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Department of Transport

Cumann Lucht Bainistíochta Contae agus Cathrach
County and City Management Association

ROADS Services Training Group

LOCAL AUTHORITY ROADS CONFERENCE and EXHIBITION - 2023

Day 1 Session 3 Presentation 1-SRAD

Naoise Grisewood

Hodson Bay Hotel Athlone, May 2023

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Climate Action Plan 2023 – Ireland's net-zero decarbonisation pathway for Transport

Naoise Grisewood
Climate Engagement & Governance – Assistant Principal
Department of Transport

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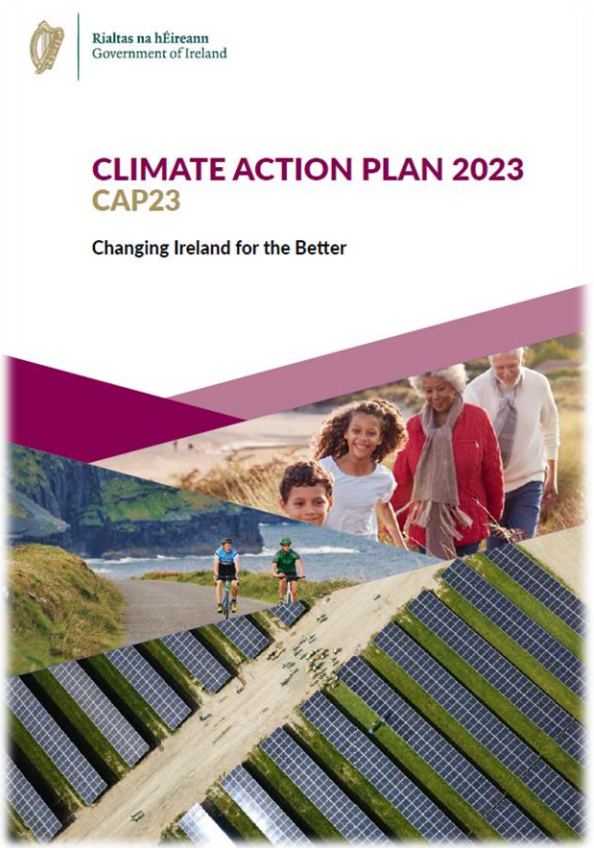
Climate Action Plan 2023 (CAP23)

- CAP23 (Dec 2022) – high level Annex of Actions (March 2023)
- First **statutory** CAP under Section 6 of *Climate Action and Low Carbon Development (Amendment) Act 2021* that reflects **carbon budget programme** and **sectoral emissions ceilings**.
- Key sectors must set out a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050.



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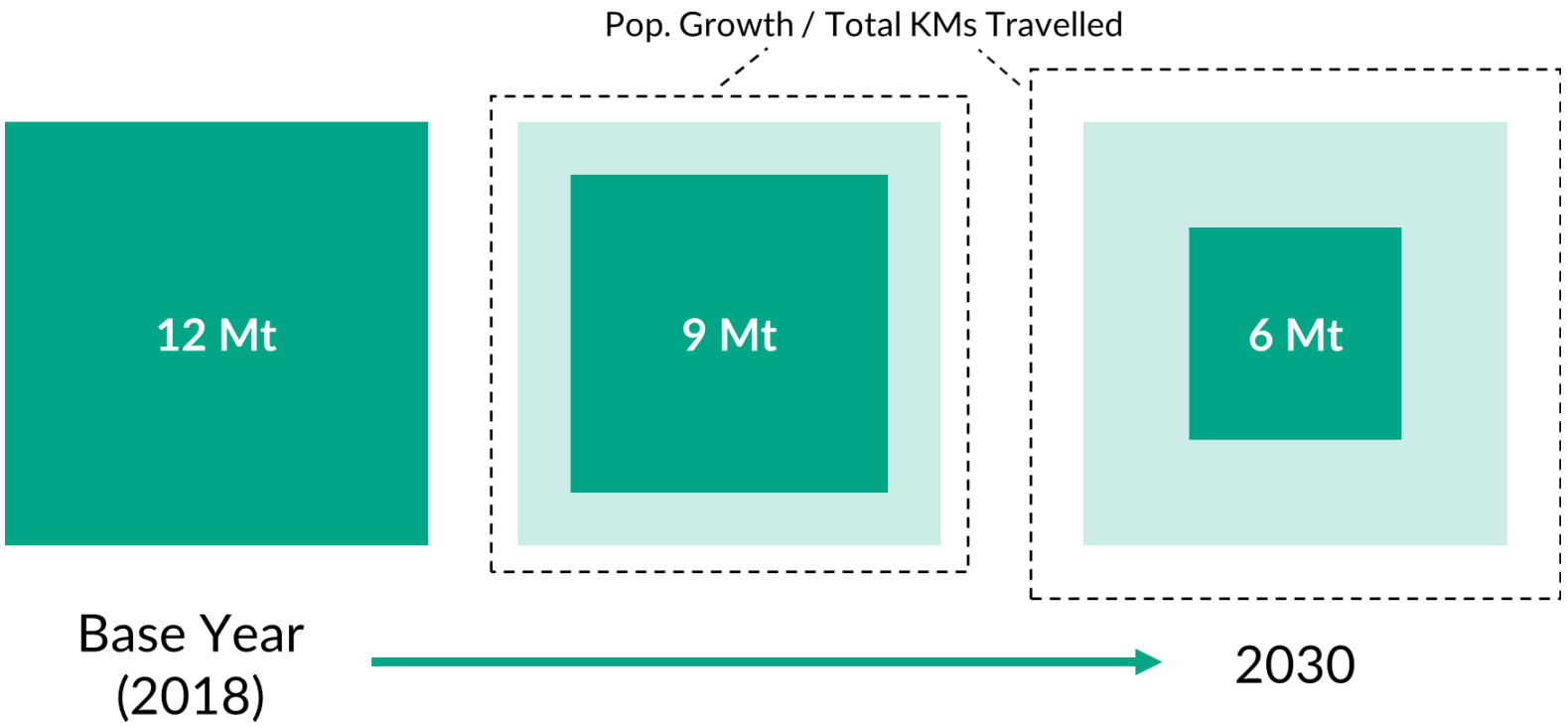
Climate Action Plan 2023 (CAP23)

- 50% transport decarbonisation pathway to 2030, must be consistent with **5-year sectoral emissions ceilings** of:
  - 54 MtCO2eq. over 2021-2025
  - 37 MtCO2eq. over 2026-2030.

Carbon Budgets & Sectoral Emissions Ceilings



- Accounting for expected population growth, transport emissions **projected to grow** to c.14 Mt by 2030 in a '**business as usual**'.

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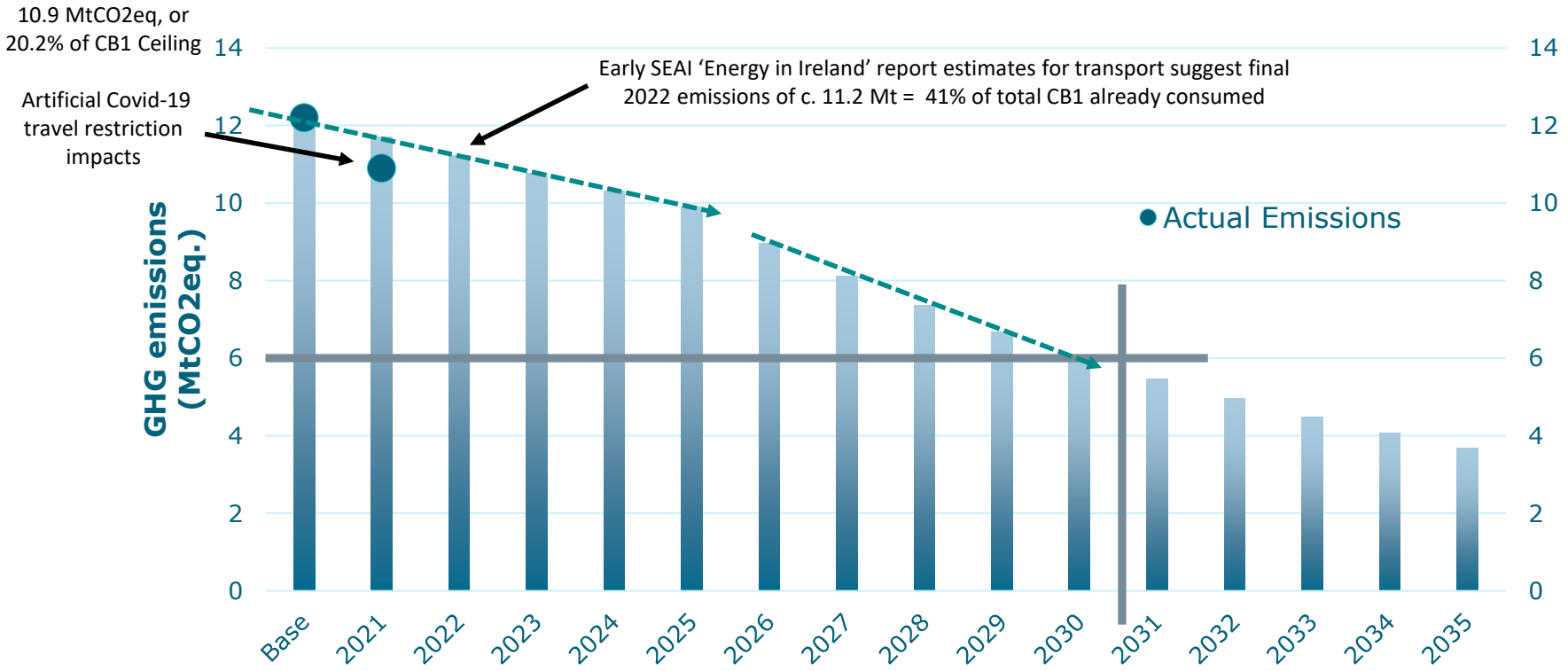
Indicative Decarbonisation Pathway consistent with SECs



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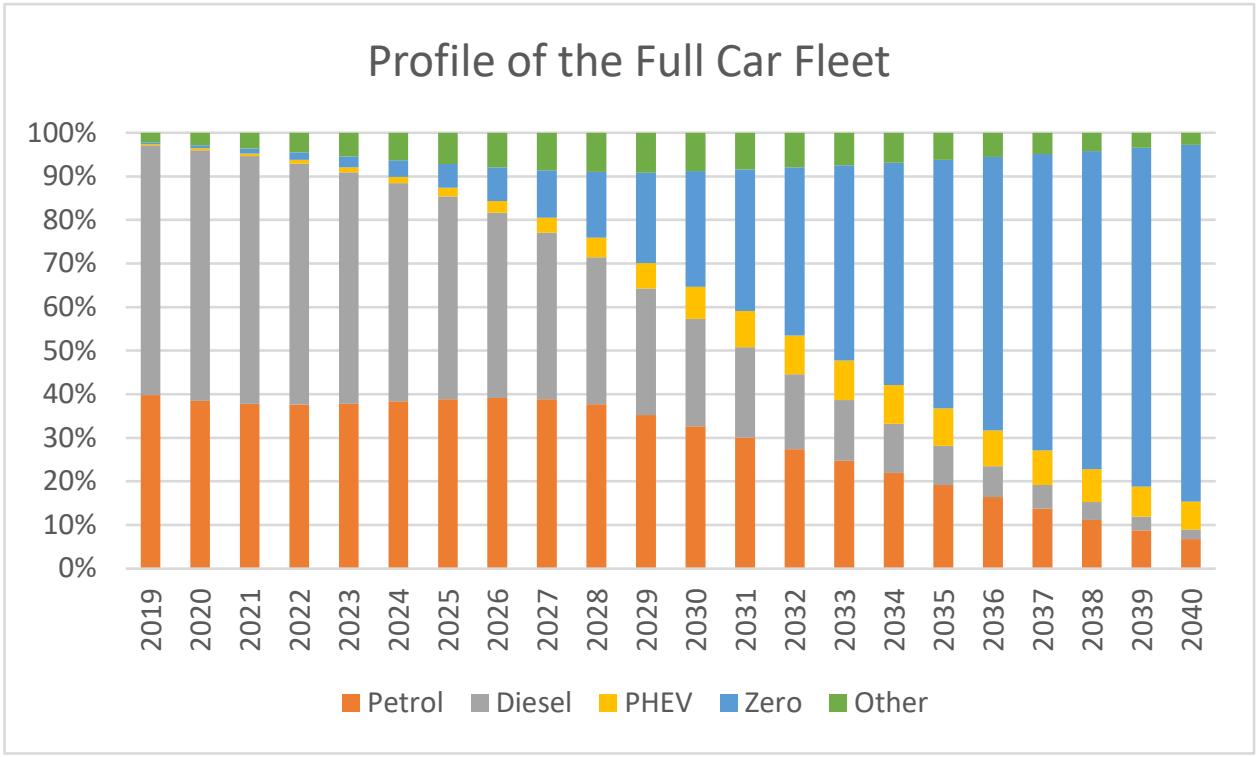
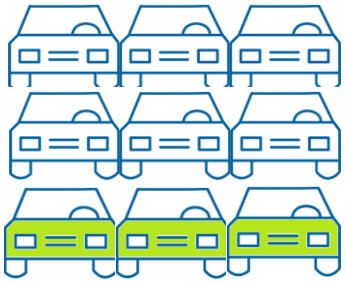
Massive Challenge - Timeframe for Transition





- Need at least 1 in 3 cars to be battery electric by 2030.
- Compliance with SECS -> **electrification insufficient**.
- System and behavioural change required.

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Redesigning Ireland's Transport for Net-Zero & Transport through a Well-being Lens

Climate Crisis

OECD recommends major redesign of Irish transport to meet climate targets and improve wellbeing

Reallocating road space to be main driver for transforming transport sector rather than congestion charges — Minister

Mobility hubs and change to Ireland's 'car-centric mindsets' needed, says OECD

The OECD report, Redesigning Ireland's Transport for Net Zero, has recommended a drastic change to Ireland's transport system.

Redesigning Ireland's Transport for Net Zero
TOWARDS SYSTEMS THAT WORK FOR PEOPLE AND THE PLANET

OECD

News ▸ Irish News ▸ Transport

Electric Vehicles won't deliver the emissions reductions in the transport sector that Ireland needs, report warns

There's a gap between Ireland's climate goals and climate policies

NEWS By Shauna Corr Environment Correspondent
14:52, 5 OCT 2022

Comments

OECD report calls for more Government funding to decarbonise transport in Ireland

October 5, 2022 by Cian Ginty

CLIMATE & ENVIRONMENT

Eamon Ryan signals less space on Irish roads for cars

A new OECD report found that the Irish transport system encourages growing car use and emissions

Journal.ie + Follow View Profile

Ireland's 'car-dependent' transport system needs to change, says OECD

Jamie McCarron - Yesterday 13:01

React 11

A REPORT BY the Organisation for Economic Co-operation and Development (OECD) has found that "current mobility patterns in Ireland are incompatible" with meeting our climate targets and that transformative change in our transport system is needed.

CLIMATE CHANGE ADVISORY COUNCIL

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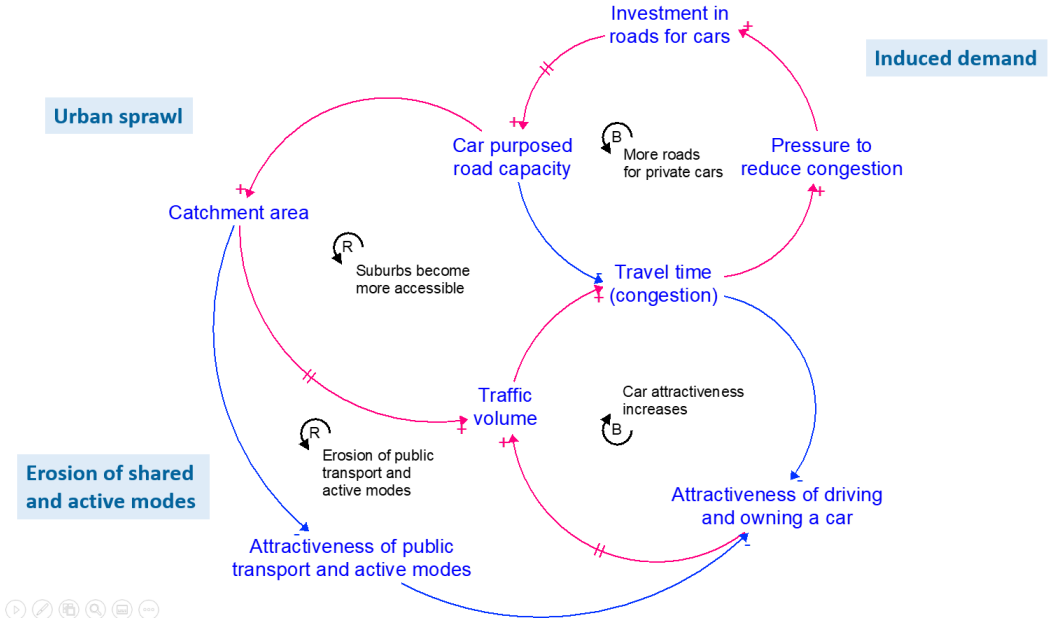
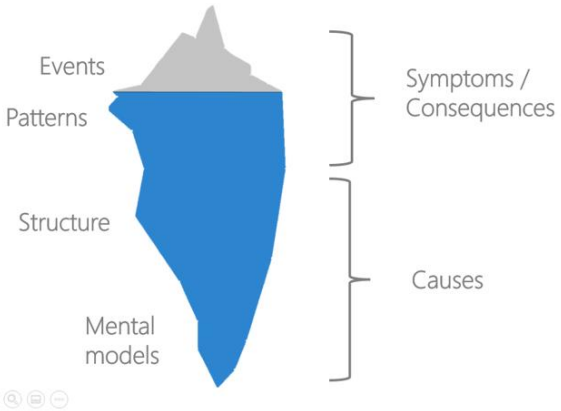
OECD – System Innovation & Well-being Lens Approach





High impact policies?

- Roadspace Reallocation
- Communications & Engagement Strategies
- Mainstreaming of on-demand, shared services

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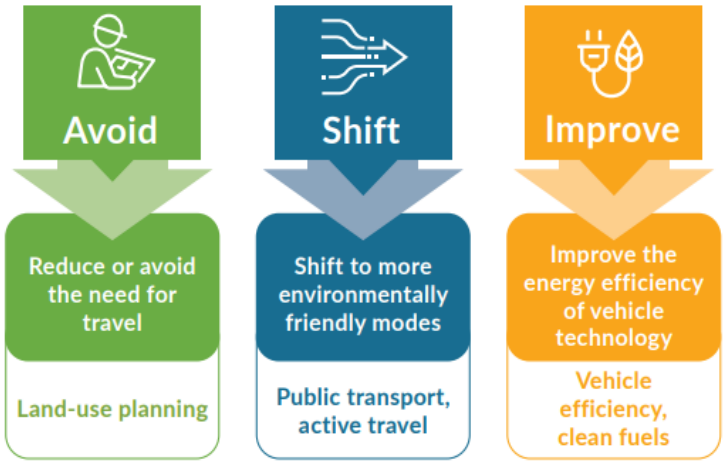
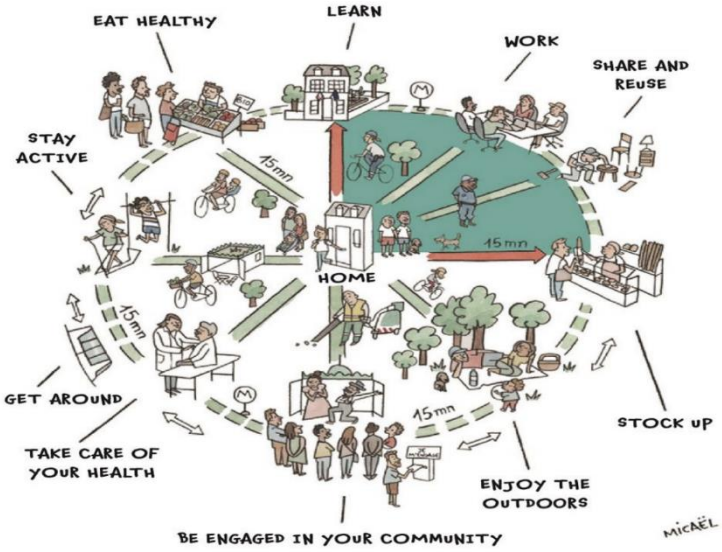
CAP23 – Principles for Change





- Develop our services, communities and infrastructure in such a manner as to **AVOID** the need to travel as much as we do today.
- Enhance the relative attractiveness of sustainable travel modes to encourage a **SHIFT** away from car use.
- **IMPROVE** the efficiency of residual vehicle based movements through e.g. electrification and use of biofuels as a transitionary measure.

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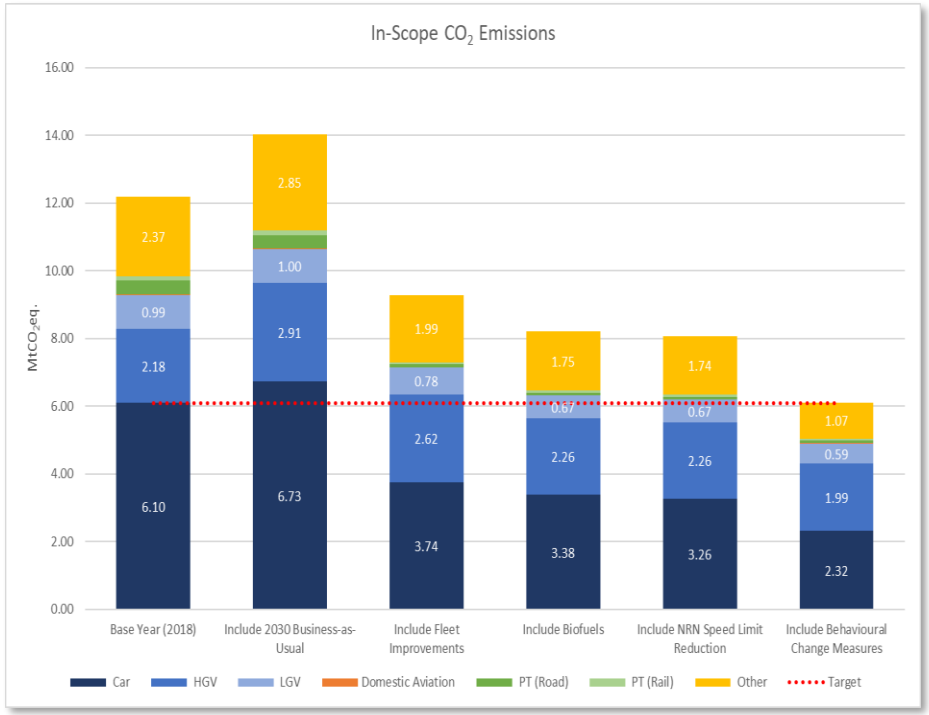
CAP23 – Modelling and Pathway to Compliance



Description	Mt.	Δ	%
Base Year (2018)	12.2	-	-
2030 BAU	14.0	1.8	15%
With Fleet Improvements	9.3	-4.7	-24%
With Biofuels	8.2	-1.1	-33%
With NRN Speed Limit Reduction	8.1	-0.1	-34%
With Behavioural Change Measures	6.1	-2.0	-50%

Executive Summary of modelling available on NTA website:
Research and Publication - National Transport

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CAP23 – Recalibrated 50% Pathway to Compliance - What we need to achieve?

Journey Purpose – Commuting Car kms: **-20%**

Journey Purpose – Escort to Education car journeys: **-30%**

Fleet Electrification – min. **30%** of total car fleet, and **100%** new sales to be electric

Biofuels – Transitionary measure, 10% bioethanol in petrol, 20% biodiesel

- Daily modal share of car journeys to drop from 72% (current) to 53%
- i.e. **one in every two daily journeys** via sustainable mode
- Key pivot from CAP21 – perceived take-away of "1 million EVs on the road by 2030"

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CAP23 – 15 Key Work Programmes

- Enhanced Governance & Accelerating Implementation
- Communications Strategy Work Programme
- Road Haulage Strategy
- Enhancing Spatial & Land-Use Planning
- Strategic Transport Planning
- Demand Management Strategy
- Roadspace Reallocation
- Active Travel & Accessibility Work Programme
- Major Public Transport Infrastructure Programme
- PT Services Investment & Rural Mobility Programme
- Smart, Shared & Integrated Mobility
- Decarbonising PT & School Transport Services
- ZEVI Policy & EV Charging Infrastructure
- Renewable Fuels for Transport
- Adaptation for Enhanced Climate Resilence

CAP23 – 15 Key Work Programmes

<table>
<tr><th>Avoid Actions</th><th>Avoid and Shift Actions</th><th>Shift Actions</th><th>Improve Actions</th></tr>
<tr><td rowspan="2">Enhanced Spatial and Land Use Planning – Enabling Systems Change</td><td rowspan="3">Demand Management Strategy – Reducing Travel Demand with Improved Sustainable Mobility Alternatives</td><td>Active Travel Infrastructure Programme</td><td rowspan="3">Zero Emission Vehicles Ireland Work Programme and Electrification Strategy</td></tr>
<tr><td>Major Public Transport Infrastructure Programme</td></tr>
<tr><td rowspan="2">Strategic Transport Planning - Systems Change in Practice</td><td>Public Transport Services Investment</td></tr>
<tr><td rowspan="3">Road Space Reallocation</td><td>NTA Connecting Ireland – Rural Mobility Programme</td><td rowspan="3">Renewable Transport Fuels</td></tr>
<tr><td>Digital Access to Services, Remote Working and Wider Systemic Behavioural Change</td><td>Escort to Education Journeys</td></tr>
<tr><td>Smart, Shared & Integrated Mobility and the Promotion of Alternatives to the Private Car</td></tr>
</table>

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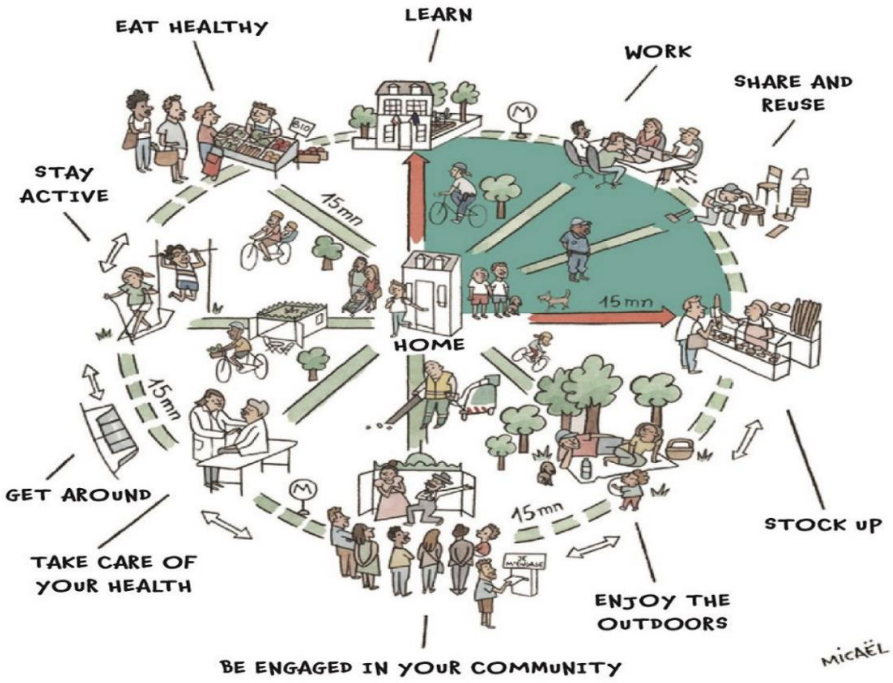
CAP23 – Overview of Measures

AVOID

Develop our services, communities, and infrastructure in such a manner as to AVOID the need to travel as much as we do today



CAP23 – Overview of Measures - AVOID

- **Enhanced Spatial and Land-use Planning**
  - Design Manual for Urban Roads and Streets (DMURS)
  - Transport-orientated Development – working group with DHLGH
  - Sustainable and Compact Settlement Guidelines (S.28)
  - Updated Transport Appraisal Guidelines

- **Strategic Transport Planning**
  - Expansion of NTA strategic transporting planning remit to regional cities
  - Metropolitan Area Transport Strategies - Updates
  - Strategic Network Planning

- **Wider System**
  - National Planning Framework
  - Housing for All
  - Town Centres First
  - Our Rural Future

CAP23 – Overview of Measures

AVOID

+

SHIFT

CAP23 – Overview of Measures – AVOID + SHIFT

- **Demand Management Strategy**
  - Publish National Demand Management Strategy
  - Speed Management and Enforcement Work (TII, RSA, AGS)
  - Project BRUCE
  - Support Remote/Blending Working Policies to reduce car commuting journeys

- **Roadspace Reallocation**
  - Deliver on SMP Pathfinder Programme
  - Develop S38 Guidelines
  - Network identification by LAs to identify suitable roads and streets
  - Leverage 'Protection & Renewal' programme to enhance safety of sustainable modes

CAP23 – Overview of Measures

SHIFT

Improve the relative attractiveness of sustainable travel modes such as Public Transport, Cycling and Walking, to SHIFT away from car use; this will facilitate increased use of lower-carbon modes and reduce the percentage of total journeys that are made by private car (modal share) from over to 70% (today) to just over 50% in 2030

CAP23 – Overview of Measures – SHIFT

- **Active Travel & Accessibility Work Programme**
  - Roll-out 1,000 km walking/cycling infrastructure/national cycle and greenway networks
  - Publish National Cycling Manual (Design Standards)
  - Deliver on SMP Pathfinder Programme

- **Major PT Infrastructure Programme, PT Services Investment & NTA Connecting Ireland – Rural Mobility Programme**
  - Metrolink, BusConnects, DART+, Cork Commuter Area Programme, Interurban rail fleet capacity / rail services expansion
  - Delivery of NTA Connecting Ireland / New Town Services
  - Develop high-level, multi-annual costed programme of PT services required to meet pathway assumptions

- **Smart, Shared & Integrated Mobility**
  - Establishment of Shared Mobility Unit and progress policy development
  - Regulating use of Personal Powered Transporters and expansion of bike-share schemes and incentives for eCargo / eBikes
  - Development / rollout of 'eMobility Hub' shared mobility solutions

CAP23 – Overview of Measures

IMPROVE

Increasing the proportion of EV's in our car fleet to 30% by 2030, which will IMPROVE the efficiency of the national car fleet; electrification of the freight and public transport sector will also be key.

CAP23 – Overview of Measures – IMPROVE

- **ZEVI work programme & EV Charging Infrastructure Strategy**
  - Ongoing provision of policy supports for uptake of EVs, eSPSVs and AFHDVs
  - EV Charging Infrastructure Strategy published Jan 2023
  - Development of LA and Regional EV Network plans
  - Destination Charging Schemes
  - AFIR targets - high–powered charging implementation plan

- **Renewable Fuels for Transport**
  - Draft update to National Policy Framework on Alternative Fuels in Transport
  - Move from E5 to E10 (2023) & publish Policy Statement for 2023-2025.
  - Support Renewable Gas Development / Renewable Energy use in Hard to Abate sectors – Aviation / Maritime / Road Haulage

- **Decarbonising Public Transport & School Transport Services**
  - PSO electric bus fleet procurement / depot charging upgrades
  - Decarbonisation strategy for long-distance bus services
  - Decarbonisation pathway for interurban rail services
  - With D/Education – identification of mechanisms to improve sustainability of School Transport Scheme

CAP23 – Overview of Measures

SPECIAL FOCUS / HORIZONTAL WORK PROGRAMMES

CAP23 – Overview of Measures – SPECIAL

- **Road Haulage Strategy**
  - First 10-year plan for the road haulage sector (published Dec 2022)
  - CAP23 Pathway – HGV sector need to achieve overall abatement of c30% reduction in emissions relative to 2030 BAU
  - Strategy sets out 39 actions – short-term actions and medium-to-long term enablers
  - Global MOU on ZE-MHDVs – target of 30% of new MHDV sales to be 2030

- **Climate Action Communications Strategy for Transport**
  - Public Engagement – National Ad Campaign, Stakeholder Engagement, Community & Citizen Engagement
  - SMP Project Acceptance Supports
  - Car Advertising Regulation & Labelling
  - Evaluation Framework & Research Support – Attitudes & Best Practices

- **Enhanced Governance / Accelerating Implementation**
  - SMP Leadership Group & Delivery Teams established
  - Pathfinder Programme - 35 Projects for 2025
  - Pathfinder – Development of Training Programme for LAs, Cllrs, with Southern Regional Assembly

- **Climate Adaptation for Enhanced Resilience**

CAP23 – What does this mean for Roads Sector

- **Sustained investment in major capital infrastructure projects in line with National Investment Framework for Transport in Ireland (NIFTI) intervention and modal hierarchies**
  - Metrolink, DART+, BusConnects are the high-profile PT programmes, with BusConnects accommodating some roadspace reallocation elements.
  - Leveraging of Roads programme to support e.g. Town Centres First policy.

- **Review demands on the road network and infrastructure**
  - Supporting shared spaces, pedestrian enhancement plans, design standards for cycling, more bus transit, heavier EVs

- **Reimagining and reviving our existing urban spaces & public realm**
  - More people-focused spaces that are accessible and permeable

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Climate Action in Transport requires Systemic Response

Enhanced Spatial and Land-use Planning	Our long-term capacity to reduce transport emissions / address congestion for net-zero is fundamentally linked with spatial planning More than just emissions – enhanced urban spaces, healthy streets…
Public Communications & Stakeholder Engagement	CAP commitments require significant public and stakeholder buy-in. Sustained focus on building public support and acceptance - forthcoming Comms Strategy, National Ad Campaign + leveraging engagement networks
Local Authorities & Agencies	Climate Action Plan requires significant shift in activities and resourcing for LAs and Agencies. Local Authority Climate Action Plans will be crucial – reinforcement of AVOID, SHIFT, IMPROVE approach and focus on enhancing 'sustainable accessibility'
Funding, Affordability and Access	Public transport affordability and access must be at the core of national, regional and local climate action strategies for transport. Taxation and demand management policy to influence and accelerate change.

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Day 1 Session 3 Presentation 2- Donegal CoCo.

Brendan O'Donnell

Hodson Bay Hotel Athlone, May 2023

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Reimagining Transport in Local Government

Brendan O'Donnell
Senior Engineer
Donegal County Council

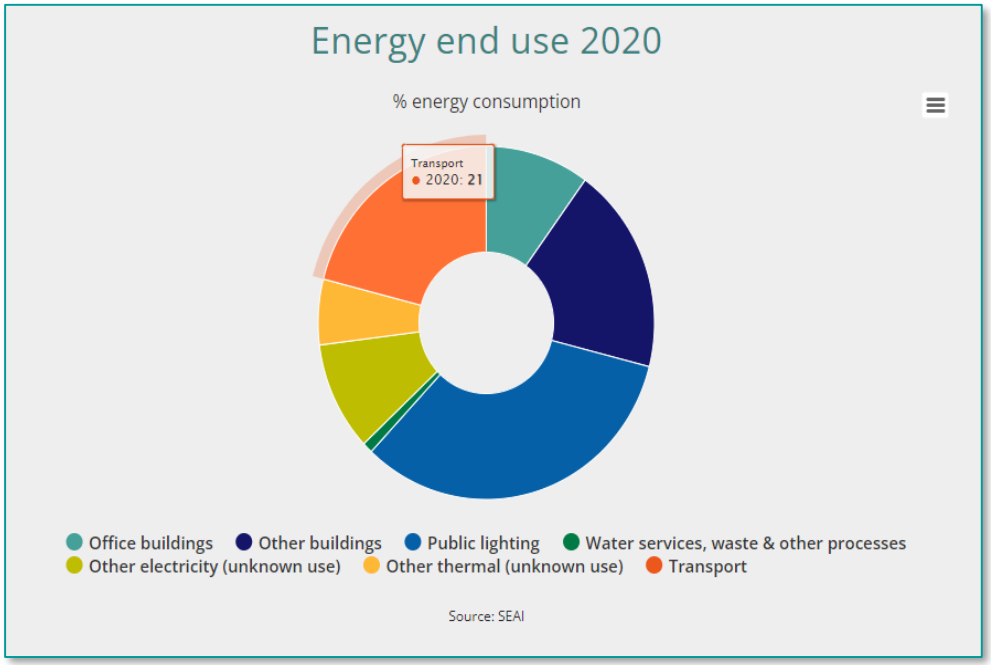
Background

Climate Action and Low Carbon Development (Amendment) Act 2021

Net-zero greenhouse gas (GHG) emissions no later than 2050, and a cut of 51% by 2030.

In 2020 the top three SEUs in the Local Authority sector were

- Buildings
- Public Lighting
- Transport



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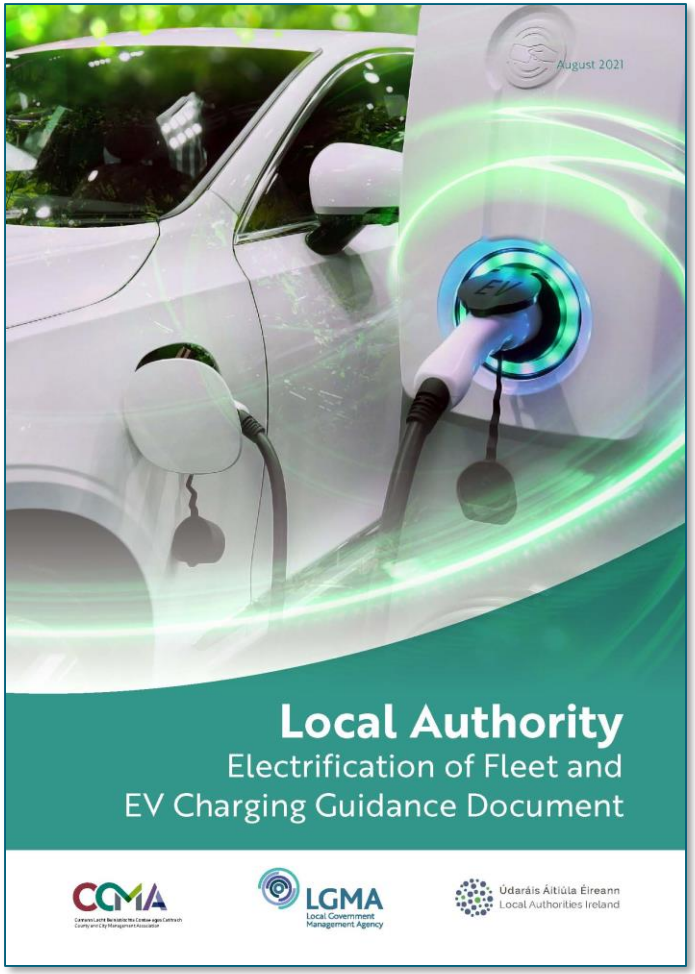
Background

Projects/ Plans for Buildings and Public Lighting were well advanced

In 2020 the LA fleet accounted for 21% of LA energy use and 26% of emissions

More action needed around the Fleet

August 2021 - *Local Authority Electrification of Fleet and EV Charging Guidance Document*



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CCMA – CATN Working Group

CCMA CATN Working Group (May 2021):

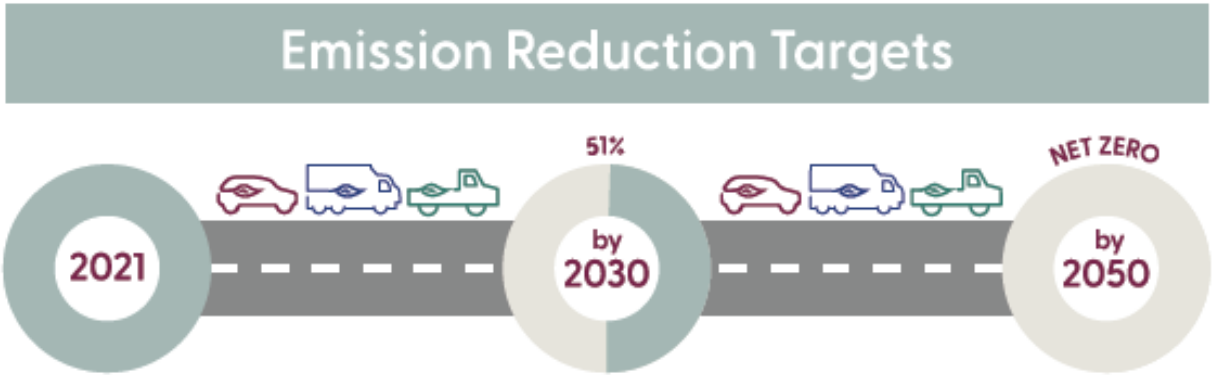
- Local Authorities (Donegal, Cork, Dublin City Council, Kerry, Kilkenny)
- CAROs (East & Midlands CARO and Atlantic Seaboard South CARO)
- SEAI
- Department of Transport
- Office of Government Procurement

Administration and Secretariat provided by LGMA

CCMA – CATN Working Group

High Level Ambition

The Working Group set out to examine ways that a sectoral approach could assist and guide individual counties to realise emission reduction and energy efficiency targets for their fleets



LA Fleet Survey

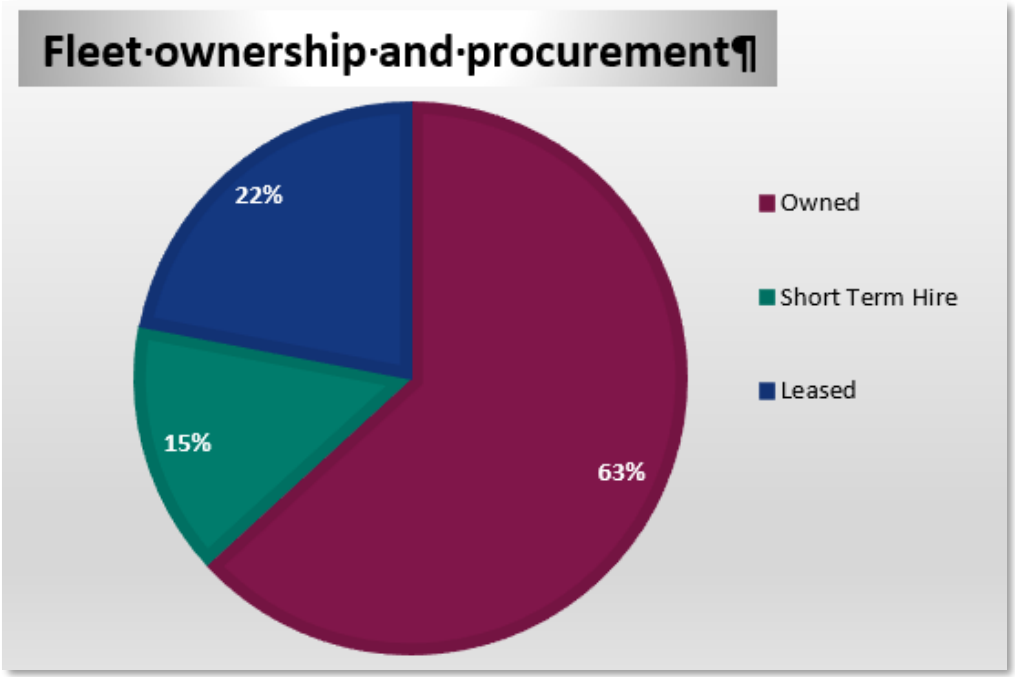
Data Collection from October to November 2021

Fleet Inventory

Owned/ Hired/Leased

Management practices

Good practice examples



- **6,435 total vehicles**

Diesel	Petrol	Electric	Other
6,134	14	248	39
95.3%	0.2%	3.9%	0.6%

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Early Interventions Report

Published June 2022

Offers a menu of actions to help LAs deliver short term decarbonisation results

Includes Fleet Survey Findings

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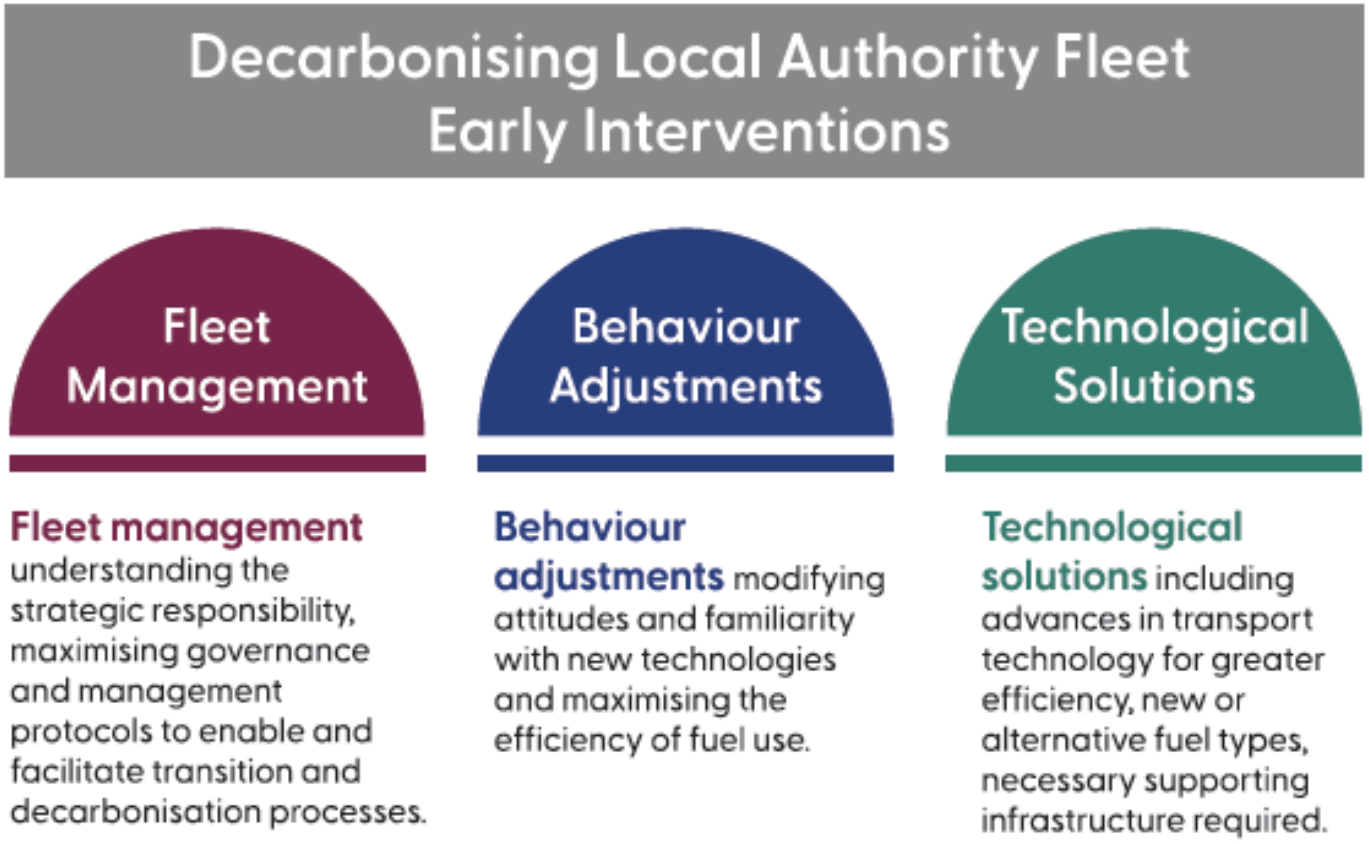
Early Interventions Report



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Early Interventions Report

Interventions

1 Leadership & Governance

Building the conditions for success

2 Fleet Management & Accounting

Monitoring and reviewing fuel use and efficiencies

Interventions

3 Fleet Management CPC Training

Potential to achieve 5% energy efficiency across the fleet

4 Eco Driver & in-vehicle driver training

Potential to achieve 5% energy efficiency on driving techniques

Interventions

5 Light Commercial Electric Vehicle

Moving towards zero emission vehicles

6 Alternative Fuels

Opportunity for efficiencies through developing capabilities of alternative fuels

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Working Group Report

Strategy Document

- Identifies the range of strategic considerations involved for fleet decarbonisation

Annex 1 Case Studies

- examples of some current decarbonisation practices in LAs

Annex 2 Supporting Documentation

- supporting information to assist in navigating the range of issues related to decarbonisation.

Strategy Document

- Background/ Context/ Policies
- Business Case/ Cost of Doing nothing
- Barriers from survey and some thoughts on how these can be overcome
  - Organisational culture / structure
  - Funding / finance
  - Capability of available vehicles
  - Industrial Relations / people
  - Topography / geography
- Guidance on developing an approach to decarbonisation for LAs
  - Short Term (Early interventions)
  - Long Term (Roadmap)
- Fleet Decarbonisation Roadmap (Avoid ¦ Shift ¦ Improve)

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AVOID – SHIFT – IMPROVE

Aim is to deliver more services to a greater population with net zero CO_2 emissions by 2050

-51% to 2030	Net Zero by 2050

AVOIDING the need for travel

Change HOW services are delivered	Change WHAT services are delivered

SHIFTING mode of travel

Low-zero emission modes	Mobility hubs to enable shared vehicles

IMPROVING performance of existing and new vehicles

Ecodriving training	ISO50001 performance management

fuels (note the path towards battery electric is clear, all manufacturers followimg as well as Gov.ie policy)

HVO & Biomethanes	Electricification (battery electric)

Fleet Decarbonisation Roadmap

Stage 1: IDENTIFY

Assign Responsibility (Lead and support)

Regulatory Context

Main Aims (What is required for your LA)

Stakeholders (Internal and External)

Stage 2: ASSESS

- Audit/inventory of vehicles and plant
- Telematics data
- Driving patterns, routes, frequency and duration
- Fleet replacement/ upgrade timeframes
- Learnings from Energy efficiency or decarbonisation initiatives undertaken to date
- Potential short term opportunities
- Barriers, challenges, etc.

Stage 3: TOOLS & TACTICS

Plot out the proposed interventions for each phase of implementation using the A-S-I approach and using the GtT tool to model expected outcomes

- ***Short term*** **-** can be based on the Early Interventions Report
- ***Medium term*** - identified interventions depending on when funding options mature. Early pilots to explore suitability of the alternatives could be helpful
- ***Long term*** **-** for fleet vehicles that are dependent on emerging technologies

Stage 4: DO & REVIEW

DO:

- Implement Roadmap Interventions

REVIEW:

- Experiences and learnings
- Evolving regulatory contexts
- Changes to estimates and costings
- New and emerging technologies

LA Sectoral Support

Methods and Processes – Keep under review

Identify and Resolve – Translation of Govt Policy, leverage procurement, work practices, etc.

Building and Supporting Capacity – Training, networking, engagement with other sectors, etc.

Align Capital Investment – LA Finance Officers grouping, financing models, leverage external funding, etc.

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ANNEX 1: Case Studies

	Intervention	Local Authority	Expected outcome
Avoid	Working from home	N/A	Achieve Govt target 40% WFH
Shift	Mobility Hub	Dun Laoghaire County Council	Evidence of Modal Shift in LA Activity
Improve (Operations)	Fleet Management	Donegal County Council	Value of a structure approach to cost and CO_2 reduction in Transport
	Eco-driving	Donegal County Council	Eco-driving Implementation
Improve (vehicles)	Electric Chargers	Cork City Council	Home parking
			Data collection
			Reporting
Alternative Fuels	Alternative Fuels Hydro-treated Vegetable Oil	Tipperary County Council	Costs, certificates and learnings

ANNEX 1:

- Alternative fuels
- Battery Electric Vehicles
- Gas
- Fuel supply mix
- Biofuel outlook to 2030
- Hydrogen infrastructure
- Electric LDV and HDV availability
- Clean Vehicle Directive (CVD)
- Carbon tax
- GHG/CO_2 factors and conversions
- EU best practice projects links
- Links & resources

Questions can be entered through SLIDO using the QR Code or Slido.com and enter 1685372

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County and City Management Association

ROADS Services Training Group

LOCAL AUTHORITY ROADS CONFERENCE and EXHIBITION - 2023

Day 1 Session 3 Presentation 3- Monaghan CoCo.

Hodson Bay Hotel Athlone, May 2023

An Roinn Iompair
Department of Transport

LASNTG
Local Authority Services National Training Group

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

LOCAL AUTHORITY ROADS CONFERENCE & EXHIBITION – 2023

Development of a Low Energy Bound Material

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TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Comhairle Contae Mhuineacháin
Monaghan County Council

Go Green
COLAS
with Colas!

Introduction

- 2020 Trial
- Working Group
- 2022 Trial
- Environmental Benefits
- Post Construction Testing
- Next Steps
- Video – Production & Installation

2020 Trial site

- Existing Stock of RAP – Accumulated 8000t
- EPA Article 27 Process (New Guidance 2023)
- Successfully repurposed 3000t of RAP asphalt planings for use on local Roads
  - Produced Cold-mix Asphalt using 100% RAP
- Peer Review - Recommendations & Findings
  - Cement inclusion – to help with early life strength
  - Site selection & pavement design
  - Establish a Working Group to include TII, DOT & Industry expertise to help direct and monitor

Working Group - Collaboration

Working Group Focus

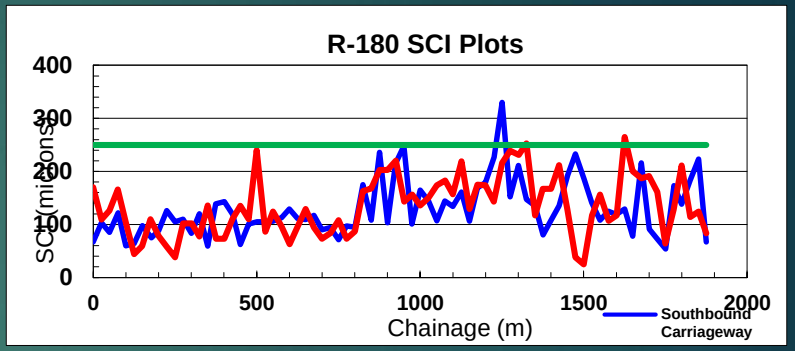
- Develop an alternative "low carbon" pavement material for use on Ireland's road network
- Propose the most efficient production method for use of the RAP feedstock.
- To optimise material use and maximise performance for both Mix and pavement design
- Continuous assessment to determine performance and lifecycle costs
- To propose a new mix specification for TII Series 900

2022 Trial Process

- Site Selection
- Pavement & Mix Design
- RAP Processing
- Site works – Transportation & Installation
- Performance Testing & Monitoring

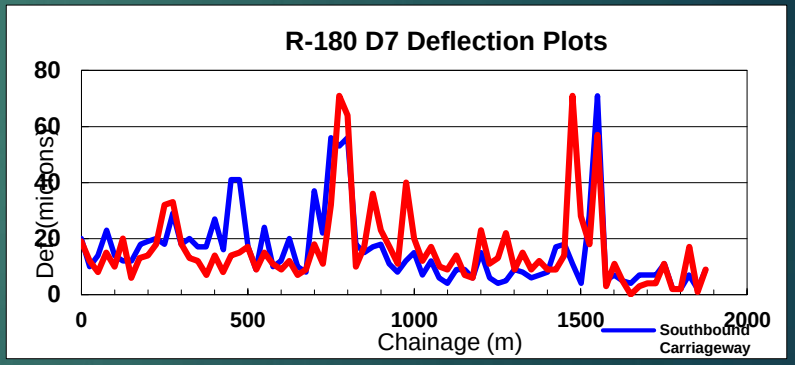
2022 Trial Site Selection

- Proposal to carry out the trial on a regional or Local Primary road using the following criteria:
  - PSCI rating of between 1-4
  - High AADT level (National Secondary)
  - Has the appropriate structural characteristics
- Non Destructive - Testing of 3 sites:
  - GPR - Ground Penetrating Radar testing
  - Falling Weight Deflectometer (FWD) testing
- Visual assessment:
  - Deformation,
  - Fatigue cracking,
  - Surface ravelling
  - Pavement failures



Outer Deflection (D7)	
<15	Stiff subgrade
15-30	Stiff to moderate subgrade
31-45	Moderate to weak subgrade
>45	Weak subgrade

SCI (D1-D2)	
<150	Good Load Spreading Ability
150-250	Good to poor load spreading ability
251-400	Poor to bad load spreading ability
>400	Bad load spreading ability



2022 Trial Site Selection

- The R-180 regional road in Monaghan was selected as the most suitable road to carry out the trial.
  - PSCI Rating 4
  - AADT 1941
  - 12.2 % HGV's
- Destructive testing was carried out to develop an appropriate pavement design:
  - Core samples of the existing pavement
  - Trial holes (c. 1m depth) at various locations identified from non-destructive test analysis
  - Trial Pits - Samples were taken of the granular layers in each trial pit and tested:
    - Gradation
    - Atterberg limits
    - Moisture Content
    - Optimum Moisture Content

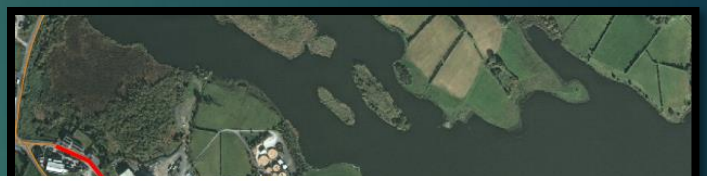


Table 1: Trial Pit 1 Pavement Profile

Trial Hole	Dir.	Ch. (m)	Material	D(mm)	Photo
1	SB	501	Bituminous	120	
			Granular	240	
			Soil	-	

Processing of the RAP Stockpile

Screening & Feedstock Management

- Screening of existing RAP stockpile → 0/32 mm grading
- NB. Best practice = Segregate RAP stockpiles, e.g. HRA, binder course layers, etc

Before **After**

Laboratory Mix Design Process

- Samples from RAP stockpile were provided to Colas Contracting Ltd.
  - Lab tests conducted include:
    1) Moisture content of the RAP
    2) RAP binder content and analysis of recovered binder
    3) Grading of RAP aggregate
- Mix recipe:
  - % RAP
  - % corrective aggregate (if any)
  - % water (if any)
  - % emulsion to be added and % oil in the emulsion
- Mix performance tests:
  1. % Air Voids content
  2. ISTM Stiffness Modulus
  3. Resistance to Rutting
  4. Resistance to Water Sensitivity

Table 3 – Mix performance test results

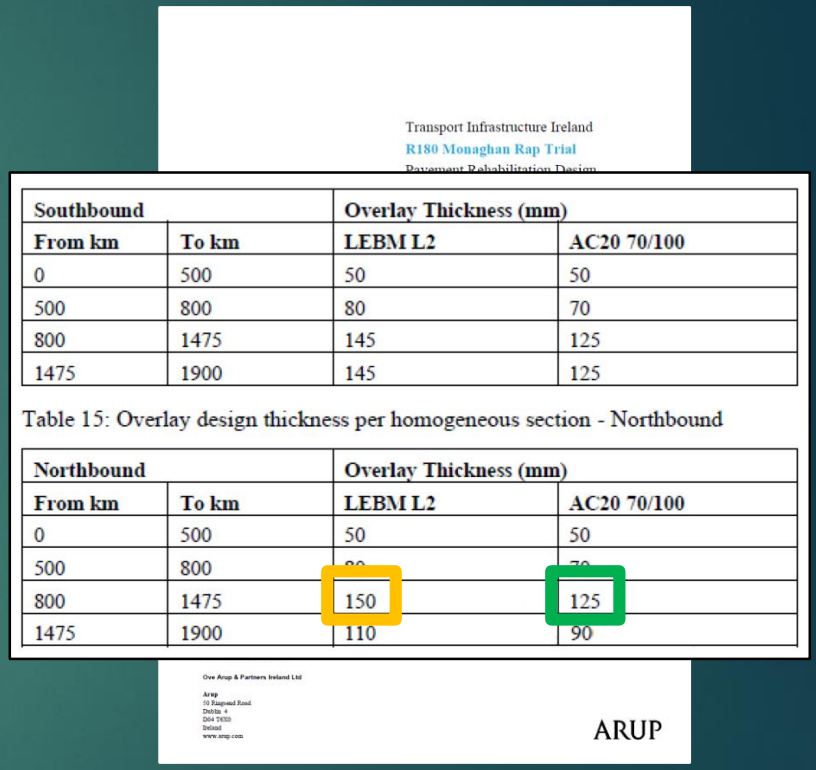
Mix characteristic	Test Method	Laboratory Curing Regime	Results	Specification
Maximum dry density	EN 12697-5 Procedure A	N/A	2373 kg/m^3	N/A
Percentage of air voids	EN 12697-31 Gyratory compaction with setting of 600 kPa load, 1° angle,12 revs/min. and 100 gyrations	N/A	6.2%	$V_{max\ 13,0}$
Stiffness Modulus	EN 12697-26, IT-CY at 20 °C, 124 ms	Conditioning for 14 days at 35 °C and 20 % R.H. The conditioning at test temperature over nigh, before testing.	2769 MPa	$ITSM_{2000}$
Resistance to Water Sensitivity	EN 12697-12, Method B	Conditioning all specimens for 7 days at 18 °C and 40 to 70 % R.H. Then conditioning "Dry" subset at 18 °C and 40 to 70 R.H. for further 7 days, while conditioning "Wet" subset in water at 18 °C for 7 days.	**80**	$i/C_{min\ 70}$
Resistance to Permanent Deformation	EN 12697-22, Procedure B at 45 °C, small device	Conditioning for 14 days at 35 °C and 20 % R.H. The conditioning at test temperature over nigh, before testing.	4.2%	$PRD_{AIR\ max\ 10,0}$

Pavement Design - IAPDM

- IAPDM = Irish Analytic Pavement Design Method
  - IAPDM input factors include:
    1) Existing pavement structure (trial holes/trenches)
    2) Stiffness modulus of the existing layers and foundation (FWD analysis)
    3) ISTM Stiffness Modulus of the proposed new pavement layers
    4) Design life of 20 years = 2.3 msa Design Traffic
- Proposed Pavement Options:
  A. 150 mm of LEBM cold-mix

     versus

  B. 125 mm of AC 20 dense bin hot-mix



Transport Infrastructure Ireland
R180 Monaghan Rap Trial
Pavement Rehabilitation Design

Southbound		Overlay Thickness (mm)	
From km	To km	LEBM L2	AC20 70/100
0	500	50	50
500	800	80	70
800	1475	145	125
1475	1900	145	125

Table 15: Overlay design thickness per homogeneous section - Northbound

Northbound		Overlay Thickness (mm)	
From km	To km	LEBM L2	AC20 70/100
0	500	50	50
500	800		
800	1475	150	125
1475	1900	110	90

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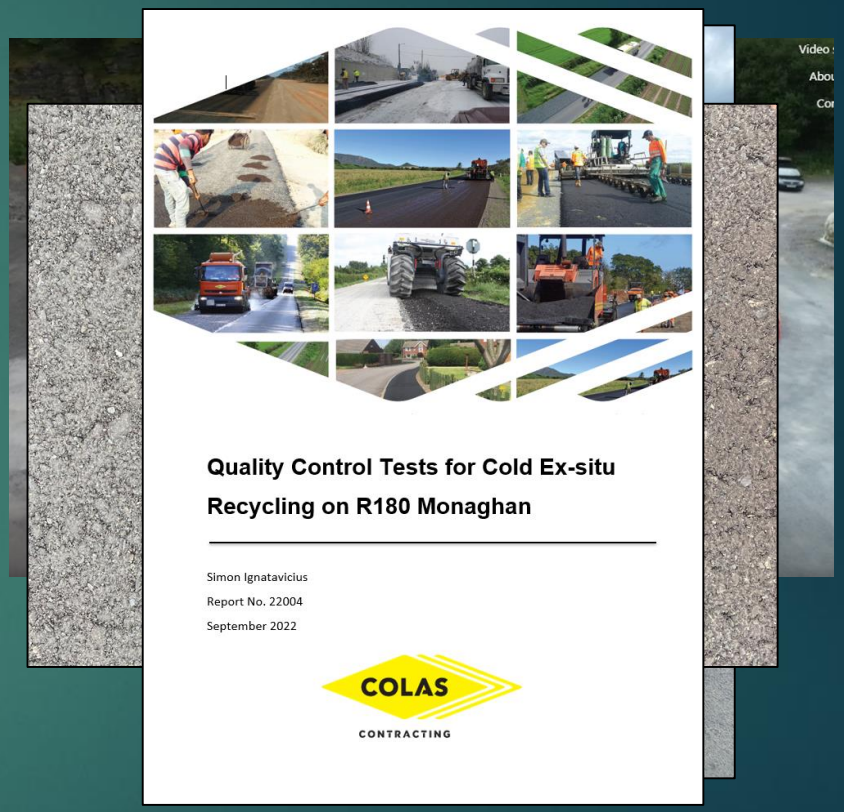
ARUP

QC & Performance Testing & Monitoring

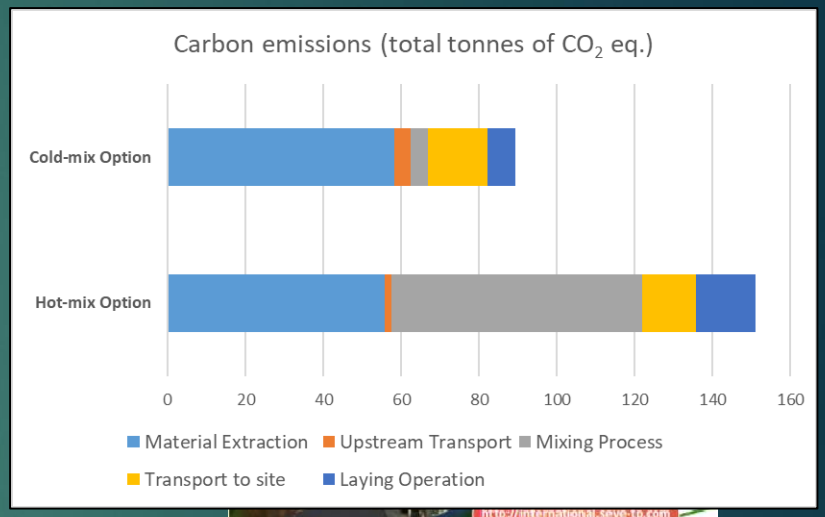
During the works operation, QC testing included:

1. Moisture content, grading and binder content of the RAP stockpile
2. Moisture content, grading and binder content of the mixed material
3. Void Content & In-situ Density – Sand Replacement Test



Environmental Benefits

- Used a carbon calculating software tool to compare the carbon footprint of the two proposed pavement solutions:
  A. 150 mm of LEBM cold-mix
     versus
  B. 125 mm of AC 20 dense bin hot-mix
- Analysis includes factors such as:
  - Carbon footprint of the raw materials used
  - Energy used in the mixing process
  - Transport distances – of both raw materials and the asphalt mix
- Carbon savings = 61.8 tonnes or 40.8 %
  - Equates to 44 tonnes per km or 8.8 kg/m^2



Pavement Solution	Material Extraction	Upstream Transport	Mixing Process	Transport to site	Laying Operation	Total
Hot-mix Option	55.9	1.5	64.6	13.8	15.4	151.2
Cold-mix Option	58.3	4.2	4.5	15.1	7.3	89.4

Site Trial – Transport & Installation

- Laid 150 mm of LEBM/RAP cold-mix in 2 layers @ 75 mm depth
- Laid using conventional paving methods
- Compacted two stage process –
  1. Larger steel drum roller for deep compaction
  2. PTR – to squeeze out moisture and help curing
- Material was left to cure for 5 days - lightly trafficked the following day
- Double surfaced dressed directly on to LEBM/RAP cold-mix
- Key Learning: General laying methods – operatives training

Post Construction Performance Testing

The following schedule of testing is ongoing:

1. Post Construction FWD and visual assessment:
   - Weekly for 1st Month
2. Post construction FWD and visual assessment
   - at 3, 6 & 12 months
3. Post construction profilometer same:
   - at 3, 6 & 12 months
4. Post construction coring:
   - as soon as practicable at 3, 6 & 12 months.
5. Medium to long term monitoring to be decided followi
   review of test results after 1year.

Next Steps

- TII Standard Series 900 – 2023/24
- Potential Usage – Appropriate roads throughout National, Regional and Local Road Network (Greenways)
- Continue to monitor scheme to determine Material/Pavement performance.
- Determine Lifecycle costs and compare with conventional methods
- LA's to take lead in processing of materials & continue to develop alternatives product methods
- Programme for Government: 51% Reduction in CO_2 by 2030
- EPA New requirements – Article 27, 28 End of waste status ?

COLD-MIX TRIAL

Thank you!

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An Roinn Iompair
Department of Transport

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County and City Management Association

RSTG Conference 2023 9th May - Day 1

9th May - Day 1

Networking\Exhibition & Coffee Break

We will resume at 16.00 pm

Session 4- Green Public Procurement & Climate Adaptation

Chair Marcus O'Connor

1st Green Public Procurement- John Slattery

& Aoife Sugrue

2nd Climate Adaption–Kevin Kissane & David Kelly

Join the Q&A session at Slido.com and enter 1685372

Or via the QR Code