From: Agata McIntyre
To: Butorac, Diane (ECY)

Cc: ECY RE SEPA Rulemaking; Clark, Stuart (ECY); Shannon Logan; Mark Buford

 Subject:
 GHG impacts from historical projects

 Date:
 Tuesday, August 25, 2020 6:28:36 PM

 Attachments:
 GHG impacts from projects.xlsx

THIS EMAIL ORIGINATED FROM OUTSIDE THE WASHINGTON STATE EMAIL SYSTEM - Take caution not to open attachments or links unless you know the sender AND were expecting the attachment or the link

Hi Diane,

As follow-up to our call, we looked at the GHG impacts of projects for which we issued permits in the last 5 years. The list below only includes permitted projects that could emit 10,000 (or more) metric tons CO2e annually from direct, on-site, combustion of fossil fuels. We hope this will be helpful in getting a feel for what projects might be captured through the GAP rule.

Briefly, any natural gas heater or boiler with a heat input exceeding 21.5 MMBtu/hr has the potential to emit more than 10,000 metric tons of CO2e per year. Units in this size range are common at a variety of industrial facilities, not just refineries. The list below includes boilers that supply steam to lumber dry kilns, boilers at a milk drying facility, and boilers at a naval base.

				Project heat		Major
		CO2e	Equipment	input		permit
Facility	Project Summary	(MT/yr)	type	(MMBtu/hr)	Fuel	(PSD)?
	Replace old coker heaters with new,				refinery	
BP refinery	larger heaters, each at 303 MMBtu/hr	286,523	heater	552	fuel gas	Yes
	Retrofit existing heater with low-NOX				refinery	
BP refinery	burners and increase capacity	60,730	heater	117	fuel gas	No
					natural	
					gas,	
	Add diesel as back-up fuel for gas				diesel	
Darigold	boiler at milk drying facility	25,591	boiler	55	back-up	No
					tanker	
					vapor +	
Tesoro	Thermal oxidizer to control vapors		thermal		natural	
refinery	from marine loading operation	55,834	oxidizer	120	gas	No
	Replacement boiler to provide steam				natural	
Darigold	at milk drying facility	23,264	boiler	50	gas	No
Naval Air						
Station	2 replacement boilers, each at 24.3					
Whidbey	MMBtu/hr, to provide steam for				natural	
Island	central heating plant	22,334	boiler	48	gas	No
	3 boilers, each at 15.8 MMBtu/hr, to					
	provide steam for new lumber drying				natural	
Teal Jones	kilns	21,868	boiler	47	gas	No
P66	Heater to help remove sulfur from				refinery	
refinery	petroleum feedstocks	12,977	heater	25	fuel gas	No

I've attached the spreadsheet used to create the table. The tab labeled "EF & Calcs" offers a chance to look at how the numbers work out for different boilers and heaters. So, for example, a 53 MMBtu/hr natural gas boiler emits 24,660 metric tons of CO2e each year.

A couple of thoughts about the table:

- All of the listed projects can emit 10,000+ metric tons of CO2e/yr, but only one received a major-source (PSD) permit. All of the others received minor-source permits.
- Several of the projects include the installation of multiple units. The emissions of a single unit would, by itself, be below the 10,000 metric ton threshold. This highlights the impact of setting the rule cut-off based on project-wide emissions vs single-unit emissions.
- If the rule cut-off was set at 25,000 metric tons instead of 10,000, the list of projects would shrink. Most of the projects outside the refineries would drop off the list. The only remaining non-refinery project would be the 55 MMBtu/hr Darigold boiler.
- If the rule cut-off was set at 25,000 metric tons, we would capture 84% of the CO2e that would be captured using the 10,000 ton threshold.

I hope you find this information helpful. We could go back further than 5 years if a larger list of projects is needed.

Please give me a call if any questions. Happy to talk at an time, and looking forward to working with you on the GAP rule!

Thank you,

Agata McIntyre, P.E. Engineering Manager Northwest Clean Air Agency

Phone: 360-419-6848

## Emissions estimates based on heat input and fue

neat input 53 MMBtu/h

	GHG estimate for Natural Gas							
Pollutant	Heat Input	hrs/yr	MMBtu/yr	EF (kg/MM	GWP	kg/yr	MT/yr	
CO2	53	8,760	464,280	53.06	1	24,634,697	24,635	
CH4	53	8,760	464,280	0.001	25	11,607	11.61	
N2O	53	8,760	464,280	0.0001	298	13,836	13.84	

## Total CO2e 24,660

GHG estimate for Refinery Fuel Gas							
Pollutant	Heat Input	hrs/yr	MMBtu/yr	EF (kg/MM	GWP	kg/yr	MT/yr
CO2	53	8,760	464,280	59	1	27,392,520	27,393
CH4	53	8,760	464,280	0.003	25	34,821	34.82
N2O	53	8,760	464,280	0.0006	298	83,013	83.01

## Total CO2e 27,510

GHG estimate for Diesel (Distillate #2)							
Pollutant	Heat Input	hrs/yr	MMBtu/yr	EF (kg/MM	GWP	kg/yr	MT/yr
CO2	53	8,760	464,280	73.96	1	34,338,149	34,338
CH4	53	8,760	464,280	0.003	25	34,821	34.82
N2O	53	8,760	464,280	0.0006	298	83,013	83.01

Total CO2e 34,456

To review different scenarios, modify the equipment heat input in the yellow cell. Calculations will update automatically.

				Project heat		
		Project	Equipment	input		Trigger major
Facility	Project Summary	CO2e (MT)	type	(MMBtu/hr)	Fuel	permit (PSD)?
	Replace old coker heaters with new,					
BP refinery	larger heaters, each at 303 MMBtu/hr	286,523	heater	552	refinery fuel gas	Yes
	Retrofit existing heater with low-NOX					
BP refinery	burners and increase capacity	60,730	heater	117	refinery fuel gas	No
	Add diesel as back-up fuel for gas boiler at				natural gas,	
Darigold	milk drying facility	25,591	boiler	55	diesel back-up	No
	Thermal oxidizer to control vapors from		thermal		tanker vapors +	
Tesoro Refinery	marine loading operation	55,834	oxidizer	120	natural gas	No
	Replacement boiler to provide steam at					
Darigold	milk drying facility	23,264	boiler	50	natural gas	No
Naval Air Station	MMBtu/hr, to provide steam for central					
Whidbey Island	heating plant	22,334	boiler	48	natural gas	No
	3 boilers, each at 15.8 MMBtu/hr, to					
Teal Jones	provide steam for new lumber drying kilns	21,868	boiler	47	natural gas	No
	Heater to help remove sulfur from					
P66 refinery	petroleum feedstocks	12,977	heater	25	refinery fuel gas	No