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FINANCIAL CONTRIBUTIONS TO THE AFRICAN REGIONAL CENTRE FOR SOLAR ENERGY BY ITS MEMBER STATES

I. INTRODUCTION

1. There could be three possibilities to establish the scale of assessment for the financial contributions of the members of the Centre:

- the OAU scale of assessment
- the United Nations scale of assessment
- the "weighted parameters approach" scale of assessment.

II. THE OAU SCALE OF ASSESSMENT

2. The OAU scale of assessment takes two parameters into consideration, namely: GDP and Population. According to this method:

(a) the percentage of contributions of each member State is equal to the average of the GDP, quotients of the member State concerned divided by the total GDP of all OAU member States multiplied by 100;

(b) the population of the member States concerned is divided by the total population of all OAU member States multiplied by 100;

(c) the percentage of GDP and population of each member State would be added and divided by 2 to obtain the total average percentage of the GDP and population.

3. The OAU scale used in this document is based on the statistical data covering 1979; it has been approved by the Assembly during its thirty-seventh Ordinary Session held in Nairobi, Kenya, from 15 to 21 June 1981 and will become operational starting June 1st, 1982.

4. The percentage to be contributed by each member of the African Regional Centre for Solar Energy, according to the OAU scale of assessment is given in Annex I. These percentages are calculated on the current number of members of the Centre (fourteen), which implies that with the increase in number of membership, the percentage of the contribution will decrease.

5. The percentage of contribution as illustrated in Annex I is intended to initial and regular budget of the Centre and does not take into consideration donor countries' contribution or other sources.

III. THE UN SCALE OF ASSESSMENT

6. The UN Scale of assessment takes into account the national income and per capita income. It has a minimum rate of 0.01 per cent, applies an allowance formula in establishing rates of assessment for low per capita income countries and keeps in mind the continuing disparity between the economies of developed and developing countries.

7. This scale grants a maximum relief of 75 per cent to developing countries with below $US 1800 per capita income level. The calculation is done as follows: the difference between $US 1,800 and per capita national income below that figure is expressed as a ratio of $US 1,800 with 75 per cent of that ratio applied as a percentage reduction from the total national income of a member State for the purpose of assessment. Thus, when the per capita national income of a member State is less than $US 1,800, that State receives a percentage reduction from its total national income, as illustrated below:

$$\frac{(1,800 - \text{per capita i national income})}{1,800} \times 75 \text{ per cent}$$

On the other hand, when the per capita national income of a member State was equal to or greater than $US 1,800, no reduction is made from that State's national income. At the second step, the total reduction for all countries below $US 1,800 is distributed pro rata among all member States.

8. As it appears in Annex II, the UN scale of assessment for the contributions of member States, contrary to the terms of reference of the Committee on Contributions, contains excessive variations of assessment.

9. On the basis of UN scale of assessment, percentages were calculated for the contribution to the Centre's budget (Annex II). These percentages were calculated on the basis of the current number of member countries of the Centre (fourteen), which implies that with the increase in number of membership, the percentage of the contribution will progressively decrease.

10. The amount of contribution to the Centre on the basis of UN scale of assessment, as illustrated in Annex II, refers to the initial and regular budget of the Centre and does not take into consideration donor countries' contributions or other additional osources of financing.

IV. THE WEIGHTED PARAMETERS APPROACH SCALE OF ASSESSMENT

11. This calo of assessment has been suggested by ECA secretariat for the African Remote Sensing Council Programme. It takes into consideration a number of parameters such as GNP, income per capita, extent of involvement in specific activities by each member country, etc.

12. A full description of this scale of assessment including examples of its utilization, is given in Annex III. The parameters used in remote sensing field can be replaced by solar energy parameters to be defined and weighted by member countries of the Centre.

V. EXAMPLE OF ASSESSMENT OF CONTRIBUTION TO THE BUDGET OF THE CENTRE (INITIAL BUDGET - FIRST TWO YEARS) ON THE BASIS OF OAU SCALE

(a) Initial budget estimates (first two years) $US 7,463,050

(b) Contribution by member countries (in $US)

	Country	Percentage	Contribution in $US
1.	Angola	4.02	300 014.61
2.	Burundi	2.15	160 455.58
3.	Djibouti	1.34	100 004.87
4.	Egypt	21.33	1 591 868.56
5.	Equatorial Guinea	1.34	100 004.87
6.	Guinea	2.76	205 980.18
7.	Ivory Coast	7.92	591 073.56
8.	Mali	3.03	226 130.42
9.	Niger	3.14	234 339.77
10	Nigeria	26.83	2 002 336.31
11.	Sierra Leone	2.07	154 485.13
12.	Sudan	9.77	729 139.99
13.	Upper Volta	3.09	230 608.25
14.	Zaire	11.21	836 607.90
		100.00	7 463 050.00

VI. EXAMPLE OF ASSESSMENT OF CONTRIBUTION TO THE REGULAR BUDGET OF THE CENTRE (THIRD YEAR) ON THE BASIS OF OAU SCALE

(a) Regular budget estimates (one year of regular functioning) $US 2 783 400

(b) Contribution by member countries (In $US)

	Country	Percentage	Contribution in $US
1.	Angola	4.02	111 892.68
2.	Burundi	2.15	49 843.10
3.	Djibouti	1.34	37 297.56
4.	Egypt	21.33	593 699.22
5.	Equatorial Guinea	1.34	37 297.56
6.	Guinea	2.76	76 821.84
7.	Ivory Coast	7.92	220 445.28
8.	Mali	3.03	84 337.02
9.	Niger	3.14	87 398.76
10.	Nigeria	26.83	746 786.22
11.	Sierra Leone	2.07	57 616.38
12.	Sudan	9.77	271 938.18
13.	Upper Volta	3.09	86 007.-6
14.	Zaire	11.21	321 019.14
	Total %	100.00	2 783 400.00

VII. EXAMPLE OF ASSESSMENT OF CONTRIBUTION TO THE INITIAL BUDGET OF THE CENTRE (FIRST TWO YEARS) ON THE BASIS OF UN SCALE

(a) Initial budget estimates (first two years) US $ 7,463,050
(b) Contribution by member states (in US $) :

	Country	Percentage	Contribution
1.	Angola	2.63	196,278.215
2.	Burundi	2.63	196,278.215
3.	Djibouti	2.63	196,278.215
4.	Egypt	18.42	1,374,693.810
5.	Equatorial Guinea	2.63	196,278.215
6.	Guinea	2.63	196,218.215
7.	Ivory Coast	7.90	589,580.950
8.	Mali	2.63	196,278.215
9.	Niger	2.63	196,278.215
10.	Nigeria	42.11	3,142,690.355
11.	Sierra Leone	2.63	196,278.215
12.	Sudan	2.63	196,278.215
13.	Upper Volta	2.63	196,278.215
14.	Zaire	5.27	393,302.735
		100.00	7,463,050.000

VIII. EXAMPLE OF ASSESSMENT OF CONTRIBUTION TO THE REGULAR BUDGET OF THE CENTRE (THIRD YEAR) ON THE BASIS OF UN SCALE

(a) Regular budget estimates (one year of regular functionning) US $ 2,783,400
(b) Contribution by member countries (in US $)

	Country	Percentage	Contribution
1.	Angola	2.63	73,203.42
2.	Burundi	2.63	73,203.42
3.	Djibouti	2.63	73,203.42
4.	Egypt	18.42	512,702.28
5.	Equatorial Guinea	2.63	73,203.42
6.	Guinea	2.63	73,203.42
7.	Ivory Coast	7.90	219,888.60
8.	Mali	2.63	73,203.42
9.	Niger	2.63	73,203.42
10.	Nigeria	42.11	1,172,089.74
11.	Sierra Leonne	2.63	73,203.42
12.	Sudan	2.63	73,203.42
13.	Upper Volta	2.63	73,203?42
14.	Zaire	5.27	146,685.18
		100.00	2,783,400.00

OAU SCALE OF ASSESSMENT*

	Country	Average percentage of contribution to OAU	Percentage of contribution to the Centre
1.	Angola	1.50	4.02
2.	Burundi	0.80	2.15
3.	Djibouti	0.50	1.34
4.	Egypt	7.95	21.33
5.	Equatorial Guinea	0.50	1.34
6.	Guinea	1.03	2.76
7.	Ivory Coast	2.95	7.92
8.	Mali	1.13	3.03
9.	Nigera	1.77	3.14
10.	Nigeria	10.00	26.83
11.	Sierra Leone	0.77	2.07
12.	Sudan	3.64	9.77
13.	Upper Volta	1.15	3.09
14.	Zaire	4.18	11.21
	Total %	37.27	100.00

* Report of the Ad-Hoc Committee on the review of the scales of of assessment of the Organization of African Unity, CM/1211(XXXVII) Rev.1, Nairobi, 15-21 June 1981.

UN SCALE OF ASSESSMENT*

	Country	Percent contribution to UN Budget	Percent contribution to the Centre
1.	Angola	0.01	2.63
2.	Burundi	0.01	2.63
3.	Djibouti	0.01	2.63
4.	Egypt	0.07	18.42
5.	Equatorial Guinea	0.01	2.63
6.	Guinea	0.01	2.63
7.	Ivory Coast	0.03	7.90
8.	Mali	0.01	2.63
9.	Niger	0.01	2.63
10.	Nigeria	0.16	42.11
11.	Sierra Leone	0.01	2.63
12.	Sudan	0.01	2.63
13.	Upper Volta	0.01	2.63
14.	Zaire	0.02	5.27
	Total %	0.38	100.00

* This scale has been recommended by the Committee on Contributions to the General Assembly's thirty-fourth session (Document,"Report of the Committee on Contributions", Supplement No. 11 (A/34/11). It applies to the UN budget for the financial years 1980, 1981 and 1982.

THE WEIGHTED PARAMETER SCALE OF ASSESSMENT

(a) Definition of the assessment parameters

The eight parameters proposed for use in establishing country assessments are prepresented by the symbols f1 to f8. Two of these parameters are used for the United Nations expense assessments. They are:

f1: Total national production in million of US Dollars, taken from the last available United Nations statistical report.

f2: Per capita income expressed in US Dollars extracted from the same source.

Those two parameters are straightforward, and their use for country assessments is a well established procedure.

During discussions at the 1976 and 1977 intergovernmental meeting on remote sensing, some representatives expressed the wish to have more variables taken into consideration and were very specific about the relationships to be expressed. Parameters f3 to f8 are presented in an attempt to satisfy those wishes.

f3: Number of LANDSAT images required to cover the country, according to the LANDSAT Index Atlas of the Developing Countries of the World (World Bank, 1975).

f4: Integral part of the square root of f3. The number of images required to cover an individual African country vary from 129 (in the case of Algeria) to only one (in the case of Mauritius). But using large numbers would unduly complicate assessment calculations. Substituting the square root of parameter f3 does not introduce a significant deviation. Using smaller numbers brings out more clearly the impact of country size in the assessment. So using f4 should make it easier to gauge the influence of that important factor, and to decide on the weighting to be assigned to f4.

f5: The cubic root of f3 as an assessment parameter would introduce a very noticeable smoothing effect. But it reduces the number of classes to only 5, which may be too few. Using f5 may even complicate decisions about the country surface parameter and its proper weighting. Utilization of f4 is recommended, f3 as well as f5 should be dropped.

f6: The "country involvement parameter" is designed to reflect the current state of remote sensing utilization within each member States. A three-classes system has been established for test purposes with a view to obtaining further guidance from the member States (increasing the number of classes would obviously compound the problem of assigning a country a specific class). The allocation of a proper weight to the involvement parameter is a management and political decision. Member States may wish to encourage countries not involved at present in remote sensing (class 1), and th and thus attach a rather high weight to f6. On the other hand, their decision may be to encourage instead those countries already active in remote sensing, and therefore to attach a lower weight to parameter f6.

f7: The "data need factor" ranks the countries into five subjectively defined classes. For instance, countries that have recently acceded to independence and/or whose large territories have never been extensively analysed for resources by the colonial Powers certainly have a higher need for information about their resources: they are tentatively assigned to class 5. Most other countries are found in classes 3 and 4, indicating that they have already a reasonable amount of resources information available. None is assigned to class 1, which would indicate a very advanced level of resources information, making the utilization of remote sensing rather futile. With regard to the f7 value applicable to industrialized countries the consensus is that many have reached class2 2, but that to date none has reached class 1.

f8: The "cloudiness factor" is a parameter specific to the African context. It takes into account the particular situation of member States within the tropical zone. Three classes seem appropriate to establish this classification on the basis of t cloudiness data over Africa obtained by LANDSAT satellites from july 1972 onward, and daily by the TIROS and NIMBUS satellites starting in 1961. The supporting base is the series of daily cloud coverage atlasses developed at the NASA Goddard Space Flight Centre, and the subregional cloudiness statistics developed therefrom. Extension of the number of cloudiness classes would seem to be of limited value.

(b) The assessment weights and their use

The assessment parameters discussed above are constant values established once and for all on the basis of specific national criteria. The parameter weights in contrast are determined by a Council decision and are valid simultaneously for all countries. They will remain valid for two years at least. After that period, they may be modified by another decision.

Country assessments must be established for a pspecific budget year, and can be expressed either in percentage terms or in monetary value. But the total of the individual country assessments expressed in monetary values in any given year should match the expenditure projected for that year, less donor contributions.

As ARSP may decide to adopt a two-year budgetary cycle, the following general formula is proposed:

$$E_{t+2,k} \qquad \sum_{k}^{1} \qquad (w_1 f_j) \qquad (1)$$

in which: E_{t+2} represents the projected expenditure for year (t+2), i.e. two years after the current calendar year.

f_j and w_j: are the eight assessment parameters and their matched weightings.

k = 1, 2, ... n: are the identification indexes for the k member States participating at time (t).

The budgetary identity to be satisfied is thus:

$$E_{t+2,k} = \sum_{k}^{1} \qquad A_t \qquad (2)$$

in which A_t represents the assessment for any k country at time t, and has the form: $A_E = w_1 f_1 + w_2 f_2 + ... + w_8 f_8$ following formula (1) above

To compute the a assessed percentage for a specific country, the rough factorial value At must first be established, using formula (3). When At has been defined, that factorial is transformable into a percentage value, after making similar calculations for all member States participating at time t. The rough At results are then factorized, so as to obtain a total of 100 per cent.

The procedure for the definition off the assessment weighting is illustrated in example shown below.

(c) Worked out example

Let us take Ethiopia as an example for fiscal eyears 1980 to 1982, i.e. two years after the present budgetary period. Ethiopia is identified by k = 14.

(i) The parametric values for Ethiopia for the factors f_1 to f_8 are the following (see Annex III):

f_1 =	1 679	f_5 =	4
f_2 =	68	f_6 =	3
f_3 =	65	f_7 =	4
f_4 =	8	f_8 =	2

(ii) Let the assumption be that the member States have decided in their Council to consider the following parameters as being irrelevant:

f_1 = Total national product

f_3 Number of LANDSAT images to cover the country

f_5 = Cubic root of that number.

The weightings they have decided to impose for f_1, f_3 and f_5 are all set equal to zero: $w_1 = w_3 = w_5 = 0$

and f_1, f_3 and f_5 are eliminated.

(iii) Let us now further assume that the member States have decided to consider low per capita income (f2), high data need (f7), and high cloudiness factor (f8) to work in favour of any country so affected. They may for instance decide to adopt the following values for the corelated weightings:

for f2: $w_2 = 0.1$; for f7: $w_7 = 0.5$ and for f8: $w_8 = 0.8$

(iv) For f4 (the simplified expression of the country size factor) and f6 (the current level of country involvement in remote sensing), the member States may now decide that the proposed numerical value of the parameters (see annex III) are a fair expression of their collective views on the importance of those factors. So they should decide to apply to both of them the unit weighting: $w_4 = w_6 = 1$

(v) Combining now the individual weightings defined by the member States (now valid for assessing all member States) with the numerical values parameters (different for every member State), the rough factorial assessment values At for every State are computed. For instance, in the case of Ethiopia, and on the base of the values for from the table in .

Assessment (Ethiopia, 1978) = (0 x 1679) + (0.1 x 68) +(0 x 65)
+ (1 x 8) + (0 x 4) = (1 x 3)
+ (0.5 x 4) + (0.8 x 2)
= (6.8 + 8.0) + (3.0 + 2.0) + 1.6 = 21.4

(vi) Rough factorial At values for all member States are computed according to the same agreed weighting and procedure. The rough factorial values are then added, and the percentages for every member State are assessed. Obviously, the member States may also decide on minimum and maximum percentages, in which case the calculation flow should be adapted accordingly.

(d) Evaluation

The difficulty inherent in the weighted parameter approach lies in its APPARENT intricacy, but that in itself imposes on the member States the obligation to select a system of assessment based on principles jointly agreed upon and then to translate those principles into normative weightings applicable to all. After a decision on the weightings is taken, the rest becomes a mathematical routine. Weighting re-evaluation should occur only on the occasion of future Council meetings. The advantage of the parameteric approach is that it would allow every factor proposed by the member States to be taken fully into account and ranked by order of relevance.

Parametric values proposed for the establishment of the country assessments

K	Parameters	F1	F2	f3	f4	f5	f6	f7	f8
Ref. No.	COUNTRY	Total National income (millions of US dollars)	Per capita National Income (US dollars)	Number of LANDSAT images for country coverage	Integral value of square root of f3	Integral value of cubic root of f3	National level of involvement a/	Data efficiency factor (needed fact) b/	Cloudiness factor c/
1	Algeria	4 141	289	129	11	5	1	4	1
2	Angola	1 587	289	66	8	4	1	5	3
3	Benin	218	81	10	3	2	1	3	3
4	Botswana	76	118	37	6	3	3	4	1
5	Burundi	220	68	4	2	1	3	4	2
6	Cape Verde	.....	....	6	2	1	1	3	2
7	Central African Empire	196	122	41	6	3	3	4	1
8	Chad	256	70	71	8	4	3	3	1
9	Comoros	26	97	4	2	1	1	3	1
10	Congo	264	281	22	5	3	3	4	3
11	Djibouti	.....	....	4	2	1	1	3	2
12	Egypt	6 721	202	60	8	4	2	3	1
13	Equatorial Guinea	72	251	3	2	1	1	4	1
14	Ethiopia	1 679	68	65	8	4	3	4	2
15	Gabon	234	468	20		2	1	4	3
16	Gambia	42	118	4	2	1	1	3	2
17	Ghana	2 036	236	20	4	2	3	3	3
18	Guinea	310	79	21	5	2	1	3	2
19	Guinea-Bissau	121	216	6	2	1	1	3	2
20	Ivory Coast	1 400	325	21	5	2	3	3	3
21	Kenya	1 406	131	33	6	3	2	4	1
22	Lesotho	71	77	4	2	1	3	3	1
23	Liberia	274	181	11	3	2	1	4	3
24	Libyan Arab Jamahiriya	2 813	1 450	93	10	5	3	4	1
25	Madagascar	854	127	40	6	4	1	4	1
26	Malawi	303	68	12	3	2	1	4	1
27	Mali	252	50	77	9	4	3	4	1
28	Mauritania	171	146	62	8	4	1	4	1
29	Mauritius	180	223	1	1	1	1	3	1
30	Morocco	3 298	225	33	6	3	3	3	1
31	Mozambique	1 779	228	54	7	4	1	5	1

K	Parameters	f1	f2	f3	f4	f5	f6	f7	f8
		Total National income (millions of US dollars)	Per capita National Income (US dollars)	Number of LANDSAT images for country coverage	Integral value of square root of f3	Integral value of cubic root of f3	National level of involvement a/	Data efficiency factor (needed fact.) b/	Cloudiness factor c/
32	Niger	283	70	69	8	4	3	4	1
33	Nigeria	7 176	130	50	7	4	2	4	3
34	Rwanda	208	57	4	2	1	1	3	2
35	Sao Tome and Principe	.....	....	4	2	1	1	3	1
36	Senegal	788	201	13	4	2	1	3	1
37	Seychelles	.....	....	4	2	1	1	3	2
38	Sierra Leone	402	158	8	3	2	1	3	2
39	Somalia	237	85	43	6	3	1	4	1
40	Sudan	1 714	109	125	11	5	3	4	1
41	Swaziland	88	215	2	1	1	3	3	1
42	Togo	247	125	9	3	2	1	3	3
43	Tunisia	1 316	257	17	4	2	1	3	1
44	Uganda	1 242	127	15	4	3	3	3	2
45	United Republic of Cameroon	1 069	183	15	6	3	1	4	2
46	United Rep. of Tanzania	1 206	94	50	7	3	3	4	2
47	Upper Volta	333	62	17	4	2	2	4	1
48	Zaire	2 558	119	120	111	5	2	5	3
49	Zambia	1 442	345	46	7	4	1	4	1
50	Namibia	.....	....	53	7	4	1	4	1

Notes:

a/ National level of involvement is defined as follows:

1 = Potential for involvement;

2 = Country hosting ARSC facility;

3 = Country participating in ARSC preparatory activity.

b/ Countries with the greatest need for ressources data are in class 5. Lesser needs are indicated by "4" and "3".

c/ Classification "1" is given to countries for which cloudiness level is immaterial to space data utilization, whereas countries such as Zaire and those on the West African coast have been placed in class 3.