

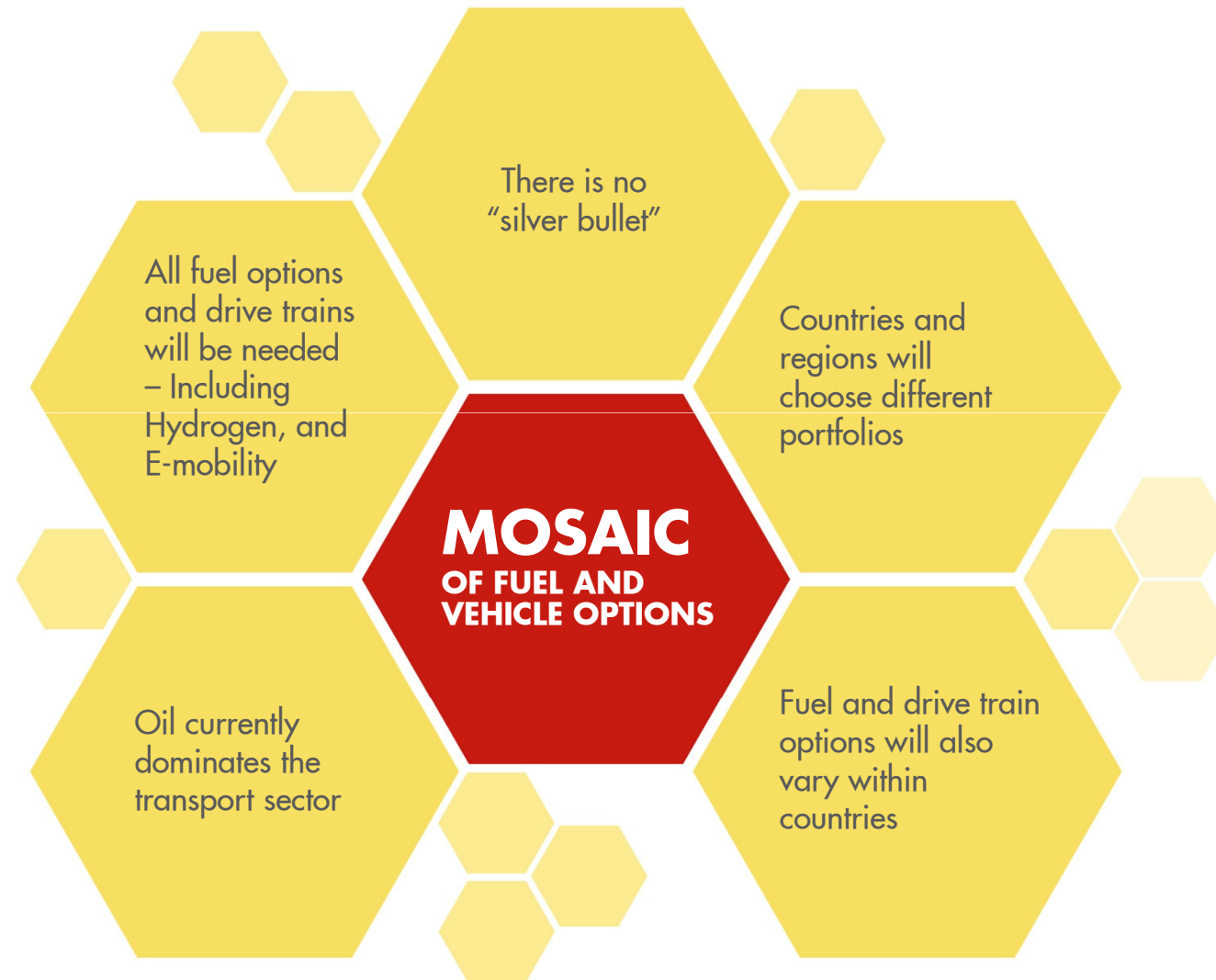


LNG AS TRANSPORT FUEL

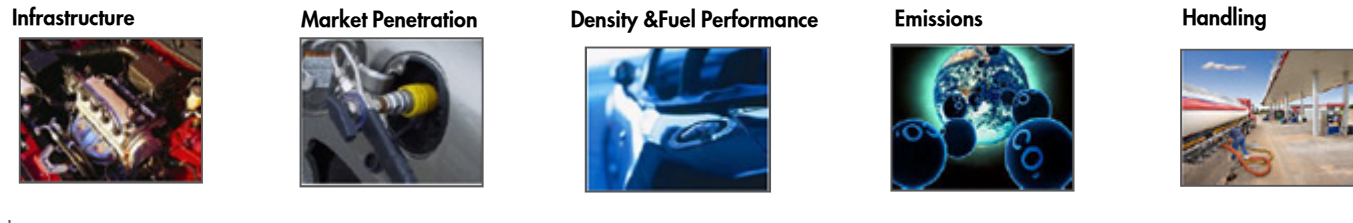


Lauran Wetemans
GM | Downstream LNG | Gas to Transport

NO SINGLE ALTERNATIVE TO OIL BASED HEAVY DUTY TRANSPORTATION...



... INCLUDING PORTFOLIO OF GAS DERIVED FUELS



Alternative Fuels over conventional fuels

	LNG	GTL	CNG
Energy Density	60% of diesel (+16% tank weight)	GTL GO/ Diesel has slightly lighter density (.79) versus the standard .82	~25% of gasoline (5x more tank weight)
Fuel Performance (km/l)	Equal / Better than Diesel	Inferior to Diesel	Inferior to gasoline
Handling	LNG weathering requires managed fuel turn-over	Similar to Diesel	No requirements of managed fuel turn-over
Infrastructure	Incremental costs in engine technology and fueling infrastructure. Fuel savings offset incremental expenses	Depends on pricing of GTL fuel, however no incremental infrastructure cost	Lower fuel cost but increased cost of infrastructure, vehicles, and maintenance
Market Penetration	New market/regional vehicles	New market/regional niche vehicles	Established in various countries
Emissions*	Reduction in local emissions (NO _x , PM), and GHG under specific conditions*	Reduction in local emissions (NO _x , PM, CO)	Reduction in local emissions (NO _x , PM)

Point to Point long-haul



Marine



Busses



Airlines



Light Fleet



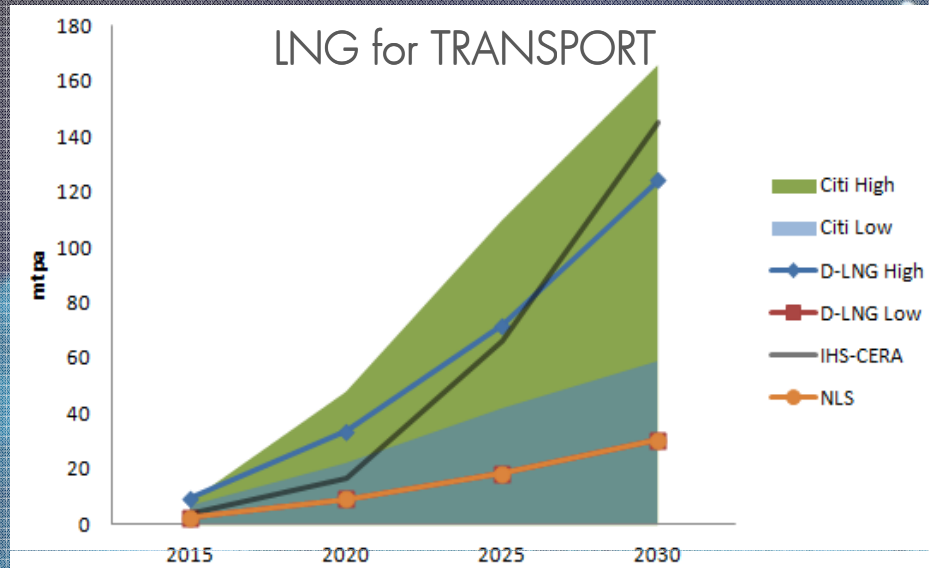
Private Cars



➔ For energy density & handling reasons, LNG fits best with long-haul heavy duty commercial fleet segments, while CNG is preferred side-by-side for private & small commercial applications

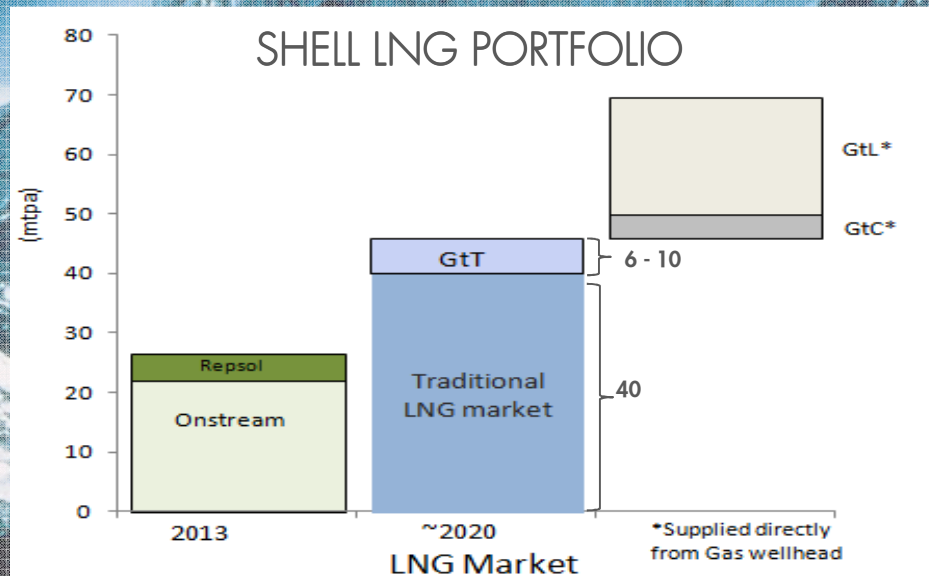
*Claims on GHG reductions are based on well-to-wheel analysis done by GIAT taking into account: Combustion engine type, source of gas and the supply chain distance. The W2W data is market specific and therefore varies under specific conditions.
 • LNG fuel enables switch to engine technology that lowers local emissions (SOX, NOX, Particulate matter)

LNG AS TRANSPORT FUEL OFFERS MATERIALITY...



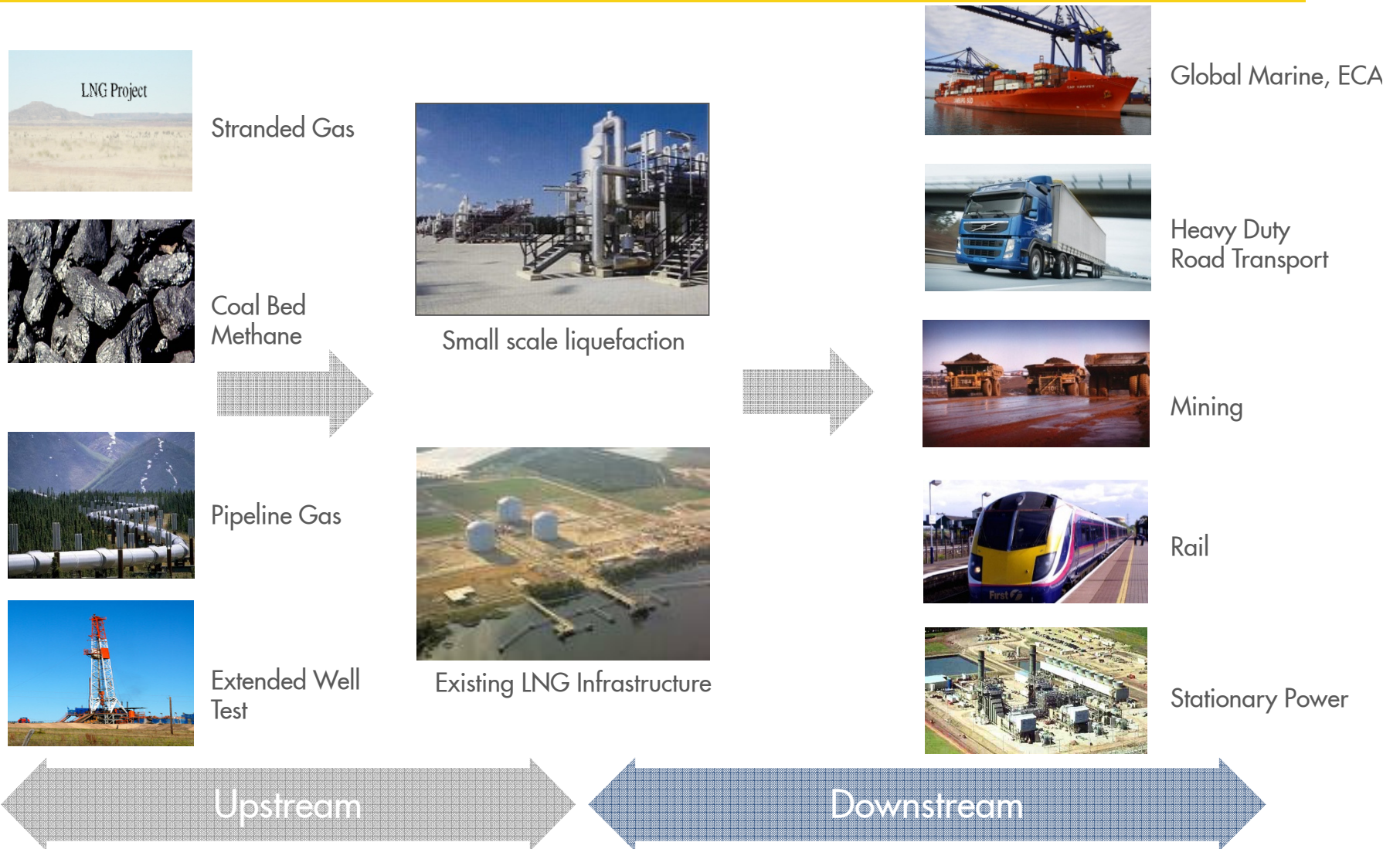
1 10 - 45 MTPA (2020)
30- 160 MTPA (2030)
Different scenarios indicate material demand

2 By 2030, LNG penetration between 6-16% of all transportation fuels across key segments



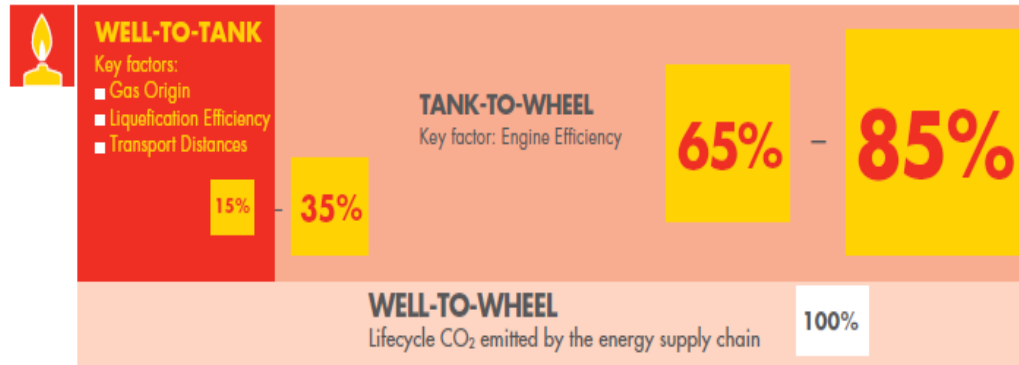
3 • D-LNG ambition is 6-10 MTPA (2020)
• 15-25% of traditional LNG volumes

... LNG CAN SERVE MULTIPLE MARKET SEGMENTS... SHELL'S INTEGRATED MODEL IS A GAME CHANGER



LNG OFFERS COMPELLING ENVIRONMENTAL BENEFITS...

SPLIT FOR **NATURAL GAS FUELS** SHOWS A WIDER RANGE DUE TO MORE VARIED SUPPLY CHAIN SET-UPS

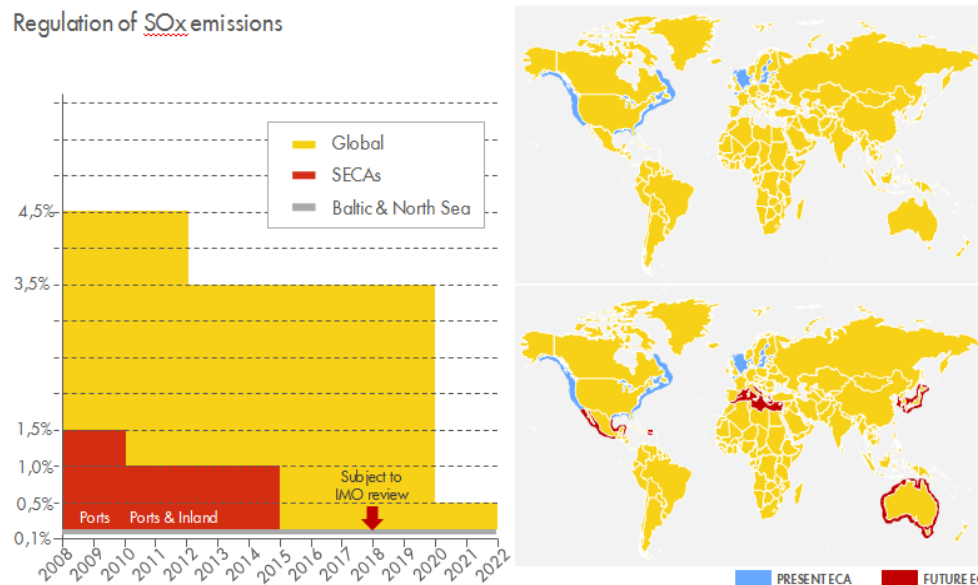


Source: Shell GIAT 2012

SAE paper published in collaboration with Volvo, outlines upto a 25% savings in GHG emissions

- 1 INTERNAL STUDIES
(By upto 25 % savings)
- 2 COLLABORATION WITH OEMs
(e.g. Volvo / Wartsila)
- 3 INFLUENCE POLICY MAKING
(TNO report in NL)

Regulation of SO_x emissions



Source: Wartsila

- 1 VIRTUALLY ZERO SO_x / PM
- 2 REDUCED NO_x

DIFFERENT MARKET ARCHETYPES EXIST...

Regional Drivers

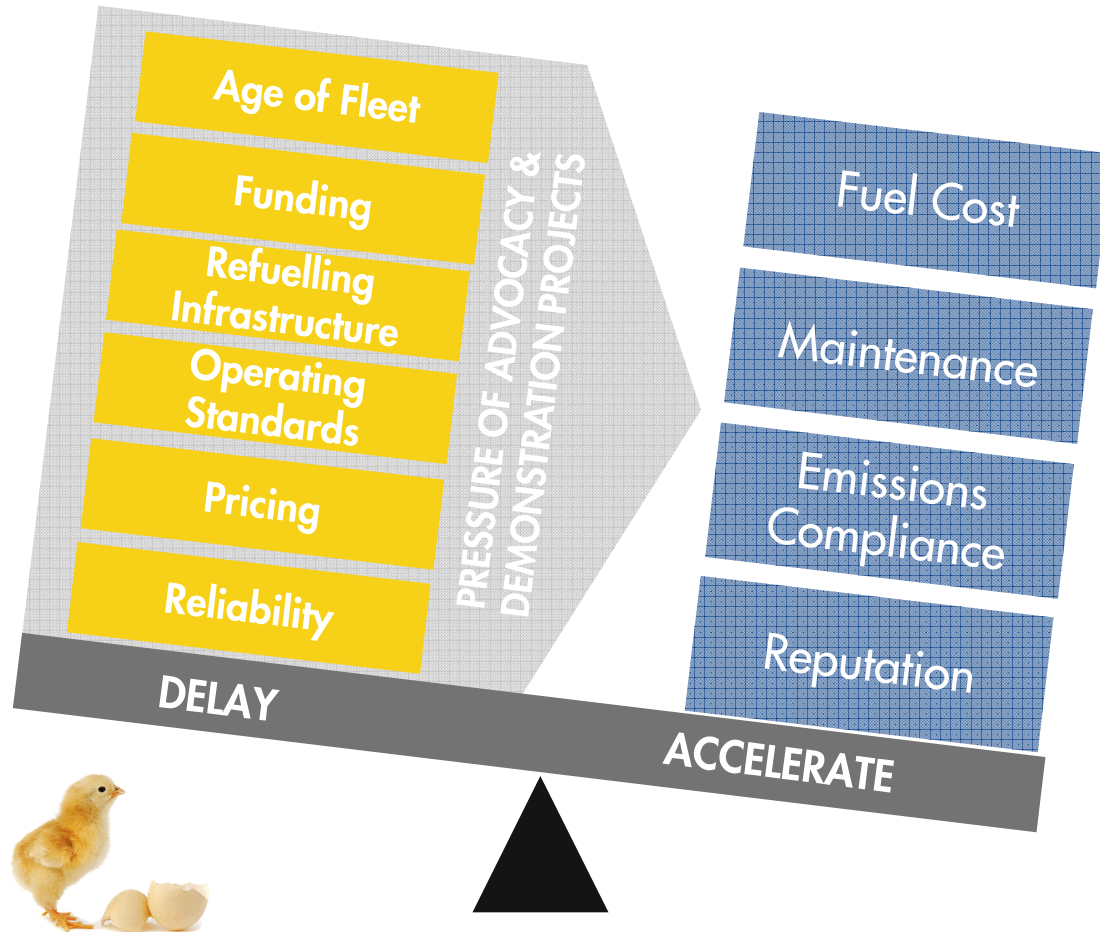
Price arbitrage

Environmental regulations

Growth



SOLVING THE CONVERSION DILEMMA...



WHAT ENABLERS WILL FOSTER ADOPTION ?

1

CUSTOMER ECONOMICS

2

REGULATIONS

3

POLICY & INCENTIVES



Q & A

