Green Solutions:

Leveraging 3D Digital Data for advanced CCTV Optimisation

Telent Green Solutions Working Group

telent NET ZERO

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

THE NET ZERO STANDARD
APPROVED NET-ZERO TARGETS

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Green Solutions: Leveraging 3D Digital Data for advanced CCTV Optimisation

- Reusing past 3D point cloud data streamlines CCTV system evaluations, ensures compliance with the NR/L2/TEL/30135 standard, and aids in early BIM model development
- Leveraging 3D digital data for advanced CCTV optimisation contributes to green initiatives by minimising carbon footprint through data reuse, remote operations, and efficient design and validation

* NR/L2/TEL/30135 – Video Surveillance Systems

Green Solutions: Leveraging 3D Digital Data for advanced CCTV Optimisation

By leveraging existing point cloud data within our existing 3D network, this information can be efficiently utilised to develop innovative CCTV design solutions, ensuring full compliance with NR/L2/TEL/30135 standards.

Reutilisation of existing 3D data	**Before**: Multi-discipline surveys are needed at each station to identify existing equipment for Phase 1 design. **Proposed process**: Reutilisation of 3D data from previous projects to identify equipment and create High Level Design Modelling.
CCTV /DOO(P)	**Before**: Creation/utilising floor plans alongside 3rd party software to design camera cones with no real world validation. **Proposed process**: Use precise point cloud data to simulate lens parameters and display camera views within a realistic model.
Equipment Simulation	**Before**: Blind spots and design validation identified only during installation, leading to delays and rework. **Proposed process**: Design validation and blind spot identification available before installation.
Image validation	**Before**: Multi-lens camera replacement was imprecise, relying on guesswork due to lack of pre-installation visibility. **Proposed process**: Simulate multi-lens camera replacement within the 3D model.

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	Design Handover	**Before**: Image validation for handover done through positioning of a camera onto a pole and positioned at the desired location for the image to be accepted by customer. Requires extra site visits. **Proposed process**: Image validation for handover done remotely via the provided 3D exported images. No extra site visits.
	Price calculation	**Before**: Pricing relied on customer-provided documentation, often non-compliant with NR/L2/TEL/30135 standards, leading to inaccurate bids. **Proposed process**: Conduct random site analyses to better estimate equipment needs and achieve more accurate pricing.
	BIM integration	**Before**: No BIM elements created **Proposed process**: Initial BIM elements developed, with potential for full conversion to integrate into a main BIM framework in the future.

Green Solutions: Our Vision

Telent have committed to achieving net-zero GHG emissions by 2050 through the Science Based Targets initiative (SBTi)

This includes emissions created indirectly by our entire value chain, from raw material extraction to customer use of our products and services - providing sustainable whole-life solutions to our customers

In 2023, we set a near-term target to reduce all emissions by an average of **50%**, no later than 2030

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SILVER 2022 ecovadis Sustainability Rating

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We set out to devise a more sustainable CCTV Optimisation process

Collaborating with our design team, we are pioneering a sustainable 3D CCTV design approach that minimises environmental impact and operating costs by reducing site visits and vehicle use whilst maximising resource efficiency.

Central storage of survey data

Reutilisation and simple refresh of existing Point Cloud Data

More accurate cost control

Bid, BOM, and design cost can be calculated more accurately through enhanced 3D Leveraging 3D Digital Data for advanced CCTV Optimisation analysis.

Efficiencies through digital design

Reduction of utilised cameras, energy efficiencies, identification of blind spots and further analysis available

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Green Solutions: Leveraging 3D Digital Data for advanced CCTV Optimisation

Automated Design updates

Digital design model updates can be applied and automated in real-time.

Compliance with NR/L2/TEL/30135

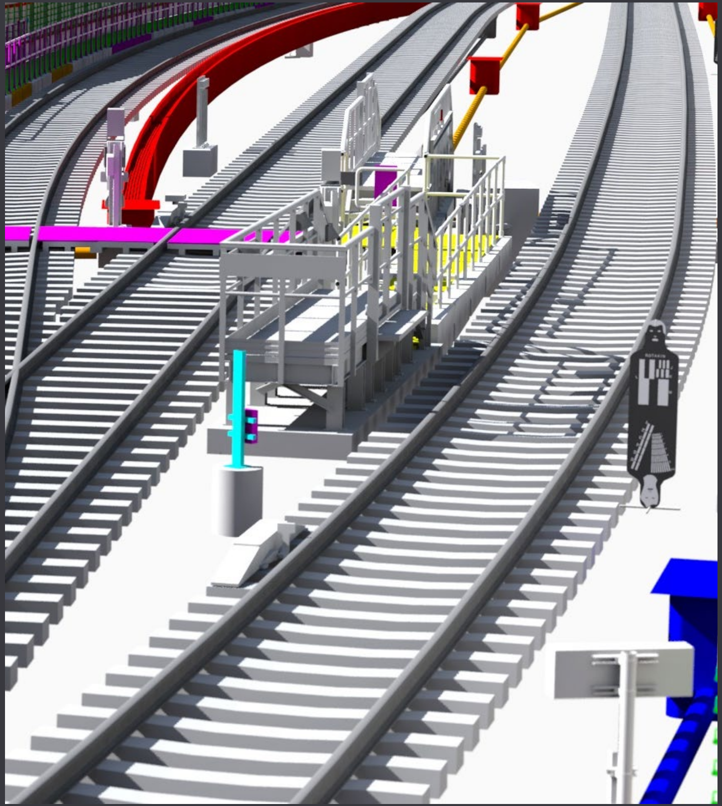
The 3D model system simulates DORI standards in compliance with NR/L2/TEL/30135 .

Network traffic

Network traffic can be precisely assessed, highlighting the additional strain on our existing infrastructure.

Early BIM integration

Elements from the digital design can be used to create BIM components.



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Green Solutions: Environmental benefits

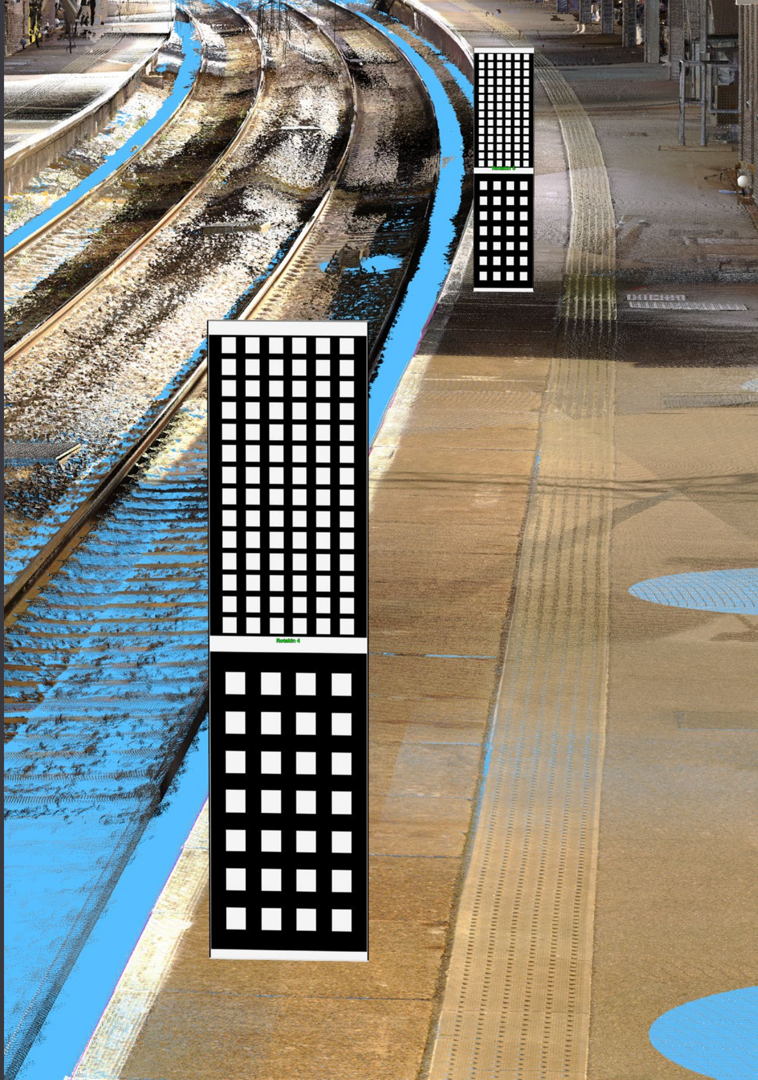
Utilisation of digitally produced 3D CCTV design data as a supporting tool offers a range of sustainable benefits:

Reduced costs, time and CO_2e emissions
Efficient, accurate digital mapping and analysis, minimises the need for physical site visits.

Efficient resource utilisation
Reduce the need for excess materials and labour, through accurate planning and execution.

Reduce the need for frequent on-site visits, and minimising exposure to potential hazards
Remote site walkthrough, reduced working at height.

Enhanced recycling processes and reduction of material waste
Creation of accurate BOM's, with better inventory tracking.



Green Solutions: Environmental benefits

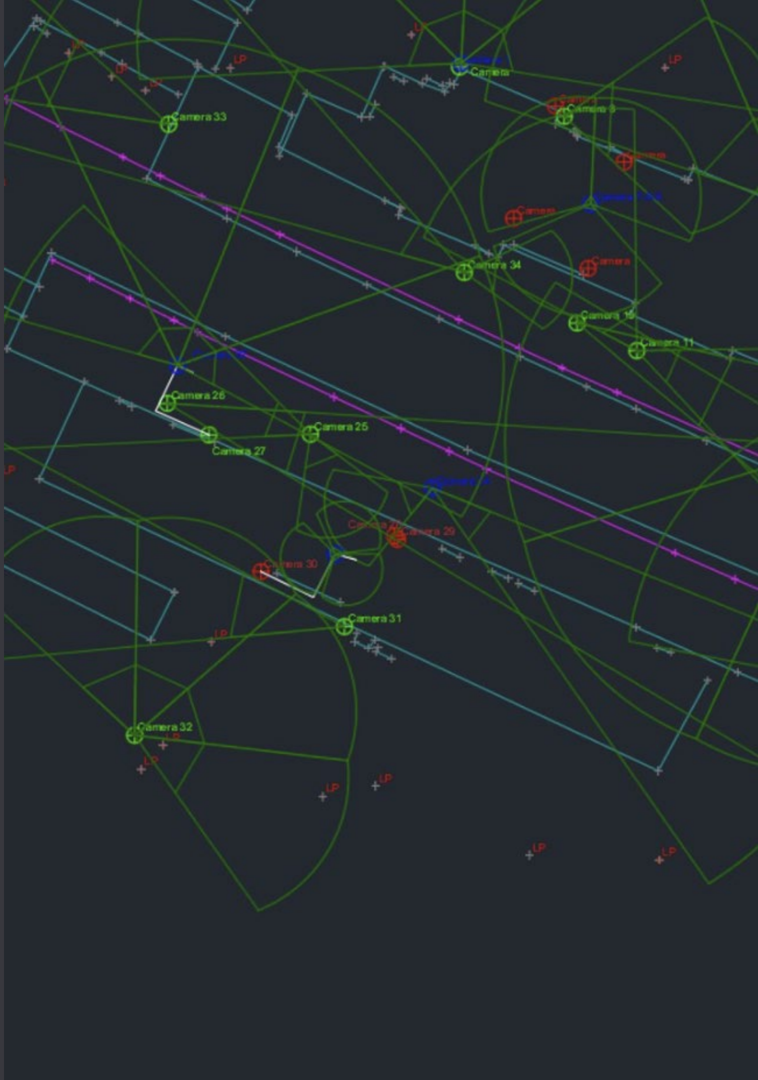
Utilisation of digitally produced 3D CCTV design data as a supporting tool offers a range of sustainable benefits:

Enhanced CCTV design and prototyping
Camera lens and optical simulation within a 3D digital model

Improved product lifecycle management
Enables better project tracking, analysis and optimization of existing processes.

Energy savings
Enables innovative camera positioning and remote image prediction aiding energy efficiencies

Heritage preservation
Creation of accurate digital records of historical sites that can be utilised within the design phase.



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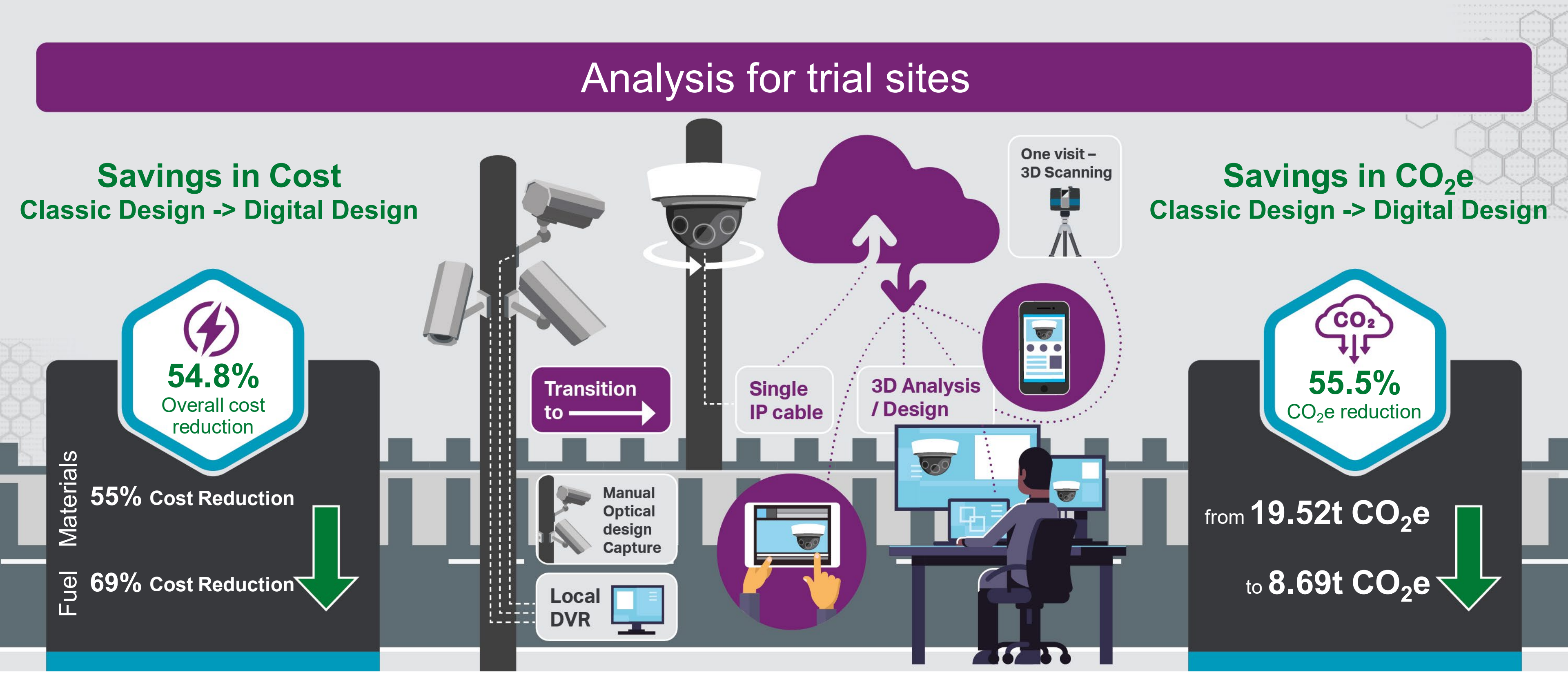

- Based on the (UK Government GHG Conversion Factor for Company Reporting 2023 Condensed Set Version 2.0) in order to precisely calculate the CO_2e produced by a Skoda Octavia Estate diesel company vehicle, the following procedure has been adopted :
- Every Km of the journey must be converted to kWh. (1 Km= 0.82514kWh)
- Every kWh must be converted to $KgCO_2e$. (1 kWh = 0.25 $KgCO_2e$).

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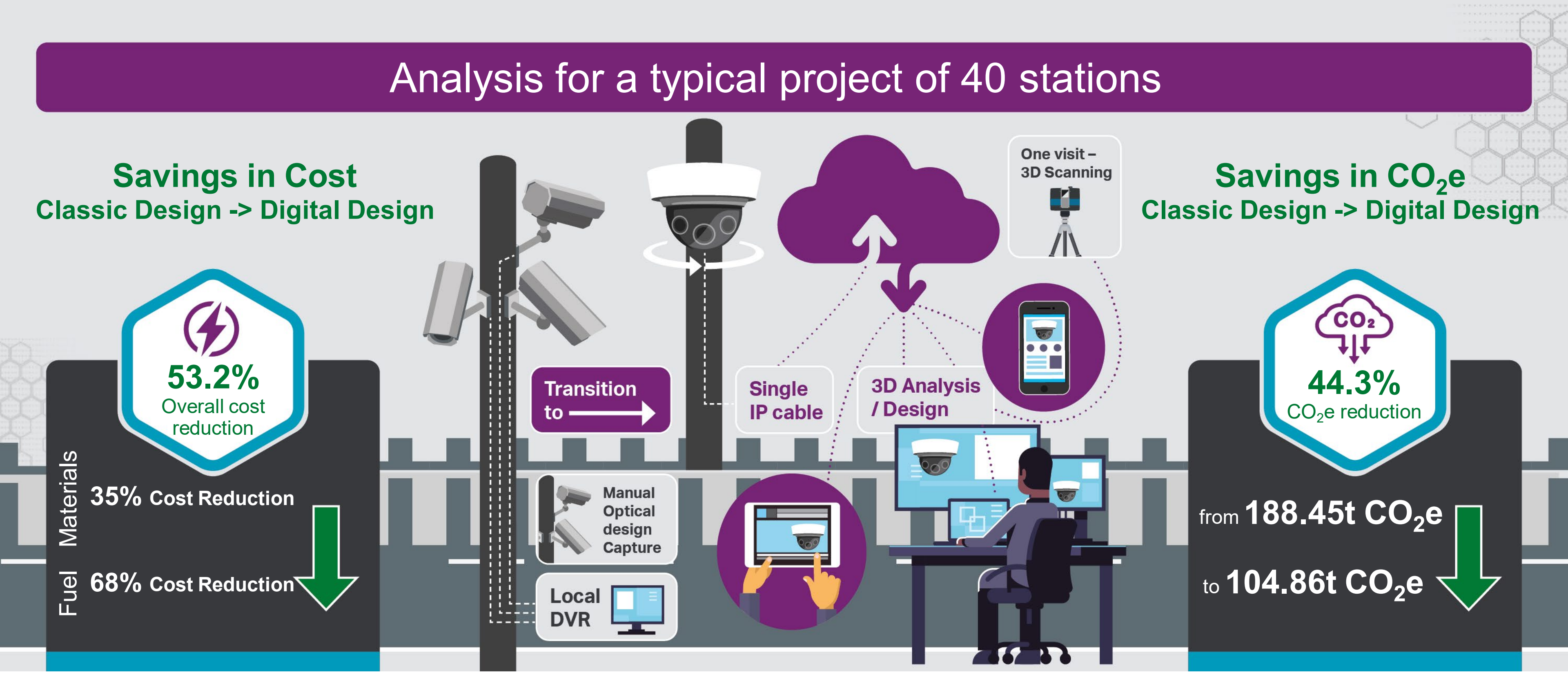

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Green Solutions: Data & Technical Specifications

ASSUMPTIONS AND COST (CLASSIC DESIGN)

- The 3D digital information has been captured during a previous project survey stage, processed and made available through the Faro Sphere online platform to be re-utilised.
- The Digital Design and Image validation for the CCTV design has been calculated in comparison with the digital design analysis performed at different sized trial stations.
- This solution does not require repositioning of any existing camera locations or introducing multi-lens cameras following a like for like replacement of cameras, only adding extra new cameras to locations that do not comply with NR/L2/TEL/30135 .
- **Classic CCTV Design Cost Metrics for a 2 Station Design**
- Station X Camera cost = Xc (Camera Cost) – like for like
- Station Y Camera Cost = Yc (Camera Cost) – like for like
- Cable Cost = Cc (Cable Cost)
- Fuel Cost (@40 mpg – £1.50 / L) = Fc (Fuel Cost)

⟹ Total Classic:

Xc+Yc+Cc+Fc

ASSUMPTIONS AND COST (DIGITAL DESIGN)

- Applying the existing 3D software already utilised within the digital design department, we have modelled and simulated every camera at the stations, in order to identify blind spots, maximise coverage and achieve NR/L2/TEL/30135 compliancy but at the same time trying to reduce cost, design time and enhance safety.
- The ability to simulate cameras within a 3D environment, unlocked the ability to relocate, recover and replace cameras with multi-lens cameras, validating compliancy with NR/L2/TEL/30135 and producing validation images without having to visit site.
- By using multisensory cameras, with PoE capability, we were also able to reduce cable requirements.
- This process has brought the total number of cameras down and ensures for a fully compliant NR/L2/TEL/30135 system
- **Digital CCTV Design Cost :**
- Station X Camera cost = Xd(Camera Cost)
- Station Y Camera Cost = £Yd (Camera Cost)
- Cable Cost = Cd (Cable Cost)
- Fuel Cost (@40 mpg – £1.50 / L) = Fd (Fuel Cost)

⟹ Total Digital

Xd+Yd+Cd+Fd

Using the above metrics and assumptions Telent calculated a cost reduction of 54.8% for this two-station trial

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Green Solutions: Data & Technical Specifications

ASSUMPTIONS

- Based on the (UK Government GHG Conversion Factor for Company Reporting 2023 Condensed Set Version 2.0) in order to precisely calculate the CO_2e produced by a Skoda Octavia Estate diesel company vehicle, the following procedure has been adopted :
- Every Km of the journey must be converted to kWh. (1 Km= 0.82514kWh)
- Every kWh must be converted to $KgCO_2e$. (1 kWh = 0.25 $KgCO_2e$).
- Average fuel consumption utilised for the calculation of fuel required to complete the journey was 40mpg and the fuel cost was identified at £1.50/L (9th of October).
- Assumed average distance from Warwick to any station to be 90miles.

CO_2e CCTV Classic Design :

- Camera equipment CO_2e = 13.31t CO_2e
- Cables CO_2e = 3.97t CO_2e
- Camera install (total mileage) = 1,428.8 miles
- Camera install (CO_2e) = 2299.43 Km * 0.82514 = 1,897.35 kWh
- 1,897.35 *0.25 = 474.33 $KgCO_2e$ ~ 0.46t CO_2e
- Image Validation CO_2e = 1,191.6 miles
- 1,917.69 Km * 0.82514 = 1,582.36 kWh
- 1,582.36kWh * 0.25 = 395.59 $KgCO_2e$ ~ 0.38t CO_2e
- Assumed 4 surveys per design/station = 4,286.4 miles
- 6,898.29 Km * 0.82514 = 5,692.05 kWh
- 5,692.05kWh * 0.25 = 1,423.01 $KgCO_2e$ ~ 1.40t CO_2e

Classic Design = 13.31t + 3.97t + 0.46t + 0.38t + 1.40t = 19.52t CO_2e

CO_2e CCTV Digital Design:

- Camera equipment CO_2e = 5.75t
- Cables CO_2e = 2.25t
- Camera install = 474.33 $KgCO_2e$ ~ 0.46t CO_2e (further reductions can be identified but requires extra analysis)
- Image Validation = 0 CO_2e
- Assumed 1 survey per design/station = 714.4 miles
- 1149.71Km *0.82514 = 948.67 kWh
- 948.67kWk * 0.25 = 237.16 $KgCO_2e$ ~ 0.23t CO_2e

Digital Design = 5.75t + 2.25t + 0.46t + 0 + 0.23t = 8.69t CO_2e

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Green Solutions: Data & Technical Specifications

ASSUMPTIONS AND COST METRICS (CLASSIC DESIGN)

- Following the analysis at the trial stations, this process was applied to typical project of 40 stations:
- At the 40 stations, that have been identified we assumed that there would be existing CCTV cameras, mostly uncompliant with the NR/L2/TEL/30135.
- We looked at past projects and made some assumptions for the numbers of cameras at each stations and ensured a reasonable mix of small, medium and large station systems.
- Using the above assumptions, we calculated an 18% increase in camera numbers would be required to achieve compliancy with the NR/L2/TEL/30135.
- **Classic CCTV Design Cost metrics to consider**
- Camera Cost for bullets/dome cameras = (Like for like system) 18% Increase in numbers
- Cable Costs
- Fuel Cost (@40 mpg – £1.50 / L) with randomised but typical driving distances

ASSUMPTIONS AND COST METRICS (DIGITAL DESIGN)

- From the digital analysis at the trial stations, an average of 43% reduction in camera numbers was identified to produce a compliant system with better coverage.
- This was achieved by introducing multi lenses for concourse areas and car parks and by repositioning the cameras, in a desktop environment and within the 3D model space.
- For camera reduction analysis the following camera volumes were assumed
- 80% of the total camera cost would be for Dome/Bullet cameras
- 20% of the total camera cost would be for multi-lens cameras.
- **Digital CCTV Design Cost Metrics to consider:**
- 80% Bullet/Dome camera cost
- 20% Multi-lens camera cost
- Cable Costs
- Fuel Cost (@40 mpg – £1.50 / L)

Using the above metrics and assumptions Telent calculated a cost reduction of 53.2% for a typical 40 station project with randomised metrics

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Green Solutions: Data & Technical Specifications

ASSUMPTIONS

- Based on the (UK Government GHG Conversion Factor for Company Reporting 2023 Condensed Set Version 2.0) in order to precisely calculate the CO_2e produced by a Skoda Octavia Estate diesel company vehicle, the following procedure has been adopted :
- Every Km of the journey must be converted to kWh. (1 Km= 0.82514kWh)
- Every kWh must be converted to $KgCO_2e$. (1 kWh = 0.25 $KgCO_2e$).
- Average fuel consumption utilised for the calculation of fuel required to complete the journey was 40mpg and the fuel cost was identified at £1.50/L (9th of October).
- Assumed average distance from Warwick to any station to be 90miles.

CO_2e CCTV Classic Design :

- Camera equipment CO_2e = 110.79t CO_2e
- Cables CO_2e = 33.03t CO_2e
- Camera install CO_2e: = 28,800 miles
- 46,080 Km * 0.82514 = 38,022.45 kWh
- 38,022.45 *0.25 = 9,505.61 $KgCO_2e$ ~ 9.35 CO_2e
- Image Validation CO_2e = 21,600 miles (taking into account that after the validation of each station all Engineers will travel back to Warwick)
- 34,761.83 Km * 0.82514 = 28,683.37 kWh
- 28,683.37kWh * 0.25 = 7,170.84 $KgCO_2e$ ~ 7.05t CO_2e
- Assumed 4 surveys per design/station = 86,400 miles
- 139,047.22 Km * 0.82514 = 114,733.42 kWh
- 114,733.42kWh * 0.25 = 28,683.35 $KgCO_2e$ ~ 28.23t CO_2e

Classic Design = 110.79t + 33.03t + 9.35t + 7.05t + 28.23t = 188.45t CO_2e

CO_2e CCTV Digital Design:

- Camera equipment CO_2e = 71.97t CO_2e
- Cables CO_2e = 18.84t CO_2e
- Camera Install = 9,505.61 $KgCO_2e$ ~ 9.35t CO_2e (further reductions can be identified but requires extra analysis)
- Image Validation = 0 CO_2e
- Assumed 1 survey per design/station = 14,400 miles
- 23,174.55 Km *0.82514 = 19,122.24 kWh
- 19,122.24kWh * 0.25 = 4,780.56 $KgCO_2e$ ~ 4.70t CO_2e

Digital Design = 71.97 + 18.84t + 9.35t + 0 +4.70t = 104.86t CO_2e

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