



# Global Lubricant Baseoils Supply Overview

A Presentation to

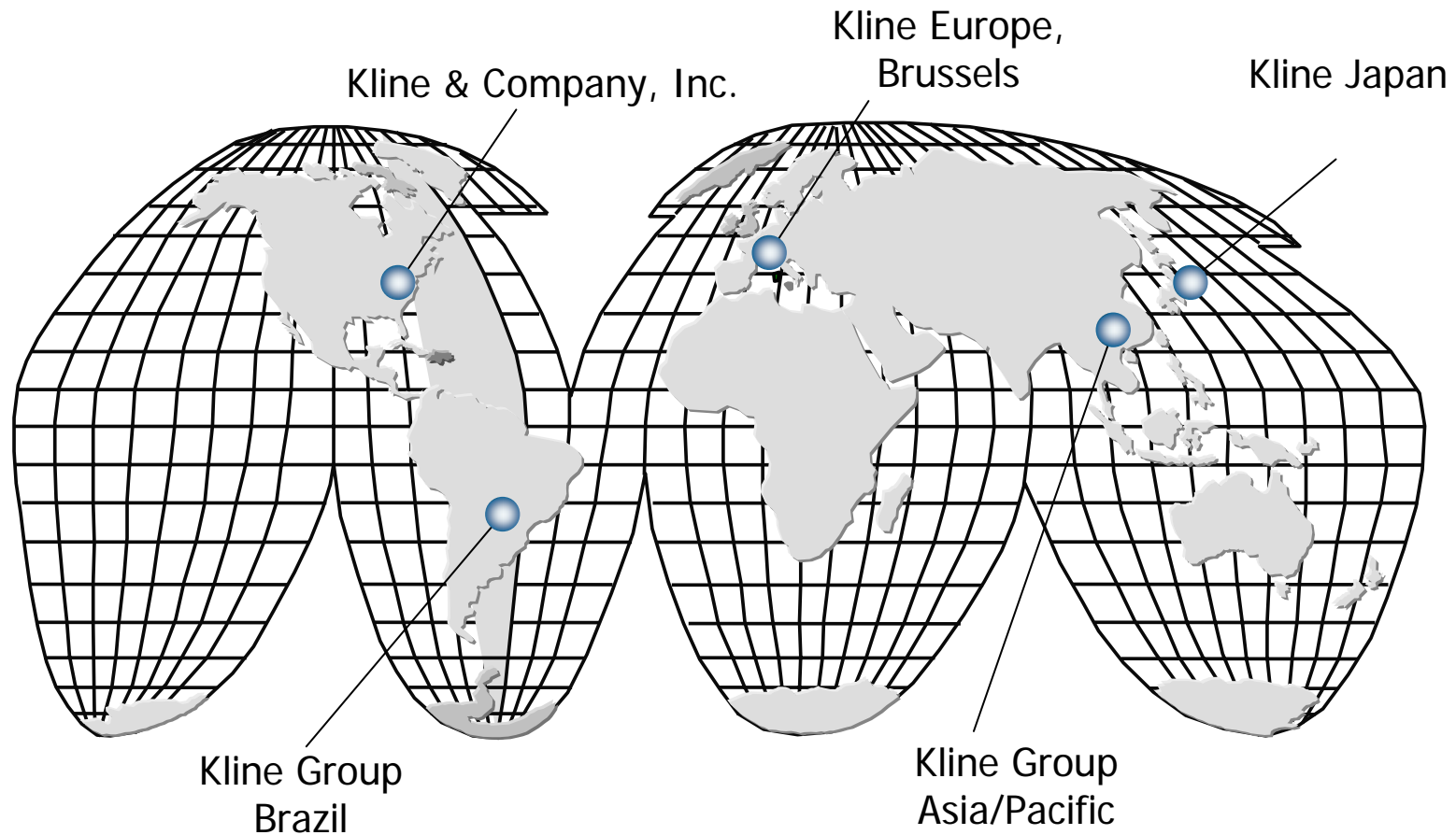


**Authors:**

**Geeta S. Agashe  
Milind Phadke**

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We provide insightful perspectives based on a foundation of rigorous analysis to help our our global clients become more successful . . .



# AGENDA

- How does Kline forecast future S/D balances ?

- Global Baseoils Supply and Demand Balance

- Regional Baseoil Supply Review

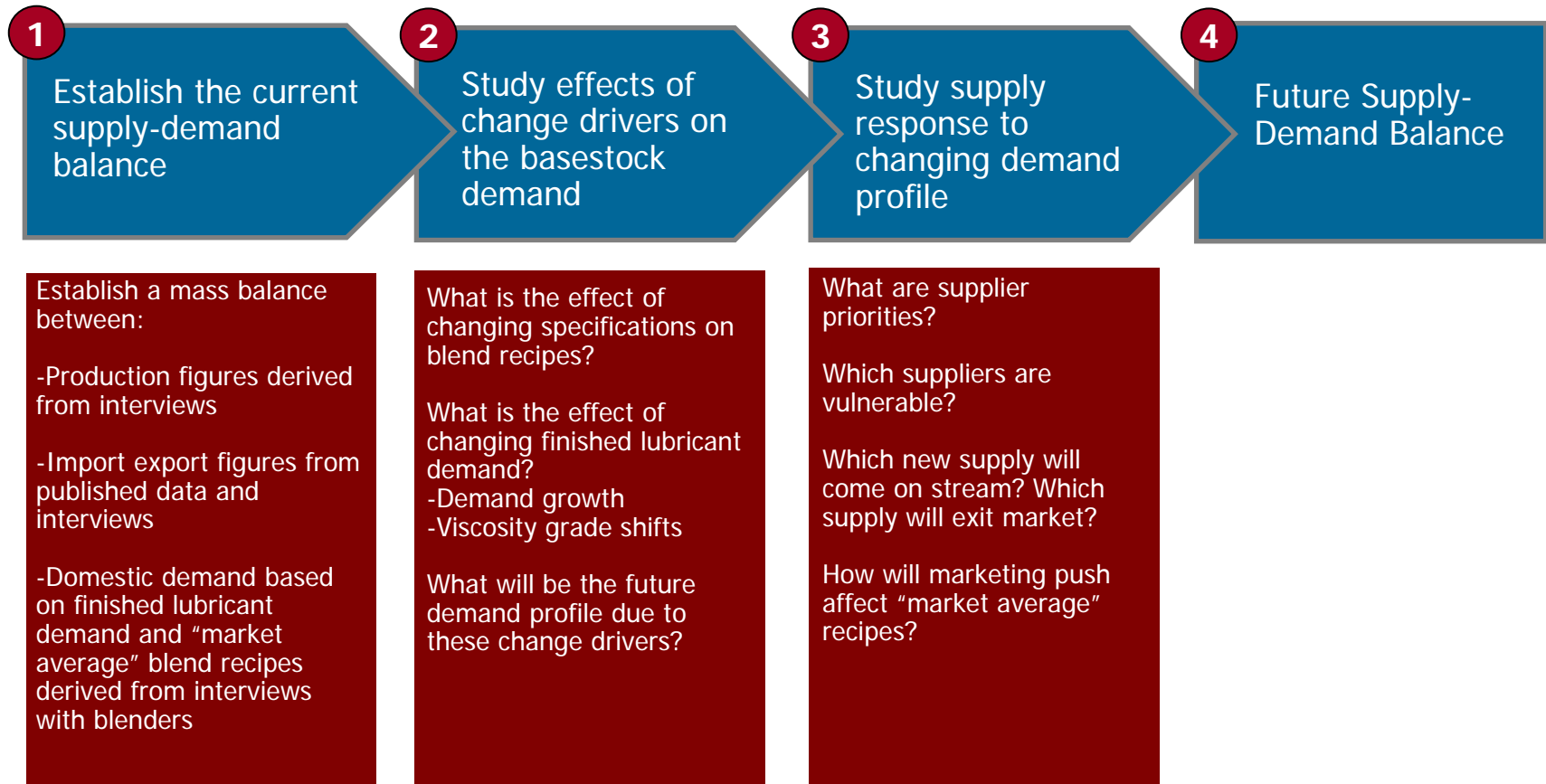
- Kline's view on changing S/D balance: W. Europe

- Conclusion

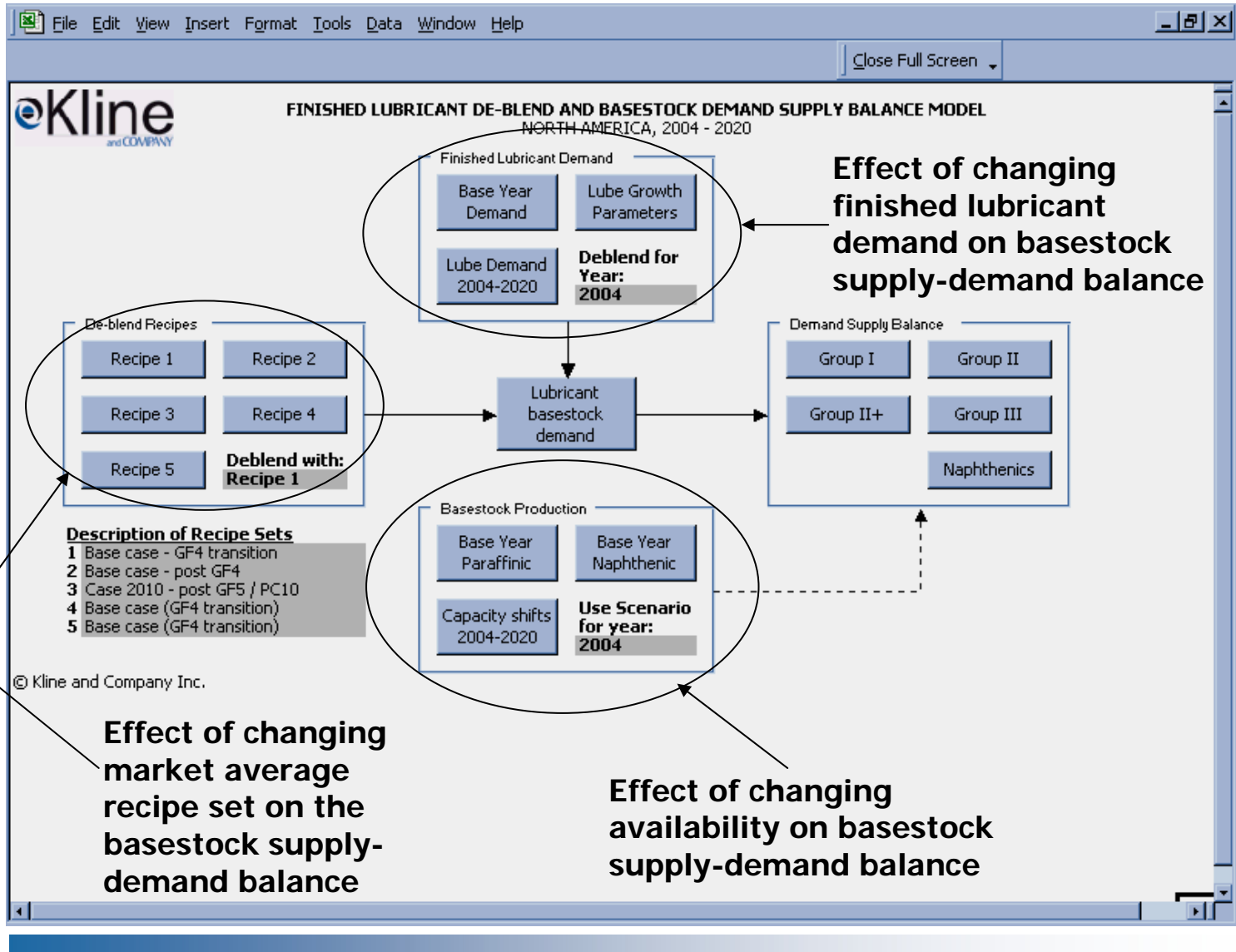


# How Does Kline Forecast Supply-Demand Analysis?

# Kline's thought process for future basestock supply demand balance is as follows...



# Kline De-blend Model embodies this thought process...



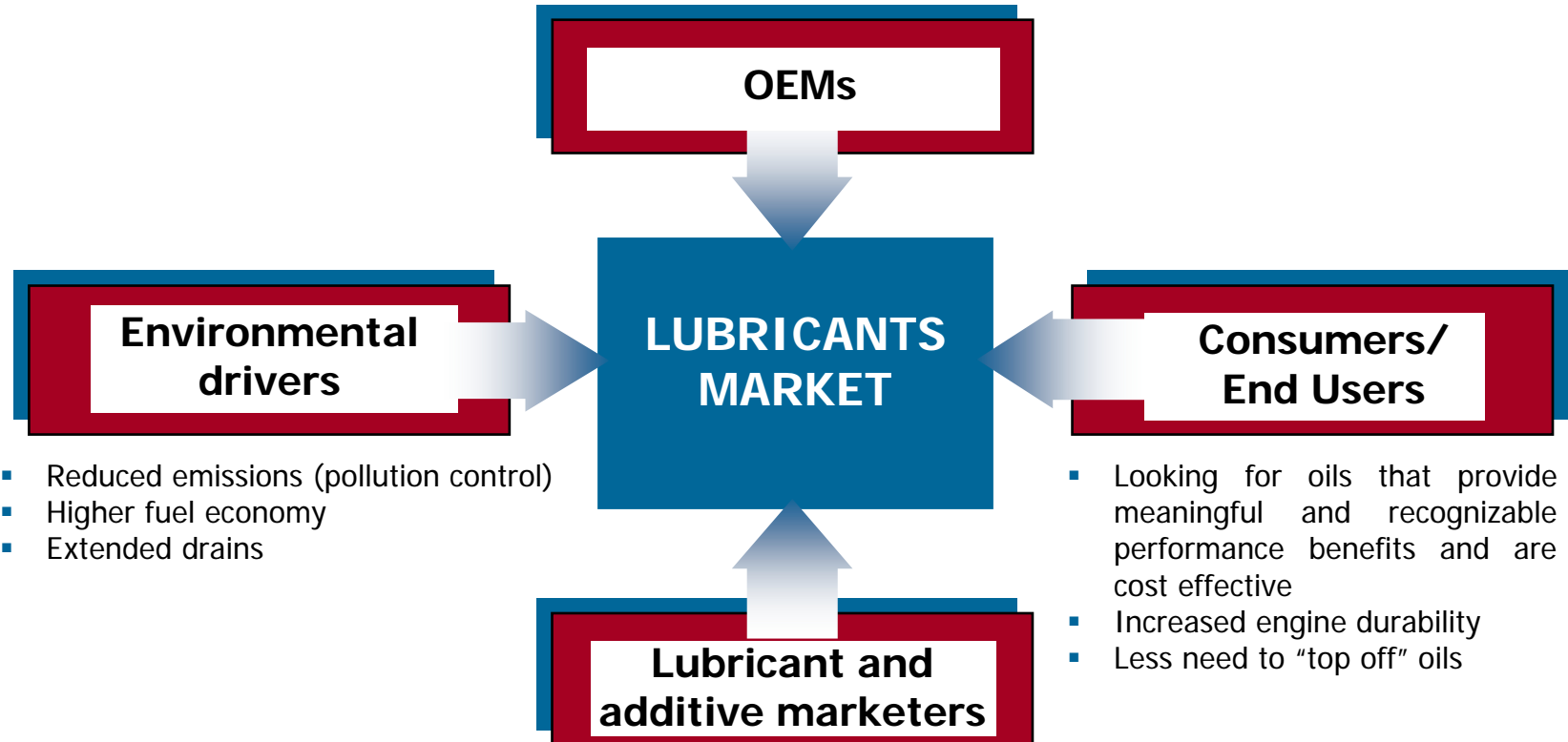


# **GLOBAL BASEOIL SUPPLY DEMAND BALANCE**

## **Importance of understanding “demand pull” and “supply push”**

# Primary drivers impacting the global lubricants market include . . .

- Increasing market share & profitability by devising higher performance, better styled, longer life, durable vehicles/equipment at lower costs while meeting enviro/governmental regulations



- Increasing competitive pressures & margin pressures
  - Lack of differentiation
- Availability of hydrocracked/XHVI/GTL basestocks

# Regulatory initiatives have had an impact on OEM decisions which in turn have had an impact on lubricant basestock and additive selection - "Demand Pull"...

## Regulatory/Environmental Initiatives

- Lower Tailpipe Emissions
- Better Fuel Economy
- Greater Usage of Low Sulfur Diesel

## OEM Reaction

- Hardware Re-design
- Catalytic Converter Durability
- Demand to Help Meet ESI
- Longer Life

## Lubricant Formulators Reaction

- Increased usage of Low SAP oils
- Increased Usage of Low Viscosity Oils
- Increased Usage of Higher Oxidation Stability and VI Oils

## Lubricant Basestock and Additive Fix

- Additive Fix: ZDDP/High Ashless AO
- Lower sulfur content = Increased usage of Group II over Group I oils
- For Low Viscosity Oils and improved Oxidation Stability = Increased Usage of Group II+ and higher oils



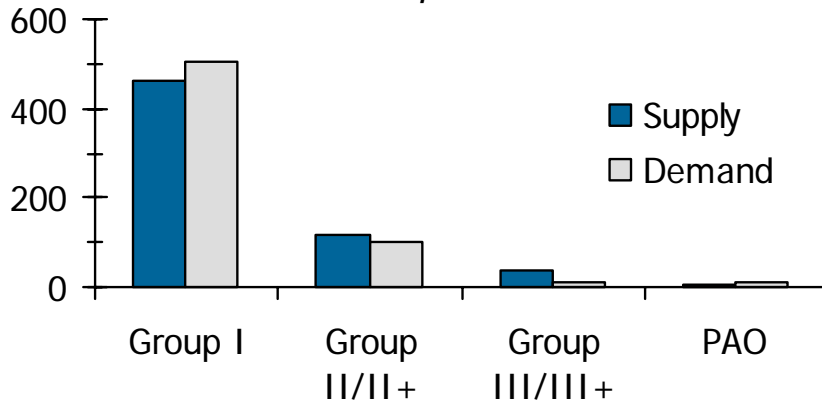
# However, supply “push” has also had a significant impact on the global market for lubricant basestocks ....and cannot be underestimated/under-accounted

## **SUPPLY “PUSH”:**

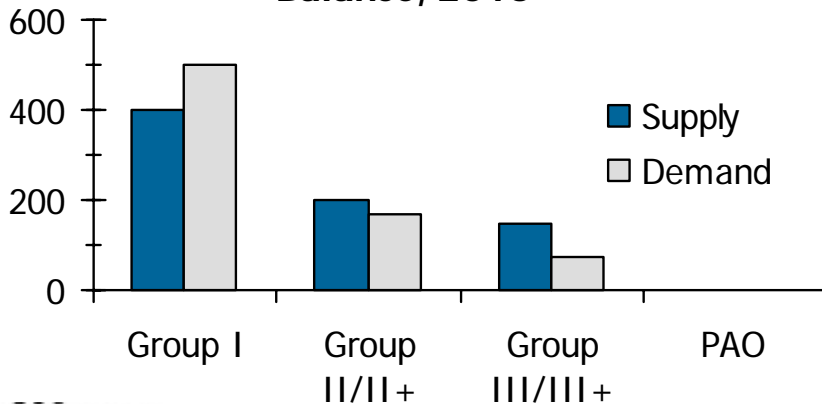
- Increasing availability of higher performance baseoils leading to a marketing push from lubricant refiners
- “Total formulation cost” calculations and the need to “differentiate” leading formulators to use these higher performance baseoils
  - Perhaps in applications where their usage is not dictated purely from a “technical” standpoint

# Global Lubricant Basestock Supply Demand Balance, 2004-2015

**Global Basestock Supply Demand Balance, 2004**



**Global Basestock Supply Demand Balance, 2015**



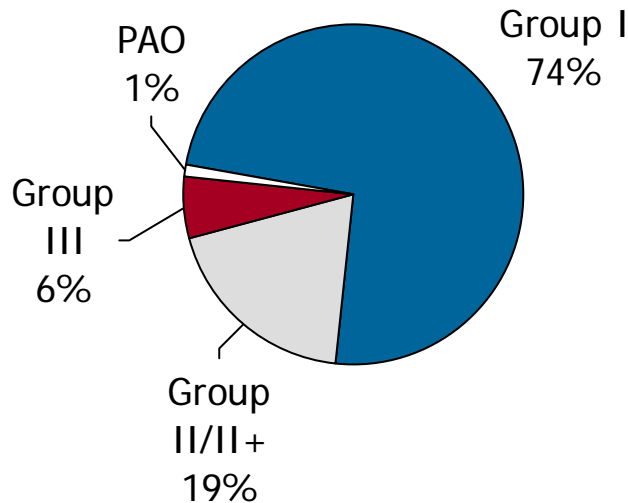
- Demand for paraffinic basestocks is forecast to reach **747** KBD in 2015 up from **626** KBD in 2004
  - Represents a compounded average growth rate (CAGR) of **3%**
- However, growth rates for individual grades vary widely
  - Group I demand is forecast to decline with a CAGR of **(2.4)%**
  - Lighter grades will decline faster as they will be more easily replaced by Group II and higher
- Demand for Group II/II+ is expected to grow by a CAGR of **9%**
  - Increased interest in high saturate baseoils
- Demand for Group III/III+ is expected to enjoy a dramatic CAGR of **27%** - albeit from a smaller base
  - Low viscosity, high VI PCMOs
  - New generation ATFs
  - Synthetic/Synthetic blends
  - Demand will also be spurred by easy availability of Group III+ (GTL) basestocks



# REGIONAL BASEOILS SUPPLY REVIEW

# GLOBAL BASESTOCK SUPPLY

**Global Basestock Supply by API Grade, 2004**

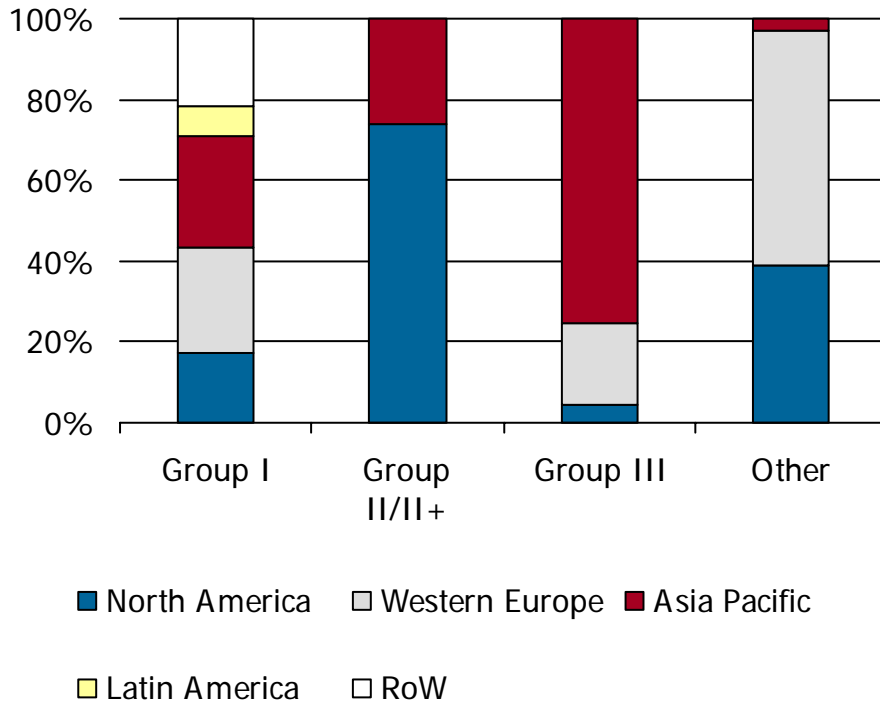


	Capacity Utilization (%)
Group I	85 – 90
Group II/II+	75 – 80
Group III	25 – 30
Other	35 – 40
<b>Total</b>	<b>70 – 75</b>

- Global basestock capacity for paraffinic basestocks was 855 KBD in **2004**
  - Basestock supply was about **624** KBD – an operating rate of 73%
  
- Group I accounts for **74%** of the total supply and is produced in all regions
  
- Group II/II+ accounts for about **19%** of the supply and is produced mainly in North America and in Asia-Pacific
  
- Group III accounts for **6%** of total supply and is produced mainly in Western Europe and Asia-Pacific

# GLOBAL BASESTOCK SUPPLY – REGIONAL SHARES

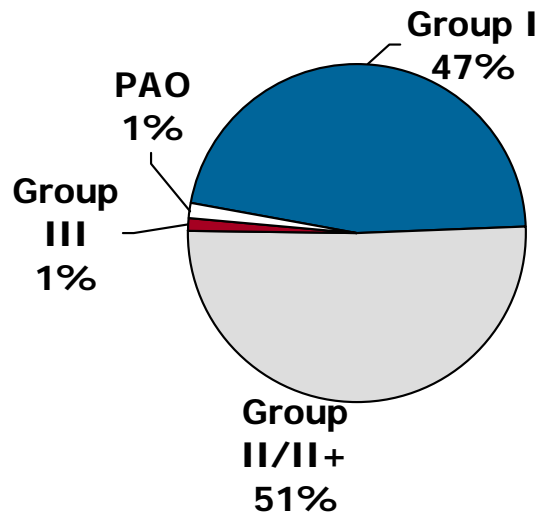
**Regional Share in Basestock Supply, 2004**



- Regional supply of basestocks is driven by:
  - Technology origin
  - Crude availability
  - Each region’s need for higher quality baseoils and finished lubricants
  
- ChevronTexaco’s hydrocracking and Isodewaxing™ technology breakthrough has led to significant Group II capacity in North America
  - As a result North America is the leading Group II supplier
  
- Western European producers have focused mainly on Groups I, III, and IV to date
  - Market conditions till now were not conducive for Group II but might be changing

# NORTH AMERICAN BASESTOCK SUPPLY

North American Basestock Supply  
by API Group, 2004



	Capacity Utilization (%)
Group I	85 – 90
Group II	80 – 85
Group III	5 – 10
Other	25 – 30
Total	75 - 80

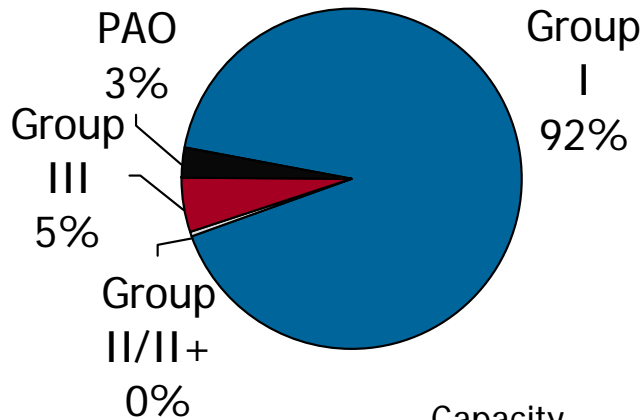
- North America supplied 27 % of the global supply
  - Fifteen companies produce paraffinic basestocks and operate 19 plant sites
  - All types of basestocks are produced except GTL basestocks
  
- Basestock supply in North America has gone through significant changes in the last 10 years
  - In 1997, Excel Paralubes added 17.5 KBD to a balanced market
  - Excel, along with a 6 KBD addition by Petro-Canada resulted in significant supply overhang
  - More recently in 2004, Motiva plant capacity increased by 2-3 KBD after a turnaround

# NORTH AMERICAN BASESTOCK SUPPLY

- Three tiers of suppliers have emerged in North America when you look at it from the availability of higher performance baseoils
  - Group II/II+/III capable companies like ChevronTexaco, Petro-Canada, Motiva, and ExxonMobil who entered the Group II+ market with its raffinate hydroconversion (RHC) technology – the “**haves alls**”
  - Flint Hill Resources has access to only Group II - the “**have some**”
    - This distinction is important as Kline forecasts a growth in Group II+/III demand and a plateauing Group II demand by the 2015 timeframe
  - The remainder suppliers which include such companies as Citgo, American Refining Group, and Marathon Ashland – the “**have nots**”
    - However, CITGO recently reported their interest in studying upgrading its Lake Charles facility to Group II/III
- The importance of Group II/II+/III to the first group should be seen in light of their finished lubricant brands
  - ChevronTexaco is the marketer of such leading HDMO and PCMO brands as DELO, HAVOLINE, and URSA
  - Similarly Shell is the marketer of ROTELLA, as well as the Pennzoil, QuakerState and Shell brands
  - ChevronTexaco and Shell must meet the Group II/II+/III demand for these brands arising from PC-10 (for HDMO) and GF-4 (for PCMO)

# WESTERN EUROPE BASESTOCK SUPPLY

Western Europe Basestock Supply by API Grade, 2004



	Capacity Utilization (%)
Group I	90 – 95
Group II	–
Group III	95 – 98
Other	80 – 85
<b>Total</b>	<b>90 – 95</b>

- Western Europe supplied 21% of global supply
  - Thirteen companies operating 23 sites supply paraffinic basestock in this region
  - ExxonMobil is the market leader supplying 45.7 KBD – Shell with 21.5 KBD is a distant second
  
- Refiners in Western Europe do not currently produce any Group II/II+ basestocks
  - The concept of Group II was born in USA where crude oil is not suitable for basestock production – put differently Group I produced in Western Europe is of a higher quality
  - Group II production will require more severe operations which will affect yield

## WESTERN EUROPE BASESTOCK SUPPLY

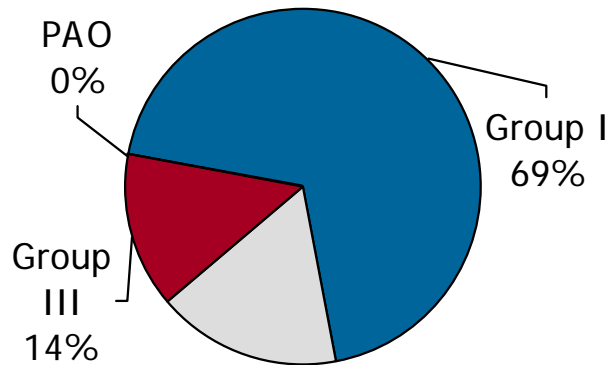
- However, there is now a discussion over Group II basestocks in Europe
  - Newer HDMO specifications have formulators thinking about a Group II and III blend approach as opposed to a Group I and III blend approach
- Western Europe has significant Group I surplus which finds its way to the export markets in Eastern Europe, Africa, Middle East and Asia
  - This is significant, because the main competition to Group I coming from Europe is Group II coming from North America

# EASTERN AND CENTRAL EUROPE BASESTOCK SUPPLY

- Eastern and Central Europe primarily produces Group I baseoils with Luk Oil in Russia producing some Group III baseoils
  - Significant capacity in Eastern Europe but capacity utilization rates very low
  - Could Eastern Europe refiners upgrade their investments and become an important supplier to the China market in the next 15 to 20 years?
    - Rafineria Gdansk and Glimar are considering the manufacture of Group II/III baseoils in Poland
- Finished lubricant specification in Eastern and Central Europe lags Western Europe, North America and Japan
  - Top-tier lubricants currently account for less than 1% of this market
  - Though certain exceptions like Poland exist – Poland is more similar to Germany
- However, OEMs are driving the move towards the usage of higher performance lubricants, albeit this shift is slow due to higher price of high performance lubricants
  - Kline estimates that approximately 500 to 600 B/D of higher performance baseoils will be needed in this region in the next 10-15 years
  - But a lot more will be “push” driven consumption

# ASIA PACIFIC BASESTOCK SUPPLY

Asia Pacific Basestock Supply by API Grade, 2004



	Capacity Utilization (%)
Group I	80 – 85
Group II	85 – 90
Group III	90 – 95
Other	15 – 20
<b>Total</b>	<b>80 – 85</b>

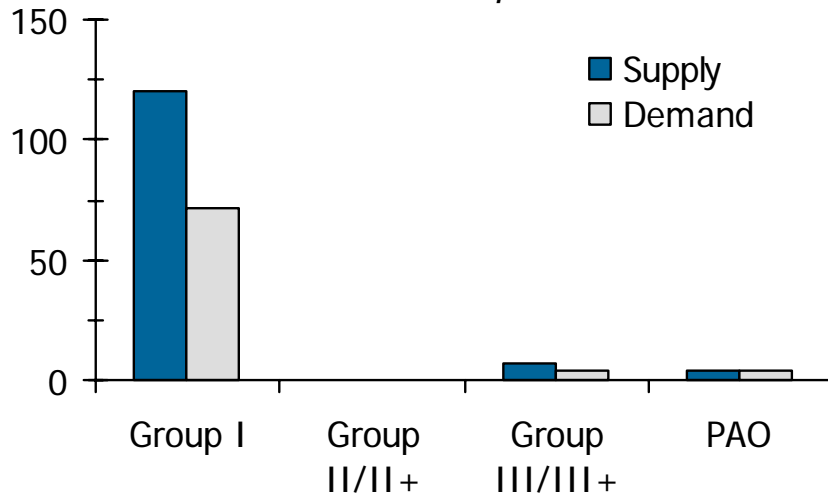
- Asia Pacific (including Japan) supplied 30% of the global supply
  - Twenty two companies in ten countries manufacture basestocks
  - China with 37.9 KBD, Japan with 36.5 KBD, and Singapore with 35.4 KBD account for nearly 40% of the supply
  
- Asia Pacific is the leading supplier of Group III baseoils
  - SK, S Oil, and others
  
- Shell produces GTL-based products at its plant in Bintulu, Malaysia
  - This plant can supply as much as 2.5 KBD of basestocks
  - Currently Shell does not produce any GTL basestocks – focusing on ultra clean fuels and specialty wax
  - A small amount of GTL waxy raffinate is shipped to Japan and France to produce XHVI basestocks



## **Kline's View on Changing Supply Demand Balance in Western Europe**

# Western Europe Basestock Supply Demand Balance, 2004

Western Europe Basestock Supply Demand Balance, 2004



- Most of the Group I surplus is exported to markets to Middle East, Africa, Eastern Europe and select markets in Asia Pacific like India
- There is a small consumption of Group II basestocks based on imports from North America and the Asia-Pacific region
- This region exports small quantities of Group III – mainly to North America
- Basestock demand in Western Europe in 2004 is 86 KBD and supply is about 140 KBD, giving a surplus of about 54 KBD
- Group I surplus accounts for about 90% of the total surplus

# Change Drivers Impacting Western Europe Basestock Supply and Demand

## Demand Side Drivers

- **Shrinking demand** – Overall basestock demand in Western Europe will shrink from 86 KBD in 2004 to about 76 KBD by 2015 – will have to lead to further supply rationalization
  - Declining population, vehicle parc, ESI, increased usage of synthetic/synthetic blends
- **Changing quality requirements** are forcing PCMO/HDMO formulations to increase share of Group III and decrease share of Group I
- Both factors will cause current high Group I surplus to increase further
- Group III supply will continue to tighten

## Supply Side Drivers

- **Entry of GTL Basestocks** – Based on announcements till date, about 80 KBD of GTL basestocks will hit the market some time in the 2010-2015 timeframe
  - About 30-35%% of this will be targeted to Western Europe
  - This supply, if it materializes, can completely meet the demand for XHVI / low volatility basestocks in the region
  - Global refiners will look to rationalize their internal supply in line with in-house requirements and expected merchant sales

# How will Western European Supply respond to these change drivers?

## Group I

- Group I suppliers face a “double whammy” of shrinking market and changing formulations which are driving away demand
- Significant rationalization in Group I supply will have to happen
  - The process is already underway

## Group III

- Group III supply will rationalize in face of GTL supply
  - Pure Group III suppliers (such as Fortum) will continue operation, but others will swing to all Group I production as yield losses associated with Group III will be uneconomical give GTL basestock availability

## Group II/II+

- Group II based formulations will start becoming more cost competitive as opposed to Group I/III approach
- One mid sized Group II plant may come up in the region
  - Large Group II domestic supply is unlikely given large surplus in N America and GTL

## Group III+ (GTL)

- About 30 - 35 KBD of GTL basestocks will be targeted for Western Europe
- Traditional PAO markets will be further eroded where technically substitution might be possible
- As Group III+ supply increases, other segments will be targeted – increasing competition with Group III – and perhaps even Group II and Group I??

# Group I supply will have to rationalize in face of growing surplus...

## Move Up

- Upgrade to/Invest in **Group II/II+**
  - Who will do it?
  - Why do it, given GTL basestocks are on the horizon?
- Process GTL waxy gas oil to **make Group III+?**
  - Possible for Group I plants?

## Do Nothing

- Possible option for some?
  - **Motor Oil Hellas, Q8, Petrogal, Others?**
    - If they have mid-sized plants with good quality product
    - Captive demand
    - Unique location
    - Brightstocks, waxes, and other markets tell a compelling economic story

## Move Down

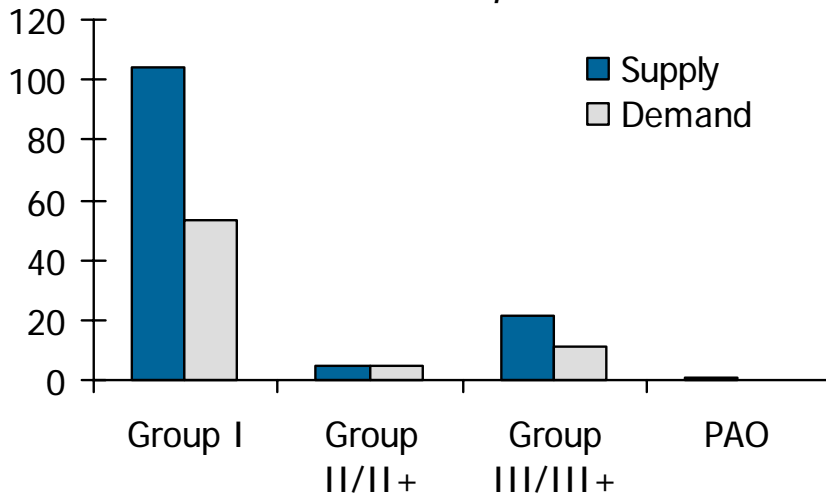
- **Export surplus Group I**
  - Where? A/P??
  - Group I will still compete (and perhaps lose to) Group II exports
  - Already been done – doubtful if exports can be ramped up significantly

## Close

- Speculation but...
  - Shell – Grassbrook, Stanlow??
  - BP – Croyton??
  - ExxonMobil/Total – Dunkirk??
  - Spain – Too many plants – might lead to closures??
  - Others??

# Western Europe Basestock Supply Demand Balance, 2015

Western Europe Basestock Supply Demand Balance, 2015



- Group I demand will fall by about 18 KBD between 2004 and 2015
  - Supply will reduce by a similar figure
  - The Group I surplus might increase by about 2-3 KBD, but this can be easily accommodated in increased exports to Asia Pacific – A/P markets are predicted to boom
- By 2015, some Group II demand will be created in this region
  - We project one mid sized Group II plant in the region which will accommodate this demand
- Group III/III+ demand will show a strong growth from 4.1 KBD in 2004 to more than 11 KBD in 2015
  - Easy availability of Group III+ will spur changes in formulation
  - PAO will be edged out of the market wherein possible
  - There will be significant surplus in Group III/III+ which will be exported



# CONCLUSION

## IN CONCLUSION...

- Basestock supply is showing a continuous shift from Group I to Group II/II+/III driven by PCMO and HDMO quality upgrades
  - However, Group I basestocks will remain the workhorse category accounting for 64% of the supply in 2015
- The biggest unknown in the global basestock industry is the entry of GTL basestocks
  - How much GTL basestock will enter the market? When?
  - What will be the effect on on existing supply? Who will get edged out?
- Only time will tell...But the most danger exists to high cost refineries run by majors as they are expected to take a more rational approach in managing their global assets...

We thank you for your attention...  
QUESTIONS????

