Agenda Date: February 20, 2014
Agenda Placement: Regular
Estimated Time: 20 Minutes
Continued Item: Yes

Board Agenda Item

TO: Air Pollution Control District Board

FROM: Dave Van Mullem, Air Pollution Control Officer

CONTACT: Michael Goldman, Engineering Manager (961-8821)

SUBJECT: Offsets

RECOMMENDATION:

That the Board:

A. Receive staff's analysis on the Offsets Workgroup options; and

B. Direct the Control Officer to proceed with public workshops and Community Advisory Council meetings in order to develop rule revisions to address the offsets issue.

DISCUSSION:

Santa Barbara County has one of the top three most costly offset programs in the State and the availability of emission reduction credits (ERCs) remains quite low. This results in difficulties for the regulated community in complying with our New Source Review (NSR) regulation.

Your Board previously received updates on the progress of the District's Offsets Workgroup in October 2012, December 2012, March 2013 and May 2013. The Workgroup commenced work in September 2012 and ended in March 2013. At the May 2013 Board Meeting, staff were directed to proceed with an analysis of the three workgroup options that the APCO deemed worthy of further examination. Since last May, we have conducted a detailed review and completed a final analysis. A summary of the analysis is presented below and a copy of the technical portion of the analysis is attached.

Staff also provided the Community Advisory Council (CAC) periodic updates and two detailed briefings on the offsets issue in October and December of 2013. Additional options were discussed with the CAC as there are potential revisions to existing rules and impacts to the draft

Clean Air Plan. Furthermore, a recommendation to add a new rule to bank local GHG emission reductions was requested. To make the background information easily available to your Board and the public, a new webpage was created. Please see http://www.sbcapcd.org/apcd/cac-offsets.htm for these additional details.

WORKGROUP PURPOSE: The District formed the Offsets Workgroup to initiate an informal dialog regarding the viability of our Emission Reduction Credit (ERC) program. ERCs are air quality "mitigation" for individual pollutants issued by the District in the form of certificates in units of tons. These ERC certificates can be used by permitted sources that trigger the emission offset thresholds of our New Source Review regulation. The Workgroup's focus centered on ERC costs and availability.

- Cost. The cost of ERCs is based on a supply versus demand market system. Today, there is still a need for ERCs and supply is low, so understandably, we are observing ERC costs at an all-time high of $115,000 per ton. Figure 1 shows the cost trends of oxides of nitrogen (NO_x) ERCs in the past 16 years.

- Availability. There are two reasons for the low supply of ERCs. First, all the easy mitigation projects were addressed and potential ERCs were created and sold. The program worked very well for the first 5 to 10 years; so in those terms it was successful and a great benefit to air quality. Second, as supply tightened, companies that owned ERCs became unwilling to sell them. These companies do not appear to be "speculating" with the ERCs as an investment, but rather the ERCs were proactively procured for real and/or potential future projects. Table 1 shows the current limited availability of ERCs on the open market. Note that the Air Force's ERCs are only valid for Department of Defense projects.

For reference to other air Districts, staff surveyed all large/medium sized agencies for their ERC costs and availability. Table 2 shows the results of that survey: Santa Barbara County APCD has the highest reported NO_x ERC price.

The Workgroup's purpose was to generate a list of possible solutions and then screen these as potential solutions. It was an informal process and did not presume that rulemaking would be an option. The APCO reviewed the options and deemed three of them worthy of further examination.

WORKGROUP OPTIONS: The options reviewed were:

- *Option 1 - Clean Technology Fund*: Instead of purchasing ERCs, sources that require offsets could pay into a Clean Technology Fund as a form of alternative mitigation in lieu of directly procuring ERCs. The generated revenue would be used to fund emission reduction projects.

- *Option 2 - Community Bank*: This option would create a Community Bank for use by essential public services and/or small businesses.

- *Option 3 - Policies*: A number of suggestions were presented to change the way the District implements its current process of approving ERCs by changing or implementing new policies to make it easier to get an ERC approved.

ANALYSIS: The District performed an evaluation of the three options noted above.

Option 1 - Clean Technology Fund: We determined that this option is not feasible. The concept of a Clean Technology Fund was to take user mitigation funds and create a pool of emission reductions. This fund would be used to implement emission controls on multiple smaller projects that would otherwise not be cost-effective or practical for an individual company to implement. The District would grant the project proponent's "ERCs" for meeting their permit's offset requirements. The pooled emission reductions would be tracked in-the-aggregate against all ERCs granted under the program. A "growth allowance" in the emission inventory section of the draft Clean Air Plan would be relied upon to (a) provide emission reductions during the startup of the program in the first few years; and (b) act as a backstop if the program was not generating the expected emission reductions.

The District hired ArrowTek, a small local firm with extensive experience in grant programs. ArrowTek performed a detailed analysis of numerous control strategies for projects in the County. Over twenty-four potential projects were evaluated. The current air emission inventory was used as the starting point for selecting the projects to evaluate. Extensive cost data was obtained and general assumptions developed for costs and equipment sizes. The results of the analysis shows that operating a rule-based Clean Technology Fund is not cost-effective. One major impediment was the need to ensure that emission reductions are in place for at least thirty years (the length of time assumed for a newly permitted project). Most of the projects were short to medium term in length of years, thus necessitating increased program costs to cover the full thirty year project life requirement. As such, the District would be unable to sustain reductions over the long term to balance against the ERCs granted to projects.

Figure 2 shows the NO_x ERC Cost Effectiveness for the top twelve projects. As can be seen, the top four projects are cost-effective in relation to the current NO_x ERC sales price of $115,000 per ton. These projects all involve electrification of agricultural diesel well or booster pump engines. Staff already considers these projects as well defined and achievable without District intervention and within the current framework of our Rules 804 and 806. The positive note to this analysis is that the creation of some new ERCs is still viable. Appendix A contains the report from Arrow-Tek. This report and supporting technical documentation can be found online at http://www.sbcapcd.org/apcd/cac-offsets.htm.

In summary, the Clean Technology Fund rule concept is deemed not feasible. The analysis does indicate that the creation of new ERCs is still viable for agricultural engines.

Option 2 - Community Bank: We determined that this option is not feasible. The concept of a Community Bank is for making ERCs available to entities that could not otherwise afford to procure ERCs on the open market. Community Banks are typically used for essential public services (e.g., schools, hospitals, landfills, wastewater treatment plants, jails) and small businesses. The District attempted to create a Community Bank in 1997 when Regulation VIII, the governing ERC rule, was created; however, the proposal did not receive support from the CAC or the public and was dropped. If adopted, the Community Bank would have been

"funded" by taking a percentage from new ERCs that were created under the new rules. Other mechanisms funding Community Banks are through shut downs of businesses or processes that were surplus and were not claimed as ERCs under our rules. Due to the size and nature of our County businesses, we have experienced few shut downs and do not have excess shut down credits available.

Staff contacted the Air Resource Board regarding the Community Bank rule concept and funding it with a growth allowance under our Clean Air Plan. ARB staff and management raised numerous concerns regarding the proposal and indicated that they would have difficulty approving any approach that relied on the "generic" use of a Clean Air Plan "growth allowance" for use in a New Source Review program as alternative ERC mitigation, including a Community Bank. They indicated that they would not be able to provide detailed feedback without first seeing a draft rule.

In summary, the Community Bank rule option is deemed not feasible as our District lacks the means to fund the Bank. This opportunity was dropped in 1997 when Regulation VIII was adopted. However, an alternative to accommodate ERC development for essential public services was discussed with the CAC. See the Next Steps section below for more on this possibility.

Option 3 - Policies: Except as noted below, we determined that this option is not feasible. The Workgroup identified a number of "policy" changes aimed at making it easier to approve ERCs or to change the renewal/permitting processes.

These ideas included:

- Adopt a policy to allow for the "maximum" or "highest" emissions for determining baseline.
- Adopt a policy to allow for the transfer of ERCs that have been applied to existing equipment that is taken out of service.
- Adopt a policy to require the District to automatically initiate the ERC renewal process.
- Revise policies to allow for replacement of existing equipment with lower emitting equipment without the need for permits.

Each of the four ideas run counter to existing District rule language and EPA guidance. As such, we are unable to implement these ideas as policy changes. One concept that we believe can be moved forward via a rule revision is for the replacement of existing equipment. This idea also came up during our discussions with the CAC. See the Next Steps section below for more on this idea.

In summary, this option is not feasible as the policy proposals run counter to existing rule requirements. We believe a potential rule change regarding replacements deserves consideration.

NEXT STEPS – RULE CHANGES. During the process of evaluating the Workgroup's ideas and briefing the CAC at their October and December meetings, a broader range of potential options were developed by staff and discussed at the CAC. These are presented below in options (1) through (5) below. All of these options would necessitate revisions to our rules, thus

requiring the initiation of our rule making process. Staff is recommending Board direction to proceed with public workshops and CAC meetings to consider rule revisions to address these five options. The process will include CEQA review.

1. *Expand trading zones to include Ventura and San Luis Obispo Counties*. This option would allow the trading of ERCs from either San Luis Obispo County or Ventura County for use in Santa Barbara County. Existing State law (H&SC Section 40709.6 - *Offset by reductions credited to stationary source located in another district*) already provides for this option since all three Districts are in the same air basin. However, one aspect of the law is that our District's rules must explicitly allow for such trades and we would need to adopt a rule or regulation to discount the emission reductions credited to the stationary source in the other district.

2. *Add an offsets exemption for Essential Public Services*. This option would address difficulties that essential public service entities would face if they were to exceed the offsets thresholds. This exemption would be capped by a specific amount by use of a *targeted* Clean Air Plan growth allowance. Current entities that may be impacted by the offset requirements of our rules include: UCSB, Marian Medical, Tajiguas Landfill and the proposed City of Santa Maria Integrated Waste Management Facility at Los Flores Canyon.

3. *Add an electrical Peaking Power Plant offsets exemption provision*. This option would address difficulties that electrical utilities face if they tried to site an electrical Peaking Power Plant in the County. As the issue for these facilities is the lack of ERC availability, this proposal would require mitigation funds to qualify for the exemption. This exemption would be capped by a specific amount by use of a *targeted* Clean Air Plan growth allowance. Current utilities that may be impacted are: Southern California Edison, Pacific Gas & Electric and the City of Lompoc (this would include any electric service provider contracted by the utility).

4. *Add an Equipment Replacement offsets exemption if Best Available Control Technology is applied*. This option would address the situation where companies are deterred from upgrading older equipment due to the need to provide offsets. Current rules allow a company to get credits for reductions for the removal of the older equipment, but equipment replacements are sometimes still required to provide offsets. This option would remove the deterrent for replacements and would encourage modernizations and emission reductions.

5. *Create a Local GHG Source Registry Rule for Banking GHG Credits*. Although this option is not related to the criteria pollutant issue, a number of people have asked that the District establish a local GHG Source Register (aka Bank). This would be independent of State requirements and would operate to allow GHG reductions to be banked for use by local companies that are required to mitigate their GHG emissions (e.g., as CEQA mitigation). A new rule would be established in a manner similar to our existing Rule 806.

NEXT STEPS – FURTHER ANALYSES. Two other options were developed and were presented to the CAC at their October and December meetings. These two options present levels of complexity that will require further analysis by staff before we are able to make a recommendation to your Board. Our goal would be to revisit these two options at a future date after we have concluded the recommended rule revisions discussed above.

1. *Revise the Offset Zones/Trading Ratios in Rule 802*. This option would re-evaluate the offset zone concept and the trading ratios. Current rules establish three offset zones (North, South, Cuyama). Offset trading ratios are established in Rule 802. Trading ratios were established as part of our rules in order to show compliance with the State's No Net Increase program and EPA's Net Air Quality Benefit criteria. The typical trading ratio is set at 1.5:1 however, trading between North and South is set at the much higher ratio of 6:1. This higher ratio effectively eliminates companies in the South zone from creating and/or buying ERCs from the North zone. Staff would evaluate whether the offset zones are still necessary and/or whether the trading ratios should be revised.

2. *Revise the Offset Threshold to the State Mandated Value*. This option would evaluate the feasibility of whether we should re-set the offset threshold to levels mandated under State law (H&SC Section 40918 - *Plan of district with moderate air pollution*). Our NSR Rule 802 offset thresholds were established in 1997 as "equivalent" to the State Mandated value. Potentially revising the offset threshold would limit the number of companies subject to the offset requirements, but would also add existing companies to the offset requirements for the first time. This would shift the offsets requirement to only the largest permitted sources.

ATTACHMENT – ArrowTek Report: Emission Reduction Credit Assessment

Figure 1 – NOx ERC Cost Trends ($/ton)

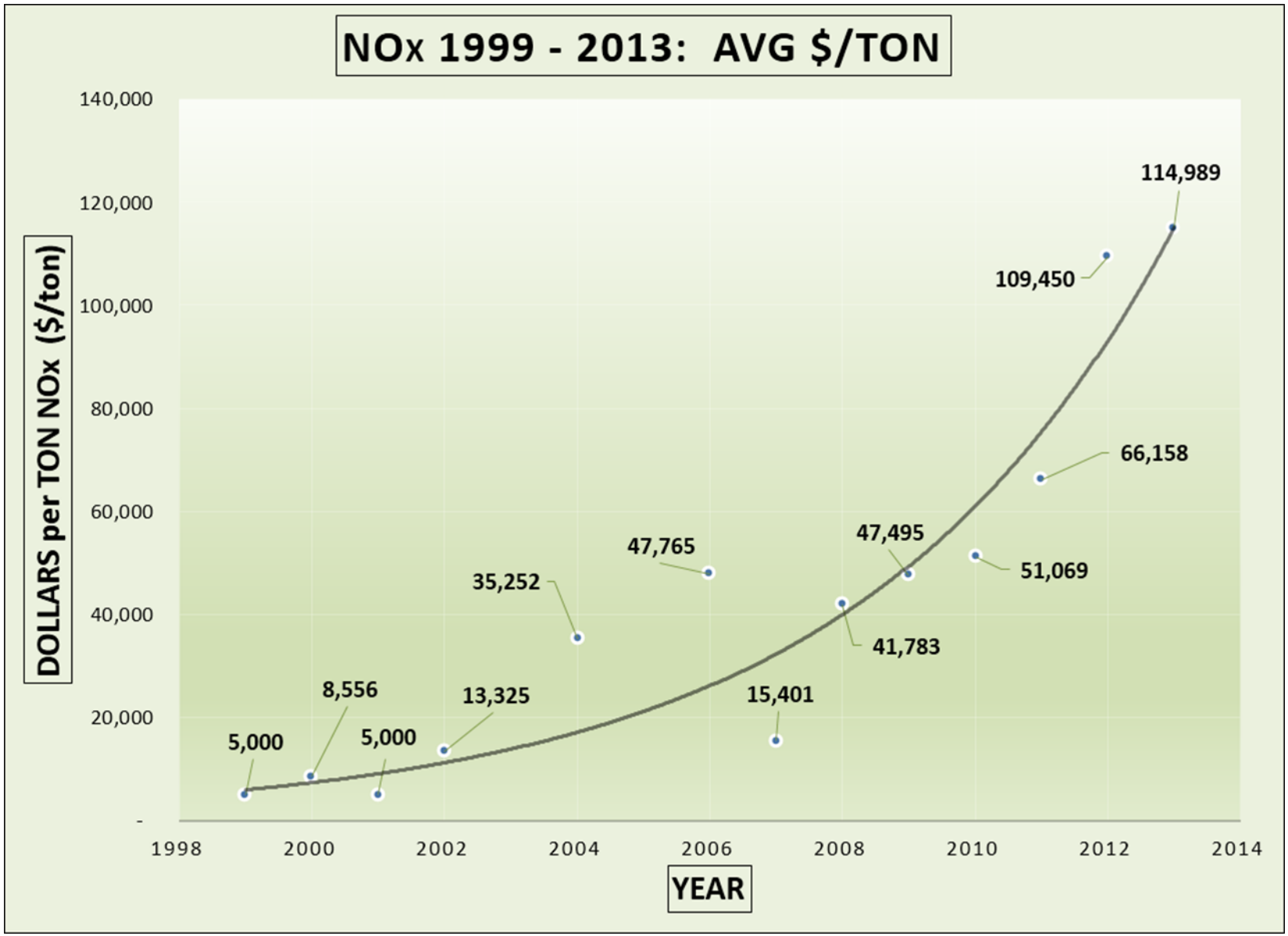


Table 1 – Current Availability of ERCs (tons/year)

ACTIVE ERCS as of DECEMBER 2013

Company Name	NOx	ROC
E&B Resource Management	2.7	13.8
Freeport McMoRan Oil & Gas	5.9	45.7
Point Arguello Companies	21.1	0.0
The Okonite Company	0.6	0.0
United Launch Alliance	5.8	2.7
United States Air Force *	99.0	10.2
Wm. Bolthouse Farms	0.0	0.0
Aera Energy	19.7	0.3
Pacific Coast Energy Company	34.1	1.4
Space Exploration Technologies	1.1	2.1
ERG Operating Company	14.9	5.8
Grand Total	**205.0**	**82.0**

* USAF ERCs are restricted to the DoD and are not available for sale on the open market.

ACTIVE ERCS by Zone as of DECEMBER 2013

ZONE	NOx	ROC
North	181.5	80.0
South	23.6	2.0
Grand Total	**205.0**	**82.0**

Table 2 – Survey of Other Air Districts

SURVEY of LARGE/MEDIUM AIR DISTRICTS
EMISSION REDUCTION CREDITS

Survey Performed by Santa Barbara County APCD
12/27/2013

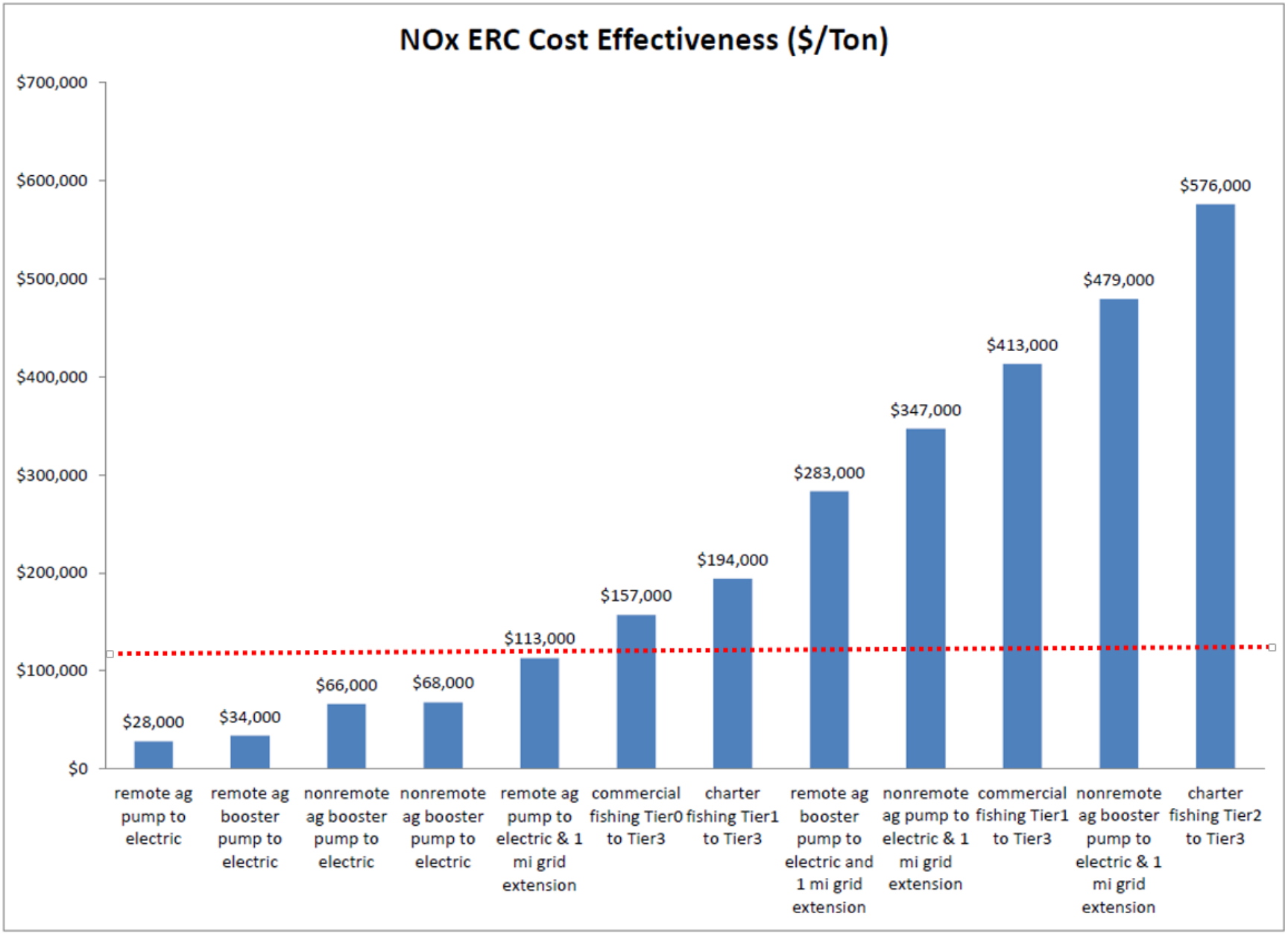
District	Size	NOx ERCs (tpy)	VOC ERCs (tpy)	NOx ($/ton)	VOC ($/ton)	Community Bank (CB)	Other Bank	Total NOx in CB/Other (tpy)	Total VOC in CB/Other (tpy)	MSERCs Allowed	MSERCs Term Limited
Bay Area AQMD	Large	2,906	3,338	12,500	7,000	--	Yes	26	627	Yes	Yes
Mojave Desert AQMD	Medium	2,180	100	10,000	6,300	No	No	--	--	Yes	Yes
Monterey Bay AQMD	Medium	1,023	95	n/a	n/a	Yes	No	125	43	Yes	Yes
Placer County APCD	Medium	154	223	15,200	10,600	No	Yes	4	31	No	--
SacMetro AQMD	Large	420	321	50,309	15,050	Yes	Yes	101	516	Yes	Yes
San Diego APCD	Large	275	339	108,738	50,865	No	Yes	0	0	Yes	Yes/No
San Joaquin Valley APCD	Large	5,385	5,853	50,000	4,800	No	No	--	--	Yes	Yes
San Luis Obispo APCD	Medium	139	52	n/a	n/a	Yes	No	33	31	Yes	Yes
Santa Barbara APCD	Medium	205	82	115,000	48,000	No	No	--	--	Yes	Yes
South Coast AQMD	Large	118	2,066	46,000	23,000	Yes	Yes	10,000	33,000	Yes	Yes
Ventura APCD	Medium	295	606	42,000	47,000	No	Yes	79	193	Yes	Yes
Yolo-Solano AQMD	Medium	191	202	40,000	10,000	No	Yes	21	17	No	--

Notes:

1. Where cost data ranges were provided, the higher value was used, otherwise the costs provided were used.
2. Each District operates and implements their offsest programs slightly differently. See each District's rules for specifics of their programs.
3. "n/a" entries under $/ton columns indicate that limited ERC cost data exists due to rarity of ERC trades (e.g., no trades in 15 years)
4. ERCs in District Banks may have specific limitations (e.g., non-federal projects only, etc.)
5. Other Banks may include Priority Reserves, Internal Banks, Essential Public Service Banks, Small Facilitiy Banks and "District" Banks.
6. For those that indicated Yes to allowing MSERCs (Mobile Source ERCs), they noted that very few if any projects actually occurred.
7. Some Distrcits implement MSERCs by specific rules.
8. For SCAQMD, most large NOx facilities are in the RECLAIM program and their Internal Bank values are "end of year projections" for 2013.
9. For SBCAPCD, 99 tons of NOx and 10 tons VOC are restricted to DoD use only.

Figure 2 – CTF Analysis: NOx ERC Cost Effectiveness

Red Line = Current ERC Cost Data



ATTACHMENT

ArrowTek Report: Emission Reduction Credit Assessment

ArrowTek
A Specialized California
Environmental Services Company
715 Westwood Dr, Santa Barbara, CA 93109 805/884-9134, Fax 805/884-9503. LarryR@Arrow-Tek.com

December 2, 2013

Mr. Michael Goldman
Manager, Engineering Division
Santa Barbara APCD
260 N San Antonio Rd
Santa Barbara, CA 93110

Subject: Emission Reduction Credit Assessment.

Dear Mike:

You requested an initial assessment of incentive funding programs to see if any might be capable of generating reasonably cost-effective NOx, ROC and PM emission reduction credits.

The initial listing of program types included:

- Replacement of gasoline powered lawn and garden equipment (e.g., lawn mowers, leaf blowers, etc) with electric powered equipment.
- Replacement of diesel agricultural pump engines with electric motors.
- Replacement of mobile diesel agricultural equipment with lower emission (Tier 4) equipment.
- Replacement of construction equipment with lower emission (Tier 4) equipment.
- Repower of commercial boats with lower emission (Tier 3) engines.
- Repower of mobile agricultural equipment with lower emission (Tier 4) engines.
- Repower of mobile construction type of equipment with lower emission (Tier 4) engines.
- Low rolling resistance tire replacement program.
- Voluntary old vehicle retirement program.

You asked that the assessment identify or estimate:

- Cost-effectiveness: The total cost to generate a 30 year ERC credit in tons/year.
- Total emission inventory: The total emissions from each program type.
- Incentive funding: Incentive funding structure and engine owner contribution.
- Emission reductions per average project.
- District cost per average project: The average amount of the incentive funding per project type.
- Project Life: The life of the emission reduction credit per project life. For example, ARB says commercial lawn and garden equipment has a life of one year. So to maintain that one year credit over 30 years 30 successive commercial equipment replacements would have to be implemented.

An initial review of the program types resulted in the elimination of several project types:

- Replacement of construction equipment with lower emission (Tier 4) equipment: This equipment is subject to ARB's Off-Road Regulation which presents two problems: (a) In the near-term (next 10 years or so) identifying surplus emission reductions would require a

company-by-company assessment, which is beyond the scope of this initial assessment. (b) In the longer term the Off-Road Regulation requires off-road equipment meet progressively lower fleet average emission rates, which greatly reduces the emission reduction potential for this category.

- Repower of mobile construction and farm equipment with lower emission (Tier 4) engines. This program type was eliminated because engine OEMs will not sell Tier 4 engines for repowering.

- Low rolling resistance tire replacement program. This program was run by the Ventura County APCD. That district is abandoning this program because of limited participation.

The results of the assessment are given in the Excel Final Report file. This file also contains links to other files that provide documentation to the data given in the report.

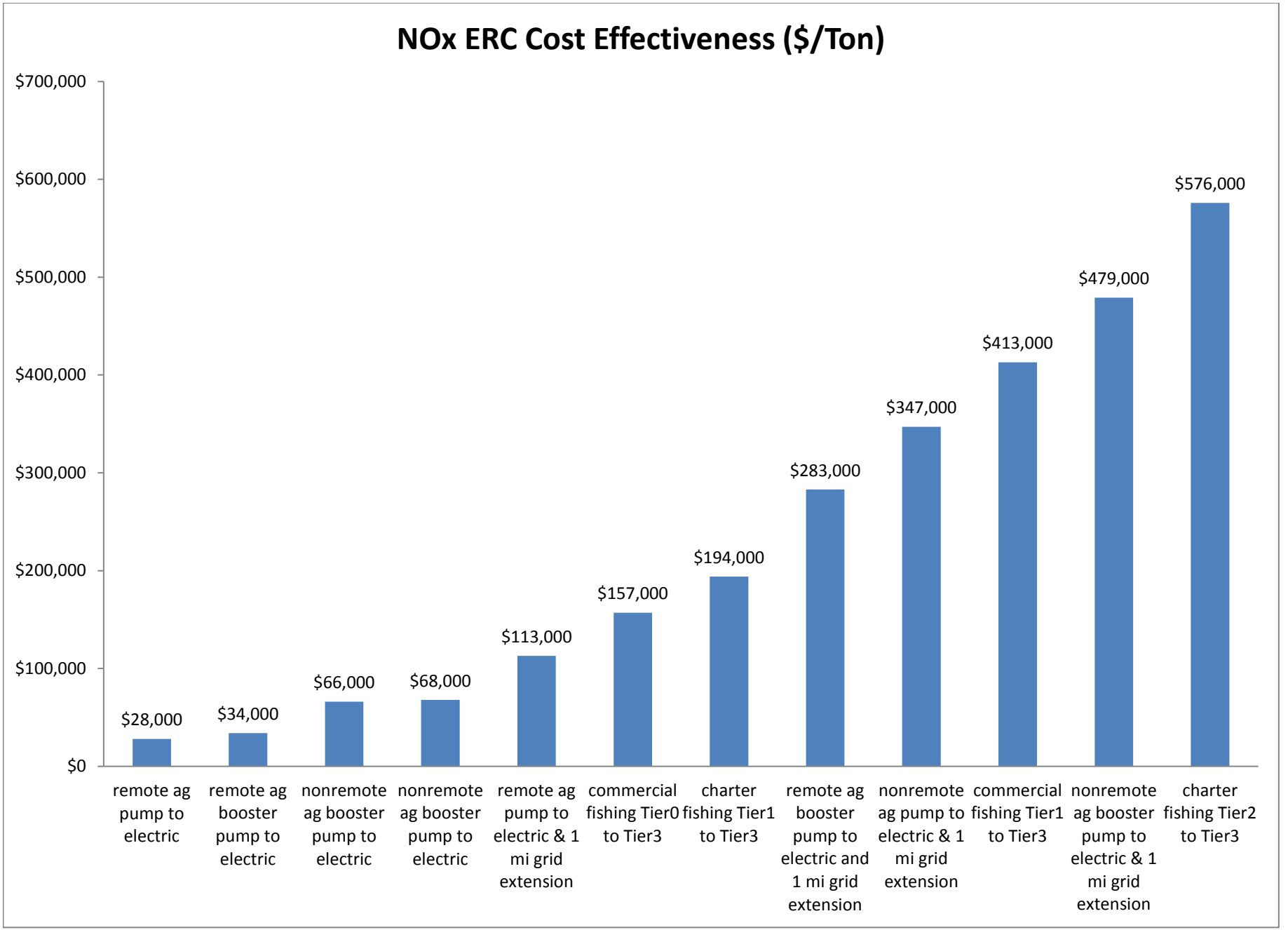
Please be advised that the results should be interpreted as an initial survey of project types that *may* warrant further investigation as a potential source of emission reduction credits. Generating the estimates required a number of assumptions which would need to be verified should a project type warrant additional consideration as a source of ERCs. For example:

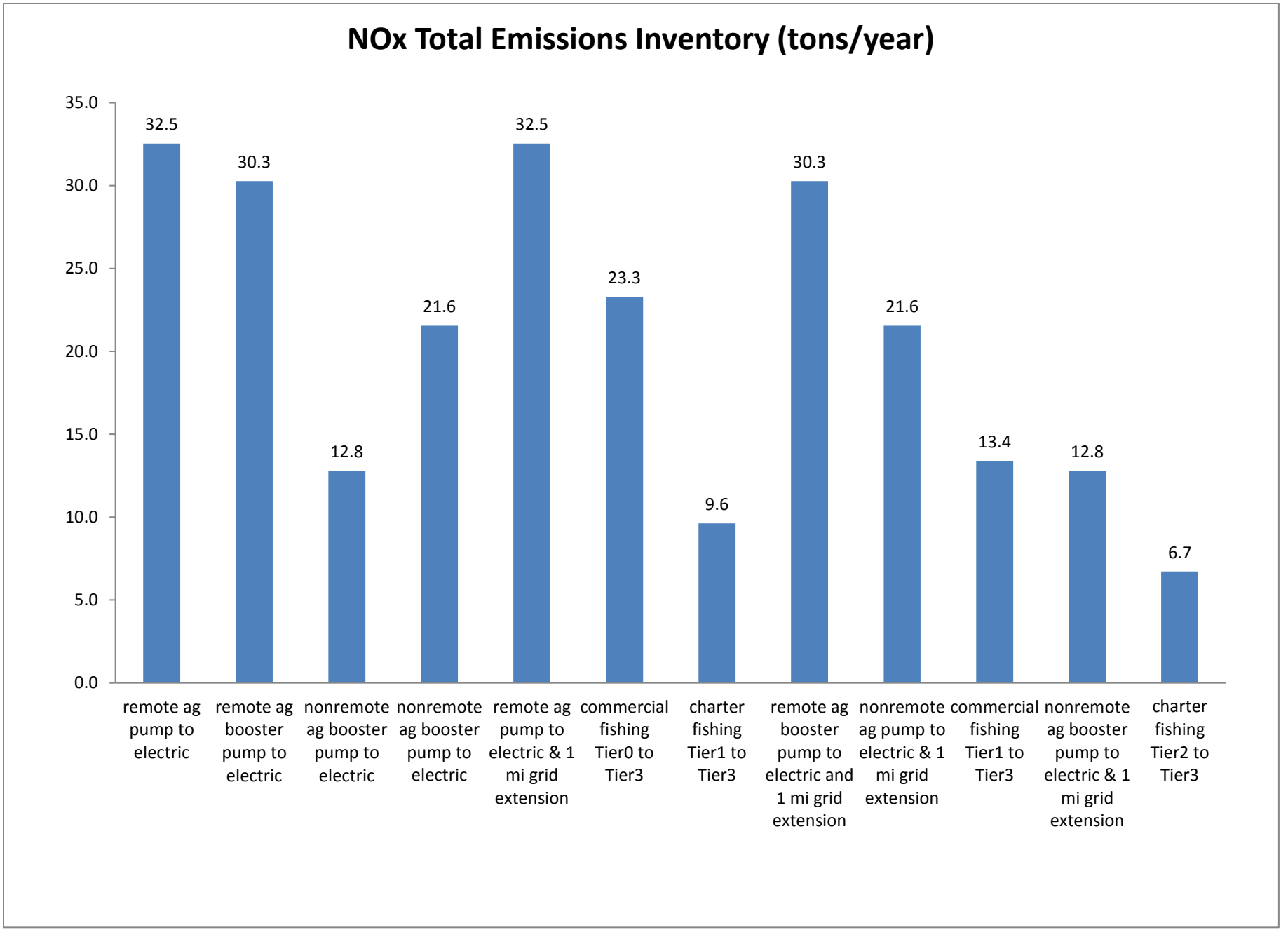
- Is the amount of the incentive sufficient to obtain the desired level of participation? Is it too high?
- Is the project life reasonable? For example, ARB data concludes that commercial lawn and garden equipment has a life of one year. Simply doubling the project life would reduce (improve) the cost-effectiveness by 50%.

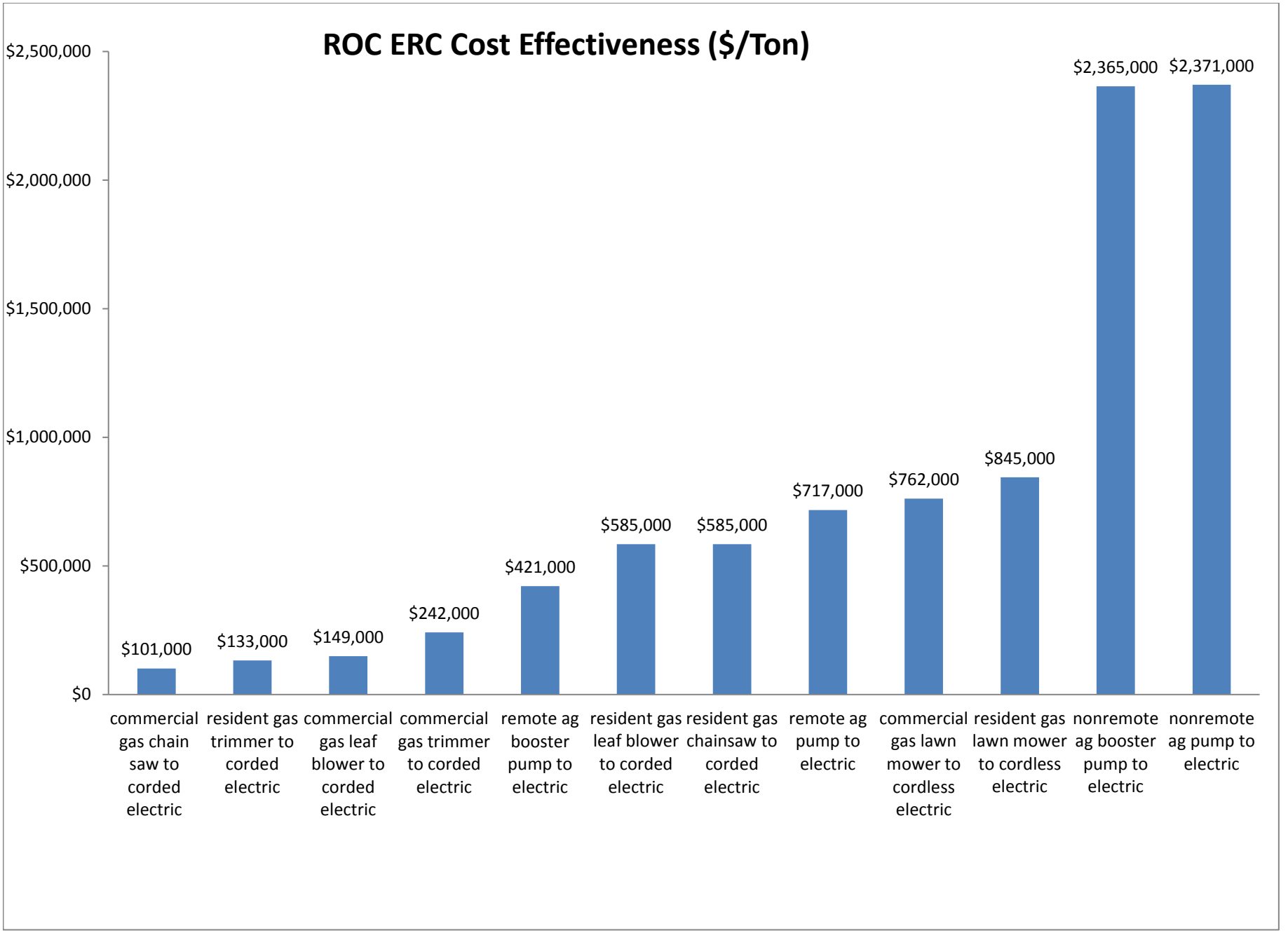
Questions/comments are welcomed.

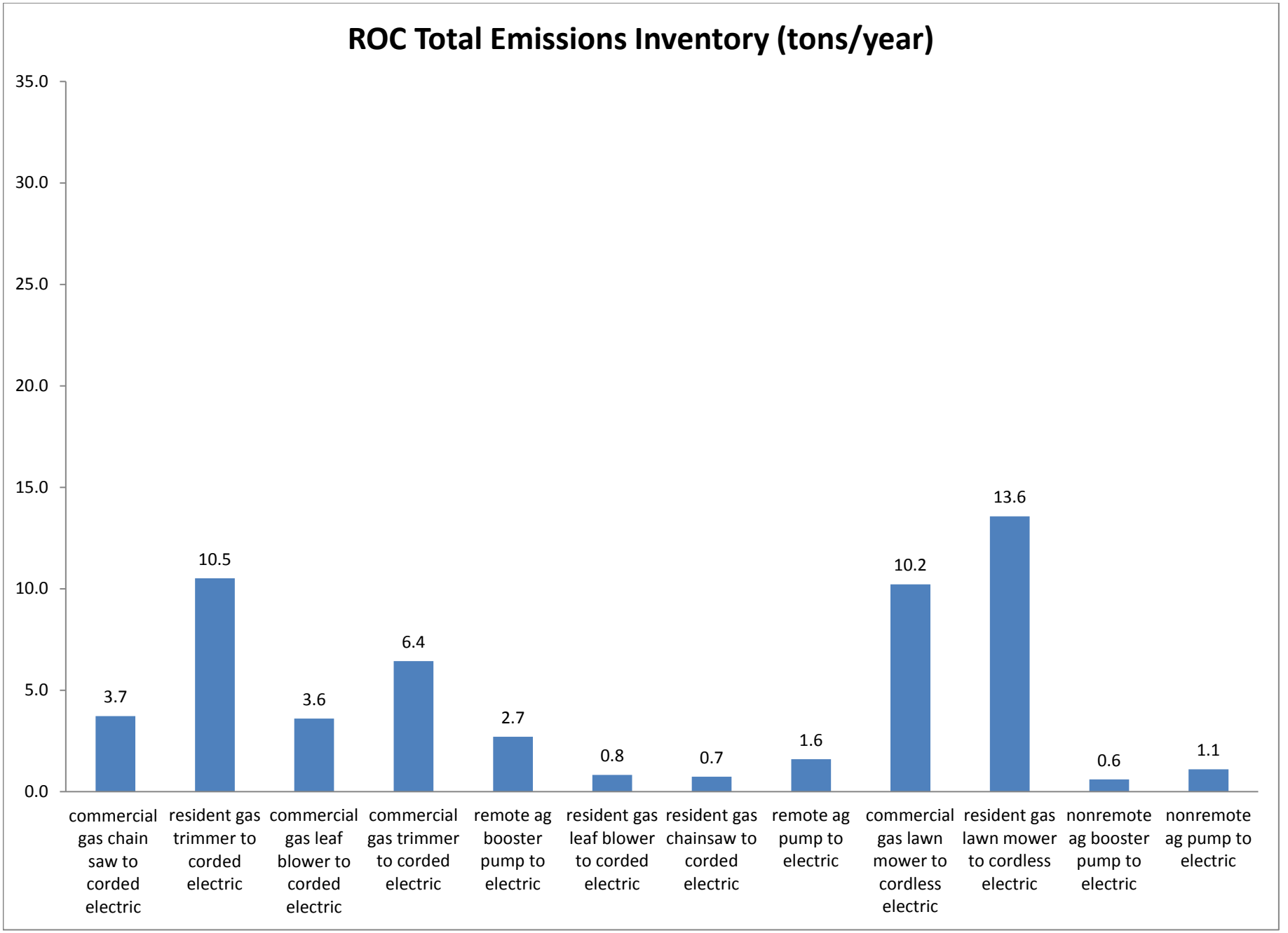
Cheers,

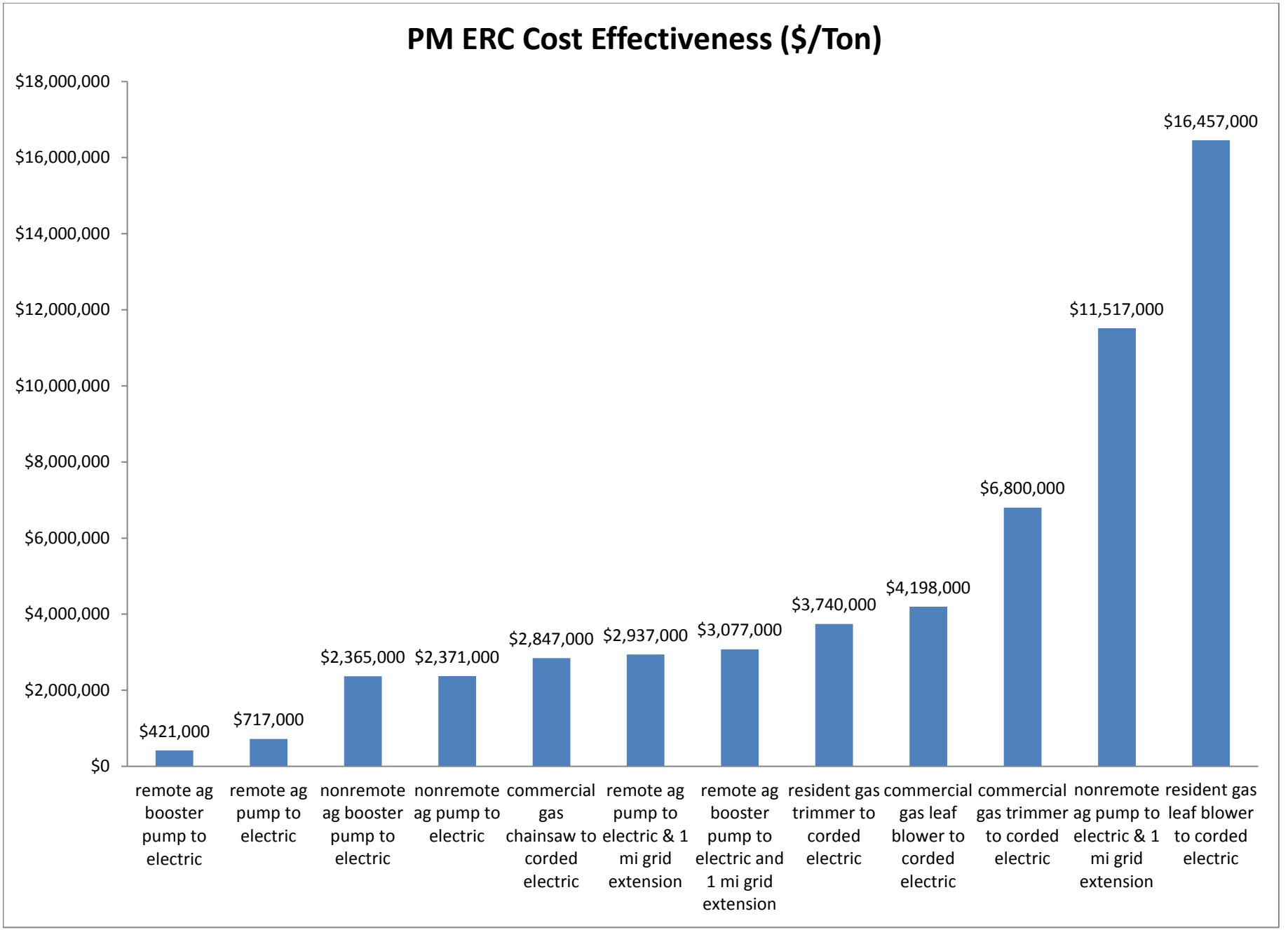
Larry Rennacker

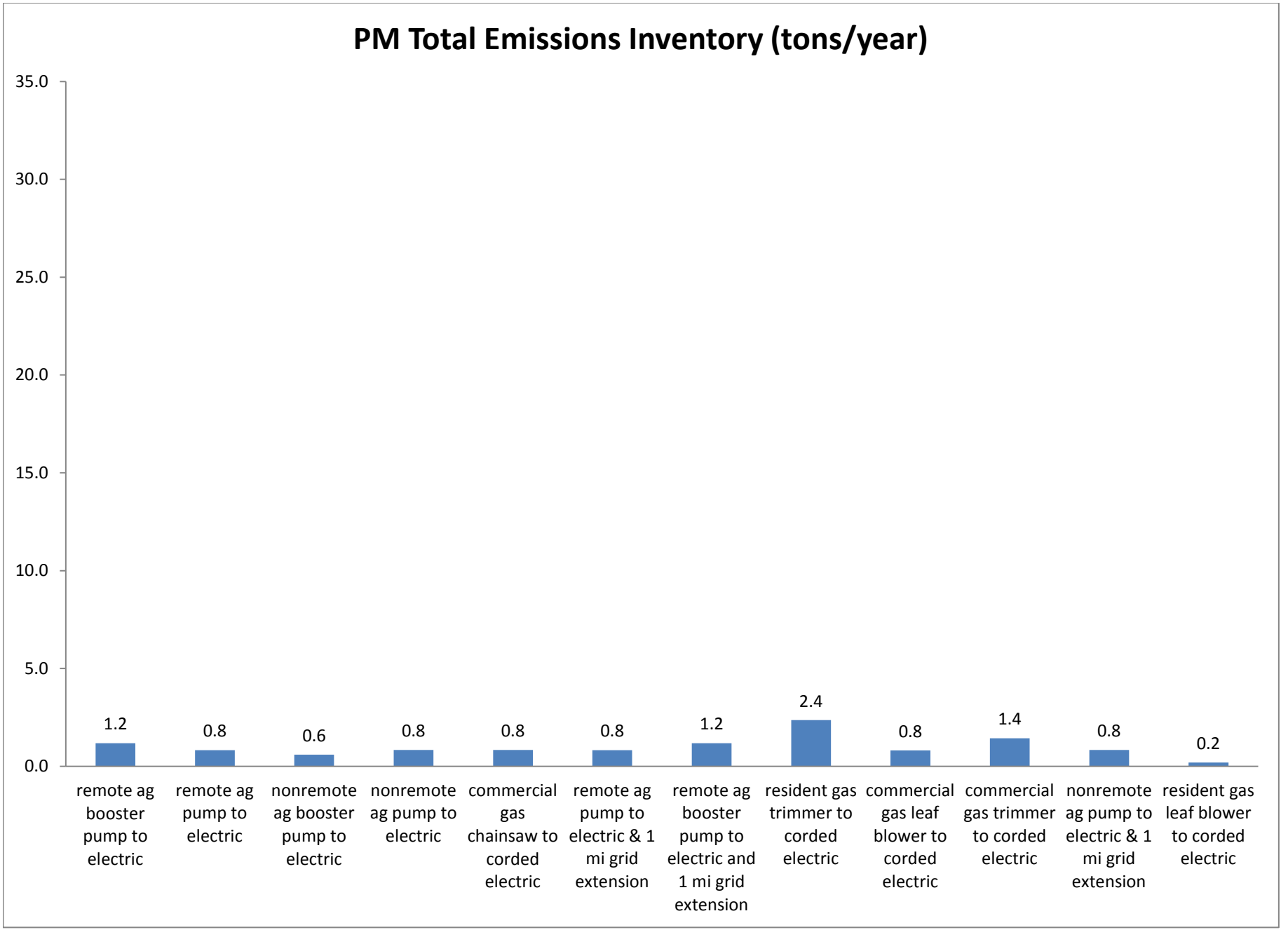

NOx ERC Cost Effectiveness ($/Ton)
$700,000
$600,000
$500,000
$400,000
$300,000
$200,000
$100,000
$0
$28,000
$34,000
$66,000
$68,000
$113,000
$157,000
$194,000
$283,000
$347,000
$413,000
$479,000
$576,000
remote ag pump to electric
remote ag booster pump to electric
nonremote ag booster pump to electric
nonremote ag booster pump to electric
remote ag pump to electric & 1 mi grid extension
commercial fishing Tier0 to Tier3
charter fishing Tier1 to Tier3
remote ag booster pump to electric and 1 mi grid extension
nonremote ag pump to electric & 1 mi grid extension
commercial fishing Tier1 to Tier3
nonremote ag booster pump to electric & 1 mi grid extension
charter fishing Tier2 to Tier3


NOx Total Emissions Inventory (tons/year)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
32.5
30.3
12.8
21.6
32.5
23.3
9.6
30.3
21.6
13.4
12.8
6.7
remote ag pump to electric
remote ag booster pump to electric
nonremote ag booster pump to electric
nonremote ag booster pump to electric
remote ag pump to electric & 1 mi grid extension
commercial fishing Tier0 to Tier3
charter fishing Tier1 to Tier3
remote ag booster pump to electric and 1 mi grid extension
nonremote ag pump to electric & 1 mi grid extension
commercial fishing Tier1 to Tier3
nonremote ag booster pump to electric & 1 mi grid extension
charter fishing Tier2 to Tier3


ROC ERC Cost Effectiveness ($/Ton)
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$0
$101,000
$133,000
$149,000
$242,000
$421,000
$585,000
$585,000
$717,000
$762,000
$845,000
$2,365,000
$2,371,000
commercial gas chain saw to corded electric
resident gas trimmer to corded electric
commercial gas leaf blower to corded electric
commercial gas trimmer to corded electric
remote ag booster pump to electric
resident gas leaf blower to corded electric
resident gas chainsaw to corded electric
remote ag pump to electric
commercial gas lawn mower to cordless electric
resident gas lawn mower to cordless electric
nonremote ag booster pump to electric
nonremote ag pump to electric


ROC Total Emissions Inventory (tons/year)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
3.7
10.5
3.6
6.4
2.7
0.8
0.7
1.6
10.2
13.6
0.6
1.1
commercial gas chain saw to corded electric
resident gas trimmer to corded electric
commercial gas leaf blower to corded electric
commercial gas trimmer to corded electric
remote ag booster pump to electric
resident gas leaf blower to corded electric
resident gas chainsaw to corded electric
remote ag pump to electric
commercial gas lawn mower to cordless electric
resident gas lawn mower to cordless electric
nonremote ag booster pump to electric
nonremote ag pump to electric


PM ERC Cost Effectiveness ($/Ton)
$18,000,000
$16,000,000
$14,000,000
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$0
$421,000
$717,000
$2,365,000
$2,371,000
$2,847,000
$2,937,000
$3,077,000
$3,740,000
$4,198,000
$6,800,000
$11,517,000
$16,457,000
remote ag booster pump to electric
remote ag pump to electric
nonremote ag booster pump to electric
nonremote ag pump to electric
commercial gas chainsaw to corded electric
remote ag pump to electric & 1 mi grid extension
remote ag booster pump to electric and 1 mi grid extension
resident gas trimmer to corded electric
commercial gas leaf blower to corded electric
commercial gas trimmer to corded electric
nonremote ag pump to electric & 1 mi grid extension
resident gas leaf blower to corded electric


PM Total Emissions Inventory (tons/year)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
1.2
0.8
0.6
0.8
0.8
0.8
1.2
2.4
0.8
1.4
0.8
0.2
remote ag booster pump to electric
remote ag pump to electric
nonremote ag booster pump to electric
nonremote ag pump to electric
commercial gas chainsaw to corded electric
remote ag pump to electric & 1 mi grid extension
remote ag booster pump to electric and 1 mi grid extension
resident gas trimmer to corded electric
commercial gas leaf blower to corded electric
commercial gas trimmer to corded electric
nonremote ag pump to electric & 1 mi grid extension
resident gas leaf blower to corded electric

Rank	Project Type	NOx ERC Cost Effectiveness ($/Ton in $1,000s)	NOx Total Emissions Inventory (tons/year)	Incentive Funding	NOx Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)	Documentation
1	Replace Remote Stationary Ag Pump Engines with Electric Motors	$28	32.54	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp	3447.68	$47,760	30	AgPumpElectricDocumentation.xlsx
2	Replace Remote Ag Booster Pump Engines with Electric Motors	$34	30.27	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp	1382.89	$23,414	30	AgPumpElectricDocumentation.xlsx
3	Replace Nonremote Ag Booster Pump Engines with Electric Motors	$66	12.81	80% of New Motor Cost at $259/motor hp; avg motor size 113hp	714.56	$23,414	30	AgPumpElectricDocumentation.xlsx
4	Replace Nonremote Ag Stationary Pump Engines with Electric Motors	$68	21.55	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp	1126.40	$38,332	30	AgPumpElectricDocumentation.xlsx
5	Replace Remote Stationary Ag Pump Engines with Electric Motors and one mile grid power extension	$113	32.54	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp; and one mi grid extension at $35/foot	3447.68	$195,600	30	AgPumpElectricDocumentation.xlsx
6	Commercial Fishing Tier 0 to Tier 3 Repower	$157	23.3	80% at~$194/hp	1600.41	$62,764	15	BoatRepowerDocumentation.xlsx
7	Charter Fishing Tier 1 to Tier 3 Repower	$194	9.62	80% at~$194/hp	4373.10	$211,771	15	BoatRepowerDocumentation.xlsx
8	Replace Remote Ag Booster Pump Engines with Electric Motors and one mile grid power extension	$283	30.27	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp; and one mi grid extension at $35/foot	1382.89	$171,254	30	AgPumpElectricDocumentation.xlsx
9	Replace Nonremote Ag Stationary Pump Engines with Electric Motors and one mile grid power extension	$347	21.55	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp; and one mi grid extension at $35/foot	1126.40	$186,172	30	AgPumpElectricDocumentation.xlsx
10	Commercial Fishing Tier 1 to Tier 3 Repower	$413	13.38	80% at~$194/hp	608.12	$62,764	15	BoatRepowerDocumentation.xlsx
11	Replace Nonremote Ag Booster Pump Engines with Electric Motors and one mile grid power extension	$479	12.81	80% of New Motor Cost at $259/motor hp; avg motor size 113hp; and one mi grid extension at $35/foot	714.56	$171,254	30	AgPumpElectricDocumentation.xlsx
12	Charter Fishing Tier 2 to Tier 3 Repower	$576	6.72	80% at~$194/hp	1471.58	$211,771	15	BoatRepowerDocumentation.xlsx

Rank	Project Type	NOx ERC Cost Effectiveness ($/Ton in $1,000s)	NOx Total Emissions Inventory (tons/year)	Incentive Funding	NOx Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)	Documentation
13	Other Commercial Tier 2 to Tier 3 Repower	$724	4.41	80% at~$194/hp	966.61	$174,857	15	BoatRepowerDocumentation.xlsx
14	Mobile Agricultural Equip. Replace.	$1,224	309.88	80% of new equipment cost	308.03	$62,830	10	MobileAgReplaceDocumentation.xlsx
15	Commercial Fishing Tier 2 to Tier 3 Repower	$1,227	9.34	80% at~$194/hp	204.64	$62,764	15	BoatRepowerDocumentation.xlsx
16	Replace Commercial Gasoline Chainsaw with Corded Electric	$1,925	1.24	$100 per	3.12	$100	1	LawnGardenDocumentation.xlsx
17	Replace Residential Gasoline Trimmer/edger/brush cutter with Corded Electric	$2,529	3.5	$100 per	0.24	$100	10	LawnGardenDocumentation.xlsx
18	Voluntary Auto Retirement	$2,537	290.5	$1,000 per vehicle	24.80	$1,000	3	AutoRetirementDocumentation4.xlsx
19	Replace Commercial Gasoline Leaf Blower with Corded Electric	$2,838	1.2	$100 per	2.11	$100	1	LawnGardenDocumentation.xlsx
20	Replace Commercial Gasoline Trimmer/edger brush cutter with Corded Electric	$4,598	2.14	$100 per	1.31	$100	1	LawnGardenDocumentation.xlsx
21	Replace Residential Gasoline Leaf Blower with Corded Electric	$11,126	0.27	$100 per	0.05	$100	10	LawnGardenDocumentation.xlsx
22	Replace Residential Gasoline Chainsaw with Corded Electric	$11,126	0.25	$100 per	0.05	$100	10	LawnGardenDocumentation.xlsx
23	Replace Commercial Gasoline Lawn Mower with Cordless Electric.	$14,300	1.17	$250 per	1.05	$250	1	LawnGardenDocumentation.xlsx
24	Replace Residential Gasoline Lawn Mower with Cordless Electric	$21,127	1.51	$250 per	0.07	$250	10	LawnGardenDocumentation.xlsx

Rank	Project Type	ROC ERC Cost Effectiveness ($/Ton in $1,000s)	ROC Total Emissions Inventory (tons/year)	Incentive Funding	ROC Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)	Documentation
1	Replace Commercial Gasoline Chainsaw with Corded Electric	$101	3.72	$100 per	59.30	$100	1	LawnGardenDocumentation.xlsx
2	Replace Residential Gasoline Trimmer/edger/brush cutter with Corded Electric	$133	10.52	$100 per	4.51	$100	10	LawnGardenDocumentation.xlsx
3	Replace Commercial Gasoline Leaf Blower with Corded Electric	$149	3.60	$100 per	40.21	$100	1	LawnGardenDocumentation.xlsx
4	Replace Commercial Gasoline Trimmer/edger brush cutter with Corded Electric	$242	6.43	$100 per	24.83	$100	1	LawnGardenDocumentation.xlsx
5	Replace Remote Ag Booster Pump Engines with Electric Motors	$421	2.70	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp	111.00	$23,414	30	AgPumpElectricDocumentation.xlsx
6	Replace Residential Gasoline Leaf Blower with Corded Electric	$585	0.83	$100 per	1.03	$100	10	LawnGardenDocumentation.xlsx
7	Replace Residential Gasoline Chainsaw with Corded Electric	$585	0.74	$100 per	1.03	$100	10	LawnGardenDocumentation.xlsx
8	Replace Remote Stationary Ag Pump Engines with Electric Motors	$717	1.60	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp	133.00	$47,760	30	AgPumpElectricDocumentation.xlsx
9	Replace Commercial Gasoline Lawn Mower with Cordless Electric.	$762	10.22	$250 per	19.68	$250	1	LawnGardenDocumentation.xlsx
10	Replace Residential Gasoline Lawn Mower with Cordless Electric	$845	13.57	$250 per	1.78	$250	10	LawnGardenDocumentation.xlsx
11	Replace Nonremote Ag Booster Pump Engines with Electric Motors	$2,365	0.60	80% of New Motor Cost at $259/motor hp; avg motor size 113hp	20.00	$23,414	30	AgPumpElectricDocumentation.xlsx
12	Replace Nonremote Ag Stationary Pump Engines with Electric Motors	$2,371	1.10	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp	32.00	$38,332	30	AgPumpElectricDocumentation.xlsx

Rank	Project Type	ROC ERC Cost Effectiveness ($/Ton in $1,000s)	ROC Total Emissions Inventory (tons/year)	Incentive Funding	ROC Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)	Documentation
13	Replace Remote Stationary Ag Pump Engines with Electric Motors and one mile grid power extension	$2,937	1.60	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp; and one mi grid extension at $35/foot	133.00	$195,600	30	AgPumpElectricDocumentation.xlsx
14	Replace Remote Ag Booster Pump Engines with Electric Motors and one mile grid power extension	$3,077	2.70	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp; and one mi grid extension at $35/foot	111.00	$171,254	30	AgPumpElectricDocumentation.xlsx
15	Voluntary Auto Retirement	$7,776	131.50	$1,000 payment per retired vehicle	11.50	$1,000	3	AutoRetirementDocumentation4.xlsx
16	Replace Nonremote Ag Stationary Pump Engines with Electric Motors and one mile grid power extension	$11,517	1.10	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp; and one mi grid extension at $35/foot	32.00	$186,172	30	AgPumpElectricDocumentation.xlsx
17	Mobile Agricultural Equip. Replace.	$15,785	26.87	80% of new equipment cost	23.89	$62,830	10	MobileAgReplaceDocumentation.xlsx
18	Replace Nonremote Ag Booster Pump Engines with Electric Motors and one mile grid power extension	$17,299	0.60	80% of New Motor Cost at $259/motor hp; avg motor size 113hp; and one mi grid extension at $35/foot	20.00	$171,254	30	AgPumpElectricDocumentation.xlsx
19	Commercial Fishing Tier 0 to Tier 3 Repower	$347,954	1.31	80% or ~$194/hp	0.72	$62,764	15	BoatRepowerDocumentation.xlsx
20	Commercial Fishing Tier 1 to Tier 3 Repower	No reduction	1.12	80% or ~$194/hp	0.00	$62,764	15	BoatRepowerDocumentation.xlsx
21	Commercial Fishing Tier 2	No reduction	1.12	80% or ~$194/hp	0.00	$62,764	15	BoatRepowerDocumentation.xlsx
22	Charter Fishing Tier 1 to Tier 3 Repower	No reduction	0.81	80% or ~$194/hp	0.00	$211,771	15	BoatRepowerDocumentation.xlsx
23	Charter Fishing Tier 2 to Tier 3 Repower	No reduction	0.81	80% or ~$194/hp	0.00	$211,771	15	BoatRepowerDocumentation.xlsx
24	Other Commercial Tier 2 to Tier 3 Repower	No reduction	0.53	80% or ~$194/hp avg	0.00	$174,857	15	BoatRepowerDocumentation.xlsx

Rank	Project Type	PM ERC Cost Effectiveness ($/Ton in $1,000s)	PM Total Emissions Inventory (tons/year)	Incentive Funding	PM Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)	Documentation
1	Replace Remote Ag Booster Pump Engines with Electric Motors	$421	1.18	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp	111.3	$23,414	30	AgPumpElectricDocumentation.xlsx
2	Replace Remote Stationary Ag Pump Engines with Electric Motors	$717	0.83	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp	133.2	$47,760	30	AgPumpElectricDocumentation.xlsx
3	Replace Nonremote Ag Booster Pump Engines with Electric Motors	$2,365	0.6	80% of New Motor Cost at $259/motor hp; avg motor size 113hp	19.8	$23,414	30	AgPumpElectricDocumentation.xlsx
4	Replace Nonremote Ag Stationary Pump Engines with Electric Motors	$2,371	0.84	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp	32.33	$38,332	30	AgPumpElectricDocumentation.xlsx
5	Replace Commercial Gasoline Chainsaw with Corded Electric	$2,847	0.84	$100 per	2.11	$100	1	LawnGardenDocumentation.xlsx
6	Replace Remote Stationary Ag Pump Engines with Electric Motors and one mile grid power extension	$2,937	0.83	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp; and one mi grid extension at $35/foot	133.2	$195,600	30	AgPumpElectricDocumentation.xlsx
7	Replace Remote Ag Booster Pump Engines with Electric Motors and one mile grid power extension	$3,077	1.18	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp; and one mi grid extension at $35/foot	111.3	$171,254	30	AgPumpElectricDocumentation.xlsx
8	Replace Residential Gasoline Trimmer/edger/brush cutter with Corded Electric	$3,740	2.36	$100 per	0.16	$100	10	LawnGardenDocumentation.xlsx
9	Replace Commercial Gasoline Leaf Blower with Corded Electric	$4,198	0.81	$100 per	1.43	$100	1	LawnGardenDocumentation.xlsx
10	Replace Commercial Gasoline Trimmer/edger brush cutter with Corded Electric	$6,800	1.44	$100 per	0.88	$100	1	LawnGardenDocumentation.xlsx
11	Replace Nonremote Ag Stationary Pump Engines with Electric Motors and one mile grid power extension	$11,517	0.84	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp; and one mi grid extension at $35/foot	32.33	$186,172	30	AgPumpElectricDocumentation.xlsx
12	Replace Residential Gasoline Leaf Blower with Corded Electric	$16,457	0.19	$100 per	0.04	$100	10	LawnGardenDocumentation.xlsx
13	Replace Residential Gasoline Chainsaw with Corded Electric	$16,457	0.17	$100 per	0.04	$100	10	LawnGardenDocumentation.xlsx

Rank	Project Type	PM ERC Cost Effectiveness ($/Ton in $1,000s)	PM Total Emissions Inventory (tons/year)	Incentive Funding	PM Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)	Documentation
14	Replace Nonremote Ag Booster Pump Engines with Electric Motors and one mile grid power extension	$17,299	0.6	80% of New Motor Cost at $259/motor hp; avg motor size 113hp; and one mi grid extension at $35/foot	19.8	$171,254	30	AgPumpElectricDocumentation.xlsx
15	Replace Commercial Gasoline Lawn Mower with Cordless Electric.	$21,152	0.79	$250 per	0.71	$250	1	LawnGardenDocumentation.xlsx
16	Mobile Agricultural Equip. Replace.	$30,603	12.22	80% of new equipment cost	12.3	$62,830	10	MobileAgReplaceDocumentation.xlsx
17	Replace Residential Gasoline Lawn Mower with Cordless Electric	$31,250	1.02	$250 per	0.05	$250	10	LawnGardenDocumentation.xlsx
18	Commercial Fishing Tier 0 to Tier 3 Repower	$44,857	0.73	80% or ~$194/hp	5.60	$62,764	15	BoatRepowerDocumentation.xlsx
19	Commercial Fishing Tier 1 to Tier 3 Repower	$150,866	0.49	80% or ~$194/hp	1.66	$62,764	15	BoatRepowerDocumentation.xlsx
20	Charter Fishing Tier 1 to Tier 3 Repower	$460,125	0.35	80% or ~$194/hp	1.84	$211,771	15	BoatRepowerDocumentation.xlsx
21	Commercial Fishing Tier 2 to Tier 3 Repower	$776,813	0.23	80% or ~$194/hp	0.32	$62,764	15	BoatRepowerDocumentation.xlsx
22	Other Commercial Tier 2 to Tier 3 Repower	$2,175,317	0.11	80% or ~$194/hp	0.32	$174,857	15	BoatRepowerDocumentation.xlsx
23	Charter Fishing Tier 2 to Tier 3 Repower	$2,369,200	0.17	80% or ~$194/hp	0.36	$211,771	15	BoatRepowerDocumentation.xlsx
24	Voluntary Auto Retirement	NA	2.5	$1,000 payment per retired vehicle	NA	$1,000	3	AutoRetirementDocumentation4.xlsx

Rank	Project Type	ERC Cost Effectiveness ($/Ton in $1,000s)	Total Emissions Inventory (tons/year)	Incentive Funding	Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)
Top 12 NOx ERC Cost Effectiveness $/ton in $1,000s; 30 year ERC							
1	Remote Ag Pump Electrification No Grid Extension	$28	32.54	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp	3447.68	$47,760	30
2	NonRemote Ag Booster Pump Electrification No Grid Extension	$34	30.27	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp	1382.89	$23,414	30
3	NonRemote Ag Pump Electrification No Grid Extension	$66	12.81	80% of New Motor Cost at $259/motor hp; avg motor size 113hp	714.56	$23,414	30
4	Remote Ag Booster Pump Electrification No Grid Extension	$68	21.55	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp	1126.40	$38,332	30
5	Remote Ag Pump Electrification W 1 mi Grid Extension	$113	32.54	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp; and one mi grid extension at $35/foot	3447.68	$195,600	30
6	Fishing Vessel Repower Tier 0 to Tier 3	$157	23.3	80% at~$194/hp	1600.41	$62,764	15
7	Charter Fishing Repower Tier 1 to Tier 3	$194	9.62	80% at~$194/hp	4373.10	$211,771	15

Rank	Project Type	ERC Cost Effectiveness ($/Ton in $1,000s)	Total Emissions Inventory (tons/year)	Incentive Funding	Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)
8	NonRemote Ag Pump Electrification W 1 mi Grid Extension	$283	30.27	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp; and one mi grid extension at $35/foot	1382.89	$171,254	30
9	Fishing Vessel Repower Tier 1 to Tier 3	$347	21.55	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp; and one mi grid extension at $35/foot	1126.40	$186,172	30
10	NonRemote Ag Booster Pump Electrification W 1 mi Grid Extension	$413	13.38	80% at~$194/hp	608.12	$62,764	15
11	Charter Fishing Repower Tier 2 to Tier 3	$479	12.81	80% of New Motor Cost at $259/motor hp; avg motor size 113hp; and one mi grid extension at $35/foot	714.56	$171,254	30
12	Other Commercial Vessel Repower Tier 2 to Tier 3	$576	6.72	80% at~$194/hp	1471.58	$211,771	15

Rank	Project Type	ERC Cost Effectiveness ($/Ton in $1,000s)	Total Emissions Inventory (tons/year)	Incentive Funding	Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)
Top 12 ROC ERC Cost Effectiveness $/ton in $1,000s; 30 year ERC							
1	Commercial Chainsaw Replacement with Electric Corded	$101	$4	$100 per	59.30	$100	1
2	Residential Trimmer Replacement with Electric Corded	$133	$11	$100 per	4.51	$100	10
3	Commercial Trimmer Replacement with Electric Corded	$149	$4	$100 per	40.21	$100	1
4	Residential Leaf blower Replacement with Electric Corded	$242	$6	$100 per	24.83	$100	1
5	Residential Chainsaw Replacement with Electric Corded	$421	$3	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp	111.00	$23,414	30
6	Remote Ag Pump Electrification No Grid Extension	$585	$1	$100 per	1.03	$100	10
7	Commercial Lawnmower Replacement with Electric Cordless	$585	$1	$100 per	1.03	$100	10
8	Residential Lawnmower Replacement with Electric Cordless	$717	$2	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp	133.00	$47,760	30
9	NonRemote Ag Pump Electrification No Grid Extension	$762	$10	$250 per	19.68	$250	1
10	Voluntary Car Retirement (avg over 30 3-year cycles)	$845	$14	$250 per	1.78	$250	10
11	Commercial Leaf blower Replacement with Electric Corded	$2,365	$1	80% of New Motor Cost at $259/motor hp; avg motor size 113hp	20.00	$23,414	30
12	NonRemote Ag Booster Pump Electrification No Grid Extension	$2,371	$1	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp	32.00	$38,332	30

Top 12 PM ERC Cost Effectiveness $/ton in $1,000s; 30 year ERC

Rank	Project Type	ERC Cost Effectiveness ($/Ton in $1,000s)	Total Emissions Inventory (tons/year)	Incentive Funding	Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)
1	NonRemote Ag Booster Pump Electrification No Grid Extension	$421	$1	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp	111.30	$23,414	30
2	Remote Ag Pump Electrification No Grid Extension	$717	$1	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp	133.20	$47,760	30
3	Remote Ag Booster Pump Electrification No Grid Extension	$2,365	$1	80% of New Motor Cost at $259/motor hp; avg motor size 113hp	19.80	$23,414	30
4	NonRemote Ag Pump Electrification No Grid Extension	$2,371	$1	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp	32.33	$38,332	30
5	Charter Fishing Repower Tier 1 to Tier 3	$2,847	$1	$100 per	2.11	$100	1
6	Remote Ag Pump Electrification W 1 mi Grid Extension	$2,937	$1	80% of New Motor Cost at $259/motor hp; avg motor size 231 hp; and one mi grid extension at $35/foot	133.20	$195,600	30
7	Commercial Chainsaw Replacement with Electric Corded	$3,077	$1	80% of New Motor Cost at $259/motor hp; avg motor size 113 hp; and one mi grid extension at $35/foot	111.30	$171,254	30
8	Fishing Vessel Repower Tier 0 to Tier 3	$3,740	$2	$100 per	0.16	$100	10

Rank	Project Type	ERC Cost Effectiveness ($/Ton in $1,000s)	Total Emissions Inventory (tons/year)	Incentive Funding	Reductions Per Avg Project (lbs/yr)	District Avg Cost/ Project	Project Life (yrs)
9	Residential Trimmer Replacement with Electric Corded	$4,198	$1	$100 per	1.43	$100	1
10	Fishing Vessel Repower Tier 1 to Tier 3	$6,800	$1	$100 per	0.88	$100	1
11	NonRemote Ag Pump Electrification W 1 mi Grid Extension	$11,517	$1	80% of New Motor Cost at $259/motor hp; avg motor size 185 hp; and one mi grid extension at $35/foot	32.33	$186,172	30
12	Commercial Trimmer Replacement with Electric Corded	$16,457	$0	$100 per	0.04	$100	10