3rd ASECAP SUSTAINABILITY FORUM

26 November 2024
Dublin, Ireland

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ASECAP

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ITIA
Irish Tolling Industry Association

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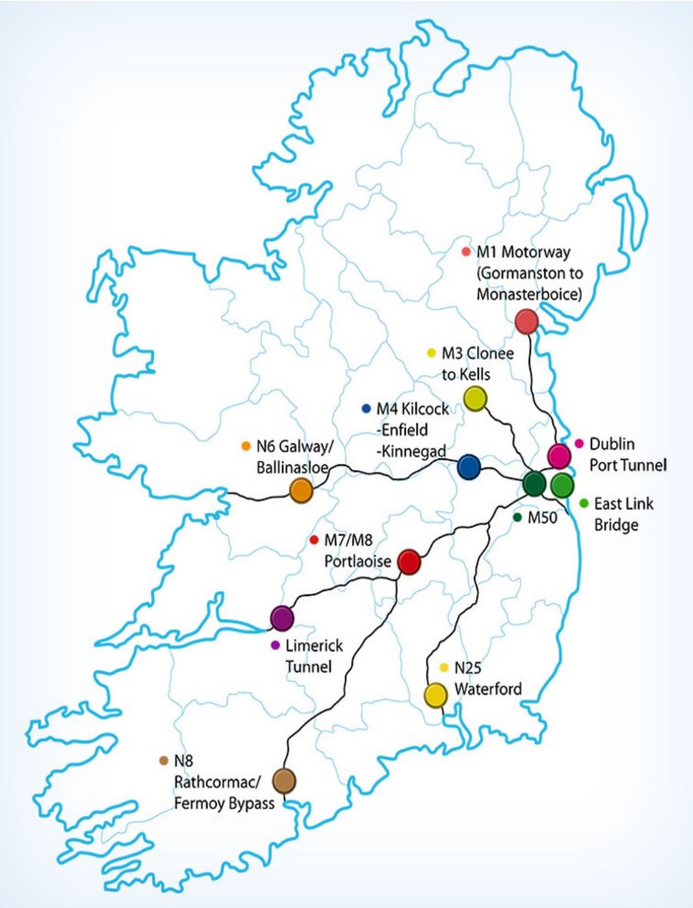
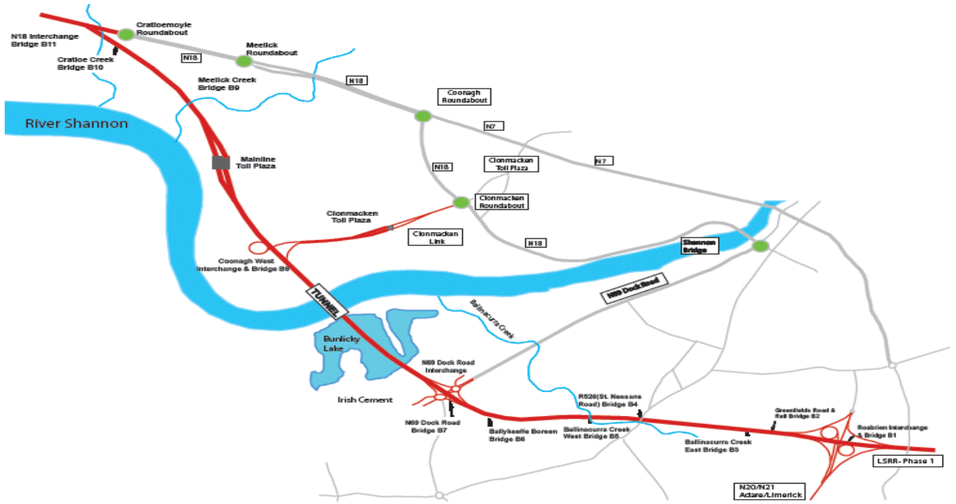
Environmental programs and best practices undertaken at the Limerick tunnel project

Declan Cahill – Limerick tunnel

Limerick Tunnel





- The Limerick Tunnel is the Limerick City bypass connecting the Dublin Road, N7 to the Ennis Road N18.
- The Limerick Tunnel consists of the following
  - 9.75km of two-lane dual carriageway
  - 2.3km of single lane dual carriageway
  - 675m long tunnel under the River Shannon
  - 750m causeway across Bunlicky Lake
  - 11 Bridges
  - 6 Underpasses and 8 Culverts
  - 2 Toll Plazas (Mainline and Clonmackin)

Link to project video
https://drive.google.com/file/d/1HoKUbdxHc6nGk9RWIXLCh7eEvuaViEHW/view?usp=sharing
or
https://youtu.be/wHkUrBk-bjA

Limerick **Tunnel Lighting** upgrade, retrofit to LED.

Summary of initiative:
All 1,092 tunnel luminaires (400W & 150W) in the Limerick Tunnel were replaced by a retrofit solution of LED lights.
The existing casings were investigated, tested and found to be in good condition and thus suitable to last for many years to come.

A retrofit solution rather than completely new lights was therefore considered to be the most beneficial solution.

Directroute Team and Signify (Philips) Engineers developed a bespoke design for this project, ensuring the safest, and most efficient installation within a 14 nights timeframe.

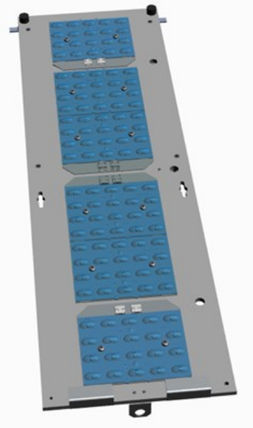
Client Comments:
Transport Infrastructure Ireland (TII) supportive of initiatives and signed off on Construction Variation.
Also removed the contractual requirement to replace lights every 3 years.

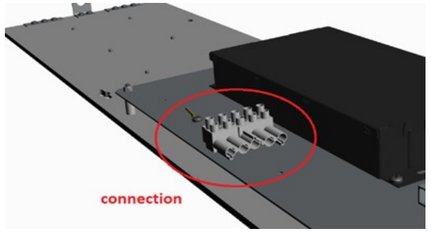
Impact:
Carbon footprint, maintenance + electricity cost reductions.
A more natural light colour, increased comfort for road users and much better visibility for control room operators helping safety and incident responses.

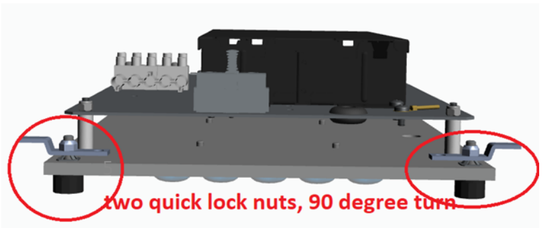
Tunnel lighting replacements - background information

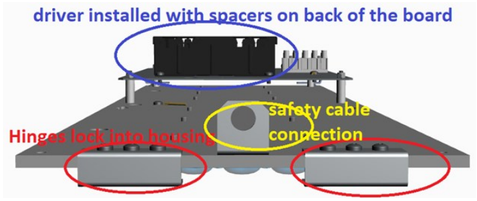
Additional Information: Below is a summary of the annual energy and costs savings at a unit rate of €0.29
With this rate, a return in vestment is expected within 3.5 years, excluding savings on defect replacement, maintenance and the waived contract requirements to replace the old SON lights every 3 years

Limerick Tunnel - LED lighting in the tunnel									
		Existing SON Lighting		Proposed LED Lighting		Unit rate:	€0.29		
LED Light fitting s	Net price including installation	KW/Year existing SON lighting	Actual energy cost /year	KW/Year LED lighting	Energy cost/year	Electricity usage reduction	Annual energy savings	ROI in years savings only	Monetary savings in 15 years
Signify lighting	**€633,978.19**	**1,029,004**	**€298,411.16**	**374,467**	**€108,595.73**	**-63.61%**	**€189,815.73**	**3 years, 4 months**	**€2,847,235.95**





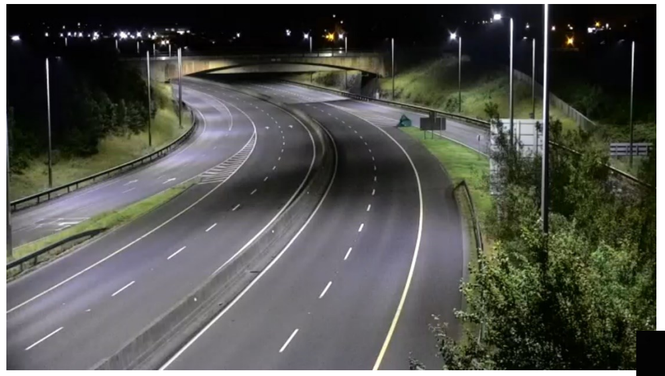


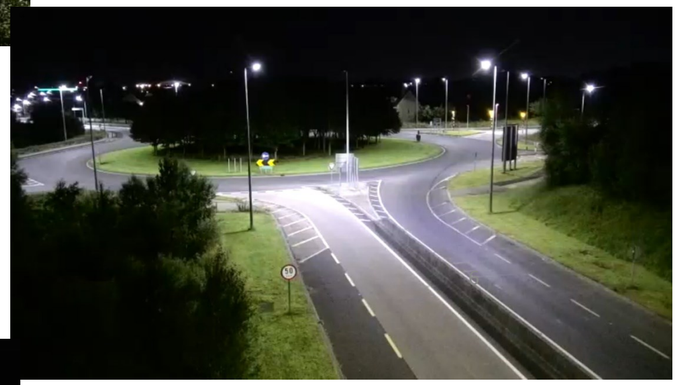


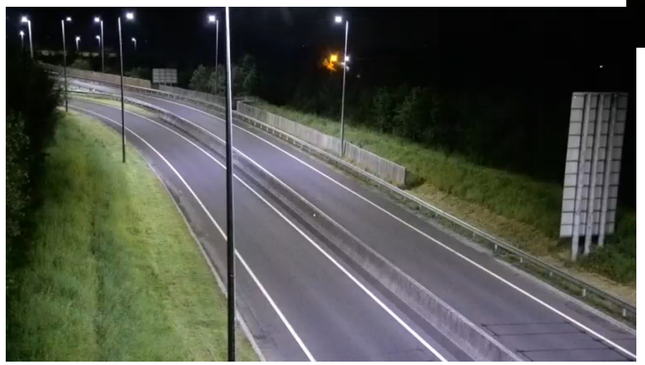
Details of lighting trays designed to fit into existing housings

- Carbon footprint, maintenance and electricity cost reductions.
- Providing a more natural light colour, increased comfort for road users and much better visibility for control room operators helping safety and incident responses.
- A reduction of electricity consumption by **933,500 KWH per year**, a reduction of -63.61% and reducing carbon emissions by **237 ton of C02 Gas per year.**

Road Lighting replacements





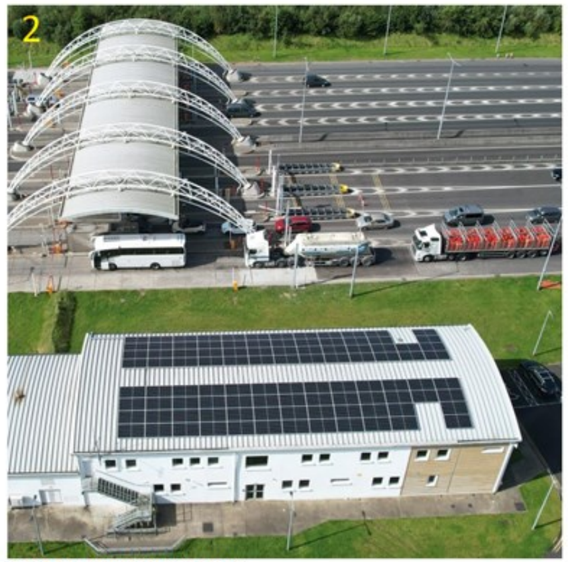


Limerick Road lighting				
Road lighting	Type	Wattage	Quantity	Comments
600 watt son lights	Phillips traffic vision	600 watt	18	
400 watt son lights	Phillips traffic vision	400 watt	67	
250 watt son lights	Phillips traffic vision	250 watt	581	
150 watt son lights	Phillips traffic vision	150 watt	63	
100 watt son lights	Phillips traffic vision	100 watt	31	
70 watt son lights	Phillips traffic vision	70 watt	3	
Total road lighting			763	

Direct Route Limerick Road Lighting Reduction Savings as a result of applying for a new TII standard					
Luminaires:			Circuit Watts	Quantity	Total Circuit Watts
150w Son			180		0
250w Son			301	80	24080
400w Son			434	4	1736
Burning Hours	4150	Per year		Total	25816
annual KW used in a year					107136400
Annual savings					
Electrciy Saving per Year @ 15c/Kw				Total	€21,908
Annual maintenance costs for the 84 lights				Total	€293
annual savings					€22,201.00
Once off capex cost					
Capex cost to remove the 124 lighting columns (once off cost) 84 by €700				Total	€58,800
Return on investment in years					2.65
Lifecycle replacement savings over concession					
Removed necessity to replace the lighting columns and wiring (84 columns @ €1,500 (estimated))				Total	€126,000

- Carbon footprint, maintenance and electricity cost reductions.
- Providing a near daylight natural light colour, increased comfort for road users and much better night-time visibility for control room operators helping safety and incident responses.
- A reduction of electricity consumption by **591,884 KWH per year**, reducing carbon emissions by **150 ton of C02 Gas per year.**
- Also removed the Irish Authorities requirements to replace road lighting, regardless condition and performance, every 3 years

PV Installation on the 4 buildings



1 & 2 above: Mainline Toll Plaza Control and office

3. North Services Building

4. South Services Building

5. Clonmacken Plaza and Depot

Summary of initiative:

As part of the Irish government's commitment to reduce Ireland's overall greenhouse gas emissions and TII's commitment to providing sustainable transport infrastructure Directroute Limerick (DRL) installed approximately 450 Solar Photovoltaic panels over four locations to support the reduction of carbon and other emissions of the Project Road Operations. These 4x 50KW Solar PV systems will produce a combined estimated energy saving of approximately 157,000 kWh annually which will reduce DRL's daytime consumption up to 35%. Design, Design Check's, Glint and Glare study and planning permission requirements were all part of the overall project.

Client Comments:
Transport Infrastructure Ireland (TII) supportive of initiatives and signed off on Construction Variation.

Impact:
Reduce reliance on fossil fuel-generated electricity and a reduction of energy costs. An approximate reduction of 45 Tonne of C02 emissions.

PV Installation (additional information)

Additional Information

Total Investment sum, (excluding Tax reduction or Grants) was €239,068.

The Accelerated Capital Allowance (ACA) is a tax incentive scheme that promotes investment in energy efficient products & equipment and was applied to this project. In addition, the Sustainable Energy Authority of Ireland (SEAI), had Grants of €12,600 per location available for this Project (€50,200). This had been applied for and almost immediately approved.
Both incentives reduced the investment sum and thus payback period significantly, from 5.5 years to just over 3.5 years! (at an electricity rate of €0.30 per KwH)

Electricity rates:	**Payback periods excluding ACA Tax reduction or Grants**	**Payback period years minus Accelerated Capital Allowance (ACA) and SEAI Grant (€50,400)**
€0.25	**6 Years, 7 Months**	4 Years, 4 Months
€0.30	**5 Years, 6 Months**	3 Years, 7 Months
€0.33	**5 Years, 0 Months**	3 Years, 4 Months
€0.35	**4 Years, 8 Months**	3 Years, 1 Months
€0.40	**4 Years, 1 Months**	2 Years, 8 Months

Carbon footprint and energy cost reductions.
Generation of approximately **185,000 KwH** electricity, resulting in a reduction of emissions by **45,8 Tonne of C02 Gas per year.**

Background: As part of the Irish government's commitment to reducing Ireland's greenhouse gas emissions and TII's commitment to providing sustainable transport infrastructure. Direct Route Limerick (DRL) installed 440 Solar Photovoltaic (PV) panels over four locations, covering an approximate area of 956 m^2. These solar arrays are dedicated to serving the specific plaza buildings and tunnel where they are installed, operating without battery storage. They will contribute to reducing carbon and other emissions associated with the Project Road Operations. The PV panels were energised sequentially from mid to the end of August 2023.

Measures taken:

- TII has undertaken reviews of the planning applications and provided feedback to Limerick City and County Council (LCCC).
- Planning permission has been granted by LCCC for the proposed installations.

Anticipated Output:

- Reduce DRL reliance on fossil fuel-generated electricity.
- Reduction of carbon emissions and energy costs.
- Estimated annual energy saved of approximately 157,000 kWh, resulting in an approximate reduction of 52 Tonne of $C0_2$ emissions.
- The Plaza Building's solar arrays are expected to reduce daytime electricity consumption from the primary grid by approximately 50%, and the Tunnel solar arrays are projected to reduce daytime electricity consumption from the primary grid by approximately 8%. This percentage is expected to rise significantly once the lighting upgrades inside the Tunnel are completed i.e. changing from high-pressure sodium (SON) to light-emitting diode (LED) lamps.
- The size of the solar system is 200kwp (kilowatt 'peak) which comprises the Mainline Plaza building, Clonmacken Toll Plaza, Northern & Southern Service buildings.

Limerick Tunnel - Carbon reduction targets

Directroute Limerick - Carbon saving measures				
Nos	Descriptions of works	Estimated savings (Tonnes of carbon)	electricity comnsumption reduction (Kwh)	completed
1	Procure green energy (100%)	1,200	1,200	Yes
2	Install LED road lighting	150	591,884	Yes
3	Install LED tunnel lighting	237	933,500	Yes
4	Install PV panels on the buildings	45.8	185,000	Yes
5	Replace Oil burners in heating systems	150.25	725.6	No
6	Install Electric vehicle chargers	16	77.269	No
7	Install LED lighting on the toll plazas	57	275.269	Yes
8	Consider the use of wind turbines			on hold
Totals		1,856	1,711,462	

Limerick tunnel
Reductions achieved (2020 to 2024)
= -61%

Thank you for the support of the following entities:

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

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Irish Government target:
In the Programme for Government and the Climate Act 2021, Ireland has committed **to halving our greenhouse gas emissions by 2030 and reaching net zero by 2050 at the latest**. The Climate Action Plan is how we do it. It's our path to a secure future for ourselves and future generations.

Thank you all

Limerick Tunnel

project