

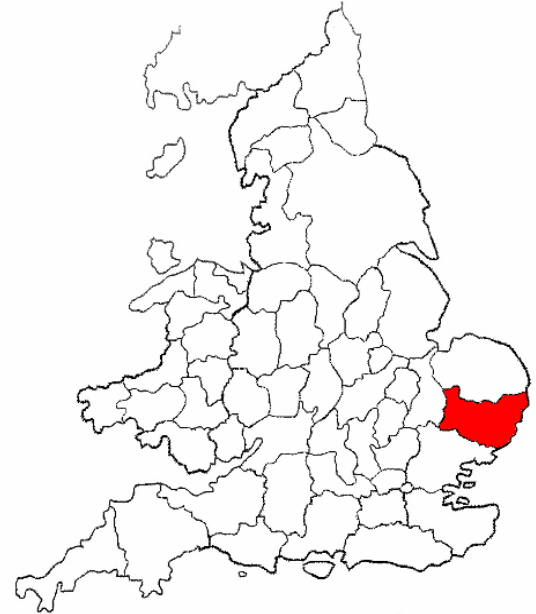
Case Study: Working in Partnership with the Private Sector to Reduce Expenditure and Carbon Emissions

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Suffolk County Council, UK



Suffolk – Overview

- 1500 sq miles (30miles x 50) Cities, Towns & Rural
- Population – 750,000
- 80,000 lights
- Smart controls (“CMS”) installed 2011-2012



Recent Activities

- Part Night Lighting Extended
 - Supporting Academic Research
 - Crime Reduction
- European SLiC Funding (£250k)
- DfT Funding (£4.41M)
- LED Replacement Programme
 - 1st Phase 20,000 units
 - 2nd Phase 43,000 units <8months
- Energy Cost now £0.44 per kwh!



Smart Lighting Concepts (SLiC)

- Researchers from Avans University of Applied Sciences and Portsmouth University
- Four Countries Participating
 - UK
 - Belgium
 - Netherlands
 - France

Goal: Can investment in sustainable public lighting contribute to reducing carbon emissions?



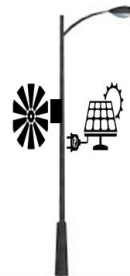
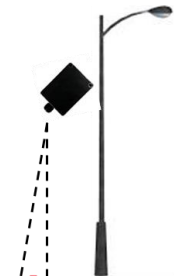
DfT Live Labs

- Smarter Suffolk – Bsi & UoS Key Partners
- 2 year £23M Project
 - 8 Councils in England
 - Over 70 vendors
 - 115 locations
 - Sensors at scale

Innovation in SMART communications, transport, highways maintenance, energy, materials and mobility



Range of Sensors Deployed



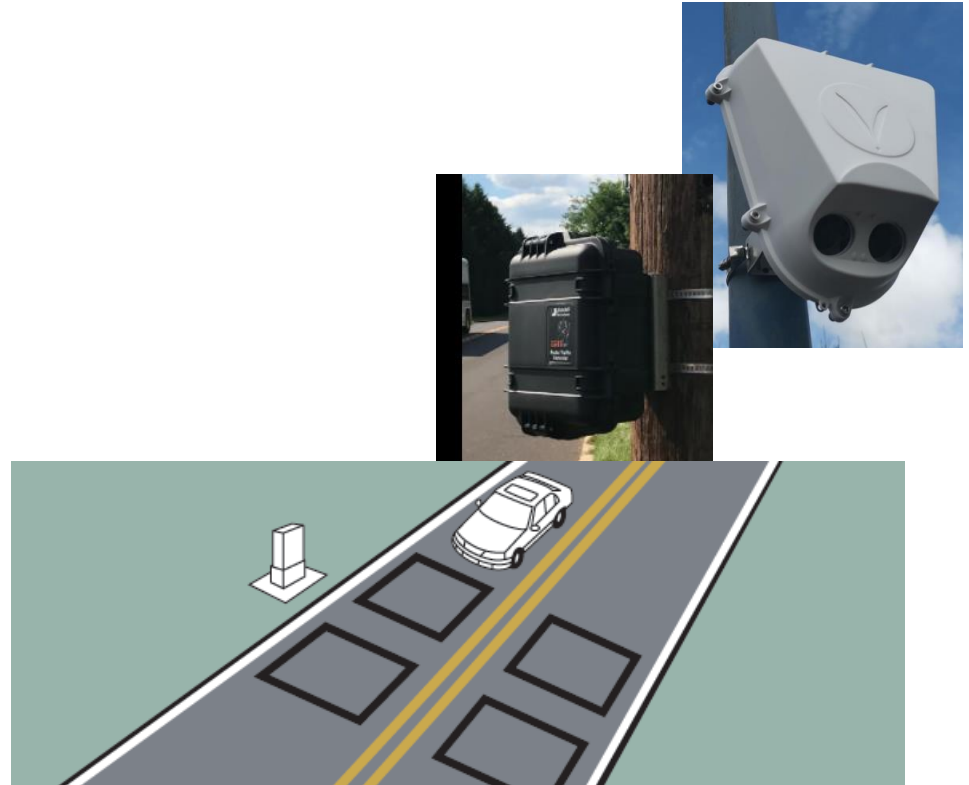
Central Management Systems

- Benefit to others
- Differing environments – Long / Short Range
 - Urban / Rural / Coastal
- Communications
 - Mobile, LoRa, Radio UNB



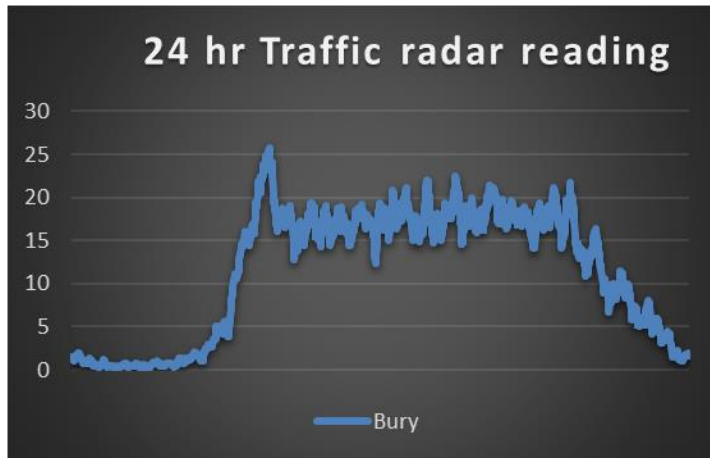
Adaptive Lighting

- Range of technologies:
 - Radar, video, loops
- Automated dimming
- Low latency / Hysteresis

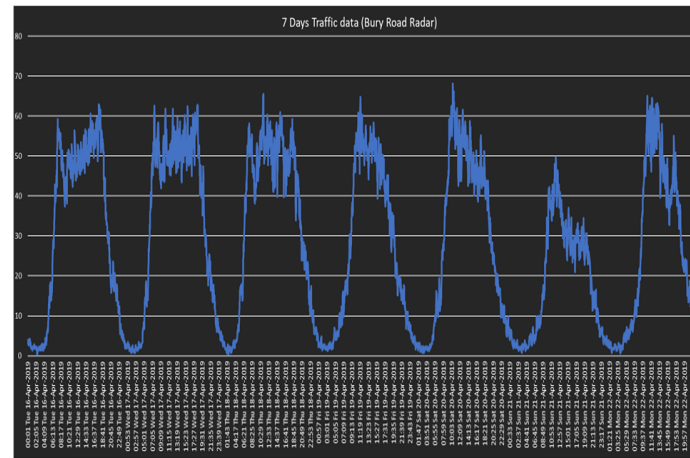


Adaptive Lighting

Traffic Monitored 2 minute interval basis

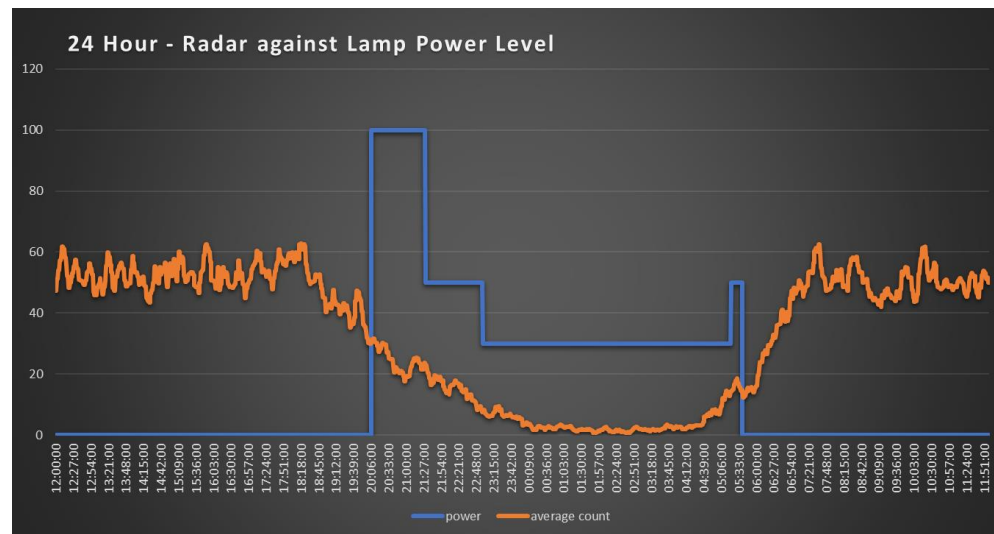


Weekday Changes



Adaptive Lighting

- Proof of concept Control Program.
- On at 70 lux falling. (20:07)
- Dim to 50% at 21:30 (veh = 50% peak)
- Adaptive control begins at 21:30 -
Traffic drops below threshold at 22:59,
Traffic rises above threshold at 05:21.
- Off at 05:39 35 lux rising.
- Adaptive control ends at 06:00



Adaptive Lighting

Resultant Control program

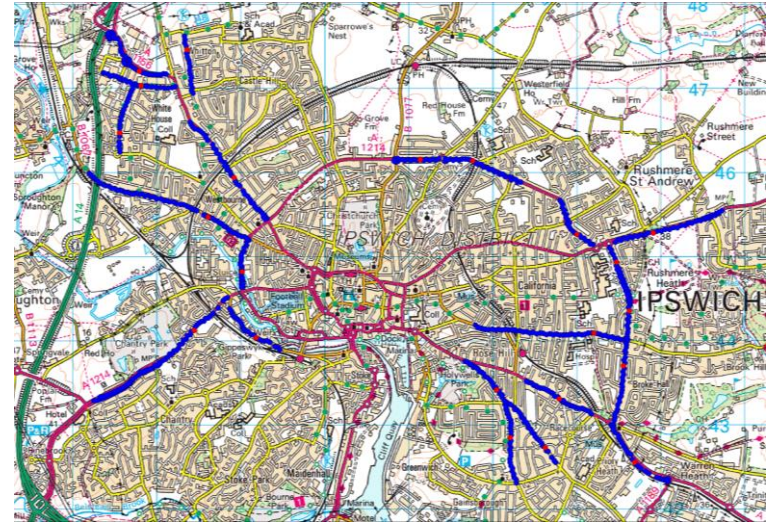
- All routes assessed were P2 class
- First dim allowed to 75% full power to P3 Class
- Second dim by further 33% of P3 class to P4 class.
- Adaptive lighting control extended from 18:30 to 06:00
- Dim by or dim to?!

Table 4: BS 5489-1:2013 - Lighting Classes of comparable level

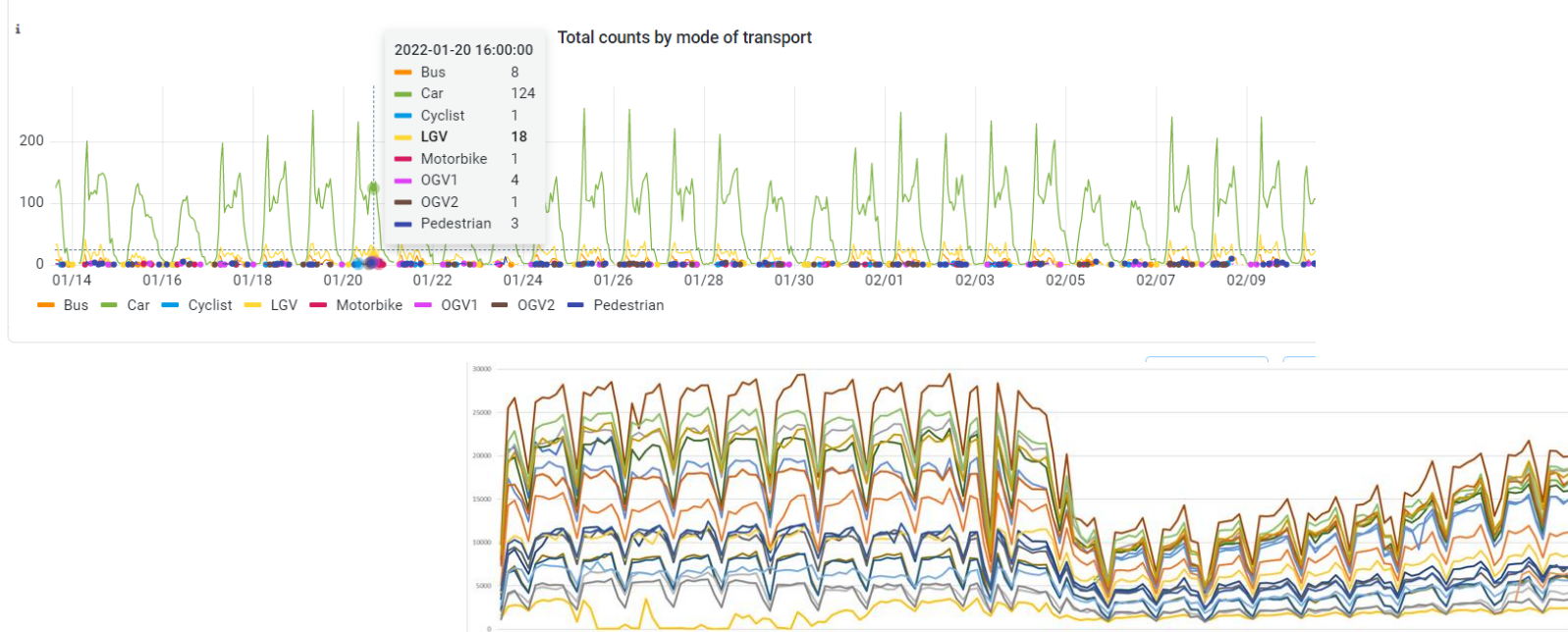
ME Class	CE Class	P Class	Required average illuminance (lux)	% dimmed compare to above class
-	C0	-	50	-
M1	C1	-	30	40%
M2	C2	-	20	33%
M3	C3	P1	15	25%
M4	C4	P2	10	33%
M5	C5	P3	7.5	25%
M6	-	P4	5	33%
-	-	P5	3	33%
-	-	P6	2	33%

Adaptive Lighting

- Nearly 1000 lights controlled
- Savings of 40% energy and cost above change to LED
- Energy price predicted to increase again next year (was 70% this year)
- Articles in national publication



Adaptive Lighting



- Future Aspirations – Road User

Stakeholder Engagement Highlights

- 2021 Speakers at HEA National Conference
- Published in National Journal for Lighting Professionals
- Speaker and Panel Member at National Highways Conference
- East of England European Lighting Professionals (ADEPT) Presentations
- October 2022 Illuminating Engineering Society (IES) – Dallas Tx
- Stakeholder Management / Public Engagement....



It has been a case in the lighting circles. If CEMs want to reduce and adapt to climate change, they need to look at the way they use their streetlights. As part of this, Suffolk County Council is investigating the potential for using traffic-dependent dynamic traffic adaptive lighting to reduce street lighting related carbon emissions.

This is the use of real-time traffic counting to adjust the street light levels, ensuring dimming periods of low road-usage, whilst being able automatically to raise lighting levels when required for higher volumes of traffic. Traffic-adaptive lighting enables the use of adaptive lighting, allowing levels of a group of streetlights to be dimmed or brightened based on real-time data from traffic counting systems.

Suffolk is building on several years of

research in to smart street lighting. In 2019, the council introduced smart LED lighting across its streetlights. This was a significant step in the direction of smart street lighting. The council is now looking at the way it can use smart street lighting to reduce carbon emissions. This is the use of real-time traffic counting to adjust the street light levels, ensuring dimming periods of low road-usage, whilst being able automatically to raise lighting levels when required for higher volumes of traffic. Traffic-adaptive lighting enables the use of adaptive lighting, allowing levels of a group of streetlights to be dimmed or brightened based on real-time data from traffic counting systems.

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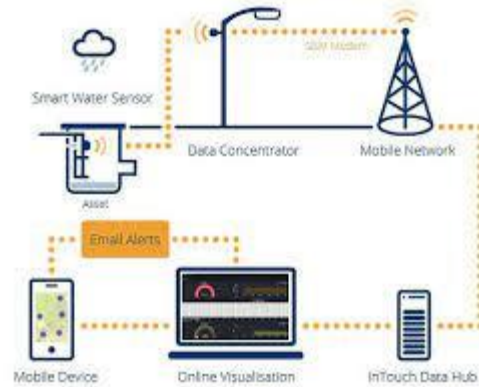
Winter Maintenance

- Road Surface Temperature
- Increased granularity
- Forecasting integration
- Grit Bin monitoring



Highway drainage

- Locations of interest
- Asset system integration
- Automated signage?



intouch
smartwater
drainage • sensors • management

Air Quality

- Huge increase in data
- NO_2 , O_3 , $\text{PM}_{2.5}$, PM_{10}
- Multiple users
- Potential end uses / Clear Air Routes



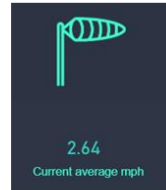
Data Insights



Adaptive Lighting

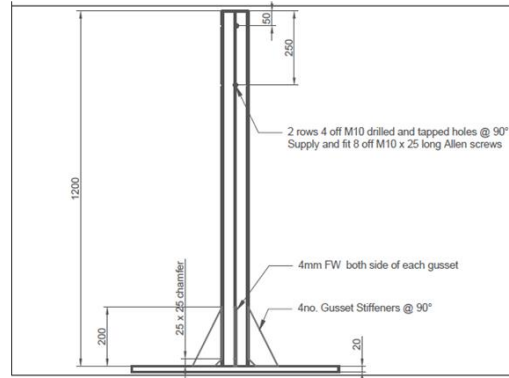
Wind Speed / Direction

Air Quality



Relieving congestion / modelling?

Solar

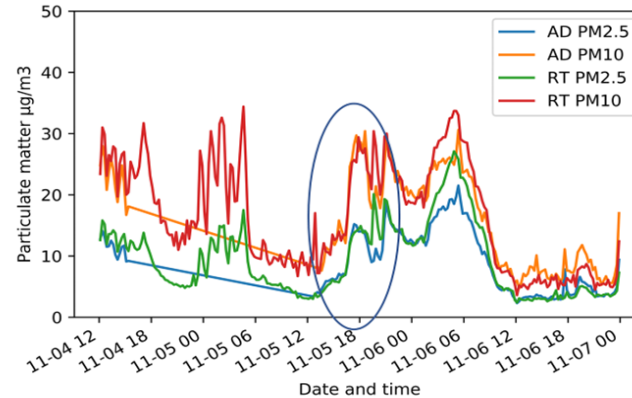


- Use of Planters
- Engineering Difficulty
- Bespoke baseplate designs
- Public Feedback



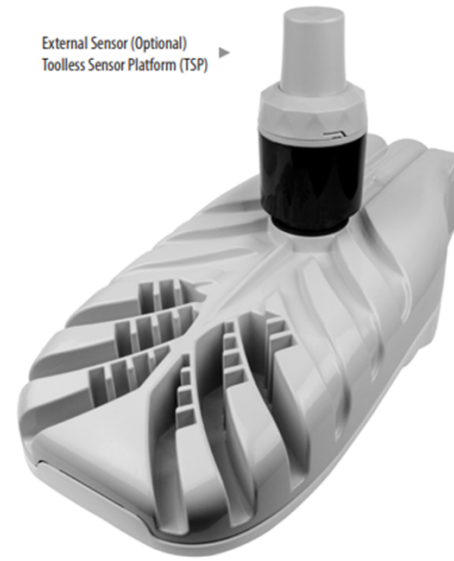
Selection of positive outcomes

- Adaptive Lighting up to 40% energy savings above the change to LED
- First large-scale particulate matter monitoring in Suffolk
- Accurate data being provided for winter maintenance and gully levels
- Public Feedback of solar solution very high
- Knowledge Share Platform to use and scale up nationally
- Business Cases formulated



Challenges

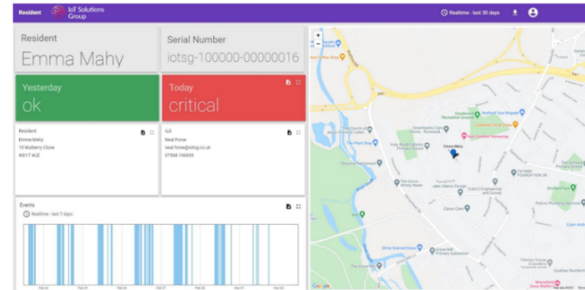
- COVID and delivery issues
- Bespoke Terms and Conditions
- Buy in from Asset Owners
- **Sensor installation**
- Benefits of plug and play option
 - Negates most traffic management and associated road space booking
 - No drilling of asset
 - No additional forces applied to lighting column that may reduce asset life
 - Speed



Non Highway Sensors



- Movement
- Temperature / Humidity
- Water Leak
- Light Path
- Our user experience



Knowledge share platform

- Repository for information
- Encouragement of debate and challenge
- Celebrate good practice
- Advice and guidance

