

# Who we are?




- 
- Isochem Australia Pty Limited was founded in 1990 by Alireza Ehsani as the exclusive agent for Bayer Polyurethanes in Australia and New Zealand.

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- Today Isochem group, still a family business, comprises of three geographical entities

Isochem Australia Pty Limited  
Market Coverage: ASEAN

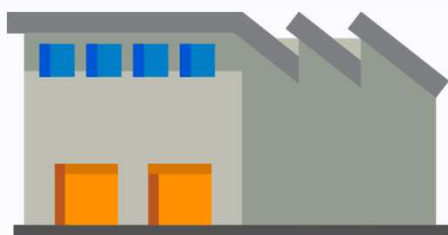
Isochem Polyurethanes UK Limited  
Market Coverage: Europe, Middle East, North Africa

Isochem North America Inc.  
Market Coverage: The Americas

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- Isochem group is a distributor of specialty chemicals with a core focus on the polyurethane industry

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- With sales offices in Sydney, Australia, New York, USA and Newcastle, UK and third party warehousing facilities in over 100 strategic locations around the world, Isochem is well positioned to serve its key markets by providing just in time deliveries and seamless supply chain to its end user customers.

# What we do?

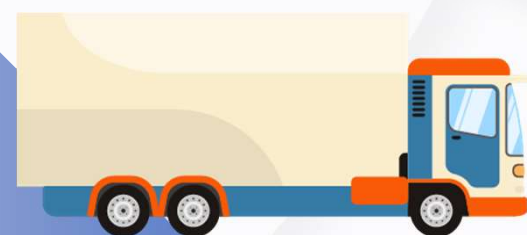


Distributor of industrial and specialty chemicals and related logistic services. Isochem operates distribution centers throughout Australia, North America and Europe representing a vast array of major industries and end markets.

Connecting global manufacturers of specialty chemicals with local downstream end users by sourcing the best fit supply chain and delivering an unparalleled level of service to its customers.



We form strategic partnerships with global manufacturers as well as align with the smaller regional producers to help deliver products to our local customers.



Proud distribution logistical services

# Business Model



**Purchase, transport and storage of large-scale quantities of diverse chemicals**

- Several global suppliers
- Full-line portfolio of polyurethane chemicals
- Network of locations worldwide

# Business Model



- Repacking from large into smaller quantities
- Filling, labelling, bar-coding and palletizing
- Mixing and blending according to customer specific requirements
- Formulating and technical support from dedicated application laboratories

# Business Model



- Leveraging high route density based on local scale
- Providing just in time delivery and vendor management inventory service
- Offering one-stop-shop solution
- Business model evolving from “Distribution and Value Add” to “Make or Buy”

# Isochem Vision & Mission



To be an innovative leader in the production and distribution of Polyurethane raw material and downstream Polyurethane systems.

Be at the forefront of Research and Product Development in the Polyurethane Industry in order to innovate greener more sustainable Polyurethane Additives.

# Project Purpose & Background



- Flame retardant performance is at the forefront of current industry discussion points;



- Isochem group has a strong footprint in the Flame Retardant's market with ongoing business to Global market leaders



- The first phase of the project is the construction of a manufacturing plant producing organophosphorus derivatives



- The second phase of the project would be to setup a World Best Research and Development Facilities for the production of 'Green' Polyurethane additives with the aim of putting KSA at the forefront of Polyurethane Innovation in the world



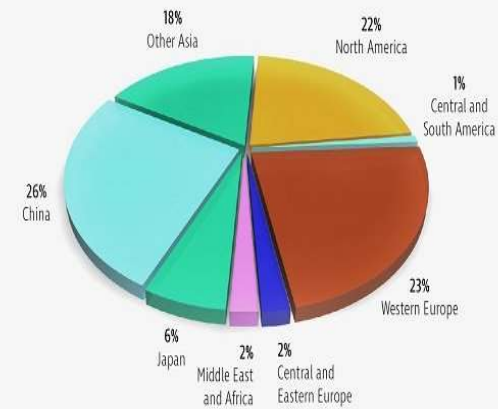
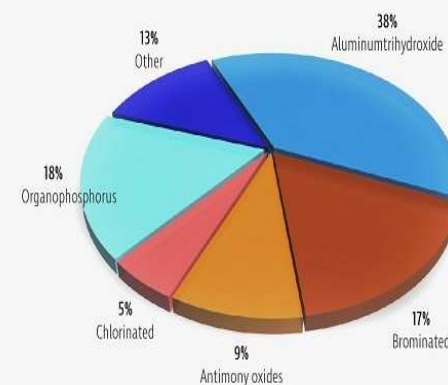
- The third phase would comprise of Setting up of world first full line Polyurethane Additives manufacturing facility.



# Business Potential

The worldwide consumption of flame retardants amounts to more than 2.25 Million tons per year.

- $\text{Al}(\text{OH})_3$  = 900,000T
- Halogenated flame-retardant systems comprising brominated and chlorinated products = 700,000T
- Organophosphorus and other flame retardants like e.g. inorganic phosphorus compounds, nitrogen and zinc-based flame retardants = 700,000T
- The Flame Retardant market is foreseen to continue to grow at a global annualized rate of 3.1% between 2018 and 2023.
- Global TCPP consumption estimated at 200,000kT per year
- 70% of production in China
- Only 2 producers in Europe
- Producing TCPP in the Kingdom of Saudi Arabia next to competitive source of PO and closer to the main end markets
- Global TEP consumption estimated at 150,000T per year
- Growing fast as a halogen free TCPP alternative



# Isochem SWOT analysis



Weakness addressed by collaborative partnership with local authorities

Threats are mitigated by the fact the project includes the best non halogenated alternative (TEP). Also this discussion on TCPP has been going on for 20 years. Geopolitical risk to be monitored.

# Isochem Key People



- **Alireza Ehsani, Founder and Managing Director**
  - BE, Applied Chemical Engineering
  - MS, Polymer and Textile Technology
  - 40 years experience in polymer chemistry, polyurethane
- **Didier Grillot: General Manager Isochem Polyurethanes UK Ltd.**
  - PhD Organic chemistry
  - More than 25 years experience in the polyurethane/specialty chemicals industry
  - Various senior roles at Global Major companies (Eni, Huntsman, Wanhua, Air Products)
- **Alex Ehsani, Global Sales Director**
  - Bcom. Law
  - Joined Isochem in 2012
  - 10 years Investment Banking Background;
  - Cash Equities Trading with Macquarie Bank
  - eFX Trading with Deutsche Bank
- **Siddharth Gupta, Project Lead- Manufacturing & Operations**
  - B.Tech, Chemical Engineering
  - MS with Excellence, Petroleum Engineering
  - 7 Years of diverse oil and gas operations experience

# Flame Retardant project - KSA

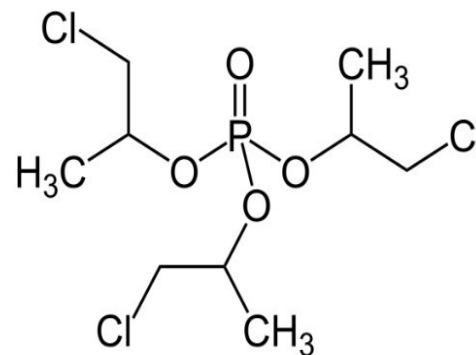
**Manufacturing of a series of  
organo-phosphate flame retardants:**

1. TCPP
2. TEP
3. TDCPP
4. TCEP

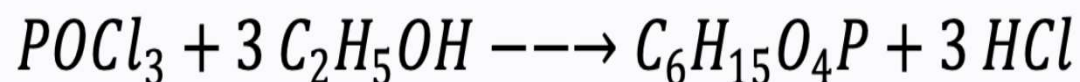
# TCPP – Tris (1-Chloro- 2-Propyl) phosphate



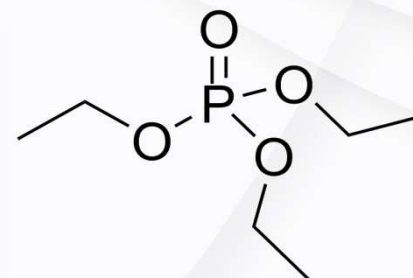
- Reaction of 1 mole of Phosphorus oxychloride and 3 moles of Propylene oxide in the presence of catalyst
- Crude TCPP is then purified by means of heating/distilling.
- Washed with acid, base and water to decompose catalyst.
- Exothermic reaction



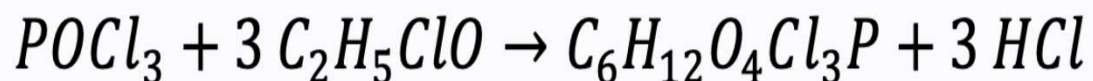
# TEP – Triethyl Phosphate



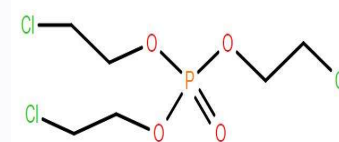
- Reaction of 1 mole of Phosphorus oxychloride and 3 mole of ethanol
- By-product formed: Hydrochloric acid
- Requires heating/distilling for purification



# TCEP – Tris(2-chloroethyl Phosphate)



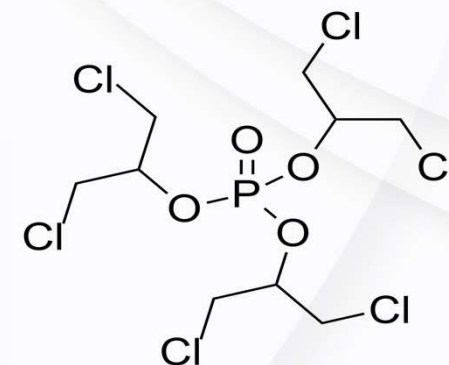
- Reaction of 1 mole of Phosphorus oxychloride and 3 mole of chloroethanol
- By-product formed: Hydrochloric acid
- Requires heating/distilling for purification





# TDCPP – Tris(1,3-dichloro2-propyl) phosphate

- Product synthesis trials under progress





# Project Details

## **CAPACITY: 30,000 TPA**

TCPD production: 25,000 TPA

TEP production: 4,000 TPA

TCEP & TDCPD production: 1,000 TPA

Land Size: 400m x 250m

## **SITE CONSIDERATION:**

Processing plant

Storage Site

Chemical Laboratory

Pilot plant

Office

# Project Development



- PROPYLENE OXIDE
- PHOSPHORUS OXYCHLORIDE
- ETHANOL
- CHLOROETHANOL
- TITANIUM TETRACHLORIDE
- SODIUM HYDROXIDE SOLUTION

# Project Development cont.

**Optimization of chemical reaction  
by varying the composition of the  
chemicals and reaction  
temperature**

**Synthesis of TDCPP**

**Purification of the crude products**

# Future Work

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**Process design**

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**Mass and Energy Balance**

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**Procurement of the equipment**

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**Construction of the plant**

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**Pre-commissioning**

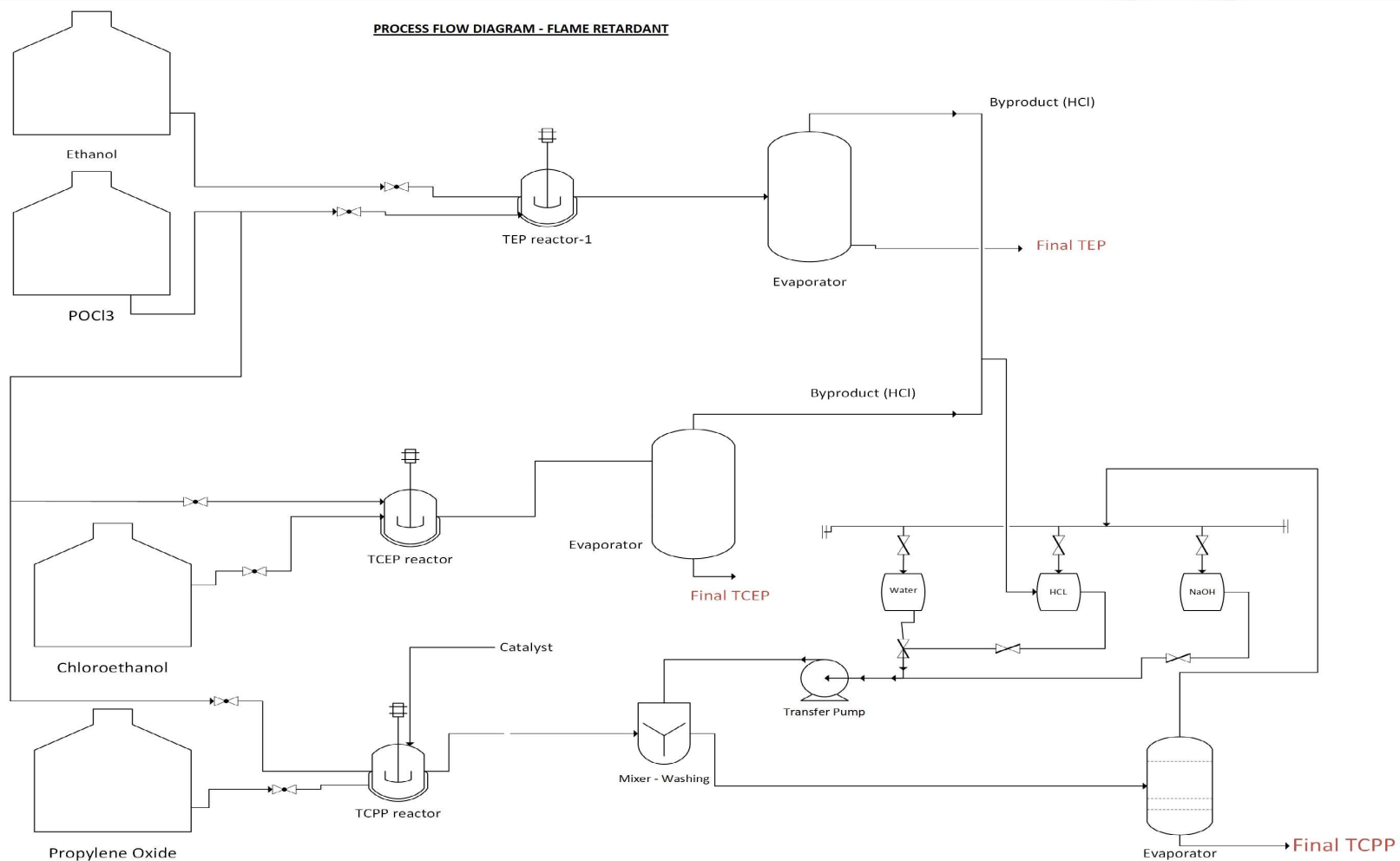
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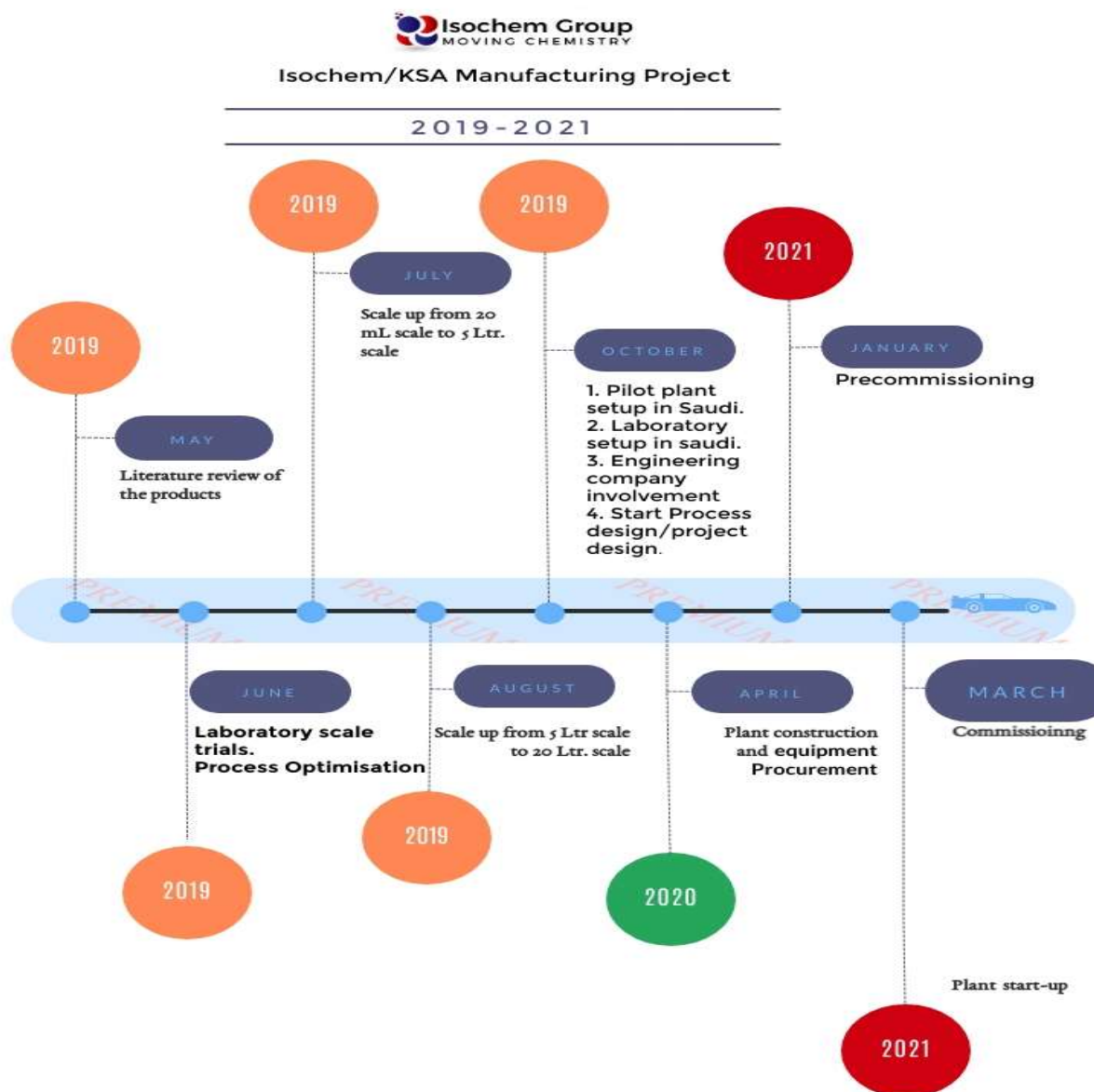
**Commissioning**

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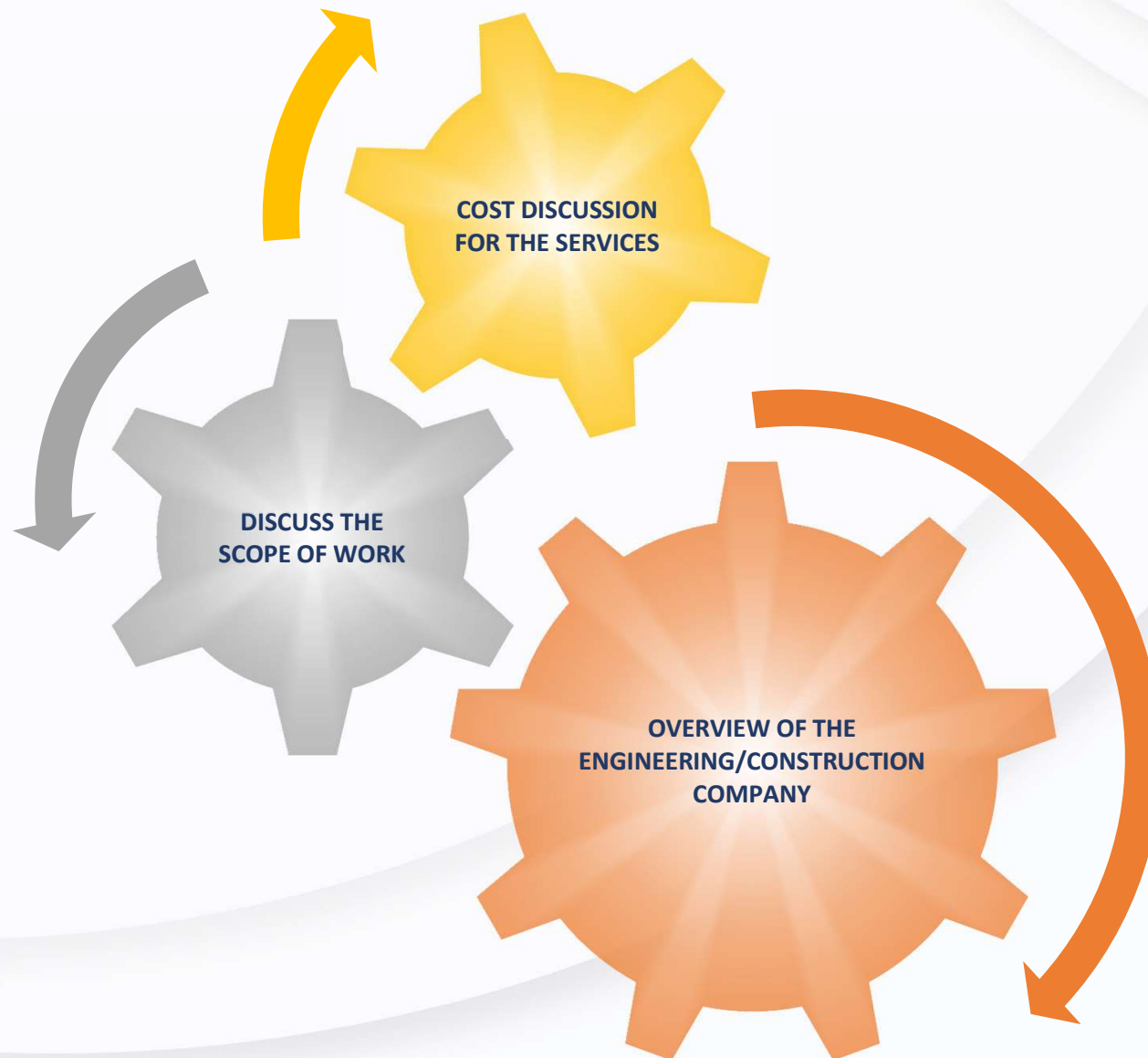


**PROCESS FLOW DIAGRAM - FLAME RETARDANT**





# Agenda for this Meeting



# Questions?





# Thank You!