

BP PTA – Advantaged Proven Technology



IOCL Conclave,
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Zhuhai 3





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Technology is Critical to the Future



A world leading methanol carbonylation technology for the production of acetic acid, with lowest capital and variable costs

BP PTA

A world leading PTA technology with clear capital, operating and environmental advantages

PX

A world leading PX technology with the lowest variable and capital cost

Technology deployed at:

- 1 wholly owned site in Europe
- 5 JVs in Asia
- 2 third party licenses

Assessment on-going for deployment of Cativa[®]XL and SaaBre technologies

Technology deployed at:

- 3 wholly owned sites in Europe and the US
- 1 wholly owned in Indonesia
- 1 JV in China
- 1 JV in Taiwan

Latest generation technology, BP PTA, deployed at Zhuhai #3, China

3 third party licenses granted

Technology deployed at:

- 3 wholly owned sites in Europe and the US

Significant next generation technology in development

2 third party licenses sold



BP's latest breakthrough technology for the production of Acetic Acid

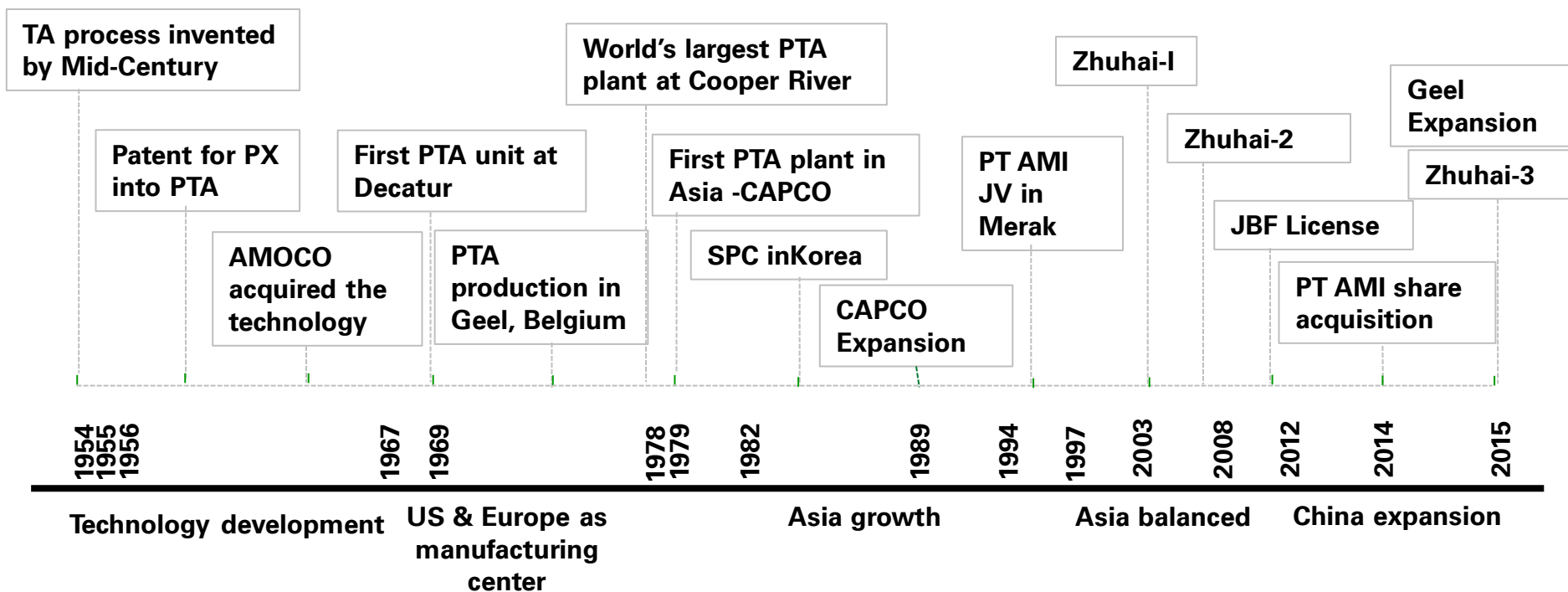


BP PTA Technology

- BP is a PTA industry leader with 50 years of investment and commitment
- BP PTA is the lowest cost commercially proven technology available today
- BP PTA licensing offer
- BP PTA, latest generation PTA technology deployed at Zhuhai
- Advantages of licensing a commercially proven technology
- Exclusive Alliance with Technip for FEED
- There is more: BP PTA +



50 year History of BP in PTA



Total PTA Capacity = 79 mtepa, ~ 7 mtepa BP owned (100% or JV)

- **A leader in PTA technology , manufacturing excellence and licensing**
- **Licensed +45* PTA plants globally, ~ 13 mtepa (9.5 mtepa operational)**

* Excludes the three licenses signed since 2012 and MCI licensed capacity

BP PTA – the most advantaged commercially proven technology



Commercially Proven Technology

- Track record of successful technology development, commercialisation and flawless project execution - deployed at company owned sites, most recently Zhuhai, China
- 50 years of owner / operator experience & licensing successes
- Long term commitment, in-house investments +\$200m
- Material R&D spend with a staff of 150 scientists , ~ 200 Patents, progressive technology innovation

BP PTA – Distinction par excellence with high reliability and availability (compared to conventional PTA technology)

\$100 – 120m Lower Capital Costs

- Reduced ISBL footprint, capacity per metre square efficiency improved by 400%
- 30 % less equipment (160 fewer pieces of equipment)

\$60/te Lower Variable Costs = \$75m/year for 1.25 mtepa

- Exothermic heat recovery and integration
 - Recycle process stream
 - Operation optimisation expertise

Distinctive Environmental Performance

- 65% lower GHG emissions
- 75% lower water discharge
- 95% lower solid waste disposal



BP PTA Technology Licensing Offer

BP – Distinctive Licensing offer

- Proven technology at Zhuhai 3
- 50 years of operator experience
- Access to:
 - ✓ Extensive technical support services
 - ✓ Capability / best practices
 - ✓ Knowledge management
 - ✓ Continuous improvement
 - ✓ Ongoing technology development
 - ✓ Extensive patent portfolio
- Delivered through BP's exclusive strategic alliance with Technip
- **Licensing Success – BP has won three licenses since the decision to re-enter licensing business**



BP PTA Technology: Zhuhai journey from 2000 to 2015

350 to 600 ktepa

Focus on capital Costs

- Major process simplification
- 40% fewer pieces of equipment
- 40% smaller plot plan
- 75% less process wastewater
- 40% less solid waste

Demonstrated at Zhuhai 1 and CAPCO 6, JVs – (2003)

Some parts of Technology implemented at existing PTA assets

Zhuhai 1

900 to 1100 ktepa

Lowest capital and variable cost PTA plant in the world – single train

- Capitalize on economies of scale
- Additional plot plan reduction
- Over 50% reduction in fuel
- Net generator of electricity

Technology allows more local sourcing of equipment

50 % reduction in GHG

Zhuhai 2

1,250 ktepa

Further process simplification – lowest cost producer in the world

Product on-spec within 24 hours

100% Operating rates

99.2% Reliability

Variable cost already lowest in the world and still reducing through optimization

Zhuhai 3

25% reduction in Capital cost compared to conventional technology

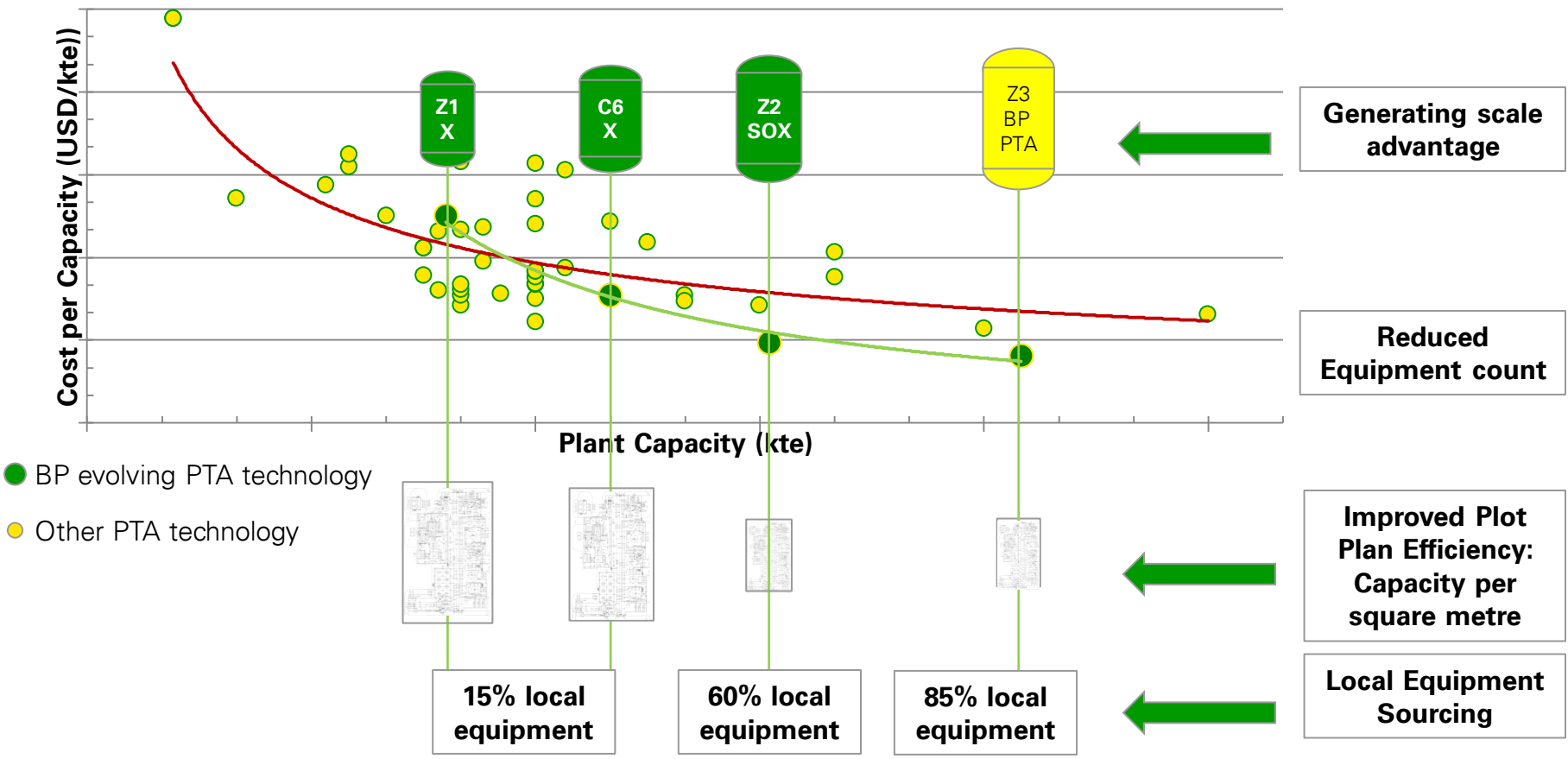
44% reduction in variable costs vs. Zhuhai1

33% reduction in variable costs vs. Zhuhai2



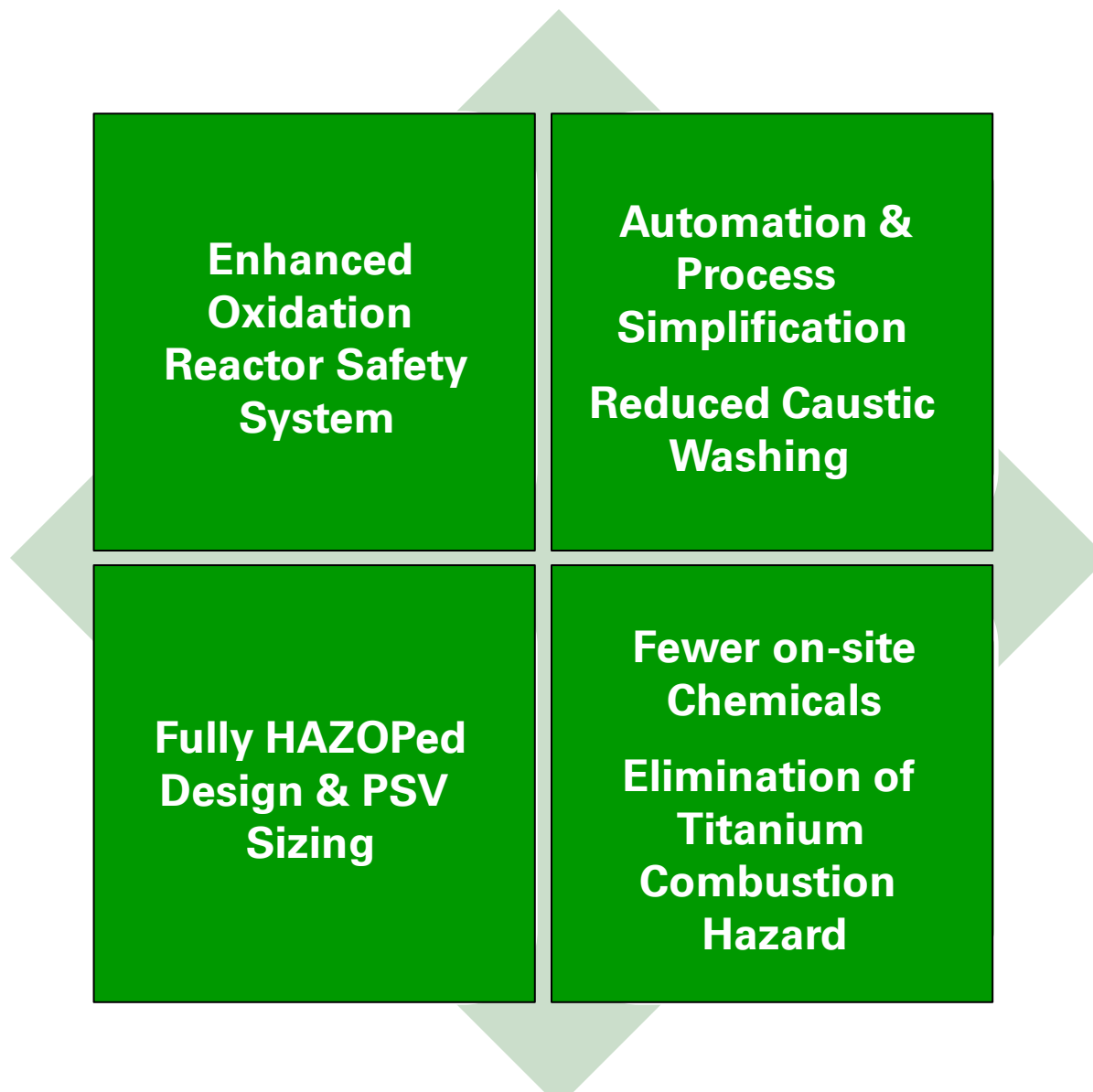
PTA Technology - Driving Capital Efficiency

Engineering, Procurement, and Construction Normalized Costs





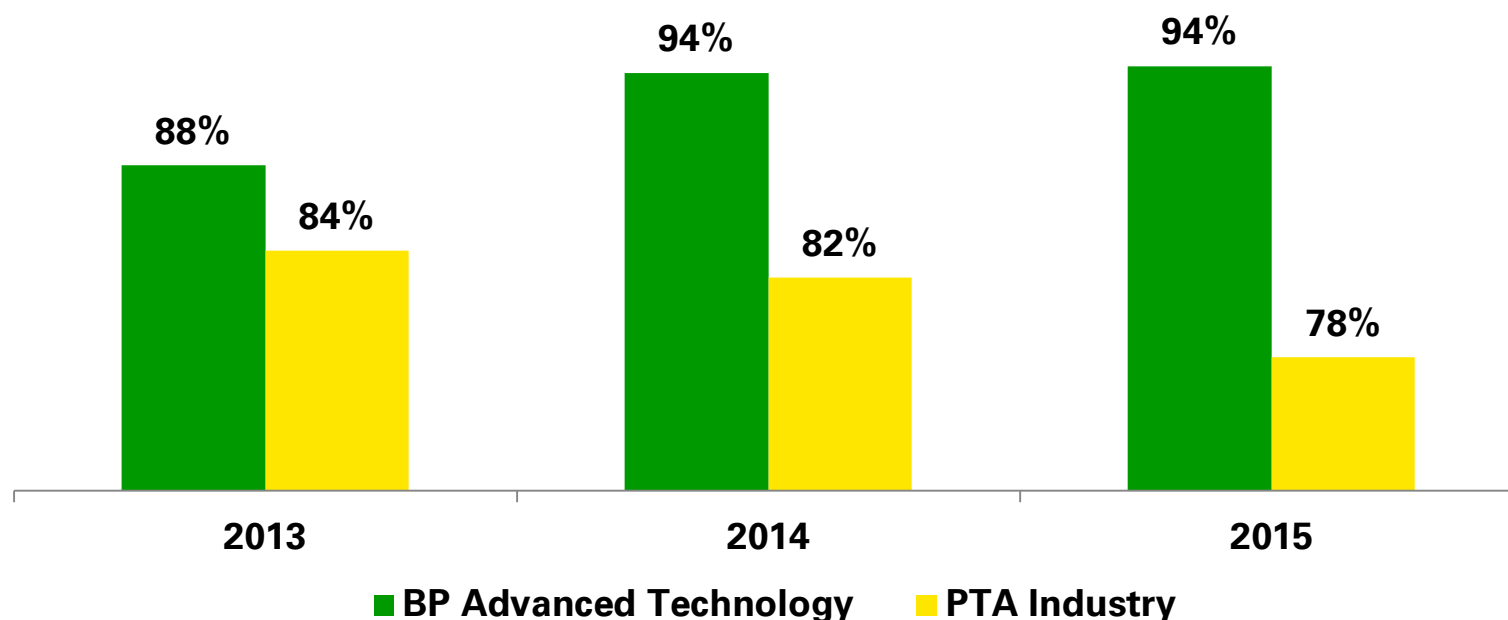
Inherently Safe Design (ISD) principles applied at Zhuhai 2 & 3





Zhuhai 2 at > 90% Utilization through downturn

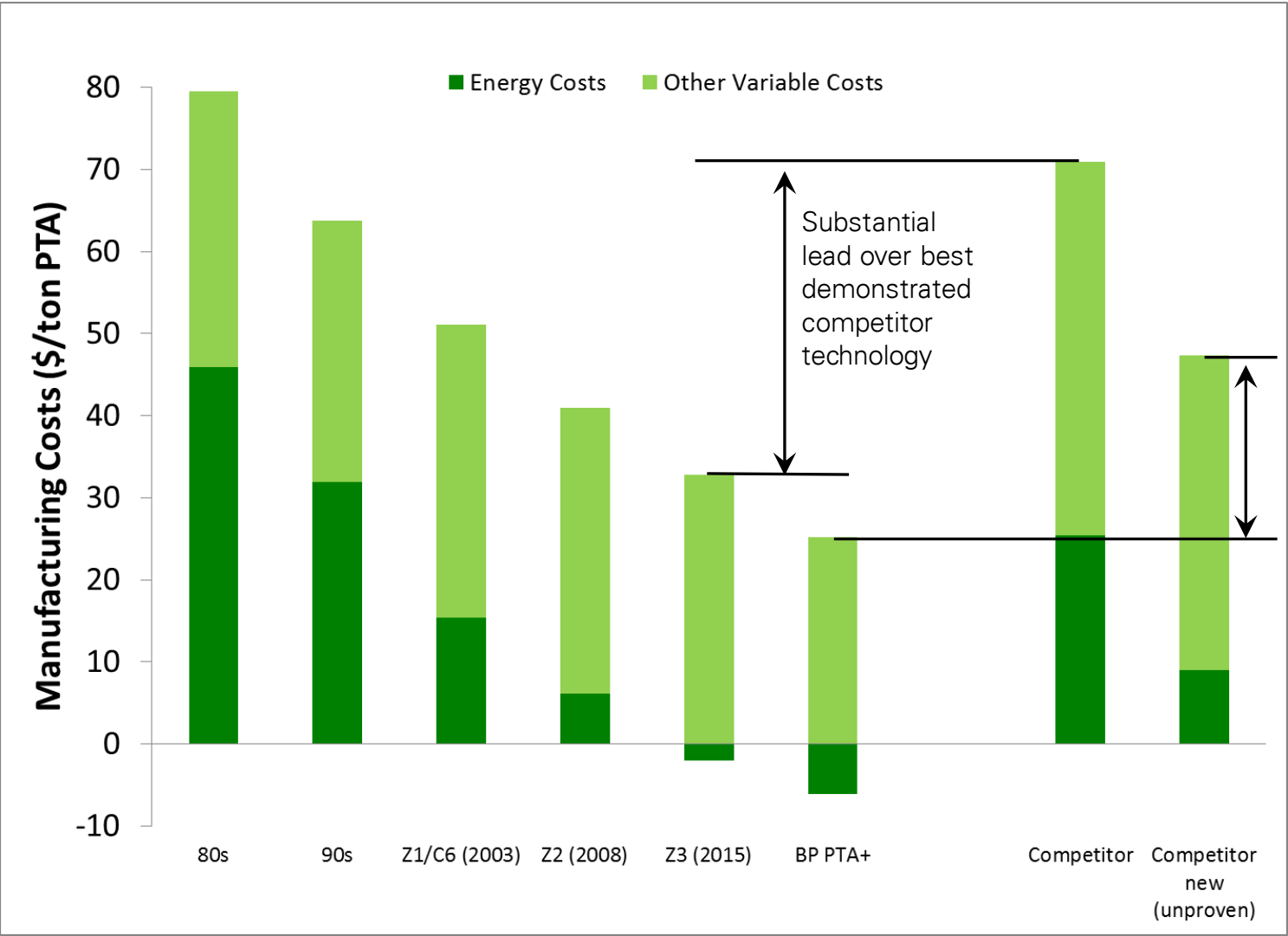
Utilization Rate



- Zhuhai 2 has been consistently operating safely at >95% Reliability
- Utilisation at Zhuhai 2 is > 90% due to low costs whilst most of China is at ~ 80% through downturn
- 10% increase in Utilisation for 1.25 mtepa = +130 ktepa



Advantages of a commercially proven technology



Z2, Z3, and BP PTA+ all maintain an advantage over any new & unproven technology.

BP actual advantage is likely to be higher given new technology risks.

Based on BP experience and industry data, new technology will have a \$15/ton higher VC for at least 3 years until new technology issues are resolved.



New Technology Commercialization Risks

	Proven Technology	New/Unproven Technology
Startup Duration (Median)	1 month	4 months
Startup Duration Variability	85% within 6 months	85% within 14 months
Initial Operability After Startup	93+%	60%

- **On average, each new step reduces operability by 14 percent in months following the initial start up period.**
- **Facilities with three or more new steps are at a much higher risk of outright failure**
- **At \$100/ton margin, every month of delayed startup is >\$10m loss.**



BP / Technip Alliance

- Alliance since 1999 and applies to fully owned/ JVs plants / third party licenses applications
- 8000 ktpa of PTA based upon BP technology engineered by Technip over 20 projects
- Technip develops on an exclusive basis the FEED to be included in the BP License Package
 - ⇒ Fully integrated BP / Technip Team
 - ⇒ A Technip “PTA Village” which is preserved to maintain and improve expertise
 - ⇒ Injection in the FEED package of the Technip EPC experience
- Supporting BP with engineering of R&D ideas within a technology continuous improvement framework
- Technip could provide, if selected by licensee as (BP preferred) EPC contractor, schedule and cost advantages, technical integrity assurance and risk management adapting to any “local” requirement



BP PTA Enhancements: BP PTA+

- BP PTA+ is the next generation of PTA technology beyond Zhuhai #3
- Current variable cost improvement is $> \$10/\text{ton}$ over Zhuhai #3, further extending BP's advantage over other technologies
- BP PTA+ is a series of incremental engineering evolutions of the Zhuhai #3 technology
- BP PTA+ also incorporates equipment improvements based on learnings from Zhuhai#3
- BP PTA+ will be the standard BP License offer at the end of Q1 2016.
- **BP is 10+ years and 2 generations of technology ahead.**

All changes to the proven technology will further lower variable costs!



Summary

- Global PTA industry is experiencing a protracted down-turn due to overcapacity in Asia; **cost leadership** is critical to be competitive in the long term

- **Distinctive technology offered by experienced owner, operator and licensor:**
 - Commitment to the PTA industry and technology
 - Capital **cost advantage of \$100 – 120m compared to conventional technology**
 - Variable **cost advantage of \$60/te, \$75m/year compared to conventional technology**
 - Distinctive environmental performance
 - Technical Services, knowledge management, continuous improvement
 - Licensing offer is a “proven technology” that is in operation today at Zhuhai, China

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