



Agenda Item 2: Analysis of the legal matters for the establishment of a Multinational Regional Organization (MRO)

COST STUDY FOR REDDIG AND CARSAMMA
(Presented by the Secretariat)

SUMMARY

This working paper presents, in connection with Agenda Item 2, preliminary information on cost study for REDDIG and CARSAMMA as well as a Cost-Benefit study for REDDIG as multinational systems to be included in a future Multinational Regional Organization.

References:

- CAR/SAM FASID Doc 8733
- RAAC/10 Meeting Report

1. Information on cost study for REDDIG and CAR/SAMMA

1.1 REDDIG and CARSAMMA are two multinational systems established under a different institutional arrangement but meeting requirements that are of regional/interregional nature in support of the provision of air navigation services. In this regard, REDDIG is a multinational system established by the SAM States (except Panama) and Trinidad and Tobago, to provide an integrated solution of fixed communication services among the States. In the other hand, CARSAMMA, a CAR/SAM multinational system established by Brazil under an agreement established through GREPECAS aimed at supporting RVSM implementation in the CAR/SAM region as a Regional Monitoring Agency.

1.2 As a preliminary study, the Secretariat prepared based on the information presented by the RLA/03/901 Technical Cooperation project, through which REDDIG is being administrated by ICAO on behalf of the States, and on information provided by Brazil, a cost study for

- a) REDDIG
- b) CARSAMMA
- c) CARSAMMA and REDDIG

1.3 **Annex A** to this Working Paper presents the above mentioned study for the period 2008-2018. It should be noted that for the REDDIG study it was possible to submit a cost-benefit figure; however, in the case of CARSAMMA the corresponding benefits should be first identified and it should be also considered that CARSAMMA is a CAR/SAM service. An effort to consider the merge of functions REDDIG/CARSAMMA was made; however, only the portion of the SAM States were considered in this merge.

2. **Action suggested**

2.1 The meeting is invited to examine the information provided in Annex A, and to provide comments concerning the study outlined in the mentioned Annex, so as to advance in the elaboration of further refinements to be introduced in the future concerning this matter.

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ANNEX A

**ESTABLISHMENT OF A REGIONAL MULTI-NATIONAL ORGANIZATION (RMO)
IN THE SAM REGION**

1. Cost assessment

This document proposes a preliminary study of the options available to progressively achieve the objective of a seamless and cost effective air navigation system in the CAR/SAM region through the establishment of Regional Multinational Organization.

As a first step, it is proposed to analyse the establishment of a RMO to carry out the functions of digital communications in the SAM and/or the monitoring of RVSM implementation in the CAR/SAM

These two functions are currently carried out by the red digital (REDDIG) and the CAR/SAM monitoring Agency (CARSAMMA).

Three options are analysed under the project case: REDDIG only (SAM region), CARSAMMA only, and REDDIG and CARSAMMA combined. The analysis covers only the costs associated with each option for the period 2008-2018. A full cost recovery scheme is considered under each option, based on data provided by the REDDIG Administration, a preliminary cost-benefit analysis has been carried out for the REDDIG.

Option 1: REDDIG only

The analysis of this options (Appendix 1 refers) covers the period 2008-2018 since the REDDIG would be completely reviewed after that. Equipment acquisition and installation costs (already incurred in 2003) have been excluded from the analysis. Only recurring costs are covered. These costs are assumed to remain constant over the analysis period.

Recurring (annual) costs:

Personnel:

one network administrator USD 163,200;

one bilingual secretary USD 26,000;

six (6) technicians for an annual amount of 200,000 US\$ (currently provided by Brazil);

one Network Specialist for an annual amount of 30,000US\$ (currently provided by Brazil).

Equipment (and software):

Operating cost: USD 26,000

Maintenance and inspection cost: USD 175,300

Communications cost (Space Satellite Segment): USD 240,000 for the period 2009-2013 and USD 350,000 beyond that period

Software upgrade in 2011: USD 150,000

Other recurring costs:

Training: USD 20,000

Telephone and internet: USD 24,000

Cost recovery:

Assuming a cost of capital equal to zero per cent (the funds are provided by States and not borrowed from Banks) and a margin of 5 per cent, the analysis shows that the average annual amount to be recovered from States (or air carriers) is about one million USD in constant terms. The yearly total amount in current terms is estimated on the basis of an inflation rate of about 3 per cent. The yearly amount to be paid by States (Appendix 2) have been calculated on the basis of their shares in the satellite bandwidth.

Benefits:

The benefits of the REDDIG consist in the cost savings resulting from its implementation. These cost savings are equal to the difference between the costs that would be incurred by States without the REDDIG and those incurred by them when it is implemented.

According to data provided by the REDDIG administration, without the REDDIG, the annual payments covering the lease of communication services would total an estimated amount of 1,170,000 USD. It should be noted that REDDIG represents an integral and dedicated solution for the States and, in order to have a service comparable to the REDDIG, an annual amount of 620,200 USD, considered within the REDDIG recurring cost, should be added to cover the administration and other support costs. Therefore, the total annual payment by States, in case there is no REDDIG, would be 1,790,200 USD.

On the other hand, the total annual payment for the REDDIG is estimated to about one million USD (in constant 2008 values), which implies an average net benefit of about 800,000 USD dollar each year. The table below provides the savings/losses for each State:

State	No REDDIG	REDDIG	Saving/loss from REDDIG
Argentina	165,816	171,052	-5,236
Bolivia	110,544	47,672	62,872
Brazil	353,127	158,493	194,634
Chile	82,908	37,550	45,358
Colombia	110,544	72,547	37,997
Ecuador	82,908	35,930	46,978
French Guyana	82,908	56,828	26,080
Guyana	82,908	14,992	67,916
Paraguay	55,272	32,921	22,351
Peru	193,452	143,661	49,791
Suriname	82,908	17,043	65,865
Trinidad and Tobago	110,544	22,800	87,744
Uruguay	82,908	58,238	24,670
Venezuela	193,452	123,906	69,546
Total	1,790,200	993,633	796,567

As can be observed on the table above, all States achieve cost savings by implementing the REDDIG, except for Argentina which incurs a minor extra-cost of about 5,000 USD..

Option 2: CARSAMMA only

The analysis of this option covers the period 2008-2018 (Appendix 1 refers). Network and Office equipment acquisition and installation costs have been included in the analysis along with the recurring costs, which are assumed to remain constant over the analysis period.

Equipment costs:

Network equipment: USD 900,000 in 2009

Office equipment: USD 238,889 in 2008, 2013 and 2018 (a life cycle of 5 years)

Recurring (annual) costs:*Personnel:*

one chief: USD 129,444;

one bilingual secretary: USD 60,556;

two (2) systems analysts: USD 178,889;

six (6) air traffic controllers: USD 466,667;

two (2) engineers/mathematicians: USD 210,000.

Other recurring costs:

Network operating cost: USD 45,000;

Training: USD 20,000;

Telephone and internet: USD 24,000;

Miscellaneous (including consultancies on evaluation and risks, air travel, etc.): USD 164,111.

Cost recovery:

Assuming a cost of capital equal to zero per cent (the funds are provided by States and not borrowed from Banks) and a margin of 5 per cent, the analysis shows that the average annual amount to be recovered from States (or air carriers) is about **USD 1.52 million in constant terms**. The yearly total amount in current terms is estimated on the basis of an inflation rate of about 3 per cent. The yearly amount to be paid by States (Appendix 3) have been calculated on the basis of their shares in the year 2007 aircraft departures. All CAR/SAM States (and territories) have been included.

Option 3: REDDIG and CARSAMMA

Under this option, the cost recovery for the REDDIG and CARSAMMA would be combined for SAM States only. Since the CARSAMMA cost recovery should cover the Caribbean and Central America region, in addition to the South American region, only a 51% share of the total costs was assigned to the latter, which corresponds to its share in aircraft departures in 2007.

Assuming a cost of capital equal to zero per cent (the funds are provided by States and not borrowed from Banks) and a margin of 5 per cent, the analysis shows that the average annual amount to be recovered from States (or air carriers) is about USD 1.78 million in constant terms. The yearly total amount in current terms is estimated on the basis of an inflation rate of about 3 per cent. (Appendix 4).

Future Work

This analysis is preliminary. All input and assumptions need to be reviewed and validated. For future analyses, it is critical to have a clear definition of the functions to be carried out by potential RMOs in the future.

2. Explanation of the Spreadsheet:

The spreadsheet 'Costs', contains the analysis of costs. A description of the various cells and rows follows:

- **Cell C2:** contains the inflation rate. This rate will be applied to the annual amount to be recovered. This rate can be changed.
- **Cell C3:** contains the profit margin. Normally, this margin should be zero, if the revenues are equal to the costs. But sometimes, a small amount can be added to the costs to be recovered in order to account for some non-identified costs. This margin also can be changed.
- **Cell C4:** represents the cost of capital which corresponds to the Bank's interest rate. Since the amounts to be paid will come from Government sources and no loan will be involved, this rate is now zero, but can be changed. If it is changed the annual amounts to be recovered will also change.
- **Cell C5:** represents the recovery period in years. Since this period extends from 2008 to 2018, the number of years is 11.

The table contains the following data:

- **Column A:** contains the component: REDDIG and CARSAMMA
 - **Column B:** contains the cost type: Equipment, Personnel, Other recurring costs
 - **Column C:** contains the cost item
 - **Column D:** contains the number of personnel
 - **Column E:** contains the present values (2008) of the stream of costs over the period 2008-2018. Since the cost of capital is equal to zero, the present value of each stream of costs is equal to the sum of the annual costs. If the cost of capital is different from zero (positive), the present value will be smaller than the sum of the annual costs because of discounting.
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- **Row 32:** contains the sub-total for the REDDIG costs
 - **Row 58:** contains the sub-total for the CARSAMMA costs
 - **Row 61:** contains the total cost for the REDDIG and CARSAMMA (total of Row 32 and Row 58).
 - **Row 63:** contains the amount of the annual payment for the cost recovery of the REDDIG only, in constant terms (excluding the effect of inflation). This amount is calculated on the basis of an annual annuity of a loan. The amount of the loan is the total cost (cell E32) augmented by the profit margin (ie. multiplied by $1+C3$), the interest rate of the loan is the cost of capital (cell C4) and the period of the loan is the recovery period (cell C5).
 - **Row 65:** contains the amount of the annual payment for the cost recovery of the REDDIG only, in current terms. This amount is obtained by multiplying the amount in constant terms (Row 63) by $(1+\text{inflation rate provided in cell C2})$.
 - **Row 67:** contains the amount of the annual payment for the cost recovery of the CARSAMMA only, in constant terms (excluding the effect of inflation). This amount is calculated on the basis of an annual annuity of a loan. The amount of the loan is the total cost (E58) augmented by the profit margin (ie. multiplied by $1+C3$), the interest rate of the loan is the cost of capital (cell C4) and the period of the loan is the recovery period (cell C5).

- **Row 69:** contains the amount of the annual payment for the cost recovery of the CARSAMMA only, in current terms. This amount is obtained by multiplying the amount in constant terms (Row 67) by $(1 + \text{inflation rate provided in cell C2})$.
- **Row 72:** contains the amount of the annual payment for the cost recovery of both the REDDIG and CARSAMMA, in constant terms (excluding the effect of inflation). This amount is the sum of rows 63 and 67.
- **Row 74:** contains the amount of the annual payment for the cost recovery of both the REDDIG and CARSAMMA, in current terms. This amount is obtained by multiplying the amount in constant terms (Row 72) by $(1 + \text{inflation rate provided in cell C2})$.

REDDIG cost recovery spreadsheet:

This spreadsheet contains the schedule for cost recovery of the REDDIG. Only SAM States are included. Note that Brazil is cited three times. The amount changes from year to year due to inflation. Columns C, E, G, I, K, M, O, Q, S, U, W contain the shares of SAM States in the total annual payment.

CARSAMMA cost recovery spreadsheet:

This spreadsheet contains the schedule for cost recovery of the CARSAMMA. All CAR/SAM States are included. The share of each State is equal to its share in the number of aircraft departures (scheduled flights) in 2007. Row 56 contains the amount to be paid by SAM States and Row 58 contains the amount to be paid by States in the Caribbean and South America.

REDDIG and CARSAMMA(SAM) cost recovery spreadsheet:

This spreadsheet contains the schedule for cost recovery of both the REDDIG and CARSAMMA for the SAM States.

APPENDIX/APÉNDICE 1

Inflation rate 3%
Margin 5%
Cost of Capital 0%
Recovery period (Years) 11

Component	Cost type	Cost	Numb	NPV	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
REDDIG															
	Equipment														
	Acquisition			0											
	Installation			0											
	Operating			286000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000
	Maintenance and In:			1928300	175300	175300	175300	175300	175300	175300	175300	175300	175300	175300	175300
	Software update							150000							
	Communications			2950000		240000	240000	240000	240000	240000	350000	350000	350000	350000	350000
	Personnel														
	Network adn	1	1795200	163200	163200	163200	163200	163200	163200	163200	163200	163200	163200	163200	163200
	Secretary	1	286000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000
	Support tech	6	2200000	200000	200000	200000	200000	200000	200000	200000	200000	200000	200000	200000	200000
	Network spe	1	330000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000	30000
	Other recurring costs														
	Training			220000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
	Telephone and inter			264000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000
	Sub-total			10409500	664500	904500	904500	1054500	904500	904500	1014500	1014500	1014500	1014500	1014500
					2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
CARSAMMA															
	Equipment														
	Office Equipment			716667	238889					238889					238889
	New Network					900000									
	Personnel														
	Chief	1	1423889	129444	129444	129444	129444	129444	129444	129444	129444	129444	129444	129444	129444
	System Anal	2	1967778	178889	178889	178889	178889	178889	178889	178889	178889	178889	178889	178889	178889
	AT Controller	6	5133333	466667	466667	466667	466667	466667	466667	466667	466667	466667	466667	466667	466667
	Engineer/ma	2	2310000	210000	210000	210000	210000	210000	210000	210000	210000	210000	210000	210000	210000
	Bilingual Sec	1	666111	60556	60556	60556	60556	60556	60556	60556	60556	60556	60556	60556	60556
	Other recurring costs														
	Training			220000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
	Network operating c			495000	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000
	Telephone and inter			264000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000	24000
	Miscellaneous			1805222	164111	164111	164111	164111	164111	164111	164111	164111	164111	164111	164111
	Sub-total			15902000	1537556	2198667	1298667	1298667	1298667	1537556	1298667	1298667	1298667	1298667	1537556
Total				26311500	2202056	3103167	2203167	2353167	2203167	2442056	2313167	2313167	2313167	2313167	2552056
Cost recovery	Annual user charges (constant terms)			993634	993634	993634	993634	993634	993634	993634	993634	993634	993634	993634	993634
	Annual user charges (current terms)			993634	1023443	1054146	1085771	1118344	1151894	1186451	1222045	1258706	1296467	1335361	
Cost recovery	Annual user charges (constant terms)			1517918	1517918	1517918	1517918	1517918	1517918	1517918	1517918	1517918	1517918	1517918	1517918
	Annual user charges (current terms)			1517918	1563456	1610359	1658670	1708430	1759683	1812474	1866848	1922853	1980539	2039955	
Cost recovery	REDDIG and CARSAMMA														
	Annual user charges (constant terms)			2511552	2511552	2511552	2511552	2511552	2511552	2511552	2511552	2511552	2511552	2511552	2511552
	Annual user charges (current terms)			2511552	2586899	2664506	2744441	2826774	2911577	2998925	3088893	3181559	3277006	3375316	

APPENDIX/APÉNDICE 2

REDDIG annual cost recovery by State/Territory
2008-2018

State	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018											
Argentina	171052	17.2%	176183	17.2%	181469	17.2%	186913	17.2%	192520	17.2%	198296	17.2%	204244	17.2%	210372	17.2%	216683	17.2%	223183	17.2%	229879	17.2%
Bolivia	47672	4.8%	49102	4.8%	50576	4.8%	52093	4.8%	53656	4.8%	55265	4.8%	56923	4.8%	58631	4.8%	60390	4.8%	62202	4.8%	64068	4.8%
Brazil	87468	8.8%	90092	8.8%	92795	8.8%	95579	8.8%	98446	8.8%	101399	8.8%	104441	8.8%	107575	8.8%	110802	8.8%	114126	8.8%	117550	8.8%
Brazil	47388	4.8%	48809	4.8%	50273	4.8%	51782	4.8%	53335	4.8%	54935	4.8%	56583	4.8%	58281	4.8%	60029	4.8%	61830	4.8%	63685	4.8%
Brazil	23638	2.4%	24347	2.4%	25077	2.4%	25829	2.4%	26604	2.4%	27402	2.4%	28224	2.4%	29071	2.4%	29943	2.4%	30842	2.4%	31767	2.4%
Chile	37550	3.8%	38677	3.8%	39837	3.8%	41032	3.8%	42263	3.8%	43531	3.8%	44837	3.8%	46182	3.8%	47568	3.8%	48995	3.8%	50464	3.8%
Colombia	72547	7.3%	74723	7.3%	76965	7.3%	79274	7.3%	81652	7.3%	84102	7.3%	86625	7.3%	89224	7.3%	91900	7.3%	94657	7.3%	97497	7.3%
Ecuador	35930	3.6%	37008	3.6%	38118	3.6%	39262	3.6%	40440	3.6%	41653	3.6%	42902	3.6%	44189	3.6%	45515	3.6%	46881	3.6%	48287	3.6%
France	56828	5.7%	58533	5.7%	60289	5.7%	62098	5.7%	63961	5.7%	65880	5.7%	67856	5.7%	69892	5.7%	71988	5.7%	74148	5.7%	76372	5.7%
Guyana	14992	1.5%	15442	1.5%	15905	1.5%	16382	1.5%	16874	1.5%	17380	1.5%	17901	1.5%	18439	1.5%	18992	1.5%	19561	1.5%	20148	1.5%
Paraguay	32921	3.3%	33909	3.3%	34926	3.3%	35974	3.3%	37053	3.3%	38165	3.3%	39310	3.3%	40489	3.3%	41703	3.3%	42955	3.3%	44243	3.3%
Peru	143661	14.5%	147971	14.5%	152410	14.5%	156983	14.5%	161692	14.5%	166543	14.5%	171539	14.5%	176685	14.5%	181986	14.5%	187445	14.5%	193069	14.5%
Surinam	17043	1.7%	17554	1.7%	18081	1.7%	18624	1.7%	19182	1.7%	19758	1.7%	20350	1.7%	20961	1.7%	21590	1.7%	22238	1.7%	22905	1.7%
Trinidad & Tobago	22800	2.3%	23484	2.3%	24188	2.3%	24914	2.3%	25662	2.3%	26431	2.3%	27224	2.3%	28041	2.3%	28882	2.3%	29749	2.3%	30641	2.3%
Uruguay	58238	5.9%	59985	5.9%	61784	5.9%	63638	5.9%	65547	5.9%	67513	5.9%	69539	5.9%	71625	5.9%	73774	5.9%	75987	5.9%	78267	5.9%
Venezuela	123906	12.5%	127623	12.5%	131452	12.5%	135396	12.5%	139458	12.5%	143641	12.5%	147951	12.5%	152389	12.5%	156961	12.5%	161670	12.5%	166520	12.5%
Total	993634	100.0%	1023443	100.0%	1054146	100.0%	1085771	100.0%	1118344	100.0%	1151894	100.0%	1186451	100.0%	1222045	100.0%	1258706	100.0%	1296467	100.0%	1335361	100.0%

APPENDIX/APÉNDICE 3

CARSAMMA annual cost recovery by State/Territory
2008-2027

Country/Territory	Region	Aircraft departures 2007	Share in 2007 departures	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belize	Central America	94081	3.8%	57571	59298	61077	62909	64797	66741	68743	70805	72929	75117	77371
Costa Rica	Central America	62472	2.5%	38229	39375	40557	41773	43027	44317	45647	47016	48427	49880	51376
El Salvador	Central America	13057	0.5%	7990	8230	8477	8731	8993	9263	9540	9827	10121	10425	10738
Guatemala	Central America	16758	0.7%	10255	10562	10879	11206	11542	11888	12245	12612	12990	13380	13782
Honduras	Central America	41357	1.7%	25308	26067	26849	27654	28484	29338	30219	31125	32059	33021	34011
Mexico	Central America	570904	23.0%	349354	359834	370629	381748	393201	404997	417147	429661	442551	455827	469502
Nicaragua	Central America	6664	0.3%	4078	4200	4326	4456	4590	4727	4869	5015	5166	5321	5480
Panama	Central America	30137	1.2%	18442	18995	19565	20152	20756	21379	22020	22681	23361	24062	24784
Anguilla West Indies	Caribbean	3898	0.2%	2385	2457	2531	2606	2685	2765	2848	2934	3022	3112	3206
Antigua/Barbuda West Indies	Caribbean	14303	0.6%	8752	9015	9285	9564	9851	10146	10451	10764	11087	11420	11763
Aruba	Caribbean	11787	0.5%	7213	7429	7652	7882	8118	8362	8612	8871	9137	9411	9693
Bahamas	Caribbean	71372	2.9%	43675	44985	46335	47725	49156	50631	52150	53714	55326	56986	58695
Barbados	Caribbean	13449	0.5%	8230	8477	8731	8993	9263	9541	9827	10122	10425	10738	11060
Bermuda	Caribbean	5098	0.2%	3120	3213	3310	3409	3511	3616	3725	3837	3952	4070	4193
British Virgin Islands	Caribbean	14084	0.6%	8618	8877	9143	9418	9700	9991	10291	10600	10918	11245	11582
Cayman Islands West Indies	Caribbean	12618	0.5%	7721	7953	8192	8437	8690	8951	9220	9496	9781	10075	10377
Cuba	Caribbean	18901	0.8%	11566	11913	12270	12639	13018	13408	13811	14225	14652	15091	15544
Dominica West Indies	Caribbean	3833	0.2%	2346	2416	2488	2563	2640	2719	2801	2885	2971	3060	3152
Dominican Republic	Caribbean	27545	1.1%	16856	17361	17882	18419	18971	19540	20127	20730	21352	21993	22653
Grenada/Carriacou Windward I	Caribbean	4563	0.2%	2792	2876	2962	3051	3143	3237	3334	3434	3537	3643	3753
Guadeloupe	Caribbean	29623	1.2%	18127	18671	19231	19808	20402	21014	21645	22294	22963	23652	24361
Haiti	Caribbean	5407	0.2%	3309	3408	3510	3616	3724	3836	3951	4069	4191	4317	4447
Jamaica	Caribbean	22219	0.9%	13596	14004	14425	14857	15303	15762	16235	16722	17224	17740	18273
Martinique	Caribbean	9150	0.4%	5599	5767	5940	6118	6302	6491	6686	6886	7093	7306	7525
Montserrat	Caribbean	1585	0.1%	970	999	1029	1060	1092	1124	1158	1193	1229	1266	1303
Netherland Antilles	Caribbean	47590	1.9%	29122	29995	30895	31822	32777	33760	34773	35816	36891	37997	39137
St. Kitts/Nevis Leeward Islands	Caribbean	8786	0.4%	5376	5538	5704	5875	6051	6233	6420	6612	6811	7015	7225
St. Lucia West Indies	Caribbean	8263	0.3%	5056	5208	5364	5525	5691	5862	6038	6219	6405	6597	6795
St. Vincent/Grenadines Windw	Caribbean	4748	0.2%	2905	2993	3082	3175	3270	3368	3469	3573	3681	3791	3905
Trinidad & Tobago	Caribbean	15485	0.6%	9476	9760	10053	10354	10665	10985	11315	11654	12004	12364	12735
Turks & Caicos Islands	Caribbean	24193	1.0%	14804	15249	15706	16177	16663	17162	17677	18208	18754	19316	19896
Argentina	South America	102176	4.1%	62525	64400	66332	68322	70372	72483	74658	76897	79204	81580	84028
Bolivia	South America	33762	1.4%	20660	21280	21918	22576	23253	23951	24669	25409	26171	26957	27765
Brazil	South America	594901	24.0%	364038	374959	386208	397794	409728	422020	434681	447721	461153	474987	489237
Chile	South America	74099	3.0%	45343	46704	48105	49548	51034	52565	54142	55767	57440	59163	60938
Colombia	South America	197236	8.0%	120695	124316	128045	131886	135843	139918	144116	148439	152893	157479	162204
Ecuador	South America	66149	2.7%	40479	41693	42944	44232	45559	46926	48334	49784	51277	52815	54400
Falkland Islands	South America	156	0.0%	95	98	101	104	107	111	114	117	121	125	128
French Guiana	South America	1469	0.1%	899	926	954	982	1012	1042	1073	1106	1139	1173	1208
Guyana	South America	3052	0.1%	1868	1924	1981	2041	2102	2165	2230	2297	2366	2437	2510
Paraguay	South America	5772	0.2%	3532	3638	3747	3860	3975	4095	4217	4344	4474	4609	4747
Peru	South America	59011	2.4%	36111	37194	38310	39459	40643	41862	43118	44412	45744	47116	48530
Surinam	South America	1087	0.0%	665	685	706	727	749	771	794	818	843	868	894
Uruguay	South America	8384	0.3%	5130	5284	5443	5606	5774	5948	6126	6310	6499	6694	6895
Venezuela	South America	119355	4.8%	73037	75228	77485	79810	82204	84670	87210	89826	92521	95297	98156
Total		2480539	100.00%	1517918	1563456	1610359	1658670	1708430	1759683	1812474	1866848	1922853	1980539	2039955
SAM States			51.7%	784553	808089	832332	857302	883021	909512	936797	964901	993848	1023663	1054373
Caribbean and South America			48.3%	733365	755366	778027	801368	825409	850172	875677	901947	929005	956876	985582
Total			100.0%	1517918	1563456	1610359	1658670	1708430	1759683	1812474	1866848	1922853	1980539	2039955

APPENDIX/APÉNDICE 4

**REDDIG & CARSAMMA annual cost recovery by State/Territory (SAM States Only)
2008-2027**

State	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Argentina	233576	240583	247801	255235	262892	270779	278902	287269	295887	304764	313907
Bolivia	68332	70382	72494	74669	76909	79216	81592	84040	86561	89158	91833
Brazil	522531	538207	554354	570984	588114	605757	623930	642648	661927	681785	702238
Chile	82894	85381	87942	90580	93298	96097	98979	101949	105007	108158	111402
Colombia	193242	199039	205010	211160	217495	224020	230741	237663	244793	252137	259701
Ecuador	76409	78701	81062	83494	85999	88579	91236	93973	96792	99696	102687
France	57727	59459	61243	63080	64972	66922	68929	70997	73127	75321	77581
Guyana	16860	17366	17887	18423	18976	19545	20132	20735	21358	21998	22658
Paraguay	36453	37547	38673	39833	41028	42259	43527	44833	46178	47563	48990
Peru	179772	185165	190720	196442	202335	208405	214657	221097	227730	234562	241598
Surinam	17708	18240	18787	19350	19931	20529	21145	21779	22432	23105	23799
Trinidad & Tobago	32276	33244	34241	35269	36327	37416	38539	39695	40886	42112	43376
Uruguay	63368	65269	67227	69244	71321	73461	75665	77935	80273	82681	85161
Venezuela	196943	202852	208937	215205	221661	228311	235161	242215	249482	256966	264675
Total	1778091	1831434	1886377	1942969	2001258	2061295	2123134	2186828	2252433	2320006	2389606