



VENTUREFEST

SOUTH WEST

Martin Attrill - Director, Marine Institute & Professor of Marine Ecology,
Plymouth University

Peter Beech - PR and Media Manager, WITT Energy

Brett Phaneuf - MD, MSubs

Iain Johnson - Managing Director, Phantom Sportsboats

Ken Wittamore - Managing Director, Triskel Marine

Peter Holland - Invest In Cornwall

Ellen Vernon - Economic Development Manager, North Devon Council

Patrick Hartop - Head of City Deal, Plymouth City Council

David Elson - Lead Technologist Marine and Maritime, Innovate UK

**MARINE TECHNOLOGY:
CASE STUDIES OF
EXCELLENCE AND OPPORTUNITIES**

From rags to riches - intellectual property development using public funds

Ken Wittamore

Triskel Marine Ltd

Triskel Marine Ltd

- Established 2003
- Cornish SME with offices in Fowey, Falmouth and Kent
- Specialists in marine data and power management
- R&D led company with a business model based on developing and selling new intellectual property

Case study – Vessel efficiency technologies

No more black smoke

Energy density of fuels

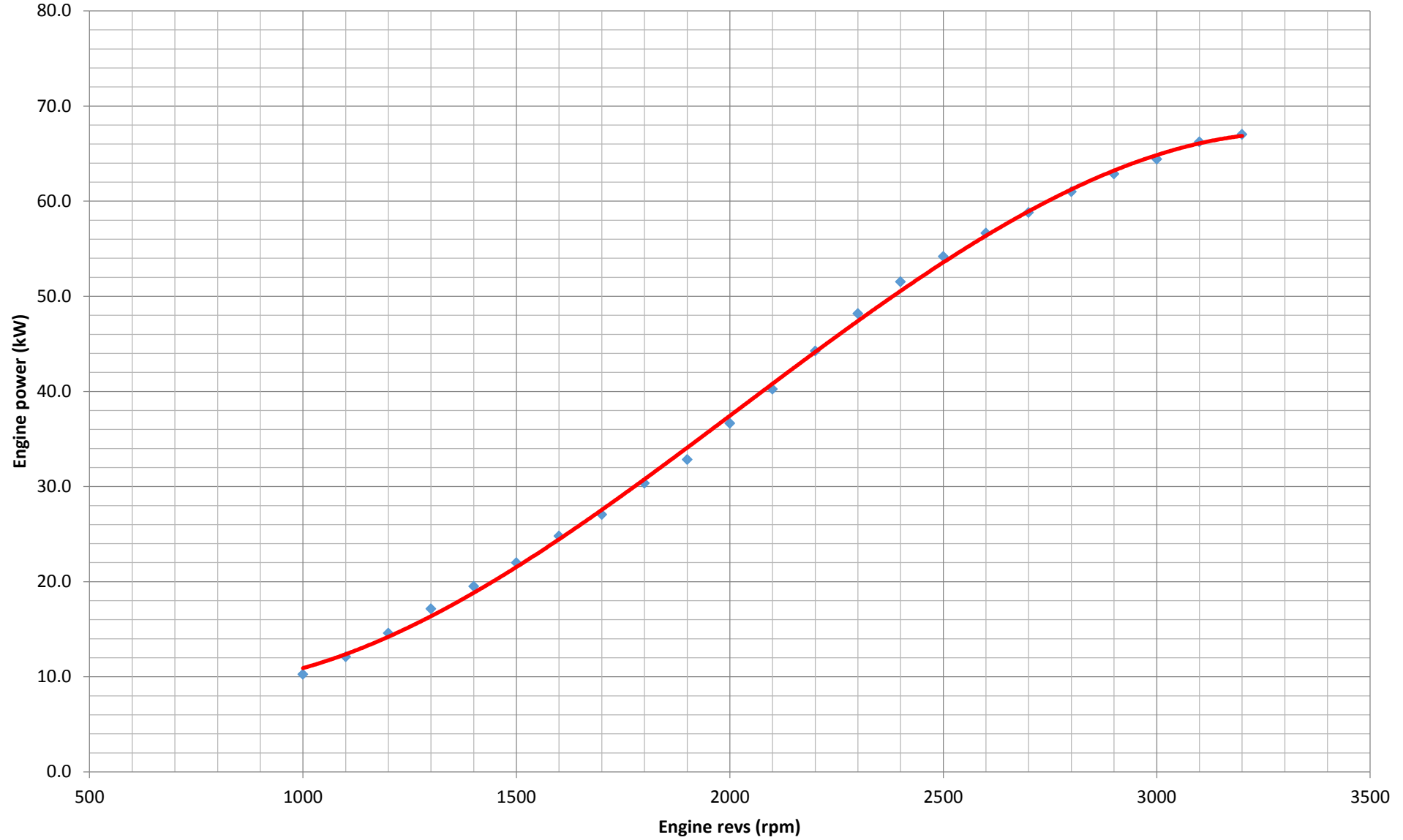
Source	Energy density MJ/kg	% of diesel
Lead acid batteries	0.17	0.3%
Lithium ion batteries	0.36	0.7%
Glycerine	16	30%
Coal	24	50%
Diesel	48	100%
LNG	50	104%
Hydrogen (700 bar)	142	295%
Nuclear (U235)	77,000,000	160,416,600%

There is no viable alternative to
fossil fuels for the foreseeable
future

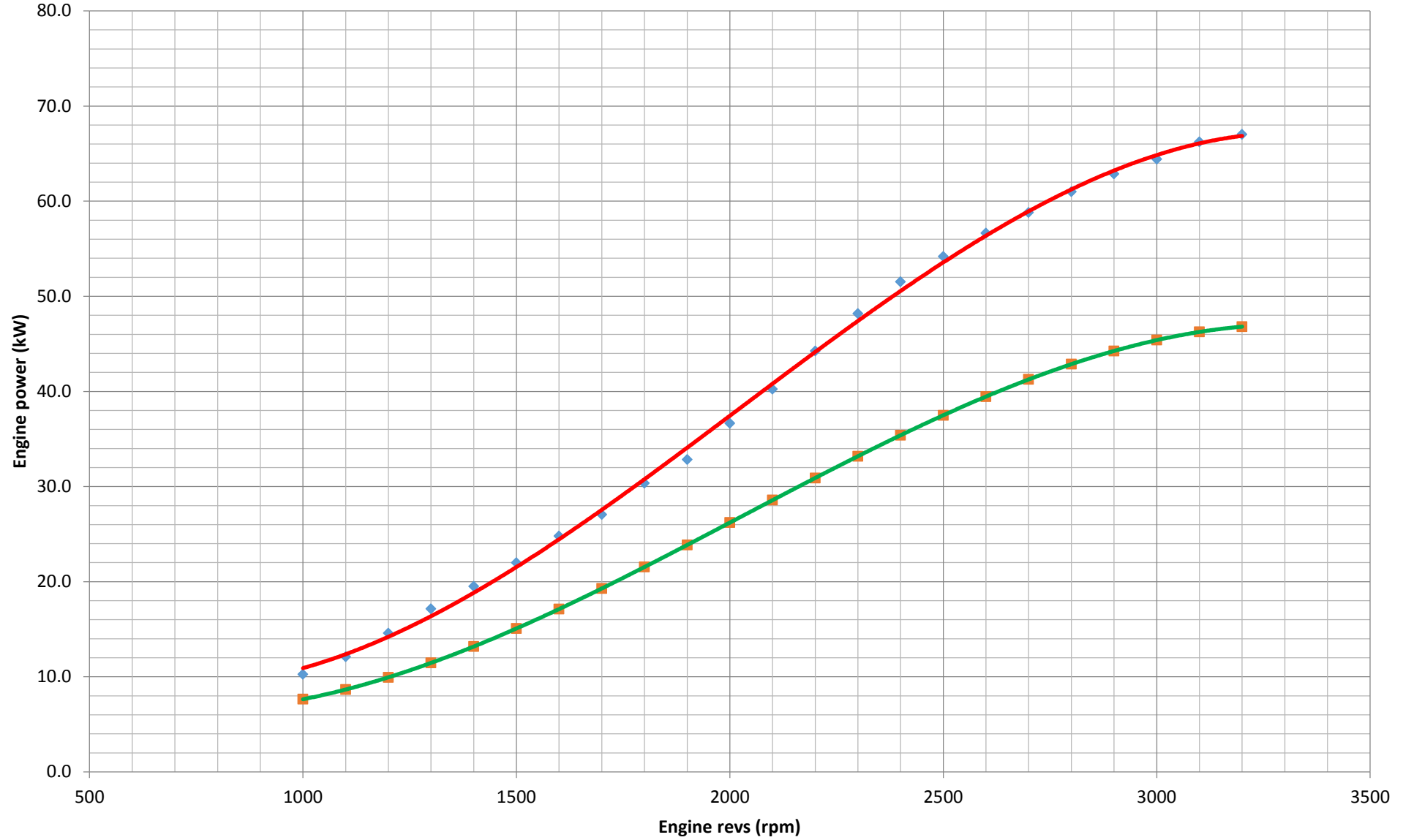




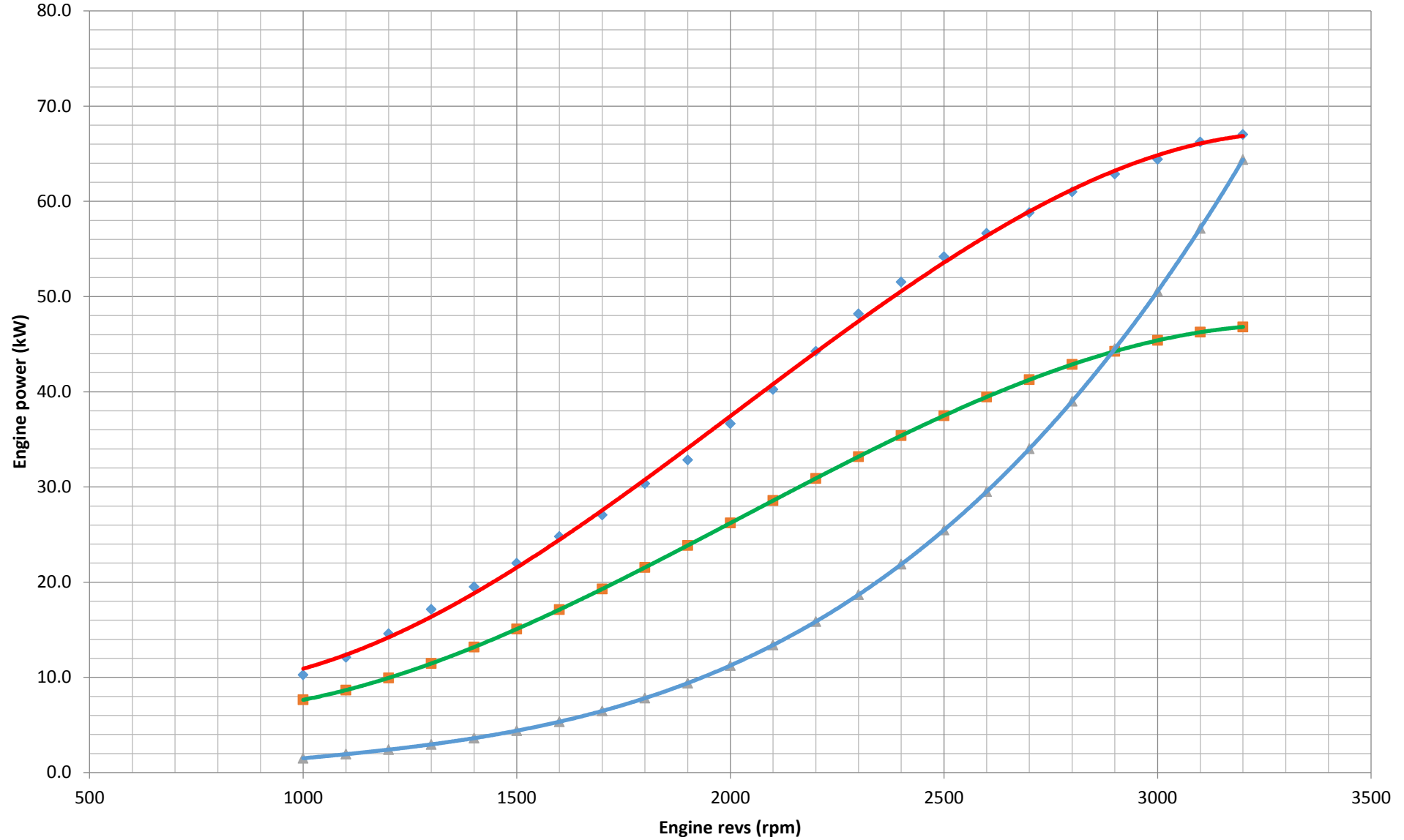
Engine loading



Engine loading



Standard propeller loading



Our mission is to fill the gap with
TML intellectual property

TML's intellectual property development 2003 -2009

- Own research on ideas for small scale power management for offshore data buoys
 - IP arising:
 - Discrete technologies for the management of electrical power, multiple sensors, data processing and remote comms in isolated environments
- Financed by TML and eligible for R&D tax credits
- Wholly owned by TML
- No patent protection

TML's intellectual property development 2009 -2012

- EU funded HYMAR project 2009 - 2012
 - Optimisation of system architectures and supporting technology for hybrid propulsion in small craft
 - 8 partners
 - €2M of grant funding in total ~€150K to TML (eligible for R&D tax credits)
- IP arising:
 - Precision, low cost battery and power sensors
 - Smart battery management strategies
 - Local and remote user interface
 - Local and remote communications technology
- Wholly owned by TML
- No patent protection

TML's intellectual property development 2013 - 2015

- Innovate UK funded HEME project 2013 – 2015
 - Development of technologies to deliver improved vessel efficiency
 - 4 UK partners
 - ~£900K of grant funding in total, ~£160K to TML (eligible for R&D tax credits)
- IP arising
 - Whole vessel energy monitoring (marine version of the car ECU)
 - Energy management strategies
 - CPP control algorithms
- Wholly owned by TML
- No patent protection

TML's intellectual property exploitation 2015 onwards

- Commercial development of controllable pitch propeller (CPP) controller in partnership with Bruntons
 - Self funded
 - IP arising wholly owned by TML
- Commercial development of main engine load management (on engine generator)
 - Part funded by major US corporation, part self funded
 - Foreground IP arising part owned by US partner, part by TML
 - Background IP wholly owned by TML



Future development

- Continuing with research led development and diversification of power management technologies - ***but Brexit is a major issue***
- Raising venture finance for the full commercialisation of the on-engine-generator in collaboration with our US partners
- Planned growth from technology development company to technology exploitation company

Ken Wittamore

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ARMOREL



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**THANK YOU &
KEEP IN TOUCH**