

APPENDIX G

COST-EFFECTIVENESS LIMIT AND CAPITAL RECOVERY FACTORS

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CARL MOYER PROGRAM REVISED COST-EFFECTIVENESS LIMIT AND CAPITAL RECOVERY FACTORS

Per statute, the Air Resources Board (ARB or the Board) updates the cost-effectiveness limit and capital recovery factors (CRF) annually. At the date of approval of the 2011 Carl Moyer Program Guidelines (April 28, 2011), the cost-effectiveness limit was \$16,640 per weighted ton of pollutants reduced and the discount rate to determine capital recovery factors for various project lives was two percent. In April of 2012, 2013, 2014 and 2015, the cost-effectiveness limit was updated to \$17,080, \$17,460, \$17,720 and \$18,030 respectively. The discount rate remained at two percent in 2012, decreased to one percent in 2013 and 2014, and increased to two percent in 2015.

To update these values for use in 2016, the average rates of return for U.S. Treasury securities and the California Consumer Price Index data available at the time of publication (January to September 2015) were used. The newly derived factors are shown in Tables G-1 and G-2f. Based on these values, the discount rate remains at two percent and the capital recovery factors (as shown in Table G-3a) and truncated cost-effectiveness limit of \$18,260 are in effect for contracts executed by air districts beginning January 1, 2016. ARB will update these factors prior to July 1, 2017, and annually thereafter through a Mail-Out.

Revised Cost-Effectiveness Limit

In order to receive Carl Moyer Program funding, each project must meet the specified maximum cost-effectiveness limit. Cost-effectiveness is a measure of the dollars provided to a project for each ton of covered emissions reduced. To calculate Carl Moyer Program cost-effectiveness, the project grant amount is annualized based upon the project's life and an appropriate discount rate. This annual cost is divided by the project's estimated emission reductions to determine the overall cost-effectiveness of the covered emissions reduced as indicated in Appendix C.

Using the California Consumer Price Index

(<http://www.dir.ca.gov/dlsr/CPI/PresentCCPI.PDF>,

<http://www.dir.ca.gov/dlsr/CPI/EntireCCPI.PDF>), and the California Department of

Finance method

(http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_UseCPI.php) of converting the Consumer Price Index to an inflation rate, a change in the cost-effectiveness limit can be determined over a specified time period (annually). Table G-1 shows the changes in the cost-effectiveness limit over time based on changes in the Consumer Price Index.

**Table G-1
Cost-Effectiveness Limit Criteria**

Year	Annual CA CPI	Percent change (inflation rate)	Annual modified amount	Revised CE cap
1998	163.7	NA	NA	\$12,000
1999	168.5	2.93%	\$352	\$12,352
2000	174.8	3.74%	\$462	\$12,814
2001	181.7	3.95%	\$506	\$13,319
2002	186.1	2.42%	\$323	\$13,642
2003	190.4	2.31%	\$315	\$13,957
2004	195.4	2.63%	\$367	\$14,324
2005	202.6	3.68%	\$528	\$14,852
2006	210.5	3.90%	\$579	\$15,431
2007	217.4	3.28%	\$506	\$15,938
2008	224.8	3.40%	\$541	\$16,479
2009	224.1	-0.31%	-\$51	\$16,428
2010	227.0	1.29%	\$212	\$16,640
2011	233.0	2.66%	\$443	\$17,084
2012	238.3	2.25%	\$385	\$17,469
2013	241.8	1.46%	\$255	\$17,724
2014	246.1	1.77%	\$313	\$18,037
2015	249.1	1.25%	\$225	\$18,262

Revised Capital Recovery Factors

The CRF used for determining the annualized costs of Carl Moyer Program grants are based on a discount rate. The CRF uses an interest rate and project life to determine the rate at which earnings could reasonably be expected if the same funds were invested over a length of time.

Previous versions of the guidelines updated the CRF using the average annual yield of United States (U.S.) Treasury securities (<http://federalreserve.gov/releases/h15/>) with a 3-year, 5-year, 7-year, and 10-year maturation over a specific period of time. Annual data for 2010 using the average rates of return for U.S. Treasury securities over that year (January to December 2010) yielded a revised discount rate as shown in Table G-2a below. Rounding to a whole number yielded a discount rate of 2 percent:

Table G-2a
Discount Rate Factor (Available for use through June 30, 2012)

Average Monthly Rate - 2010													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
3 year	1.49%	1.40%	1.51%	1.64%	1.32%	1.17%	0.98%	0.78%	0.74%	0.57%	0.67%	0.99%	1.11%
5 year	2.48%	2.36%	2.43%	2.58%	2.18%	2.00%	1.76%	1.47%	1.41%	1.18%	1.35%	1.93%	1.93%
7 year	3.21%	3.12%	3.16%	3.28%	2.86%	2.66%	2.43%	2.10%	2.05%	1.85%	2.02%	2.66%	2.62%
10 year	3.73%	3.69%	3.73%	3.85%	3.42%	3.20%	3.01%	2.70%	2.65%	2.54%	2.76%	3.29%	3.21%
Overall average for January-December 2010													2.22%

Annual data for 2011 using the average rates of return for U.S. Treasury securities from January to December 2011 yielded a revised discount rate as shown in Table G-2b below. Rounding to a whole number yielded a discount rate of 2 percent:

Table G-2b
Discount Rate Factor (Available for use April 1, 2012 through June 30, 2013)

Average Monthly rate - 2011													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
3 year	1.03%	1.28%	1.17%	1.21%	0.94%	0.71%	0.68%	0.38%	0.35%	0.47%	0.39%	0.39%	0.75%
5 year	1.99%	2.26%	2.11%	2.17%	1.84%	1.58%	1.54%	1.02%	0.90%	1.06%	0.91%	0.89%	1.52%
7 year	2.72%	2.96%	2.80%	2.84%	2.51%	2.29%	2.28%	1.63%	1.42%	1.62%	1.45%	1.43%	2.16%
10 year	3.39%	3.58%	3.41%	3.46%	3.17%	3.00%	3.00%	2.30%	1.98%	2.15%	2.01%	1.98%	2.79%
Overall average for January - December 2011													1.81%

Annual data for 2012 using the average rates of return for U.S. Treasury securities from January to December 2012 yielded a revised discount rate as shown in Table G-2c below. Rounding to a whole number yielded a discount rate of 1 percent:

Table G-2c
Discount Rate Factor (Available for use April 1, 2013 through June 30, 2014)

Average Monthly rate - 2012													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
3 year	0.36%	0.38%	0.51%	0.43%	0.39%	0.39%	0.33%	0.37%	0.34%	0.37%	0.36%	0.35%	0.38%
5 year	0.84%	0.83%	1.02%	0.89%	0.76%	0.71%	0.62%	0.71%	0.67%	0.71%	0.67%	0.70%	0.76%
7 year	1.38%	1.37%	1.56%	1.43%	1.21%	1.08%	0.98%	1.14%	1.12%	1.15%	1.08%	1.13%	1.22%
10 year	1.97%	1.97%	2.17%	2.05%	1.80%	1.62%	1.53%	1.68%	1.72%	1.75%	1.65%	1.72%	1.80%
Overall average for January – December 2012													1.04%

Annual data for 2013 using the average rates of return for U.S. Treasury securities from January to December 2013 yielded a revised discount rate as shown in Table G-2d below. Rounding to a whole number yielded a discount rate of 1 percent:

Table G-2d
Discount Rate Factor (Available for use April 1, 2014 through June 30, 2015)

Average Monthly rate - 2013													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
3 year	0.39%	0.40%	0.39%	0.34%	0.40%	0.58%	0.64%	0.70%	0.78%	0.63%	0.58%	0.69%	0.54%
5 year	0.81%	0.85%	0.82%	0.71%	0.84%	1.20%	1.40%	1.52%	1.60%	1.37%	1.37%	1.58%	1.17%
7 year	1.30%	1.35%	1.32%	1.15%	1.31%	1.71%	1.99%	2.15%	2.22%	1.99%	2.07%	2.29%	1.74%
10 year	1.91%	1.98%	1.96%	1.76%	1.93%	2.30%	2.58%	2.74%	2.81%	2.62%	2.72%	2.90%	2.35%
Overall average for January – December 2013													1.45%

Annual data for 2014 using the average rates of return for U.S. Treasury securities from January to December 2014 yielded a revised discount rate as shown in Table G-2e below. Rounding to a whole number yielded a discount rate of 2 percent:

Table G-2e
Discount Rate Factor (Available for use April 1, 2015 through December 31, 2015)

Average Monthly rate - 2014													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
3 year	0.78%	0.69%	0.82%	0.88%	0.83%	0.90%	0.97%	0.93%	1.05%	0.88%	0.96%	1.06%	0.90%
5 year	1.65%	1.52%	1.64%	1.70%	1.68%	1.68%	1.70%	1.63%	1.77%	1.55%	1.62%	1.64%	1.64%
7 year	2.29%	2.15%	2.23%	2.27%	2.19%	2.19%	2.17%	2.08%	2.22%	1.98%	2.03%	1.98%	2.14%
10 year	2.86%	2.71%	2.72%	2.71%	2.60%	2.60%	2.54%	2.42%	2.53%	2.30%	2.33%	2.21%	2.54%
Overall average for January – December 2014													1.81%

Annual data for 2015 using the average rates of return for U.S. Treasury securities from January to September 2015 yielded a revised discount rate as shown in Table G-2f below. Rounding to a whole number yielded a discount rate of 2 percent:

Table G-2f
Discount Rate Factor (Available for use beginning January 1, 2016)

Average Monthly rate - 2015													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
3 year	0.90%	0.99%	1.02%	0.87%	0.98%	1.07%	1.03%	1.03%	1.01%	NA	NA	NA	0.99%
5 year	1.37%	1.47%	1.52%	1.35%	1.54%	1.68%	1.63%	1.54%	1.49%	NA	NA	NA	1.51%
7 year	1.67%	1.79%	1.84%	1.69%	1.93%	2.10%	2.04%	1.91%	1.88%	NA	NA	NA	1.87%
10 year	1.88%	1.98%	2.04%	1.94%	2.20%	2.36%	2.32%	2.17%	2.17%	NA	NA	NA	2.12%
Overall average for January – September 2015													1.62%

*NA: Data not available at time of publication.

Refer to Table G-3a below for CRFs for various project lives at a 2 percent discount rate, and to Table G-3b below for CRFs for various project lives at a 1 percent discount rate. Each source category chapter will specify which project lives are acceptable to determine which CRF value to use.

Table G-3a
Capital Recovery Factor (CRF) for Various Project Lives
At a Two Percent Discount Rate (Effective April 2011 through March 2013 and as of April 2015)

Project Life	CRF
1	1.020
2	0.515
3	0.347
4	0.263
5	0.212
6	0.179
7	0.155
8	0.137
9	0.123
10	0.111
11	0.102
12	0.095
13	0.088
14	0.083
15	0.078
16	0.074
17	0.070
18	0.067
19	0.064
20	0.061

Table G-3b
Capital Recovery Factor (CRF) for Various Project Lives
At a One Percent Discount Rate (Effective April 2013 through March 2015)

Project Life	CRF
1	1.010
2	0.508
3	0.340
4	0.256
5	0.206
6	0.173
7	0.149
8	0.131
9	0.117
10	0.106
11	0.096
12	0.089
13	0.082
14	0.077
15	0.072
16	0.068
17	0.064
18	0.061
19	0.058
20	0.055