Solid Recovered Fuel – Local Authority Experience in UK





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AEA – Who are we?

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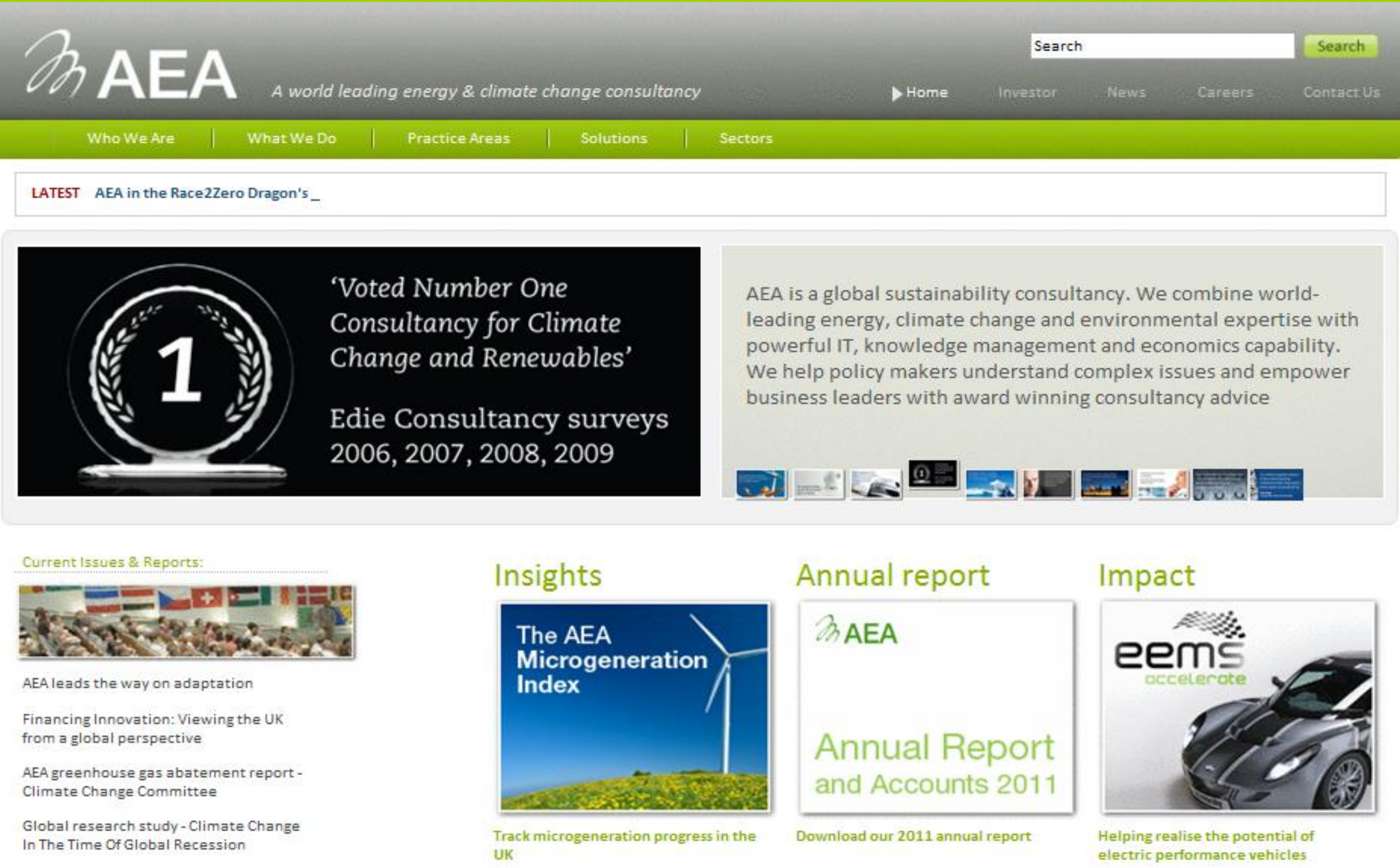

The Context for SRF Schemes

BACKDROP

- Legislation
  - EU Landfill Directive, Waste Framework Directive, Waste Incineration Directive => Industrial Emissions Directive
  - Waste Regulations (England & Wales) 2011 & Waste Strategies
  - Renewables Obligation Order (Banding review and CHP uplift?)
  - Renewables Heat Incentive (State approval received subject to reduction in large biomass tariff – Nov 11 implementation?)
  - Electricity Market Reform (FiT CfD and “vintaging” of ROCs?)
- They all aim to reduce BMW to landfill and GHG emissions
- Clarity for market place?
  - move away from landfill and embracing of newer technologies
  - significant uncertainty on support levels and related income guarantees needed to drive development forward

GOVERNMENT POLICY

- Policy changes will present opportunities and threats particularly in case of EfW – emotive political topic
- Policy set and administered by several Government Departments (Defra, DECC, Ofgem, ORED, Local Authorities)
- Vital to understand current local and national positions regarding specific technologies
  - Greater London Authority
    - State their support for EfW (in its many forms) and understood to be putting forward technology neutral position
    - Developing an Emissions Performance Standard for waste treatment and a Carbon Intensity Floor for EfW
  - Welsh Assembly are considering a minimum thermal recovery efficiency for EfW which will require CHP
  - Scottish Government have a specific EfW target threshold
  - Ongoing UK-wide focus for AD over other technologies

LOCAL AUTHORITY RATIONAL FOR SEPARATED CONTRACTS

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+ Securing efficient energy solution – heat use & electricity
+ Availability of financial support for renewables (biomass fraction) & heat use
+ Flexibility in power generation - generating when energy demand exists rather than where waste needs to be disposed
+ Broadening of market beyond waste services to encompass energy and commodity production markets
+ Improved delivery prospects by allowing markets to site energy developments
+ Allows users to consider combining with other fuel supply, supplying to more than one localised facility, and/or serve multiple markets

Local Authority Input Considerations

KEY FUEL PRODUCER ISSUES

- Waste forecast over medium to long term
- Input compositional risk (major concern)
- Output SRF specification risks (major concern)
- Achievement of recycling/ composting and diversion targets through choice of technology (MBT/AD, AD, Biodrying, MTT, etc)
  - Value of recyclates/ quality of market solution
  - Technology to deliver fuel to specification (quantity, chemical parameters, and physical form)
- Carbon footprint of overall solution and facilities and capability delivering a sustainable transport solution
- Achievement of planning, positive impact on local economy, and fit with place-shaping objectives

SRF PRODUCTION "TUG OF WAR"

Local Authority:

+ We cannot predict how waste generation characteristics will change over the life of the contract and therefore can only give limited compositional guarantees but require an output fuel specification to be met

Fuel Producer:

+ We have no control over the composition of incoming waste so how can we guarantee a pre-determined theoretical fuel specification where any technology we choose will simply concentrate any chemical parameters?

Local Authority Output Considerations

SRF CHARACTERISTICS

+ Biomass Proportion?
+ Calorific Value?
+ Moisture Content?

+ Physical Form?
+ Particle Size Distribution?
+ Fuel Compaction Density?

NLWA – FUEL SPECIFICATION

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SRF class and origin from ~585ktpa municipal waste

Class codes[a]: NCV 3 & 4, Cl 3, Hg 3   Origin[b]:20 03 01

Physical parameters

Particle form: Blend of floc and digestate

Particle size[d]: ≤250mm   **Test method**: prCEN/TS 15415

	Unit	Value Limit	Test method
Ash content	% d	≤20	prCEN/TS 15403
Moisture content	% (ar)	≤25	prCEN/TS 15414
Net calorific value (NCV)	MJ/kg (ar)	≥11 - ≤15	prCEN/TS 15400
Biomass fraction	% of NCV	≥50	prCEN/TS 15440
Chlorine (Cl)	% d	<1.0	prCEN/TS 15408

ESSEX CC – MIN FUEL SPECIFICATION

Output SRF Fuel Specification produced from ~370ktpa of municipal waste

Minimum SRF Class code: NCV 4; Cl 4; Hg 4.

Parameter	**Unit**	**Limit**
Net calorific value (NCV)	MJ/kg (ar)	No NCV less than 10
Chlorine (Cl)	%DM	No Cl greater than 1.5
Mercury (Hg)	Mg/MJ (ar)	No Hg greater than 0.15
Biomass content	% of NCV	No less than [Bid-back item]
Real Dynamic Respiration Index (RDRI)	mg O2/ kg VS.h	No greater than 1500
Particle size	mm	No greater than 150
Moisture content	% Wet weight	No greater than [Bid-back item]

NORTH LINCOLNSHIRE - CLIMAFUEL

Fuel Specification produced from ~70ktpa of residual and organic waste		
EWC Number: 19 02 10 or 19 12 10		
Parameter	**Unit**	
Gross CV	MJ/kg	10 – 40
Maximum Sulphur Content	(w/w)	2.0%
Maximum Chlorine Content	(w/w)	2.0%
Maximum Total Fluorine, Bromine & Iodine Content	(w/w)	1.5%
Maximum Mercury Content	mg/kg	10
Maximum Group II Metals Content (Total Cd & Tl)	mg/kg	30
Maximum Group III Metals Content - Copper - Lead	 mg/kg mg/kg	 500 300
Maximum Total Group III Metals Content	mg/kg	800

TIMEFRAMES

- Already producing SRF
  - Neath Port Talbot (35ktpa?)
  - East London Waste Authority (90ktpa?)
- In Procurement
  - North London Waste Authority: Contract SRF expected to be available to Fuel Use Contractor from April 2016: Forecast quantity ~300ktpa
  - Essex Waste Partnership: ~180ktpa SRF forecast to be produced from late 2014
  - West Sussex County Council: ~100ktpa fuel expected to be available second half 2013/2014
  - North Lincolnshire Council: ~25ktpa fuel expected to be produced from April/May 2013
- Other Authorities
  - Greater Manchester Waste Disposal Authority (>275ktpa) – Ineos Chlor
  - Barnsley Doncaster Rotherham, Bradford/ Calderdale, Wakefield?

OTHER CONSIDERATIONS

- CEN/TS standards (15359) to be transposed to CEN/EN standards by end 2011 but these are widely regarded as a classification system for SRF as they are voluntary
- IBA from the firing of SRF is not the same as IBA derived from MSW (finer ash with no metals, little aggregates, and potentially concentrated chemical properties e.g. zinc)
- Grit and glass – two options:
  - Use for aggregate replacement to add to recycling performance but may be heavily contaminated with organics limiting its use
  - Blending back into SRF to ensure that the SRF ash is recyclable but this impacts on GMT and gate fee

SOME FUEL OFF-TAKER ISSUES

+ Site availability with good planning prospects
+ Length of planning and construction timetable to coincide with fuel availability
+ Value of energy / income guarantees including fiscal incentives
+ Securing heat use / CHP on good commercial terms & securing associated subsidies
+ Efficient environmental solution in use of fuel
+ Flexibility of the proposed solution both in terms of types and quantities of fuel which can be processed
+ Final ownership and residual value of energy facility (if fuel off-taker is allowed to site the facility)

SRF OFF-TAKE "TUG OF WAR"

Local Authority:

+ We can only determine the actual characteristics of the fuel after it is actually produced and will only be able to monitor its physio-chemical parameters after it is processed by the fuel off-taker due to testing timeframes

Fuel Off-taker:

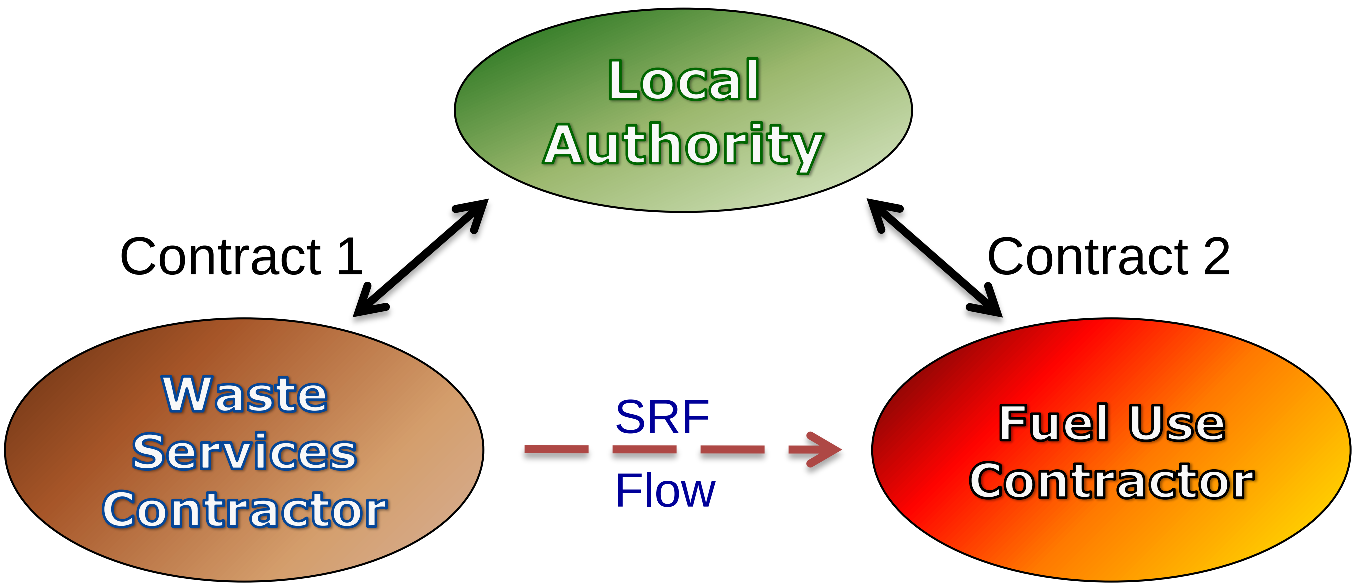
+ We need to have a regular supply of fuel with known and consistent qualities (CV, moisture, form) which can be easily unloaded and used without fear of damaging equipment (chlorine & sulfur)

Contract Interface
“and never the twain shall meet”

SOME KEY INTERFACE ISSUES

- **Sustainable transportation of the fuel** – SRF compaction density and containerisation are key issues
- **Delivery requirements** – compatible infrastructure, and regular scheduled deliveries with adequate storage capacity at both ends which will determine container numbers
- **Fuel testing and acceptance** – ensuring consistent quality fuel which meets the agreed specification is supplied over the long term (CV & chemical parameters e.g. Chlorine)
- **Contractual mechanisms** - to ensure that all material (incl. both in/out spec material) are managed with appropriate financial recourse
- **Co-terminus contracts** - to minimise residual risk – both supply and off-take residual risk

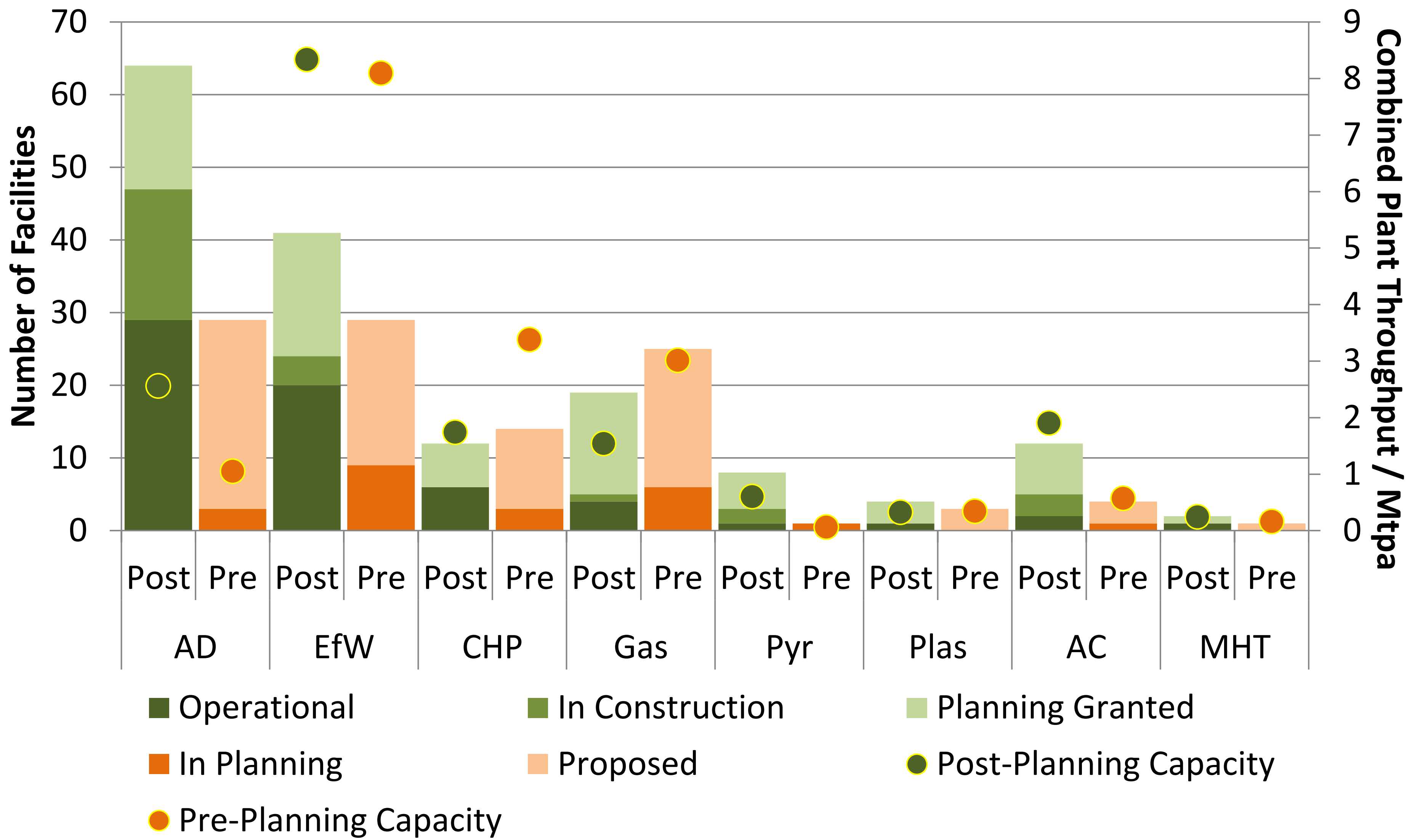
MANAGING INTERFACE RISKS



- Both contracts will create responsibilities and obligations on each of the contractors (in each case to the Authority)
- The interface risks that lie with the Authority can be managed, primarily through the transfer back of consequent financial liabilities associated with non-performance to the contractor at fault

Waste Infrastructure & SRF Outlets

UK STATE OF PLAY – ON THE RADAR



UK STATE OF PLAY – ON THE RADAR

	Operational	In Construction	Planning Granted	Total
AD	28	5	8	**41**
Combustion EfW	30	5	15	**50**
MBT	17	6	14	**37**
MHT	2	3	4	**9**
Advanced Thermal	3	3	19	**25**
Totals	**80**	**22**	**60**	**162**

RDF EXPORTS PERMITTED BY EA FROM 09/09/10 TO 09/09/11 - SOURCE EA

Country	Notifier	Amount Moved (tonnes)	Amount Notified (tonnes)
Denmark	Transwaste Recycling & Aggregates Ltd	2,288.3	10,000
Denmark	DONG Energy Waste UK Ltd	602.0	160,000
Estonia	Hinkcroft Transport Ltd	1,666.0	15,000
Estonia	Shanks Waste Management Ltd		45,000
Germany	Shanks Waste Management Ltd	1,990.4	13,000
Germany	Thanet Waste Services Ltd	8,846.9	12,000
Latvia	N&P Alternative Fuels Ltd		50,000
Latvia	SITA UK Ltd		25,000
Netherlands	Shanks Waste Management Ltd		50,000
Netherlands	SITA UK Ltd	17,173.7	386,000
Netherlands	SITA UK Ltd	1,385.8	2,500
Netherlands	Biffa Waste Services Limited	19,867.6	50,000
Netherlands	Greenway Waste Recycling Ltd	2,518.0	114,000
Netherlands	New Earth Solutions Ltd	8,326.5	90,000
Netherlands	Waste Recycling Limited	533.8	12,500
Netherlands	Nordic Recycling Ltd	612.9	2,000
Portugal	Transwaste Recycling & Aggregates Ltd		24,000
Portugal	Camreg Limited	1,083.2	1,500
Spain	N&P Alternative Fuels Ltd		30,000
Sweden	SITA UK Ltd	23.4	20,000
Sweden	Stobart Biomass Products Ltd		30,000
	TOTAL	**66,918.6**	**1,142,500**

MARKET DISTORTION

+ Glut of spare EfW capacity in European market (Holland, Germany, Sweden, Denmark, etc)
+ Shortage is a critical issue
  - Contractual penalties linked to a failure to provide heat
  - Difficulty in "turning down" operational parameters
  - Threat to revenues and commercial viability
+ TFS (Trans-Frontier Shipment Regulations)
  - Permitting of RDF exports for combustion in the EU (no formal definition of RDF or SRF)
  - "Fuel" must be "prepared" first by sorting and baling
  - Over 1 Million tonnes of export now permitted
  - Negotiation of a significant number of off-take contracts over the past 12 months
  - Pricing "all up" (including TFS fees, brokerage, transport, baling, loading, unloading, etc) range £55 to £85

Realising SRF Energy Opportunities

CHP AND THERMAL EFFICIENCIES

• 153ktpa SRF • NCV 13MJ/kg • 7,800 hrs/yr	WRATE		Other European Experience - Combustion		
	Max Efficiency - Combustion CHP	Electricity Only - Combustion	100% District Heating	~50% District Heating	No District Heating
Max Efficiency					
-Electricity	8.0%	23.0%	20.4%	21.3%	26.0%
-Heat	71.0%	0.0%	64.4%	32.3%	0.0%
-Total Efficiency	**79.0%**	**23.0%**	**84.8%**	**53.5%**	**26.0%**
Energy Output					
-Electricity (MWe)	5.7	16.3	14.5	15.1	18.5
-Heat (MWth)	50.3	0	45.7	22.9	0

REALISING CHP OPPORTUNITIES

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In order to realise CHP opportunities, the following need to be in place:

+ CHP enabled EfW infrastructure (currently not common in the UK);
+ Heat distribution network(s);
+ Sufficient and predictable heat "baseload" – a constant heat demand load; and
+ Energy prices (for heat and electricity) which are able to cover the long term infrastructure costs.

THE IDEAL CONFIGURATION?

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- A CHP EfW facility located near an industrial heat user?
- A CHP EfW facility linked to a district heating network?

- Two key governing factors:
    1. Heat demand – how much?
    2. Heat quality – how hot?

- A CHP EfW generating electricity (to grid or private wire) and supplying high grade heat to an industrial facility (to utilise the high grade heat) which then links to a district heating network (to utilise the low grade heat).
- IS THIS REALISTICALLY ACHIEVABLE?

THE ELEPHANT IN THE ROOM

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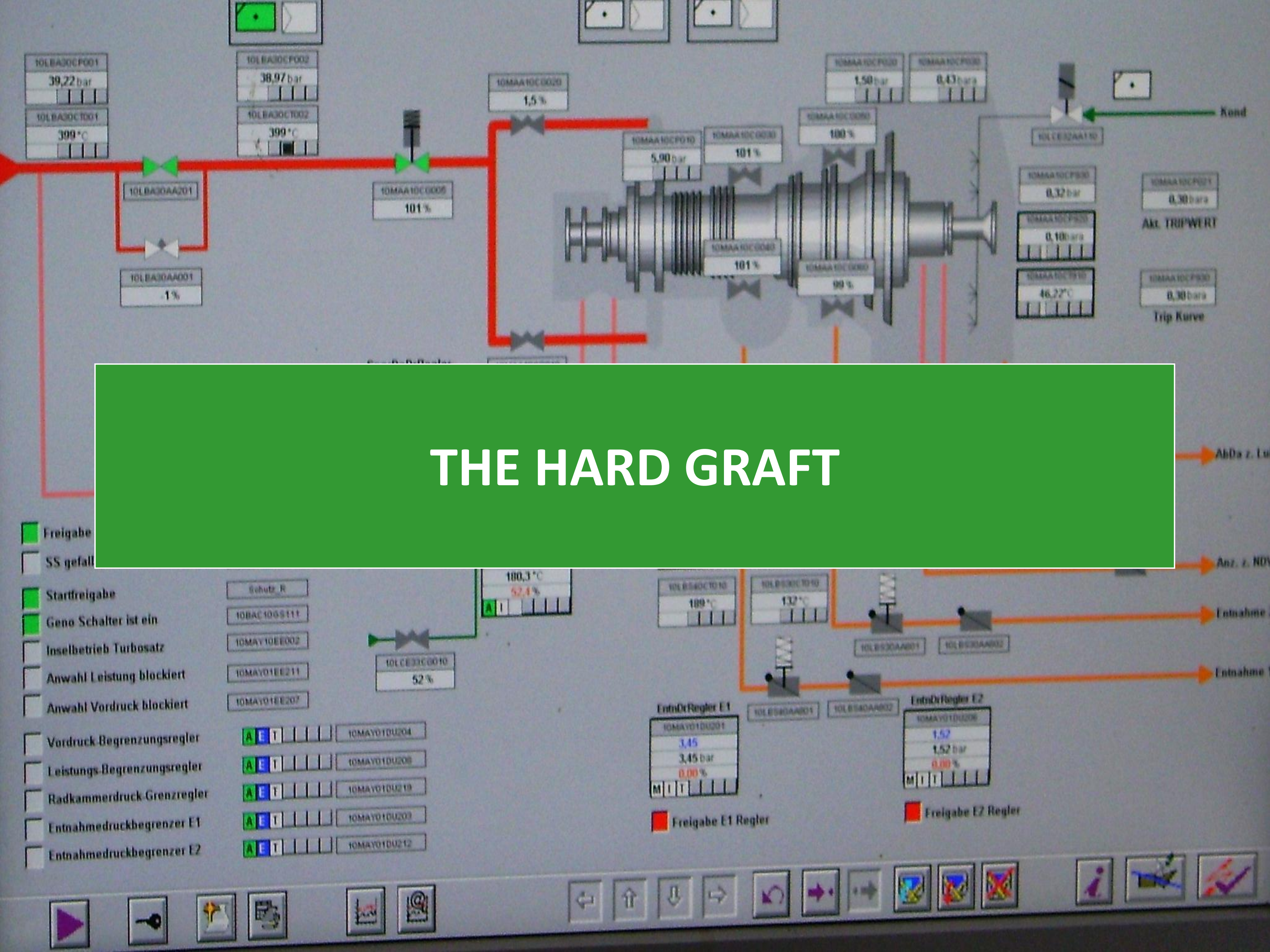
- DEFRA: “The best CHP systems can increase the overall efficiency of an EfW plant from 20-25% to up to 60-70%. Therefore, the addition of CHP to a project significantly increases the displacement of other fuels compared to electricity only EfW.”
- “DECC say that district heating may in certain cases be the only viable option for delivering renewable heat. In these ‘hard to treat cases’ it may be physically impossible or disproportionately expensive to install individual renewable heating . . .”
- BUT WHO IS ESTABLISHING THE MUCH REQUIRED HEAT DISTRIBUTION NETWORKS & HOW DO THEY TIE IN TO EFW FACILITIES?



THE HARD GRAFT

THE ONGOING CHALLENGE

- Delivering value for money throughout the concession period and protection of the public purse
- Maximising the environmental benefit of a two strand procurement
- Ensuring a successful outcome with sufficient system flexibility to meet current and future (long term) requirements
- Ensuring compliance with legislation and regulation over the life of the life of the project
- Minimising risk of project failure – technical, financial and legal
- Using a transparent process to select the most beneficial solution and minimise the risk of challenge

THANK YOU

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