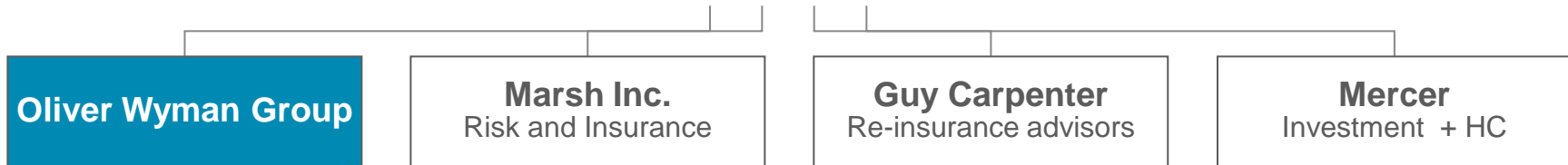


RISKS AND RISK SHARING FOR REFUELLING INFRASTRUCTURE DEVELOPMENT HYDROGEN ROADMAP WORKSHOP

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Oliver Wyman is a global strategy consulting firm in the Marsh McLennan group with deep expertise in risk management



- \$1.5 BN of revenues (2012)
- Staff of 3,000 in 50+ cities across 25 countries
- Deep specialisation within key industries and functional capabilities, e.g.
 - **Trusted advisor:** Financial sector, energy companies, automotive and transportation, retailers, healthcare, etc.
 - **Value-creating solutions:** Strategy development, operational improvement and risk management
 - **Active publication of insights:** 50 reports in 2012 with over 20 on risk
- Collaboration with a wide range of expert networks on risk-related topics



Risks associated with the development of hydrogen refuelling infrastructure cannot be fully disassociated from other elements in the value chain

Value chain (simplified)

Hydrogen supply



Refuelling infrastructure (HRS)

Physical

Financial

Key investment drivers / issues

- Production cost
- Supply logistics
- Availability from low carbon production

- Network density requirements
- Site real estate requirements / capacity
- Interoperability
- Potential obsolescence due to technology change
- Scale of investment
- Operating margins
- Return on investment + timescale

Vehicle market



- Competition vs. oil, biofuels, and BEVs
- Cost-effectiveness of FCEVs on a lifetime basis
- Non-cost criteria – e.g. safety, range, refuelling ability

Generally speaking, the exposures associated with large-scale investment in infrastructure can be mitigated in a number of different ways

Mode	Key features	Details (non-exhaustive)
Share	Development cost reduction at loss of upside	<ul style="list-style-type: none"> • Joint ventures with other companies • Public private partnerships • Equity finance from other investors
Sweeten	Development cost reduction	<ul style="list-style-type: none"> • Loan guarantees – to secure deals below bank interest rate • Cash / land incentives to invest in a locale • (Green) bond issuance – supported by tax incentives
Control	Development cost and risk reduction	<ul style="list-style-type: none"> • Decision gateways for each phase • Tight project management • Cost benefit analyses of mitigation activities
Transfer	Development and operating risk reduction at a price	<ul style="list-style-type: none"> • Construction / operating risk insurance • Political risk insurance – lifetime of the asset • First loss protection mechanisms
Hedge	Operating risk reduction with some loss of upside and cost	<ul style="list-style-type: none"> • Commodity price – largely for operating phase • Currency (for multinationals) and interest rate • Diversification across political jurisdictions / value chain
Guarantee	Operating risk reduction	<ul style="list-style-type: none"> • Demand guarantees / off-take agreements • Price guarantees / subsidies / tariff adjustments

Strategic de-risking solutions for HRS can help reduce investor uncertainty, pull interested parties together, enable hedging, and support the push for success

1

Framework

Stakeholders:

- Governments and industry

Details:

- Clear national strategy
- Long-term policies
- Technical standards
- Streamlined approvals
- Cross-border leadership

Challenges:

- Speed of technological change

2

Incentives

Stakeholders:

- Governments and industry

Details:

- RD&D support
- Tax breaks for vehicle purchase & operation
- Subsidised green hydrogen production
- Phase 1 infrastructure investment

Challenges:

- Scale of investment vs. low carbon benefits
- Economic constraints

3

Collaborations

Stakeholders:

- Industry (and governments)

Details:

- Cross-automotive for FCEV development
- Cross-industry (automotive, utilities, oil & gas) for infrastructure
- Upstream/downstream position-taking

Challenges:

- Competition / intellectual property – but partnerships already

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Opportunity

Stakeholders:

- Industry, banks, institutional investors

Details:

- Packaging of opportunities for investors
- E.g. rated green infrastructure bonds, Treasury gilts, asset-backed bonds

Challenges:

- Prudential regulation
- Investor comfort zone
- Framework clarity

The measures available give rise to a number of questions for participants and other potential stakeholders

Which interventions...

- Would achieve the greatest **impact** in terms of mitigating the investment risks associated with HRS development?
- Are **affordable** for participants – industry, governments, etc.?
- Are politically **acceptable**?
- Are most likely to **attract capital** from industry and elsewhere?
- ...