



Washington State Mandatory GHG Emissions Reporting Rule  
Advisory Committee Meeting



# Indirect Emissions

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- What does RCW 70.94.151(5) say about “indirect” emissions?
- What are “indirect” emissions?
- How to calculate indirect emissions.
- What are the issues?
  - Emission factors – regional, utility specific, fuel mix data
  - Other concerns?



# RCW 70.94.151(5)

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If owner or operator meet the reporting threshold...

- a source or combination of sources** that emit at least **ten thousand metric tons** of greenhouse gas annually in the state

Then must report....

- their total annual emissions of greenhouse gases.

Defined as....

- all direct emissions and all indirect emissions.

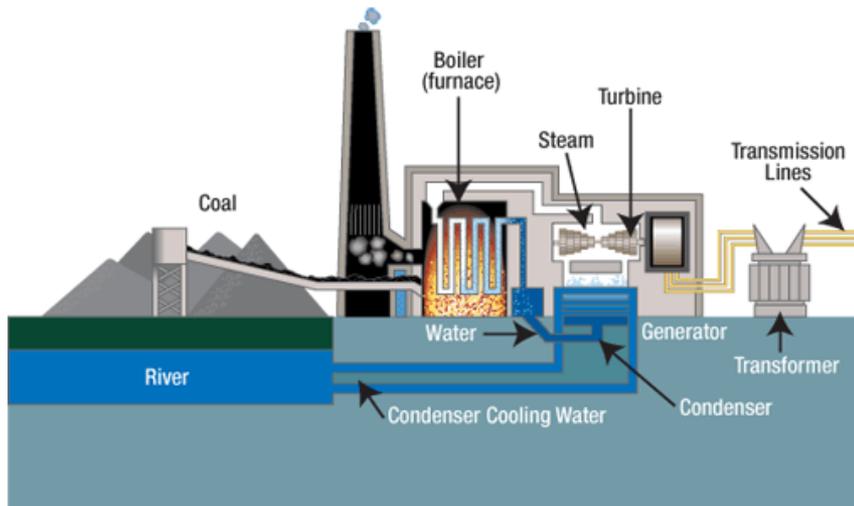


# Definition – Indirect Emissions

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- "Indirect emissions" means emissions of greenhouse gases associated with the purchase of
  - electricity,
  - heating,
  - cooling, or
  - steam.
- May include power purchased from sources outside of Washington for use within Washington

# Indirect Emissions - Electricity



Power plant produces ghg emissions  
( direct emissions )

The electricity is purchased by  
the reporter.  
(indirect emissions)





# Quantification of GHG Emissions from Purchase & Use of Electricity

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1. Determine your annual electricity use
2. Select the appropriate emission factors
3. Calculate annual emissions in metric tons CO<sub>2</sub>e



# Data Quality Tiers

Metered readings or utility bill



Utility specific data / NWPP default fuel mix data



Metered readings or utility bill



eGrid Power Pool emission factor



Estimated electricity use



eGrid Power Pool emission factor





# Electricity Indirect Emissions Using NWPP subregion eGRID emission rates

- TCR General Reporting Protocol  
Table 14.1

- 2004 NWPP eGRID emission rates
  - 921.10 lbs CO<sub>2</sub>/MWh
  - .022 lbs CH<sub>4</sub> / MWh
  - .014 lbs N<sub>2</sub>O / MWh

Figure 14.2 Map of U.S. eGRID Subregions, 2004



$$\text{MWh} \times \text{lbs CO}_2/\text{MWh} \div 2204.62 \text{ (lbs / metric ton)} = \text{MT CO}_2 \text{ emissions}$$

[http://www.epa.gov/solar/documents/egridzips/eGRID2007V1\\_0\\_year05\\_GHGOutputRates.pdf](http://www.epa.gov/solar/documents/egridzips/eGRID2007V1_0_year05_GHGOutputRates.pdf)  
2005 output rates



# Calculate Indirect Emissions from Electricity Use

**CO<sub>2</sub> Emissions** (metric tons) =

$$\frac{\text{Electricity Use (MWh)} \times \text{Emission Factor (lbs CO}_2\text{/MWh)}}{2,204.62 \text{ (lbs/metric ton)}}$$

**CH<sub>4</sub> Emissions** (metric tons) =

$$\frac{\text{Electricity Use (MWh)} \times \text{Emission Factor (lbs CH}_4\text{/MWh)}}{2,204.62 \text{ (lbs/metric ton)}}$$

**N<sub>2</sub>O Emissions** (metric tons) =

$$\frac{\text{Electricity Use (MWh)} \times \text{Emission Factor (lbs N}_2\text{O/MWh)}}{2,204.62 \text{ (lbs/metric ton)}}$$

- Calculate metric tons of carbon dioxide, methane and nitrous oxide for each fuel in fuel mix

Conversion:

$$\text{MWh} = 3.412 \text{ MMBtu}$$



# Convert to Carbon Dioxide Equivalents

<b>CO<sub>2</sub> Emissions</b> (metric tons CO <sub>2</sub> e)	=	CO <sub>2</sub> Emissions (metric tons)	×	1 (GWP)
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<b>CH<sub>4</sub> Emissions</b> (metric tons CO <sub>2</sub> e)	=	CH <sub>4</sub> Emissions (metric tons)	×	21 (GWP)
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<b>N<sub>2</sub>O Emissions</b> (metric tons CO <sub>2</sub> e)	=	N <sub>2</sub> O Emissions (metric tons)	×	310 (GWP)
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<b>Total Emissions</b> (metric tons CO <sub>2</sub> e)	=	CO <sub>2</sub> + CH <sub>4</sub> + N <sub>2</sub> O (metric tons CO <sub>2</sub> e)
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- Multiply emissions by GWP, then total



# Facility X purchases 5000 MWh electricity - Indirect Emissions using eGrid data

NWPP eGrid	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	CO <sub>2</sub> e
MT emissions	2089.022	0.050	0.032	
x GWP	2089.022	1.048	9.843	2099.913

eg. 5000 MWh x 921.10 lbs CO<sub>2</sub> / MWh ÷ 2204.62 (lbs/MT) =  
2089.022 MT CO<sub>2</sub> emissions x 1 GWP = 2089.022 CO<sub>2</sub>eq

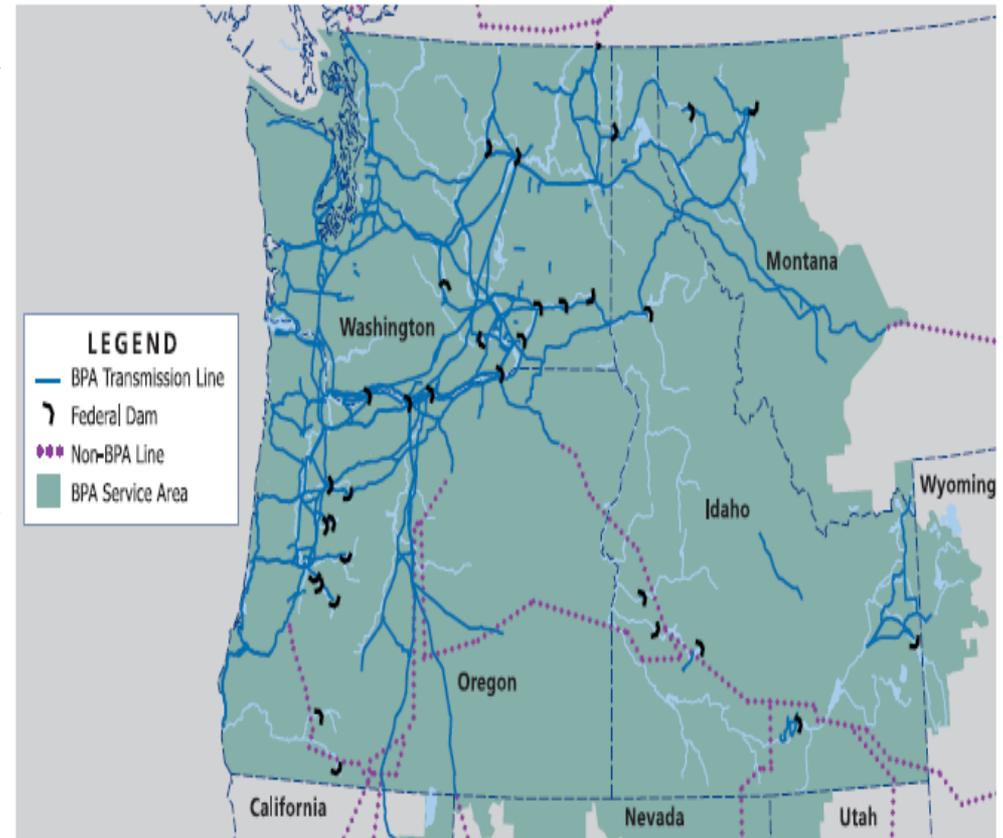
GWP CO<sub>2</sub> = 1; CH<sub>4</sub> = 21; N<sub>2</sub>O = 310



# Fuel Mix Disclosure RCW 19.29A

- Instructs retail electricity providers, beginning in 2001, to provide existing and new retail electric customers its **annual fuel mix** information by generation category

Transmission System and Federal Dams





# Fuel Mix Disclosure

## HB 2565 (2000)

- The statute also permits any utility to report the **default fuel mix**, which is the U.S. Northwest Power Pool (NWPP) net system mix

## Northwest Power Pool



The U.S portion of the Northwest Power Pool (U.S. NWPP) was chosen as the boundary for fuel mix analysis because of the interconnected nature of the electricity grid system. This includes all or major portions of the states of Washington, Oregon, Idaho, Utah, Nevada, Montana, Wyoming and a portion of northern California



# Fuel Mix & Indirect Emissions

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- Can fuel mix information be used to estimate indirect emissions?
- Utility-specific verified Emission Factors
  - e.g. Local Government Operations protocol – utility specific emission factors verified to the standard within the CCAR Power / Utility Protocol



# 2007 NWPP Default Fuel Mix & Utility Examples

<http://www.cted.wa.gov/site/539/default.aspx>

Fuel Source	Percent Distribution - Fuel Mix 2007			
	NWPP Default Net System Mix	PSE	PUD #1 Snohomish	Peninsula Light
biomass	0.84	0.22	0.83	0.09
coal anthracite				
coal bituminous	45.17	37.43	6.46	2.51
coal lignite	0.71			
cogeneration			0.11	
coke	0.28			
geothermal				
Hydro	33.79	41.92	80.77	83.86
Landfill gases	0.04	0.02	0.46	
Natural gas	16.77	9.26	2.46	1.04
Nuclear	1.81	0.74	8.73	10.27
Other	0.07		0.01	
Petroleum -heavy oil	0.02	0.02	0.06	0.03
Petroleum -light oil	0.08			
solar photovoltaic				
solar- thermal				
waste	0.44	0.73	0.1	0.07
wind	0	0.17		2.12
Total	100	100	100	100



## Electricity Emission Factors

source: EIA – <http://www.eia.doe.gov/oiaf/1605/coefficients.html>

IPCC: Volume 2: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html>

<b>Fuel Source for Electricity Generation</b>	<b>Carbon Dioxide lbs / MMBtu</b>	<b>Methane lbs / MMBtu</b>	<b>Nitrous Oxide lbs / MMBtu</b>
Biomass (wood)	195.0*	.0111	.00444
coal anthracite	227.4	.00141	.00326
coal bituminous	205.3	.00141	.00326
coal lignite	215.4	.00141	.00326
cogeneration			
coke	225.13	.00141	.00326
geothermal	0	0	0
Hydro	0	0	0
Landfill gases	varies	varies	varies
Natural gas	117.06	.000287	.000233
Nuclear	0	0	0
Other	0	0	0
Petroleum -heavy oil	173.960	.00163	.0014
Petroleum -light oil	161.386	.00163	.0014
solar photovoltaic	0	0	0
solar- thermal	0	0	0
Waste (msw)	199.8**	.0111	.00444
wind	0	0	0

\* Biogenic \*\* portion non-biogenic



# Electricity Fuel Source Distribution using NWPP Fuel Mix default

## Facility X - Annual Electricity Purchase of 5000 MWh

<b>Fuel Source</b>	<b>2007 NWPP fuel mix percent distribution</b>	<b>Facility X – 5000 MWh</b>
biomass	0.84	42
coal anthracite		
coal bituminous	45.17	2258.5
coal lignite	0.71	35.5
cogeneration		
coke	0.28	14.0
geothermal		
Hydro	33.79	1689.5
Landfill gases	0.04	2.0
Natural gas	16.77	838.5
Nuclear	1.81	90.5
Other	0.07	3.5
Petroleum -heavy oil	0.02	1.0
Petroleum -light oil	0.08	4.0
solar photovoltaic		
solar- thermal		
waste	0.44	22.0
wind	0	
<b>Total</b>	<b>100</b>	<b>5000</b>



## Facility X - Using NWPP default fuel mix

Fuel Source -using NWPP Fuel Mix	Facility X 5000 MWh	MMBtu	carbon dioxide (MT)	methane (MT)	nitrous oxide (MT)	
biomass (wood)	42.00	143.304	12.6753	0.0007	0.0003	
coal bituminous	2258.50	7706.002	717.6031	0.0049	0.0114	
coal lignite	35.50	121.126	11.8345	0.0001	0.0002	
coke	14.00	47.768	4.8779	0.0000	0.0001	
Hydro	1689.50	5764.574	0.0000	0.0000	0.0000	
Landfill gases	2.00	6.824	0.0000	0.0000	0.0000	
Natural gas	838.50	2860.962	151.9102	0.0004	0.0003	
Nuclear	90.50	308.786	0.0000	0.0000	0.0000	
Other	3.50	11.942	0.0000	0.0000	0.0000	
Petroleum -heavy oil	1.00	3.412	0.269	0.000	0.000	
waste (MSW)	22.00	75.064	1.9938	0.0004	0.0002	
metric tons total			901.1641	0.0065	0.0124	
x GWP ( CO2e)			901.164	0.137	3.841	905.141
<i>biogenic</i>						-13.6
						891.54



# What if Facility X purchased 5000 MWh of electricity from Peninsula Light?

<b>Fuel Source</b>	<b>2007 Peninsula Light percent distribution</b>	<b>Facility X – 5000 MWh</b>
biomass	0.09	4.5
coal anthracite		
coal bituminous	2.51	125.5
coal lignite		
cogeneration		
coke		
geothermal		
Hydro	83.86	4193
Landfill gases		
Natural gas	1.04	5.2
Nuclear	10.27	513.5
Other		
Petroleum -heavy oil	0.03	1.5
Petroleum -light oil		
solar photovoltaic		
solar- thermal		
waste	0.07	3.5
wind	2.12	106
<b>Total</b>	<b>100</b>	<b>5000</b>





# Data Comparison for Facility X

Emission Factor / Fuel Mix Source	CO2e from Electricity Use
NWPP eGrid	2099.913
NWPP Default Fuel Mix	891.54
Peninsula Light Fuel Mix	42.077



# Questions

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