

Designing Environmental Services Vehicles for Efficient and Effective Use.

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Order of play

- Define 'environmental services vehicle'
- Vehicle design and specification
- Load optimisation and avoidance of overloads
- Alternative fuels
- Hybrid options
- Changing requirements for environmental services vehicles



Environmental Services Vehicles?

- Trucks
- Vans
- Plant/mowers
- Works trucks
- Company cars



Vehicle design and specification



Vehicle design and specification

- What do you want the vehicle to do?
- Consider duty cycle
- Look carefully at any potential loss of payload
- Consider intermodal (Demounts)
- Calculate whole life costs
- Don't forget driver training!



Load optimisation and avoidance of overloads

Refuse Collection Vehicle (RCV)

PROCUREMENT AND OPERATION PROCEDURES



A best practice guide produced by the
Refuse Vehicle Overload Technical Officer Group

2005 - Best
practice guide
produced by
members of the
Public Authority
Transport Network.



FREIGHT TRANSPORT ASSOCIATION

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'Alternative' fuels

- **Bio diesel** - Can be used at a 5 per cent blend in existing diesel engines with no need for modification. Using higher blends could affect your vehicle warranty.
- **Bioethanol**- Produced by the fermentation of starch, sugar and cellulose plants. A 5 per cent blend in petrol can be used in existing petrol vehicles with no modifications.
- **Liquefied petroleum gas (LPG)** - Suitable for smaller vehicles such as cars and light vans that have high mileage or operate predominantly in city centres.
- **Electricity** - Powering vehicles either completely by electricity or by electricity and a range extending internal combustion engine (plug in hybrid vehicles).
- **Natural gas** - An option for goods vehicles with depot-based refuelling sites.
- **Biogas** - Organic materials are broken down by a microbiological activity to produce methane.
- **Pure plant oils (PPO)** - Vehicles powered on fuel made from plant oils. Very similar to diesel but a heater must first be added to the fuel line. Not widely available in the UK
- **Hydrogen** - Currently only used in prototype vehicles. It may be used as a fuel in a modified petrol engine or indirectly to power a fuel cell in an electric vehicle.



'Hybrid' options

- **Parallel hybrid**
 - most commonly produced at present, have both an internal combustion engine (ICE) and an electric motor connected to a mechanical transmission.
- **Series hybrid**
 - the combustion engine drives an electric generator instead of directly driving the wheels.
- **Regenerative hybrid**
 - Capture braking energy for reuse



Calculate whole life cost

Fuel savings using HRB														
Cost per litre (£.p)		£	0.8740	Cost of HRB		£20,000.00	Write down (in years)		7	£2,857.14		p.a. revenue		
Projected fuel savings p.a. to give a return within 8 year cycle														
Vehicle	Fleet	Pro-rata Full yr	08-09 £ per month	13%	14%	15%	16%	17%	18%	19%	20%	21%	22%	
#1	V810	22420	£ 1,633	2547	2743	2939	3135	3331	3527	3723	3919	4115	4311	
#2	V809	22358	£ 1,628	2540	2736	2931	3127	3322	3517	3713	3908	4104	4299	
#3	V869	22277	£ 1,622	2531	2726	2920	3115	3310	3505	3699	3894	4089	4283	
#4	V855	21935	£ 1,598	2492	2684	2876	3067	3259	3451	3642	3834	4026	4218	
#5	V854	21030	£ 1,532	2389	2573	2757	2941	3125	3308	3492	3676	3860	4044	
#6	V881	20596	£ 1,500	2340	2520	2700	2880	3060	3240	3420	3600	3780	3960	
#7	V837	20120	£ 1,465	2286	2462	2638	2814	2989	3165	3341	3517	3693	3869	
#8	V867	19404	£ 1,413	2205	2374	2544	2713	2883	3053	3222	3392	3561	3731	
#9	V814	18725	£ 1,364	2128	2291	2455	2618	2782	2946	3109	3273	3437	3600	
#10	V883	17044	£ 1,241	1936	2085	2234	2383	2532	2681	2830	2979	3128	3277	
#11	V615	15935	£ 1,161	1811	1950	2089	2228	2368	2507	2646	2785	2925	3064	
#12	V859	15829	£ 1,153	1799	1937	2075	2214	2352	2490	2629	2767	2905	3044	
#13	V310	14993	£ 1,092	1703	1835	1966	2097	2228	2359	2490	2621	2752	2883	
#14	V313	14825	£ 1,080	1684	1814	1944	2073	2203	2332	2462	2591	2721	2851	
#15	V872	13619	£ 992	1547	1666	1785	1904	2023	2143	2262	2381	2500	2619	
#16	V860	13325	£ 970	1514	1630	1747	1863	1980	2096	2213	2329	2446	2562	
		294433	£ 21,445											
Total cost of HRB fitments p.a.				£ -	£ -	£ 11,429	£ 17,143	£ 22,857	£ 25,714	£ 25,714	£ 28,571	£ 34,286	£ 37,143	
Total saving per annum on fuel				£ -	£ -	£ 11,667	£ 18,265	£ 25,279	£ 29,712	£ 31,363	£ 35,993	£ 43,622	£ 48,582	
Total NET saving				£ -	£ -	£ 238	£ 1,122	£ 2,422	£ 3,998	£ 5,649	£ 7,421	£ 9,337	£ 11,440	
Total saving in CO2 (tonnes p.a.)					0	0	36	56	78	91	96	110	134	149



Hydraulic Regenerative Braking (HRB)



Connaught Hybrid+



www.connaughtengineering.com



Changing requirements for environmental services vehicles

- Loss of tipping points (more miles?)
- Variety of waste fractions (densities?)
- Kerbside sorting (inefficiencies?)
- Carbon footprint (expectations to reduce?)



Conclusions?

- ‘Horses for courses’
- Variety of options for fuels and technology
- Be cautious – evaluate wherever possible – benchmark with other operators
- Avoid ‘fashionable’ trends
- Don’t ignore the issues



Any questions?

