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6th Petrochemical Conclave

India's Petrochemical Vision 2030 – Opportunities and Challenges

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Indian Petrochemical Sector – a key pillar of the economy

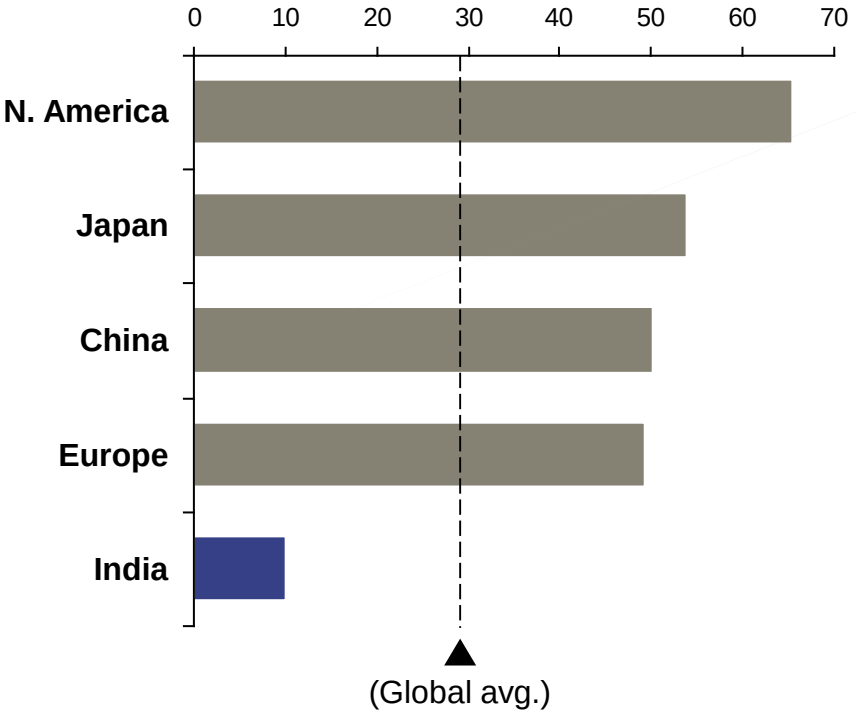
- ***Total demand at 17m MT – a USD $20bn+ market***
- ***5 year historic demand growth at CAGR 8% - 2.5X of global***
- ***Current capacity of 15m MT***
- ***Significant capacity addition by 2020 – total capacity to reach 22m MT***

Key question – what is the potential over the next 10-15 years?

We believe there is significant headroom for growth

Per capita consumption much lower than global peers

Plastics[2] consumption per capita
(Kg, 2016)



Key growth drivers likely to have significant impact

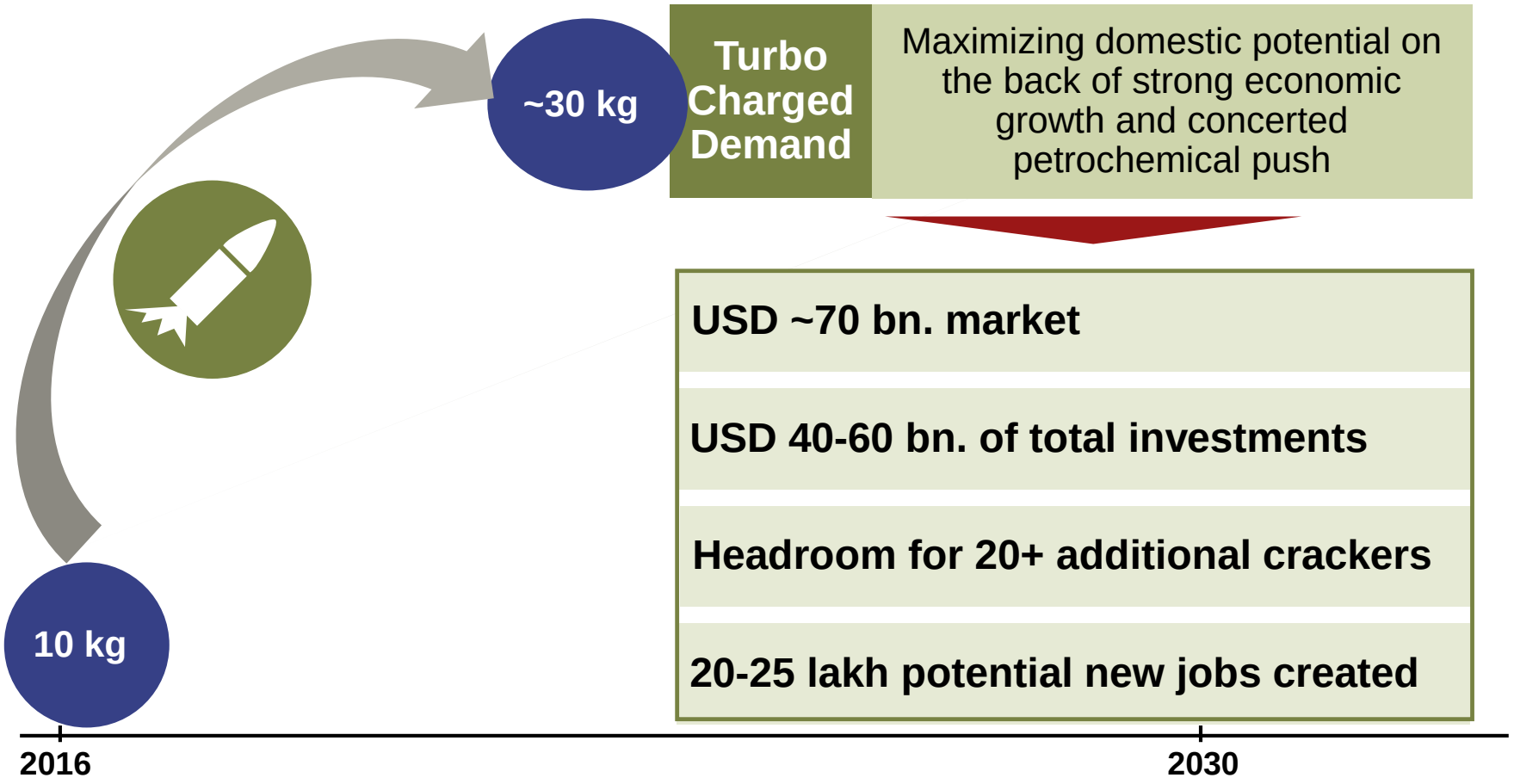
Economic growth to fuel demand in key end user segments - packaging, automotive, infrastructure, textile etc

Changing consumer behaviors – increased adoption of downstream products

Government-led initiatives to create demand impetus – e.g Make in India, Swachh Bharat, Housing for all, etc.

Indian petrochemical demand can register 3X growth - potential to be a ~USD $70 billion market by 2030

India's per capita consumption growth



1. Includes major derivatives of propylene, ethylene, aromatics & butadiene; Estimated at current prices
Source: A.T. Kearney Global Petrochemical Model, Nexant

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Five key challenges have held the sector back from realizing full potential – solving them is critical

1. **Underpenetrated end-user markets**
   - **Slow pace of adoption in many industry segments** (e.g. limited use of plasticulture in agriculture, engineering plastics in automobile)
2. **Limited access to competitive feedstock**
   - **Low domestic availability (**ethane; NGLs)
   - **Feedstock cost disadvantage** vis-à-vis global gas / coal based capacities
3. **Absence of robust ecosystem with downstream players**
   - Slow implementation of **petrochemical parks**
   - **Infrastructure and logistics bottlenecks**
4. **Low focus on R&D**
   - **Limited indigenous capabilities** to develop production technologies, efficient catalysts, additives, etc.
5. **Regulatory and policy issues**
   - **Incentives lower than several Asian countries** (e.g. as import duty waiver on feedstock, cheap credit, etc.)

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A three pronged **Action Agenda** needs to be adopted to realize India's petrochemical potential

Action Agenda

1 Increase demand penetration

- **a. Promote petrochemicals usage** in key end use industries
- b. Leverage government initiatives to **drive consumption**
- **c. Enhance focus on high value derivatives** to negate feedstock disadvantage

2 Improve cost competitive ness

- a. Setup **petrochemical complexes integrated with refineries**
- b. Explore **possibility of reverse SEZs**; strategic partnerships for feedstock import
- **c. Build feedstock flexibility** to optimize cost; create **global scale capacities**

3 Strengthen key enablers

- **a. Expedite petrochemical park** implementation
- b. Enhance **focus on R&D**
- **c. Provide regulatory & policy support** and increase ease of doing business

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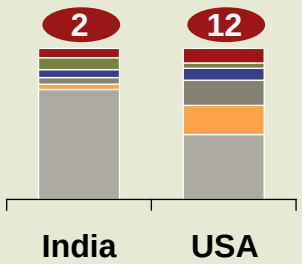
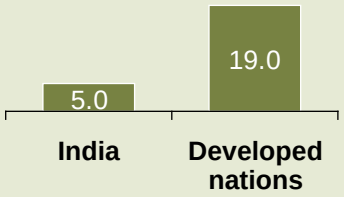
Enhancing usage : Increased awareness; co-creation with end-users and focused R&D can help enhance demand

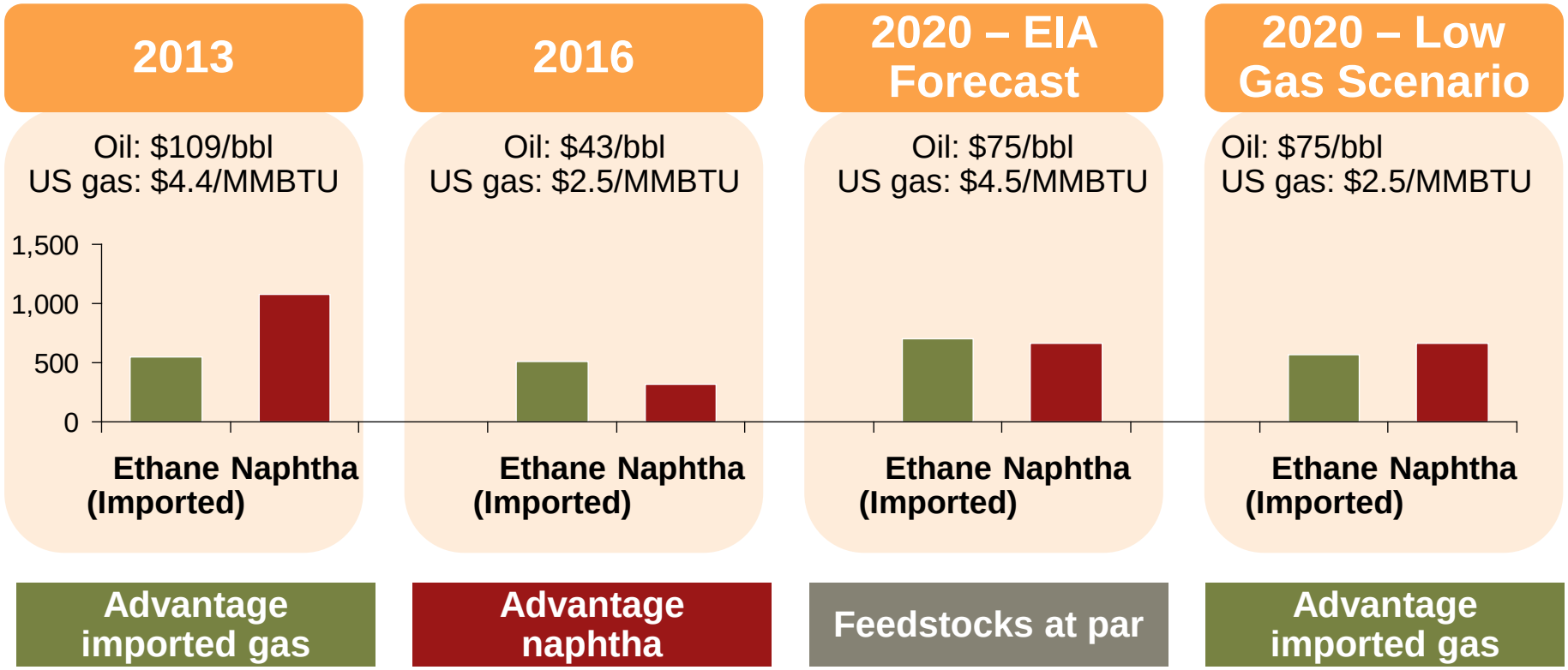
Example

End Use Industry	Current State and Opportunity	Action Items
Infrastructure	*Per capita PVC consumption in kg*  • Low per capita consumption • Applications other than pipes are in early stages	• **Advancing new applications** in infrastructure to **substitute traditional options** • **R&D and product development** to generate high performing/cost effective solutions • **Increased awareness** in end-use industry
Automobile	Plastic (kg) per car  • Low usage of engineering plastic components • Significant potential to replace metal	• **Technical innovation** to develop advanced composites, engineering plastics to **replace metal components** • **Joint development with user industries**

Source: Industry reports, Press releases, A.T. Kearney

Feedstock flexibility : Feedstock markets have been volatile, building flexibility would be critical

Ethylene cash cost comparison for Naphtha vs. imported gas for cracker in India ($/T)



1. Range driven by variation in ethane shipping cost ($150-$250/T) depending on size of vessel
Source: A.T. Kearney Global Petrochemical Model, Nexant, Bloomberg, EIA

Petrochemical parks : creating world class production ecosystem with scale and efficiency would be critical

Petrochemical Parks Implementation

Key features of Petrochemical Parks

Feedstock accessibility	Best in class infrastructure	End-user cluster
		
• Refinery / feedstock company as anchor investor	• Rail, road, airport connectivity • Utilities and other services • Enablers – talent pool, social infra. etc	• Industries across downstream value chain • Support and ancillary industries

Five-pronged **action agenda:**

1. **Develop vision and implementation roadmap for each hub**– in line with global benchmarks
2. **Build core infrastructure** such as multi modal logistics linkage, utilities via suitable SPVs
3. Establish **investor friendly processes** such as 'single window' clearance, policy support for land acquisition
4. Provide **incentives** for competitive business case
5. Establish a dedicated steering team with **center, state govt. and industry representation**

Source: Press articles, India chemicals website, A.T. Kearney

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