

**SUBMISSION TO
ALL PARTY PARLIAMENTARY LIGHT RAIL GROUP
INQUIRY INTO LIGHT RAIL**

JPM PARRY & ASSOCIATES Ltd

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Executive Summary

1. JPM Parry & Associates Ltd (Parry Associates) originated an innovative technology for energy-efficient 'lightweight rail' in the early 1990s. This technology is referred to under the name 'Parry People Movers' (PPM). It addresses real needs in transport, environmental and business policy. It is adaptable to short line suburban rail services and street tramway operation serving smaller towns and districts of larger conurbations.
2. Over 100,000 passenger journeys were made during demonstrations of PPM technology in various locations from the mid-1990s to the middle of the current decade. All of these demonstrations were approved by the relevant safety authorities, and culminated in a year of Sundays-only public operation of the Stourbridge Town branch in the West Midlands in 2005-06.
3. This development has met with formidable barriers in the way of its application. For example, early in the development of PPM technology, the Stourbridge Town branch in the West Midlands was identified as a suitable application. Centro, the local Passenger Transport Executive, commissioned a feasibility study into this application in 1993. It took until 2007 for PPM to be formally adopted for full operation of this branch line, with public services using PPM vehicles commencing in 2009.
4. The resistance – intentional or otherwise – to the adoption of PPM technology, and the passage of time before implementation, has presented a heavy drain on the resources employed in the development of a concept that offers a way of meeting many high level public objectives in terms of quality public transport, environmental improvement, economic development and reduction of greenhouse gas emissions – all contributing to quality of life.

Introduction to Submitter

5. Parry Associates is the originator of the PPM venture, and remains the technology licensor and project manager for the separately-incorporated company Parry People Movers Ltd.
6. The PPM concept, in essence, is a technology for highly energy efficient light rail vehicles using flywheel energy storage and lightweight construction for use on suburban rail, local rail and tramway applications.

Factual Information

Concept

7. The development of PPM technology began with investment from Parry Associates. This continued after the formation in 1991 of Parry People Movers Ltd as a separate company, which has attracted investment funding ever since. The purpose of the development was to commercialise an idea: that by combining flywheel energy storage with lightweight vehicle construction on rails, a new form of affordable and energy-efficient public transport could be created.
8. This would be suitable for a number of applications:
 - Operation of railway branch lines more efficiently than with heavy rail technology
 - Operation of street tramways, which could be built and operated more efficiently than with conventional light rail technology
 - Export to overseas markets, in particular the developing world where cities were already suffering from the effects of worsening traffic congestion and where the ‘appropriate technology’ approach of Parry Associates would ensure that new transport systems would be maintainable in challenging operating environments
9. The PPM concept is complementary to other forms of transport – including buses, conventional light rail and heavy rail – but provides an ‘intermediate mode’ for short distance transport applications where existing modes do not provide optimum attractiveness, affordability or efficiency.

Development

10. In the early and mid-1990s, a series of prototype vehicles were constructed using funds generated by shareholder investment, combined with a small amount of public sector support.
11. The prototype vehicles steadily became larger as the technology progressed, and working demonstrations were undertaken in a number of different locations, including Leicester, Himley Park, Brighton, Swansea, Barking and central Birmingham. Tens of thousands of passenger journeys were made during these demonstrations, which were approved by the relevant safety authorities.
12. These demonstrations used flywheel energy storage technology combined with *intermittent electrical supply* – with which the energy to be stored by the flywheel is transmitted electrically to the vehicle during schedule stops at boarding points only. In this way, quiet and emission-free operation is possible without the installation of continuous electrification infrastructure.

Full Size Demonstrations

13. In 1997, Parry People Movers Ltd completed its tenth prototype, the first to be recognisable as a full-size public transport vehicle with capacity for 35 passengers. This vehicle, which used the *intermittent electric* power system, was commissioned by Bristol Electric Railbus. Between 1998 and 2000 it operated in passenger service on the Bristol Harbourside railway, until this had to be stopped due to lack of official encouragement. Bristol City Council, having expressed great enthusiasm for the concept, became more interested in conventional light rail and their support reduced. It is notable that later it proved impossible to justify conventional light rail in Bristol and the city is currently investigating less expensive rapid transit modes.
14. The eleventh PPM vehicle was also the first to feature the *self-powered* variant of PPM technology, with which the vehicle is provided with an internal combustion engine that transmits energy to the flywheel. This hybrid combination permits the engine to be much smaller than would normally be the case, as when high power is required (e.g. on acceleration), energy is drawn from the flywheel as well as the engine. Therefore noise, emissions and vibration are considerable reduced compared to what would be expected with a conventional self-powered rail vehicle of this sized.
15. The twelfth PPM vehicle ('Car 12') was a lightweight railcar capable of accommodating 50 passengers and engineered as a *self-powered* vehicle suitable for operation on railway branch lines. It was specifically designed and built in 2001 for demonstration operation on the Stourbridge Town branch in the West Midlands, following an agreement with Centro to fund a year's duration of Sundays-only running (at the time, the branch line had a Monday-Saturday service only). *Operation of the Stourbridge Town branch is segregated from the rest of the rail network and therefore does not impact on any way on other train operation; hence this route was judged by Centro to be a perfect testbed.*
16. Car 12 was taken to Stourbridge in 2002 having been prepared for service, but was not permitted to enter public service and so was removed having remained there for nine months. Despite acceptance by HM Railway Inspectorate that it was suitable to operate on the Stourbridge Town branch, approvals were not forthcoming from the rail industry (it is noted that at the time Railtrack plc was in crisis following the Hatfield crash).
17. In the subsequent years, Car 12 was approved for and operated in demonstration passenger-carrying service on the Great Central, Chasewater and Wensleydale Railways. However, the difference in regulatory systems between these independent lines and the national rail system meant that it was not until 2005 that Network Rail became receptive to the idea of running Car 12 at Stourbridge.
18. Following a lengthy process including derogations from Railway Group Standards, permissions from Network Rail and HM Railway Inspectorate, and other approvals, Car 12 carried passengers on Sundays at Stourbridge from December 2005 to December 2006. The

train operator was Pre Metro Operations Ltd, a company that had been formed especially for this purpose.

19. It was calculated that PPM operation led to the costs of operation of the Stourbridge Town branch being reduced by 50% while carbon dioxide emissions were cut by around 75%.

Public Service

20. The demonstration operation in 2005-06 was judged to have been a success and the Department for Transport included the potential of PPM technology for operating the Stourbridge Town branch under the new 'West Midlands' franchise. During the bidding phase Parry Associates accordingly supplied information requested by each of the three bidders shortlisted.
21. The successful bidder was Govia, who branded the franchise as 'London Midland'. Govia's bid included operation of the Stourbridge Town branch by PPM vehicles and required the offer of a subcontracted operation. Therefore, vehicles were supplied by Parry People Movers Ltd to Porterbrook Leasing Company Ltd, for lease to London Midland. London Midland have a separate operating and maintenance agreement with Pre Metro Operations Ltd, who in turn subcontract the vehicle maintenance to Parry Associates.
22. A contract for supply of two of the newly-named 'Class 139' PPM railcars, with capacity for 60 passengers, was signed in early November 2007. Delayed delivery meant that the planned service start in December 2008 was not achieved, but by mid-2009 both vehicles were in service and operating no fewer than 214 passenger services each weekday – a higher frequency of operation than could be achieved with heavy rail operation. *It is notable that this constitutes over 1% of ALL passenger trains operated in Great Britain, and 17% of London Midland's passenger train services – the effect of an intensive service on a very short route.*
23. There have been commissioning faults and commercial strains associated with the introduction of PPM vehicles. The delayed delivery arose from problems at supply chain companies and different views on acceptable technical standards that arose at a very late stage. Introduction into service was further delayed by the withdrawal and then reinstatement of heavy rail services, which limited training and running-in opportunities. Since the start of service there have been interruptions to service caused by technical failures and externally induced damage, including severe wheel wear that led to a temporary cessation of Class 139 operation. With delays, the cash positions of Pre Metro Operations Ltd, Parry Associates and Parry People Movers Ltd have been put under extreme pressure, jeopardising the ability to address arising issues.
24. However, the vehicles show themselves to be ideally suited to short branch line operation, have features that are highly popular with passengers and are an unqualified 'best practice' example of low-energy, environmentally-friendly operation.

Discussion

25. PPM technology offers the potential for development of the UK's transport system in several ways:
- Conversion of short branch lines from heavy rail to lightweight rail operation
 - Enabling a rail re-opening programme – offering a more affordable option for the operation of re-opened routes previously dismissed as unviable
 - Providing new impetus to the implementation of new urban tram systems, especially in locations where traffic flows are too low to justify conventional light rail technology
26. The technological concept is highly flexible, so the basic design with flywheel energy storage can be adapted to much larger vehicles than have been built to date. Market indications are that there is much latent demand for the larger vehicles that could be built.
27. PPM technology is a British development and PPM vehicles are manufactured in the UK. The concept has worldwide application – in both industrialised and developing countries – and as a result a new manufacturing industry could be established with exports making up a significant proportion of orders.
28. The above benefits are, however, at risk from two linked causes:
- The current financial strains on Parry Associates and Parry People Movers Ltd are delaying the development of larger vehicles, for which there is much market interest
 - Relatively minor issues at Stourbridge have a disproportionate affect on perception and reputation as it is currently the only full-scale application
29. It is particularly important to note that the PPM concept is primarily a *technical* development that, with the appropriate support, provides an affordable, dependable and highly energy-efficient form of transport. Without the necessary support, however, it will be perceived to have failed even if technical success is unchallenged. Success or failure can only be judged based on a properly-supported operation.
30. It is possible that the current Stourbridge operation of a most promising technology might be dismissed out of the inconvenience and embarrassment of having to make adjustments arising from lessons learned during commissioning.

Conclusions

- 31.** PPM technology has a proven ability to provide local public transport with the ambience of conventional light rail but with considerable reductions in cost.
- 32.** PPM technology is proving to be highly energy-efficient and can help significantly reduce carbon emissions from the transport sector.
- 33.** PPM technology has been developed in the UK and PPM vehicles are manufactured in the UK.
- 34.** PPM technology is applicable to overseas markets where it addresses real needs for better transport at affordable cost using robust engineering.
- 35.** Therefore, PPM technology addresses several public policy goals for transport, the environment and the development of innovative technology, manufacturing and export sales.
- 36.** The progress from concept, via prototypes and demonstrations to public transport service has been described as 'lethargic' due to the UK transport industry's resistance to fundamental, rather than incremental, change.
- 37.** A strategic decision by the Department for Transport to encourage development of bus-based, rather than rail-based, innovations in local transport has deprived the PPM venture of resources.
- 38.** The slow progress has put at risk the development of a technology that addresses public policy goals in several different areas.

Recommendations for Action

- 39.** As a technology that addresses public policy objectives, the PPM lightweight rail mode should be recognised for the potential it offers to the UK.
- 40.** Early commissioning delays that have arisen as a result of cash starvation of the application of lightweight rail technology to a heavy rail branch line must not be permitted to affect perception of the suitability for public operation of PPM technology.
- 41.** Clear objective information analysing the potential of lightweight rail technology – such as the PPM concept – should be available to transport planning functions within the public sector. This information should take full account of how closely such technology addresses public policy objectives.