

Energy Strategy

for Roadside Equipment



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Executive Summary

The Energy Strategy for Roadside Equipment is to address issues associated with the supply of electricity to roadside equipment.

The objectives of the Energy Solutions Programme are to:

- Reduce the cost of electricity supply (currently c.£22M per annum)
- Reduce energy consumption (currently c.220M kWh per annum)
- Respond to the requirements of the Carbon Reduction Commitment Energy Efficiency Scheme
- Improve the accuracy of recording and reporting on electricity consumption
- Improve energy efficiency
- Give guidance on the provision of power supplies to equipment to meet scheme programmes
- Improve the resilience of power supplies
- Streamline the administration of the payment of electricity supply invoices

The Strategy is required to:

- Encourage national consistency for more effective management
- Provide a cohesive approach to research and development and improvement projects
- Provide visibility of intent and a forward trajectory to ensure outcomes and associated workstream priorities reflect the operational requirements of the business

The principal proposals of the Strategy are as follows:

- Trading / Procurement
 - Seek national consistency in management responsibility for road lighting, illuminated signs and traffic signals
 - Incentivise regions to improve energy efficiency, targeting interventions to those locations where most benefits will accrue
 - Use Central Purchasing Body (Buying Solutions) for electricity procurement and bureau services (as required), but subject to DfT wide procurement proposals
 - Consider a risk strategy (i.e. purchase in advance vs. closer to the time of consumption) for electricity procurement that will present best value for money
 - Give due regard to the requirement on the HA to host DfT wide electricity procurement
- Management
 - Strengthen the accuracy of, and accessibility to, the asset inventories
 - Through connection guidance, reduce the number of connections that are not on the national supply contracts
 - Automate consumption monitoring and invoice processing
 - Use software management systems to generate queries for resolution and management reports; including for carbon emission accounting
- Operation
 - Seek national consistency, including a National Framework Agreement with Distribution Network Operators

- For road lighting, light “at the right place, at the right time, at the right level” whilst maintaining or improving road user and workforce safety and reducing workforce exposure
- Technology
 - Continue research and development on alternative energy sources
 - Equip to enable road lights to be dynamically controlled
 - Use reduced energy lamps for road lighting, illuminated signs, message signals (VMS) and traffic signals
 - Provide / develop a toolkit of measures to reduce energy consumption in tunnels to the “best in class” standard
 - Include energy efficiency and sustainability in the consideration of the design and use of new equipment, including that in RCCs
- Change Programme
 - Programme rate of implementation to reflect the resources available (staff, finance, site operatives, Network occupancy)
 - Work through project life-cycle for the implementation of initiatives, planning for stage success and keeping stage periods (research to roll-out) to a minimum
 - Stagger the introduction of progressively more challenging initiatives, ensuring that initiatives are compatible with each other
 - Review the Change Programme as required to reflect changes to initiative evaluation parameters, alignment to the Strategy and to re-prioritise as necessary

Through the implementation of these proposals the outcomes of the Strategy are expected to be:

- Reduced energy costs
- Reduced carbon emissions
- Reduced maintenance and replacement of equipment
- Reduced workforce risk
- Reduced traffic management

1 Background

1.1 Purpose of this document

- 1.1.1 This document sets out the Highways Agency (HA) Energy Strategy for Roadside Equipment. This Strategy is not intended to be a definitive implementation plan but rather to act as a guidance framework for energy management, procurement, operation, and technology improvement.

1.2 Structure of this document

- 1.2.1 Following this Background section the Introduction section describes current energy procurement, management and operation within the HA whilst also identifying the current issues. The Key Principles are then presented including the aims and objectives behind the development of the Strategy. After detailing the strategic considerations used in its development the Strategy is presented and followed by a section on its implementation in terms of Change Management.

1.3 Life of this document

- 1.3.1 This document has been compiled to address current HA operational needs as well as the legislative and political requirements impacting on the HA's energy consumption. It is recommended that this Strategy be reviewed in one year (from publication) following more detailed work on its elements.

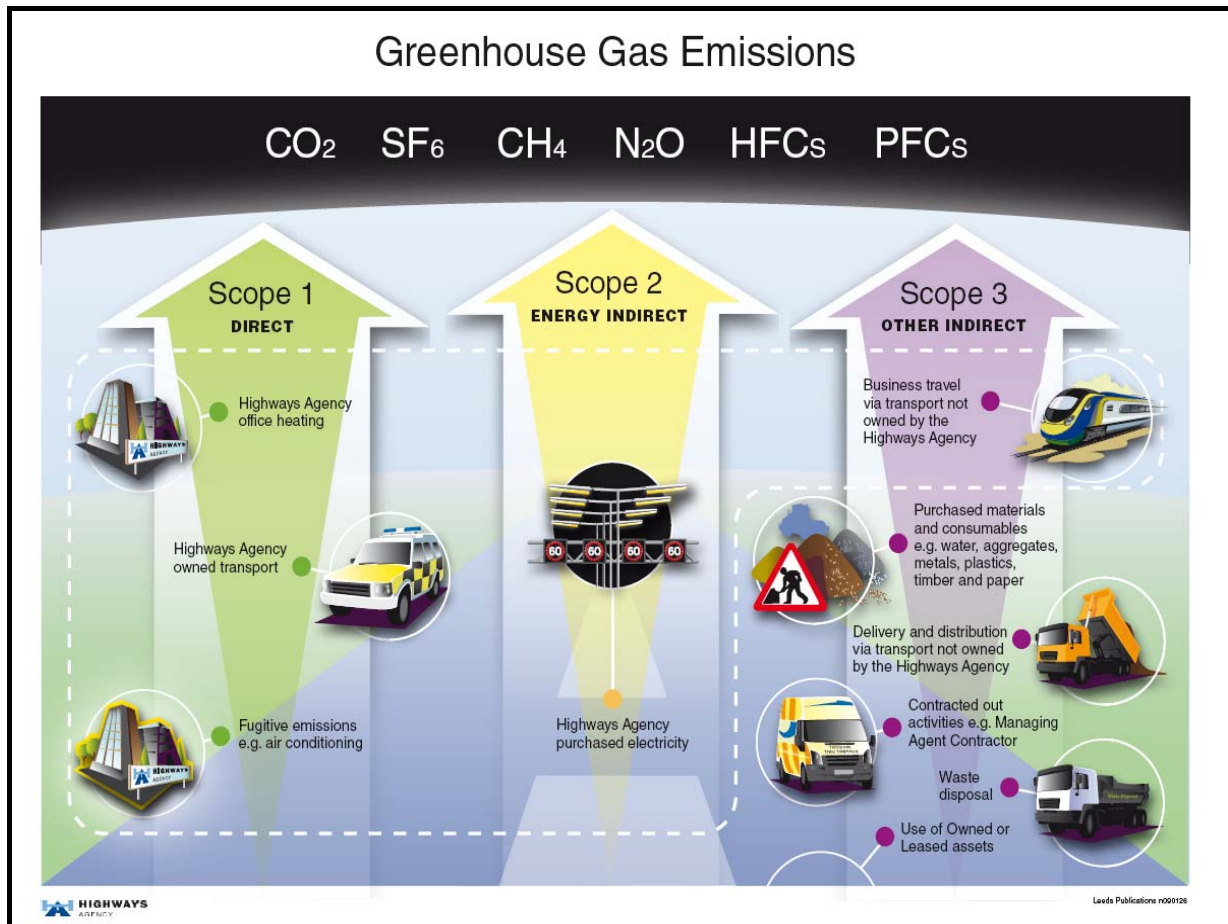
1.4 Overview

- 1.4.1 Currently the HA is procuring electricity through Buying Solutions (BS) which is one of the Office of Government Commerce (OGC) approved Central Purchasing Bodies (CPB).
- 1.4.2 BS provides the HA with four energy procurement options (referred to as National Framework Contracts) to cater for the various operational energy consumption needs.
- 1.4.3 In addition the HA needs to respond to the following key legislative requirements (Detailed in Appendix B):
- The Carbon Reduction Commitment (CRC) Energy Efficiency Scheme; this will require the HA to accurately record all electricity consumption which will facilitate the calculation of Carbon Credits for sustainability reporting
 - Green Public Procurement (GPP); a policy requiring the HA to take into account environmental factors when buying products, services or works and address their life-cycle impacts
 - Eco-design of Energy-Using Products (EuP); which focuses on energy consumption during the use of the product. This will require the HA to address the equipment design and its electricity usage during operation, standby and storage
- 1.4.4 The HA's annual operational electricity consumption is approximately £22M in financial terms for year 2008-2009. Road lighting consumes about 70% of this expenditure whilst the rest is expended by roadside electronic systems, the Regional Control Centres (RCCs) and their Outstations.

- 1.4.5 In late 2008, the HA commissioned a wider review of electricity procurement and connection operations. The aims of this review were to:
- Determine whether there is a need for a single team to manage and control the provision of electricity for roadside equipment
 - Identify best practice to manage electricity usage for the long term
 - Ensure that the HA can meet the requirements of the new government CRC Energy Efficiency Scheme
- 1.4.6 The review concluded that the HA needs to better manage the provision, operation and maintenance of energy to roadside equipment. The level of roadside equipment is being continually upgraded and expanded through schemes such as the Managed Motorways Programme. There is also increasing Government focus on energy consumption, to which the HA should respond, to ensure sustainability going forward.
- 1.4.7 This Strategy responds to these needs by:
- Encouraging national consistency for more effective management
 - Providing a cohesive approach to research and development and improvement projects
 - Providing visibility of intent and a forward trajectory to ensure outcomes affect business requirements
- 1.4.8 Fourteen technology initiatives have been identified as being within the scope of this Energy Strategy. These initiatives were identified through a process of direct engagement with stakeholders and a benchmarking exercise with other organisations of comparative energy usage within the UK and Europe.

1.5 **Scope**

- 1.5.1 This Strategy is limited to Scope 2 of the Greenhouse Gas Protocol as interpreted for HA use, and further limited to that related to roadside equipment, RCCs and their Outstations. The following diagram indicates this positioning relative to other elements of the Protocol.



Greenhouse Gas Emissions - HA Interpretation of Greenhouse Gas Protocol

- 1.5.2 The HA has been nominated to consider hosting the procurement of Utilities, including electricity, for DfT and its Agencies to ensure consistency and obtain best value. This Strategy gives due regard to the potential requirement on the HA to host DfT wide electricity procurement.
- 1.5.3 The Strategy takes due account of the consideration of energy consumption reporting to meet carbon accounting requirements.

2 Introduction

2.1 Strategic imperative

2.1.1 To respond to changing requirements and enhance its operational effectiveness the HA needs to:

- Manage expenditure in a volatile electricity market
- Improve the security and resilience of electricity procurement
- Respond to constrained resources by reducing electricity consumption and expenditure
- Comply with the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme
- Secure a consistent national approach to providing electricity supplies
- Maintain an up-to-date and accurate electricity asset inventory for facilitation of management decisions and accurate reporting
- Have a coherent approach to research and development to meet customer and operational requirements
- Respond to the potential of being nominated to be the host unit for Department for Transport (DfT) Utilities procurement.

2.1.2 A clear and coherent Energy Strategy for Roadside Equipment is required to overcome these challenges. The Strategy proposed in this document therefore prioritises the identified initiatives based on an understanding of the following:

- Stakeholder requirements
- Management requirements
- Operational requirements
- Technology developments

2.2 Approach

2.2.1 The Energy Strategy for Roadside Equipment has been developed in consultation with major stakeholders within, and external to, the HA. It also takes account of the relevant governing principles. The Strategy covers the following:

- Intelligence led management; including consumption monitoring, billing processes, performance monitoring, data capture process and procedures
- Operation; including Service Level Agreements with Distribution Network Operators (DNO), design and connection guidance
- Technology developments; including technologies to reduce energy consumption of lighting, communication systems, signs and signals, tunnels, Regional Control Centres (RCC) and their Outstations
- Procurement and trading; including the electricity procurement risk strategy and incentives for Managing Agent Contractors (MAC/TechMAC).

2.2.2 The resultant Strategy is not intended to be a definitive implementation plan, but rather to act as a guidance framework for energy management, procurement and operation. It also highlights the technology development and implementation decisions that are required to be made in the period to 2015.

3 Key Principles

3.1.1 The key principles upon which the Strategy development has been based are:

- To light the HA Network “at the right place, at the right time, at the right level”
- To provide a consistent national approach to actively manage energy consumption
- To promote sustainability in HA energy management, procurement and operation

3.1.2 The objectives of the Strategy are to:

- Reduce the cost of electricity supply
- Reduce energy consumption
- Respond to the requirements of the CRC Energy Efficiency Scheme
- Improve the accuracy of recording and reporting on electricity consumption
- Improve energy efficiency
- Provide guidance on the provision of power supplies to equipment to meet scheme programmes
- Improve the security and the resilience of power supplies
- Streamline the process of electricity payment administration

3.1.3 The Energy Strategy for Roadside Equipment, together with other strategies, supports the HA in achieving its primary objective “to deliver a high quality service to all our customers”.

4 Strategic Considerations

4.1 General

- 4.1.1 In 2008/2009 the HA's annual operational electricity consumption was approximately 220M kWh costing the public approximately £22M, 70% of which was for road lighting. The HA's aim is to reduce both electricity consumption and cost.
- 4.1.2 Organisations in the HA supply chain require a clear and coherent strategy, including policy and guidance, which will enable them to support the HA in achieving its aims and objectives.
- 4.1.3 The HA's primary objective is "to deliver a high quality service to all our customers by reducing congestion and improving reliability, improving road safety, respecting the environment and seeking and responding to feedback from our customers". (Highways Agency - Our Aims, Values and Objectives)

4.2 Trading and Procurement

- 4.2.1 The HA is required by Government policy, derived through the Pan Government Energy Project, to act collaboratively with other public sector bodies and use one of the Central Purchasing Bodies (CPBs) recommended by the OGC for energy procurement. The Pan Government Energy Project is implementing eight projects: risk management, sustainability, aggregation, supply chain development, standard terms and conditions, competitive dialogue, carbon trading and communications.
- 4.2.2 Consideration is being given to the HA becoming the host business unit for the procurement of Utilities for DfT. This Strategy needs to align with the procurement strategy that HA endorses for DfT and its Agencies.
- 4.2.3 The wholesale electricity market is volatile. The HA needs to ensure it has the best supply in terms of value for money.

4.3 Management processes

- 4.3.1 Currently a dedicated Electricity Team, together with supporting consultants, process the operational electricity consumption data and administer the payment processes. They process some 700 paper invoices every month.
- 4.3.2 There are more than 150,000 electricity consuming assets on the HA road network. These include but are not limited to road lighting, bollards, traffic signals, signs, communication systems, CCTV cameras, emergency roadside telephones and other devices such as weather stations. The number of such assets is increasing rapidly. To ensure accurate reporting / charging, an up-to-date and accurate asset inventory needs to be maintained. This is a requirement of the Connection Agreement for Unmetered Suppliers (UMS) signed by the HA and Distribution Network Operators (DNOs).
- 4.3.3 To effectively manage its asset, the HA needs to be able to audit the process of connections, fault repair performance, and asset data capture.
- 4.3.4 Accurate data is vital to intelligence led management. The prompt identification of significant changes in energy usage and patterns is highly desirable to ensure that faults are repaired and energy waste is minimised.
- 4.3.5 Electricity suppliers require accurate data on energy consumption to calculate costs.

4.3.6 The CRC Energy Efficiency Scheme (formerly known as the Carbon Reduction Commitment) managed by the Department of Energy and Climate Change (DECC) is the UK's mandatory climate change and energy saving scheme, due to start in April 2010. It is central to the UK's strategy for improving energy efficiency and reducing carbon dioxide (CO₂) emissions, as set out in the Climate Change Act 2008. Under this scheme the HA is required to monitor and report carbon consumption.

4.4 Operational requirements

4.4.1 There is a need to better ensure a consistent service level from all connection service providers. In addition the Electricity Team needs to be kept up to date on changes in roadside equipment configurations before invoices are received to enable invoice validation.

4.4.2 Connection guidance is also required for designers to achieve national consistency and better avoid potential delays in connections and post-implementation issues.

4.4.3 The need to save energy and reduce overall carbon emissions requires the HA to reconsider the current lighting requirements on its road network.

4.5 Technology initiatives

4.5.1 There are various research and development projects in the HA with the objectives of saving energy and reducing carbon emissions. A coherent and consistent national approach is required to coordinate these initiatives and ensure outputs satisfy operational needs.

4.5.2 The following table summarises the previously identified technology initiatives with their description. These initiatives are being prioritised and considered coherently to partially deliver the Strategy described in the next section.

Ref	Technology	Description
T01	Reduce power requirements	Reduce power requirements for power supplied to individual components to reduce energy consumption on the HA road network.
T02	Power generation	Generate power and partner with electricity suppliers to feed to National Grid.
T03	Alternative energy sources	Provide alternative means to supply power to roadside equipment (e.g. equipment in remote locations). This includes generators, fuel cells etc and 'green' alternatives such as wind turbines and solar panels.
T04	Electronic ballasts for road lighting	Also referred to as control gear. These use solid state electronic circuitry to provide the correct starting and operating electrical conditions to power lamps to improve efficiency, therefore saving energy and enable lighting control.
T05	Reduced energy lamps for road lighting	This includes energy efficient lighting technologies such as metal halide lamps, discharge lamps, Compact Fluorescent Lamps (CFL) and LEDs. The aim is to reduce energy consumption and whole life costs (from reduced maintenance and longer lifespan of equipment etc).
T06	LED Matrix signals	Changing to LEDs to reduced energy lamps. This reduces energy consumption and whole life cost.

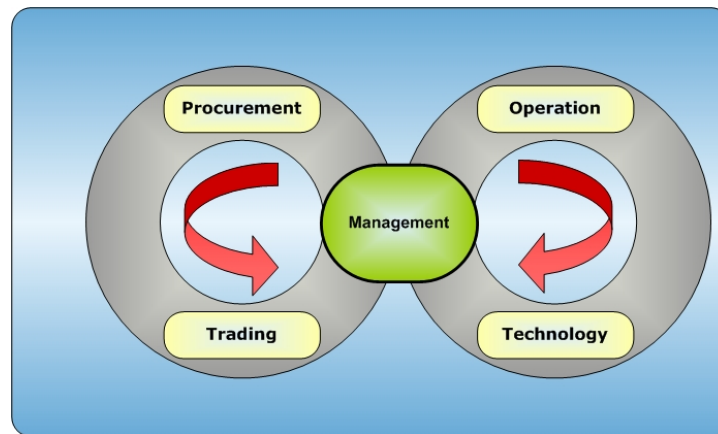
T07	High reflective material used for signs	Highly reflective material will increase the visibility of signs in lower light conditions (e.g. part night or dimmed areas).
T08	Controlled sign lighting	This involves the use of photocells for control which produce a current or voltage when exposed to light and can be used to control 'on' and 'off' times of signs and also measure sign lighting energy consumption.
T09	Reduced energy lamps for signs	The replacement of existing lamps with LEDs to provide the maintenance benefits of increased lifespan, also helping to reduce energy consumption.
T10	LED traffic signal	LEDs are currently being used to replace existing lamps in traffic signal heads to reduce energy usage and whole life cost.
T11	Technologies to reduce tunnel energy	The use of a lighter colour roof and/or road surface increases overall luminance inside the tunnel, thus reducing the number of luminaires required to meet the lighting requirements and safety levels. This will reduce energy consumption and whole life cost.
T12	Voltage optimisation in RCCs and Outstations	Specialist optimisation devices can be installed to reduce power consumption (and ultimately cost) by reducing and stabilising the supplied voltage to a piece of equipment in RCCs or Outstations.
T13	Central Management System	A central system to manage road lighting in order to achieve such functions as dimming, trimming, switch on/off, and to monitor overall system performance.
T14	Alternative Lighting (Mesopic lighting)	This involves the specification of lighting requirements based on different wavelength/colour of the lighting that utilises the drivers' intermediate vision to reduce the lighting levels required, whilst not impacting on safety levels. This could improve overall lighting design and save energy.
T15	Trimming	This technique is to optimise lighting switch regimes in order to refine the appropriate lighting switch on/off time to save energy
T16	Mid-life lighting assessment	A review to assess the lighting requirement and identify whether lighting is required to maintain road safety.

5 The Energy Strategy for Roadside Equipment

5.1 Strategy Initiatives

5.1.1 The initiatives to address identified issues and deliver the Highways Agency Energy Strategy for Roadside Equipment are summarised within this section. This covers the whole process of energy procurement through new connections to energy use to invoicing and payment processes.

5.1.2 There is an ongoing inter-relationship between the five key elements of energy management. This is represented in the figure below and described further in the following sub-sections.



The inter-relationship between the key elements of energy governance

5.1.3 To achieve a high quality service, the establishment of a “one-stop shop” energy management team is recommended to provide consistency and a clear point of responsibility. This will deliver a better coordinated approach to energy procurement, management, operational guidance and administration.

5.2 Trading and Procurement

- **Seek national consistency in management responsibility for road lighting, illuminated signs and traffic signals.**
- **Incentivise regions to improve energy efficiency, targeting interventions to those locations where most benefits will accrue.**
- **Use Central Purchasing Body (Buying Solutions) for electricity procurement and bureau services (as required), but subject to DfT wide procurement proposals.**
- **Consider a risk strategy (i.e. purchase in advance vs. closer to the time of consumption) for electricity procurement that will present best value for money.**
- **Give due regard to the requirement on the HA to host DfT wide electricity procurement.**

5.2.1 The HA will continue to review services provided by all CPBs and independent organisations to ensure best value for money and to use one of the Office of Government and Commerce approved CPBs for energy procurement. This route can help to avoid the lengthy OJEU process, and is consistent with the Pan Government Energy Project recommendations which aim to promote best practice, share knowledge with all public sectors and provide advice and guidance on energy procurement. These

recommendations have been accepted as government policy.

- 5.2.2 To achieve best value for money in energy procurement the HA should develop and agree a suitable procurement risk management strategy. This should be done in conjunction with the HA's stakeholders and form a framework which:
- Adheres to Best Practice
 - Fits with the DfT and HA electricity procurement policy
 - Is commercially viable, realistic and achievable
 - Is supported and understood by all stakeholders.
- 5.2.3 This procurement risk management strategy should be supported by an agreed governance procedure. Through the governance procedure the following will be determined:
- Membership/Terms of Reference of the governing body
 - The objectives of the risk management strategy
 - Roles and responsibilities within the organisation;
 - The means by which trading is executed, monitored and reported
 - The means by which changes to the risk strategy are agreed
 - How the selected risk strategy has performed in line with the objectives
- 5.2.4 Following the establishment of an appropriate measurement system where it can identify its energy efficiency to the required level, the HA will be able to better incentivise its maintenance service providers. The MAC/TechMAC and PFI contractors will be required to implement measures that promote energy saving and carbon reduction.
- 5.2.5 To achieve national consistency, the HA should ensure clear and consistent management responsibility for road lighting, illuminated signs and traffic signals.

5.3 Management

- **Strengthen the accuracy of, and accessibility to, the asset inventories.**
- **Through connection guidance, reduce the number of connections that are not on the national supply contracts.**
- **Automate consumption monitoring and invoice processing.**
- **Use software management systems to generate queries for resolution and management reports; including for carbon emission accounting.**

- 5.3.1 To save its internal administration resources the HA Electricity Team will review the energy invoice and payment process, automating it where practical. This could be through adoption of an electronic system that reduces the overall number of paper invoices and enables more comprehensive analysis of historical data.
- 5.3.2 Data is a vital input to intelligence led management. A data capture system and process will be required to monitor and audit the performance of the DNOs and MAC/TechMAC in energy supply and energy savings.
- 5.3.3 In order to meet the requirements of the CRC Energy Efficiency Scheme the HA will

establish appropriate processes and procedures to accurately and effectively monitor energy consumption. The online management of electricity consumption could help to identify significant changes in energy usage and patterns to ensure that energy waste is minimised.

- 5.3.4 By identifying suitable parameters and combining existing data sets the HA will classify its network in terms of energy efficiency to monitor the performance of the road network and assist in targeting intervention.

5.4 Operation

- **Seek national consistency, including a National Framework Agreement with Distribution Network Operators.**
- **For road lighting, light “at the right place, at the right time, at the right level” whilst maintaining or improving road user and workforce safety and reducing workforce exposure.**

- 5.4.1 The HA will work closely with DNOs regarding connection provision. This will help to ensure national consistency in energy supply. To successfully achieve this the HA will:

- Review the standards set up by OfGEM on Distribution Network Operator (DNO) service performance
- Identify its own requirements
- Negotiate a National Framework Agreement with DNOs and provide them with client focal point(s)
- Set up local agreements with each DNO for minor variances

- 5.4.2 For the HA supply chain operations the HA will:

- Investigate the feasibility of encouraging DNO / Independent Connection Providers (ICP) competition for new installations
- Provide clear guidance and advice on connection provision to rationalise invoices outside the National Framework Contracts for electricity supplies
- Move to Automatic Meter Reading (AMR) for new and existing installations to reduce administrative costs and improve workforce safety

- 5.4.3 The HA will continue research to determine criteria via data analysis, desktop study, driver simulation and pilots to improve lighting requirement and design guidance to support the objective of providing lighting “at the right place, at the right time and at the right level”.

5.5 Technology

- **Continue research and development on alternative energy sources.**
- **Equip to enable road lights to be dynamically controlled.**
- **Use reduced energy lamps in road lighting, illuminated signs, message signals (vms) and traffic signals.**
- **Provide / develop a toolkit of measures to reduce energy consumption in tunnels to the “best in class” standard.**
- **Include energy efficiency and sustainability in the consideration of the design and use of new equipment, including that in RCCs.**

5.5.1 Initially the HA will deploy currently available technology at its disposal to reduce energy consumption and meet the CRC Energy Efficiency Scheme requirements. The next stage will be for the HA to appraise emerging technologies for the purpose of promoting sustainability including lower electricity consumption. The following initiatives are proposed to be implemented subject to satisfactory business cases:

- To deploy a Central Management System (CMS) that will monitor lighting performance, achieving dimming, trimming and partial night lighting
- To progressively install an energy efficient and manageable lighting system, including reduced energy lamps, electronic ballast installation and LED lamp application
- To progressively install an energy efficient communication system including reducing component energy consumption
- To progressively install energy efficient sign lighting, including using Class 1 reflective materials to minimise lighting requirements, using photocells to control the sign lighting time and using LED sign lighting lamps
- To progressively install energy efficient traffic signal lighting, including using LED signal heads
- Energy saving measures in RCCs and their Outstations, including investigation into the optimisation of incoming supply

5.5.2 In addition to the above initiatives the HA will investigate the following:

- Tunnel energy usage; a systematic coherent approach to investigate new technologies with a view to reducing energy consumption. This includes providing a toolkit to reduce energy consumption in tunnels to the “best in class” standard including the consideration of lighter road surfaces, lighter tunnel roof linings and using reduced energy lamps.
- Use of alternative energy sources, including solar panels, wind turbines and the impact on overall energy consumption of their wider use.
- Alternative lighting (Mesopic lighting) to save energy.

6 Change Programme

- **Programme rate of implementation to reflect the resources available (staff, finance, site operatives, Network occupancy)**
- **Work through project life-cycle for the implementation of initiatives, planning for stage success and keeping stage periods (research to roll-out) to a minimum**
- **Stagger the introduction of progressively more challenging initiatives, ensuring that initiatives are compatible with each other**
- **Review the Change Programme as required to reflect changes to initiative evaluation parameters, alignment to the Strategy and to re-prioritise as necessary.**

- 6.1.1 As given in para. 4.5.2, sixteen technology initiatives have been identified within the scope of this work. Some of these are currently being implemented or piloted. New initiatives will be progressively implemented as development matures. The rate of delivery is dependent on the resources available (staff, finance, site operatives, Network occupancy), and where possible will be implemented as part of wider schemes or as part of the maintenance regime. All initiatives require a business case and a safety case before being implemented.
- 6.1.2 A live change management programme will be developed and all initiatives reviewed to reflect changes to the initiative evaluation parameters, alignment to the Strategy and to re-prioritise as necessary based on benefit cost analysis, including operational and environmental impact. This will ensure the HA obtains value for money in achieving energy savings, and responding to the sustainability agenda.
- 6.1.3 Implementation of initiatives will proceed through a project life-cycle, planning for stage success and keeping stage periods (research to roll-out) to a minimum.
- 6.1.4 Introduction of more challenging initiatives will be progressively staggered ensuring that initiatives are compatible with each other.
- 6.1.5 A carbon reduction delivery plan and monitoring tool will be developed to assist in prioritising initiatives to achieve both short term and long term targets.

7 Long term initiatives

7.1.1 In the longer term there are opportunities for further research and benefit realisation including:

- Partnering with alternative energy providers to generate electricity and supply any surplus to the National Grid
- As technology develops to utilise LED lighting in locations requiring high luminance levels e.g. motorways
- Reduce luminance level standards for road lighting
- Reduce illumination requirements for signs

8 Abbreviations

Item	Description
AMR	Automatic Meter Reading
BS	Buying Solutions
CFL	Compact Fluorescent Lamps
CPB	Central Purchasing Body
CRC	Carbon Reduction Commitment
CMS	Central Management System
DECC	Department of Energy & Climate Change
DfT	Department for Transport
DNO	Distribution Network Operator
EuP	Energy-Using Products
GPP	Green Public Procurement
ICP	Independent Connection Providers
LED	Light Emitting Diode
MAC	Managing Agent Contractors
NFC	National Framework Contract
OfGEM	Office of Gas & Electricity Markets
OJEU	Official Journal of the European Union
OGC	Office of Government Commerce
PFI	Private Finance Initiative
PSA	Public Service Agreement
RCC	Regional Control Centre
TechMAC	Technology Managing Agent / Contractors
VMS	Variable Message Sign

Appendices

Appendix A: Reference List

Andy Collines, Tom Thurrell, Robert Pink and Jim Feather, Dynamic Dimming: The future of Motorway Lighting, The Lighting Journal, Sep./Oct. 2002

DEFRA, 2008, Policy Brief: Improving the Energy Performance of Street Lighting and Traffic Signals.

DECC, 2010. CRC Energy Efficiency Scheme [online]

http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/crc.aspx [Retrieved March 09, 2010].

DECC, 2010. CRC Energy Efficiency Scheme user guide. [online]

http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/compliance/compliance.aspx [Retrieved March 09, 2010]

Elaxon, 2005. BSC Procedure BSCP520

European Commission, 2004. Buying green! A Handbook on Environmental Public Procurement

European Commission, 2008. Public Procurement for a Better Environment

BSREC, 2007, Intelligent Road and Street Lighting in Europe (E-Street),

Highways Agency, 2010. The Highways Agency's Strategic Plan 2010 -15

Lancashire County Council, 2008, Sustainable Development Overview and Scrutiny Committee.

Northern Alliance for Greenhouse Action (NAGA), 2008, Sustainable Public Lighting Testing Program

OfGem, 2008. Gas and Electricity Connections Industry Review 2007-08

OGC, 2008. OGC guidance on Central Purchasing Bodies

Appendix B: Key Legislative Requirements

CRC Energy Efficiency Scheme

“The CRC Energy Efficiency Scheme (formerly known as the Carbon Reduction Commitment) is the UK’s mandatory climate change and energy saving scheme, due to start in April 2010. It is central to the UK’s strategy for improving energy efficiency and reducing carbon dioxide (CO2) emissions, as set out in the Climate Change Act 2008. It has been designed to raise awareness in large organisations, especially at senior level, and encourage changes in behaviour and infrastructure. The schemes amended title serves to better reflect the CRC’s focus on increasing energy efficiency.”

http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/crc.aspx

Green Public Procurement (GPP) and Energy Using Products (EuP)

This is a process requiring public Authorities to take account of environmental factors when buying products, services or works and addresses their life-cycle impact and also links to the ‘Energy Using Products’ (EuP) Directives, which focus on energy consumption during the use of the product.

Road lighting has a high public profile and on average the units are on for 4,000 hours a year, with a lifespan of around 30 to 40 years. Therefore it is seen that there is a potential for a range of energy efficiency measures that can be implemented, which include technology changes, design and improved management, and control. Road lighting, along with traffic signals, clearly fits as a product group to be included with GPP and EuP.

<http://efficient-products.defra.gov.uk/cms/product-strategies/subsector/commercial-lighting>

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:076:0017:0044:EN:PDF>

Appendix C Sustainability Assessment

SUSTAINABLE DEVELOPMENT QUESTIONNAIRE TO BE INCLUDED IN ALL 'FOR DECISION' PAPERS					
RECOMMENDATION		(Include recommendation here)			
AREA	IMPACT OF RECOMMENDATION IN TERMS OF:	RESPONSE			COMMENTS
		CONTRIBUTION (Tick)			
		+IVE	0	-IVE	
Economy	Journey time reliability for road users		X		
	Impact on whole life costs	X			Energy consumption of tech/comms assets to be prioritised
	Value for money	X			More efficient procurement of energy to suit the Agency's operational requirements
	Making best use of HA's existing assets (road infrastructure, lighting, IT etc.)	X			Adapting usage to accommodate efficiencies
Social	Safety (H&S compliance, safety of HA staff, roadworkers, contractors & users, accidents, crime & fear of)		X		
	Wellbeing of staff/public.		X		
	Accessibility		X		
	Use of more sustainable forms of travel.		X		
	Communities.		X		
Environment	Carbon emissions	X			Direct correlation to energy consumption
	Biodiversity and habitats		X		
	Noise/vibration from the network		X		
	Visual impacts of the network (lighting, signs, gantries)	X			Potential reduction in lighting on network
	Physical changes to countryside		X		
	Demand for new materials/increase use of recycled and sustainable materials		X		
Sound Science	Quality of water/reduce flood risk		X		
	Consideration of long term issues (3-25 years)	X			Any decisions to change human resources, physical assets or procurement processes must be seen in the long term
	Research and development, improving/sharing knowledge	X			R&D initiated
	Evidence base used, best practice and benchmarking	X			Benchmarking exercises carried out
	Standards, guidance, legislation, government policy	X			Energy Strategy sits against background of carbon legislation
	Sensitivity to changes in underlying assumptions	X			Assumptions should be periodically challenged
Governance	Consultation, participation, engagement, education.	X			Enhanced engagement essential to effect change
	Corporate performance, HA objectives, scorecard, KPI, PSA targets	X			Cost, carbon, CSR boxes all ticked
	Compliance with HA procedures, WwW	X			Enhanced procedures for data capture
	Budget	X			Any investment should be

					recouped in overall energy savings
	Regularity/Propriety		X		
	Risk management	X			The HA will better manage risk as a result of an energy strategy
	Getting the best from people and/or encouraging creativity from suppliers	X			Clear guidance to promote overall efficiency in every business area
	Corporate reputation.	X			Resolution required of issues surrounding MNSO