

Version 2.0

User Guide

RUTGERS Edward J. Bloustein School

of Planning and Public Policy



GASCAP was developed by the Alan M. Voorhees Transportation Center at Rutgers University under contract to the New Jersey Department of Transportation (NJDOT). This software is freely available to use for all purposes associated with estimating greenhouse gas emissions for transportation capital projects. Any modifications or updates made to GASCAP must also be for public use and the product and any modifications to. GASCAP may not be sold for commercial use.



User Guide: Version 2.0



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Introduction

GASCAP is a Microsoft Excel based spreadsheet tool designed for the New Jersey Department of Transportation to estimate greenhouse gas emissions associated with transportation capital projects. The current version includes sections to calculate emissions for the following:

Section 1: Materials - Estimates direct and upstream emissions for materials used in construction projects based on item codes from NJ DOT project bid sheets.

Section 2: Non-Road Equipment - Estimates direct and upstream emissions for non-road equipment used during construction activities.

Section 3: Recyclables - Estimates a credit against estimated emissions based on the use of various recycled materials in construction projects.

Section 4: Lifecycle Maintenance - Estimates direct and upstream emissions based on expected materials and equipment that will be used in maintaining the completed product over its lifespan.

Section 5a: Staging - Estimates direct and upstream emissions for on-road vehicles and temporary lighting used during construction of a project.

Section 5b: Traffic Disruption - Estimates direct and upstream emissions resulting from changes in vehicle miles of travel and vehicle efficiency due to work zones, lane closures, and detours.

Section 6: Lighting - Estimates direct emissions from the operation of permanent lighting fixtures over the lifespan of a project.

Section 7: Rail - Estimates direct and upstream emissions for various inputs that are specific to rail construction projects.

Section 8: Induced Travel - Estimates changes in mobile source emissions caused by changes in road capacity

Maintenance Department Module - Estimates emissions from routine, minor maintenance activities.

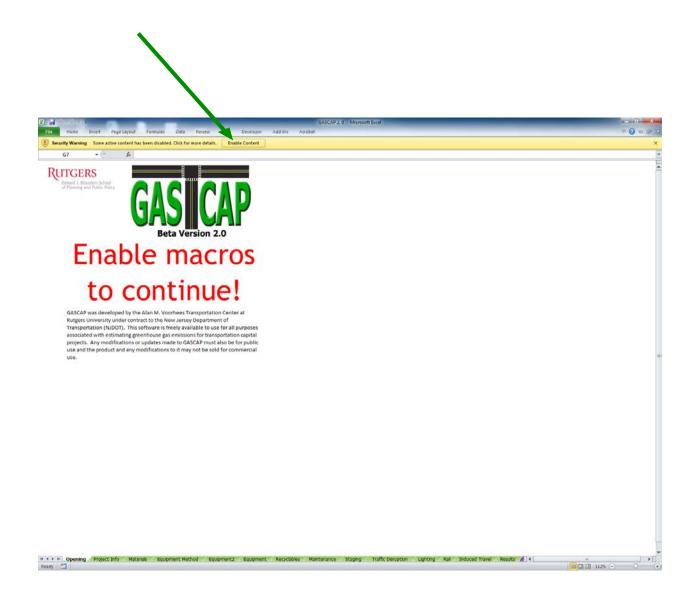
Section 9: Updating GASCAP - Procedures for updating background data on energy, vehicles, and materials used by GASCAP when estimating emissions.

Introduction



Enabling Macros

Most of the functionality of GASCAP is contained within macros, which are scripts that automate calculations and other program functionality. By default, macros are usually disabled in Excel. After opening the spreadsheet, a prompt will ask if the user wishes to enable macros or will present a security warning that some content is disabled. This prompt should be followed to enable macros. Macros must be enabled to load and run GASCAP.



Enabling Macros



Project Info

The first worksheet displayed after enabling macros is the Project Info page. Basic information about the project (title, location, start and end dates, and description) should be entered here. The Reset button can also be used to reset the entire workbook and remove all items added in all sections. The project title displayed on other sheets is linked to the one entered on this page.

It is *critical to program functionality* that estimated project start and end dates are entered, even if they are very rough estimates. The dates are used to calculate project length (displayed on the Project Info page for reference) which is used in several emission calculation functions.

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GASICAP Beta Version 2.0	Section 1: Section 2: Materials Equipment	Section 3: Recyclables Baintenance Staging	Section 5b: Traffic Section 6: Disruption Lighting Sect	tion 7: Rail Induced RESULTS Travel	
Title:	Enter Project Title He	ere		Maintenance Dep (Special Module	
Location	Enter Project Locatio	n Here			
Approx. Project Start Date:	Estimated project start and end da	Approx. End Date	103		
	that are based on project length	. Based on the dates entered, the project length is (day	s): 181	_	
Description	Enter Project Description				
	Reset All Sections		Save		
					-
			ection 9:		
Administrator Password			Admin		
H 4 + H Opening Project Info Materials E	Equipment Method Equipment2	Equipment Recyclables Maintenance Star	ing / Traffic Disruption / Lighting / Rail /	Induced Travel Results	
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Project Info



Section 1: Materials

Material inputs to GASCAP are based on NJ DOT bid sheet item codes. The first step in entering a material is to input the 7-digit item code from the bid sheet. After inputting the item code, clicking 'Go' will display the appropriate unit of measurement for the item and prepopulate default variables for that item.

If you do not know an item's 7-digit code, you can click "Find Codes" to look up codes by item name. Then click "Ok" to send the code to Input Item Code box and click "Go."

The second step is to input the quantity of the item, which is located next to the item code on the bid sheet. Additionally, in step 3, default variables related to asphalt and concrete are displayed. These variables can be changed if desired. Variables that do not apply to the item selected will be greyed out. Clicking the Add Material button creates a new line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all materials. Individual line items can be removed by their respective buttons, or the entire sheet can be reset with the appropriate button. Total emissions can be viewed in grams or metric tons.

			100.000	TION OF BII	ransportation DS			: 04/19/11 : 109 -3
CALL ORDER : 109 LETTING DATE : 04/14, SET-ASIDE :	/11 10:00AM	/	CONTRACT ID : 1110 DISTRICT : C1	99	cot	UNTIES : MERCE	ER	
LINE NO / ITEM CODE / ALT	/		(1) E0622 EARLE ASPHALT COMPA		(2) D2206 JOSEPH DEFINO TRU		(3) G7305 GREEN CONSTRUCTIO	N INC.
ITEM DESCRIPTION	QU NTITY		UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT
0038 202021P REMOVAL OF PAVEMENT	73.000	SY	17.00000	1241.00	15.00000	1095.00	30.00000	2190.0
0039 203041P	115.000 : BILIZATION	SY	3.50000	402.50	5.00000	575.00	0.01000	1.1
0040 302036P	1233.000 BASE COURSE,		8.00000	9864.00	12.00000	14796.00	7.50000	9247.5
0041 302060P	77.000	CY	50.00000	3850.00	25.00000	1925.00	0.01000	0.7
COARSE AGGREGATE, SIZE 1 0042 401009P HMA MILLING 3" OR LESS	2774.000	SY	3.80000	10541.20	8.00000	22192.00	4.00000	11096.0
HMA MILLING 3 OR LESS 0043 401021M HOT MIX & PHALT PAVEMENT	140.000	SY	60.00000	8400.00	1.00000	140.00	0.01000	1.4
0044 4010 M POLYMERIZED JOINT ADHES	3175.000	LF	0.01000	31.75	2.00000	6350.00	0.50000	1587.5
TACK COAT	225.000	GAL	0.01000	2.25	0.01000	2.25	4.00000	900.0
0046 401036M PRIME COAT	435.000	GAL	0.01000	4.35	0.01000	4.35	0.01000	4.3
0047 401063M	990.000		83.00000	82170.00	100.00000	99000.00	85.00000	84150.0
HOT MIX ASPHALT 12.5 H ' 0048 401099M HOT MIX ASPHALT 25 M 64	579.000	Т	73.00000	42267.00	100.00000	57900.00	75.00000	43425.0
CORE SAMPLES, HOT MIX AS	5.000		60.00000	300.00	75.00000	375.00	125.00000	625.0
1050 601122P 15" REINFORCED CONCRETE	32.000	LF	50.00000	1600.00	120.00000	3840.00	85.00000	2720.0
0051 601404P SUBBASE OUTLET DRAIN	33.000	LF	32.00000	1056.00	20.00000	660.00	80.00000	2640.0
1052 602012M INLET, TYPE B	2.000	U	3500.00000	7000.00	4000.00000	8000.00	2250.00000	4500.0
053 602099M	3.000	U	190.00000	570.00	250.00000	750.00	450.00000	1350.0
RESET EXISTING CASTING 054 602117M SET SQUARE FRAMED MANHON CIRCULAR COVER	2.000 LE CASTING,	υ	2500.00000	5000.00	3000.00000	6000.00	1500.00000	3000.0
0055 602153M RECONSTRUCTED INLET, TYP	1.000	-	1500.00000	1500.00	2500.00000	2500.00	1000.00000	1000.0

Section 1: Materials



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	Project Info	Section 1: Materials	Section 2 Equipment			Section 5a: Staging	Section Traffic Disrupti	c Sec	ction 6: ghting Sect		Section 8: Induced Travel	RESUL	TS	
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ļ		Go F	ind Codes			RIALS TO	TALS			ge Unit				
					Direct CO ₂ Direct CH ₄				0.0					
2. Inpu	It Item Quantity				Direct N ₂ O				0.0	(8)				
	Sq	Yard			Direct CO ₂ Upstream C				0.0					
3. Verif	fy or Change Defa	ault Variables			Upstream C				0.0					
	Cement	Heating			Upstream M Upstream S				0.0					
	Aggregate	Ambien	1		Upstream	0 ₁ Equivalent			0.0					
	Ratio	Tempe	rature (°F)		Combined	CO ₂ Equivalent			0.0	(g)				
					Companyo	LO2 Equivalent								
	% Binder	% Mois Aggreg	ture in			CO2 Equivalent								
		% Mois	ture in ate ack		Reset	LU3 Equivalent				Save	1			
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	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Cement Ratio Agate	Reset		's Moisture	Cutheck	Depth (feet)	Save		t <u>CH.(q)</u>	Direct N-D (a)	Direct CO. Low
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Sement Balio Agare	Reset		S.Moisture	Cutheck	Depth (feet)	Save		tt 5H. (0)	Direct N.O (a)	Direct CO. Lowh
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Connent Ratio Aspace	Reset		35 Moisture	Cuthack	Depth (feet)	Save		tCH.(0)	Pirest N.O (a)	Direct CO. Louis
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Sement Batis Agare	Reset		% Moisture	Cutheck	Depth (feet)	Save		tt 5H, (q)	Direct.N.O (a)	Direct.CO. Equil
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Coment Ratio Aque	Reset		S Moisture	Cutheck	Depth.Uesti	Save		t CH. (a)	Direct NoD (a)	DirectCO.Lash
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Coment Ratio Aggre	Reset		's Moisture	Cutheck	Depth.Useti	Save		t CH.ia)	Direct No (a)	Direct CO. Lowin
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Coment Ratio Agare	Reset		S Meisture	Cutheck	Depth.dfeetD	Save		t CHLIG)	Picest N-O (a)	Direct CD. Equily
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Comoni Batio Ascars	Reset		S Moisture	Cutheck	Depth.(feet)	Save		t CHLIG)	Pirest N.O (a)	Pirect CO. Inels
	% Binder Solvent Add Material	% Mois Aggreg % Cutb Depth (ture in ate ack feet)	Cement Batin Assarc	Reset		% Moisture	Cathack	Depth (Sect)	Save		t(5H.60)	Pirest N.O (a)	Prect CO. Taub

elect Item From List (Or Start Typing)	Item Code	ОК
HMA - Base Course	401102M	Cancel

Section 1: Materials



Section 2: Equipment

Section 2 is where all non-road equipment used during construction should be entered. There are two methods for entering equipment as shown below. Click the button for the method you want to use.

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GASICAP Beta Version 2.0 Project Info		Section 5a: Section 5b: Section 6: Section 7: Rail Induced Travel	
SECTION 2: NON-ROAD		Maintenance Dept. (Special Module)	
Select A Method for Estimating Emis	sions from Non-road Equipment Activity		
Enter Equipment Activity Manually. Create a new list of construction equipment used for this project by year, fuel and power rating. You will need to enter each piece of equipment used separately.	2. Estimate Equipment Activity and Emissions based on the project type and projected number of workdays. Estimate activity for 38 pieces of construction regipment based on a same of roadway construction projects. Select the project type and phasing that best matches the current project. The estimated equipment		
Enter Activity by Equipment	Inactions die Conten polyck. The estimated equipment hours, years, leef and power rating can be customized.		
H 4 + H Opening Project Info Materials Equipment	Method Equipment2 Equipment Recyclables N	laintenance / Staging / Traffic Disruption / Lighting / Rail / Induced Travel / Results	

Method 1: Enter Equipment Activity Manually

Choose Method 1 if you know what pieces of non-road equipment will be used in the project and how long each piece of equipment will be operating. Equipment is selected through a series of drop down boxes that must be selected in order.

Method 2: Estimate Equipment Activity

Choose Method 2 if you do not know what pieces of equipment will be used or for what period of time. GASCAP will allow you to estimate the number of hours of equipment activity for 38 pieces of non-road equipment based on a sample of projects.



Method 1 Enter Equipment Activity Manually

- Step 1: Select the year the vehicle was manufactured
- Step 2: Select the type of equipment
- Step 3: Select the type of fuel used
- Step 4: Select the vehicle's power rating
- Step 5: Enter the number of hours the vehicle will be used in total during construction
- Step 6: The 'Add Equipment' button will add a line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all equipment.

Before hitting the 'Add Equipment' button, the box labeled 'Air Conditioning?' should be checked if the equipment has it. Individual line items can be removed by their respective buttons, or the entire sheet can be reset with the appropriate button. Total emissions can be viewed in grams or metric tons.

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UASICAP Project into Materials Eq	ction 2: Section 3: Section 4: Lifecyclables Maintenance		ection 6: Section 7: Rail	Section 8: Induced RESULTS Travel		-
Create a new list of construction equipment used for this project by year, fiel and power rating. You will need to enter each piece of equipment used for this project by year, fiel and power rating. You will need to enter each piece of equipment used for projects.	A serviciation A servic	Cinalian Iramic				
H ← → H Openng / Project Info / Materials Equipment Method	Equipment2 / Equipment / Recyclables / Mair	ntenance Staging Traffic Disruption	Lighting Rai Induced Travel	Results		~
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Method 2: Estimate Equipment Activity

- Step 1: Enter the expected number of workdays in the textbox and click "OK." (Remember workdays do not include holidays or weekends on which no work will be performed).
- Step 2: Select one of six project types from the dropdown menu. Choose which of the following *best* describes the current project:
 - 1. Resurface Existing Highway
 - 2. Construct Freeway / Extra Lane
 - 3. Pavement Rehabilitation / Widening
 - 4. Construct / Reconstruct Bridge
 - 5. Construct Median, Thrie Beam Barrier
 - 6. Landscaping

Then click "Estimate Phasing."

		1	Section 4:		Section 5bc	1	1 1	Section 8:			
	Project Info Section 1: Section 2: Equipment	Section 3: Recyclables	Lifecycle Maintenance	Section 5a: Staging	Traffic Disrupture	Section 6: Lighting	Section 7: Rail	Induced Travel	RESUL	TS	
EC	TION 2: NON-ROAD EQUIPME	NT EMISSI	ONS	Maintenance D (Special Modu							
	Enter the expected number of project Work Days, excluding v during which no work will be performed. Then Click "OK" before		[OK	l	EQUIPME	NT TOTALS	;	Chan	ge Unit	
	Select the Project Type from list that best describes the curre	ent project.	- Est	mate Phasing		Direct CO2			0.00	(g)	
	I Click "Estimate Phasing" before proceeding.			make r nabiliy		Direct CH ₄ Direct N ₂ O			0.00	(g) (g)	
	Project Phasing: To accept the default values, simply proceed "Change Default Phasing" and change phase percentages be			values, click		Direct PM _{8C} Direct CO ₂ Equiva	alent from HFCs		0.00	(g) (g)	
	Change Default Phasing		% of Work	Average Activity Hours Per Day	age Activity rs Per Day Direct CO ₂ Equivalent				0.00	(g)	
	1 - Land Clearing and Grubbing				1	Upstream CO ₂			0.00	(g)	
	2 - Roadway Excavation					Upstream CH ₄			0.00	(g)	
	3 - Structural Excavation					Upstream N ₂ O			0.00	(g)	
	4 - Base and Subbase					Upstream PM _{bC}			0.00	(g)	
	5 - Structural Concrete					Upstream SF ₆			0.00	(mg)	
	6 - Paving					Upstream CO ₂ E	quivalent.		0.00	(g)	
	7 - Drainage / Environmental / Landscaping					Combined CO ₂ E	quivalent		0.00	(g)	
	8 - Striping / Painting								Reset	Save	
	9 - Traffic Control / Signage / Barriers 10 - Change Contract Orders										
	11 - Other										
	TOTAL										
	Click "OK" to Calculate Estimated Equipment Activity.			ОК	I						
	Estimation may take up to one minute. To change default equ click the "Change" button next to each below piece of equipm		er or activity hour	3,							
	T ACTIVITY ESTIMATION										
Year	Description	Fuel Type	Power Rating	Hours	Air Conditioning	Direct CO ₂ (a)	Direct CH, (q) Di	rect N ₂ O (g) Dire	ct PMas (q) C	O, Equiv. from HPirect (CO ₂ Equiv. (g





Step 3: The phasing describes what portion of the project work (in hours) is allocated to each phase – or general category of activity. To accept the default phasing, simply go to Step 4. To alter the default phasing, click the "Change Default Phasing" button to bring up the below menu. Enter new values for the percent of time devoted to each phase. To account for rounding errors, the total may range from 99.8% to 100.2%.

Enter the percentage of th project duration that will b to each of the below types construction activities.	e devot	ed
1- Land Clearing and Grubbing	0.0	%
2 - Roadway Excavation	12.3	%
3 - Structural Excavation	1.7	%
4 - Base and Subbase	4.9	%
5 - Structural Concrete	1.4	%
6 - Paving	38.8	%
7 - Drainage / Environmental / Landscaping	4.1	~%
8 - Striping / Painting	4.1	%
9 - Traffic Control / Signage / Barriers	22.2	~%
10 - Change Contract Orders	7.7	~%
11 - Other	3.0	~%
Total	100.2	%
Note: Due to rounding error, total may no However, the total must range from 99.8		

Click the "Update Phasing Values" button to update the value.

Different mixes of equipment are used in each phase, so accurate phasing helps GASCAP to more closely approximate the specific project.

"Change Contract Orders" is an allowance for extra construction time due to changes in the contract. "Other" accounts for time that is spent performing uncategorized activities.



- Step 4: Click the "OK" Button on the main screen to populate a default list of equipment activity and emissions.
- Step 5: If you need to change the default hours of activity, model year, fuel type, or power of equipment, click the "Change" button next to the piece of equipment you would like to alter, as shown below.

EQUIPMENT ACTIVITY ESTIMATION

	Year	Description	Fuel Type	Power Bating	Hours	Air Conditioning
Change	2008	Bore/Drill Pigs	Diesel	175	59.1	No
Change	2008	Coment & Mortar Mixers	4 Stroke Gasoline (10% Ethanol RFC	11	0.0	No
Change	2003	Dumpers/Tenders	4 Stroke Gasoline (10% Ethanol RFC	11	11.5	No
Change *	2008	Concrete/Industrial Saws	4 Stroke Gasoline (10% Ethanol RFC	11	31.7	No
Change	2008	Cranes	Diesel	300	4.4	No
Change	2008	Crushing/Proc. Equipment	Diesel	75	0.0	No
Change	2008	Crawler Tractors	Diesel	175	0.0	No
Change	2008	Excavators	Diesel	175	119.7	No

The "Change" button will bring up a menu for selecting the equipment model year, fuel type and horsepower (which you must change in that order). Check the Air Conditioning box if the specific equipment model uses air conditioning.

To change the Hours of Activity, simply overwrite the previous value. There is no way to remove equipment from the list. If the equipment *will not be used at all*, specify 0 as the Hours of Activity.

Then click "Update."

Update Equipment A	Activity		×
Update Value	s for Crushing/Proc. Equip	ment	
Year	2008	Hours of Activity	0
Fuel Type	Diesel	Air Conditioning?	
Power Rating (HP)	75]	
	Cancel	Update	



Section 3: Recyclables

The Recyclables worksheet displays a list of recycled materials that will give a credit against emissions if used in the project. The amount of each material used in pounds should be entered in the respective cell. Pressing the 'Calculate Recycled Materials Credit' button will update the Recycled Materials Credit totals to reflect the amount of the credit. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.

Vision Entert Page Layout For Y33	Section 1: Materials	Equipment Recy	clion 3: Clion 3: Clabiles Maintenance	Section 5a:	Section 5b: Traffic Disruption	Section 6:		Section 8:		∞ 0 ⇔
Project Info	Materials	Equipment Recy	Lifecycle	Section Sa:	Traffic					
Signal And	Materials	Equipment Recy	Lifecycle	Section Sa:	Traffic		former & first			
SECTION 3: RECY	CLING C	REDIT				Lighting	Section 7: Rail	Induced Travel	RESULTS	
				Enter	Project Title Here			Ma (S	aintenance Dept Special Module)	
Recycled Asphall Pavement (RAP):	0	Ib	RECYCLE	D MATERIA	ALS CREDIT	Change	e Unit		10	
Reclaimed Concrete Material (RCM)	0	ıь	CO ₂		0	.00 (mt)				
Foundry Sand:	0	lb				(
Coal Bottom Ash	0	lb	CH4		0	.00 (mt)				
Glass Cullet/CRCG:	0	lb				,,				
Ground Bitumnous Shingle Material	0	lb	N ₂ O	-	0	.00 (mt)				
ated Petroleum Contaminated Soli Aggregate:	0	lb				(
Blast Furnace Slag:	0	ь	SF ₆		0	.00 (kg)				
Coal Fly Ash:	0	lb	2012/00/02/03	1.51		(66)	A.			
Ground Granulated Blast Furnace Slag	0	Ib	Total CO ₂ Equivalent		0	.00 (mt)	(
Other Industrial Waste Products	0	lb								
c	Calculate Recycled Materials Totals	1				Reset	Save			
Opening Project Info Materials	Equipment Metho	d Equipment2 Equ	pment Recyclables	Maintenance Stag	ng Traffic Disruption	Lighting	Ral Induced Trav	el Results 4	0•1	100% (=) 0

Section 3: Recyclables

GAS CAP

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Section 4: Lifecycle Maintenance

The Lifecycle Maintenance section is designed to estimate direct and upstream emissions based on expected materials and equipment that will be used in maintaining the completed product over its lifespan. *Bridge lifecycle maintenance is not estimated in the current version.*

Each field in the steps below is populated with default values that may be changed.

- Step 1: Select the Pavement Type from the dropdown (Asphalt, Concrete, or Asphalt Overlay Concrete)
- Step 2: Enter the Length of the project in miles.
- Step 3: Enter the number of Lanes
- Step 4: Enter the Pavement Depth (in inches) of the main roadway
- Step 5: Enter the Combined Width (in feet) of both shoulders of the roadway
- Step 5: Enter the Pavement Depth for the shoulders of the roadway
- Step 6: Enter the distance (feet) for Transverse Joint Spacing (Step 6 does not apply when the Pavement Type is Asphalt).

Click "Update Maintenance."

SICAP Project	ect Info Section 1 Materials			Section 4: Lifecycle Maintenance	Section 5a:	ction 5b: Fraffic sruption	Section 6 Lighting		Section 8: Induced Travel	RESULTS		
	4: MAINTE	ENANCE	EMISSION	S				Enter Proje	ect Title Here	Maintenance Dept (Special Module)		
Pavement Type	Asphalt	•				0	hange Unit					
Length (mi)	1		MAINTENA	NCE TOTAL	LS		mange om					
Lanes	2		Direct CO ₂			0.00	(9)					
Lane Width (ft)	12		Direct CH4 Direct N2O			0.00	(g) (g)					
Pavement Depth (in)	8		Direct PMec Direct CO ₂ Equivale	ent		0.00	(g) (g)					
Combined Shoulder Width (ft)	12		Upstream CO ₂ Upstream CH ₄			0.00	(9)					
1210120120120120			Upstream N ₂ O			0.00	(g) (g)					
Shoulder Depth (in)	2						(g)	1				
	2		Upstream PM _{6C} Upstream SF ₆			0.00	(mg)					
Shoulder Depth (in) Transverse Joint Spacing (ft)	0		Upstream SF ₆ Upstream CO ₂ Equi			0.00 0.00	(mg) (g)					
			Upstream SF ₆			0.00	(mg) (g) (g)					
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct CH_(q)	Upstream SF ₆ Upstream CO ₂ Equi		<u>Direct CO, Equiv. (r</u>	0.00 0.00 0.00 Reset	(mg) (g) (g)	Upstream CH_(q)	Upstream N.O (g)	Uestzeam PMac	ijpstream \$F_(mg)	Up
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct CH ₄ (a)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct.CO, Equiv. In	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	Upstream CH. (a)	Upstream N.O. (g)	Vestream PMac	Spatream Sf. (ma)	Up
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct.CH_(a)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct CO, Equiv. (r	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	. Upsiream CH_(a)	Upstreen N.O.(a)	Westream PMac	<u>Upstream SF_(mg)</u>	Upp
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct CH ₄ (q)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct CO., Faulty, In	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	J Vostream.CH, (a)	Bostream B.O. (o)	Uestream PMs:	<u>lipsfream.5F. (maj</u>	Upt
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct CH_(q)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct.CO., Kautr. (r	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	Juniteam CH ₂ (a)	Vestreen N.O. (a)	Upstream PMs.	Bastream 55_(mg)	Uper
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct.CH ₄ (a)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct.CO., Eastr. Ir	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	Nosiream CH_(s)	Upstream N.O.(a)	Bostreem PMsc	Bestream Sf. (ma)	Ups
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct.CH_(q)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct.CO, Eavin. In	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	Nosiream CH_(o)	Spatreen N.O.(a)	Vestreem PM-c	Bastrean S. (ma)	Upt
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct.CH_(q)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct.CO, Easth, Ir	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	Nosiream CH_(a)	läpstream N.O.(a)	Upatream PMu;	lipstreen S. (ma)	
Transverse Joint Spacing (ft)	0 Update Maintenence	Direct.CH_(a)	Upstream SF ₆ Upstream CO ₂ Equi Combined CO ₂ Equi	ivalent	Direct.CO, Equito. In	0.00 0.00 0.00 Reset	(mg) (g) (g) Save	Nostream CH_(a)	lässtreem N.O.(a)	Uestream PM	läpskresen 35. (ma)	<u>Ue</u>

Section 4: Lifecycle Maintenance



	Asphalt Pavement	Concrete Pavement	Asphalt Overlay Concrete Pavement
Total Lifecycle	50 Years	50 Years	30 Years
5 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Crack seal 500 ft. per lane mile (PA)	
10 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Clean and seal 100% of longitudinal joints Clean and seal 100% of transverse joints Crack seal 500 ft. per lane mile (PA)	Concrete patch 2 - 10% of pavement area Crack seal 500 ft. per lane mile (PA) Bituminous overlay to 4 in. depth
20 years	Mill wearing course to 2 in. depth Bituminous inlay to 2 in. depth micro surface shoulders	Concrete patch 2 - 10% of pavement area Diamond grind 100% of total area Clean and seal 100% of longitudinal joints Clean and seal 100% of transverse joints	Concrete patch 2 - 10% of pavement area Mill wearing course to 2 in. depth Bituminous inlay to 2 in. depth
30 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Concrete patch 2 - 10% of pavement area Diamond grind 100% of total area Clean and seal 100% of longitudinal joints Clean and seal 100% of transverse joints	
40 years	Full depth patch 5% of pavement area Mill wearing course to 4 in. depth Bituminous inlay to 4 in. depth micro surface shoulders	Concrete patch 2 - 10% of pavement area Crack seal 500 ft. per lane mile (PA) Bituminous overlay to 4 in. depth	
50 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Concrete patch 2 - 10% of pavement area Mill wearing course to 2 in. depth Bituminous inlay to 2 in. depth	

Section 4: Lifecycle Maintenance



Section 5a: Staging

Transportation

The Staging worksheet allows emissions to be estimated for activities involved in staging the construction site. The first box, Transportation, is similar in function to the Equipment worksheet, except with on-road vehicles.

- Step 1: Select the vehicle type
- Step 2: Select the year the vehicle was manufactured
- Step 3: Select the type of fuel used
- Step 4: Enter the one way distance of a trip with that vehicle type
- Step 5: Enter the number of one way trips made with that vehicle type
- Step 6: Enter the number of vehicles of that type
- Step 7: The 'Add Item' button will add a line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all equipment.

To assist in determining distance traveled, a quick Distance Calculator box accepts the input of a starting and ending 5-digit zip code; clicking the 'Find Distance' button will bring up the user's web browser with a Google Maps page giving the driving miles between the two zip codes.

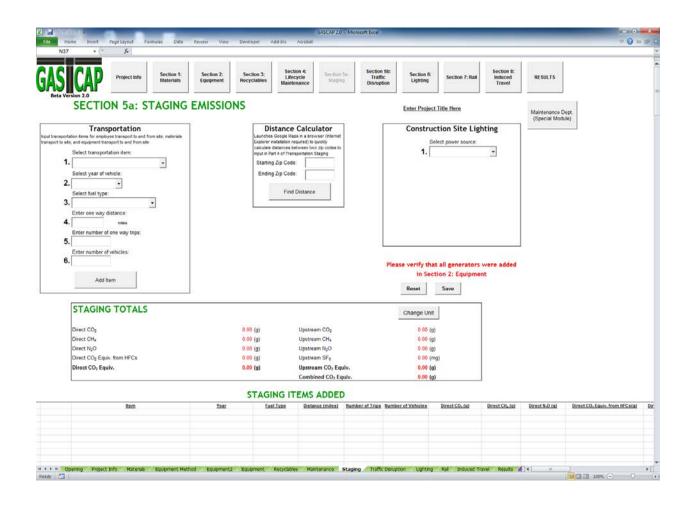
Construction Site Lighting

The second part of calculating construction staging emissions involves estimating the use of lighting for nighttime work at the site. By default, the power is generator based. In this event, please verify that generators were added as equipment items in Section 2.

If the power is grid-based, choose that option in the drop down box. The sheet then prompts for the number of fixtures, watts per fixture, and operating hours per day. Multiple line items can be added. The operating hours box is prepopulated with an estimated figure based on the actual daylight hours expected based on the dates of the project. This default number can be changed if desired. Pressing the 'Add Lighting' button creates a new line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all materials. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.

Section 5a: Staging





Section 5a: Staging

GAS CAP

User Guide

Section 5b: Traffic Disruption

Section 5b estimates the emissions from six project staging options, which result in changes in traffic patterns that occur during roadway construction and maintenance. GASCAP classifies staging procedures as one of the following work zone types:

1.	Work Zone Only	No lanes closed, with workers present during construction for the duration of the project
2.	Lane Closure	One or more, but fewer than all, lanes are closed for the duration of the project
3.	Intermittent Lane Closure	One or more, but fewer than all, lanes are closed during specific periods each day or week, but otherwise open, for the duration of the project
4.	Full Road Closure	Road is fully closed (all lanes) for the duration of the project, with a signed diversion route
5.	Combination Road and Lane Closure	Road is fully closed (all lanes) during specified periods each day or week, with a signed diversion route; otherwise one or more, but fewer than all, lanes are closed.
6.	Intermittent Road Closure	Road is fully closed (all lanes) during specific periods each day or week, with a signed diversion route, but otherwise open, for the duration of the project
7.	Intermittent Work Zone	No lanes closed, with workers present during construction during specific periods each day or week, for the duration of the project

Traffic flow changes in GASCAP are based on calculations from the 2010 Highway Capacity Manual. Because different emissions impacts must be calculated for each staging procedure, this is the most complex module in GASCAP. Some staging procedures will require entering additional data, as noted in the procedures below.



Step 1: Select the Staging Option from the dropdown menu

9 • (* fr											
Project Info	Section 1: Materials	Section 2: Equipment	Section 3: Recyclables	Section 4: Lifecycle Maintenance	Section 5a: Staging	Section Stc Traffic Disruption	Section 6: Lighting	Section 7: Rail	Section 8: Induced Travel	RESULTS	
				Maintenance		Lasrupsion			Traver		
TION 56: TRAFI		TION									
TION 3D. TION	ic Disitor	non		Enter Pro	pject Title Here					Maintenance Dept. (Special Module)	
taging			Dista	nce Calcul		1					
	<u>.</u>		Launches Google N	Maps in a browser	(Internet Explorer						
evant			installation required) to 2ip codes to	quickly calculate di to input in Staging P	stance between two rocedure						
f the Enter Details			Starting Zip Code:	10 200	901						
				00	201						
			Ending Zip Code:	08	904						
			_								
Save Reset			Find	d Distance							
Direct CO2	0.00	(9)	Upstr	ream CO ₂			.00 (g)				
Direct CH ₄	0.00	(9)		ream CH4		0	(g) 00				
Direct N ₂ O	0.00	(g)	Upste	ream CH ₄ ream N ₂ O		0	.00 (g) .00 (g)				
			Upstr	ream CH ₄ ream N ₂ O ream Black Cart	on	0 0	00 (g) 00 (g) 00 (g)				
Direct N ₂ O	0.00	(g)	Upstr Upstr Upstr Upstr	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi		0 0 0 0 0	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equiv.	v.	0 0 0 0 0	.00 (g) .00 (g) .00 (g) .00 (mg)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 0 0 0 0	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				
Direct N ₂ O Direct Black Carbon	0.00	(g) (g)	Upstr Upstr Upstr Upstr Total Char	ream CH ₄ ream N ₂ O ream Black Cart ream SF ₀ ream CO ₂ Equi I CO ₂ Equiv. nge in Average	v. MPG	0 0 0 0 0 0 NA	00 (g) 00 (g) 00 (g) 00 (mg) 00 (g)				

Step 2: Click the Enter Details Button to open the Work Zone details window.

work will be carried out:			
1. Description	4. Physical Cha	racteristi	cs
Name	Lane Width (Feet)		
Length (miles)	Posted Speed Limit (mph)		-
Functional Class	Median	False	•
Number of Lanes (per direction)	Ramps or Access Points per Mile		
AADT	Lateral Clearance - Left	6	•
2. Single Lane Base Capacity	Lateral Clearance - Right	6	-
Dominant Direction Capacity	Directional Split		
Total Capacity (both directions)	Grade	Level	-
Opposite Direction Capacity	No Passing Lane - Level	0.2	
3. Intermittency	No Passing Lane - Rolling	0.4	
Intermittency TRUE	Urban/ Rural	Urban	-
Days per week 7			
Start Time 11 • 59 •	PM 👻		
Finish Time 11 • 59 •	PM 👻		



Step 3.1: Enter the following Descriptions of the roadway at the site of the Work Zone:

- a. Name of the roadway
- b. Length (in miles) of the segment of the roadway affected by the work zone
- c. The functional class of the roadway at the work zone. Note: Selecting a functional class will populate default values for Physical Characteristics of the roadway. These may be changed in Step 3.4
- d. The number of lanes per direction of that road segment at the work zone
- e. The Annual Average Daily Traffic (AADT) for the roadway

Step 3.2: Accept Default Values for the Single Base Lane Capacity of the Work Zone, or enter:

- a. The dominant direction of traffic flow at the work zone
- b. The total flow at the work zone
- c. The opposite direction flow at the work zone is then calculated automatically

Step 3.3: Enter the Intermittency schedule for intermittent lane/road closures:



Note: Step 3.3 applies only for intermittent work zones. During Step 1, if you selected any staging options other than 3 (Intermittent Lane Closure), 5 (Combination Road and Lane Closure), 6 (Intermittent Road Closure) or 7 (Intermittent Work Zone) this section will appear as "grayed out" and the fields will be inactive.

- a. The number of days per week the lane/road closure is expected to take place
- b. The start time at which the lane/road closure is expected to begin each day
- c. The finish time at which the lane/road closure is expected to end each day.

Step 3.4: Enter the following Physical Characteristics of the Roadway around the site of the work zone:

- a. The lane width (in US Feet)
- b. The posted speed limit (in miles per hour)
- c. Select TRUE if there is a median within the work zone; otherwise select FALSE
- d. The number of ramps per mile within the work zone plus three miles upstream and downstream of the work zone for Freeways, or the number of access points per mile (driveways and unsignalized intersections within the work zone for other road types)
- e. The lateral clearance (shoulder width) on the left and right sides of the roadway at the work zone
- f. The directional split of traffic (proportion from 0.00 to 1.00 of traffic flowing in the dominant direction) at the work zone
- g. The grade (either Level, Rolling, or Mountainous) of the roadway at the work zone
- h. No passing Lane Level



- i. No Passing Lane Rolling
- j. Whether the work zone is in an Urban or a Rural location

Step 3.5: Click the Update Values button.

Step 4: Accept the default values or enter custom values for the proportion (from 0.000 to 1.000) of vehicles using the roadway that are:

- a. Passenger Cars
- b. Trucks or Buses
- c. Recreational Vehicles (RVs)

Note: Entered values must add up to 1.000

Click "Update Values."

If staging procedure 1 (Work Zone Only) is selected, this is all of the information that is required.

If staging procedure 2 (Lane Closure), 3 (Intermittent Lane Closure) is selected, you will be prompted to enter the number of lanes affected by closures in the following dialogue:

How many lanes will be	
direction)?	· ·
Update Values	Cancel

Step 5.1: Enter the number of lanes to be closed in the dominant direction. The maximum number of lanes that can be closed is one less than the total number of lanes in the work zone. If all of the lanes are to be closed, this would be classified as a Road Closure.

If staging procedure 4 (Full Road Closure) or 6 (Intermittent Road Closure) is selected, you will be prompted to enter further information for establishing a detour.



Step 6.1: Enter the number of links (1 - 5) for the signed diversion route resulting from any road closures.

Number of Diversions	23
How many links are there on the signed diversion route? (1 - 5)?	•

Step 6.2: Enter the following details for each diversion route link into the dialogue box shown below:

- a. Enter the Description, Single Lane Base Capacity, and Physical Characteristics for each link in the detour, as in Step 3
- b. Accept, for each detour link, the default values or enter custom values for the proportion (from 0.000 to 1.000) of vehicles using the roadway that are:
 - 1) Passenger Cars
 - 2) Trucks or Buses
 - 3) Recreational Vehicles (RVs)

Note: Entered values must add up to 1.000

etour Links				8
Please enter the details of	feach detour link:			
Link 1	Link 2	Link 3	Link 4	Link 5
1. Description				
Name	Name	Name	Name	Name
Langth (miles)	Length (miles)	Length (niles)	Length (miles)	Length (miles)
Functional Gases	Functional Class	Functional Class	Functional Class	Functional Class
Number of Lanes	Number of Lanes	Number of Lanes	Number of Lanes	Number of Lones
AVDT	AADT	AADT	AADT	AADT
2. Single Lane Base Capacity	2, Single Lane Base Capacity			
Dom. Directors	Dom Directory Play	Don-Directory Flow	Dors: Direction More	Dors. Direction Mox
Fotal Flow	TotalFlow	Total Flow	Total Flow	Total Flow
Opposits Direction Plow	Opposite Direction How	Opposite Direction Flow	Opposite Director Flow	Opposite Director Plan
3. Physical Characteristics				
Lene Width (Feet)	Lana Width (Feat)	Lane Width (Feet)	Larve Widths (Fead)	Laine MidBi (Feat)
Posted Speed	Posted Speed Limit (mph)	Posted Speed Limit (hph)	Posted Speed	Posted Speed Linst (not)
Median Pake	Median Palse	Median Take	Nodan Telse	Notion Trice

If staging procedure 5 (Combination Road and Lane Closure) is selected, you will be prompted to enter information about BOTH a road closure with detour and a lane closure. Refer to Steps 5.1 - 6.2.



Section 6: Lighting

The Lighting worksheet estimates direct emissions from traffic lights and street lights that are installed as part of the project over their operating lifespan.

Step 1: Select the lighting typeStep 2: Select the power rating for the light if necessaryStep 3: Enter the number of lamps or signal headsStep 4: Enter the anticipated number of operating years

Pressing the 'Add Item' button creates a new line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all materials. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.

• (* fe						
CAP Project Info Section 1 Material		Section 4: Lifecycle Section 5a: Maintenance Staging	Section 5b: Traffic Disruption	Section 7: Rail	Section 8: Induced RESULTS Travel	
ECTION 6: LIGHTING E		Enter P	oject Title Here		Maintenance Dept. (Special Module)	
wer Rating		HTING TOTALS				
mber of Lamps/Signal Heads	Direc	t CO ₂	Change Unit	(mt)		
nber of Years Operating	Dire	t N ₂ O t CO ₂ Equivalent	0.00 0.00 0.00	(mt) (mt) (mt)		
Add Item	Upst	eam SF ₆ ream CO ₂ Equivalent CO ₂ Equivalent	0.00 0.00 0.00	(kg) (mt) (mt)		
	LIGHTING IT	EMS ADDED	Reset	Save		



Section 7: Rail

Section 7 estimates emissions from the construction of railway projects.

Step 1: Select the category of rail item to be added. Step 2: Select the specific item within that category.

Step 2 will determine the remaining steps, dependent on the variables involved with the selected item. Variables for specific items include:

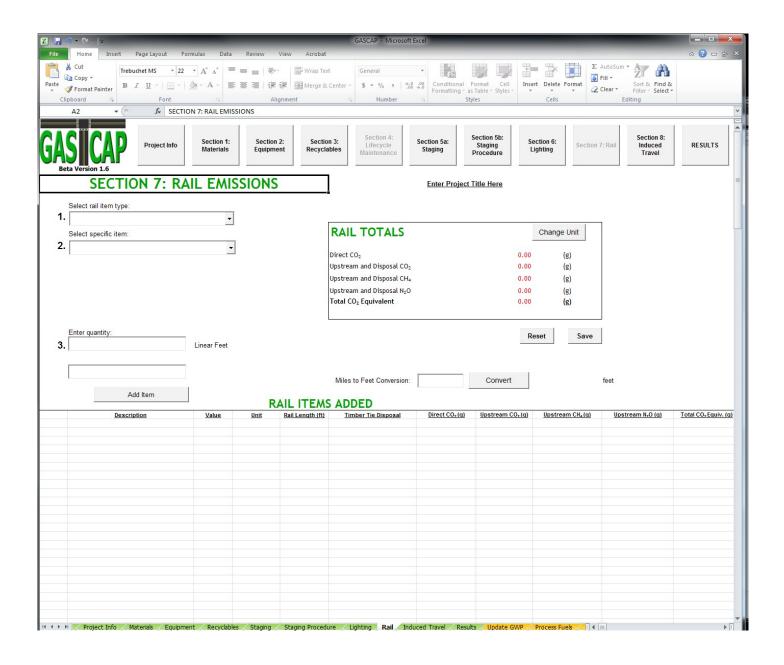
Joint Bars: When selecting joint bars, the user will be prompted for rail length in order to determine how many joint bars are required. Rail length options are 39 feet, 80 feet, or continuous. If continuous is selected, the user will be prompted to enter the continuous rail length.

Timber Ties: For timber ties, the user is prompted to choose a timber disposal method. The disposal method will result in a credit against emissions due to either the burning of the timber as fuel or the storing of it in a landfill (carbon sequestration).

For all items that are dependent on length of track, the user will be prompted to enter the number of parallel tracks. As most items require an input in feet, there is a simple calculator on the page that can be used to convert miles into feet. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.

Section 7: Rail





Section 7: Rail

GAS CAP

User Guide

Section 8: Induced Travel

Section 8 of GASCAP estimates the additional impact of mobile emissions from induced travel —the increase (or decrease) in travel activity that occurs in response to adding (or removing) capacity from a roadway, assuming that the project life is 50 years.

ersion 2.0		Equipment Recyclables Mail	staging	Disruption	Lighting		Travel.		
CTION 8	: INDUCED TRAV	EL Enter	r Project Title Here					Maintenance Dept. (Special Module)	
	city been added or take	n away?							
)Yes ()									
ne Miles Add	led or Subtracted	INDUCED TRA	VEL TOTALS			Chang	e Unit		
	n taken away enter the appropriate boxes	Type of Facility Lane Miles Added or	Expressways Freeways Interstates 0.00	Arterial Roads Colle 0.00	ctor Roads Local Roads 0.00 0.00				
Expressways	0	Subtracted CO ₂ over 50 years	0.00	0.00	0.00 0.00	0.00	(g)		
eeways Interstates		CH ₄ over 50 years	0.00	0.00	0.00 0.00	0.00	(g)		
Arterial Roads	0	N ₂ O over 50 years BC over 50 years	0.00	0.00	0.00 0.00		(g) (g)		
0.0.0 Dest	0	SF, over 50 years	0.00	0.00	0.00 0.00		(mg)		
Collector Roads	-	Total CO ₂ Equivalent	0.00	0.00	0.00 0.00		(g)		
Local Roads	0	Save Reset							

Step 1: Select "Yes" if the project has either added or reduced road capacity; otherwise select "No."

Step 2: Enter the additional capacity in lane-miles for each class of road (Expressways/Freeways/Interstates, Arterial Roads, Collector Roads, Local Roads) that will result from the project. If capacity has been reduced, enter the change as negative lane-miles.

Section 8: Induced Travel



Results

The Results worksheet displays the cumulative results from all sections of GASCAP. In addition to results from each individual section, the worksheet contains emission estimation totals for the entire project, and an estimated fuel consumption box based on the Equipment and Staging sections. Current fuel prices can be entered and the total cost updated by pressing the 'Update Fuel Costs' button. The 'Print Results' button will print all results in a two page format.

X . • • • • • • •			_	_		GASCAP 2.0 - Mic	rosoft Excel	_	_	_	_		- 0 - *	
File Home Insert Page L	ayout Formulas fx	Data	Review View	Developer Ad	id-lins Acrobat								v 🕜 – 🖗	_
150 1	<i>/</i>													> 4
		tion 1: erials	Section 2: Equipment	Section 3: Recyclables	Section 4: Lifecycle Maintenance	Section 5a: Staging	Section 5b: Traffic Disruption	Section 6: Lighting	Section 7: Rail	Section 8: Induced Travel	RESULTS			•
			Enter Project Title	Here										
SECTION 1:	Materials			L RESULT	S			Chan	ge Unit		Maintenance Dept. (Special Module)			
Direct CO ₂ Direct CH ₄		00 (g) 00 (g)	CO ₂ CH ₄			0.00					(opecial module)			
Direct N ₂ O	0.	(g) 00	N ₂ O			0.00	(g)	Print	Results					
Direct CO ₂ Equivalent		(g) 00	SFe			0.00								
Upstream CO ₂		00 (g)	PM _{BC}			0.00								
			1 MBC			0.00	(9)							
Upstream CH ₄		00 (g)						5	ave					
Upstream N ₂ O	0.	00 (g)	Total CO	2 Equivalen	t	0.00	(g)							
Upstream SF6		00 (mg)												
Upstream CO ₂ Equivalent		00 (g)	Fuel Consun	nption										
Combined CO ₂ Equivalent	0.	00 (g)	0	6 Ethanol RFG)			gallons							
SECTION 2:	Equipment		Gasoline	e Ethanol RFG)			gallons							
			20% Biodiese	el			gallons							
Direct CO ₂	0.	00 (g)	Diesel			0.00	gallons							
Direct CH ₄		00 (g)	Liquified Petro				gallons							
Direct N ₂ O		00 (g)	Compressed	Natural Gas		0.00	GGE							
Direct PM _{BC}		00 (g)												
Direct CO ₂ Equiv. from HFCs		00 (g)	Fuel Costs		4.00	_								
Direct CO ₂ Equivalent		00 (g)		6 Ethanol RFG)	4.00		\$ per gallon							
Upstream CO ₂		00 (g)	Gasoline		3.75		S per gallon							
Upstream CH ₄		00 (g)	20% Biodiese	1	4.00		\$ per gallon							
Upstream N ₂ O		00 (g)	Diesel		1.50		\$ per gallon							
Upstream PM _{BC}		00 (g)	Liquified Petre		1.50		\$ per gallon							
Upstream SF ₆		00 (mg)	Compressed	Natural Gas			\$ per GGE							
Upstream CO ₂ Equivalent		00 (g)		Hoda	te Fuel Costs									
Combined CO ₂ Equivalent	0.	00 (g)			te i dei Gusta									
SECTION 3:	Recyclables Credi	ts	Total Fue	l Cost		\$0.00								
CO ₂		00 (g)	[
CH4		00 (g)	SECTION 5b		Traffic Disrupti	on								
N ₂ O		00 (g)												
SF6 Total CO, Equivalent		00 (mg)	Direct CO ₂			0.00								
Total CO ₂ Equivalent	0.	00 (g)	Direct CH ₄ Direct N ₂ O			0.00								
SECTION 4:	Lifecycle Mainten	-	Direct N ₂ O Direct PMac			0.00								
SECTION 4:	cnecycle mainten.	ince	Direct CO ₂ E	quivalent		0.00								
Direct CO ₂	0	00 (g)	Upstream CO			0.00								
Direct CH ₄		00 (g)	Upstream CH			0.00								Ŧ
H 4 F H Opening Project Info	Materials / Equipri				Recyclables 🧹 Main	tenance Stagin	g 🧹 Traffic Disrup	otion 🏑 Lighting 🏑	Rail / Induced Tr	ravel Results				1
Ready 🞦												I II 100% —	0	۲

Results

GAS CAP

User Guide

Maintenance Department Module

GASCAP's Maintenance module addresses planned rehabilitations of NJDOT facilities, but not routine maintenance, such as pothole filling and crack sealing. To address this gap, GASCAP includes a special module for estimating direct and upstream emissions from equipment fuels and materials from routine maintenance activities to enable a more complete life-cycle analysis with respect to capital projects. The results from this data gathering module are treated as separate section from other GASCAP modules.

Maintenance Equipment

- Step 1: Click the "Equipment" radio button to begin adding equipment.
- Step 2: Enter (in the following order) the type; quantity of pieces; model year; fuel; time spent idling; miles travelled; horse power rating; and air conditioning for each equipment item you would like to add. Not all fields are applicable to every equipment item, and may appear grey.
- Step 3: Click "Update Maintenance" to add equipment. The item will appear in list the bottom of the spreadsheet (once for running emission and once for idling emissions). Click the "Remove" button to the right of the item to remove it from the equipment list.

Maintenance Materials

- Step 1: Click the "Materials" radio button to begin adding materials.
- Step 2: Enter (in the following order) the type; heating temperature; outdoor ambient temperature; quantity; percentage of binder; percentage of aggregate moisture; and solvent type for each material item you would like to add. Not all fields are applicable to every material and may appear grey.
- Step 3: Click "Update Maintenance" to add materials. The item will appear in list the bottom of the spreadsheet. Click the "Remove" button to the right of the item to remove it from the materials list.

Viewing and Saving Detailed Results

A summary of the maintenance emissions appears on main worksheet. You can also view emissions separately for materials; generators; idling vehicles; and running vehicles. To see separate results, click "View Detailed Results" to navigate to the results page.

Clicking "Save" on the data entry sheet opens a dialogue to save the results in a new workbook. The first sheet will contain the list of equipment and materials. The second sheet will contain detailed results from the module. *Once the results are saved, the module will automatically reset.*

Maintenance Department Module



SICAP	Project Info Section		Section 3: Recyclables	Section 4: Lifecycle Maintenance	Section 5a: Staging	Section 5b Traffic Disruption	sect	tion 6: hting	Section 7 Rail	1	ection 8: nduced Travel	RESULTS				
leta Version 2.0	MAINT	ENANCE (S	PECIAL								Maetar	ance Dept. al Module)				
oject Nam	Select I	nput Type					MA	INTER	NANCE	тота	LS					
	pment		Materials C		Direct CO ₂ Direct CH ₄		0.00		Upstream C Upstream C			0.00				
Equip	oment Type	1VA	laterials Type	9	Direct N ₂ O Direct PM _{BC} Direct CO ₂ e		0.00 0.00 0.00	(g)	Upstream N Upstream P Upstream S	Mec		0.00 0.00				
Quantity N/A	Year	Heating Temp		nt Temp *F	from HFCs Direct CO ₂ e	3	0.00	(g)	Upstream (Combined			0.00		6		
N/A	uel	Quantity N/A Binder %	Uni N/A	ggregate	View D Res					C	hange Unit	Unit (9)				
Hours Idling N/A Horse Power	Miles Traveled	N/A	Solvent		Save	Reset										
N/A 🗾 I	Ar Conditioning?	Update		<u> </u>												
NTENANCE	ITEMS ADDED	Maintenance														
Equip. Pieces	Description	Value	Vnit Dir	ect CO. (g) Direct CH.	g) Direct NJO (g)	Direct PMar.	Direct CO.e. from HFCs(a)	Direct CO.e (a)	<u>Upstream.</u> <u>CO.(q)</u>	Upstream CH_(g)	<u>Vostream</u> <u>N.O.(q)</u>	Upstream PMa.	Upstream SF_(mg)	Upstream CO. Equiv. (q)	FuelVse	

Maintenance Department Module



CURRENT MAINTENANCE RESULTS

		Unit			
				Change Unit	(g)
Direct CO ₂	0.00 (g)	Upstream CO ₂	0.00 (g)	1.	
Direct CH ₄	0.00 (g)	Upstream CH ₄	(g) 0.00		
Direct N₂O	0.00 (g)	Upstream NzO	(e) 0.00		
Direct PM _{PC}	0.00 (g)	Upstream PM _{PC}	0.00 (g)		
Direct CO ₂ Equiv. from HFCs	0.00 (g)	Upstream SFs	0.00 (mg)		Return to Data Entry
Direct CO ₂ Equiv.	0.00 (g)	Upstream CO ₂ Equi	0.00 (g)		LINUY
		Combined CO ₂ Equ	0.00 (g)		-

		Unit			
				Change Unit	(g)
Direct CO ₂	(و) 0.00	Upstream CO ₂	0.00 (g)		
Direct CH ₄	0.00 (g)	Upstream CH ₄	0.00 (g)		
Direct N₂O	0.00 (g)	Upstream NzO	0.00 (g)		
Direct PM _{PC}	0.00 (g)	Upstream PM _{ec}	(e) 0.00		
Direct CO ₂ Equiv. from HFCs	0.00 (g)	Upstream SFs	0.00 (mg)		Return to Data
Direct CO ₂ Equiv.	0.00 (g)	Upstream CO ₂ Equi	0.00 (g)		Entry
		Combined CO ₂ Equ	0.00 (g)		

Ve		Unit			
				Change Unit	(9)
Direct CO ₂	(g) 0.00	Upstream CO ₂	0.00 (g)		
Direct CH ₄	0.00 (g)	Upstream CH ₄	0.00 (g)		
Direct N ₂ O	0.00 (g)	Upstream N₂O	0.00 (g)		
Direct PM _{PC}	0.00 (g)	Upstream PM _{PC}	0.00 (g)		3000 63260
Direct CO2 Equiv. from HFCs	0.00 (g)	Upstream SFs	0.00 (mg)		Return to Data
Direct CO ₂ Equiv.	0.00 (g)	Upstream CO ₂ Equi	0.00 (g)		Entry
		Combined CO ₂ Equ	0.00 (g)		

Vel	nicle Runr	ning Emissions		
				Change Unit
Direct CO ₂	0.00 (g)	Upstream CO ₂	0.00 (g)	12
Direct CH ₄	0.00 (g)	Upstream CH ₄	0.00 (g)	
Direct N₂O	0.00 (g)	Upstream N₂O	0.00 (g)	
Direct PM _{ec}	0.00 (g)	Upstream PM _{PC}	(و) 0.00	
Direct CO ₂ Equiv. from HFCs	(g) 00.0	Upstream SF:	0.00 (mg)	
Direct CO ₂ Equiv.	0.00 (g)	Upstream CO ₂ Equi	0.00 (g)	
		Combined CO ₂ Equ	0.00 (g)	

	Total E	missions			Unit
				Change Unit	(9)
Direct CO2	0.00 (g)	Upstream CO2	0.00 (g)		
Direct CH4	0.00 (g)	Upstream CH4	0.00 (g)		
Direct N2O	(g) 00.0	Upstream N2O	0.00 (g)		
Direct PMBC	(g) 00.0	Upstream PMBC	0.00 (g)		
Direct CO2 Equiv. from HFCs	(g) 00.0	Upstream SF6	0.00 (mg)		
Direct CO2 Equiv.	0.00 (g)	Upstream CO2 Equi	0.00 (g)		
Second Second Second Second	50 States	Combined CO2 Equ	0.00 (g)		

Maintenance Department Module

Return to Data Entry

Unit (g)

GAS CAP

User Guide

Section 9: Updating GASCAP

Periodically, it may be necessary to update GASCAP with new data with emissions factors, new vehicles, etc. There are several, password-protected modules which allow administrators to easily update the software.

There are 9 modules for updating data in GASCAP:

- Section 9a: Update Global Warming Potential Values
- Section 9b: Process Fuels
- Section 9c: Electricity Production
- Section 9d: Steel
- Section 9e: Other Materials
- Section 9f: Equipment Year
- Section 9g: Staging
- Section 9h: Induced Travel

Before updating Sections 9b - 9e, it is necessary to extract new emissions factors from the latest version of Argonne National Laboratory's GREET model. For detailed instructions for obtaining these factors, see the Technical Memorandum **Updating GASCAP with Revised Greet Vehicle and Fuel Cycle Values.**

Other Sections may require extracting data from other models, such as NONROAD or MOVES. This will be noted in the instructions for updating these sections.

Accessing the Update Modules

To access GASCAP's updating modules, type the administrator password into the box on the Project Info tab.

Administrator Password	Confirm Password	Section 9: Admin	
------------------------	---------------------	---------------------	--

Click Confirm Password. If the password is correct, the confirmation window to
the right will appear.



Click OK. Then click the Section 9: Admin button.





Section 9a: Global Warming Potential Values

Click the "Section 9a: Update GWP Values" button at the top of the screen to navigate to the correct worksheet. To update GWP values, replace the existing values for Methane, Nitrous Oxide, Hexafluoride, and HFC-134a. Then click the "Update GWP" button at the bottom.

X Microsoft	Excel - GASCAP 2.0		_	_	_	Second Second	and a second				 3
GAS	Version 2.0	Project Info	Section 9a: Update GWP Values	Section 9b: Process Fuels	Section 9c: Electricity Production	Section 9d: Steel	Section 9e: Other Materials	Section 9f: Equipment Year	Section 9g: Staging	Section 9h: Induced Travel	4
	SECTION	1 9a: UF	DATE GW	/P VALUI	ES			Enter Pro	ject Title Here		
1.	Enter admin p (This only nee				sion)		GWP V	أعابيوه			
							GULLA	alues		Value	
2.	Input Methan	e GWP					Carbon Diox	ide		1	
							Methane			25	
							Nitrous Oxid	e		298	
-							Sulfur Hexaf	luoride		22,800	
3.	Input Nitrous	Oxide GWF	•				HFC-134a			18	
4.	Input Sulfur H	lexfluoride	GWP								
5.	Input HFC-134	4a GVVP									
	Update G	WP									
									-	2.1	 Ŧ
16 6 F H B	Update GWP Process	Fuels Electricity	Production Steel	Other Materials 🖉 Upd	ate Equipment 🖉 U	Jodate Staging Factors	Induced Travel Fac	tors / Update Log	(• • • · /		

GAS CAP

User Guide

Section 9b: Process Fuels Emissions Factors

GASCAP allows you to update upstream emissions and combustion emissions for process fuels. Click the "Section 9b: Process Fuels" button to navigate to the correct updating worksheet, shown below.

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GAS	C/	Project Info Section 9a: Section 9b: Electricity Process Fuels Section 9c: Section 9d: Cother Materials Section 9f: Equipment Year Staging Staging Staging Stagent Sta	-
	1.	Enter admin password (Project Info tab) (This only needs to be done once per GASCAP session)	
	2.	Click Update Process Fuels Upstream Emissions or Update Process Fuels Combustion Emissions Upstream Emissions Upstream Emissions	
	3.	Enter revised values in form	
	4.	Click Update Factors	

To update the upstream emissions, click the "Update Process Fuels Upstream Emissions" button. Enter new values for each greenhouse gas and process fuel in the dialogue box shown below. Click Update Factors.

	Coal	Natural Gas	Conv. Gasoline	Distillate Fuel Oil	Residual Oil	LPG	Coke	Petroleum Coke	Asphalt
:02	108,266	\$9,379	75,645	78,169	85,045	68,024	NA	104,622	NA
CH4	4.000	1.100	5.193	.180	3.240	1.080	NA	4.000	NA
120	1.000	1.100	2.400	.390	.360	4.860	NA	1.000	NA.

To update the combustion emissions, click the "Update Process Fuels Upstream Emissions Button." Enter new values for each greenhouse gas and process fuel in the dialogue box shown below. Click Update Factors.

	Coal	Natural Gas	Conv. Gasoline	Distillate Fuel Oil	Residual Oil	LPG	Coke	Petroleum Coke	Asphalt
CO2	1,654	12,855	15,249	16,786	7,326	11,766	1,952	22,895	17,276
СН4	148	551	133	128	37	320	207	173	128
N20	.031	,271	1.124	.222	.110	.182	.034	.369	.238



Section 9c: Electricity Production Emissions Factors

Click the "Section 9c: Electricity Production" button to navigate to the correct worksheet, shown below.

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GAS CA	Project Info Section 9x: Update GWP Values Section 9b: Electricity Production Section 9d: Steel Section 9d: Materials Section 9f: Equipment Year Section 9g: Staging Section 9h: Induced Travel	
SECT	ION 9c: ELECTRICITY PRODUCTION Enter Project Title Here	
1.	Enter admin password (Project Info tab) (This only needs to be done once per GASCAP session)	
2.	Click Update Energy Sources for Electricity, Update Transmission Loss or Update Energy Emissions for Electricity Update Energy Emissions for Electricity Update Energy Emissions for Electricity	
3.	Enter revised values in form	
4.	Click Update Factors	

First click the "Update Energy Sources for Electricity" button to update the mix of fuels used to generate electricity. The dialogue below will appear.

Electricity Production	and per	×					
Residual Oil	%						
Natural Gas	49.66	%					
Coal	7.96	%					
Nuclear Power	31.24	%					
Biomass	%						
Other Sources	%						
C United States Average							
Update Factors	Cancel						

Select your region to load default data, either the United States Average or for Northeast. Enter the new values and click Update Factors.



Click the "Update Transmission Loss" button, opening the dialogue box below. Enter the new value for the percentage of electricity lost in transmission. Click Update Factor.

Transmission Loss	
Transmission Loss	8.00 %
Update Factor	Cancel

Click the "Update Energy Emissions for Electricity" button to open the updating dialogue box shown below. Select a region to load the default data for either the United States Average or the Northeast. Enter the new emissions factors in grams per million BTUs. Click Update Factors.

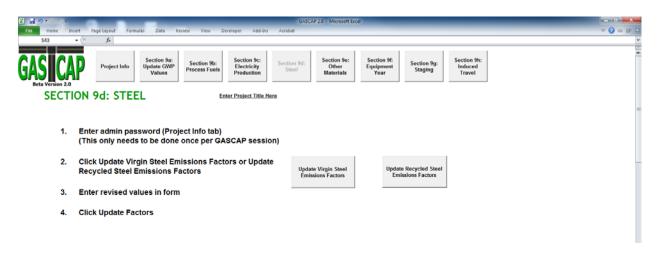
Emissions Factors for Electrici	ty Production	×							
voc	4.931	g/MMBtu							
со	42.432	g/MMBtu							
CH4	5.290	g/MMBtu							
N2O	2.689	g/MMBtu							
CO2	112,882	g/MMBtu							
CO2 (Incl. VOC, CO)	112,964	g/MMBtu							
C United States Average									
Update Factors	Ca	ncel							

GAS CAP

User Guide

Section 9d: Emissions Factors for Steel

Click the "Section 9d: Steel" button to navigate to the worksheet for updating emissions factors associated with virgin and recycled steel, shown below.



To update factors for virgin steel, click the "Update Virgin Steel Emissions Factors" button. Enter the new values in the dialogue box shown below. Click "Update Values."

CO2 75,957Å 776,673 148,076 1,300,865 95,300,865 97,90,077 172,447 CH4 79,477 751,49 798,445 696,08 791,277 1,778,677 1,778	CO2 75,954 775,673 148,674 1,573,865 1,573,865 85,715 718,677 1 CH4 79,477 351,44 390,455 696,575 718,677 1		Ore Recovery	Ore Pelletizing and Sintering	Coke Production	Blast Furnace	Basic 02 Furnace	Electric Arc Furnace	Sheet Production & Rolling	Stamping
CH4 29.47 [56.49] [96.45] [96.45] [96.68] [212.77] [1,781.67] [1,198	CH4 79 47 201.49 390.45 600.55 396.60 272.77 1,270.67 1		g/ton of steel	g/ton of steel	g/ton of steel	g/ton of steel	g/ton of steel	g/ton of steel	g/ton of steel	g/ton of stee
		CO2	25,957	276,623	148,069	1,363,165	1,363,165	85,315	718,637	522,460
N20 63 3.00 3.05 62 1.01 1.14 11.28 8.33	N20 (i) 1.01 1.07 (i) 1.01 1.14 1.120 (i)	сн4	29.47	351.49	390.45	696.36	396.08	217.77	1,730.67	1,179.46
		N20	.63	3.80	1.05	.62	1.01	1.14	11.70	8.33

To update factors for recycled steel, click the "Update Recycled Steel Emissions Factors" button. Enter the new values in the dialogue box shown below. Click "Update Values."

	Basic O2 Processing	Electric Arc Furnace	Sheet Production & Rolling	Stamping
	g/ton of steel	g/ton of steel	g/ton of steel	g/ton of steel
CO2	99,568	593,328	718,637	522,460
CH4	25.10	1,514.50	1,730.67	1,179.46
120	.06	7.94	1,730.67	8.33
	lle	date Values	Cancel	Ĩ.





Section 9e: Emissions Factors for Other Materials

Click the Section 9e: Other Materials button to navigate to the worksheet for updating emissions factors associated with plastics or other materials, shown below.

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GAS Beta V	ersion 2.0		-
	SEC	TION 9e: OTHER MATERIALS Enter Project Title Here	
	1.	Enter admin password (Project Info tab) (This only needs to be done once per GASCAP session)	
	2.	Click Update Plastics Emissions Factors or Update Update Plastics Other Materials Emissions Factors	
	3.	Enter revised values in form	
	4.	Click Update Factors	

Click the "Update Plastics Emissions Factors" button. Enter the new values for carbon dioxide, methane, and nitrous oxide emissions (in grams per ton) for each plastic product type in the dialogue box shown below. Click "Update Values."

Plastics				×
	Final Polypropylene Product: Combined	Final Average Plastic Product: Combined	Final Glass Fiber- Reinforced Plastic Product: Combined	Final Carbon Fiber-Reinforced Plastic Product: Combined
	giton	g/ton	giton	g/ton
CO2	3,257,690	4,137,271	4,995,743	10,007,762
CH4	5,271.53	6,236.88	7,629.05	16,027.34
N20	38.84	42.57	48.70	95.10
	Up	date Values	Cancel	

Click the "Update Other Materials Emissions Factors." Enter the new values for carbon dioxide, methane, and nitrous oxide emissions (in grams per ton) for each other material product type in the dialogue box shown below. Click "Update Values."

	Rubber	Zinc	Virgin Aluminum	Recycled Aluminum	Glass	Lubricating Oil	Copper
	gton	gton	giton	giton	giton	giton	g/ton
02	2,759,383	7,637,808	10,582,916	2,796,298	1,241,794	3,929,319	7,358,381
CH4	5,122.61	13,894.11	16,319.14	6,483.46	6,600.77	4,039.78	12,162.94
120	29.82	34.46	126-26	44.86	18.79	24.04	88.32

GAS CAP

User Guide

Section 9f: Equipment Data

GASCAP can be updated with new models of construction equipment. Emissions factors for new equipment must be extracted from EPA's NONROAD model. VTC has prepared scripts for extracting this data using MySQL. See the Technical Memorandum "**Updating Equipment Data in GASCAP**" for step by step directions for preparing a spreadsheet with updated equipment data for new model years. Then follow the instructions below.

Click the "Section 9f: Equipment" button to navigate to the worksheet for updating equipment, shown

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GAS CA Beta Version 2.0	Section 9a: Update GWP Values Section 9b: Process Fuels Section 9c: Electricity Production Section 9c: Steel Section 9f: Other Materials Section 9f: Year Section 9g: Staging Section 9h: Induced Travel	
SECTIO	N 9f: UPDATE EQUIPMENT Enter Project.Title.Here	
1. 2.	Enter admin password (Project Info tab) (This only needs to be done once per GASCAP session) Input Most Recent Year	
3.	Click Update Equipment button	
4.	Paste data into worksheet created	
5.	Save then re-open GASCAP	
Let Let		

below.

Enter the most recent year for new equipment in the box labeled Input Most Recent Year. Click Update Equipment. This will create and open a new worksheet tab called "20xx Data," as shown below.

eel 📈	Other Mat	terials 20	12 Data 🥖	Update Ed	uipment 🕢	Update S	tail

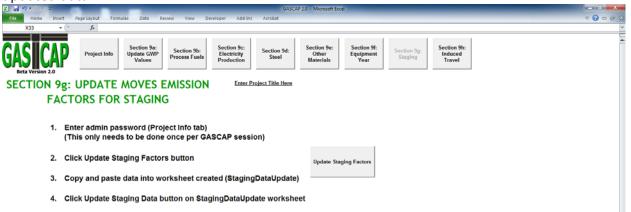
Copy and paste the data from the spreadsheet created using NONROAD into the "20xx Data" worksheet. Save and then re-open GASCAP.

You do not need to do anything else. GASCAP will then be able to estimate emissions from new construction equipment.



Section 9g: Staging Emissions Factors

Before updating Staging emissions factors, it is necessary to extract updated data from the latest version of EPA's MOVES software. See the Technical Memorandum "**Updating Staging Emissions Factors in GASCAP**" for detailed instructions for creating a spreadsheet with updated data.



Click the "Section 9g: Staging" button to navigate to the worksheet for updating emissions factors associated with transportation of vehicles and personnel to and from construction sites, shown below.

Click the Update Staging Factors button to create and open a new worksheet tab called "Staging Data Update," shown below.

A	B	C	D	E	F	G	н	Lange Lange and	3	K	L	M	N	0	P	
tem	Year	Fuel	Direct CO2 (g/mle)	Direct CH4 (g/mile)	Direct N20 (g/mle)	Upstream CO2 (g/mile)	Upstream CH4 (g/mile)	Upstream N2O (gimile)	MMBTU/mi	MMBTU/gal	MPG					
															1.21	
														Update staging (

Copy and paste the updated data from the spreadsheet created with MOVES into the "Staging Data Update" worksheet. Then click the "Update Staging Data" button.



Section 9h: Induced Travel Emissions Factors

Before updating Induced Travel emissions factors, it is necessary to extract updated data from the latest version of EPA's MOVES software. See the Technical Memorandum "**Updating Induced Travel Emissions Factors in GASCAP**" for detailed instructions for creating a spreadsheet with updated data.

Click the Section 9h: Induced Travel button to navigate to the worksheet for updating emissions factors for Induced Travel, shown below.

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GAS CA Beta Version 2.0	Project Info Section 98: Update GWP Values Section 9b: Process Fuels Section 9b: Electricity Production Steel Section 94: Steel Stee	-
SECT	TION 9h: INDUCED TRAVEL Enter Project Title Here	
		-
1.	Enter admin password (Project Info tab) (This only needs to be done once per GASCAP session)	
2.	Check default file path for induced travel emission factors (and change if necessary) (This is set to the directory GASCAP is currently saved in)	
	ThTPICarbon FootprintIGASCAP 2.0 Final VersionInduced_travel.csv	
3.	Click Update Induced Travel Emissions Factors button	

Locate the spreadsheet created with MOVES on your computer. Copy and paste complete file path into the box provided.

Click the "Update Induced Travel Emissions Factors" button.