

Qenos Alkadyne® pipe resin is building a supply backbone for Australian water and gas distribution

ENGINEERED TO OUTPERFORM

- Polyethylene pipe is an engineered product, required to withstand internal pressure and external influences for up to 100 years
- Qenos is the recognised benchmark in Australia for the supply of premium world class PE100 Polyethylene grades for use in pressure pipes for water conservation and delivery, waste management, mining and gas

Qenos pipe resin customers

- Vinidex
 - Iplex
 - David Moss
 - Cromford
 - Zekt
 - Netafim
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Midland Irrigation project Tasmania

10



In 2011 Qenos embarked on research to explore the potential of nanocomposites to deliver PE125 performance

- Qenos was interested in exploring the pathway to PE125
- At the same time, the world class Carbon Nexus centre was established at the Deakin University Institute for Frontier Materials, 60 km from Qenos
- Carbon Nexus is a purpose-built research facility at the forefront of carbon fibre and related projects that are strategic and complex
- Qenos made the decision to collaborate in a research project to explore how polyethylene responded to a range of nanoparticles
- This research collaboration is still active, and continues to provide advances in technology



Qenos has made in excess of 1 million tonnes of PE100 pipe resin and has a particular expertise in the Australian pipe market

Installation	Application	Qenos PE100		
		HDF193B	HDF145B	HCR193B
Trench	Water Distribution	✓✓	✓	✓
	Gas Distribution	✓✓	✓	✓
	Mining Slurry	✓✓	✓	✓
	Large bore, thick wall	✓	✓✓	✓
Trenchless	HDD large bore	✓	✓✓	✓
	HDD	✓	✓	✓✓
	Pipe cracking/bursting	✓	✓	✓✓
	Slip-lining, tight-lining	✓	✓	✓✓
	Plough-in	✓	✓	✓✓



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Anglesea Ocean Outflow Victoria



Newcastle Water New South Wales



Logan River Queensland

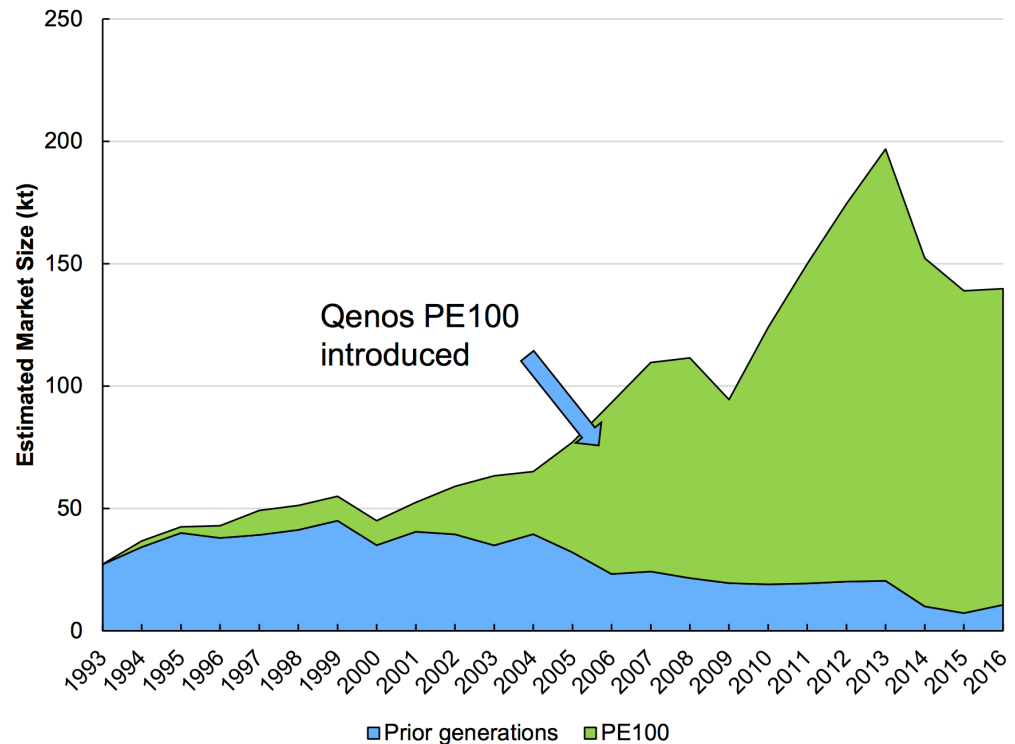


The adoption of PE in pipe in Australia increased markedly with the introduction by Qenos of HDF193B PE100 pipe resin

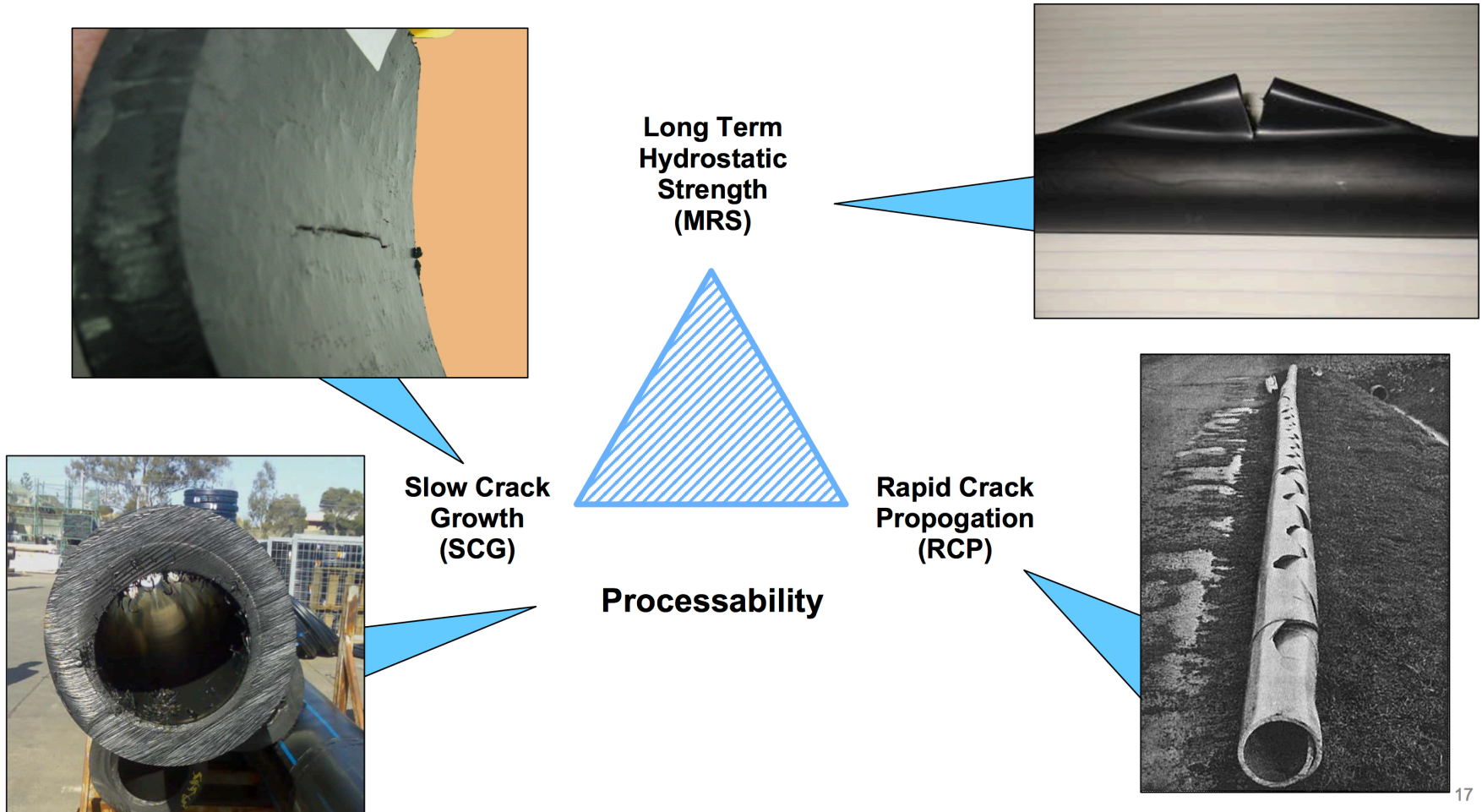
Qenos PE100 and the Australian pipe market

- PE100 grades were widely available in the Global PE market from the 1990's
- Qenos developed HDF193B in 2005
- HDF193B exhibits world class extrusion and application performance
- Qenos worked with pipe manufacturers and end users to promote PE100 and its use in applications traditionally serviced by PVC, steel and concrete
- The PE100 market took-off with the arrival of Qenos PE100

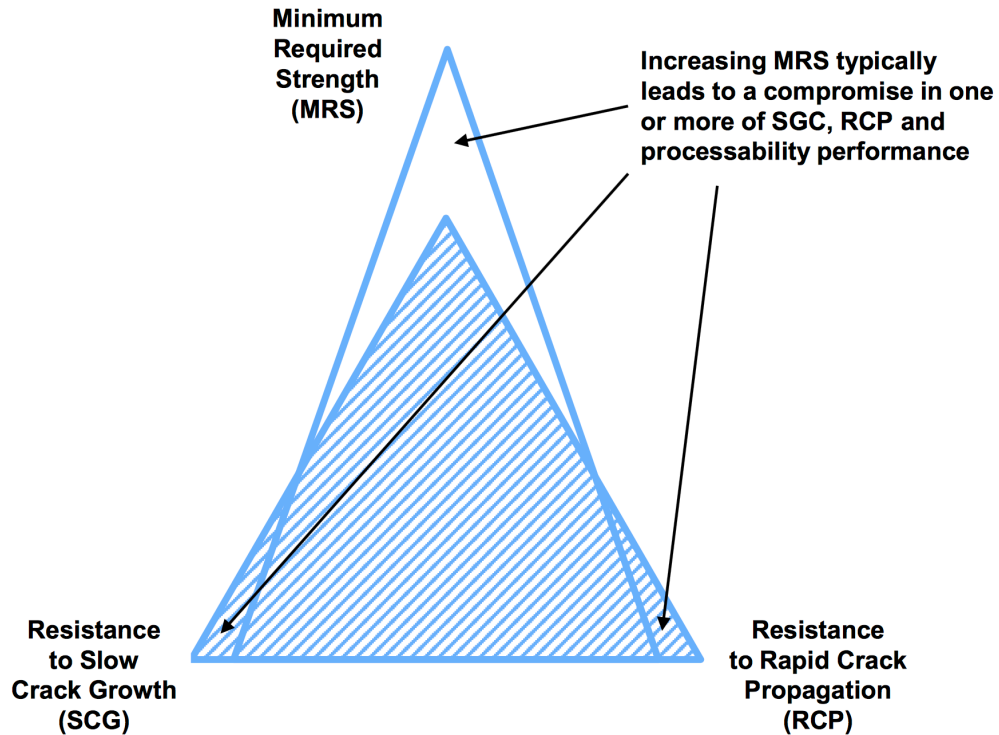
Australian Polyethylene Pipe Market



PE100 is a demanding pipe specification for pressure applications and is based around a service life of 100 years



However the jump to PE125 has proved elusive and many believe that the intrinsic performance limit of PE may have been reached



The MRS of the resin can be increased by enhancing its crystallinity, however this compromises the resin's resilience, making it less resistant to SCG and RCP

Increasing the relative proportion of the amorphous phase improves the resistance to SCG and RCP but compromises strength



PE125 conceptually offers considerable benefits over PE100 and starts to challenge steel in some applications

PE type	DR	Wall thickness (mm)	Working pressure (Bar)	
			Gas	Water
PE100	11	22.7	10	16
PE125	11	22.7	12.5	20

Same wall thickness, higher pressure

“This is a 25% increase for gas pipe, which could mean the difference between having to use steel pipe and being able to use PE pipe.”

Gene Palermo

DR	Wall thickness (mm)	Working pressure (Bar)		Weight (%)	Flow (%)
		Gas	Water		
11	22.7	10	16	100%	100%
13.6	18.5	10	16	83%	120%

Same pressure, increased internal diameter, increased flow, lower weight and cost

“This increase in flow rate, or increase in capacity of the pipeline, between DR11 pipe and DR13.6 pipe could mean the difference whether a design engineer chooses PE pipe or steel pipe.”

Gene Palermo

Source: High Strength Polyethylene (HSPE) Materials for Superior Plastic Pipe Performance. Gene Palermo August 2016

19

