



Transforming Rail Outcomes: Embracing Systems Thinking

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Amey —

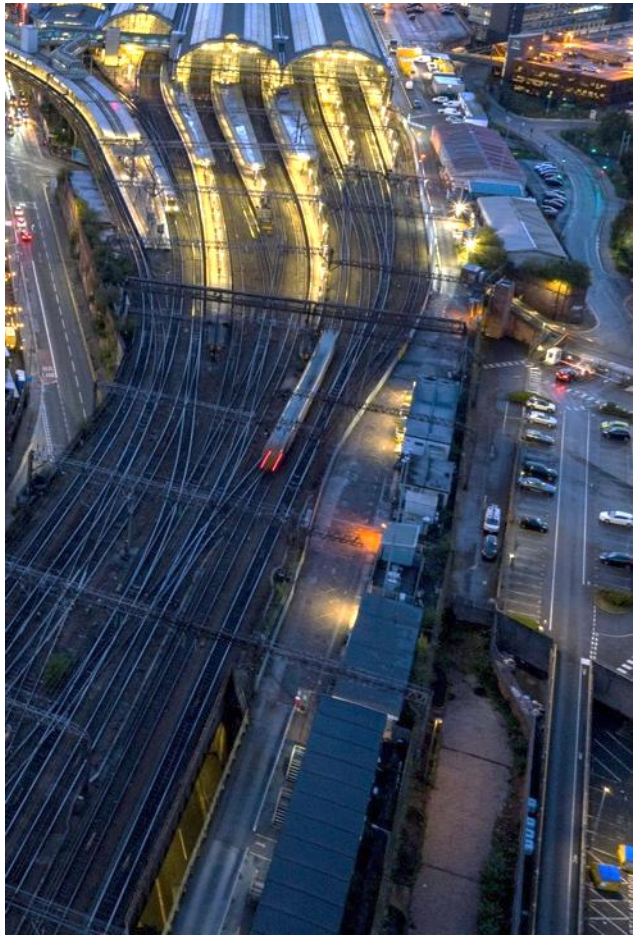
Life's better connected



Challenges and opportunities

Amey

- Funding
- Infrastructure
- People
- Climate
- Opportunities for change
 - ✓ The vertical integration opportunity



Core Valley Lines – part of the South Wales Metro Transformational Outcomes

Outcome led:

- Capacity – 4tph to the valley heads
- Performance – Reduced journey times
- Environmental – Zero carbon at the train
- Accessibility – Level Boarding
- Extendibility – Enable future on-street running

Key enabler:

- New rolling stock (as part of the new franchise)

Remit requirements:

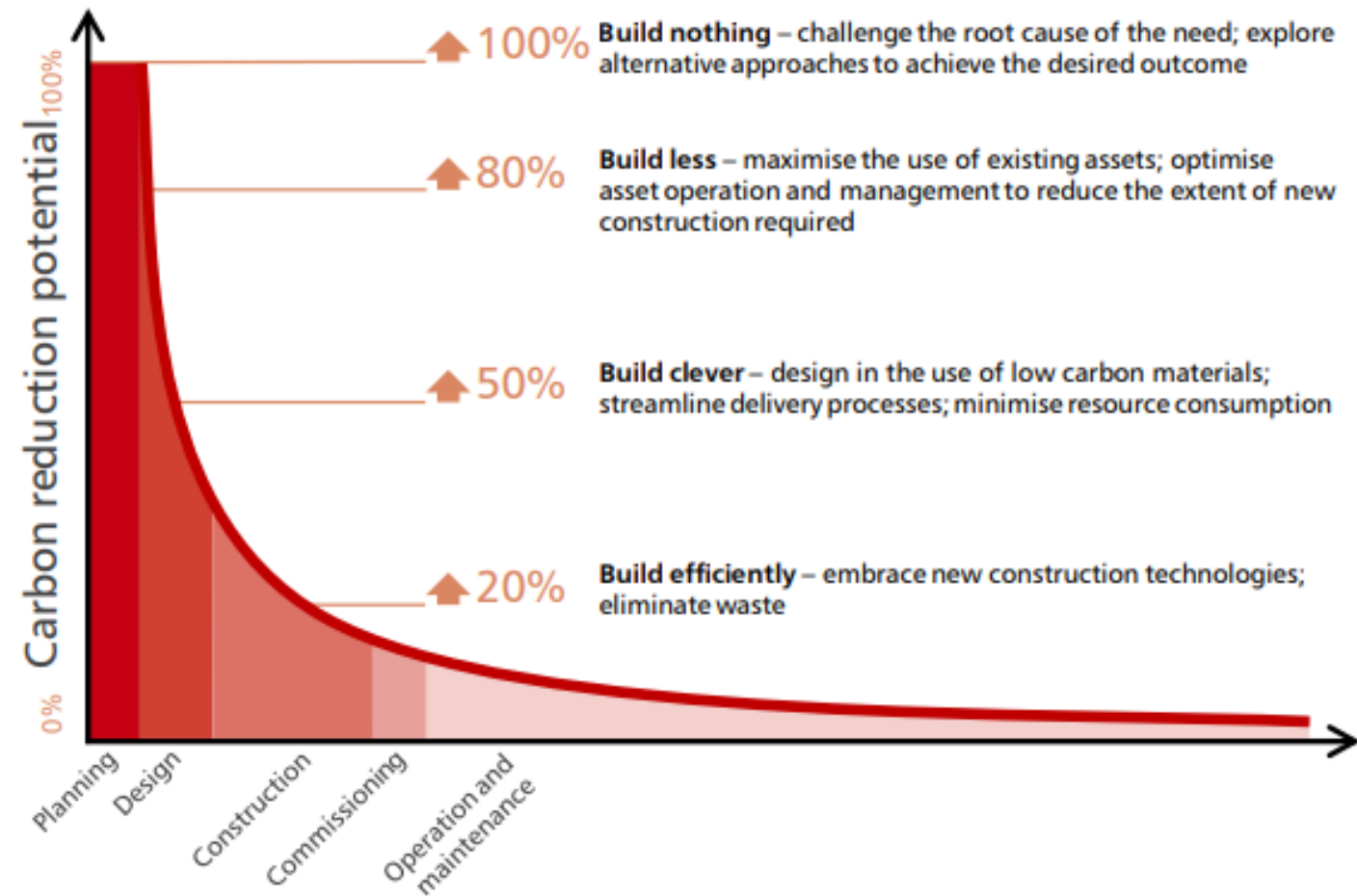
- Well-being of future generations
- Prosperity for all
- Active travel Wales



- Costs: The cost of electrification infrastructure schemes is heavily affected by civils interventions at bridges with sub standard electrical clearances
- Conventional electrification schemes have used earthed or unwired sections:
 - ✓ Stranding risk in PESs limiting location/length
 - ✓ Traditional bi-mode vehicles struggle to dynamically/frequently transition between traction supplies

Solution – SMART electrification

- Hybrid rail vehicles: use onboard batteries as an alternative = additional traction power source



Stadler Class 398 Metro Vehicle

- “Tram-Train” light rail vehicle
- Traction power uses 25kV overhead line and onboard energy system (batteries)
- Capable of on-street, line-of-sight operation, passive provision for DC charging
- Mid-height floor with retractable step



Stadler Class 756 FLIRT

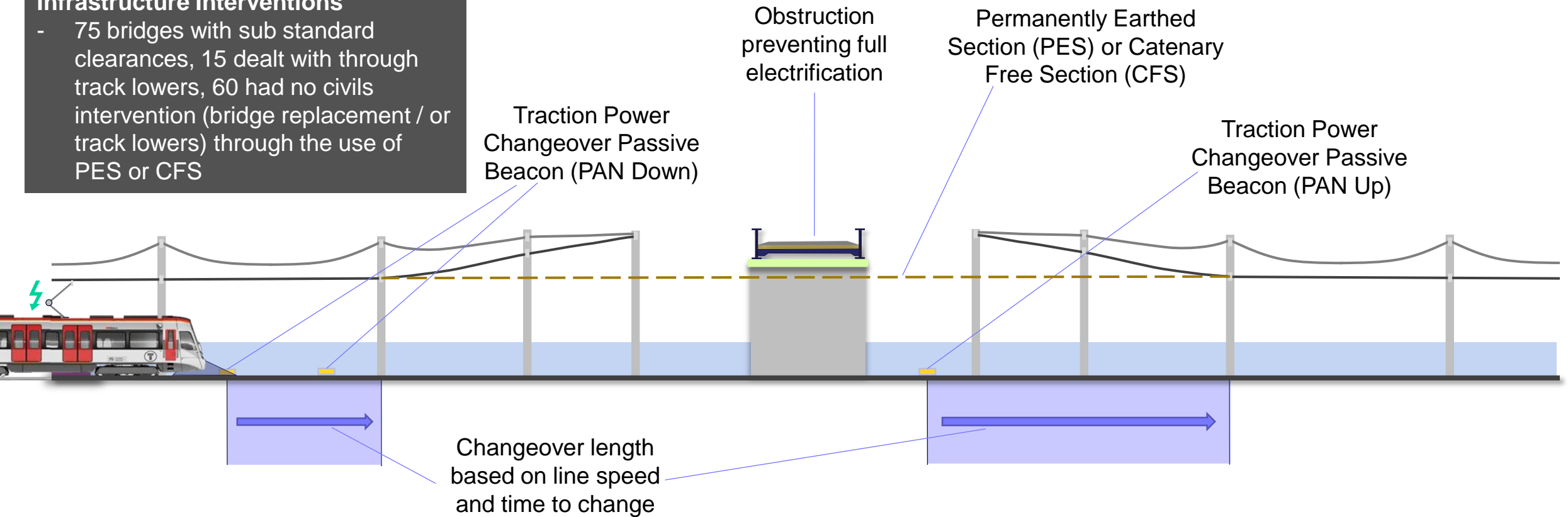
- Mainline, heavy rail vehicle
- Traction power uses 25kV overhead line and onboard energy system (batteries)
- Diesel Range Extender to increase range
- Automatic power mode transition on the move
- Mid-height floor with retractable step



Smart Electrification – Operation

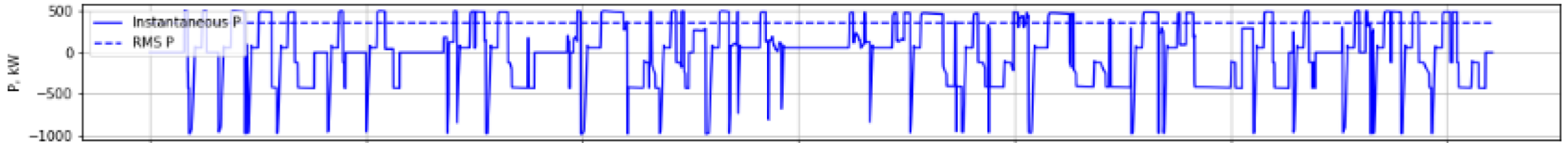
Smart Electrification – Avoidance of Infrastructure Interventions

- 75 bridges with sub standard clearances, 15 dealt with through track lowers, 60 had no civils intervention (bridge replacement / or track lowers) through the use of PES or CFS



- The batteries on-board have a finite capacity and an optimum working range
- The two new trains are very different
 - Metro Vehicles
 - Tri-Mode FLIRT
- Detailed power and battery performance
- Ongoing iterations

Power Consumption



State of Charge (SOC)

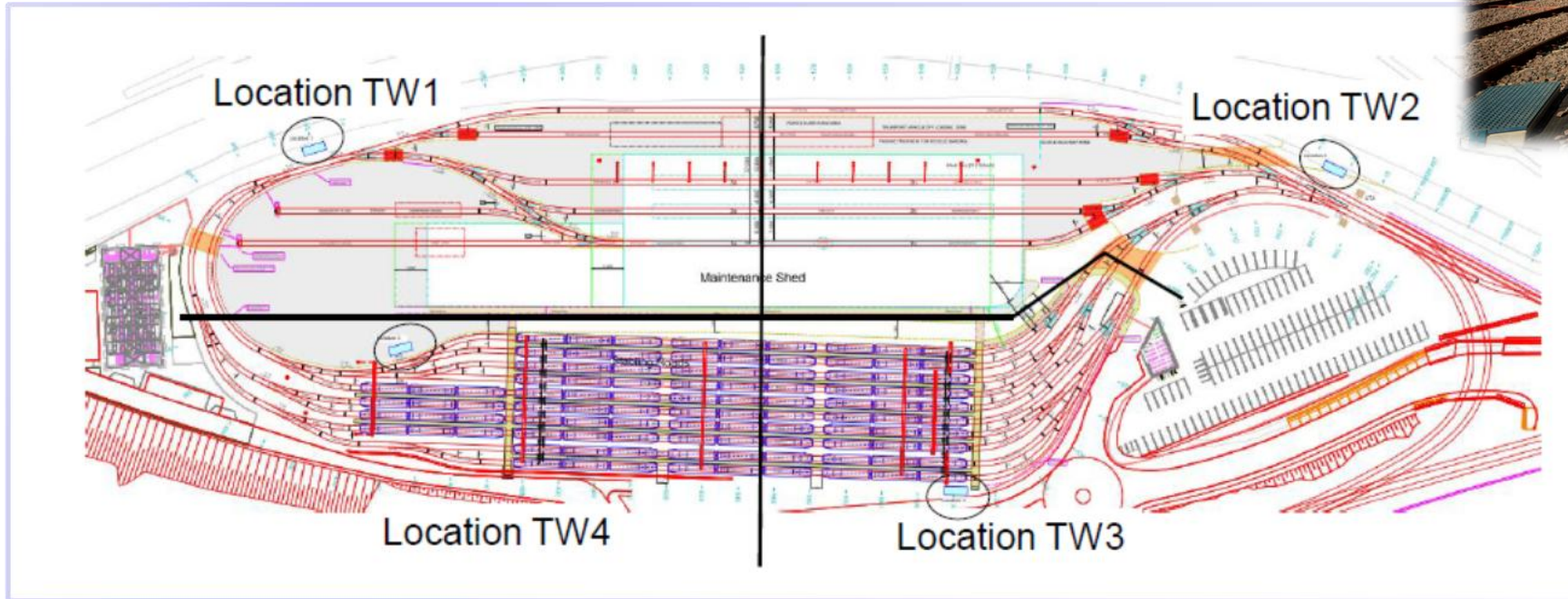


- Use of 60 PES installations to avoid civils/track interventions and 79km Catenary Free Sections
- Cost Avoidance - approx. 30% of Infrastructure Budget
- Avoiding the cost of circa £300m in civils, mechanical and electrical interventions in a project with a value of £1 billion
- ROI for the taxpayer
- Reducing risk
- Creating innovative solutions
- Achieving the first UK implementation of a novel application of PES/CFS technology



Digital Signalling Solution: Taff's Well Depot

- The Programmable Logic Controller (PLC) Digital Signalling Solution offers a simple modular system architecture, capable of controlling up to 10 points, 10 signals and 16 axle counter heads, resulting in a low-cost solution.



- Cost-Effective Deployment & Operation
- Operational Continuity
- Future-Proof Design
- Seamless Integration
- Reliability & Longevity



Any questions?

For more
information,
please visit
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