

# Strategies for Producing Cleaner Gasolines; Refining Challenges

GCC Clean Fuels and Vehicle Policy

Meeting

Bahrain 13th March 2008

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Neste Oil

**NESTE OIL**

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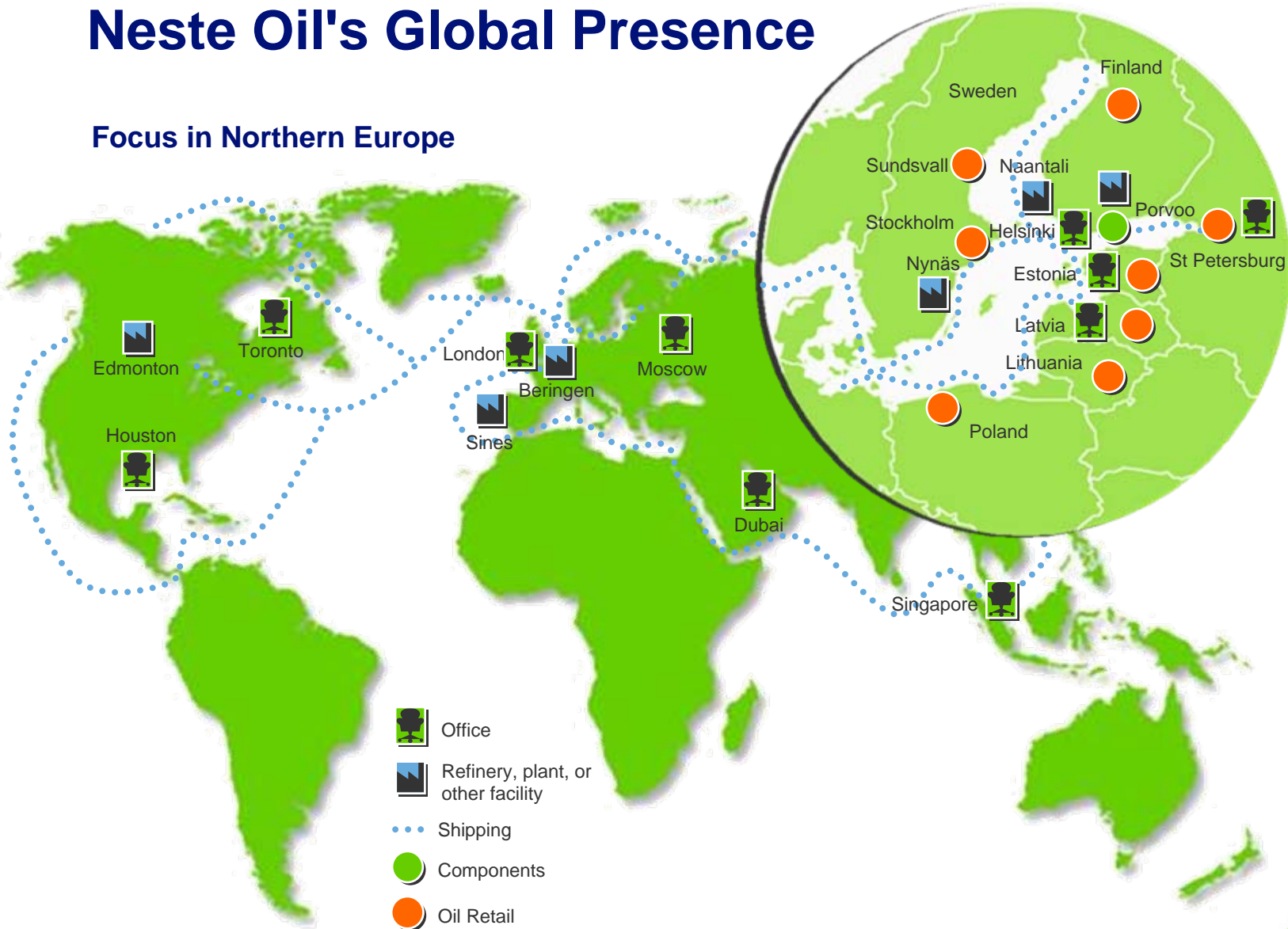
## Neste Oil

- Northern Europe's leading refiner of low-emission traffic fuels and lubricants
- Committed to develop, produce and market environmentally compatible petroleum products
- Company's growth strategy is based on oil refining and renewable diesel. Growth driven by cutting-edge components for traffic fuels and lubricants
- Two state-of-the-art refineries in Finland with an annual crude production of 14 million tons



# Neste Oil's Global Presence

## Focus in Northern Europe

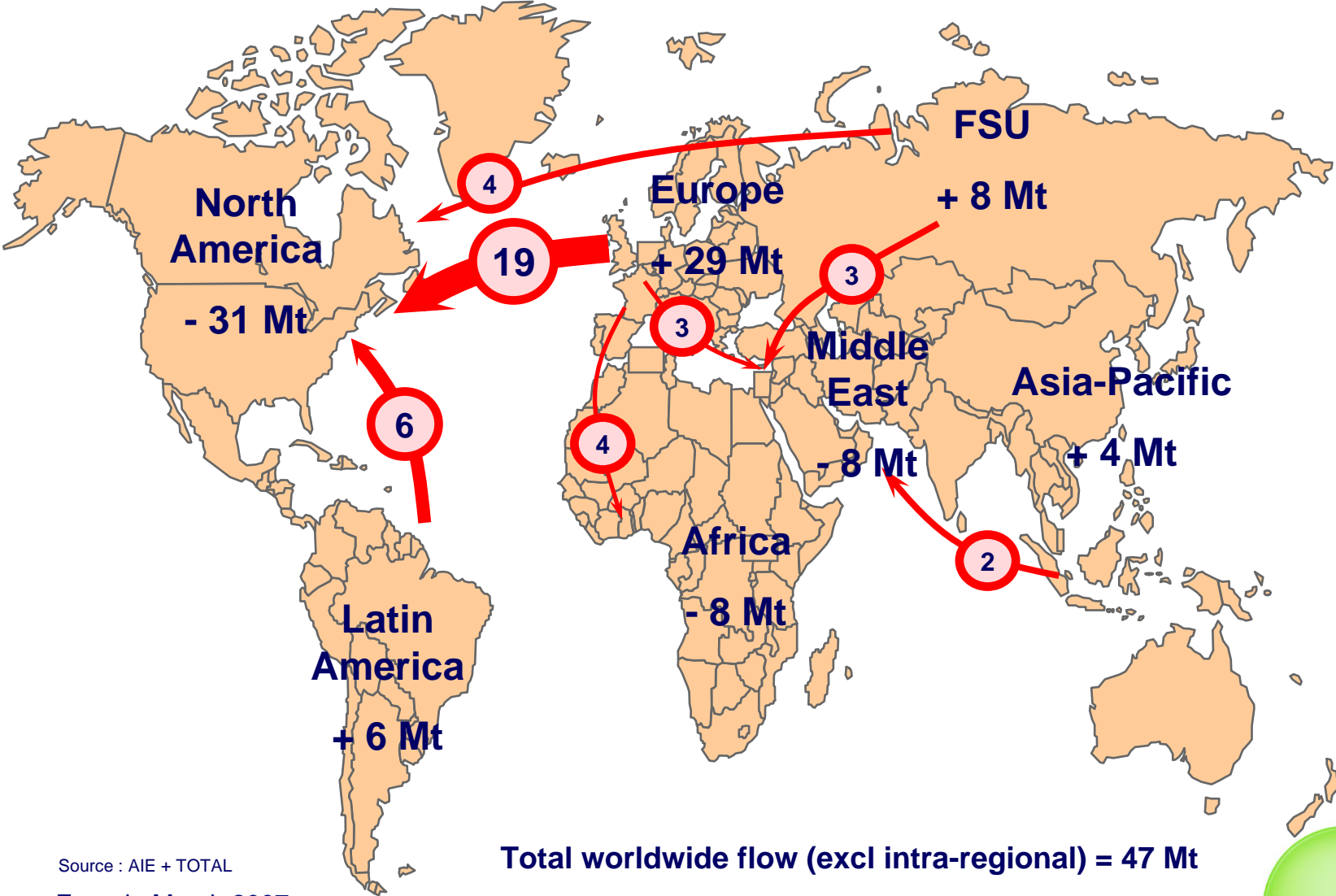


## Traffic Fuel Market Trends in EU 27

- Gasoline consumption declining
  - 1995 140 Mt/a
  - 2010 100 Mt/a
- Europe remains gasoline exporter, mainly to US
- Diesel car penetration expected to reach 50 % by 2015 in EU
- Demand for diesel increases
  - 1995 115 Mt/a
  - 2010 200 Mt/a



# Large Gasoline Surplus in Europe



Source : AIE + TOTAL  
Europa March 2007



# Political Trends: European Union

Policies	Implications
<ul style="list-style-type: none"><li>• <b>Strong commitment to Kyoto Protocol targets</b></li><li>• <b>Global lead in carbon dioxide reduction after initial Kyoto commitments</b></li> <li>• <b>Agricultural policy</b></li> <li>• <b>Energy security</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Proposed mandatory CO<sub>2</sub> target 130 g/km on average for new cars by 2012</b></li><li>• <b>Additional measures including more biofuels use to cut CO<sub>2</sub> emissions to 120 g/km by 2012</b></li><li>• <b>But customers prefer larger cars</b></li> <li>• <b>Support development and job creation in rural areas</b></li> <li>• <b>Increase domestic production and diversify supply sources</b></li><li>• <b>Conflict of interest with raw material imports</b></li></ul>



# Gasoline Specifications; Europe

Gasoline				
	EN 228: 1993 <i>Euro II</i>	Dir 98/70 2000 <i>Euro III</i>	Dir. 98/70 2005 <i>Euro IV</i>	Dir. 98/70 2009 (EP/Council)
Aromatics, vol%, max	-	42	35	(Review) *
Olefins , vol%, max	-	21/18	18	(Review) *
Benzene, vol%, max	5.0	1.0	1.0	(Review) *
Oxygen, wt%, max	-	2.7	2.7	(Review) *
Sulfur, ppm, max	500	150	50(10) **	10
RVP, kPa	35 - 100	45.0 /70.0	45.0/70.0	(Review) *
Lead, g/l max	0.013	None	None	none

- already currently a number of countries are at 10 ppm S
- main change would be
  - tightening of aromatics/benzene limit
  - increased biofuel (EtOH, ETBE) consumption



# Implications to Gasoline Pool; Lead

- Lead is a health hazard & catalyst poison in cat converters
- Octane compensation
  - Reformate addition
  - Use of ethers
    - MTBE / ETBE
    - TAME
  - Other high octane components
    - Alkylate
    - Isomerate
  - Very little MMT in to European gasoline pool



# Implications to Gasoline Pool; Aromatics, Benzene

- Benzene & Aromatics
  - Toxic / carcinogenic components
  - Increase emissions
- Reduces the amount of reformat in gasoline blending
- Octane replacement has to be done with other components (ethers, alkylate) as well



# Implications to Gasoline Pool; Olefines, Oxygen

- **Olefines**
- Reactive components. Light olefins contribute to ground level ozone formation
- Reduces the amount of FCC gasoline as well as light olefines to be blended in gasoline. FCC olefines could be fed to etherification / alkylation
- **Oxygen**
- Allowed the usage of ethers
  - Ethers have contributed to:
    - emission reduction (over-night effect)
    - aromatics and olefines reduction (high octane, dilution effect)



# Implications to Gasoline Pool; Sulphur

- **Sulphur**
- Increased emissions
- Lowers the efficiency of catalytic converters
- Reduction of sulphur requires refinery investments / disposal of sulphur
- Could limit (high sulphur) naphtha blending
- Final blend difficult to correct at 10 ppm level

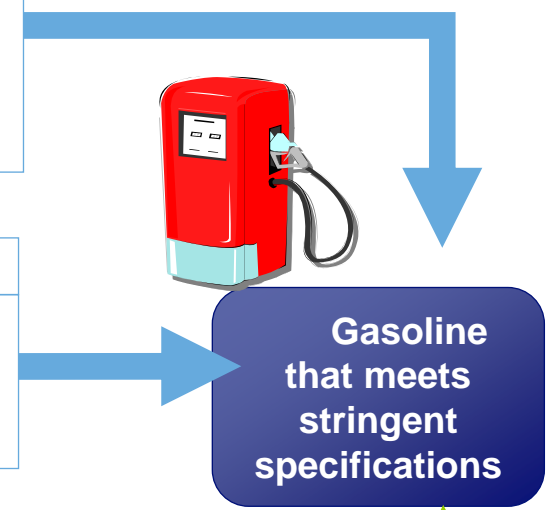


# High-quality Components Allow Use of Low Value Blend-stocks

	Examples	Key concern
<b>Gasoline blend-stocks from main refinery units</b>	<ul style="list-style-type: none"> <li>Gasoline stocks from crude distiller and upgrading units</li> <li>LPG</li> </ul>	<ul style="list-style-type: none"> <li>Lower than desired octane</li> <li>High aromatic, olefin, sulphur</li> </ul>

	Examples	Key concern
<b>Bio-components blended per regulation</b>	Bio-ethanol	<ul style="list-style-type: none"> <li>Increases vapour pressure</li> </ul>

	Examples	Solution
<b>Specialty gasoline components</b>	MTBE (other ethers), Iso-octane, Alkylate, Isomerate	<ul style="list-style-type: none"> <li>Increases octane</li> <li>Reduces vapour pressure</li> </ul>



# Strategy for Cleaner Fuels

- Technical capability to supply gasoline to all major market areas
  - Capability to fulfil different specifications & geographical areas => several blending models available
  - Active trading arm to seek for the best paying market => CLEANER GASOLINE
- Gasoline production is based on own complex production units, additional feedstocks / blending components (ethers, alkylate, iso-octane) from the market, if feasible, to achieve high flexibility for quality and quantity



# Strategy for Cleaner Fuels

- Requirements for refinery configuration to produce clean fuels
  - Modern reformation / FCC units
  - Efficient sulphur reduction
  - Conversion of light olefines to valuable gasoline components
    - Ethers (MTBE, ETBE, TAME)
    - Alkylate
    - Iso-octane
  - Naphtha isomerisation

LOW SULPHUR BASE GASOLINE

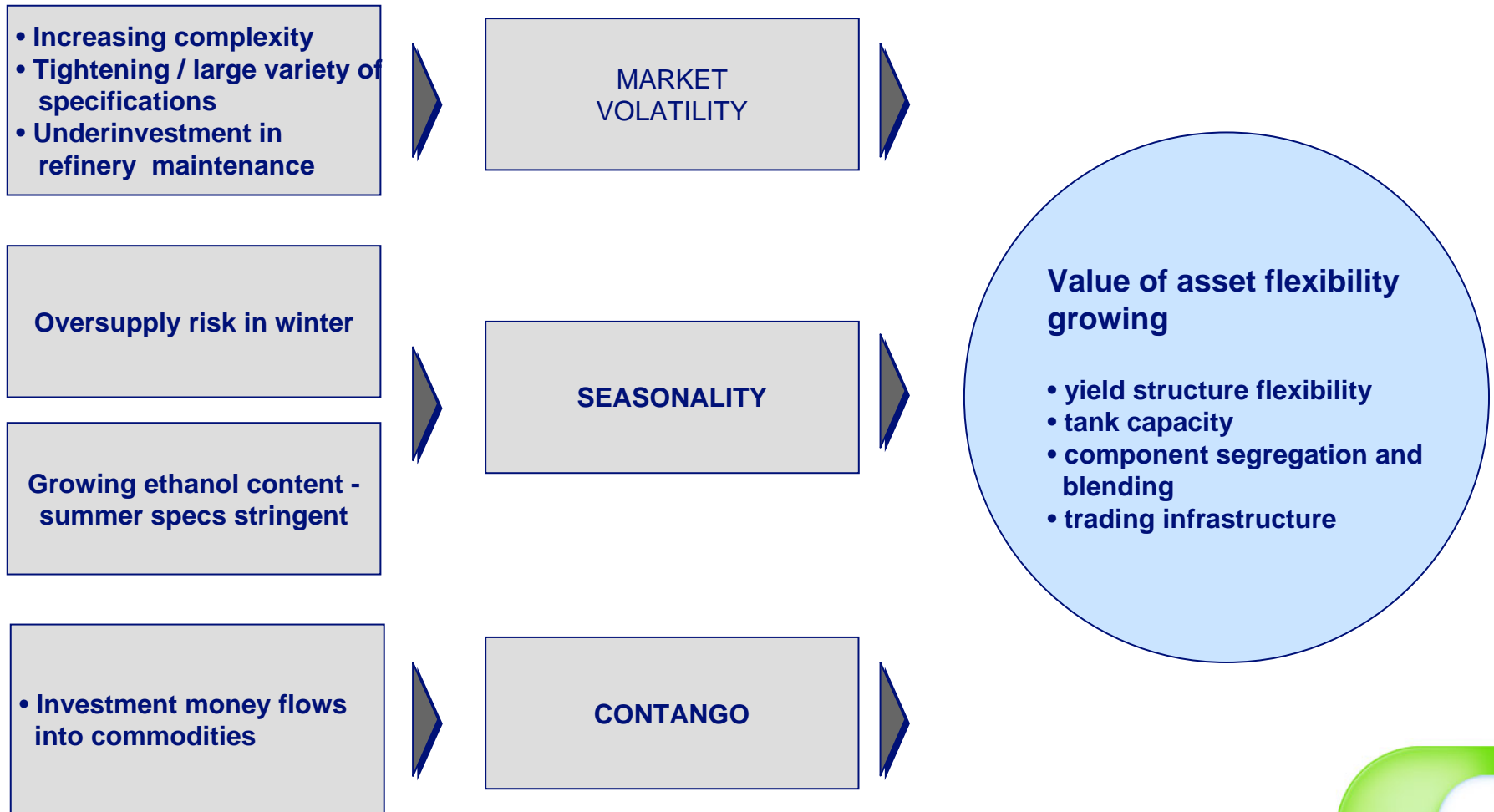
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GOOD BLENDING COMPONENTS

=> CLEAN GASOLINE



## In spite of calculated gasoline surplus, increasing seasonality and market niches create opportunities for flexible market participants



# EU Biofuels Directives; Gasoline

EU Fuels Directive (98/70) / Biofuels Directive (2003/30)

- **Directive (98/70)** currently under review
  - Two grades: no and low biofuel
- **Directive (2003/30)**
- Widely divergent targets and approaches
  - Reduce CO<sub>2</sub> emissions
  - Increase security of supply
  - Support rural economy



# Conclusions

- Specification changes should be made step-by-step
- Reasonable administrative guidance gives best results
- Solutions must be based on reliable technology / fair economy
- Suitable blending components are available
- New specifications should be seen as a business opportunity

