

## Mr. Jon Horler

### *Acetyls Project & Engineering Manager BP*



- ❖ A Chartered Chemical Engineer, Mr. Jon Horler has worked for BP for 25 years and leads a team responsible for the delivery of technology and engineering in support of BP's proprietary package for the manufacture of Acetic Acid.
- ❖ Part of his role is also to provide project management during concept selection and early stage development for licensing opportunities worldwide.
- ❖ Mr. Jon has previously worked on major projects in the UK, China, Taiwan, Malaysia, Korea and India.



# Overview of Acetic acid Production Through Petcoke Gasification

IOCL Petrochemicals Conclave  
18<sup>th</sup> March 2013

Jon Horler, Projects and Engineering Manager  
Acetyls and Aromatics Technology

# Outline



- Overview:
  - What is Acetic Acid
  - Key Uses of Acetic Acid
  - Chemistry
- Feedstock Choices
- Acetic Acid Technology
- Sources of Project Value

# What is Acetic Acid?



- A very important chemical
- A key raw material for the production of a wide number of products we use in our everyday lives
- Do you know that acetic acid in its very dilute form is vinegar that is consumed or used in the manufacture of food products?
- Acetic acid is involved in the manufacture of other items you'll find in your shopping basket, such as washing powder, drink bottles and food packaging



**With just 1 tonne  
of acetic acid our  
customers can  
make 38,000 jars  
of pickles\***

\*BP Internal Data

# Key uses of Acetic Acid



- **Vinyl Acetate Monomer (VAM)**

- Paint, adhesives in furniture or floor covering, manufacture of clothes, shoe soles, juice cartons and cheese packaging, manufacture of safety glass for car windscreens



- **Purified Terephthalic Acid (PTA)**

- Plastic containers for beverages, food and electronics, apparel, home textiles, carpets and industrial fibre products, audio and video recording tapes, photographic films and labels



- **Acetate Esters (Ethyl Acetate, Butyl Acetate...)**

- Solvent in printing inks, laminating adhesive in flexible packaging and plastic films. Also used as solvent in paint, varnishes, resin coatings and nail polish remover



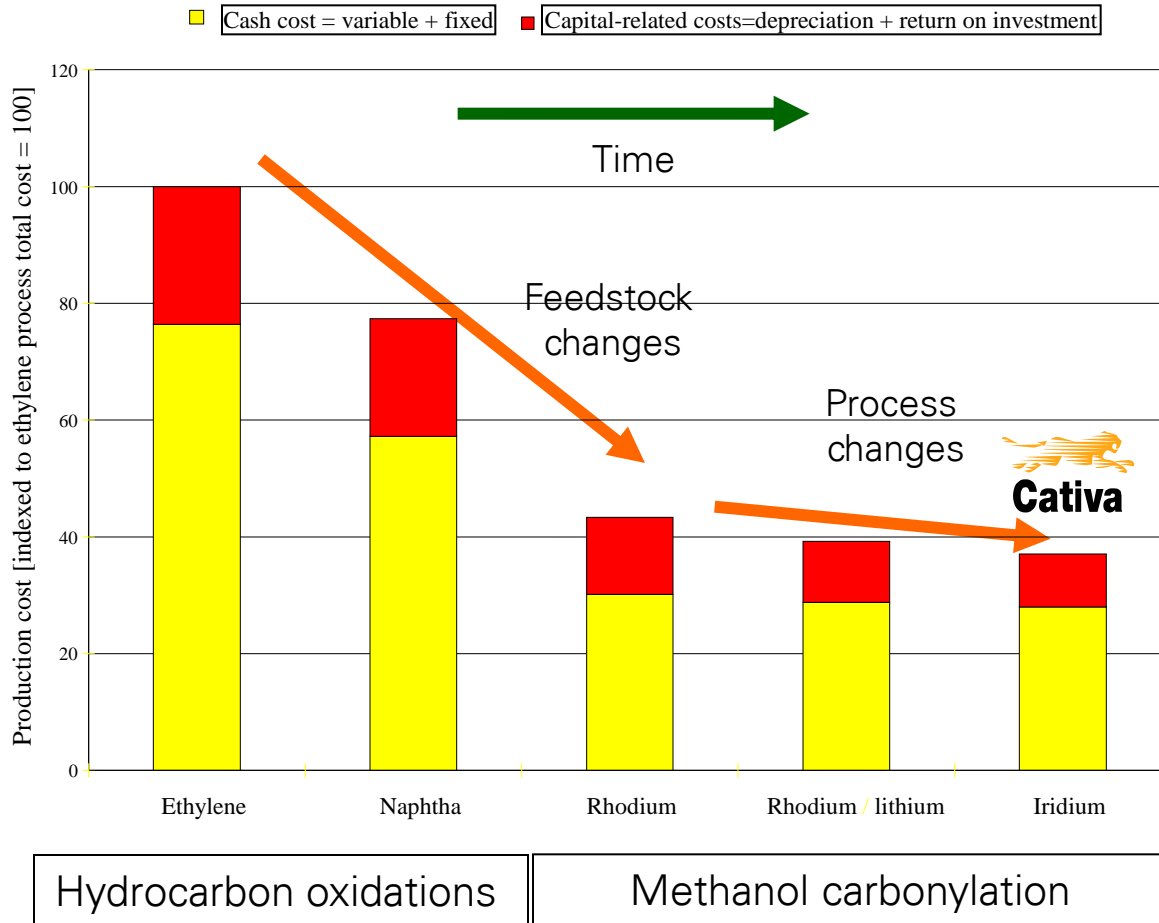
- **Acetic Anhydride**

- More than 75% made into cellulose acetate found in filter tow, textiles, photographic and x-ray films
- Also used in pharmaceuticals such as aspirin and paracetamol





# Acetic Acid Technology Evolution

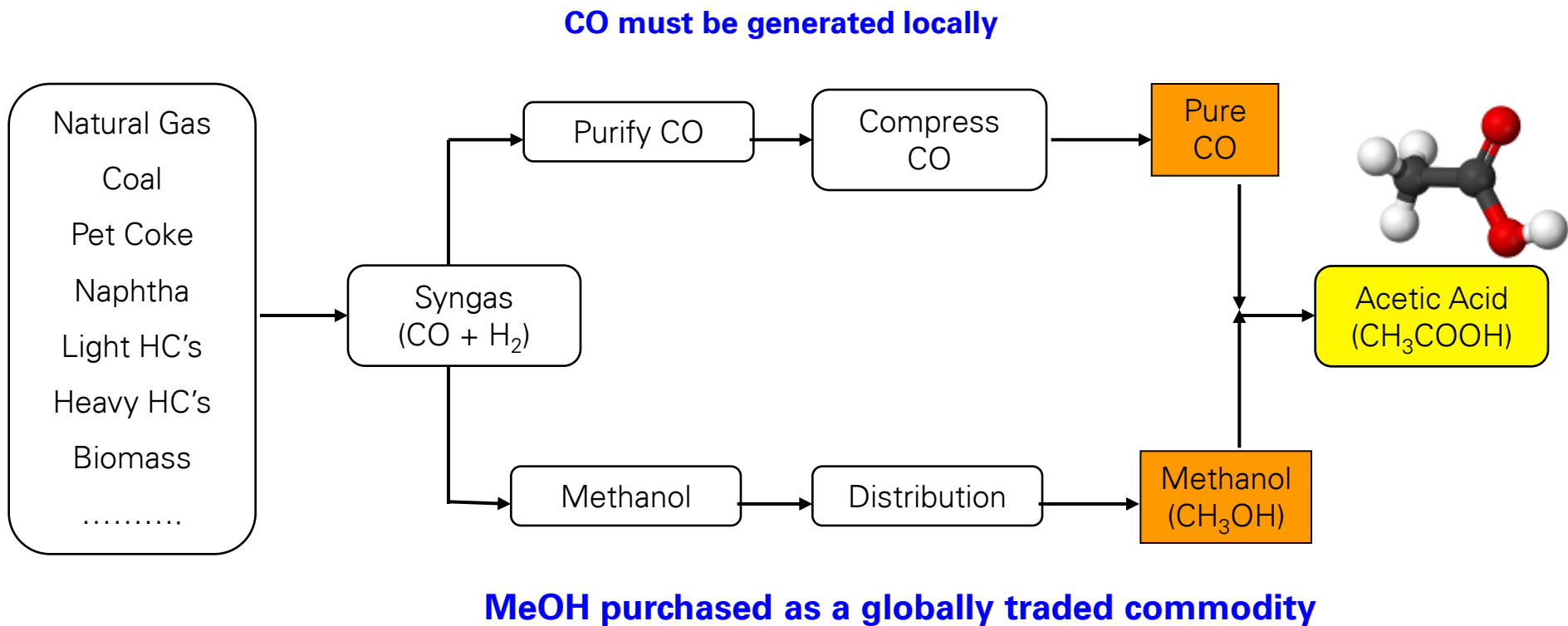


## CATIVA® gives advantages across all key project criteria:

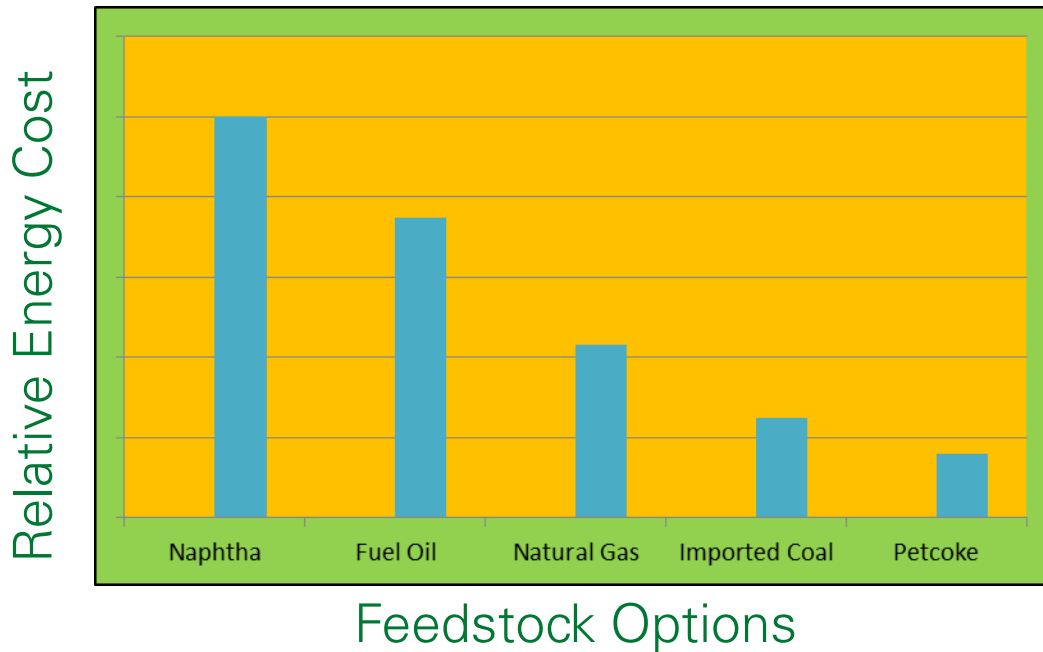
- Capital - simplification of flowsheet results in lower project costs for new build plants
- Variable Cost - patented catalyst technology and subsequent reduced energy requirements result in lower operating costs
  - Cash Cost / Reliability - less equipment items to maintain mean lower annual maintenance spends and less downtime
- Scale - potential to build at scale to suit market demands improves capital efficiency
- Fully Built-up Cost - all of the above have a positive impact on overall project economics and long term sustainable operations

Cost estimates are based on generic models

# Methanol Carbonylation: A C<sub>1</sub> route to Acetic Acid



# Feedstock Selection In India



- For a methanol carbonylation production, feedstock access for competitive CO production cost is key to the Acetic Acid value chain

- Main issues associated with accessing attractive CO economics are:
  - High energy costs. Investment in lower capital Nat Gas/Fuel Oil based Syngas plants (eg SMR/POX) have higher variable costs
  - Investment in Coal/Petcoke based Syngas plants (Gasification) delivers much lower energy / variable cost but carries a much higher capital cost burden and is dependent on scale and integration opportunity



# BP Acetyls – Global Experience



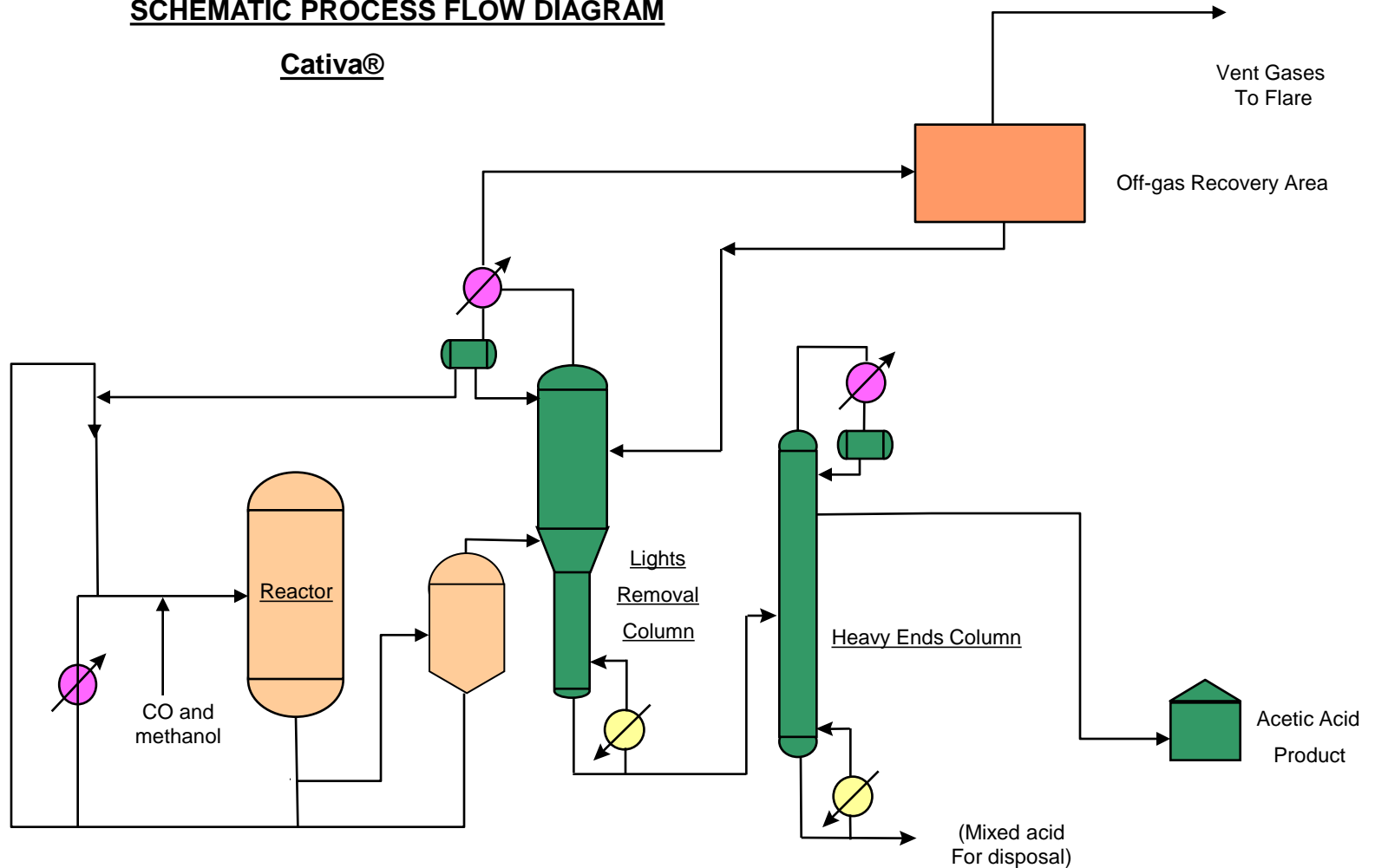
- Acetyls sites
- Commercial/Sales offices
- % BP share of JVs

# CATIVA® Process Flow Diagram

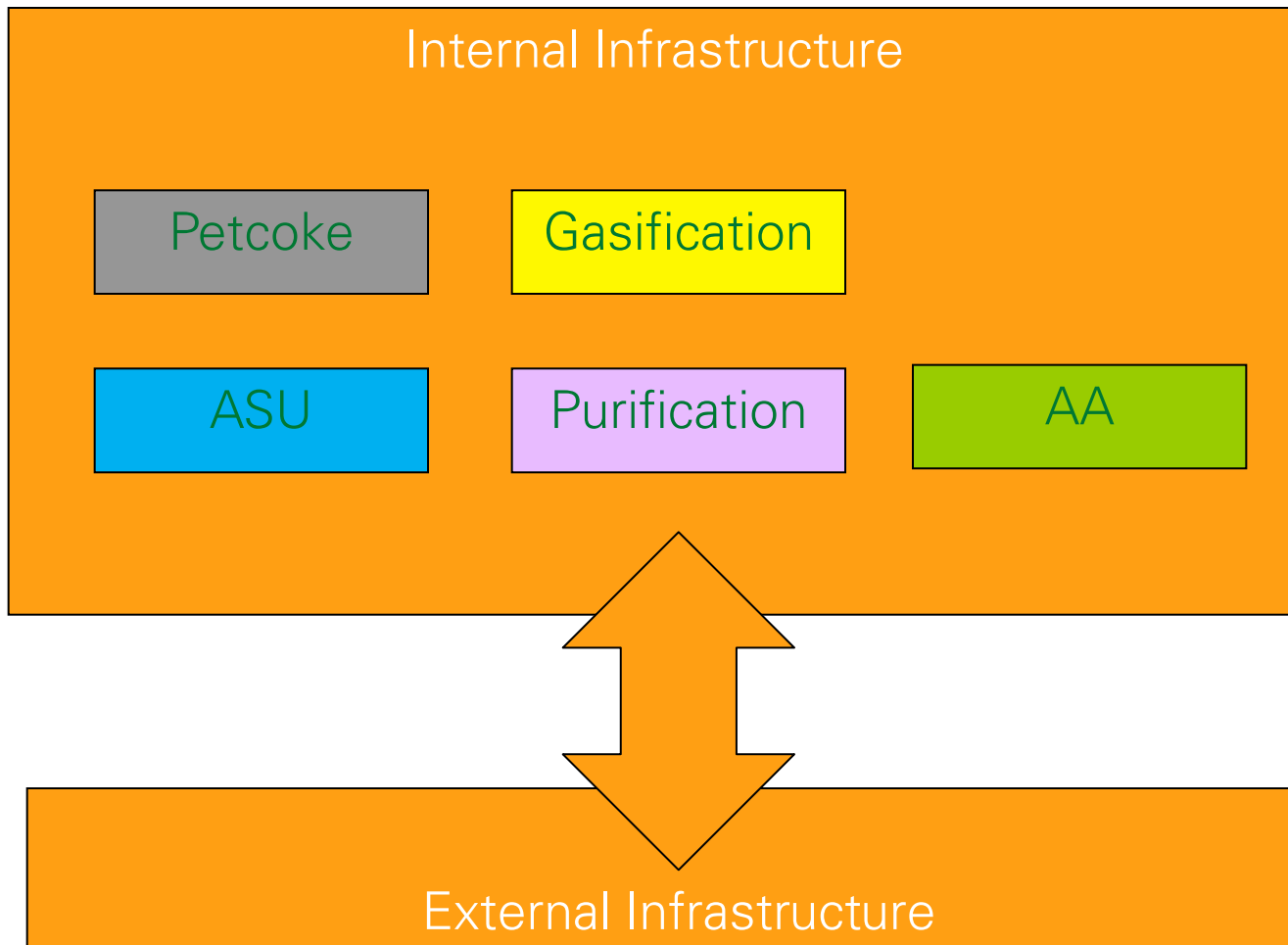


## SCHEMATIC PROCESS FLOW DIAGRAM

Cativa®



# Value Levers: Project Integration



## Keys to Project Value

- Build at scale
- Locate near market
- Locate close to petcoke feedstock
- Integrate common infrastructure
- Leverage the strengths of both parties

# Summary



- Acetic Acid is a petrochemical building block for products associated with a sophisticated growing modern economy
- BP has developed world leading technology for the manufacture of acetic acid.
- Feedstock choice is critical
- Integration opportunities help to lever value

Thank You