Regional & Local Roads – Carbon Calculator Tool Pilot Project

A practical application of carbon emissions measurement in the delivery of RI and RM programmes at Offaly County Council.

Comhairle Chontae Uíbh Fhailí
Offaly County Council

CARO

RSTG

Presentation Contents

1. Introduction
2. Background
3. Practical Application by Offaly County Council

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1. Introduction

- CARO Initiative sponsored by Department of Transpor
- Green Procurement & Carbon Management
- CTD Working Group - Pilot Project (Ongoing)
- Objective: measure, optimise, record and report carbon emissions
- Approach: tool and technique

existing arrangements in Irish Transport Sector, not reinvent the wheel…….

test practical application in RI & RM programmes

"What gets measured gets managed."
Peter Drucker

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2. Background

CARBON TOOL
Transport Infrastructure Ireland

- TII Carbon Tool – managed and operated by TII
- Lifecycle Stages - for a Road Construction Project
- Before Use (Construction) Stage – Use Stage – End of Life Stage (-Reuse/Recycle)
- Emissions - Embodied Carbon and Operational Carbon
- Calculation - Material quantity x Carbon Factor = Carbon Emitted in CO_2e
- Carbon Factors – Database Built-In, Future EPDs
- Material Quantities - Data Collection

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3. Practical Application by Offaly County Council, Roads Operations

Offaly County Council is a participating member of the ‘Carbon Development Tool Pilot Project' which is being run as part of the development of Guidance for Local Authorities on the Climate Adaptation of Regional & Local Roads Project. The Objective is to use Transport Infrastructure Ireland (TII) Carbon Tool to assess the Tool for use in the Local Authority Roads Sector under of the following criteria:

- Usability.
- Functionality.
- Performance.
- Scalability and Flexibility.
- Fitness of purpose for our work streams under the Department of Transport Road

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Inputs used to calculate Carbon Emissions.

We had 70 lines of data or input information for our Road Improvement Programme and 119 for our Road Restoration Programme. The more actual data inputted the more accurate the output.

We sought the following information from each Municipal District area office post the completion of the Programs.

i. Project Location for each scheme
ii. Description of the work
iii. Length & Width of each project
iv. Quantity and Description of Material used for each
v. Locations of Aggregate Quarries, and Material Depots
vi. Information on Plant, Machinery, Vehicles, Labour, Supervision and Travel during construction.

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Sample Master Spreadsheet: Forms the basis of the information added to the TII Carbon Tool

Tullamore Municipal District - Restoration Improvement 2024 Surface Dressing Works

								Embodied Carbon - Materials																						
								Raw Materials															Transport						
			Eircode / Google Pin				Surface Dressing Type	Binder Type	Rate of Spread	Total	1st Chips Size	Conv. Factor	1st Chips	1st Chips	1st Chips	2nd Chips Size	Conv. Factor	2nd Chips	2nd Chips	2nd Chips	Dist. from Quarry to Chip Depo	Dist. from Binder Plant to Depo	Dist. From Chip Depo to Site	Dist. from Binder Depo to Site	No. of Trips - Chip	No. of Trips - Binder	Total Travel
Code No.	Road No.	Description / Location of Works		Length (m)	Width (m)	Area (m2)			l/m2	Tonne	mm		l/m2	kg/m2	Tonne	mm		l/m2	kg/m2	Tonne	km	km	km	km			Km
B3013040	R436	R436 Grogan Ballycumber	https://maps.a	885	7.1	6283.5	Racked-in Surface Dressing	Pol 80%	2.04	**13.21**	6/10 (10mm)	1.5	10.50	15.75	**98.97**	2/6 (6mm)	1.5	3.00	4.50	**28.28**	89	113	10	10	12	2	**1434.00**
B4013210	L-6009	Cappincur	https://maps.a	1125	5.5	6187.5	Racked-in Surface Dressing	Pol 80%	2.46	**15.69**	10/14 (14mm)	1.45	10.50	15.23	**94.20**	6/10 (10mm)	1.6	3.00	4.80	**29.70**	89	113	5	6	12	2	**1366.00**
B3013041	R421	Rr421 Killananny	https://maps.a	3650	6.4	23360	Racked-in Surface Dressing	Pol 80%	2.10	**50.57**	10/14 (14mm)	1.45	10.50	15.23	**355.66**	2/6 (6mm)	1.6	3.00	4.80	**112.13**	89	113	5	5	43	5	**4632.00**
B4013209	L-6007	Gorteen	https://maps.a	2536	4.85	12299.6	Single Surface Dressing	Pol 80%	2.10	**26.63**	6/10 (10mm)	1.5	8.50	12.75	**156.82**	Select	Select	0.00	0.00	**0.00**	89	113	10	10	15	3	**1854.00**
B4013211	L-2007	Ballinamire, Rahan	https://maps.a	2165	5.2	11258	Single Surface Dressing	Pol 80%	2.10	**24.37**	6/10 (10mm)	1.5	8.50	12.75	**143.54**	Select	Select	0.00	0.00	**0.00**	89	113	13	11	14	3	**1800.00**
B4013212	L-2010	Ballincanty,	https://maps.a	1175	4.5	5287.5	Single Surface Dressing	Pol 80%	2.10	**11.45**	6/10 (10mm)	1.5	8.50	12.75	**67.42**	Select	Select	0.00	0.00	**0.00**	89	113	13	8	7	2	**956.00**
B4013213	L-6025	Gortacur, Mountbbolus	https://maps.a	889	4	3556	Single Surface Dressing	Pol 80%	2.10	**7.70**	6/10 (10mm)	1.5	8.50	12.75	**45.34**	Select	Select	0.00	0.00	**0.00**	89	113	19	16	5	1	**669.00**
B4013214	L-2015	Erry, Clara	https://maps.a	1080	4.9	5292	Single Surface Dressing	Pol 80%	2.10	**11.46**	6/10 (10mm)	1.5	8.50	12.75	**67.47**	Select	Select	0.00	0.00	**0.00**	89	113	10	11	7	2	**941.00**

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Sample Master Spreadsheet: Forms the basis of the information added to the TII Carbon Tool

Tullamore Municipal District - Restoration Improvement 2024 Surface Dressing Works

Construction Activities Emissions

Construction Activities

Road Sweep	Fuel Type	Usage / hr	Time	Time	Bitumens Spraying	Fuel Type	Usage / hr	Time	Time	Phoenix Gritter	Fuel Type	Usage / hr	Time	Time	Lorries (chips)	Fuel Type	Usage / hr	Time	Time	Pneumatic Roller	Fuel Type	Usage / hr	Time	Time	Shuttle system	Fuel Type	Usage / hr	Time	Time
		l / hr	hrs	days			l / hr	hrs	days			l / hr	hrs	days			l / hr	hrs	days			l / hr	hrs	days			l / hr	hrs	days
	HVO	28.7	1	1		HVO	33.18	3	1		HVO	22.43	2	1		HVO	35.41	2	1		HVO	24.44	3	1		HVO	4.2	6	1
	HVO	28.7	1	1		HVO	33.18	3	1		HVO	22.43	2	1		HVO	35.41	2	1		HVO	24.44	3	1		HVO	4.2	6	1
	HVO	28.7	1	3		HVO	33.18	3	3		HVO	22.43	2	3		HVO	35.41	2	3		HVO	24.44	3	3		HVO	4.2	6	3
	HVO	28.7	1	2		HVO	33.18	3	2		HVO	22.43	2	2		HVO	35.41	2	2		HVO	24.44	3	2		HVO	4.2	6	2
	HVO	28.7	1	2		HVO	33.18	3	2		HVO	22.43	2	2		HVO	35.41	2	2		HVO	24.44	3	2		HVO	4.2	6	2
	HVO	28.7	1	1		HVO	33.18	3	1		HVO	22.43	2	1		HVO	35.41	2	1		HVO	24.44	3	1		HVO	4.2	6	1
	HVO	28.7	1	1		HVO	33.18	3	1		HVO	22.43	2	1		HVO	35.41	2	1		HVO	24.44	3	1		HVO	4.2	6	1
	HVO	28.7	1	1		HVO	33.18	3	1		HVO	22.43	2	1		HVO	35.41	2	1		HVO	24.44	3	1		HVO	4.2	6	1

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Sample Master Spreadsheet: Forms the basis of the information added to the TII Carbon Tool

Tullamore Municipal District - Restoration Improvement 2024 Surface Dressing Works

Construction Worker Travel

Pick-up Truck	Trip	No. Trips	Distance	Car	Trip	No. Trips	Distance	Pick-up Truck	Trip	No. Trips	Distance
	km		km		km		km		km		km
Labours * 2 Vehicles	14	4	56	GSS & Engineer	14	4	56	TTM Team * 2 Vehicles	30	4	120
Labours * 2 Vehicles	14	4	56	GSS & Engineer	14	4	56	TTM Team * 2 Vehicles	30	4	120
Labours * 2 Vehicles	14	12	168	GSS & Engineer	14	12	168	TTM Team * 2 Vehicles	30	12	360
Labours * 2 Vehicles	14	8	112	GSS & Engineer	14	8	112	TTM Team * 2 Vehicles	30	8	240
Labours * 2 Vehicles	14	8	112	GSS & Engineer	14	8	112	TTM Team * 2 Vehicles	30	8	240
Labours * 2 Vehicles	14	4	56	GSS & Engineer	14	4	56	TTM Team * 2 Vehicles	30	4	120
Labours * 2 Vehicles	14	4	56	GSS & Engineer	14	4	56	TTM Team * 2 Vehicles	30	4	120
Labours * 2 Vehicles	14	4	56	GSS & Engineer	14	4	56	TTM Team * 2 Vehicles	30	4	120

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Summary of Inputs and Source Information

Item No.	Input Data	Source
	Master Spreadsheet Input	
	Embodied Carbon: Raw Material Quantities	
1	Paver laid Cl 804	Municipal District Area Team - Treatment Designs
2	Dry Recycling Cl 804	Municipal District Area Team - Treatment Designs
3	80mm AC32 Dense Base	Municipal District Area Team - Treatment Designs
4	60mm AC20 Dense Binder	Municipal District Area Team - Treatment Designs
5	40 mm PMSMA	Municipal District Area Team - Treatment Designs
	Embodied Carbon: Material Transport (Travel Distances & Vehicle Type)	
6	Aggregate - Quarry	Municipal District Area Team
7	Asphalt Plant	Municipal District Area Team
8	Bitumen, Binder Plant	Municipal District Area Team
9	Local Authority, Chip Depo	Municipal District Area Team
10	Local Authority, Binder Depo	Municipal District Area Team
	Construction: Construction Activities	
11	Plant Type	Municipal District Area Team
12	Operating Time	Municipal District Area Team
13	Vehicle Fuel Usage per hour	Generic Carbon Emission Values prepared by ASBS CARO
14	Bitumen Storage Tank Heater: KW/h	Generic Carbon Emission Values prepared by ASBS CARO
	Construction: Construction Worker Travel to Site (Travel Distances & Vehicle Type)	
15	Travel Distances & Vehicle Type	Municipal District Area Team

Item No.	Input Data	Source
	TII Carbon Tool Input	
	Embodied Carbon: Raw Material	
16	Single Surface Dressing	TII Carbon Tool Internal Database
17	Racked-in Surface Dressing	Generic Carbon Emission Values prepared by ASBS CARO
18	Aggregates - Type 1 depth 60-100mm	TII Carbon Tool Internal Database
19	60mm AC20 Dense Binder	Generic Carbon Emission Values prepared by ASBS CARO
20	Polymer Modified SMA 40mm	Generic Carbon Emission Values prepared by ASBS CARO
21	Double Surface Dressing	TII Carbon Tool Internal Database
	Embodied Carbon: Material Transport (Vehicle Emission Factors)	
22	HGV - Articulated - Average	TII Carbon Tool Internal Database
	Construction: Construction Activities	
23	Vehicle Fuel Usage per hour	Generic Carbon Emission Values prepared by ASBS CARO
24	Bitumen Storage Tank Heater: KW/h	Generic Carbon Emission Values prepared by ASBS CARO
	Construction: Water Usage (RI Works Only)	
25	Water Use - UK Average	TII Carbon Tool Internal Database
	Construction: Construction Worker Travel to Site (Vehicle Emission Factors)	
25	Van - Average	TII Carbon Tool Internal Database
26	Car - Average	TII Carbon Tool Internal Database

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Why should we use a Carbon Tool?

- To ensure that we record sectoral wide changes and advancements with regards to Low Carbon Materials and RAP.
- To ensure that we record localized changes in program delivery such as the delivery of services using own resources(RM program) and the associated benefits with regards to the ongoing migration of our Corporate Fleet towards Low Carbon Fuels primarily HVO.
- Provides another metric that can be used to justify our expenditure approach or underpin requests for additional expenditure.
- Show that the Roads Sector as unit is doing our part with regards to our Climate Action Targets and should motivate industry to move quicker and engage positively with regards to Carbon reduction techniques.

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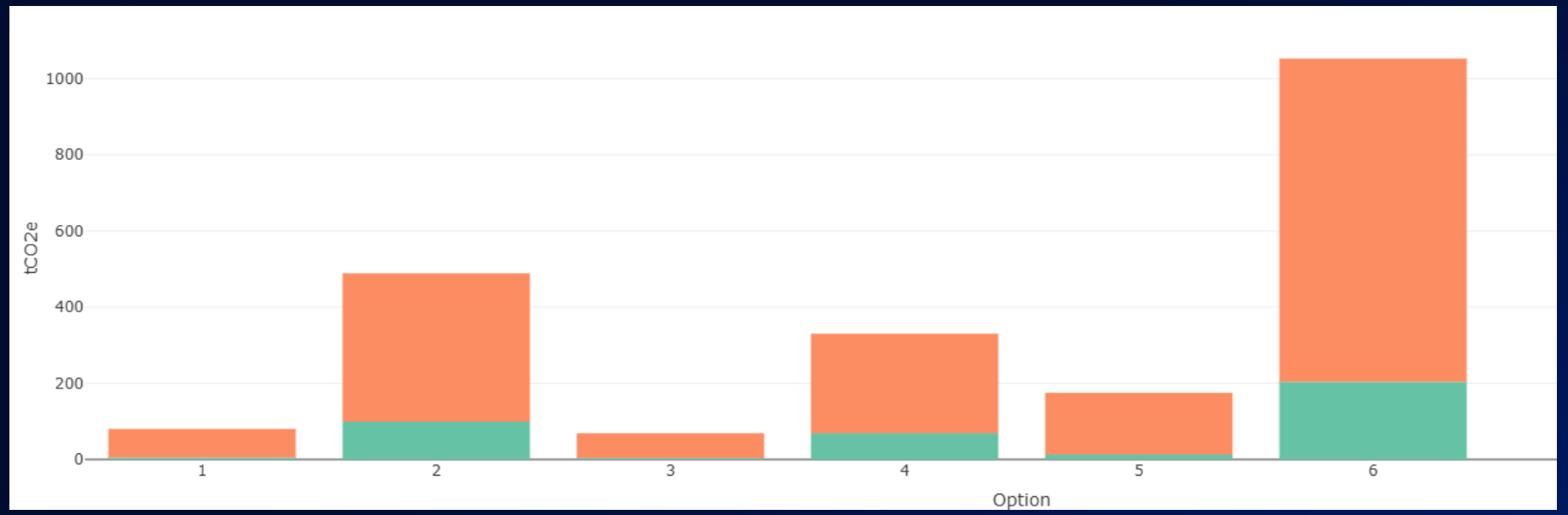
Output and Findings

Emissions Breakdown: Embodied Carbon (Raw Material) & Construction Stage



Option	Name
1	Edenderry MD Area RM/SD
2	Edenderry MD Area RI
3	Tullamore MD Area RM/SD
4	Tullamore MD Area RI
5	Birr MD Area RM/SD
6	Birr MD Area RI

Construction
Embodied Carbon

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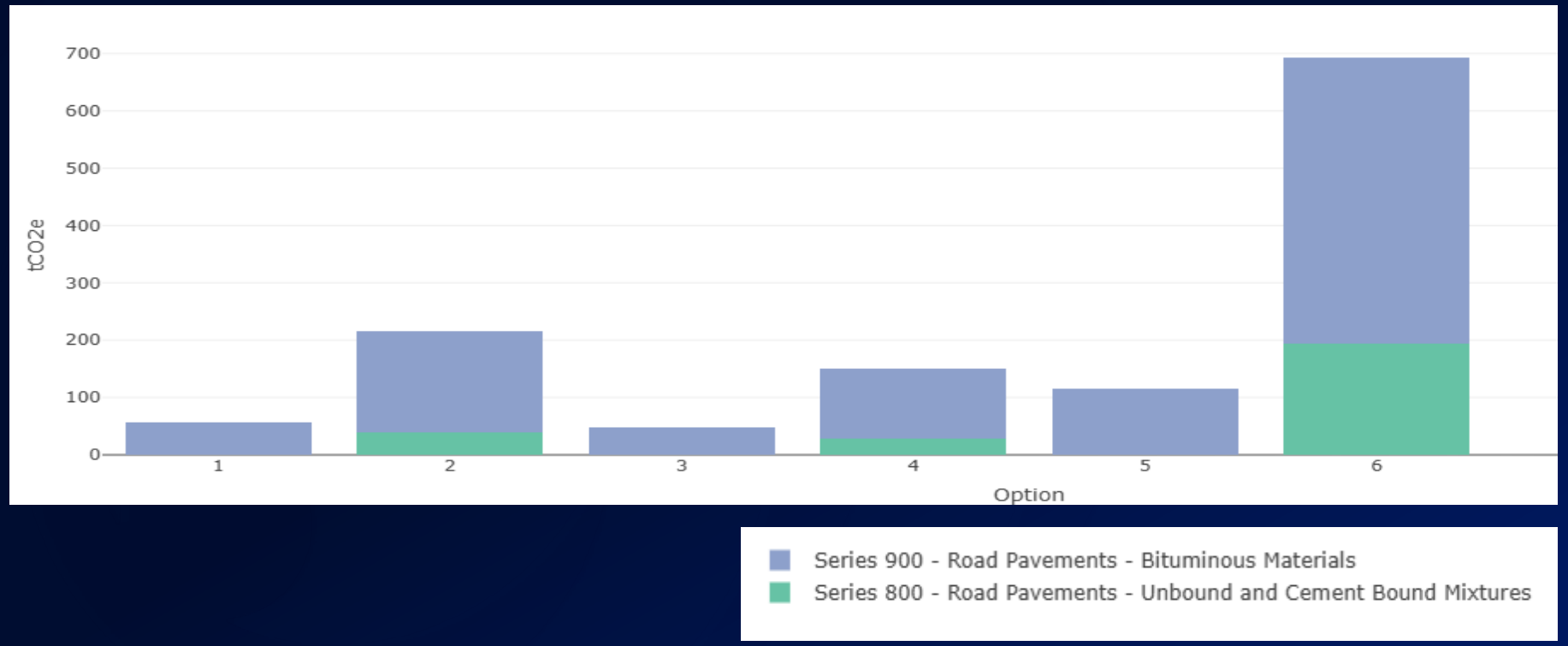
Output and Findings

Embodied Carbon Emission by Series: Series 800 & Series 900



Option	Name
1	Edenderry MD Area RM/SD
2	Edenderry MD Area RI
3	Tullamore MD Area RM/SD
4	Tullamore MD Area RI
5	Birr MD Area RM/SD
6	Birr MD Area RI

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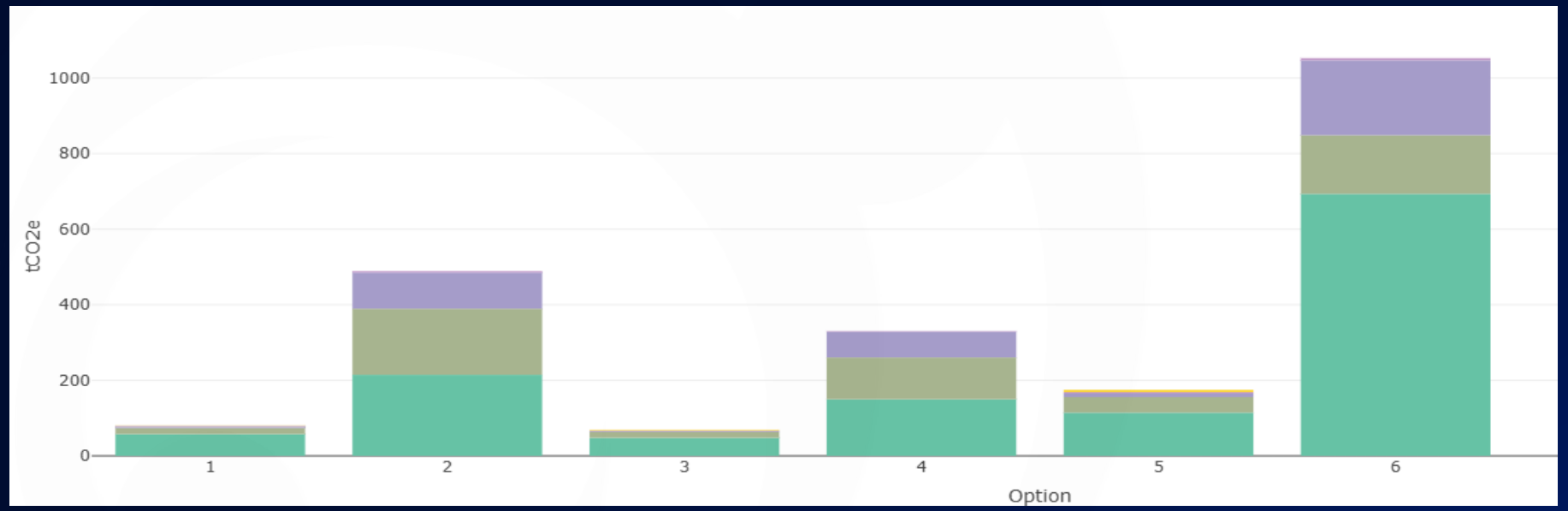
Output and Findings

Detailed Breakdown



Option	Name
1	Edenderry MD Area RM/SD
2	Edenderry MD Area RI
3	Tullamore MD Area RM/SD
4	Tullamore MD Area RI
5	Birr MD Area RM/SD
6	Birr MD Area RI

- Materials
- Material Transport
- Clearance and demolition
- Land Use Change and Vegetation Loss
- Clearance and Demolition Water Use
- Excavation
- Construction Water Use
- Plant Use
- Construction Worker Travel to Site

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Output and Findings

Carbon Emissions, Detailed Breakdown: Offaly County Council RI & RM 2024 Programmes

Name	Materials	Material Transport	Construction Water Use	Plant Use	Construction Worker Travel to Site	Maintenance Material	Total	Total Per Area
Edenderry MD Area RM/SD	57.69	16.55	0.000	3.85	1.23	0.84	80.16	
Edenderry MD Area RI	214.71	174.90	0.002	95.70	3.54	0.00	488.85	**569.01**
Tullamore MD Area RM/SD	47.77	15.36	0.000	2.89	0.80	2.16	68.97	
Tullamore MD Area RI	149.81	111.01	0.004	67.77	1.53	0.00	330.13	**399.10**
Birr MD Area RM/SD	114.48	41.04	0.000	9.87	3.15	6.45	174.99	
Birr MD Area RI	693.46	155.26	0.010	198.50	5.41	0.00	1052.63	**1227.63**
							Total	***2195.73*** tCO2e

Note: Material % for Maintenance Purposes: Automatically added by the TII Carton Tool, this additional allowance will need to be reviewed going forward.

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Learnings

- The tool can easily be applied to the RM and RI program.
- The critical element is the recording of the input data streams. Continuity across LA as to how the data sets are to be recorded.
- Consistency as to how the Tool is used whether that is via broad application of EPD's for a process such as Surface Dressing or whether we break it down into the steps included with same- Individual Raw Material, Sweeping/Prep, Spraying, Chipping, Bedding in the chip, maintenance and Sweeping.
- We are ahead of the industry. We have no access to accurate supplier side EPD's and may not get access to same (Commercially Sensitive)
- Once the input Data has been confirmed as accurate and reflective of the works the actual Data input into the Tool can be done by Technical or Admin Staff.
- Based on getting a strong geographical spread from Outputs from the Tool an average Carbon output can be easily formulated and easily applied within the FORM A as a simple multiplier (indicative output only and hard to verify).

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Kieran Kissane, CARO
Barry Lennon, Senior Engineer at Offaly County Council

THANK YOU

Join the Q&A session at Slido.com and enter 3873601 or via the QR Code.
Questions must include name and associated Local Authority to be considered by the panel.

LASNTG Local Authority Services National Training Group

An Roinn Iompair
Department of Transport

CCMA
Cumann Lucht Bainistiochta Contae agus Cathrach
County and City Management Association

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