enterprise M3
Driving prosperity in the M3 corridor

coast to capital
local enterprise partnership

SOUTH EAST
LOCAL ENTERPRISE
PARTNERSHIP

EnergySouth2East

Action Plan and Project Models

Version 8.0

This Action Plan provides a clear pathway in delivering the Energy Strategy achieving the Vision through Clean Growth for our three tri-LEP areas; Enterprise M3, Coast to Capital and South East LEP. Implementing the Action Plan through the South East Energy Hub, LEP resources and the relevant stakeholders will provide clean, sustainable growth for the south east region while realising a fair share of the reduction in emissions of CO2 for which the nation is committed through the fifth UK Carbon Budget to 2032.

If this Action Plan is delivered in line with the recommended Project Models, by 2032 the tri-LEP region will have achieved:

- Secured investment in the region of £14.755 billion in commercially and technically viable projects that deliver healthy returns to stakeholders
- Delivered a reduction in CO2 emissions across the electricity, heat and transport sectors of 13,615 kT CO2e
- Transition of 47,455 GWh of energy from polluting, high-carbon generation sources to clean energy sources
- And created or secured 75,652 jobs across the tri-LEP area

It is clear that the scale and ambition embodied in this Action Plan is massive, requiring strong leadership, the deployment of significant resources and investment, a lot of which is perhaps not in place today.

Project Model	Project Model	Potential Action	Action Leads	Timeline
#1	**District Heat Network (DHN) rollout** England has a target to get 18% of all heat generation and distribution into network infrastructure by 2050. For the Local Energy Strategy, the Local Authorities will aim to deliver DHN projects to achieve 9% for heat within the tri-LEP region by 2032.	Review, analyse and priority rank HNDU DHN project applications to unlock up-to 5 DHN pending projects to be used as Demonstrators.	Commissioned by LEPs; the activity can be scoped to cover the south east region, so this could be undertaken by the Greater South East Local Energy Hub.	Immediate
		Conduct feasibility studies of the identified (up-to) 5 DHN projects and commence development as Demonstrators	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub	Short-term
		Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, LEP energy networks/groups	Short-term
		Delivery of (up-to) 5 DHN Demonstrators - with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Project leads, Local Authorities and DHN developers	Short-term
		Commence roll-out of a targeted 144 DHN projects across the tri-LEP region, based on learning from the DHN Demonstrators	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub	Medium-term
#2	**Off-gas grid homes** A range of interventions to update heating technology and improve insulation are developed within this Project Model to reduce	Setup district working groups with Southern Gas Networks to identify 3 target communities, one for each LEP, to be used as Demonstrators: - identify support requirements - define, allocate and recruit resources - develop detailed action plan	Tri-LEP Strategic Energy Delivery Group and Southern Gas Networks	Immediate
		Conduct feasibility studies of the identified target community projects and commence development as Demonstrators	Local Authorities	Short-term

Project Model	Project Model	Potential Action	Action Leads	Timeline
	energy consumption and move all off-gas homes in the tri-LEP region towards sustainable, low carbon sources.	Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, LEP energy networks/groups	Short-term
		Delivery of the 3 Demonstrators - with sharing of lessons learned around the funding mechanisms, technical delivery and delivery operations	Project leads, Local Authorities and Southern Gas Networks	Short-term
		Commence roll-out of full programme to connect all off-gas grid homes across the tri-LEP region, based on learning from the 3 Demonstrators	Tri-LEP Strategic Energy Delivery Group and Southern Gas Networks	Medium-term
#3	**<u>Hydrogen injection into the Natural Gas Grid</u>** The UK has a world class gas grid delivering heat conveniently and safely to over 83% of homes. Emissions could be reduced by lowering the carbon content of the natural gas through blending with hydrogen.	Facilitate investment and development discussions/ workshops with National Grid Gas, Southern Gas Networks and key regional stakeholders (supply chain, representative bodies, etc.) to develop Demonstrator project at large-community scale (as a minimum)	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub National Grid Southern Gas Networks	Short-term
		Conduct feasibility study of the identified project and commence development of the Demonstrator	Project working group	Short-term
		Delivery of the Demonstrator project - with sharing of lessons learned around the technical delivery, impact on the consumers and their response, funding mechanism and operations	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub, National Grid Southern Gas Networks	Short-term
		Commence full programme to inject hydrogen into the gas grid across South East region and / or English gas network, based on learning from the Demonstrator project	National Grid Southern Gas Networks	Medium-term
#4	**<u>Offshore wind development</u>** The UK Offshore Wind Industry is on trajectory to reach the 10GW mark as early as 2020. Offshore wind opportunities for the tri-LEP area exist with Crown Estate block release in coming years – the LEPS will be a key facilitator in commercialising and supporting supply chain infrastructure developments.	Identify all key stakeholders relevant to Offshore Wind development and setup regular Collaborative committee to regularly refresh and maintain outreach across the industry with developers, Crown Estate and key regional stakeholders such as supply chain, representative bodies, etc.	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, LEP energy networks/groups	Short-term
		Undertake programme of workshops and engagement with industry to clearly identify key initiatives and interventions to support and further develop the plan for the delivery of Offshore Wind in the south east region	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, LEP energy networks/groups	Short-term
		Trial interventions (e.g. policy changes, enterprise funding, supply chain engagement / support, etc.) with sharing of lessons learned around the business model, investment mechanism, etc.	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, LEP energy networks/groups	Medium-term
		Based on outcomes from trial interventions, develop and commence medium-term road map for encouraging further Offshore Wind in south east region through engagement with stakeholders	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub,	Medium-term
#5	**<u>Solar and microgrid on landfill sites</u>** Former landfill sites are ideal for solar developments as they have little	Engage market to identify solar, wind and renewables project pipeline. Review, analyse and priority rank project to unlock up-to 5 pending projects to be used as Renewables Demonstrators.	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub,	Short-term
		Conduct feasibility studies of the identified (up-to) 5 projects and commence development as Renewables Demonstrators	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub, relevant Local Authorities and developers	Short-term

Project Model	Project Model	Potential Action	Action Leads	Timeline
	productive value and require years of remediation. The tri-LEP region has a large number of landfill sites under Local Authority ownership; these can be pooled to create a large renewable energy portfolio attractive to large scale investment.	Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, LEP energy networks/groups	Short-term
		Delivery of (up-to) 5 Renewables Demonstrators - with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, Local Authorities and developers	Short-term
		Commence roll-out of a targeted 80 landfill renewables projects across the tri-LEP region, based on learning from the Renewables Demonstrators	Tri-LEP Strategic Energy Delivery Group, Local Authorities, Greater South East Local Energy Hub, Local Authorities and developers	Medium-term
#6	**<u>Biomass fuel supply chain development</u>** The yield from the significant woodland resources in tri-LEP region can be taken through a sustainable and localised supply chain to support community biomass heating projects; such projects can be considered both for "on gas grid" situations in the form of urban heating network schemes, but also as potentially being a key provider of an off-grid community heating system.	Identify all key stakeholders relevant to Biomass development and setup regular Collaborative committee to regularly refresh and maintain outreach across the industry such as supply chain, representative bodies, communities, etc.	Commissioned by LEPs and bringing in appropriate Local Authority actors / community / business parties as identified If the activity can be scoped to cover the south east region, this could be undertaken by the Greater South East Local Energy Hub.	Immediate
		Setup working group with stakeholders to: - determine trial locations and associated community / business and Local Authority actors - identify support requirements - define and allocate resources - develop detailed action plan	Tri-LEP Strategic Energy Delivery Group	Short-term
		Undertake programme of workshops and engagement with industry to clearly identify key initiatives and interventions to support and further develop the plan for the delivery of Biomass in the south east region	Tri-LEP Strategic Energy Delivery Group Local Authorities Stakeholders	Short-term
		Trial interventions (e.g. policy changes, enterprise funding, supply chain engagement / support, etc.) with sharing of lessons learned around the business model, investment mechanism, etc.	Tri-LEP Strategic Energy Delivery Group and appropriate actors	Short-term
		Based on outcomes from trial interventions, develop and commence medium-term road map for developing Biomass in south east region through engagement with stakeholders	Tri-LEP Strategic Energy Delivery Group and appropriate actors	Medium-term
#7	**<u>Solar energy for Network Rail</u>** In the Tri LEP region the Kent, Sussex and Wessex rail routes together consumed 1.38TWh of traction electricity in 2015/16, at a total cost to train operators of £ 114M. Analysis indicates that each traction substation in the Southern Region should on average	Identify all key stakeholders relevant to Renewables development along with Network Rail and setup regular Collaborative committee to regularly refresh and maintain outreach across the industry with developers, Community Energy South, Riding Sunbeams project and key regional stakeholders such as supply chain, representative bodies, etc.	Tri-LEP Strategic Energy Delivery Group and relevant Local Authorities Community Energy South Network Rail Greater South East Local Energy Hub	Immediate
		Engage market to identify solar, wind and renewables project pipeline. Review, analyse and priority rank project to unlock up-to 5 pending projects to be used as Renewables Demonstrators.	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub Network Rail	Short-term
		Conduct feasibility studies of the identified (up-to) 5 projects and commence development as Renewables Demonstrators	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub Network Rail, Community Energy groups	Short-term

Project Model	Project Model	Potential Action	Action Leads	Timeline
	be able to comfortably accommodate intermittent supply from a connected ~1MWp solar array.	Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub	Short-term
		Delivery of (up-to) 5 Renewables Demonstrators - with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub Network Rail, Community Energy groups, local developers	Short-term
		Commence roll-out of a targeted 200 renewables projects across the tri-LEP region, based on learning from the Renewables Demonstrators	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub	Medium-term
#8	**Car parks - solar potential** Through the innovative integration of three technologies, solar PV (in the form of solar carports), battery storage and electric vehicle charge-points, it is now possible to turn carparks into power stations,	Engage market to identify solar, wind and renewables project pipeline. Review, analyse and priority rank project to unlock up-to 5 pending projects to be used as Renewables Demonstrators.	Commissioned Tri-LEP Strategic Energy Delivery Group bringing in appropriate Local Authorities and developers	Short-term
		Conduct feasibility studies of the identified (up-to) 5 projects and commence development as Renewables Demonstrators	Tri-LEP Strategic Energy Delivery Group relevant Local Authorities	Short-term
		Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub	Short-term
		Delivery of (up-to) 5 Renewables Demonstrators - with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Tri-LEP Strategic Energy Delivery Group Greater South East Local Energy Hub Relevant Local Authorities and local developers	Short-term
		Commence roll-out of a targeted 100 car park solar projects across the tri-LEP region, based on learning from the Renewables Demonstrators	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub	Medium-term
#9	**Energy Efficiency in homes** A programme of home energy efficiency measures enabling improved levels of loft and cavity wall insulation to assist in homes achieving an EPC rating of C to align with the 2032 Pathway.	Setup district working groups to identify 3 target communities, one for each LEP, to be used as Demonstrators: - identify support requirements - define, allocate and recruit resources - develop detailed action plan	Tri-LEP Strategic Energy Delivery Group	Immediate
		Conduct feasibility studies of the identified target community projects for Energy Efficiency and commence development as Demonstrators	Tri-LEP Strategic Energy Delivery Group with, relevant Local Authorities, Housing Associations and or developers	Short-term
		Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub	Short-term
		Delivery of the 3 Demonstrators - with sharing of lessons learned around the funding mechanisms, technical delivery and delivery operations	Local Authorities and project leads	Short-term
		Commence roll-out of full programme to roll-out energy efficiency and insulation across the tri-LEP region, based on learning from the 3 Demonstrators	Tri-LEP Strategic Energy Delivery Group, Greater South East Local Energy Hub	Medium-term
#10	**SME Support Programme** This Project Model is to facilitate SMEs to develop and refocus to be ready to exploit the significant sector changes	Identify all key stakeholders relevant to SME support and setup regular Collaborative committee to regularly refresh and maintain outreach with SMEs and key regional stakeholders such as representative bodies, etc.	Tri-LEP Strategic Energy Delivery Group, LoCASE Project Board	Immediate
		Workshop to disseminate best-practice learning from LOCASE project and develop next steps for rollout to other LEPs / districts	SELEP	Short-term

Project Model	Project Model	Potential Action	Action Leads	Timeline
	detailed in this Action Plan.from improving process activity in Industry and the commercial arena. The Project Model advocates that the LoCASE programme approach is greatly expanded and becomes a tri-LEP region activity.	Undertake programme of workshops and engagement with SMEs and business support parties to clearly identify key initiatives and interventions to further develop the plan for developing and assisting SMEs in the south east region	Project lead(s)	Short-term
		Apply for identified grant and Government funding	Project lead(s)	Short-term
		Based on project outcomes and evaluations, develop and commence medium-term road map for encouraging SMEs in the south east region through engagement with stakeholders	Tri-LEP Strategic Energy Delivery Group, project lead(s)	Medium-term
#11	**Housing and Community micro grids** With the thousands of new homes that will be built each year in the south east, microgrids offer an excellent opportunity to retain more of the economic value of the energy that is generated locally and enable developers to circumvent constraint issues on the public distribution grid.	Engage market to identify housing development pipeline. Review, analyse and priority rank projects to unlock up-to 5 pending projects to be used as Community Microgrid Demonstrators.	Tri-LEP Strategic Energy Delivery Group bringing in appropriate Local Authority and developers	Immediate
		Conduct feasibility studies of the identified (up-to) 5 projects and commence development as Community Microgrid Demonstrators	Tri-LEP Strategic Energy Delivery Group, relevant Local Authorities and developers	Short-term
		Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group	Short-term
		Delivery of (up-to) 5 Community Microgrid Demonstrators - with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Tri-LEP Strategic Energy Delivery Group, relevant Local Authorities and developers	Short-term
		Commence roll-out at a targeted rate of 8000 homes per year across the tri-LEP region, based on learning from the Community Microgrid Demonstrators	Tri-LEP Strategic Energy Delivery Group	Medium-term
#12	**EV charging & Hydrogen fuelling infrastructure** An estimated 38,000 on-street charging points will be necessary to enable members of the public to charge their vehicles conveniently. This level of charging infrastructure will be critical to enable the EV rollout and the wider transition to a low carbon economy.	Facilitate investment and development discussions workshops with CENEX and key regional stakeholders (supply chain, representative bodies, etc.) to develop ULEV Fuelling Demonstrator project	Tri-LEP Strategic Energy Delivery Group; the activity can be scoped to cover the south east region, so this could be undertaken by the Greater South East Local Energy Hub CENEX	Short-term
		Conduct feasibility study of the identified project and commence development of the ULEV Fuelling Demonstrator	Greater South East Local Energy Hub	Short-term
		Delivery of the ULEV Fuelling Demonstrator project - with sharing of lessons learned around the technical delivery, impact on the EV / hydrogen vehicle sector and their response, funding mechanism and operations	Greater South East Local Energy Hub CENEX	Short-term
		Commence full programme of rollout of EV charging and hydrogen fuelling infrastructure of 80 sites across South East region based on learning from the ULEV Fuelling Demonstrator project	Greater South East Local Energy Hub CENEX	Medium-term
#13	**Compressed Natural Gas (CNG) Fleet Fuelling** Opportunities exist for vehicle fleet operators to move to CNG as their prime fuel,	Setup working group with project developer to: - determine trial location and associated business and Local Authority actors - identify support requirements - define and allocate resources - develop detailed action plan	Tri-LEP Strategic Energy Delivery Group and bringing in appropriate Local Authority actors / business parties as identified	Immediate
		Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group and relevant Local Authorities	Immediate

Project Model	Project Model	Potential Action	Action Leads	Timeline
	because it is both lower priced and produces lower CO_2e emissions. To facilitate this change, there needs to infrastructure created for fuelling station capability and also for engine conversion.	Delivery of trial project with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Tri-LEP Strategic Energy Delivery Group , Local Authorities and developer	Short-term
		Commence roll-out at a targeted rate of 200 HGVs per Local Authority based on learning from the initial trial	Tri-LEP Strategic Energy Delivery Group and relevant Local Authorities	Medium-term
#14	**Ports – Modernisation of Port Energy Infrastructures** The activities of the ports generate a high level of pollution mainly due to diesel generators powering the ships while at the docks, diesel trailers, large cranes and container trucks. A green energy smart energy infrastructure programme supported by energy storage scheme and EV infrastructure can help us to reduce the emission levels.	Setup working group with tri-LEP region Port (e.g. Tilbury, Newhaven, Purfleet) to: - determine trial location and associated business and Local Authority actors - identify support requirements - define and allocate resources - develop detailed action plan	SELEP regional Port Authority	Short-term
		Identify all ports and key stakeholders setup regular Collaborative committee to regularly refresh and maintain outreach with ports and key regional stakeholders such as supply chain, funding sources, etc.	LEPs regional Port Authorities	Short-term
		Facilitate investment discussions through outreach and workshops	LEPs regional Port Authorities	Short-term
		Delivery of trial project at tri-LEP region Port with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	SELEP tri-LEP region Port	Short-term
		Commence roll-out to all south east ports with target to achieve 80% of supply from low carbon sources based on learning from the tri-LEP region Port trial	LEPs regional Port Authorities	Medium-term
#15	**Setup of ESCO or MUSCO infrastructure** The tri-LEP will look to setup the ESCo / MUSCo infrastructure (customer services, meter reading, billing management, Regulatory compliance, etc.), likely using an arms-length organisation. This will facilitate multiple Local Authorities to run multiple front-end ESCo / MUSCo's based on their own local priorities.	Setup working group with Local Authorities to undertake strategic development for ESCO / MUSCO: - identify support requirements - define and allocate resources - develop detailed action plan - build trial project with LEPs as infrastructure provider and key Local Authorities to trial approach to market	Tri-LEP Strategic Energy Delivery Group Local Authorities Greater South East Local Energy Hub	Short-term
		Market research, review and select short-term routemap for setup of ESCO / MUSCO infrastructure by LEPs	Tri-LEP Strategic Energy Delivery Group Local Authorities Greater South East Local Energy Hub	Short-term
		Facilitate investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group Local Authorities Greater South East Local Energy Hub	Short-term
		Delivery of trial project of LEP ESCO / MUSCO infrastructure and setup of 5 companies by Local Authorities, with sharing of lessons learned around the business model, investment mechanism, technical delivery and operation	Tri-LEP Strategic Energy Delivery Group Local Authorities Greater South East Local Energy Hub	Short-term

Project Model	Project Model	Potential Action	Action Leads	Timeline
		Commence roll-out of ESCO / MUSCO offering to all tri-LEP Local Authorities based on learning from the initial trial	Tri-LEP Strategic Energy Delivery Group Local Authorities Greater South East Local Energy Hub	Medium-term
#16	**New build homes on Hydrogen grid** Working with Southern Gas Networks, we will build a new housing development trial, ideally affordable homes built by a local authority, along with a new polyethylene pipe network to provide hydrogen for heating and cooling.	Setup working group with Southern Gas Networks to: - determine trial location and associated business and Local Authority actors - identify support requirements - define and allocate resources - develop detailed action plan	Tri-LEP Strategic Energy Delivery Group and bringing in appropriate Local Authority actors / business parties as identified Southern Gas Networks	Immediate
		Facilitate further investment discussions through outreach and workshops	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Short-term
		Delivery of the trial project - with sharing of lessons learned around the technical delivery, impact on the consumers and their response, funding mechanism, technical delivery and operations	Tri-LEP Strategic Energy Delivery Group and associated working group(s) Southern Gas Networks	Short-term
#17	**Biofuel evolution** This Project Model would enable investment to drive innovative new business to locate operations in south east and commercialise their ground-breaking bio-fuel technology.	Identify all key stakeholders relevant to Biofuel development and setup regular Collaborative committee to regularly refresh and maintain outreach across the industry with innovators, research partnerships, supply chain, representative bodies, etc.	Tri-LEP Strategic Energy Delivery Group	Short-term
		Undertake programme of workshops and engagement with industry to clearly identify key initiatives and interventions to support and further develop planning for Biofuel sector in the tri-LEP region	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Short-term
		Trial interventions (e.g. policy changes, grant / competition funding, supply chain engagement / support, etc.) with sharing of lessons learned around the business model, investment mechanism, etc.	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Short-term
		Based on outcomes from trial interventions, develop and commence medium-term road map for encouraging biofuel sector development in south east region through engagement with stakeholders	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Medium term
#18	**Support developments in CO2 capture, use and Storage (CCUS)** A tri-LEP supported demonstrator facility would the first in the UK and help to establish the south east as a centre for CCUS technology with significant potential job creation and GVA	Identify all key stakeholders relevant to CCUS developments and setup regular Collaborative committee to regularly refresh and maintain outreach across the industry with innovators, research partnerships, supply chain, representative bodies, etc.	Tri-LEP Strategic Energy Delivery Group	Short-term
		Undertake programme of workshops and engagement with industry to clearly identify key initiatives and interventions to support and further develop planning for CO2 capture sector in the tri-LEP region	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Short-term
		Trial interventions (e.g. policy changes, grant / competition funding, supply chain engagement / support, etc.) with sharing of lessons learned around the business model, investment mechanism, etc.	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Medium-term

Project Model	Project Model	Potential Action	Action Leads	Timeline
	growth prospects.	Based on outcomes from trial interventions, develop and commence medium-term road map for encouraging CCUS sector development in south east region through engagement with stakeholders	Tri-LEP Strategic Energy Delivery Group and associated working group(s)	Medium-term

The Project Models presented have been developed in detail with our Stakeholders and analysis of multiple public data sources. A series of stakeholder engagements including workshops attended by over 100 representative organisations from our territory, face-to-face meetings and calls over social media were undertaken to create a long-list of project opportunities. These were analysed, reviewed, filtered and short-list modelled in the tri-LEP Intelligence Tool to conduct first-pass high-level techno-economic assessment. Projects demonstrating positive business cases were taken forward for more involved investigations. As we found new projects, or existing opportunities were reconsidered from different stakeholder perspectives, an iterative process was followed so that we moved towards this shortlist of Project Models for the Action Plan, based on the output of the tool and assessment against a number of criteria against our strategic objectives. Discussions were continued with the instigators, developers and appropriate parties to understand the rollout timescales, which we then cross-referenced and embedded into the required decarbonisation and emission reduction trajectories shown in the local energy strategy. Funding options were researched and considered in the configuration of the models built in the Intelligence Tool.

These Project Models will act as exemplars, unlocking larger scale investments into grouped portfolios of related projects; the detail for both the initial stage and scale-up opportunities are presented in this Action Plan, and have fed back into the Strategy to show how we unlock significant benefits for the South East and the UK as a whole. These actions will create the bedrock for ambitious, large scale undertakings within the tri-LEP area to fulfil our Strategic Vision.

In this Action Plan, the Project Models are developed from the context of the five priority themes identified in the strategy, based on our research to find specific, real opportunities based in the tri-LEP region. We provide each with a supporting summary, overview detail and baseline financial data. Some of the Project Models are the result of discussions with specific development entities who are treated here as anonymous, others are directly related to specific central government policy developments.

The scale-up opportunity is viewed as a targeted level of deployment out to 2032 and indicates the level of overall carbon savings with associated costs and energy savings. The indicated CAPEX value is viewed as an indicative guide for both public and private sector investment awareness and initiatives.

The individual Project Models descriptors follow a common approach to make them comparable:

1. Summary - overview of the opportunity,
2. Detail - giving specific Project Model background and information,
3. Project Model investment requirements and carbon saving potential,
4. Scale up opportunity with baseline financials and carbon saving,
5. Stakeholder projects unlocked - output from workshops and engagement is considered.

The Project Models are split into Short Term (considered "spade ready" for deployment) and Medium term, where more technological development or market preparation and understanding are required. Table 4 (over the page) presents a summary of the scaled opportunities detailing carbon savings, energy balances, investment profiles and job creation potential that will be achieved. The cumulative environmental and economic benefits for the tri-LEP region are fed back into the Conclusions and Recommendations for the local energy strategy and demonstrate what we will achieve for the South East and the UK as a whole. Ultimately, these Project Models create the bedrock for ambitious, large scale undertakings within the tri-LEP area to fulfil our Strategic Vision.

Action Plan

		Electricity			Heat			Transport		
		Emission ktCO2e	Energy GWh	Investment £M	Emission ktCO2e	Energy GWh	Investment £M	Emission ktCO2e	Energy GWh	Investment £M
1990 -	*Government Baseline view for CO2e Emission - Electrical Power & Energy for Heat and Transport*	17,386			20,754			26,172		
2015 -	*Tri LEP Baseline view for Emission, Electrical Power & Energy for Heat and Transport*	11,022	23,847		13,157	56,758		16,593	65,665	
2032 -	*Tri LEP Projected view to 2032 for allowed fossil related Carbon and associated Power and Energy requirements - aligned to fifth UK Carbon Budget*	7,476	16,175		8,924	38,496		11,254	44,146	
Change / reduction required	*Balance of 2030 projected view against 2015 baseline to give fossil related emissions and associated Power and Energy to be mitigated*	3,546	7,672		4,233	18,262		5,339	21,519	
Summation from Project Models		2,647	5,731	£ 5,042	5,495	25,009	£ 5,629	5,473	17,843	£ 4,084
Performance against emissions reduction target by 2032		-899			1,262			134		
Performance against decarbonisation of energy supply target by 2032			-1,941			6,747			-3,676	

Total investment required £M	£ 14,755
Overall emissions reduction (ktCO2e)	497
Performance against supply target (GWh)	1,130

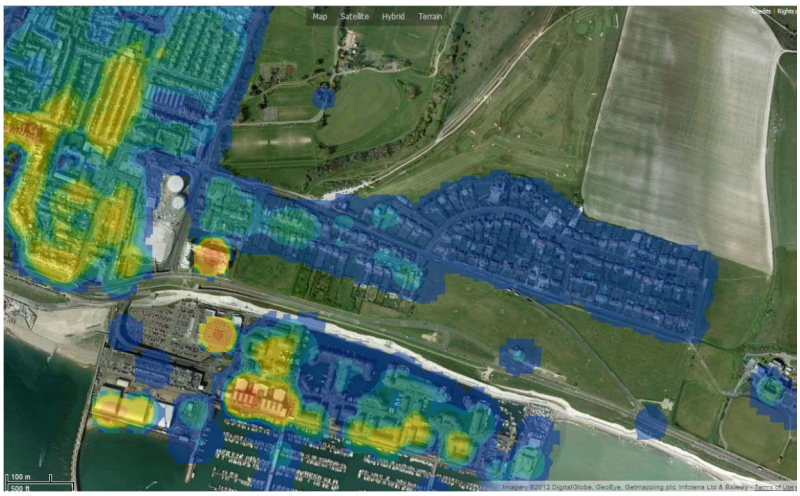
	Short Term		Project Model - Scale-up Opportunity									Jobs Created by 2032	75,652
	Theme	Description	ktCO2e	GWh	£M	ktCO2e	GWh	£M	ktCO2e	GWh	£M		
Project Model #1	Heat Networks	District Heat Networks rollout	n/a			120	581	£ 1,440	n/a			2,016	
Project Model #2	Heat Networks	Off grid homes	n/a			1,861	7,824	£ 334	n/a			11,298	
Project Model #3	Heat Networks	Hydrogen injection into NG supply grid	n/a			1,323	6,457	£ 1,253	n/a			2,000	
Project Model #4	Renewable Energy	Offshore wind development	1,518	3,285	£ 3,000	n/a			n/a			1,834	
Project Model #5	Renewable Energy	Solar and microgrid on landfill site(s)	869	1,880	£ 1,450	n/a			n/a			4,000	
Project Model #6	Renewable Energy	Biomass fuel supply chain development	n/a			365	1,404	£ 225	n/a			18,000	
Project Model #7	Renewable Energy	Solar energy for Network Rail	n/a			n/a			26	56	£ 200	120	
Project Model #8	Renewable Energy	Car parks - solar potential	15	38	£ 52	n/a			n/a			88	
Project Model #9	Energy Efficiency	Energy Efficiency Insulation Improvements in Homes	140	303	£ 162	1,724	8,412	£ 1,992	n/a			3,000	
Project Model #10	Energy Efficiency	SME Support Programme	15	33	£ 25	15	73	£ 25	n/a			1,688	
Project Model #11	Smart Energy	Housing micro grids	90	193	£ 353	45	220	£ 360	n/a			22,700	
Project Model #12	Transport Revolution	EV Charging and Hydrogen fueling Infrastucture Scale up	n/a			n/a			3,987	15,760	£ 1,744	6,758	
Project Model #13	Transport Revolution	CNG Fleet Fuelling	n/a			n/a			84	109	£ 640	2,100	
Project Model #14	Transport Revolution	Ports - Move to on site Renewable Power	n/a			n/a			1,376	1,918	£ 1,500	50	
Project Model #15	Non-Technical	Setup of ESCO / MUSCO infrastructure	R&D			R&D			R&D			R&D	
	Medium Term												
Project Model #16	Heat Networks	New build homes on Hydrogen grid	n/a			42	38	R&D	n/a			R&D	
Project Model #17	Renewable Energy	Biofuel evolution	n/a			R&D			R&D			R&D	
Project Model #18	Smart Energy	Support developments in CO_2 capture	R&D			n/a			n/a			R&D	

Table 4: Detail for Project Models carbon savings, energy balances, investment profiles and job creation

Project Model #1: District Heat Networks rollout

Theme: Heat Networks

Summary Information



Supported by SGN investment in Power Generation plant, development of Brighton Marina as a District Heat Network for connection into nearby Industrial & Commercial, council and hospitals and residential units.

Detail

The Brighton & Hove Project Model could be a regional exemplar project acting as an initial trailblazer for regional district heat network (DHN) deployment. The action is to move forward a feasibility study to be conducted on the viability and investability of a Brighton Marina DHN supported by a Southern Gas Networks (SGN) power generation investment centred on the area which would offer a heat offtake option. UK Government Head Network Development Unit (HNDU) support should be sourced to move the DHN feasibility study forward.

The proposed DHN area would encompass Brighton Centre through Kempton to the Brighton Marina Village. This development would require a network length for the main network spine of approximately 5.5 to 6 km miles running along the Eastern Rd / Edward St / Western Rd axis from East to West.

This routing would have a CAPEX envelope of c £6-7M – this is for the spine pipe infrastructure which would facilitate connections into both public and private buildings. Connections from the spine would be an additional cost – and be dependent on individual building situations, this is envisaged to be of the order of c£2M for an envisaged 75 key buildings on the routing.

The selection of Brighton Marina area as a DHN focus is due to it being identified in the Brighton Master plan as a target area for development as indicated in a recent report by the engineering company AECOM[56]. The Marina east of the Kempton area has a number of existing buildings such as an ASDA supermarket, offices, leisure, retail and residential buildings.

Further studies are required to understand the exact levels of heat load and seasonality, but the heat generation will likely be required to satisfy a load of about 15 GWh. This could be met by a heat only

[56] AECOM, “Brighton and Hove,” (Energy Study) January 2013 [online]

generation approach or as a combined heat and power turbine generator system (CHP) providing localised electrical generation. This would then be the genesis of a Brighton microgrid system.

It is viewed that concurrently with any DHN development the buildings for connection must be ensured to be meeting highest levels of insulation and efficiency certification that pertains at that time. Therefore, building improvement programmes would necessary as part of the DHN programme.

Project Investment Analysis

Project	Brighton and Hove DHN
Project Lifetime	25 years
Investment Required	£ 10 Million
OPEX per annum	£ 500,000 pa
Revenues and sources	Heat sale / savings from system service charge
Project Return	Payback period is 15 - 20 years
Sources of Investment	Dependent on ESCo ownership model - Private equity with LA stake
Ownership model	Community ESCo / Private entity options
CO2 reduction	833 t CO_2e pa (@ 20% efficiency gain on NG) *

Scale-up Opportunity

The emission level and resulting energy demand relating to Natural Gas usage over the tri-LEP Local Authorities allows a view to be developed on the heat demand for the Local Authorities. Taking an atypical DHN heat demand model as 20GWh which is approximately 50% of the Stoke-on-Trent City Centre DHN power demand which is viewed as a model but large system by HNDU in BEIS.

This allows a view to be developed on how many 20GWh heat demand DHNs are required to meet the BEIS target to have 18% of the Heat in England supplied in DHN systems by 2050. A view was taken to target half of this 2050 level by 2032 – to have a scale up opportunity level of 9% of the tri-LEP's LA heat load in DHN system by 2032, this resulted in some 144 DHN systems of a 20GWh heat demand.

Scale-up Opportunity	BEIS target of 18% of Heat from DHNs by 2050 – achieve 9% by 2032= 144 x 20GWh DHNs
By when?	2032
Investment Required	**£ 1,440 Million**
Potential scale up cost saving %	**15-20%**
Job Creation	**2,016**
CO2 reduction	**120 kt CO_2e pa (@20% efficiency gain on NG) ***

***It can be noted that as the majority of these DHN systems built out to 2032 will be powered by Natural Gas the initial CO2 saving will relate to system efficiency gain i.e. one heating system rather than many individual systems – this is viewed as a 20% efficiency gain in reduced NG usage.**

Once the DHN infrastructure system is in place as, in the control and piping systems, future opportunities to greatly reduce the CO2e emission exist in a move from the NG heat source to low to zero carbon fuels such as H2, biomethane, or deep geothermal, or even renewable generated electrical heating.

Stakeholder Projects unlocked:

- Whitehill and Borden - green + healthy new town
- Use of heat energy from Chineham Incinerator
- Speak to ALEO – regional fuel poverty networks
- Smart grid (with DH?) for Worthing Civic Centre (includes Law Court, Town Hall, Civic Offices, Health Hub, Assembly Halls, Library) car park + EV charging?
- District Heating for Shoreham harbour with water source heat-pump
- Maidstone Heat Network
- Heat Network potential in Wealden
- Commercial projects using heat recycling from processes (match funding for viability)
- Heat network in Bohemia, Hastings
- New heat network for Worthing Civic Centre to Worthing Hospital
- Adur: Shoreham Harbour new HP based HN
- Heat network Worthing Crematorium
- Colchester - DHN / Geothermal (heat pump)
- Resource Hubs - using heat from sewers e.g. to heat swimming pools
- Give Planning Authorities powers to demand higher energy efficiency standards (e.g. Brighton + Hove Local actions 19% improvement)

Project Model #2: Off-gas grid homes

Theme: Heat Networks

Summary

–Long-term programme to move away from oil as heating fuel.

–Major capital support programme to connect homes to gas grid (if close proximity) or integrate alternative heat sources such as heat pumps

20%
Of domestic emissions in are from heating oil

88%
of off-gas grid homes need more insulation to enable heat pumps etc. to work effectively

- A range of interventions to update heating technology and improve insulation to reduce energy consumption and move all off-gas homes in the tri-LEP region towards sustainable, low carbon sources.
- Off-grid homes within 23m of the gas network can be connected at no cost to the occupants; homes less than 50m where the connection is complex may be asked to contribute but otherwise are also undertaken at no cost.
- Off-grid home more-than 50m from the gas network should be encouraged to move to wood chip burners (from solid fuel); improved oil efficiency boilers or move from electrical heating to air-source heat pumps.
- Funding is required to provide energy efficiency for these off-grid homes because 88% are EPC Level D or lower, so not sufficiently efficient for low grade heating replacement.
- Funding should be encouraged from Government schemes like the Energy Company Obligation specific to high-deprivation areas; a low-interest loan scheme administered at arm's length (like the student loans scheme) could be another means of assisting home owners to complete the capital investment required.

Detail

Heating oil and solid fuels such as coal produce considerably more environmentally-harmful emissions than gas or heat pumps. Around 30% of homes in the tri-LEP area are not connected to the gas grid and so it is important to find alternative forms of heat for these properties in the coming years. Houses that are less than 50m away from the gas network should be connected and schemes are in place to enable homeowners to do this at minimal cost. In certain cases such as deprived areas, the tri-LEPs, councils, energy supply companies and SGN should fund the full cost of this work. This should be done with urgency to support the national trajectory for emissions reductions, not least

this Project Model would form the first step along the pathway for these properties towards a national hydrogen gas network (see Project Model #16).

Properties that are not near the gas mains should be dealt with in a different way. An ideal solution would be to convert these to electric forms of heat such as heat pumps, however 88% of the off grid properties are EPC level D or below, which means they are not efficient enough to cope with the low grade heat that is supplied with heat pumps. Homeowners with more efficient homes should be prioritised in the transition to electrical heating. Framework agreements should be set up with suppliers so that residents can benefit from the economies of scale.

Not all homes will suit this type of action though. These properties should instead be converted to wood chip, which produces 95% less emission than heating oil. Not only would this reduce the carbon footprint of these properties, it would also stimulate the local economy as only local wood chips should be used by these residents (and not wood pellets imported from abroad). It can be expensive to install a wood fuel boiler, and capital support should be made available to support and incentivise homeowners. Not only does this solution benefit the environment and the local economy, wood chips produce a high-grade heat much like oil, so existing radiators in the property would not need to be replaced.

Project Investment Analysis

For Enterprise M3 region:

- Of the 728,279 domestic dwellings, some 208,131 (as of 2011) are off the gas grid. Almost 65% of these are located within 50m of the gas network. Of these, almost a third are fuelled by oil or coal which are highly carbon intensive.
- An investment across the Enterprise M3 region of £79.3M will provide the following benefits:
    - 64,177 houses will have their heat supply upgraded and will be sufficiently insulated to move to EPC A producing 448 kTCO2eq savings
    - This represents an intervention of £1,230 per dwelling, with the remainder being met by the occupants, energy supply companies and SGN
    - The intervention will provide a representative 78.3% reduction in fuel bills for the occupants

Project	Off-gas grid homes – EM3
Project Lifetime	+25 years
Investment Required	£ 79.3 Million
OPEX per annum	N/A
Revenues and sources	N/A
Project Return	Grant funded
Sources of Investment	Government funded; Energy supply companies + owner / occupant
Ownership model	Builder owner
CO2 reduction	448 kt CO_2e pa

Scale-up Opportunity

Scale-up Opportunity	Extend the program across the tri-LEP areas to c290,000 dwellings
By when?	2032
Investment Required	**£ 334 Million**
Potential scale up cost saving %	**20%-25%**
Job Creation	**11,298**
CO2 reduction	**1,861 kt CO_2e pa**

Stakeholder Projects unlocked:

- Park homes
- Localised Energy community schemes – solar
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Give Planning Authorities powers to demand higher energy efficiency standards (e.g. Brighton + Hove Local actions 19% improvement)
- Gov't should explore 0% Green Deal - pay as you save model
- PV + insulation on council houses in Winchester
- Changes to PRS caps
- CWI poorly fitted – extraction needs to be funded. As well, CWI inappropriately installed e.g. flood areas.
- LED rollout and Insulation programmes for all LA buildings
- Whitehill and Borden - green + healthy new town
- Use of heat energy from Chineham Incinerator
- Speak to ALEO – regional fuel poverty networks
- EPC ratings + SAD ratings too low to drive forward EE fast enough

Project Model #3: Hydrogen injection into the Natural Gas Grid

Theme: Heat Networks

Summary

The UK has a world class gas grid delivering heat conveniently and safely to over 83% of homes. Emissions could be reduced by lowering the carbon content of the natural gas through blending with hydrogen. Compared with solutions such as heat pumps, this means that customers would not need disruptive and expensive changes in their homes to pursue an environmental agenda. This route has the potential to deliver 29TWh per annum of decarbonised heat in Great Britain, saving £8.1 billion and 119 million tonnes of carbon by 2050. The UK Gas Safety (Management) Regulations currently only permit 0.1% hydrogen in the network, despite formerly distributing town gas with 40-60% hydrogen.

Detail

There has been substantial study work into hydrogen injection into the natural gas grid but limited practical experience. To pursue this decarbonisation route, the UK needs to undertake practical hydrogen injection testing to establish feasibility and determine the appropriate level of blending on current networks and in appliances. This requires deployment that is carefully executed, safely managed, deployment, to demonstrate that the practical, regulatory and operational barriers can be successfully addressed.

A pilot or demonstrator Project Model in our tri-LEP region could determine the level of hydrogen which could be used by gas customers safely, and with no changes to their behaviour or existing domestic appliances. This could ultimately inform a pathway towards a wider hydrogen network, supporting industry and transport as well as the domestic customer. Many experts see hydrogen as an adaptable alternative to fossil fuels because when hydrogen is burned it doesn't produce CO2, just water and heat.

Laboratory tests have also been carried out on a range of common household gas appliances as well as extensive research on the effects of hydrogen on the different materials found on the gas pipe network. A more extensive project is underway at Keele University with its "Hydeploy" project which is researching the operational issues and requirements with injecting hydrogen into a "real" working gas network on the campus site.

Project Investment Analysis

Project	Hydrogen injection into the Natural Gas grid
Project Lifetime	+25 years
Investment Required	At Scale-up - £1,253 Million
OPEX per annum	@15% = £ 125 Million
Revenues and sources	Gas supply utilities / private sector
Project Return	Payback period is 15 - 20 years
Sources of Investment	Gas supply utilities
Ownership model	Gas supply utilities
CO2 reduction	1,323 kt CO_2e pa

Scale-up Opportunity

Scale-up Opportunity	Injection at 20% blend with NG
By when?	2032
Investment Required	**£ 1,253 Million**
Potential scale up cost saving %	**15-25%**
Job Creation	**2,000**
CO2 reduction	**1,323 kt CO_2e pa**

***Note that because this is a 'revolutionary' Project Model, operational costs and job creation cannot be estimated, hence business case information cannot be presented. We only present environmental savings and the scale-up opportunity.**

Stakeholder Projects unlocked:

- Hydrogen injection into gas grid
- Biomethane injection into gas grid
- Replicate "Medtech Accelerator Concept" for new energy initiatives / solutions -> concept investment

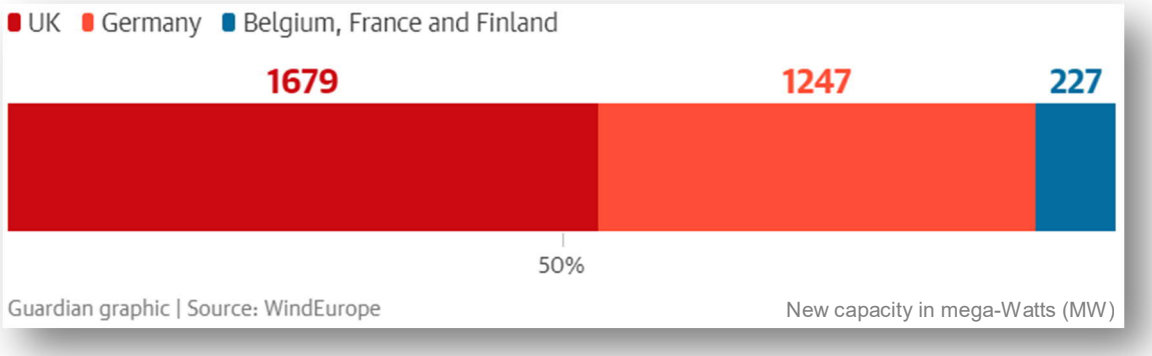
Project Model #4: Offshore wind development

Theme: Renewable Energy

Summary

The UK Offshore Wind Industry has seen a period of significant growth in the past decade, growing from 1.3GW in 2010 to 5.1GW as of 2016, an almost 400% increase in just 6 years, and is on trajectory to reach the 10GW mark as early as 2020. By 2032, installed capacity will have reached 20 GW. Although any projection of the future is uncertain, there seems to be a large degree of consensus around this rate of deployment within the industry.

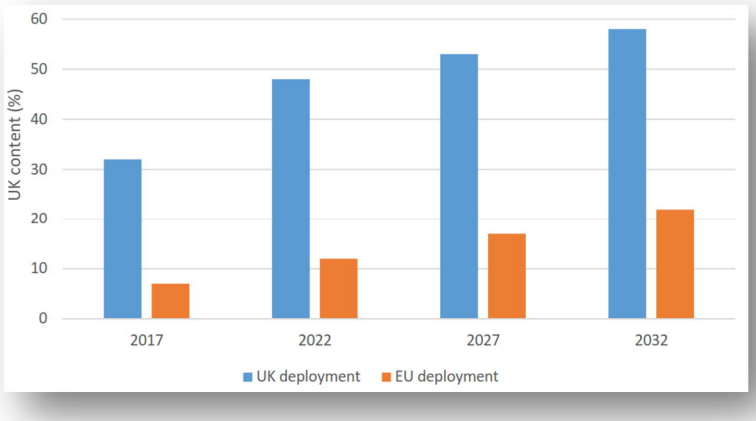
And the UK remains at the forefront of Offshore Wind growth, being responsible for over 50% of Europe's wind developments. Just this year, the base of the Rampion project was officially opened - it stretches from East Worthing to Brighton and covers 72 square kilometres, which is larger than the island of Guernsey. When it goes operational in the autumn of 2019, the 116 turbines will power the equivalent of half the homes in Sussex[57].



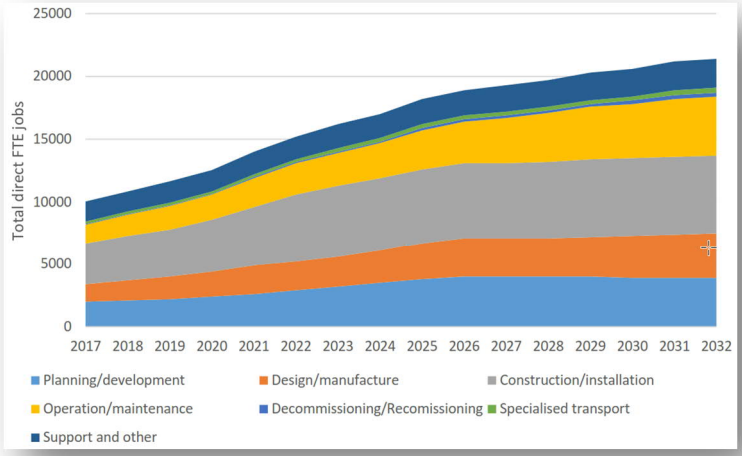
Detail

UK content of the UK and EU offshore wind value chain is set to continue to grow significantly over the next decade.

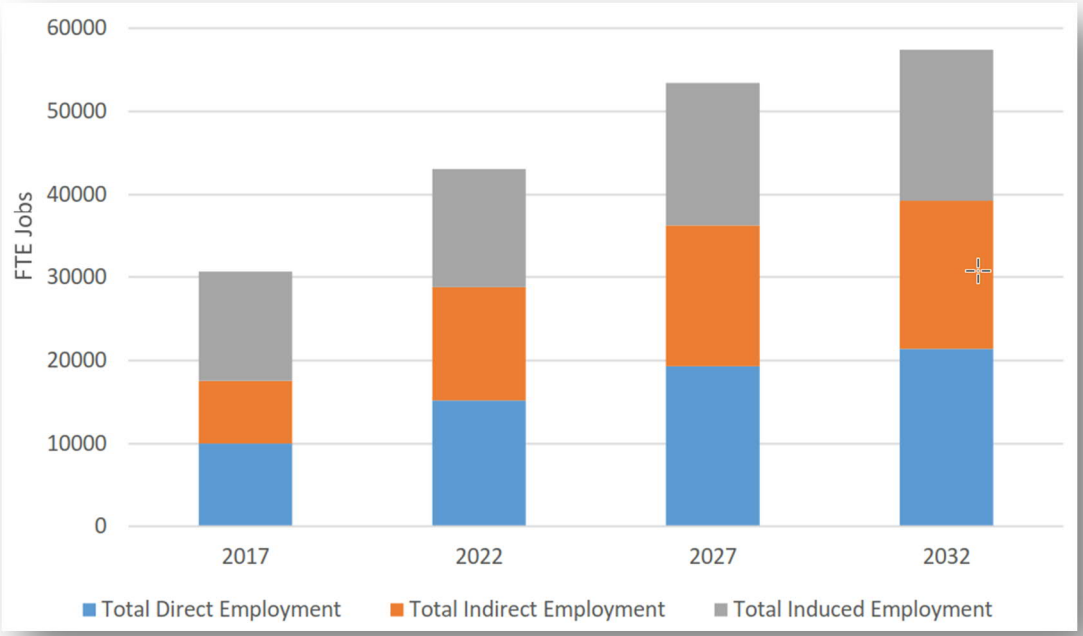
[57] British Broadcasting Corporation, "BBC News," 29 May 2018, https://www.bbc.com/news/uk-england-sussex-44287014



Projections by Cambridge Econometrics show that there will be a doubling of the number of jobs in the sector by 2030, and that over half of this will be local to the offshore wind farms themselves.



Further, less than 20% of the jobs will be semi-skilled or support, with the remainder classed as 'skilled manual', 'technical professional' or management. Although beyond the scope of this Energy Strategy, the directly full-time employed (FTE) figures are estimated by Cambridge Econometrics as 22,000, the additional indirect and induced employment figures take the total to well-over 55,000.



Scale-up Opportunity

One of the key blockers for the large-scale development of offshore wind is that for the investment case, the industry requires a viable project pipeline. To achieve this:

- the UK Government will have to raise capacity targets, expand infrastructure, and tackle transmission bottlenecks;
- Developers need to be locked into building farms, by shortening the time between bidding and construction; and
- Operators will likely have to take on so-called merchant risk with the removal of subsidies, effectively increasing the risk on the investment through exposure to the fluctuating price of wholesale electricity.

As LEPs, we can have a key role in addressing these problems by facilitating the energy infrastructure development in the South East. With that, the investors and supply chain businesses can be brought in to enhance the region's attractiveness for the Offshore Wind industry, securing the sector into the area and the job growth that will come with that. Boston Consulting Group state that one of the "early indicators of accelerated growth" in the market is "major initiatives to upgrade electricity grids that provide for the injection of offshore-wind energy". We can facilitate from the position of a perfect storm of existing Offshore Wind industry knowledge, close links with the electrical Distribution Network Operators (DNOs) and the organisations, businesses and parties that (through this strategy) will relieve pressure on the electricity grid to provide the capacity required for new projects.

Scale-up Opportunity

Scale-up Opportunity	300 x 5 MWe turbines
By when?	2032
Investment Required	**£ 3,000 Million**
Potential scale up cost saving %	**10-15%**
Job Creation	**1,834**
CO2 reduction	**1,518 kt CO_2e pa**

Stakeholder Projects unlocked:

- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Localised Energy community schemes – solar
- Grid balancing - large scale battery storage next to constrained substations along coastal strip

Project Model #5: Solar and microgrid on landfill sites

Theme: Renewable Energy

Summary

- Renewables deployed on Landfill or other council landholdings. Typically, these sites are contaminated so cannot be developed, have got a good grid connection, are located far away from people and are large enough to be a meaningful investment.
- Council ownership ensures that returns can be used for public / community purposes including the vulnerable, the fuel poor, etc. for instance through ESCO status.
- The model can also be extended to car parks or other council landholdings.

Detail

Former landfill sites are ideal for solar developments as they have little productive value and require years of remediation before they can be used in a normal productive development sense.

There is a strong commercial case for extending the role of former landfill sites to include the generation of solar power. Many former landfill sites had a connection to the electricity grid in order to export electricity from landfill gas engines and, as landfill gas generation diminishes, grid capacity potentially becomes available. The lack of availability and limited capacity of an existing grid connection is normally a significant negative factor preventing development of a large-scale solar PV facility.

The connection could potentially be optimised by using the solar farm to generate and export electricity during daylight hours while still utilising the landfill gas engines at peak demand times in a demand response mode. Alternatively, battery and alternative storage technologies can also be employed as the economics becomes more favourable.

However, there can be technical issues involved in developing ground-mounted solar generation on landfill sites because differential settlement occurs, caused by variations in the depth, type, method of waste disposal and decomposition rate within the underlying landfill. Therefore, feasibility studies are recommended for each landfill site being considered, to be a carried out by persons with geotechnical landfill expertise.

In recent years new technology has emerged which overcome geotechnical settlement and stability issues. One of the world's leading solar PV suppliers, Juwi, has developed a bespoke design for frame-mounted solar arrays on landfill sites that keeps panels flat and level. The solution has been successfully deployed and proven on a number of solar farms which have been developed on closed landfill sites in Germany

It is recommended that financial analysis is undertaken on these German operations for a financial viability comparison in the UK and to understand the range of development options for ownership and operation models that can be tailored the specific circumstances of the site.

Project Model Investment Analysis

Project	35 MW solar park (345,000m2)
Project Lifetime	+20 years
Investment Required	£ 25 Million
OPEX per annum	£ 725,000
Revenues and sources	Capacity Market: £ 260,000
Project Return	Payback period is 4 - 5 years
Sources of Investment	Public/private partnership or private venture
Ownership model	Dependent on investment model
CO2 reduction	15 kt CO2e pa

Scale-up Opportunity

In the south east there are more than 80 different landfill sites (mostly decommissions, but some that although operational will cease operation in the next 10 years) which aggregate to approximately 20 km^2 of useable area that could be utilised for solar generation. Many of these are in public ownership. Further, considering the maturity level of the technology, established business case and project rollout experience within the UK will further reduce the risk of investment.

West Sussex County Council has already capitalised on this opportunity at its closed landfill site in Westhampnett. This site produces enough low-carbon electricity to power 1,500 households, paying for itself in less than ten years and generating £13.8 million in income for the council over 20 years.

Scale-up Opportunity	80 sites across tri-LEP totalling useable 20 km^2
By when?	2032
Investment Required	(1/0.345 x £ 25M) = £ 72.5 M x 20 = **£ 1.45 B ***
Potential scale up cost saving %	**15-20%**
Job Creation	**4,000 jobs**
CO2 reduction	**870** kt CO2e pa

***Scale-up based on 80 sites aggregating to 20km^2 area – CAPEX per for 1km^2 development**

Stakeholder Projects unlocked:

- Park homes
- Solar highway as being trialled in Scandinavia
- Solar farms for every local authority on urban fringe
- Rooftop solar on car parks

- Solar streetlights
- Solar panels on churches - can be done on historical buildings!
- Bishops Waltham - hydro car Big Pond
- Anaerobic digester at Sparshot College (approved but Gov't policy on AD holding it up!)
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Localised Energy community schemes – solar

Project Model #6: Biomass supply chain development

Theme: Renewable Energy

Summary

- Forestry Commission has identified 655,000m3 pa open woodland area. This could be managed through a hub supply chain network
- Scale-up of the initial development assumes more-than 300 hubs at 2,000m3 pa hub capacity
- A wood hub network of 300 hubs can be built from a mixed investment to establish wood supply chain companies
- tri-LEP biomass hub system would setup an estimated 20 businesses per hub, with the creation of an estimated 3 jobs per business. This is further scalable to 300 hubs across the tri-LEP region, which equates to 10,000-18,000 jobs (assuming business chains across multi hubs)

Detail

The tri-LEP area has large areas of woodland both in public and private ownership. Woodland covers 15.6% of the South East, making it the most wooded area in England where the national average is lower than 10%; in some areas like Surrey, woodland cover is as high as 25%[9]. This natural asset could be utilised to generate clean economic growth and displace fossil fuels from our energy system. The Forestry Commission estimates that if 75% of woodland cover was managed, the potential sustainable yield from approaches 1,000,000m3 pa.

This will act as a sustainable and localised supply chain to support community biomass heating projects. This could be further enhanced to utilise waste wood collected, for example, at recycling centres, creating the foundations of a circular-economy. Such projects can be considered both for "on gas grid" situations in the form of urban heating network schemes, but also as potentially being a key provider of an off-grid community heating system. In on grid situations, this would mean replacing natural gas as the incumbent energy choice for systems. As LEPs, we can facilitate discussions with the pockets of significant experience in the delivery of such technology; this typically lies out of area and Internationally, but such parties can often bring operational experience and off-the-shelf proven hardware into the region to assist in kick starting the move to DHN powered with biomass solutions.

This Project Model for off grid situations is of great interest as it would provide a vehicle for moving off grid oil use out of a fossil driven position into a sustainable and localised solution. The potential present wood fuel assets across the tri-LEP area, based on Forestry Commission figures, would be:

LEP	Wood grade fuel av. pa	Thermal energy potential pa	Potential homes to heat pa	Heating Fuel Oil offset pa	Mitigated fossil fuel emission pa
SELEP	210,000m^3	450 GWh_{th}	30,000	45M ltrs	117 $kTCO_2e$
C2C	140,000m^3	300 GWh_{th}	20,000	30M ltrs	78 $kTCO_2e$
M3	305,000m^3	654 GWh_{th}	44,000	65M ltrs	170 $kTCO_2e$
Total	**655,000m^3**	**1,404 GWh_{th}**	**94,000**	**140M ltrs**	**365 $kTCO_2e$**

The wood fuel sector could be encouraged to grow its capabilities to facilitate the creation of a wood fuel supply chain base which would underpin community biomass heat and power developments. A sustainable wood fuel supply chain offers a number of social, economic and environmental advantages:

- Supports the local economy – keeping the pound spend local
- Woodland management improves leisure and social access
- Brings local communities together as they are part of the supply chain
- Creates jobs and drives skills and training
- Climate change mitigation effects in moving from long term fossil related carbon to short term bio-fuel carbon which can be viewed as carbon neutral*
- Increases woodland bio-diversity

An example is that the Forestry Commission has developed a South East Wood Hub concept which is looking to close capital funding to start-up a series of "wood hubs" across the SELEP area. These hubs will allow local businesses to add value to locally managed wood and woodland products and provide local employment – keeping the pound spent local.

The proposed action is to obtain appropriate funding to support an exemplar South East Wood Hub being established to prove the supply chain concepts and benefits then to act as facilitator for a chain of regional Wood hubs to be established through private investment funding supported by the Forestry Commission working in partnership with the three LEPs and the local business community.

A further benefit would be that the creation of such a large-scale, self-sustaining circular economy would lead to expertise that could export best practice and understanding to bring money into the tri-LEP region.

Project Investment Analysis

Project	Biomass supply chain development
Project Lifetime	+25 years
Investment Required	£ 750,000
OPEX per annum	N/A
Revenues and sources	Business support funding / Funding 20 business / £37.5k/business for 2-3yrs
Sources of Investment	LEP supported funding / private sector support
Ownership model	Community ownership by hub business + FC
CO2 reduction	1,217 t CO_2e pa

Scale-up Opportunity

Scale-up Opportunity	655,000m3 pa open for wood management through hub supply chain network - +300 hubs at 2,000m3 pa hub capacity
By when?	2032
Investment Required	**£ 225 Million**
Potential scale up cost saving %	**10-15%**
Job Creation	**18,000**
CO2 reduction	**365 kt CO_2e pa**

Stakeholder Projects unlocked:

- Biomethane injection into gas grid
- Replicate "Medtech Accelerator Concept" for new energy initiatives / solutions -> concept investment
- Commercial projects using heat recycling from processes (match funding for viability)
- Park homes
- Resource Hubs - using heat from sewers e.g. to heat swimming pools
- Local Biomass (AD / Combustion) to generate power and biomethane
- Anaerobic digester at Sparshot College (approved but Gov't policy on AD holding it up!)
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Link CECAN ("The Centre for the Evaluation of Complexity Across the Nexus") at Surrey University to employment / skills board + invest plans

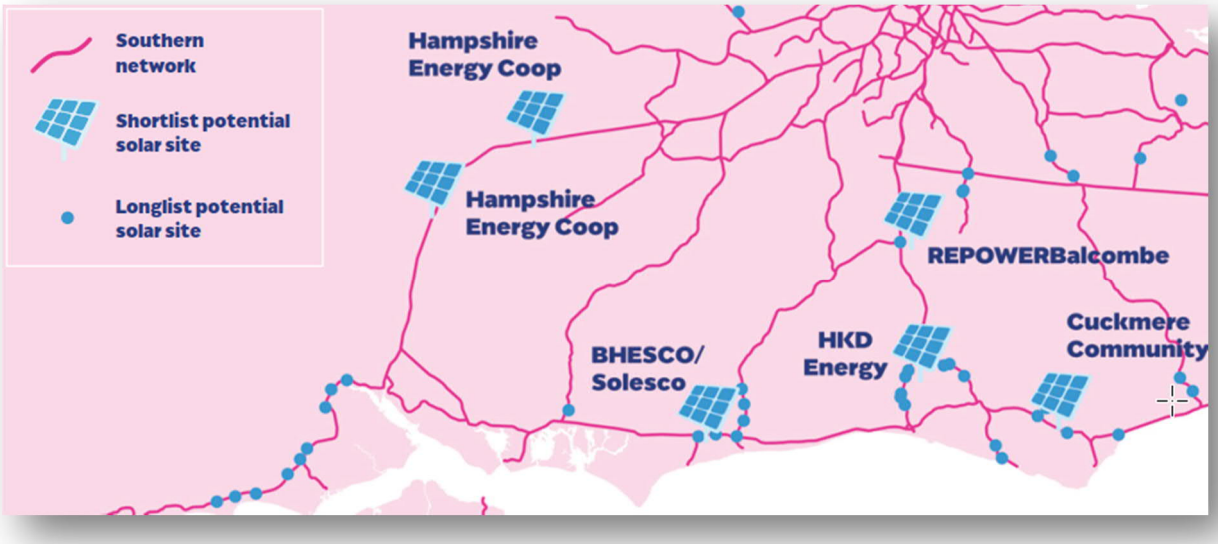
Project Model #7: Solar energy for Network Rail

Theme: Renewable Energy

Summary

- Using specially designed power electronics, solar PV can be connected directly to electrified railways to power trains, with no need for intermediary connection via the electricity utility. However, this has not yet been done anywhere in the world.
- Small solar farms installed alongside Britain's dc electrified tracks could provide around one tenth of the energy needed to power trains on these routes each year.
- Connection costs would be competitive today, meaning solar can already be developed for this market without the need for any public subsidy.
- Solar traction power would be cheaper for rail companies than grid supplied power, even at today's prices. Cost trends indicate this gap will continue to widen into the future.
- There are major opportunities to deploy direct solar traction power on the Kent, Sussex and Wessex commuter rail networks, as well as the London Underground.

Detail



The Kent, Sussex and Wessex routes together consumed 1.38TWh of traction electricity in 2015/16, at a total cost to train operators of £ 114M. Analysis indicates that each dc traction substation in the Southern Region should on average be able to comfortably accommodate intermittent supply from a connected ~1MWp solar array.

Such a scale of solar capacity should be big enough to support the fixed development and connection costs for each array. In most cases this would mean the array would provide 100% or more of the substation's traction demand for four or five months of the year (roughly, May to August). At these times, any surplus would flow onto neighbouring track sections, implying that we should avoid connecting solar PV at this scale to contiguous substations.

The South of England enjoys some of the highest solar irradiance levels in the UK, but it is also home to some of the most congested electricity distribution networks. 16 Community Energy South's (CES) members have conducted a high-level audit of land use constraints around the 540 traction substations on the Southern Region. Their findings suggest that around three quarters of these have suitable lineside opportunities for solar development.

If 1MWp solar farms were developed and connected at half of the 400 or so suitable locations, this would generate the equivalent of 15% of the Southern Region's total traction electricity demand - currently a £17.1m a year market. This percentage assumes that storage is used where necessary; so, the commercially optimal proportion may be somewhat lower, but will certainly exceed 10%. As storage costs continue to fall over the coming years, the commercially optimal proportion will rise consequently.

CES' work has also produced a long list of over 50 technically viable sites, and a shortlist of seven of the most promising sites with prospective community developers. This shortlist is likely to be the focus of any future pilot phase.

Scale-up Opportunity

Scale-up Opportunity	Solar infrastructure at 200 traction substations
By when?	2032
Investment Required	**£ 200 Million**
Potential scale up cost saving %	**15-20%**
Job Creation	**120**
CO2 reduction	**26 kt CO_2e pa**

For further information on the project, please see Climate Action's report "Riding Sunbeams: powering our railways with solar PV," which is available at https://1010uk.org/riding-sunbeams-report/

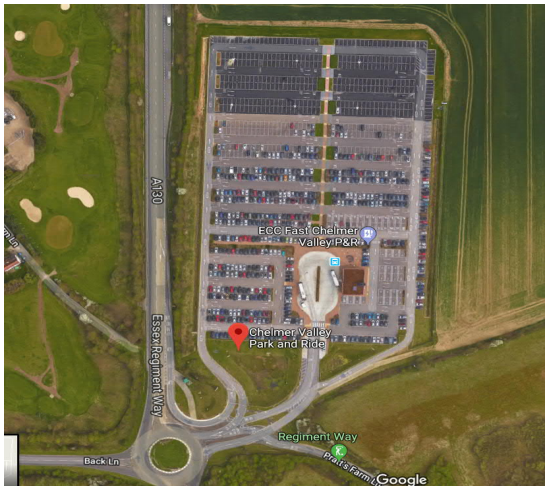
Stakeholder Projects unlocked:

- Solar farms for every local authority on urban fringe
- Rooftop solar on car parks
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Localised Energy community schemes – solar
- Brighton main line - digital infrastructure along rail line
- Shift investment away from increasing transport infrastructure capacity (e.g. as in Missing Links report for the South East) to managing demand - more sustainable, local, shared transport solutions
- Grid balancing - large scale battery storage next to constrained substations along coastal strip

Project Model #8: Car parks – solar potential

Theme: Renewable Energy

Summary



- Chelmer Valley Park and Ride – install solar powered canopy, battery storage and electric vehicle charging infrastructure
- Land owned by Essex CC
- Used as surface car park
- Land size circa 100m x 200m
- Benefits = low-cost energy for EV charging + battery storage

Detail

Through the innovative integration of three technologies, solar PV (in the form of solar carports), battery storage and electric vehicle charge-points, it is now possible to turn carparks into power stations, addressing the challenges of decentralised energy generation while supporting the electric mobility transition.

Solar PV is a tried and trusted technology with predictable annual generation. Where rooftop systems are impractical due to size or structural constraints, or where there is a desire to deploy EV charge-points, solar carports are an attractive and cost-effective solution.

Benefits of solar car park solution would typically include:

- reduced O&M costs due to the car park lighting infrastructure
- a substantial reduction of the cost of EV charge-point deployment
- a highly visible carbon reduction initiative and
- vehicles and occupants are protected from inclement weather.

Project Investment Analysis

Project	Car parks – solar potential + EV charging (based on 700 spaces)
Project Lifetime	20 years
Investment Required	£ 1.83 Million
OPEX per annum	£180,000
Revenues and sources	£ 4.2 Million over 20 years
Project Return	Payback period is 12 - 13 years
Sources of Investment	Council or private sector
Ownership model	Council or private sector
CO2 reduction	533 t CO_2e pa

Scale-up Opportunity

Scale-up Opportunity	400 surface publicly-owned car parks in the tri-LEP; assume 100 are right scale / area and 200 spaces
By when?	2032
Investment Required	**£ 52 Million**
Potential scale up cost saving %	**15-20%**
Job Creation	**88**
CO2 reduction	**15 kt CO_2e pa**

Ref: Robert Carpenter, Flexi-Solar, www.flexi-solar.com

Stakeholder Projects unlocked:

- Park homes
- Solar highway as being trialled in Scandinavia
- Solar farms for every local authority on urban fringe
- Rooftop solar on car parks
- Solar streetlights
- Solar panels on churches - can be done on historical buildings!
- Bishops Waltham - hydro car Big Pond
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Make easier to sell renewable electricity to building users where multi-tenanted (inc. flats)
- Localised Energy community schemes – solar

Project Model #9: Energy Efficiency in Homes

Theme: Energy Efficiency

Summary

- Homes now account for 13 percent of the UK's emissions relating to heat,
- Rising to 22 per cent of the UK emissions once electricity use is taken into account,
- The average household's energy consumption has fallen by 17 per cent since 1990,
- Central Government has an ambition to further reduce emissions in homes:
    - whilst ensuring everyone has a comfortable home which is healthy and affordable to run; and
    - it is targeting emissions to fall by 20% by 2032.

Detail

While there are now approximately a quarter more homes than in 1990, the overall total of emissions from the sector has reduced by about a fifth over this period. This has been driven by a combination of: tighter building and products standards, in particular better boilers; the uptake of insulation and other energy efficiency measures, mainly delivered through obligations on energy suppliers; and greater awareness of potential energy savings.

Central Governments 2032 Pathway for homes will see that existing buildings waste even less energy. The Pathway will see a further six to nine million properties insulated with a particular focus on those in fuel poverty, with up to 2.5 million fuel poor homes in England improved to an EPC rating of C or better by 2032.

Therefore, we are pulling together a programme of home energy efficiency measures enabling improved levels of loft and cavity wall insulation to assist in homes achieving an EPC rating of C to align with the 2032 Pathway. When considering the level of scale-up in our tri-LEP region it is viewed that the following numbers of homes will be targeted for improvement measures over a 12-year period:

- 981,000 homes for loft insulation measures - @ 80% take-up,
- 360,000 homes for cavity wall insulation measures – @ 80% take-up,
- 225,000 homes for heat pump fitment

Project Investment Analysis

Project	Energy Efficiency in Homes
Project Lifetime	+25 years
Investment Required	£ 2,154 Million
OPEX per annum	£10.78 Million
Revenues and sources	Utilities obligations programme
Sources of Investment	Utilities
Ownership model	Builder owner / Utility companies
CO2 reduction	**1,864 kt CO_2e pa**
By when?	2032
Job Creation	**3,000**
Potential scale up cost saving %	**15-20%**

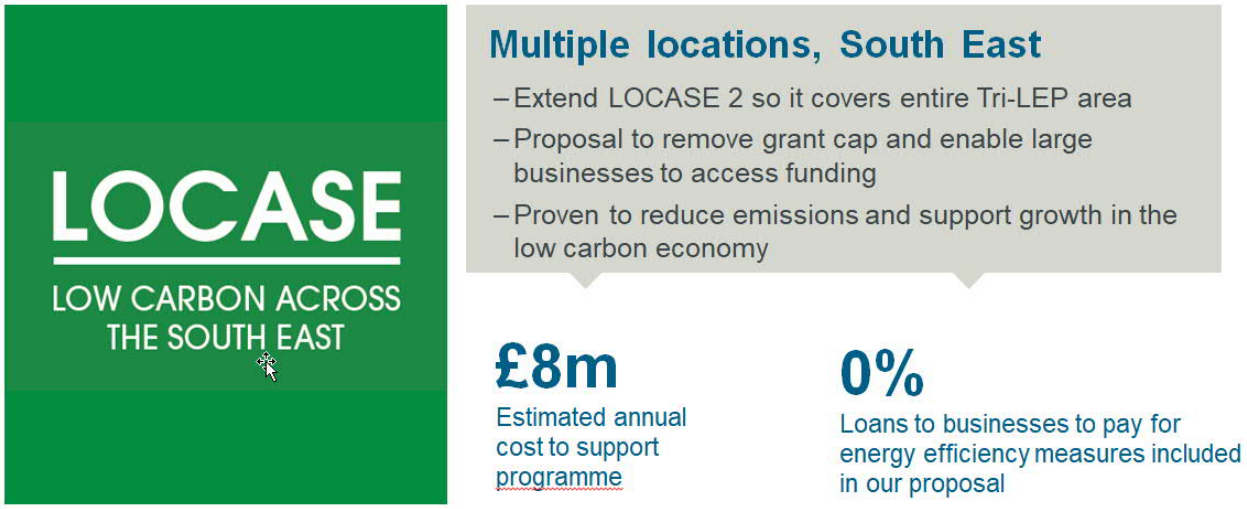
Stakeholder Projects unlocked:

- Park homes
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Give Planning Authorities powers to demand higher energy efficiency standards (e.g. Brighton + Hove Local actions 19% improvement)
- Gov't should explore 0% Green Deal - pay as you save model
- PV + insulation on council houses in Winchester
- Changes to PRS caps
- CWI poorly fitted – extraction needs to be funded. As well, CWI inappropriately installed e.g. flood areas.
- LED rollout and Insulation programmes for all LA buildings
- Whitehill and Borden - green + healthy new town
- Use of heat energy from Chineham Incinerator
- Speak to ALEO – regional fuel poverty networks
- EPC ratings + SAD ratings too low to drive forward EE fast enough

Project Model #10: SME Support Programme

Theme: Energy Efficiency

Summary



Detail

The SE LEP area has an ERDF programme actively in place until 2023 called LoCASE run by Kent County Council which offers funding support to SMEs (as defined in ERDF ruling), to a value of 40% supported up-to £10,000 for two key supported areas being:

1. SMEs who wish to implement energy efficiency measures as hardware or operational services to show an energy reduction and measurable carbon emission reduction, and;

2. SMEs who are in the Low Carbon / Environmental supply chain who wish to develop a specific product or service that achieves energy efficiency gains and carbon reductions.

This Project Model is to facilitate SMEs is to develop and refocus to be ready to exploit the significant sector changes detailed in this Action Plan, from improving process activity in Industry and commercial activities. This can be through the application of technology and / or through reducing none value-added activity (NVA) and concentrate energy and people resource on only Value Add (VA) activities.

The Project Model advocates that this programme approach is greatly expanded and becomes a tri-LEP region activity - termed here as ***Further LoCASE***. The scheme shall support innovation in low carbon supply chain SMEs to develop, market and introduce products and services that contribute or position themselves to low carbon and clean growth markets. The Strategy sees a ***Further LoCASE*** programme as continuing with short to medium activity support in evolutionary aspects for the implementers and potentially to support revolutionary innovation from SME supply chain entities. Examples could include an SME seizing efficiency gains from their indirect operations, such as a move to low energy lighting or improving its building fabric insulation, through to direct operations, either by investing directly in process equipment or holistically, such as undertaking an operational process review to identify energy reduction opportunities.

Such a programme should be rolled out across the M3 and C2C LEP areas. We will then look to create a network vehicle which oversees programmes such as ***Further LoCASE*** which can be a home for programmes, advice, cross supply chain innovation and collaboration facilitation. Networks such as these then can act as the central hub from which better focused and targeted programmes can be established and managed.

We can then support organisations to achieve long term sustainability and maximise their business opportunities through innovative low carbon environmental activity. Novel funding routes could include performance guarantee / shared risk financing with suppliers of energy efficiency services and equipment; or a low-interest loan scheme administered at arm's length (like the student loans scheme) could be another means of assisting businesses to complete the capital investment required.

Project Model Investment Analysis

tri-LEP area – c£50M funded programme for 5 years – led at County level (av. £8.3Million / County) to target SMEs to facilitate low carbon innovation and as energy efficiency interventions.

Project	SME Efficiency Support Programme
Project Lifetime	5 years
Investment Required	£ 8.3 Million
OPEX per annum	Government grant funded / business support
Revenues and sources	Government grant funded / business support
Sources of Investment	Public funded support programme (as was ERDF/ESIF)
Ownership model	Public sector – Local Authority
CO2 reduction	5 kt CO_2e pa

Scale-up Opportunity

We will roll-out a LoCASE-type SME low carbon supply chain development programme across the tri-LEP area, to be managed and operated at County level, across Hampshire, Surrey, West Sussex, East Sussex, Kent and Essex.

Scale-up Opportunity	To have tri-LEP coverage by County
By when?	2025
Investment Required	**£ 50 Million**
Potential scale up cost saving %	**NA**
Job Creation	**1,688**
CO2 reduction	**30 kt CO_2e pa**

Stakeholder Projects unlocked:

- Replicate "Medtech Accelerator Concept" for new energy initiatives / solutions -> concept investment
- Commercial projects using heat recycling from processes (match funding for viability)
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Roll-out bikeshare scheme to other towns and cities

- Renewed push on workplace travel plans to reduce single car occupancy journeys to work
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Give Planning Authorities powers to demand higher energy efficiency standards (e.g. Brighton + Hove Local actions 19% improvement)
- Gov't should explore 0% Green Deal - pay as you save model
- Changes to PRS caps
- Speak to ALEO – regional fuel poverty networks
- EPC ratings + SAD ratings too low to drive forward EE fast enough
- Link CECAN ("The Centre for the Evaluation of Complexity Across the Nexus") at Surrey University to employment / skills board + invest plans

Project Model #11: New housing smart micro grids

Theme: Smart Energy

Summary

– Smart micro grid with advanced software that monitors and manages generation and demand
– Flexible generation of electricity, heat and cold
– Long-term revenue for council (or housing developer) and model for new garden communities

100%
Energy value retained locally

Higher
Penetration of renewable energy sources

- Micro-grid housing development of 350 homes on a greenfield site
- Heat by water-source heat pump, large electrical demand load on the network. Significant costs to increase capacity at substation. Renewable generation close; large onshore wind and an 18.8MW solar array. Three interventions:
    - £10k feasibility for microgrid
    - £100k detailed engineering design
    - £500k capital works
- Investment could come from Local Authority revenue from Use-of-System like DuoS.
- Could retain 100% of the energy benefit locally
- Scale up for North Essex Garden Communities.

Detail

Community microgrids are a way for neighbourhoods, villages, towns and cities to meet their energy needs locally. Increasingly, community microgrids are being explored as an option even in areas where a larger grid already exists, mainly as a way to increase local energy independence and resilience. With the thousands of new homes that will be built each year in the south east microgrids offer an excellent opportunity to retain more of the economic value of the energy that is generated locally and enable developers to circumvent constraint issues on the public distribution grid. Further, it would enable the sharing of benefits and savings from local generation amongst all members of the community. It seems an excellent opportunity for large scale developments such as the North Essex Garden Communities, Otterpool, Manydown and South Godstone.

To prove the concept is commercially viable, it is proposed to deliver a microgrid to a new development in Colchester called the Northern Gateway where around 350 homes are being built.

This could be connected to a nearby solar farm to directly provide renewable power to the community. A water or air source heat pump could also be integrated alongside thermal and electro-chemical storage to provide a renewable source of heat and ensure any fluctuations in demand or generation can be managed. If the concept proves successful it can be rolled out to future, larger scale developments following the necessary feasibility studies.

Project Model Investment Analysis

Project	New Housing Smart Micro Grids (350 houses)
Project Lifetime	+25 years
Investment Required	£ 1.163 Million
OPEX per annum	£ 36,000
Revenues and sources	FIT £8.7k / Capacity Market £5.7k / DUoS £24.5k
Project Return	Payback period is 4 - 5 years
Sources of Investment	Private developer / Utility company
Ownership model	House owners mini ESCO
CO2 reduction	560 t CO_2e pa

Scale-up Opportunity

Scale-up Opportunity	8,000 new house pa till 2032 (13 yrs)
By when?	2032
Investment Required	**£ 713 Million**
Potential scale up cost saving %	**15-20%**
Job Creation	**22,700**
CO2 reduction	**135 kt CO_2e pa**

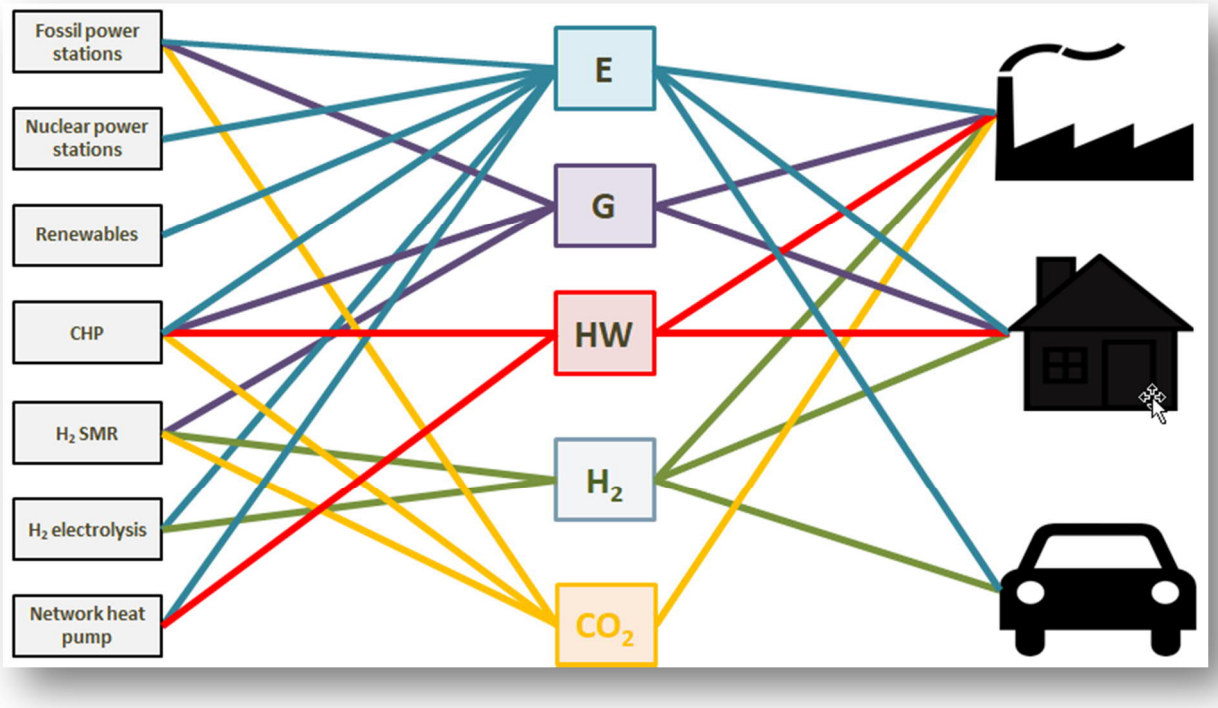
Stakeholder Projects unlocked:

- District Heating for Shoreham harbour with water source heat-pump
- New heat network for Worthing Civic Centre to Worthing Hospital
- Otterpool - new development
- Colchester - DHN / Geothermal (heat pump)
- Park homes
- Resource Hubs - using heat from sewers e.g. to heat swimming pools
- Solar streetlights
- Make easier to sell renewable electricity to building users where multi-tenanted (inc. flats)
- Localised Energy community schemes – solar
- Roll-out bikeshare scheme to other towns and cities
- Renewed push on workplace travel plans to reduce single car occupancy journeys to work
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Shift investment away from increasing transport infrastructure capacity (e.g. as in Missing Links report for the South East) to managing demand - more sustainable, local, shared transport solutions
- Bus companies - there is a disconnect between routes and local employment centres

- Give Planning Authorities powers to demand higher energy efficiency standards (e.g. Brighton + Hove Local actions 19% improvement)
- Gov't should explore 0% Green Deal - pay as you save model
- PV + insulation on council houses in Winchester
- EPC ratings + SAD ratings too low to drive forward EE fast enough

Project Model #12: EV charging & Hydrogen fuelling infrastructure

Theme: Transport Revolution



Summary

- Electric and Hydrogen Vehicles were at the forefront of National Grid's Future Scenarios Report, where they upwardly revised their figure for the number of EVs on the road to 11 million in 2030, and 36 million in 2040;
- There will need to be a significant rollout of charging infrastructure for EVs and upgrading of the electrical distribution network to meet the requirement
- Opportunity to centralise large-scale multi-charge point charging hubs similar to motorway service stations, but with intelligent scheduling and control for efficient charge-time turnaround and fleet management
- Significant development of secondary economy and supply chain around large-scale charge hubs, with retail outlets, vehicle-to-grid, localised renewables generation and many other opportunities to be considered for revenue

Detail

The electric vehicle revolution is imminent, and it will dramatically affect how we use and fuel our vehicles. An estimated 38,000 on-street charging points will be necessary to enable members of the public to charge their vehicles conveniently. In some cases, this will be done through the deployment of multi-purpose infrastructure such as smart lamp posts.

The cost of this will be high, but it is critical to enable the EV rollout and the wider transition to a low carbon economy for transport. For instance, public transport is the source of over 7% of all transport carbon emissions associated with English households, but the undertaking of direct intervention on bus emissions (for instance, through increased passenger uptake and fuel efficiency) can have a demonstrable effect in carbon reduction[58]. By way of example, Hampshire County Council has an innovative public sector framework that enables public bodies such as local councils and the police to purchase feasibility studies at a near zero cost, and also procure the charging infrastructure at low prices too. This scheme will be extended to the whole south east, and funding identified to help with the capital cost, particularly in rural areas. In addition, at least 80 rapid charging stations or Hydrogen filling stations will be installed in the south east to provide charging infrastructure across South East.

An argument could be made that this type of infrastructure could or should be provided by the private sector, and no barriers will be put in front of large companies such as BP and Shell who may wish to operate such infrastructure at their forecourts. It is understood that Pivot Power, National Grid and other potential providers are already looking for opportunities to invest in these schemes. We will look to work with these solution providers / developers to ensure fully-fledged EV charging or Hydrogen filling stations are established by 2032.

Underpinning this Project Model, there will be significant growth required of the domestic and business / commercial EV infrastructure which his would need to see 300,000 atypical solar/battery combinations to be in place by 2032 above present levels.

Project Investment Analysis

Project	EV Charging / H2 filling station scale up	Street charging points
Project Lifetime	+25 years	+25 years
Investment Required	£ 20 Million	£ 3800
OPEX per annum	£ 2.0 Million	£ 380
Revenues and sources	EV charge sale	EV charge sale
Sources of Investment	Private sector	Private sector
Ownership model	Private sector	Private sector
CO2 reduction	49,840 t CO_2e pa	

Scale-up Opportunity

Scale-up Opportunity	80 fast charging / / H2 filling multi point stations	38,000
By when?	2032	2032
Investment Required	**£ 1,600 Million**	**£144 Million**
Potential scale up cost saving %	**20-25%**	
Job Creation	**6,758**	
CO2 reduction	**3,987 kt CO_2e pa**	

[58] Committee on Climate Change: "Chapter 5: Progress reducing transport emissions", June 2013 [online]

Stakeholder Projects unlocked:

- Hydrogen injection into gas grid
- Solar highway as being trialled in Scandinavia
- Clean gas - utilisation of existing networks – electrolysis
- Solar farms for every local authority on urban fringe
- Rooftop solar on car parks
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Brighton main line - digital infrastructure along rail line
- Roll-out bikeshare scheme to other towns and cities
- Renewed push on workplace travel plans to reduce single car occupancy journeys to work
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Shift investment away from increasing transport infrastructure capacity (e.g. as in Missing Links report for the South East) to managing demand - more sustainable, local, shared transport solutions
- Courier / empty mileage schemes (like pallet network)
- Bus companies - there is a disconnect between routes and local employment centres
- Work on taxi companies to incentivise changeover to EV / Hybrid - use changes in licensing arrangements
- Use of bus lanes - free-up to HGVs (or EVs?) at times?
- Improved cycling and walking infrastructure in Shoreham + Worthing town centre + surrounds
- Introduction and roll out of electric and hydrogen fuelled bus fleets, particularly in Crawley, Worthing and Adur, and Brighton and Hove, building on developments that are already underway
- Grid balancing - large scale battery storage next to constrained substations along coastal strip

Project Model #13: CNG fleet rollout

Theme: Transport Revolution

Summary

Multiple locations, South East

- Convert council refuse fleet to CNG and build fueling stations at council refuse depots
- Cost: £200k per depot. £150k per vehicle.
- Technology already proven and used in places like Sheffield, Madrid, .

30%
Saving in cost per mile travelled

95%
CO2e saving compared to diesel when using Bio-Methane

- £25k costlier per vehicle (usually £125k)
- 20% CO_2 savings against normal diesel; 95% against bio-methane
- Quieter and improved air quality
- Technical challenges because CNG is very expensive to compress so better to be near centralised gas grid
- Investment would be required from 50 District Councils (not County)
- This may be considered by private fleets (such as Stobarts, Amazon, Ocado, etc.) with warehousing, distributions centres in the region
- Benefit for Councils who are looking to build lorry parks to avoid "Operation Stack"
- Parallel infrastructure to EVs - provides improved environmental performance (compared to diesel / oil) considering the problem that electrification / battery power is often insufficient for large / heavy vehicles such as large / HGV and large vehicle fleets, buses, distribution, refrigeration vehicles.
- Large reduction in CO_2 emissions comes with future move to biomethane supply replacing CNG

Detail

Opportunities exist for vehicle fleet operators to move to CNG as their prime fuel, because it is both lower priced and produces lower CO_2e emissions. To facilitate this change there needs to infrastructure created for fuelling station capability and also for engine conversion – or purchase of CNG new vehicles when fleet change cycles allow. Conversion to CNG gives around a 20%

reduction in emissions over diesel fuel use by HGV fleets – a far larger reduction is available by following through to using compressed biomethane (CBM) at a later date – this then would give a 95% reduction in CO_2e over diesel. But to facilitate this for CNG and then Biomethane, the infrastructure needs to be in place: this is the basis of this Project Model to support the change to CNG and Biomethane by an initial infrastructure deployment.

For the fuelling infrastructure, an opportunity exists to utilise a presently unused high-pressure gas pipeline system in the tri-LEP area to act as the CNG feed spine to a mother fuelling point. The mother decanting point and conversion to lower pressures would allow bulk road tankage filling that then could be moved as required to strategically placed "daughter" fuelling points off the pipeline system.

Whilst some forward-thinking logistics companies are moving to CNG – to promote the change to the wider operator field it is viewed that Local Authorities can take a lead by having their waste vehicle fleets moved to CNG. This is irrespective if they are the waste collection entity or through their third-party waste contractor.

Project Model Investment Analysis

Consideration of fleet and daughter fuelling site basis – an atypical tri-LEP authority has 12 RCV in operation managing their residual waste collection (there are other waste related vehicles i.e. recycling collection – this is based on residual waste compression vehicles).

Project	CNG for 12 vehicle RCV fleet
Project Lifetime	+20 years
Investment Required	£ 650,000
OPEX per annum	£ 50,000
Revenues and sources	TBA
Project Return	Payback period is 5 - 6 years
Sources of Investment	Public/private partnership or private venture
Ownership model	Dependent on investment model
CO2 reduction	85 t CO2e pa

Scale-up Opportunity

In the tri-LEP area CNG conversion potential by 2032has been researched by the developer to be at an average of 200 HGVs per Local Authority area, noting this is not just RCV fleets but private logistic fleet operators.

Scale-up Opportunity	11,800 HGVs
By when?	2032
Investment Required	**£ 640 M**
Potential scale up cost saving %	**15-20%**
Job Creation	**2,100 jobs**
CO2 reduction	**84** kt CO2e pa

Stakeholder Projects unlocked:

- Local Biomass (AD / Combustion) to generate power and biomethane
- Clean gas - utilisation of existing networks – electrolysis
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Make easier to sell renewable electricity to building users where multi-tenanted (inc. flats)
- Shift investment away from increasing transport infrastructure capacity (e.g. as in Missing Links report for the South East) to managing demand - more sustainable, local, shared transport solutions
- Courier / empty mileage schemes (like pallet network)
- Bus companies - there is a disconnect between routes and local employment centres
- Work on taxi companies to incentivise changeover to EV / Hybrid - use changes in licensing arrangements
- Grid balancing - large scale battery storage next to constrained substations along coastal strip

Project Model #14: Ports – Modernisation of Port Energy Infrastructures

Theme: Transport Revolution

Summary

Our major ports manage most of our export and import of goods required for the country supported by around 2,500 to 3,000 directly employed staff and 30,000 indirect employments at each of the major ports. However, ports activities generate high level of pollution in the areas mainly due to diesel generators powering the ships while at the docks, diesel trailers, large cranes and container trucks. Typically, major UK ports provide birth facilities for 6 to 9 ships at a time. Most of these ships are powered by diesel generators of size up to 5 MVA while at birth. In addition, container movements at the ports are supported by several cranes of size up to 3MW, 600 to 700 diesel trailers and up to 50,000 container trucks per week to transport containers from each of the port to inland.

It is predicted that in the coming years, Automation / Digitalisation will increase greatly in the loading and unloading of shipping which will increase the speed and accuracy of ship turn around logistics. Automated shore handling equipment will move away from being diesel powered to being electric for light loads and hydrogen fuelled for heavier operations. A green energy smart energy infrastructure supported by energy storage scheme and EV infrastructure can help us to reduce the emission levels at our ports. The following aspects need to be considered to establish a smart energy infrastructure for a port:

- Shore to ship power to remove ships powering from diesel generators while at birth.
- Converting the existing diesel based tug units and refrigeration units to CNG based ultra-low emission trailers or Electric vehicles.
- EV charging / CNG filling facilities for the port trailers and container trucks.
- Renewable energy generation and energy storage infrastructure at site to support port energy needs.
- Smart electricity infrastructures to support the port operations using renewable energy generation and energy storage.

- **Project Investment Analysis**

Project	Port move to on site Renewable Power
Project Lifetime	+25 years
Investment Required	475 Million
OPEX per annum	5 Million
Revenues and sources	Energy saving
Project Return	Payback period is 9 - 10 years
Sources of Investment	Private
Ownership model	Port owned
CO2 reduction	520 kt CO_2e pa

- **Scale-up Opportunity**

Scale-up Opportunity	Roll-out to SE Ports (based on 80% supply)
By when?	2032
Investment Required	**1,500 Million**
Potential scale up cost saving %	**-**
Job Creation	**50**
CO2 reduction	**1,376 kt CO_2e pa**

Stakeholder Projects unlocked:

- District Heating for Shoreham harbour with water source heat-pump
- Commercial projects using heat recycling from processes (match funding for viability)
- Adur: Shoreham Harbour new HP based HN
- Local Biomass (AD / Combustion) to generate power and biomethane
- Clean gas - utilisation of existing networks – electrolysis
- Solar farms for every local authority on urban fringe
- All Local Authorities should allocate energy sites in their local plan for medium to large-scale renewable energy
- Shift investment away from increasing transport infrastructure capacity (e.g. as in Missing Links report for the South East) to managing demand - more sustainable, local, shared transport solutions
- Courier / empty mileage schemes (like pallet network)
- Grid balancing - large scale battery storage next to constrained substations along coastal strip
- Use of heat energy from Chineham Incinerator
- Smart grid (with DH?) for Worthing Civic Centre (inc Law Court, Town Hall, Civic Offices, Health Hub, Assembly Halls, Library) car park + EVs
- Grid balancing - large scale battery storage next to constrained substations along coastal strip

Project Model #15: Setup of ESCO / MUSCO infrastructure

Theme: Non-technical

Summary

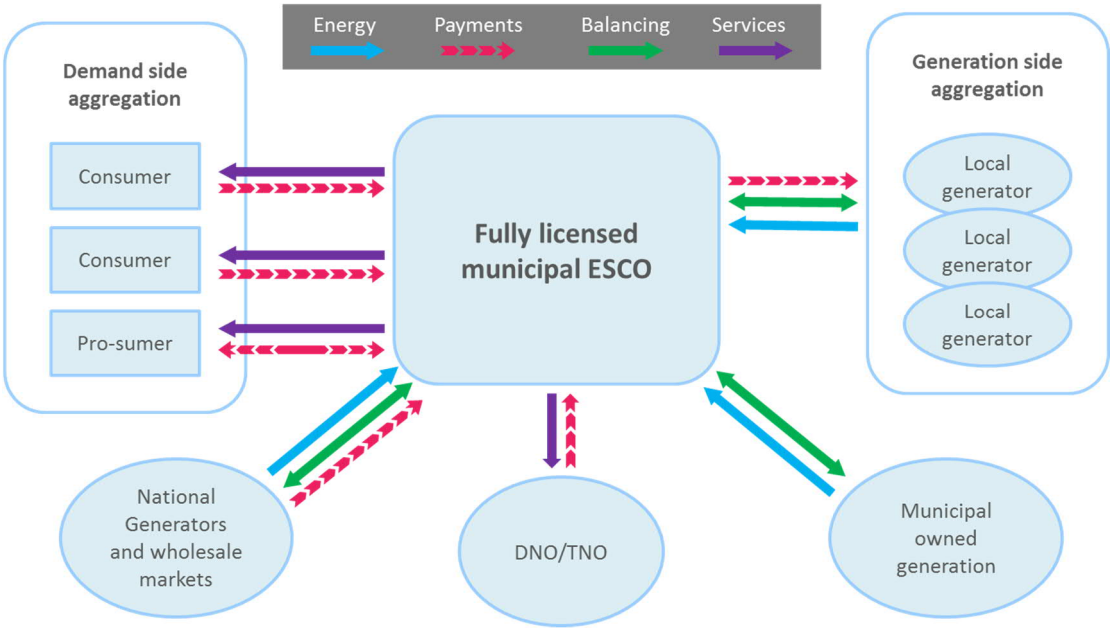


Figure 14: High-level view of the operation of a municipal ESCO

A number of different delivery models exist that could be deployed alongside the Project Models. Examples of this include ESCo (Energy Services Company) and MUSCo (Multi-Utility Services Company). ESCo's and MUSCo's are alternative models of delivering energy and other services to consumers. The defining characteristics of an ESCo are:

- (1) the single point of service to energy utilities; and
- (2) profiting from service delivery, not selling physical products.

They are generally set-up as Special Purpose Vehicles.

The emphasis on service delivery represents a shift away the supply and demand of physical flows (energy, water, etc) to the supply of services (warm homes, light, transport, etc.). The lower the energy consumption of its clients, the higher the ESCo's profit – provided that the ESCo maintains the requested level of service provision.

As far as local authorities are concerned this is a relatively untapped area to date, with East Hampshire District Council the only authority to create its own MUSCo called RegenCo.

We, as the LEPs will look to setup the ESCo / MUSCo infrastructure (customer services, meter reading, billing management, Regulatory compliance, etc.), likely using an arms-length organisation. This will facilitate multiple Local Authorities to run multiple front-end ESCo / MUSCo's based on their own local priorities. Thus, we remove much of the operational risk from the Councils, and share that cost across a number of providers. Initial capital could be provided via the council's own reserves or from a public/private funding provider. Having a local authority as an active participant, it has the

potential to generate revenues to the local authority and present more opportunities to address local low carbon development, energy security and fuel poverty.

***Note that because this is a 'revolutionary' Project Model, operational costs and job creation cannot be estimated, hence business case cannot be calculated.**

Stakeholder Projects unlocked:

- Otterpool - new development
- Park homes
- Make easier to sell renewable electricity to building users where multi-tenanted (inc. flats)
- Localised Energy community schemes – solar
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- PV + insulation on council houses in Winchester
- Speak to ALEO – regional fuel poverty networks

Project Model #16: New-build homes on hydrogen grid

Theme: Heat Networks

Summary Information

- Build polyethylene gas grid on new housing estate for hydrogen (H2) network demonstration project
- Based on H100 project in Scotland
- Will create first H2 network in South East England and use it to develop supply chain and low carbon economy

1st
At scale H2 project in South East, establishing

0%
emissions if using renewable sources to generate the hydrogen

- £5M investment by Southern Gas Networks for a 300 home new-build development fully invested for for council / affordable housing with a social-minded developer.
- Hydrogen generated through electrolysis supplied by local renewable generation so heating and cooking is zero carbon.
- Can inform retrofit of the existing gas network for blended methane with hydrogen up-to 20% for environmental benefit (see Project Models #2 and #3)
- Benefit is the early development of a hydrogen economy in south east utilising surplus local generation, providing job security / growth for SGN.

Detail

Gaseous hydrogen can be transported through pipelines much the way natural gas is today. This can be burned for cooking and heating and the only thing that is 'emitted' is water – no carbon or other pollutants. This can be done in a way that is as safe, as natural gas and renewable electricity can be used to produce the hydrogen via an electrolyser.

This Project Model would look to be delivered with the local gas distribution operator SGN and would see a new polyethylene pipe network built to serve a new housing development, ideally affordable homes built by a local authority. The pilot of 300 homes would be the first of its kind in the south east and would build on the experience SGN has gained in the H100 project in Scotland, which has been designed to demonstrate the safe, secure and reliable distribution of hydrogen.

If successful it could be rolled out to thousands of households in the tri-LEP area and elsewhere in the country. By locating the first at-scale demonstrator in the south east it positions the region as a centre of excellence for this kind of technology, helping to establish many new supply chain businesses in the area and enable large regional companies like SGN to find new business models, to secure and create hundreds of new jobs.

Project Investment Analysis

Project	New build homes on hydrogen grid
CO2 reduction	580 t * CO_2e pa

***Note that because this is a 'revolutionary' Project Model, operational costs and job creation cannot be estimated, hence business case cannot be calculated.**

Stakeholder Projects unlocked:

- Biomethane injection into gas grid
- Park homes
- Local Biomass (AD / Combustion) to generate power and biomethane
- Clean gas - utilisation of existing networks – electrolysis
- Make easier to sell renewable electricity to building users where multi-tenanted (inc. flats)
- Creation of internet cottages / work hubs.
- Integrated communities (work / live / play in same place)
- Shift investment away from increasing transport infrastructure capacity (e.g. as in Missing Links report for the South East) to managing demand - more sustainable, local, shared transport solutions
- Give Planning Authorities powers to demand higher energy efficiency standards (e.g. Brighton + Hove Local actions 19% improvement)
- Whitehill and Borden - green + healthy new town

Project Model #17: Bio-fuel evolution

Theme: Renewable Energy

Summary

Provide investment to enable innovative new business to locate operations in south east and commercialise their ground-breaking bio-fuel technology.

Investment required:

- £20,000 to locate business in south east (stage 1)
- £25,000 to complete feasibility study (stage 2)
- £300,000 to support commercialisation of technology (stage 3)

Funding options:

- Local business grant via local authority
- Support for Innovate UK bid, possibly in consortium with local authorities and the LEP
- Support for private sector investment (venture capital etc.)

Detail

According to the Food and Agriculture Organisation (FAO) of the United Nations, 1.3 billion tonnes of food produced globally for human consumption is lost or wasted every year. The Waste and Resources Action Programme (WRAP) estimate that in the UK this food waste generated more than 20million tonnes of CO_2e per year and if this was eliminated it would be the same impact as removing 1 in 4 cars off our roads.

Biofuel Evolution has succeeded in designing a realistic and commercially viable, standalone, unit to convert food waste into bioethanol - a more environmentally-friendly method of generating energy on a small-scale.

Biofuels like bioethanol are widely used across Europe; in the UK for instance most transport fuel is blended with bioethanol to make it ‘greener’. Bioethanol is produced by a mature established process utilising raw materials like corn or sugar beet, which is grown on arable land that would otherwise be utilised for food production.

A wave of second generation companies are rapidly emerging who are looking to use waste food rather than raw materials to produce biofuel.

Central Government has great interest in promoting the development of new bio generated fuels. This is best signalled through the DfT’s Future Fuels programme which is aimed at road haulage and aviation to develop new low carbon and bio material derived fuels - this is revolutionary in nature as it will take many years of testing to achieve certification and homologation for aircraft and HGV use – but it does offer a way to move away from fossil derived fuel sources.

***Note that because this is a 'revolutionary' Project Model, operational costs and job creation cannot be estimated, hence business case cannot be calculated.**

Stakeholder Projects unlocked:

- Biomethane injection into gas grid
- Replicate "Medtech Accelerator Concept" for new energy initiatives / solutions -> concept investment
- Commercial projects using heat recycling from processes (match funding for viability)
- Resource Hubs - using heat from sewers e.g. to heat swimming pools
- Local Biomass (AD / Combustion) to generate power and biomethane
- Clean gas - utilisation of existing networks – electrolysis
- Anaerobic digester at Sparshot College (approved but Gov't policy on AD holding it up!)

Project Model #18: Support developments in CCUS (Carbon Capture Use and Storage)

Theme: Smart Energy

Summary

Provide investment to enable large-scale carbon-capture demonstrator to be built in south east.

Investment required:

- £25,000 to complete feasibility study (stage 1)
- £200,000 to support demonstrator facility (stage 2)

Funding opportunities (subject to availability):

- Local business grant via local authority
- Support for Innovate UK bid, possibly in consortium with local authorities and the LEP
- Central government support:
    - There is currently a £15 million call for Carbon Capture, Use and Storage (CCUS) innovation to offer grant funding for innovation projects that lead to significant reduction in the cost of capturing and sequestering carbon dioxide.
- Coast to Capital Local Enterprise Partnership
    - C2C LEP has committed £5 million of capital to create a new funding escalator comprising a loan scheme and an equity fund managed by The FSE Group. Surrey based SMEs with the potential to deliver high growth and employment opportunities are eligible to apply.
    - Growing Places Investment Fund

Detail

Biogas produced from anaerobic digestion (AD) and landfill gas (LFG) is playing a more and more important role in the energy market. There are more than 500 AD plants in the UK currently, which collectively produce more than 700MW of energy, enough to power 850,000 homes.

Biogas has been considered as the cleanest renewable fuel for transportation by the United States and the European Union. However, since raw biogas mainly consists of methane (CH_4 ~ 65vol%) and carbon dioxide (CO_2 ~ 35vol%), an upgrading process is normally needed to remove CO_2 and other unwanted impurities before it can be used. However, the CO_2 could potentially be removed from the raw biogas and captured and stored instead of being released into the atmosphere.

According to Pike Research, the AD industry is a fast-growing low carbon market. Global revenue was $17.3 billion in 2011 and will nearly double by 2022, hitting $33.1 billion in that year.

Due to the rapid growth of biogas upgrading, there is a huge potential for CO_2 capture. For example, assuming 50% of raw gas is upgraded would result in a CO_2 capture of 19,4 M tonnes.

There is a broad international consensus that Carbon Capture, Use and Storage (CCUS) has a vital future role in reducing emissions.

The International Energy Agency estimates there will be a global CCUS market worth over £100 billion - with even a modest share of this global market, UK GVA could increase to between £5 billion and £9 billion per year by 2030.

The demonstrator facility would the first in the UK and help to establish the south east as a centre for CCUS technology with significant potential job creation and GVA growth prospects.

A range of potential CCUS technologies ranging from advanced mechanical scrubbing, to biological "living" filtering systems are in development and there is an opportunity to support a carbon capture demonstrator unit – with the technology selected through a proactive competition selection process with the tri-LEP working in partnership with BEIS and a winning third party.

***Note that because this is a 'revolutionary' Project Model, operational costs and job creation cannot be estimated, hence business case cannot be calculated.**

Stakeholder Projects unlocked:

- Replicate "Medtech Accelerator Concept" for new energy initiatives / solutions -> concept investment
- Commercial projects using heat recycling from processes (match funding for viability)
- Clean gas - utilisation of existing networks – electrolysis
- Link CECAN ("The Centre for the Evaluation of Complexity Across the Nexus") at Surrey University to employment / skills board + invest plans