

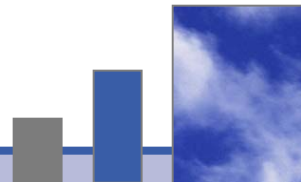


Low-Emission On-Road Trucking Technologies

NOx and PM Retrofit Devices

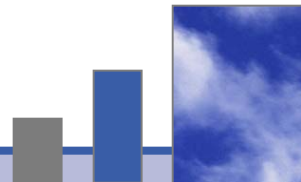
Tim Taylor
Claire Advanced Emission Controls, LLC

December 8, 2004



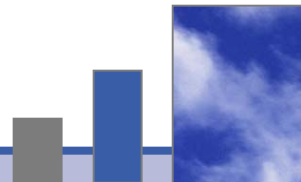
Why Retrofit?

- Why increase your operating costs and add maintenance requirements?
- The short answer: Because it's the right thing to do
- The long answer...
 - Environmentalists: Because it's essential for protecting human health
 - Government Agency: Because without retrofits, we can't meet the deadlines for federal air quality standards
 - Business Community: Because we need to avoid lawsuits and preserve federal transportation funding to our communities and we need to create healthy communities for our employees



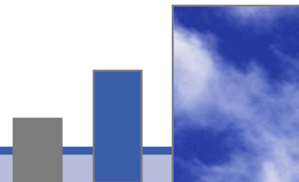
Funds are Available for Retrofits

- Moyer
- Registration Surcharge
 - DMV (i.e. 2766)
- Court Settlements
 - i.e. port programs
- SEPs
- Various others
 - CMAQ
 - Property tax



Issues to Consider

- Multi-media reductions
 - Is it better to reduce all harmful emissions when a retrofit decision is made?
- Cost-effectiveness
 - Measuring \$/ton
- Cost-efficiency
 - Measuring \$/ton plus factoring total tons reduced
- Verification
 - Some technologies that are not Verified really work...many don't!
 - Be skeptical of technologies with no Verifications
- Distributor's ability to support product



Distributor Support: Example

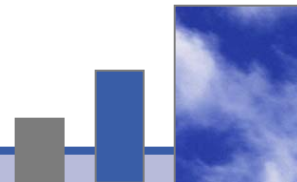
Captured in tail pipe . . .



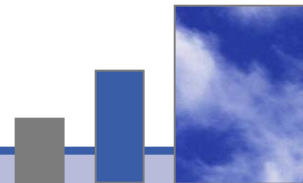
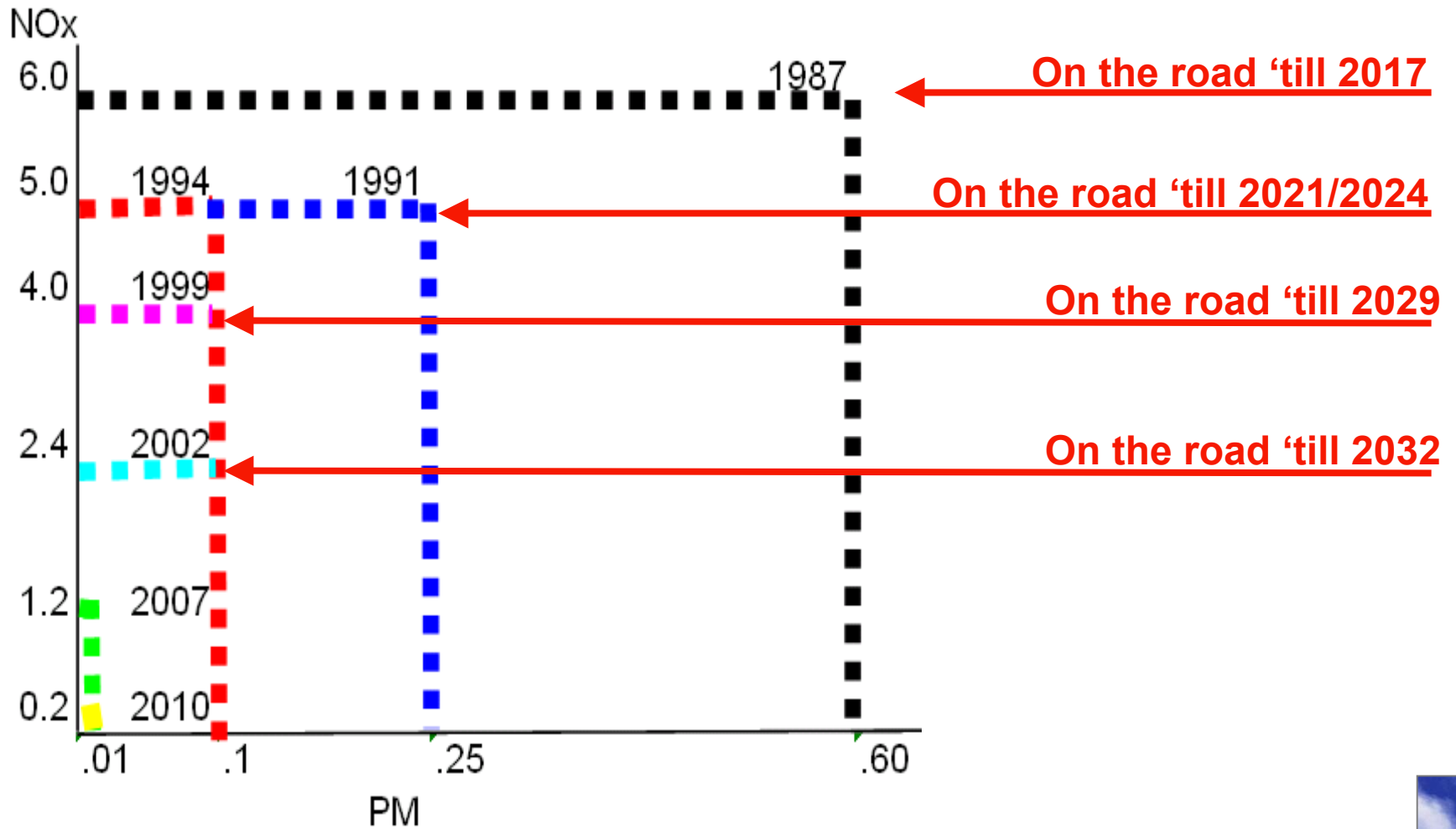
Stored onsite . . .



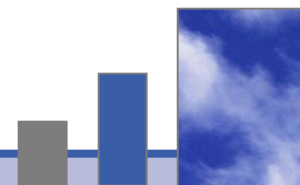
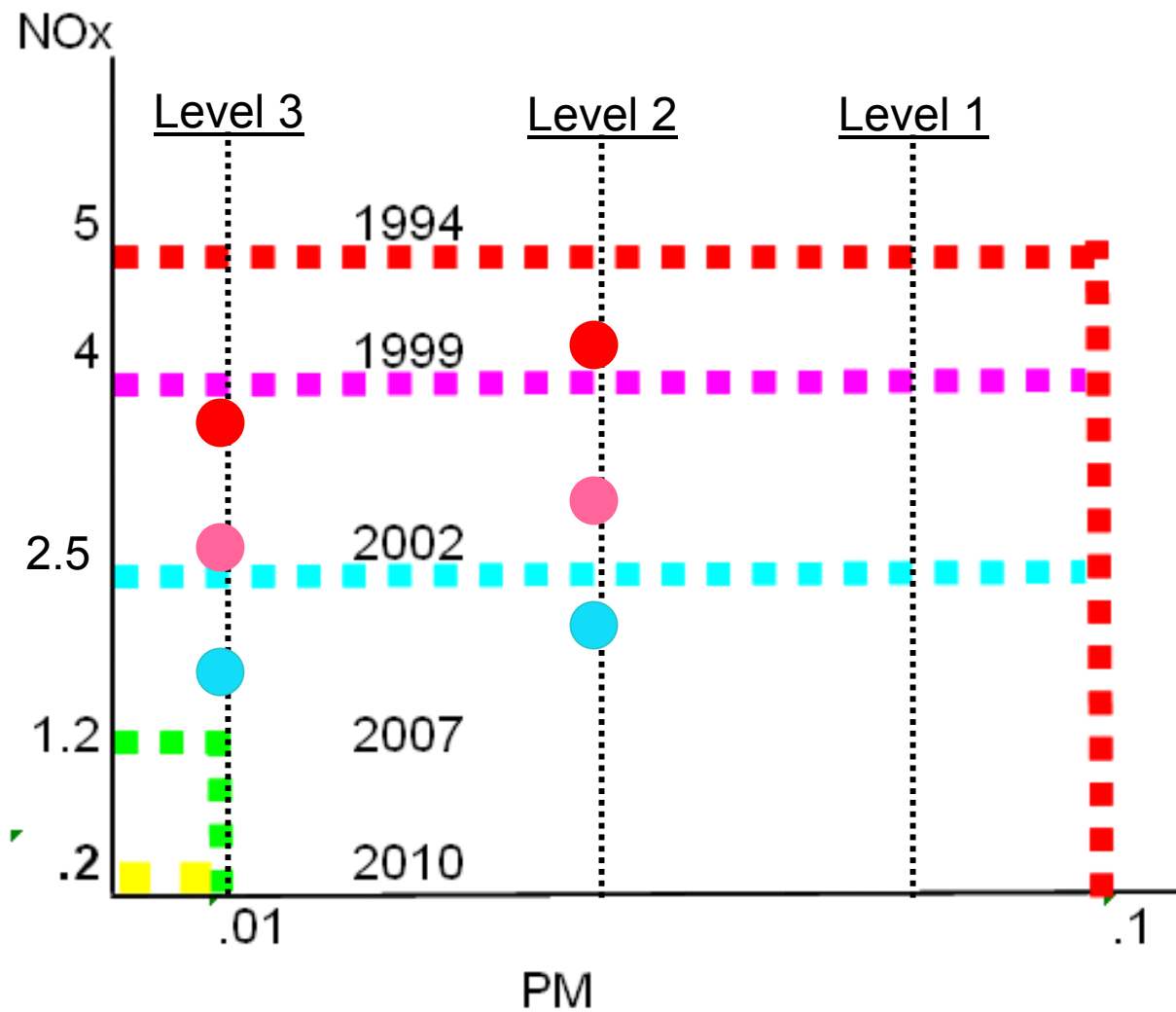
and sent to hazardous waste facility.



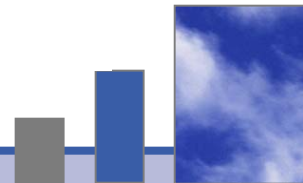
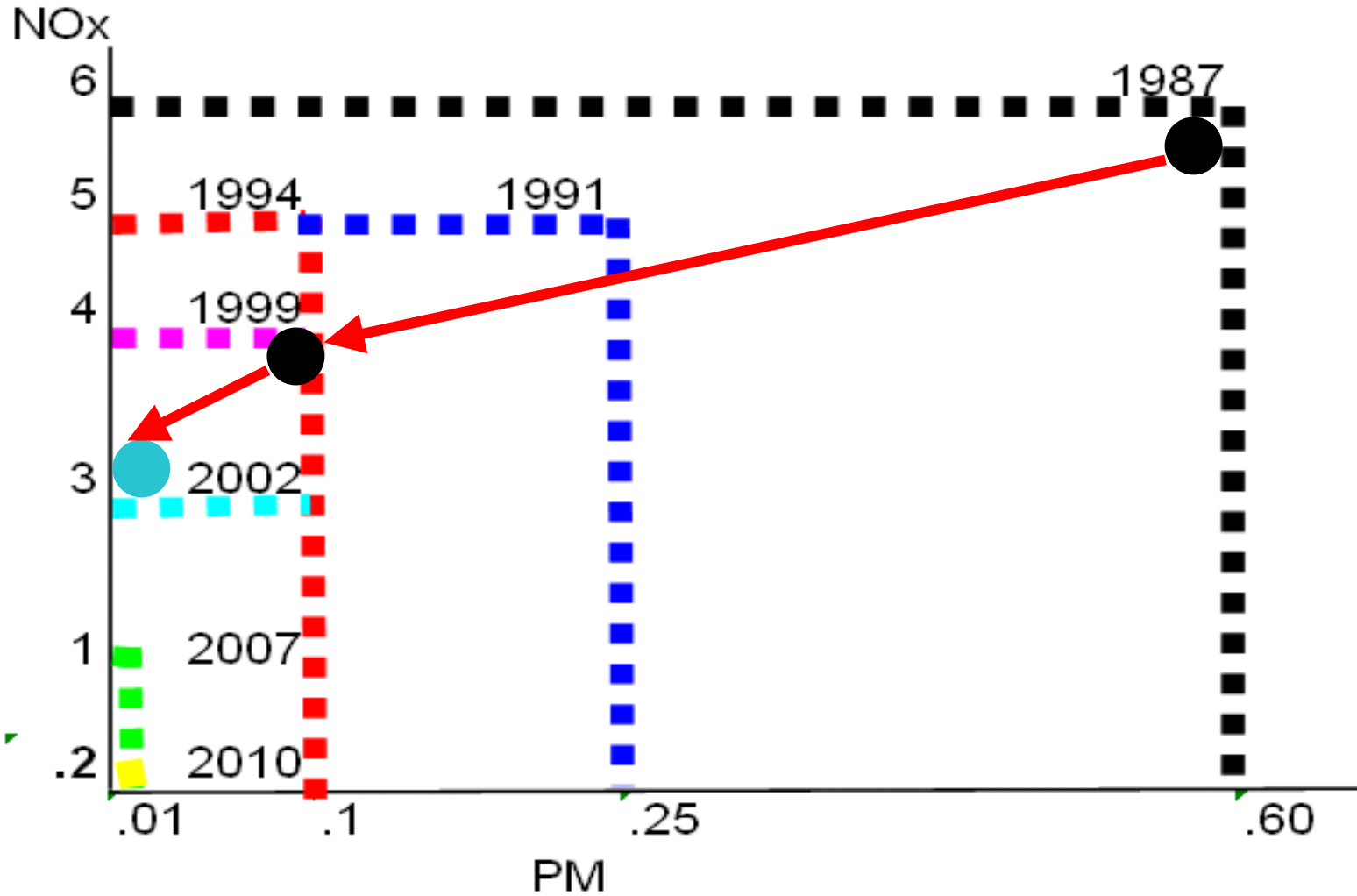
First OEM Low PM & Low NOx:2007



Levels of Reduction



Greatest Cost-effectiveness & Cost-efficiency: Fleet Modernization Plus Retrofit



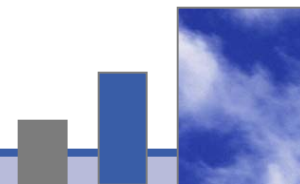
Currently CARB-Verified Systems

Company	Model Years ⁽¹⁾	Device	PM Level	NOx Level
Cleaire	93-03	<u>DPF+NOx</u>	3	25
Donaldson	88-02	DOC	1	
Donaldson	94-02	DPF	3	
Engelhard	96-02	DPF/bi-fuel ⁽²⁾	3	
ESW	91-93	Reactor	2	
J/M	94-02	DPF	3	
Lubrizol	91-03	DOC	1	
Lubrizol	88-03	<u>PuriNOx⁽³⁾</u>	2	15
Lubrizol	94-03	DPF	3	

1) *Not all engines in a model year are Verified – always check the CARB listing for current Verifications*

2) *Bi-fuel engines only*

3) *PuriNOx is an emulsified fuel*



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