

G-RES TOOL VALIDATION REPORT #3.102260

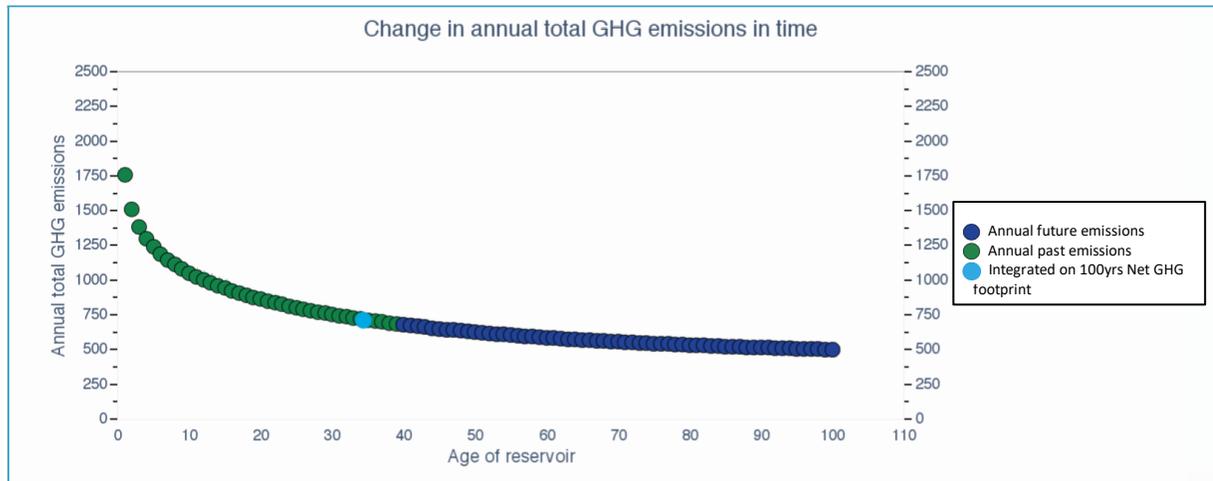
Harris

The G-res tool is a web-based tool that allows hydropower companies, investors, consultants, decision-makers and other stakeholders to more accurately report on the net impact on GHG emissions resulting from the introduction of a reservoir in a landscape, whether for an existing or planned reservoir.

The G-res tool accounts for pre-impoundment GHG emissions, post-impoundment GHG emissions, unrelated anthropogenic sources (UAS) emissions, along with the temporal evolution of emissions over the lifetime (100yrs) of the reservoir, the emissions from the construction phase, and the allocation of GHG emissions to hydropower and any other services provided by the reservoir.

RESERVOIR CHARACTERISTICS AND RESULTS

G-res ID	Name	Climate	Reservoir Area (km ²)	Net GHG Footprint (gCO ₂ e/m ² /yr)	
				Integrated on 100 yrs	Integrated on remaining lifetime (2022-2082)
3.102260	Harris	Subtropical	39.9	719 (676 - 768)	569



*See G-res Tool pdf report for detailed input values and results.

Name of reservoir: Harris

Landscape Information

Catchment Area (km ²)	3755.48	Phosphorus Community sewage in the catchment (kg P /yr)	
Population in the Catchment	109309	Community Wastewater Treatment	None
Catchment Annual Runoff (mm/yr)		Phosphorus Industrial sewage in the catchment (kg P /yr)	
		Industrial Wastewater Treatment	

	Land Cover in the Catchment Area				Pre-impoundment Land Cover in the Reservoir Area					
	%	km ²	Land Use Intensity Past	Current	%	km ²	% Mineral Soil	% Organic Soil	Land Use Intensity	% of Drained Organic
Croplands	0.1 %	3.8							100	
Bare Areas	0.2 %	7.5			0.3 %	0.1	0.3 %			
Wetlands	1.6 %	60.1			0.1 %		0.1 %			
Forest	61.2 %	2298.4			69.0 %	27.5	69.0 %			
Grassland/Shrubland	26.2 %	983.9			14.0 %	5.6	14.0 %			
Permanent Snow/Ice										
Settlements	9.2 %	345.5			7.7 %	3.1	7.7 %			
Water Bodies	1.7 %	63.8			9.6 %	3.8	9.6 %			
Drained Peatlands										
No Data	-0.2 %	-7.5			-0.7 %	-0.2	-0.7 %			

Reservoir Information

Country	United States	River Length before Impoundment (m)	46671.0
Longitude of Dam (DD)	-85.62	Phosphorus Concentration (ug/L)	30
Latitude of Dam (DD)	33.26	Trophic Level	Mesotrophic
Climate Zone (Reservoir Area)	Subtropical	Mean Global Horizontal Radiance (kWh/m ² /d)	4.7
Impoundment Year	1982	Mean Temperature per Month (°C)	
Reservoir Area (km ²)	39.9	January	6.67
Reservoir Volume (km ³)	0.5242	February	8.33
Water Level (m above sea level)		March	12.78
Maximum Depth (m)	41.15	April	16.67
Mean Depth (m)	13.138	May	21.11
Littoral Area (%)	14.905	June	25
Thermocline Depth (m)	10	July	26.67
Water Intake Depth (m)	8.83	August	26.67
Secondary Water Intake Depth (m)		September	23.33
Soil Carbon Content (kgC/m ²)	1.72	October	17.22
Annual Wind Speed at 10 m (m/s)	4.0	November	11.67
Water Residence Time (WRT, yrs)	0.2293	December	7.78
Annual Discharge Main Intake (m ³ /s)	72.5	Mean Annual Air Temperature (C°)	17.0
Annual Discharge Secondary Intake (m ³ /s)			

Name of reservoir: **Harris**

Net Predicted Annual CO₂e Emission

	Post- Impoundment-	Pre- Impoundment -	Unrelated Anthropogenic Sources =	Net GHG Footprint	95% CI
Emission Rate (tCO ₂ e/yr)	14 682	-14 012	=	28 694	(26 984 - 30 631)
of which CO ₂	4 575	-14 133	n/a =	18 707	
of which CH ₄	10 107	121	=	9 986	
<hr/>					
Emission Rate (gCO ₂ e/m ² /yr)	368	-351	=	719	(676 - 768)
of which CO ₂	115	-354	n/a =	469	
of which CH ₄	253	3	=	250	

*Using GWP100 of 34 to obtain CH₄ emissions as CO₂e (IPCC 2013)

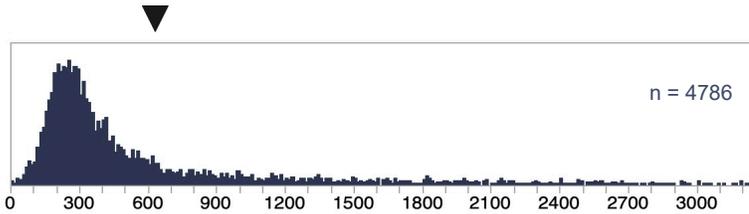
Unrelated Anthropogenic Sources

Potential amount of UAS as % of post-impoundment emissions
Weighted sum model risk result

56 %
87

This reservoir compared to worldwide reservoirs

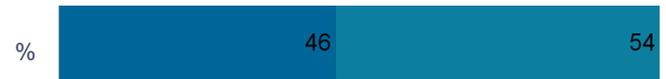
Net Reservoir Footprint (gCO₂e/m²/yr) = 719



Detailed CH₄ Post-Impoundment Emissions

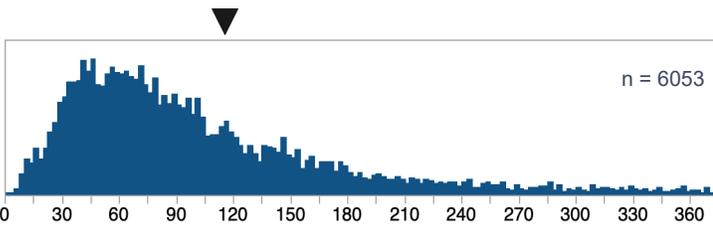
Relative contribution to CH₄ Post-Impoundment Emissions (%)

■ % CH₄ diffusive ■ % CH₄ Bubbling
■ % CH₄ Degassing

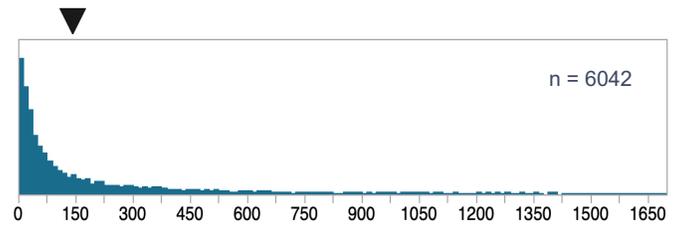


This reservoir CH₄ and CO₂ emissions compared to worldwide

CH₄ Diffusive Emissions (gCO₂e/m²/yr) = 117

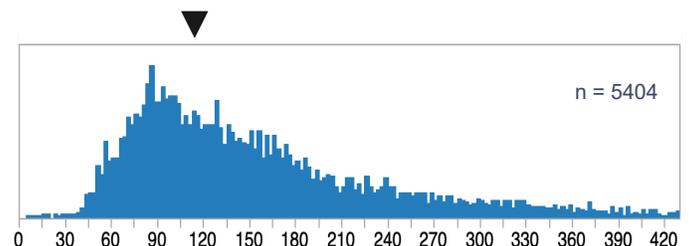


CH₄ Bubbling Emissions (gCO₂e/m²/yr) = 137



CH₄ Degassing Emissions (gCO₂e/m²/yr) =

CO₂ Diffusive Emissions (gCO₂e/m²/yr) = 115



Water Level or Thermocline not Define. Degassing Considered Zero.

Name of reservoir: **Harris**

Total GHG footprint information

	Post- Impoundment	-	Pre- Impoundment	-	Unrelated Anthropogenic Sources	+	Construction (Reservoir)	=	Net GHG Footprint	95% CI
Areal Emissions (gCO ₂ e/m ² /yr)	368	-	-351	-		+	n/a	=	719	(676 - 768)
Reservoir Wide Emissions (tCO ₂ e/yr)	14 682	-	-14 012	-		+	1 028	=	29 722	(28 012 - 31 659)
Total Lifetime Emission (tCO ₂ e)	1 468 216	-	-1 401 159	-		+	102 771	=	2 972 147	(2 801 237 - 3 165 923)

*Using GWP100 of 34 to obtain CH₄ emissions as CO₂e (IPCC 2013)

Name of reservoir: Harris
Own Assessment

 Emission output
 kgCO₂e

Known Value for Construction	Total construction emissions
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Basic Assessment

Earth and Rockfill	Material excavated and/or used for construction	52976 m ³	km moved	1154877
Concrete	All concrete brought to site for the dam, tunnels, foundations	299705. m ³	km delivery distance	100452125
Steel	All steel brought to site for reinforcement, pipelines, mechanical and electrical	453 tonne	km delivery distance	1164210

More Detailed Assessment

Earthworks	Soft Excavation	m ³	km moved	0
	Rock Excavation	m ³	km moved	0
	Clearance and Removals	ha		0
Fill	Granular Fill	m ³	km delivery distance	0
	Rock Armour	m ³	km delivery distance	0
	Zoned Rockfill	m ³	km delivery distance	0
	Rock bolts	number	km delivery distance	0
Concrete Works	Formwork	m ²		0
	Facing Concrete	m ³	km delivery distance	0
	Mass Concrete	m ³	km delivery distance	0
	Reinforced Concrete	m ³	km delivery distance	0
	Shotcrete	m ²	km delivery distance	0
	Reinforcement	tonne	km delivery distance	0
Steelworks	Steel Penstocks	tonne	km delivery distance	0
	Steel Liner	tonne	km delivery distance	0
	Miscellaneous Steelwork	tonne	km delivery distance	0
Roads and Bridges	New Roads	km		0
	Refurbishment of Existing Roads	km		0
	PCC Vehicular Bridge Deck	m ²		0
Equipment	Power Generation	MW		0
	Power Connection	kV	km length	0