



**PORT OF OAKLAND
SEAPORT**

*Reconvened MAQIP Task Force - Meeting #2
The Port of Oakland's Implementation Options
Wednesday, May 9, 2018*

Review of 2009 MAQIP Goals

- **By 2020, reduce on- and near-shore emissions from Port activities from the baseline 2005 emissions level**

Pollutant	MAQIP Reduction Goal
DPM	85%
SOx	85%
NOx	34%

- **SOx goal has been achieved**
- **NOx goal is likely to be achieved in 2020**
- **DPM goal:**
 - **89% reduction from land sources, 74% for water sources**

Projections of 2020 Emissions

- **Starcrest projections of 2020 reductions from 2005 levels:**

Forecast	DPM	SOx	NOx	CO ₂ e
Low Activity/ Low Emission Factor	-84%	-94%	-39%	0%
High Activity/ High Emission Factor	-83%	-93%	-34%	7%
MAQIP Goal	-85%	-85%	-34%	--

- **To meet DPM goal, need ~5 tpy in reductions from water sources**
- **Key Reduction Measures**
 - **Ocean-Going Vessels fuel switch and shorepower**
 - **Turnover of truck fleet to Model Year 2007 and newer**
 - **Turnover of Cargo-Handling Equipment and addition of DPF**



2020 Assumptions

➤ Regulatory Changes

- Increased use of shorepower as required by regulation
 - May use a shore power extension system (SPES) or bonnet
- Turnover of truck fleet to Model Year 2010 and newer
- Truck On-Board Diagnostics (OBD) in MY 2014 and newer requires truck operator to maintain exhaust treatment systems (DOC/DPF)

➤ Beyond Regulation

- Turnover of Cargo-Handling Equipment
- Turnover of Commercial Harbor Craft
- Growth range from 2.4% to 3%, intermodal range from 15% to 40%

Analysis of Potential Emission Reduction Measures

Near-Term Measures	Cost (millions)	Potential Emissions Reductions		
		DPM (tons/yr)	NO _x (tons/yr)	CO ₂ e (tonnes/yr)
OGV Vessel Speed Reduction (Outer Zone)	\$1 - \$2 per year	2.0 - 2.1	130 - 137	4,200 - 4,500
OGV Barge-Based Scrubber System	\$6 per Barge	3.5 - 3.7	201 - 212	-
HC Engine Replacement*	\$53.2	2.5 - 2.7	59 - 62	-
Hybrid Tugboat Retrofit*	\$38	1.0 - 1.1	31 - 38	4,400 - 4,600
Hybrid RTG Cranes (Replace 13 RTGs)*	\$6.3	0.1	36	1,200

* Within the source category, reductions from these measures are exclusive and cannot be added

- VSR only possible in the outer part of the precautionary zone
- Potential for 5 tpy DPM reductions from a combination of water-side measures

Analysis of Potential Emission Reduction Measures

Long-Term Measures	Cost (millions)	Potential Emissions Reductions		
		DPM (tons/yr)	NO _x (tons/yr)	CO ₂ e (tonnes/yr)
OGV Vessel Speed Reduction (Outer Zone)	\$1 - \$2 per year	2.3 - 2.5	151 - 169	4,900 - 5,500
OGV Barge-Based Scrubber System	NA	4.4 - 4.9	243 - 272	-
HC Engine Replacement*	NA	1.6 - 2.6	42 - 71	-
Hybrid Tugboat Retrofit*	NA	0.8 - 1.2	29 - 47	5,600 - 6,200
Electrification of CHE	\$350	0.48 - 0.54	46 - 51	74,000 - 83,000
Zero Emission Trucks	\$2,400	0.07 - 0.11	50 - 79	14,000 - 22,000
Zero Emission Switch Locomotives	\$2 - \$2.5	0.1 - 0.4	8 - 25	276 - 822

* Within the source category, reductions from these measures are exclusive and cannot be added

- VSR only possible in the outer part of the precautionary zone
- Complete CHE and truck fleet turnover estimates provide bounding scenarios

Emissions Reduction Projects

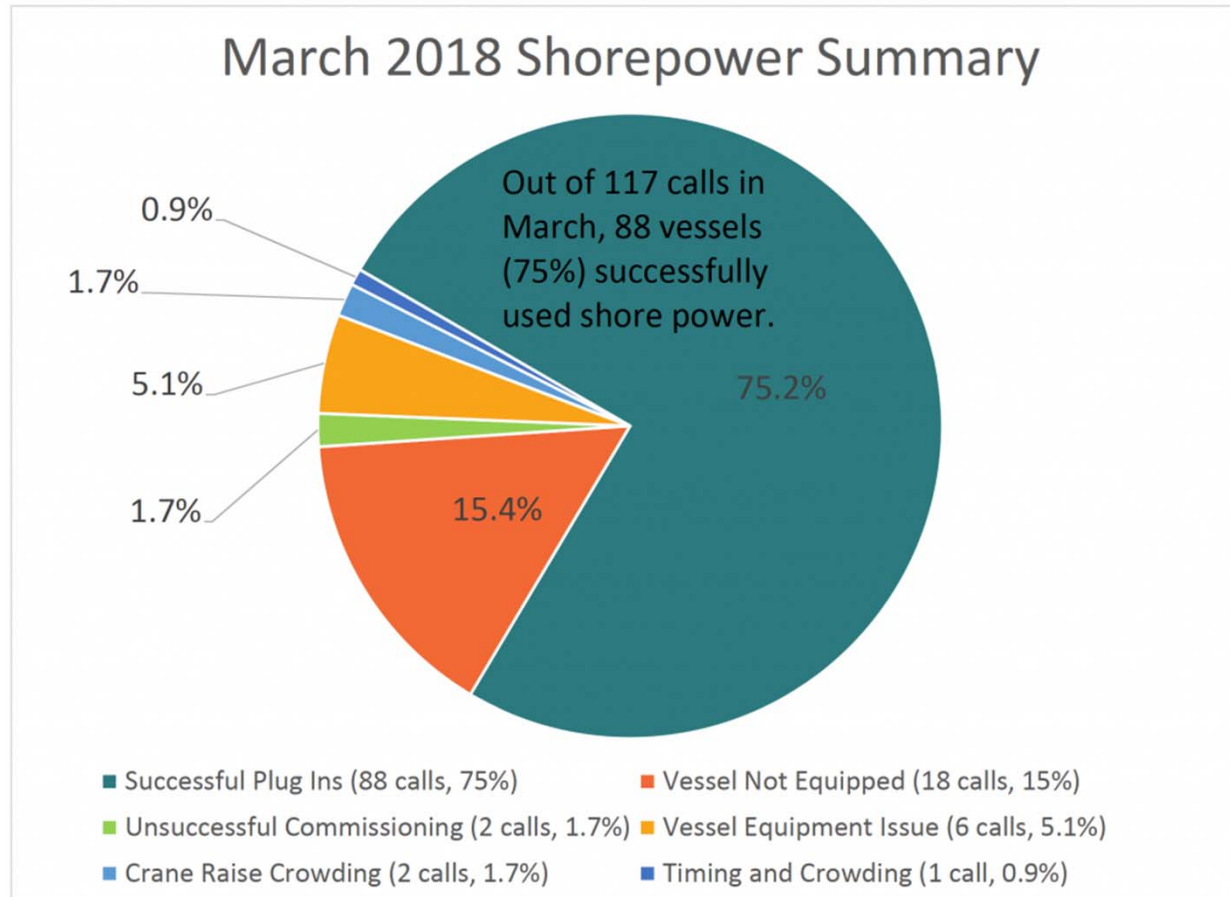
- 13 Hybrid RTG cranes for ~\$6m (vs. \$30m for all electric)

Pollutant	Annual Emissions Reductions (tpy)	Emissions Reductions
NOx	36	99%
ROG	1.7	98%
DPM	0.1	95%
Weighted Criteria	40	99%
GHG	>1,214 MT CO ₂ e	>40%
Cost Effectiveness (Carl Moyer Program):	~\$24,000 per weighted ton, below the threshold of \$30,000	

- Fleet of electric yard hostlers (UTRs), conditioned on funding

Updated Shorepower Website

➤ Features monthly usage summaries



<http://www.oaklandseaport.com/development-programs/shore-power/>



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