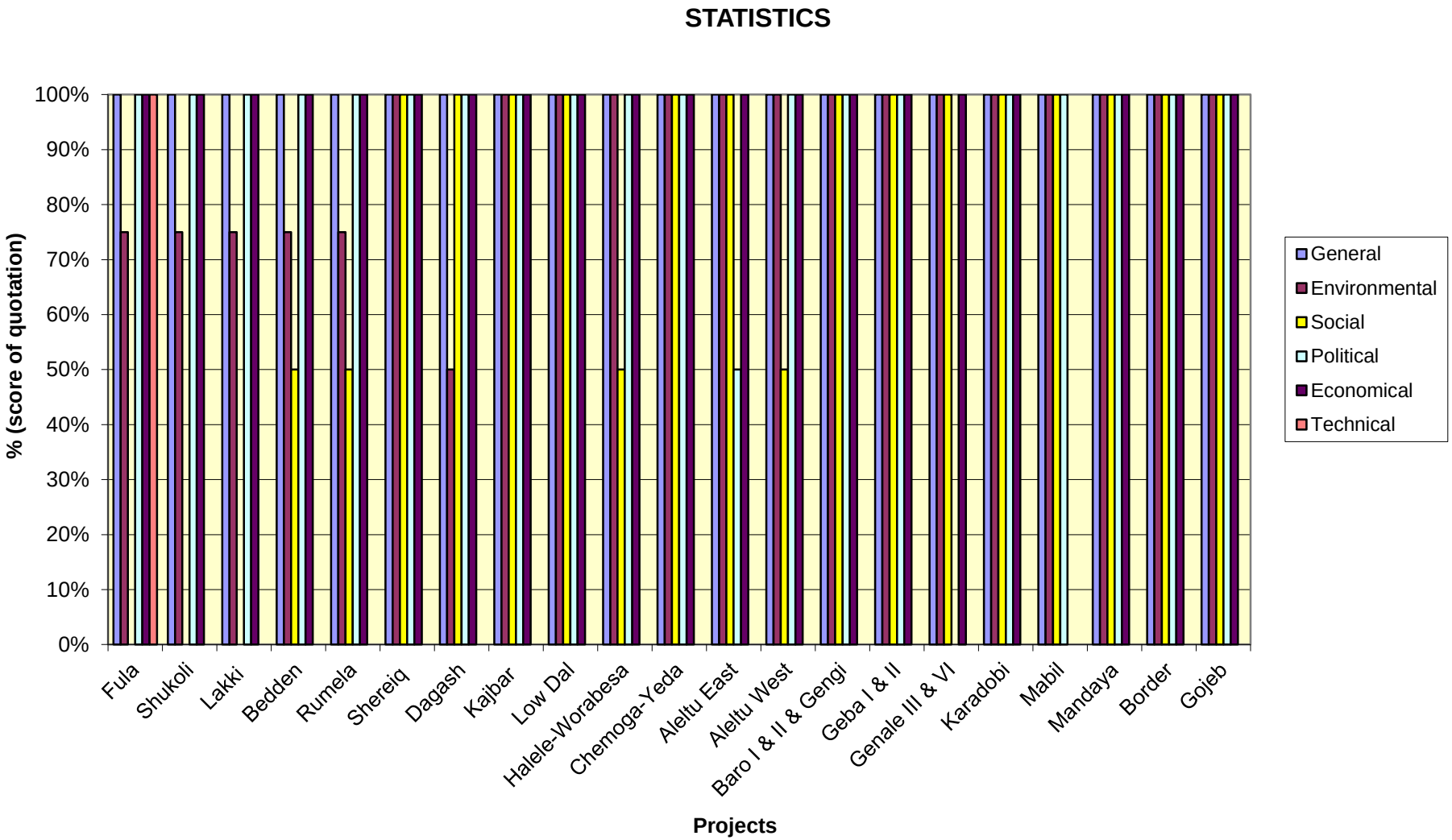
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Kajbar
Low Dal
Halele-Worabesa
Chemoga-Yeda
Aleltu East
Aleltu West
Baro I & II & Gengi
Geba I & II
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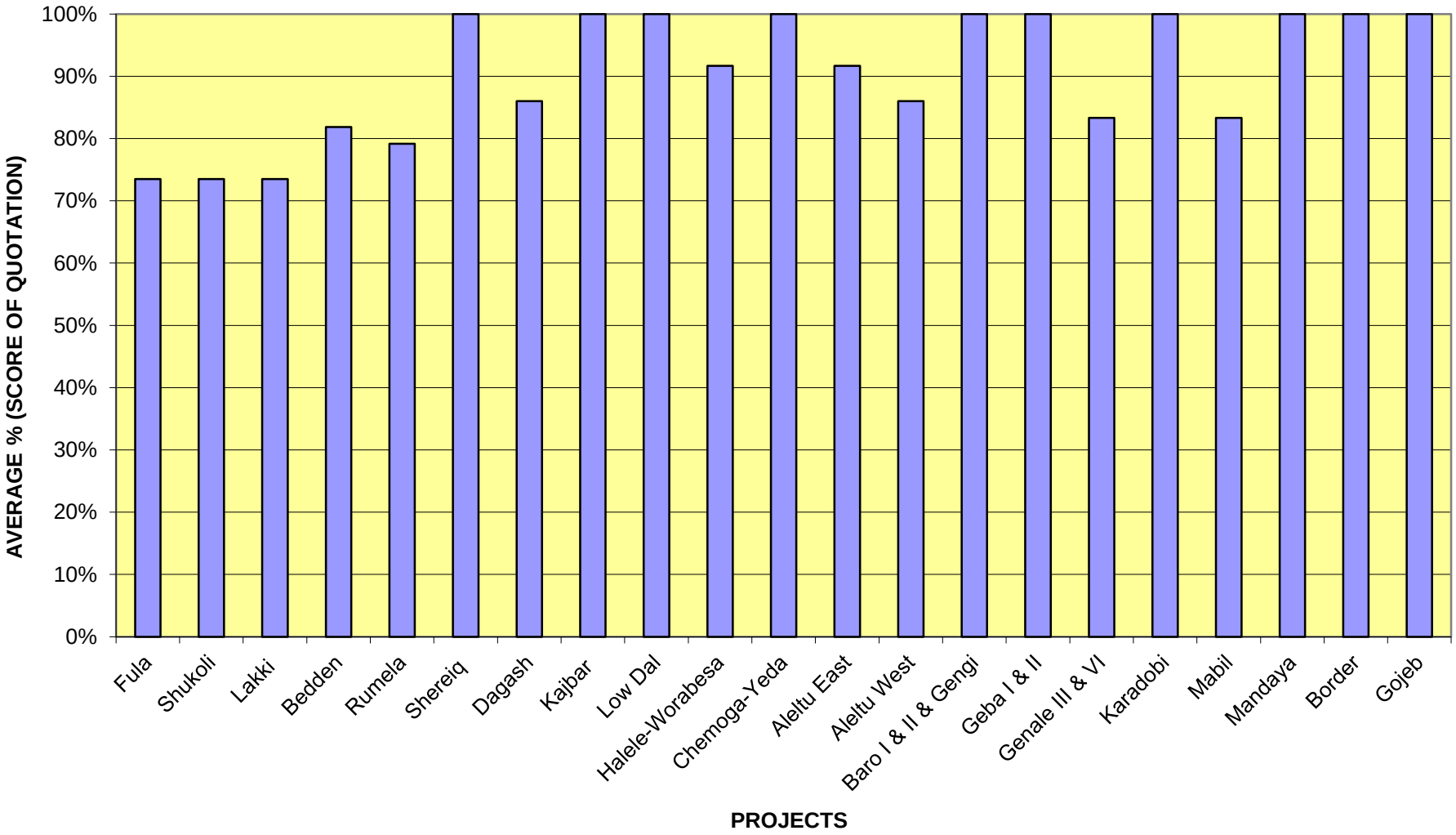
Border
Gojeb
Projects
General
Environmental
Social
Political
Economical
Technical

STATISTICS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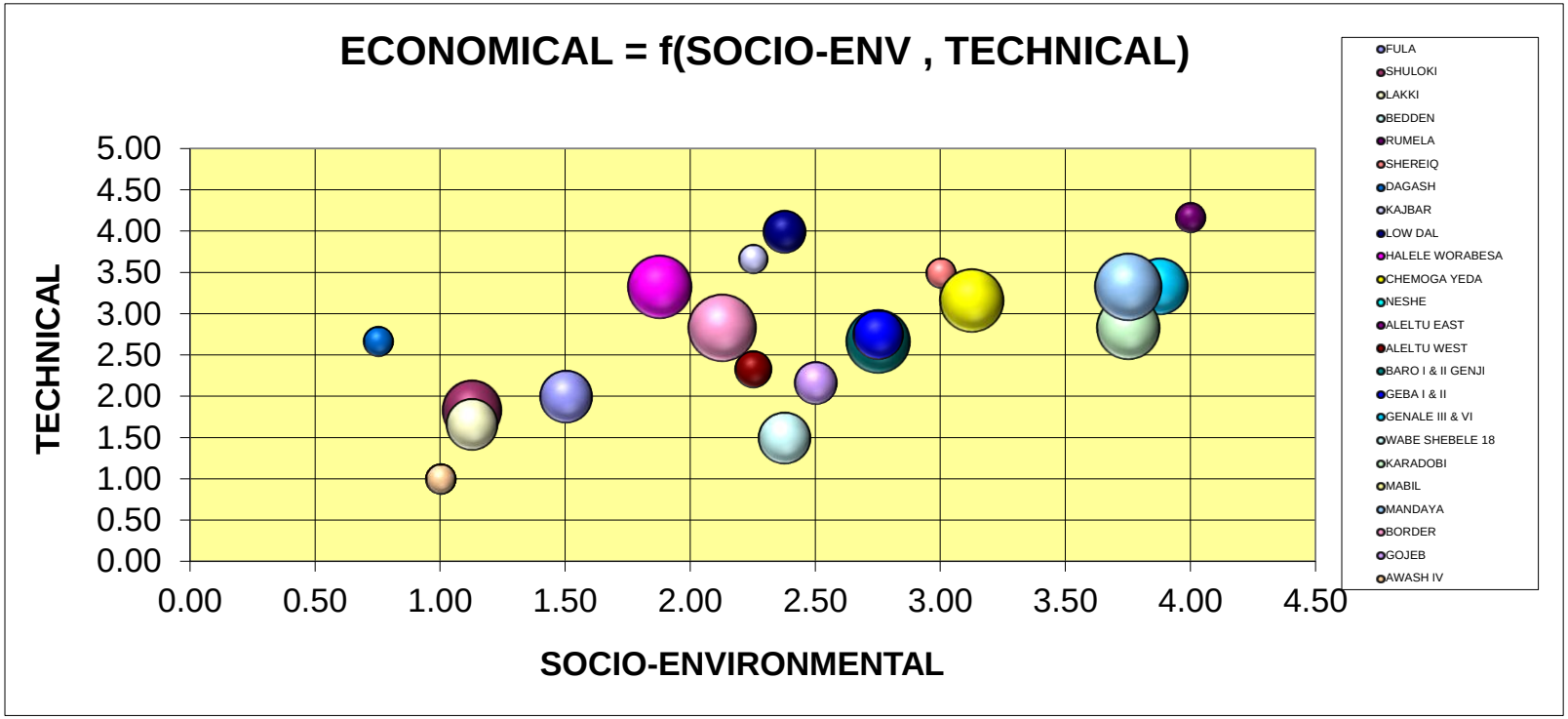
Kajbar
Low Dal
Halele-Worabesa
Chemoga-Yeda
Aleltu East
Aleltu West
Baro I & II & Gengi
Geba I & II
Genale III & VI
Karadobi
Mabil
Mandaya
Border
Gojeb
PROJECTS

	CRITERIA						
Project Name	**General**	**Environmental**	**Social**	**Political**	**Economical**	**Technical**	**Average**
Fula	100%	75%	0%	100%	100%	66%	74%
Shukoli	100%	75%	0%	100%	100%	66%	74%
Lakki	100%	75%	0%	100%	100%	66%	74%
Bedden	100%	75%	50%	100%	100%	66%	82%
Rumela	100%	75%	50%	100%	100%	50%	79%
Shereiq	100%	100%	100%	100%	100%	100%	100%
Dagash	100%	50%	100%	100%	100%	66%	86%
Kajbar	100%	100%	100%	100%	100%	100%	100%
Low Dal	100%	100%	100%	100%	100%	100%	100%
Halele-Worabesa	100%	100%	50%	100%	100%	100%	92%
Chemoga-Yeda	100%	100%	100%	100%	100%	100%	100%
Aleltu East	100%	100%	100%	50%	100%	100%	92%
Aleltu West	100%	100%	50%	100%	100%	66%	86%
Baro I & II & Gengi	100%	100%	100%	100%	100%	100%	100%
Geba I & II	100%	100%	100%	100%	100%	100%	100%
Genale III & VI	100%	100%	100%	0%	100%	100%	83%
Karadobi	100%	100%	100%	100%	100%	100%	100%
Mabil	100%	100%	100%	100%	0%	100%	83%
Mandaya	100%	100%	100%	100%	100%	100%	100%
Border	100%	100%	100%	100%	100%	100%	100%
Gojeb	100%	100%	100%	100%	100%	100%	100%
Average	88%	80%	67%	81%	83%	77%	**79%**

	10%					10%			10%			5%			30%									35%	100%	
WEIGHT	2					2			2			1			6									7	20	
	General	Environmental					Social			Political / Macroeconomics			Economical / Financial			Technical								TOTAL SCORE	SOCIO ENV
Project Name	Level of studies	GHG reduction	Upstream impacts	Downstream impacts	Reservoir area/energy	Average	Resettlement	Multipurpose benefit	Average	Transboundary benefit	Poverty reduction	Average	Capacity cost	Generation cost	Average	Hydro-Generation risk	Reservoir filling time	Constr. risk	Accesses/Lines	Grid insertion	Hydraulic link (e.g. cascade)	Average		
Fula	2.00	5	0	3	4	3.00	0	0	0.00	1	3	2.00	2	4	3.00	4	0	0	1	2	5	2.00	2.20	1.50
Shukoli	2.00	2	0	3	4	2.25	0	0	0.00	1	3	2.00	3	5	4.00	4	0	0	1	2	4	1.83	2.37	1.13
Lakki	2.00	2	0	3	4	2.25	0	0	0.00	1	3	2.00	2	4	3.00	4	0	0	1	2	3	1.67	2.01	1.13
Bedden	2.00	4	0	3	4	2.75	0	4	2.00	1	3	2.00	2	4	3.00	4	0	0	1	2	2	1.50	2.20	2.38
Rumela	3.00	1	4	5	4	3.50	4	5	4.50	1	5	3.00	1	1	1.00	1	5	4	5	5	5	4.17	3.01	4.00
Shereiq	4.00	4	4	3	1	3.00	2	4	3.00	3	3	3.00	1	1	1.00	1	4	3	4	4	5	3.50	2.68	3.00
Dagash	2.00	5	1	0	0	1.50	0	0	0.00	2	3	2.50	1	1	1.00	4	0	0	4	4	4	2.67	1.71	0.75
Kajbar	4.00	3	3	3	1	2.50	2	2	2.00	1	2	1.50	1	1	1.00	2	5	4	5	4	2	3.67	2.51	2.25
Low Dal	3.00	2	3	5	1	2.75	2	2	2.00	3	2	2.50	2	2	2.00	4	5	4	5	4	2	4.00	2.90	2.38
Halele-Worabesa	4.00	5	4	3	1	3.25	1	0	0.50	1	3	2.00	4	5	4.50	2	4	1	4	4	5	3.33	3.39	1.88
Chemoga-Yeda	4.00	3	3	3	4	3.25	1	5	3.00	3	3	3.00	4	5	4.50	4	3	3	4	3	2	3.17	3.63	3.13
Aleltu East	4.00	2	4	3	3	3.00	2	3	2.50	3	0	1.50	2	1	1.50	2	3	3	3	3	2	2.67	2.41	2.75
Aleltu West	3.00	2	3	4	3	3.00	3	0	1.50	3	3	3.00	2	1	1.50	4	0	3	0	3	4	2.33	2.17	2.25
Baro I & II & Gengi	4.00	4	2	4	4	3.50	3	1	2.00	4	2	3.00	4	5	4.50	1	4	3	1	2	5	2.67	3.38	2.75
Geba I & II	4.00	4	2	4	4	3.50	3	1	2.00	4	2	3.00	4	5	4.50	1	4	3	1	2	5	2.67	3.38	2.75
Genale III & VI	2.00	5	4	4	4	4.25	5	2	3.50	4	0	2.00	3	4	3.50	5	5	2	4	2	2	3.33	3.29	3.88
Karadobi	4.00	5	3	4	4	4.00	4	3	3.50	4	2	3.00	5	4	4.50	5	1	4	1	3	3	2.83	3.64	3.75
Mabil	1.00	3	3	3	4	3.25	4	2	3.00	3	2	2.50	0	0	0.00	1	3	4	2	3	1	2.33	1.67	3.13
Mandaya	3.00	5	3	4	4	4.00	5	2	3.50	4	2	3.00	5	5	5.00	3	3	4	2	3	5	3.33	3.87	3.75
Border	3.00	3	3	4	1	2.75	1	2	1.50	4	2	3.00	5	5	5.00	1	4	4	3	3	2	2.83	3.37	2.13
Gojeb	5.00	1	3	3	3	2.50	3	2	2.50	1	2	1.50	3	1	2.00	1	3	3	3	2	1	2.17	2.43	2.50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SOCIO-ENVIRONMENTAL
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SHULOKI
LAKKI
BEDDEN
RUMELA
SHEREIQ
DAGASH
KAJBAR
LOW DAL
HALELE WORABESA
CHEMOGA YEDA
NESHE
ALELTU EAST
ALELTU WEST
BARO I & II GENJI
GEBA I & II
GENALE III & VI
WABE SHEBELE 18
KARADOBI
MABIL
MANDAYA
BORDER
GOJEB
AWASH IV

FULA

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	LTPSPS : ACRES 1993
Environmental	**2**	**GHG reduction**	**5**	95% Firm energy 2300 GWh
	3	**Upstream impacts**		not available
	4	**Downstream impacts**	**3**	Low siltation problems
	5	**Reservoir area/energy**	**4**	0,0437 $km^{2/}$GWh
Social	**6**	**Resettlement**		not available
	7	**Multipurpose benefit**		not available
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	none
	9	**Poverty reduction**	**3**	In the case of a programme involving local population ; electrification dissemination
Economical / Financial	**10**	**Capacity cost**	**2**	1830 USD2006/kW (720 MW)
	11	**Generation cost**	**4**	49.1 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	Average energy = 4119 GWh Firm = 2300 GWh - White Nile inflows have low seasonality
	13	**Reservoir filling time**		not available
	14	**Constr. risk**		not available
	15	**Accesses/Lines**	**1**	transmission line to main grid not expected before 2020
	16	**Grid insertion**	**2**	Support the development of the southern part of Sudanese grid
	17	**Hydraulic link (e.g. cascade)**	**5**	The first upstream project in Sudan followed by Shukoli

SHUKOLI

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	LTPSPS : ACRES 1993
Environmental	**2**	**GHG reduction**	**2**	95% Firm energy 914 GWh
	3	**Upstream impacts**		not available
	4	**Downstream impacts**	**3**	Low siltation problems
	5	**Reservoir area/energy**	**4**	0,01 $km^{2/}$GWh
Social	**6**	**Resettlement**		not available
	7	**Multipurpose benefit**		not available
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	none
	9	**Poverty reduction**	**3**	In the case of a programme involving local population ; electrification dissemination
Economical / Financial	**10**	**Capacity cost**	**3**	2000 USD2006/kW (210 MW)
	11	**Generation cost**	**5**	45 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	Average energy = 1420 GWh, Firm energy = 914 GWh - White Nile inflows have low seasonality
	13	**Reservoir filling time**		not available
	14	**Constr. risk**		not available
	15	**Accesses/Lines**	**1**	transmission line not expected before 2020 ; 10 MUSD2006
	16	**Grid insertion**	**2**	Support the development of the southern part of Sudanese grid
	17	**Hydraulic link (e.g. cascade)**	**4**	14 km downstream from Fula

LAKKI

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	LTPSPS : ACRES 1993
Environmental	**2**	**GHG reduction**	**2**	95% Firm energy 912 GWh
	3	**Upstream impacts**		not available
	4	**Downstream impacts**	**3**	Low siltation problems
	5	**Reservoir area/energy**	**4**	0,01 $km^{2/}$GWh
Social	**6**	**Resettlement**		not available
	7	**Multipurpose benefit**		not available
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	none
	9	**Poverty reduction**	**3**	In the case of a programme involving local population ; electrification dissemination
Economical / Financial	**10**	**Capacity cost**	**2**	2040 USD2006/kW (210 MW)
	11	**Generation cost**	**4**	46 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	Average energy = 1415 GWh, Firm energy = 912 GWh - White Nile inflows have low seasonality
	13	**Reservoir filling time**		not available
	14	**Constr. risk**		not available
	15	**Accesses/Lines**	**1**	transmission line not expected before 2020 ; 11.9 MUSD2006
	16	**Grid insertion**	**2**	Support the development of the southern part of Sudanese grid
	17	**Hydraulic link (e.g. cascade)**	**3**	24 km downstream from Shukoli

BEDDEN

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	LTPSPS : ACRES 1993
Environmental	**2**	**GHG reduction**	**4**	95% Firm energy 1850 GWh
	3	**Upstream impacts**		not available
	4	**Downstream impacts**	**3**	Low siltation problems
	5	**Reservoir area/energy**	**4**	0,04 $km^{2/}$GWh
Social	**6**	**Resettlement**		not available
	7	**Multipurpose benefit**	**4**	irrigation of the Bahr et Jebel area
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	none
	9	**Poverty reduction**	**3**	In the case of a programme involving local population ; electrification dissemination
Economical / Financial	**10**	**Capacity cost**	**2**	2200 USD2006/kW (400 MW)
	11	**Generation cost**	**4**	49 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	Firm energy = 1850 GWh, average energy = 2700 GWh - White Nile inflows have low seasonality
	13	**Reservoir filling time**		not available
	14	**Constr. risk**		not available
	15	**Accesses/Lines**	**1**	transmission line not expected before 2020 ; 32.8 MUSD2006
	16	**Grid insertion**	**2**	Support the development of the southern part of Sudanese grid
	17	**Hydraulic link (e.g. cascade)**	**2**	66 km downstream from Lakki

RUMELA

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**3**	F/S completed (SOGREAH)
Environmental	**2**	**GHG reduction**	**1**	95% Firm energy 35 GWh
	3	**Upstream impacts**	**4**	No permanent households
	4	**Downstream impacts**	**5**	Reservoir downstream Khasm Elsirba
	5	**Reservoir area/energy**	**4**	
Social	**6**	**Resettlement**	**4**	No permanent households
	7	**Multipurpose benefit**	**5**	Regulation for downstream irrigation - Project having high priority for irrigation purposes
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	none
	9	**Poverty reduction**	**5**	Development of a local associated programme involving local population
Economical / Financial	**10**	**Capacity cost**	**1**	6400 MUSD2006/kW (30 MW)
	11	**Generation cost**	**1**	340 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**1**	Firm energy = 35 GWh, average energy = 82 GWh (Atbara river)
	13	**Reservoir filling time**	**5**	1 month
	14	**Constr. risk**	**4**	No major risks
	15	**Accesses/Lines**	**5**	Few km from grid and roads
	16	**Grid insertion**	**5**	Good effect to balance
	17	**Hydraulic link (e.g. cascade)**	**5**	Reservoir downstream Khasm Elsirba

SHEREIQ

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	Feasibilty Hydroproject & Dar Consult 1999
Environmental	**2**	**GHG reduction**	**4**	95% Firm energy 1936 GWh
	3	**Upstream impacts**	**4**	impact on fish migration ; reduction of agriculture land
	4	**Downstream impacts**	**3**	Regulation, sediment trapping ; impact on fish migration ; reduction of agriculture recession
	5	**Reservoir area/energy**	**1**	386 km² / 1536 GWh (average energy) = 0.25 km²/GWh
Social	**6**	**Resettlement**	**2**	Flooding of settlements and cultivated lands ; densely populated area between Abia and Atbara
	7	**Multipurpose benefit**	**4**	irrigation ; fishery in the case of a development programme ; considered as first priority by Dams Implementation Unit of Sudan
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	Reduction of silt transportation to Egypt
	9	**Poverty reduction**	**3**	In the case of a programme involving local population ; electrification dissemination
Economical / Financial	**10**	**Capacity cost**	**1**	3780 USD2006/kW (315 MW)
	11	**Generation cost**	**1**	122 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**1**	Firm energy = 80 % of average energy
	13	**Reservoir filling time**	**4**	6 months during the low water period
	14	**Constr. risk**	**3**	Low geological risk. Good dam foundations, no undergrounds works.
	15	**Accesses/Lines**	**4**	transmission cost 7 MUSD2006
	16	**Grid insertion**	**4**	National context
	17	**Hydraulic link (e.g. cascade)**	**5**	Impact on Nile cascade : Dagash, Merowe, Kajabar, Dal, etc.

DAGASH

	N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	LTSP Study ACRES 1993
Environmental	**2**	**GHG reduction**	**5**	95% Firm energy 3836 GWh
	3	**Upstream impacts**	**1**	relocation 65km railway (in service) ;
	4	**Downstream impacts**		not available
	5	**Reservoir area/energy**		not available
Social	**6**	**Resettlement**		not available
	7	**Multipurpose benefit**		not available
Political / Macroeconomics	**8**	**Transboundary benefit**	**2**	Reduction of silt transportation to Egypt
	9	**Poverty reduction**	**3**	In the case of a programme involving local population ; electrification dissemination
Economical / Financial	**10**	**Capacity cost**	**1**	3680 USD2006/kW (285MW)
	11	**Generation cost**	**1**	109 USD2006/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	Nile river hydrology, just dowstream of Sheireq (lower risk thanks to regulation from Sheireq)
	13	**Reservoir filling time**		not available
	14	**Constr. risk**		not available
	15	**Accesses/Lines**	**4**	transmission cost 6MUSD2006
	16	**Grid insertion**	**4**	National context
	17	**Hydraulic link (e.g. cascade)**	**4**	Impact on Nile cascade : Merowe, Kajabar, Dal, etc.

KAGBAR

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	F-S
Environmental	**2**	**GHG reduction**	**3**	Low benefit at regional scale / Average energy 1307 GWh/y
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Moderate flooded area. Barrier for fish migration (If Mandaya is not developed, 80% storage loste in 7 years)
	4	**Downstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Gross storage 0.03 x MAR. High evaporation loss
	5	**Reservoir area/energy**	**1**	Ratio = 0.154 km2/Gwh
Social	**6**	**Resettlement**	**2**	Significant inundation of population and loss of resources (flooded land)
	7	**Multipurpose benefit**	**2**	Fisheries could be developed
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	No downstream benefit
	9	**Poverty reduction**	**2**	No direct national benefit (except power)
Economical / Financial	**10**	**Capacity cost**	**1**	5200 USD/kW (high)
	11	**Generation cost**	**1**	107 USD/MWh (high)
Technical	**12**	**Hydro-Generation risk**	**2**	Firm power 176 MW, Firm 98 %
	13	**Reservoir filling time**	**5**	< 1 month @ 50% of inflow (very short)
	14	**Constr. risk**	**4**	Low geological risk. Good dam foundation. No underground works. Good rock mass quality
	15	**Access/Lines**	**5**	Transmission line 220 kV under construction. Acess road under construction.
	16	**Grid insertion**	**4**	Low capacity but close to Egypt, Regional context, transmission line 220 kV under construction
	17	**Hydraulic link (e.g. cascade)**	**2**	Downstream of Merowe, adversely affected by Merowe sediment flushing operation

LOW DAL

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**3**	Pre F-S on going
Environmental	**2**	**GHG reduction**	**2**	Low benefit at regional scale / Average energy 1944 Gwh/y
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Low flooded area. Barrier for fish migration
	4	**Downstream impacts**	**5**	No critical issue for acquatic and terrestrial ecology. Some sediment trapping. Gross storage 0.03 x MAR. High evaporation loss
	5	**Reservoir area/energy**	**1**	Ratio = 0.154 km2/Gwh
Social	**6**	**Resettlement**	**2**	Significant inundation of population and loss of resources (flooded land)
	7	**Multipurpose benefit**	**2**	Fisheries could be developed
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	No downstream benefit
	9	**Poverty reduction**	**2**	No direct national benefit (except power trade with Egypt and Sudan)
Economical / Financial	**10**	**Capacity cost**	**2**	2000 USD/kW (high) - to be confirmed in the current Pre-feasibility Study
	11	**Generation cost**	**2**	75 USD/MWh (high) - to be confirmed in the current Pre-feasibility Study
Technical	**12**	**Hydro-Generation risk**	**4**	Firm power 298 MW, Firm 98 %
	13	**Reservoir filling time**	**5**	< 1 month @ 50% of inflow (very short)
	14	**Constr. risk**	**4**	Low geological risk. Good dam foundation. No underground works. Good rock mass quality
	15	**Access/Lines**	**5**	Close to transmission line under construction (220 kV). Access road under construction.
	16	**Grid insertion**	**4**	Low capacity but close to Egypt, Regional context, transmission line 220 kV under construction
	17	**Hydraulic link (e.g. cascade)**	**2**	Downstream of Merowe, adversely affected by Merowe sediment flushing operation

Halele Werabesa

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	feasability studies (aug. 2000 & dec 2004)
Environmental	**2**	**GHG reduction**	**5**	firm energy : 2 TWh
	3	**Upstream impacts**	**4**	the project won't adversely affect any known endangered species of plants or animals
	4	**Downstream impacts**	**3**	Increased generation at GebeIII,~5%(including the completonof gojeb)
	5	**Reservoir area/energy**	**1**	0,14 km2/GWh (total) ; 0,09 for stage I, 0,61 for stage II
Social	**6**	**Resettlement**	**1**	635 households; reservoir will flood 280 km2 of which 13 are productive
	7	**Multipurpose benefit**		not available
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	national context
	9	**Poverty reduction**	**3**	improve transport to town, will stimulate local trade
Economical / Financial	**10**	**Capacity cost**	**4**	1123 $/kW (2260 $/kW for stage I ; 790 $/kW for stage II)
	11	**Generation cost**	**5**	40$/MWh (75 $/MWH for stage I ; 25 $/MWh for stage II)
Technical	**12**	**Hydro-Generation risk**	**2**	Stage I : firm energy = 93 % of average energy ; Stage II : firm energy = 90 % of average energy(needs to be evaluated in a system context or contribution of the plant to the overall system generation)
	13	**Reservoir filling time**	**4**	< 1 year
	14	**Constr. risk**	**1**	dam foundation : heterogeneous volcanic layers. Underground work in basalt (important length). Uncertainties
	15	**Accesses/Lines**	**4**	30 km of transmission line 230 kV and 30 km of transmission line 115 kV ; 40 km of roads
	16	**Grid insertion**	**4**	national context
	17	**Hydraulic link (e.g. cascade)**	**5**	Gibe III will take advantage of Halele Werabesa regulation

Chemoga- Yeda

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	feasability study
Environmental	**2**	**GHG reduction**	**3**	firm energy : 1350 GWh
	3	**Upstream impacts**	**3**	no specific impact on andegered species of plants or animals. 63 km2 of land flooded in a region intensively cultivated with high demand for land
	4	**Downstream impacts**	**3**	no specific impact on andegered species of plants or animals. Important water supply demand dowstream (human and livestock). Recommendation to construct water supply points
	5	**Reservoir area/energy**	**4**	0,02 km2/GWh
Social	**6**	**Resettlement**	**1**	1462 households, lost of cultivated and grazzing land
	7	**Multipurpose benefit**	**5**	significant potential for irrigation in the area
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	none
	9	**Poverty reduction**	**3**	transport improvement, local rural electrification
Economical / Financial	**10**	**Capacity cost**	**4**	1400 $/kW
	11	**Generation cost**	**5**	37 $/MWh (55 $/MWh for Chemoga Yeda I ; 32 for Chemoga -Yeda II)
Technical	**12**	**Hydro-Generation risk**	**4**	firm energy = 97 % of average energy (driest year production : 90 % of firm energy),compare it in a system context)
	13	**Reservoir filling time**	**3**	2 wet seasons
	14	**Constr. risk**	**3**	6 km of tunnel for stage I ; 12 km for stage II (including tailrace); underground powerhouse for stage II. Quite poor rockmass quality. Powerhouse in good gneiss. Presence of landslides for stage II
	15	**Accesses/Lines**	**4**	70 km of new road; 45 km of transmission line (230 kV)
	16	**Grid insertion**	**3**	regional context
	17	**Hydraulic link (e.g. cascade)**	**2**	low impact (project on tributaries of the Abbay river)

Neshe (Committed)

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	Feasability report (sept 05)
Environmental	**2**	**GHG reduction**	**1**	firm energy : 215 GWh
	3	**Upstream impacts**	**4**	no critical issue for terrestrial and aquatic ecology
	4	**Downstream impacts**	**4**	minimal natural flow of 220 l/s maintained downstream
	5	**Reservoir area/energy**	**1**	0,14 km2/GWh
Social	**6**	**Resettlement**	**1**	1100 settlements affected loss of grazing land (decrease of livestock number and of quality of the remaining livestock)
	7	**Multipurpose benefit**	**3**	new irrigation areas and employement (Finchaa sugar estate and factory) some fisheries developments possible
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	none
	9	**Poverty reduction**	**3**	electricfication and access road may develop tourism in the region
Economical / Financial	**10**	**Capacity cost**	**4**	1328 $/kW
	11	**Generation cost**	**1**	$85 to 90 /MWh
Technical	**12**	**Hydro-Generation risk**	**4**	firm production = 95 % of average production
	13	**Reservoir filling time**	**4**	75 % full after 1 wet season
	14	**Constr. risk**	**3**	Fair conditions for dam foundation. Underground works.
	15	**Accesses/Lines**	**4**	construction of 39 km transmission line and 25 km of road
	16	**Grid insertion**	**3**	national context
	17	**Hydraulic link (e.g. cascade)**	**2**	low impact (project on tributaries of the Abbay river)

Aleltu East

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	Feasability study (feb 95)
Environmental	**2**	**GHG reduction**	**2**	firm energy : 780 GWh
	3	**Upstream impacts**	**4**	No critical issue for acquatic and terrestrial ecology. lost of cultivated and grazing land ; localised but significant impact on microclimate ; eutrophication highly probable
	4	**Downstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. impact on water users downstream the chacha reservoir
	5	**Reservoir area/energy**	**3**	0,05 km2/GWh
Social	**6**	**Resettlement**	**2**	460 households
	7	**Multipurpose benefit**	**3**	better water availability for livestock; improved access from gorges tio plateau
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	none
	9	**Poverty reduction**		not available
Economical / Financial	**10**	**Capacity cost**	**2**	2200 $/kW
	11	**Generation cost**	**1**	$95 /MWh (high)
Technical	**12**	**Hydro-Generation risk**	**2**	firm production = 92 % of average production
	13	**Reservoir filling time**	**3**	2 years
	14	**Constr. risk**	**3**	dam foundation : poor for Chacha, fair for Rikicha. Tunnels (12 km) poor rock mass quality. Underground works reduced.
	15	**Accesses/Lines**	**3**	no new road needed. 94 km of new transmission line (230 kV)
	16	**Grid insertion**	**3**	regional context
	17	**Hydraulic link (e.g. cascade)**	**2**	low impact (project on tributaries of the Abbay river)

Aleltu West

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**3**	prefeasability study (jan 94)
Environmental	**2**	**GHG reduction**	**2**	firm energy 983 GWh
	3	**Upstream impacts**	**3**	continual availability of water (positif for agriculture, negatif for health)
	4	**Downstream impacts**	**4**	regulation of flows will improve habitat of present species and perhaps attract other species
	5	**Reservoir area/energy**	**3**	0,08 km2/GWh
Social	**6**	**Resettlement**	**3**	many old orthodox churches in the area
	7	**Multipurpose benefit**		not available
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	none
	9	**Poverty reduction**	**3**	21 M$ for agricultural support programm associated and the families displaced acompanying
Economical / Financial	**10**	**Capacity cost**	**2**	2000 $/kW w/o transmission
	11	**Generation cost**	**1**	$85 $/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	firm production = 94 % of average production
	13	**Reservoir filling time**		not available
	14	**Constr. risk**	**3**	uncertainties (low level of field investigations) dam foundations : fair. Long tunnels, rock mass quality : fair
	15	**Accesses/Lines**		not available
	16	**Grid insertion**	**3**	national context
	17	**Hydraulic link (e.g. cascade)**	**4**	low impact (project on tributaries of the Abbay river)

Geba I & II

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	feasability study
Environmental	**2**	**GHG reduction**	**2**	firm energy : 1700 GWh. Inundation of 30 km2 of rainforest
	3	**Upstream impacts**	**2**	reduction of rainforest area is a very significant impact that cannot be mitigated. Eutrophication higly probable
	4	**Downstream impacts**	**3**	flows regulation may have an impact on Gambela national park (wetland considered as important bird area)
	5	**Reservoir area/energy**	**3**	0,065 km2/GWh (0,13 for Geba I)
Social	**6**	**Resettlement**	**3**	115 households, 2000 ha of grazing land, 39 ha of cultivated land
	7	**Multipurpose benefit**	**3**	no possibilities of irrigation in Geba region but development possible in Gambela plain. Very limited impact on floods in Gambela
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	no transboundary impact
	9	**Poverty reduction**	**3**	new roads increase local trade opportunities
Economical / Financial	**10**	**Capacity cost**	**4**	1400 $/kW
	11	**Generation cost**	**5**	35 $/MWh (Geba I : 55 $/MWh ; Geba II : 25 $/MWh)
Technical	**12**	**Hydro-Generation risk**	**2**	only 2 years of data on Geba river. Sor hydrology has been used with simple proportional relationship. Limited data on floods
	13	**Reservoir filling time**	**4**	1 year
	14	**Constr. risk**	**3**	Geba I : dam, tunnels (10 km) and powerhouse in basalt formation (poor quality). Geba II : powerhouse in crystalline rock (good quality). Tunnels in crystalline rock
	15	**Accesses/Lines**	**3**	difficult acces to project area. new road : 43 km. New transmission line : 220 km
	16	**Grid insertion**	**2**	far from consumption centers
	17	**Hydraulic link (e.g. cascade)**	**4**	Geba II benefits from Geba I regulation

Baro I & II

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	faisability study
Environmental	**2**	**GHG reduction**	**4**	firm energy : 2800 GWh ; inundation of rainforest
	3	**Upstream impacts**	**2**	inondation of 38 km2 of rainforest and 2 km2 of wetland
	4	**Downstream impacts**	**4**	no significant downstream effect
	5	**Reservoir area/energy**	**4**	0,016 km2/GWh
Social	**6**	**Resettlement**	**3**	240 households, 280 ha of grazzing land, 30 ha of arable land
	7	**Multipurpose benefit**	**1**	none
Political / Macroeconomics	**8**	**Transboundary benefit**	**4**	flow regulation can increase irrigation and firm energy in Sudan
	9	**Poverty reduction**	**2**	access roads
Economical / Financial	**10**	**Capacity cost**	**4**	1200 $/kW
	11	**Generation cost**	**5**	42 $/MWh (90 $/MWh for Baro I ; 20/25 $/MWh for Baro II)
Technical	**12**	**Hydro-Generation risk**	**1**	firm energy = 85 % of average energy
	13	**Reservoir filling time**	**4**	26 weeks
	14	**Constr. risk**	**3**	Favorable geological conditions. Underground powerhouses. Baro I dam : gneiss. Tunnel : good rock mass quality. Baro II : weathered basalt (poor)
	15	**Accesses/Lines**	**1**	transmission line to Roseires : 548 km ; 80 km of road development
	16	**Grid insertion**	**2**	Project intended for power export to Sudan and Egypt
	17	**Hydraulic link (e.g. cascade)**	**5**	regulation of Baro flows will increase production in Sudan (135 GWh)

Genale III & VI

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	pre faisability (Genale III prefaisability study not available, but most impats and costs are linked with this first stage)
Environmental	**2**	**GHG reduction**	**5**	firm energy = (1010+1200)GWh / y
	3	**Upstream impacts**	**4**	none (second equipment in a cascade). Genale III impacts not available
	4	**Downstream impacts**	**4**	Genale VI does not alter regulation from Genale III
	5	**Reservoir area/energy**	**4**	0, 004 km2/ GWh
Social	**6**	**Resettlement**	**5**	no resettlement
	7	**Multipurpose benefit**	**2**	none
Political / Macroeconomics	**8**	**Transboundary benefit**	**4**	Export to KENYA
	9	**Poverty reduction**		not available
Economical / Financial	**10**	**Capacity cost**	**3**	1686 $/kW
	11	**Generation cost**	**4**	40 / 60 $/MWh
Technical	**12**	**Hydro-Generation risk**	**5**	firm energy = 98 % of average energy
	13	**Reservoir filling time**	**5**	6 days
	14	**Constr. risk**	**2**	Uncertainties. 16 km of tunnel, large surge tank. Open air powerhouse. Presence of karst (dans foundations and reservoir)
	15	**Accesses/Lines**	**4**	84 km of transmission line to Genale III
	16	**Grid insertion**	**2**	production exportation to Kenya
	17	**Hydraulic link (e.g. cascade)**	**2**	benefits from regulation of Genale III

Wabe Shebele 18

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**2**	excerpt from masterplan (not available)
Environmental	**2**	**GHG reduction**	**2**	firm energy 927 GWh
	3	**Upstream impacts**	**5**	The project has no major negative impacts. No mitigation and monitoring cost.
	4	**Downstream impacts**	**5**	The project has no major negative impacts. No mitigation and monitoring cost.
	5	**Reservoir area/energy**	**2**	0,095 km2/GWh
Social	**6**	**Resettlement**	**5**	no social and economic loss
	7	**Multipurpose benefit**	**5**	The plant is meant mainly for irrigation (92,400 ha), and also for Flood Control, Water Supply, Fisheries and Tourism Development Project
Political / Macroeconomics	**8**	**Transboundary benefit**	**2**	Flow reduction to Somali
	9	**Poverty reduction**		not available
Economical / Financial	**10**	**Capacity cost**	**1**	6300 $/kW
	11	**Generation cost**	**1**	90 $/MWh
Technical	**12**	**Hydro-Generation risk**	**4**	firm energy = 927 GWh for more than 70 % of the year
	13	**Reservoir filling time**		not available
	14	**Constr. risk**		not available
	15	**Accesses/Lines**		not available
	16	**Grid insertion**	**3**	238 km from Bale Robe substation
	17	**Hydraulic link (e.g. cascade)**	**2**	downstream Malka Wakana (existing)

GOJEB

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**5**	Detailed design and bid documents completed
Environmental	**2**	**GHG reduction**	**1**	Low benefit at regional scale / firm energy 420 GWh/y, Average energy 594 Gwh/y
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Moderate flooded area. Barrier for fish migration
	4	**Downstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Partial regulation. Sediment trapping.
	5	**Reservoir area/energy**	**3**	Ratio = 0.062 km2/Gwh
Social	**6**	**Resettlement**	**3**	Small number of permanent households inundated (55) and loss of resources (flooded land)
	7	**Multipurpose benefit**	**2**	Fisheries could be developed
Political / Macroeconomics	**8**	**Transboundary benefit**	**1**	none
	9	**Poverty reduction**	**2**	No direct national benefit (except power)
Economical / Financial	**10**	**Capacity cost**	**3**	1600 USD/kW (high)
	11	**Generation cost**	**1**	95 USD/MWh (very high)
Technical	**12**	**Hydro-Generation risk**	**1**	Firm power 48 MW, Firm energy = 70 % of average
	13	**Reservoir filling time**	**3**	2 years
	14	**Constr. risk**	**3**	Low geological risk. Good dam foundation. Surface powerhouse.
	15	**Access/Lines**	**3**	Transmission line from Gojeb 50 KM to Jima ,95KM to G.Gibe,125KM to Wolita Sodo,all 230KV
	16	**Grid insertion**	**2**	National context
	17	**Hydraulic link (e.g. cascade)**	**1**	None

Awash IV

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	feasability study (oct. 2005) Geological and geotechnical investigations (nov 2004 - Sept. 2005)
Environmental	**2**	**GHG reduction**	**1**	firm energy : 144 GWh
	3	**Upstream impacts**	**4**	Elimination of 2 ha of riverine forest, 9 ha of irrigated lands
	4	**Downstream impacts**	**4**	substraction of water from the Awash over a strech of 5 km
	5	**Reservoir area/energy**	**2**	0,12 km2/GWh (firm energy)
Social	**6**	**Resettlement**	**4**	50 houses, to be rebuild in the immediacy
	7	**Multipurpose benefit**	**2**	Increase of the percentage of land irrigated by gravity rather than by pumping
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	none (the Awash is a domestic river)
	9	**Poverty reduction**	**3**	$1 100 000 for environnemental & social mitigation to improve local living conditions (water treatment plant, medical poste, school and other facilities)
Economical / Financial	**10**	**Capacity cost**	**4**	1200 $/kW
	11	**Generation cost**	**5**	$43 /MWh
Technical	**12**	**Hydro-Generation risk**	**2**	firm production = 90 % of average production. Energy production will decrease with sedimentation in Koka dam and irrigation developpement in Wonji.
	13	**Reservoir filling time**	**4**	< 1 year
	14	**Constr. risk**	**4**	No major geological problem foreseen. Open air works.Good conditions for weir foundations, canal and penstock
	15	**Accesses/Lines**	**5**	new road : 3,5 km. New transmission line (132 kV) : 3,8 km (to Awash III)
	16	**Grid insertion**	**5**	38 MW project. 100 km from Addis Ababa
	17	**Hydraulic link (e.g. cascade)**	**2**	downstream Koka dam, Awah II & III

KARADOBI

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**4**	Pre F-S, F-S on going
Environmental	**2**	**GHG reduction**	**5**	High benefit at regional scale / average enegy 8293 GWh/y
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Large flooded area. Barrier for fish migration
	4	**Downstream impacts**	**4**	No critical issue for acquatic and terrestrial ecology. Regulation. Sediment trapping. Flood alleviation. Filling time = crutial. Navigation improved downstream
	5	**Reservoir area/energy**	**4**	Ratio = 0,046 km2/Gwh
Social	**6**	**Resettlement**	**4**	No permanent household but loss of ressources (flooded land)
	7	**Multipurpose benefit**	**3**	Fisheries could be developped
Political / Macroeconomics	**8**	**Transboundary benefit**	**4**	Downstream benefit in Sudan (Flood, inflow, sedimentation)
	9	**Poverty reduction**	**2**	No direct national benefit (except power trade with Egypt and Sudan)
Economical / Financial	**10**	**Capacity cost**	**5**	1390 USD/kW (low)
	11	**Generation cost**	**4**	50 USD/MWh (low)
Technical	**12**	**Hydro-Generation risk**	**5**	Firm energy = 94 % of average
	13	**Reservoir filling time**	**1**	3 years (long)
	14	**Constr. risk**	**4**	Low geological risk. Good dam foundation (gneiss). Large cavern for powerhouse. Tunnel lenth reduced. Good rock mass quality
	15	**Accesses/Lines**	**1**	Transmission line 480 km to Roseires (500 kV). Important access roads to be built.
	16	**Grid insertion**	**3**	Regional context
	17	**Hydraulic link (e.g. cascade)**	**3**	Regulation not needed for downstream projects (Mandaya, Border) but benefit for Roseires in case of Karadobi alone.

MABIL

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**1**	Identification studies only (1964, USBR)
Environmental	**2**	**GHG reduction**	**3**	Moderate benefit at regional scale / average energy 5314 GWh/y, Firm energy estimated at 2500 Gwh/y
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Fairly large flooded area. Barrier for fish migration
	4	**Downstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Sediment trapping. Flood alleviation. Navigation improved downstream
	5	**Reservoir area/energy**	**4**	Ratio = 0.046 km2/Gwh
Social	**6**	**Resettlement**	**4**	No permanent household but loss of resources (flooded land)
	7	**Multipurpose benefit**	**2**	Fisheries could be developed
Political / Macroeconomics	**8**	**Transboundary benefit**	**3**	Small downstream benefit in Sudan (Flood, inflow, sedimentation)
	9	**Poverty reduction**	**2**	No direct national benefit (except power trade with Egypt and Sudan)
Economical / Financial	**10**	**Capacity cost**		not available
	11	**Generation cost**		not available
Technical	**12**	**Hydro-Generation risk**	**1**	Firm energy < 50 % of average
	13	**Reservoir filling time**	**3**	1.5 years @ 50% of inflow (medium)
	14	**Constr. risk**	**4**	Fairly low geological risk. Good dam foundation (gneiss). Large cavern for powerhouse. Good rock mass quality
	15	**Access Lines**	**2**	Transmission line 320 km to Roseires (500 kV). Important access roads to be built.
	16	**Grid insertion**	**3**	Regional context
	17	**Hydraulic link (e.g. cascade)**	**1**	Site flooded by Mandaya FSL 800m. Refer to new replacement site Beko Abo. Upstream regulation (Karadobi) needed for maximum firm energy. No significant benefit for downstream projects (Mandaya, Border, Roseires)

MANDAYA

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**3**	Pre F-S on going
Environmental	**2**	**GHG reduction**	**5**	High benefit at regional scale / average energy 16 000 GWh/y (12 119 if no upstream large dam)
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Large flooded area. Barrier for fish migration
	4	**Downstream impacts**	**4**	No critical issue for acquatic and terrestrial ecology. Regulation. Sediment trapping. Flood alleviation. Gross storage 1.54 x MAR, Filling time = 3 years @ 50% of inflow. Navigation improved downstream
	5	**Reservoir area/energy**	**4**	Ratio = 0.066 km2/Gwh
Social	**6**	**Resettlement**	**5**	600 people
	7	**Multipurpose benefit**	**2**	Fisheries could be developed
Political / Macroeconomics	**8**	**Transboundary benefit**	**4**	Downstream benefit in Sudan (Flood, inflow, sedimentation)
	9	**Poverty reduction**	**2**	No direct national benefit (except power trade with Egypt and Sudan)
Economical / Financial	**10**	**Capacity cost**	**5**	1000 USD/kW (low)
	11	**Generation cost**	**5**	35 USD/MWh (low)
Technical	**12**	**Hydro-Generation risk**	**3**	Firm energy = 92 % of average
	13	**Reservoir filling time**	**3**	3 years @ 50% of inflow (long)
	14	**Constr. risk**	**4**	Low geological risk. Good dam foundation (gneiss). Surface power station. Few underground works. Good rock mass quality
	15	**Access/Lines**	**2**	Transmission line 260 km to Roseires (500 kV). Important access roads to be built.
	16	**Grid insertion**	**3**	Regional context
	17	**Hydraulic link (e.g. cascade)**	**5**	Floods site of Mabil dam upstream but new site (Beko Abo) selected to replace Mabil. Regulation benefit for downstream projects (Border) and benefit for Roseires in case of Mandaya alone.

BORDER

	Criteria N°	CRITERIA	Quotation	Justification
General	**1**	**Level of studies**	**3**	Pre F-S on going
Environmental	**2**	**GHG reduction**	**3**	Fairly high benefit at regional scale / firm energy 3966 GWh/y, Average energy 6011 Gwh/y
	3	**Upstream impacts**	**3**	No critical issue for acquatic and terrestrial ecology. Large flooded area. Barrier for fish migration
	4	**Downstream impacts**	**4**	No critical issue for acquatic and terrestrial ecology. Regulation. Sediment trapping. Flood alleviation. Filling time = crutial. Navigation improved downstream
	5	**Reservoir area/energy**	**1**	Ratio = 0.145 km2/Gwh
Social	**6**	**Resettlement**	**1**	Estimated 14,000 persons and loss of resources (flooded land)
	7	**Multipurpose benefit**	**2**	Fisheries could be developed
Political / Macroeconomics	**8**	**Transboundary benefit**	**4**	Some downstream benefit in Sudan (Flood, inflow, sedimentation)
	9	**Poverty reduction**	**2**	No direct national benefit (except power trade with Egypt and Sudan)
Economical / Financial	**10**	**Capacity cost**	**5**	1000 USD/kW (low)
	11	**Generation cost**	**5**	35 USD/MWh (low)
Technical	**12**	**Hydro-Generation risk**	**1**	Firm energy = 66 % of average
	13	**Reservoir filling time**	**4**	< 0.5 years @ 50% of inflow (very short)
	14	**Constr. risk**	**4**	Very low geological risk. Good dam foundation (granite). Surface powerhouse. No underground works. Good rock mass quality
	15	**Access/Lines**	**3**	Transmission line 140 km to Roseires (500 kV). Important access roads to be built.
	16	**Grid insertion**	**3**	Regional context
	17	**Hydraulic link (e.g. cascade)**	**2**	Needs regulation from upstream downstream projects (Mandaya, Karadobi) for maximum firm energy benefits