



Gas Strategies Presentation to the Korea Energy Institute

Security of Supply in World Energy Markets

David Ledesma, Managing Director, Gas Strategies
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UK – September 2000

Protestors Block Refineries



UK – September 2000

Empty tanks



UK – September 2000 Drivers Queuing for Petrol



Overview



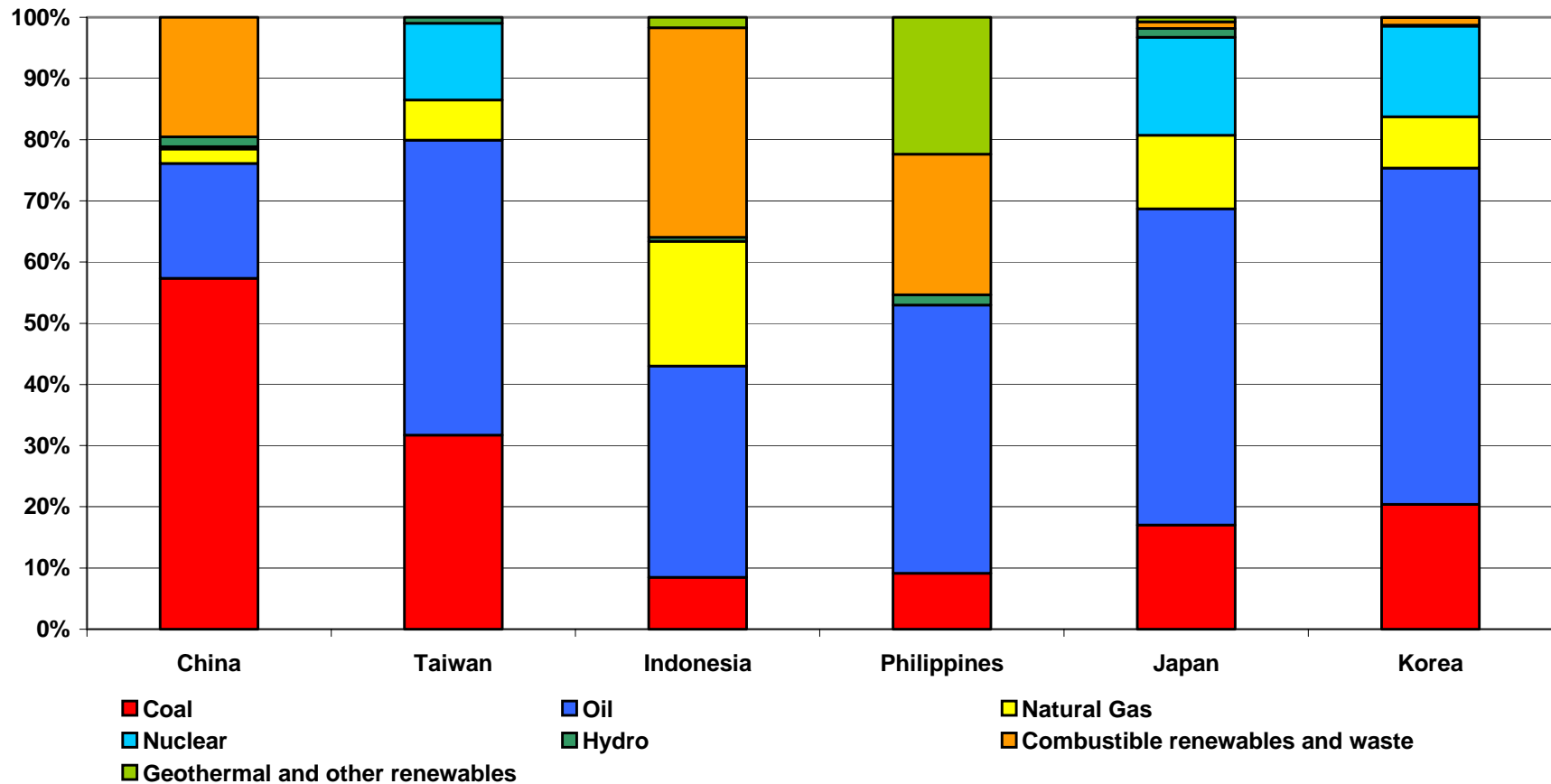
- **Internal and external infrastructure integrity**
- **Supply security is not just a matter of storage**
- **External supply diversity through different supply sources and methods gives security**
- **Security of Supply is a political and economic issue and comes at a cost**
- **Diversity of security is a key internal element**

Energy import Dependency



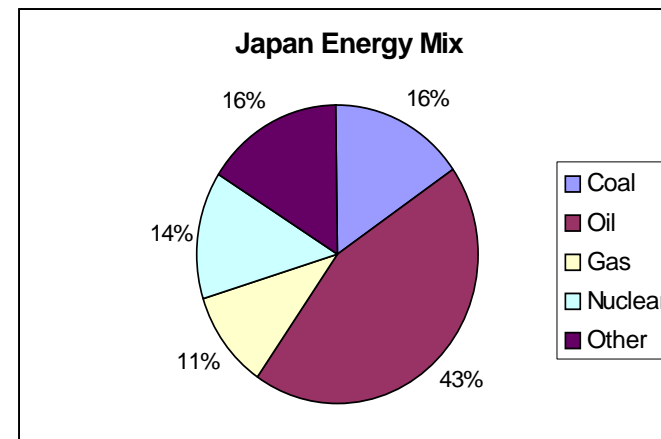
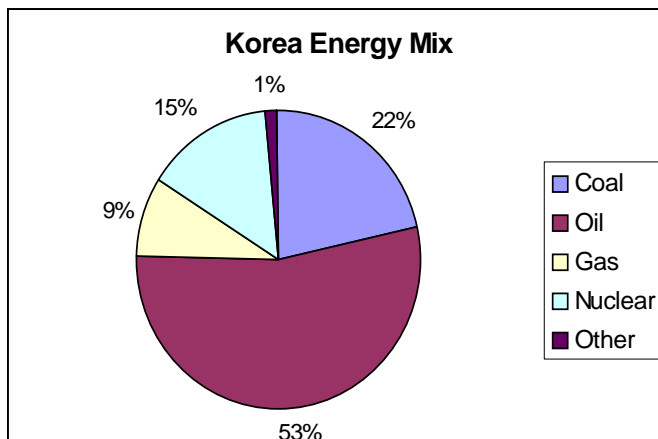
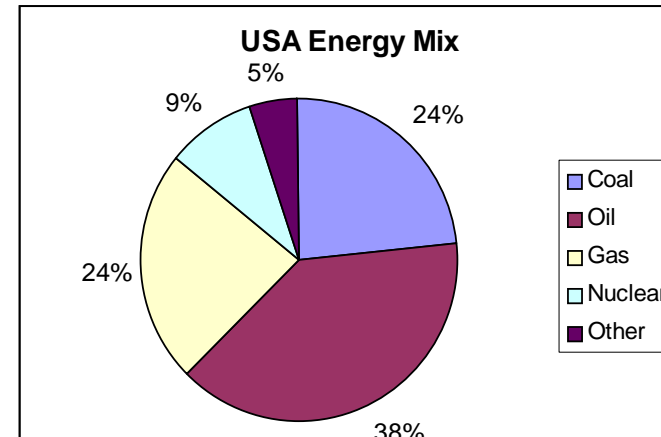
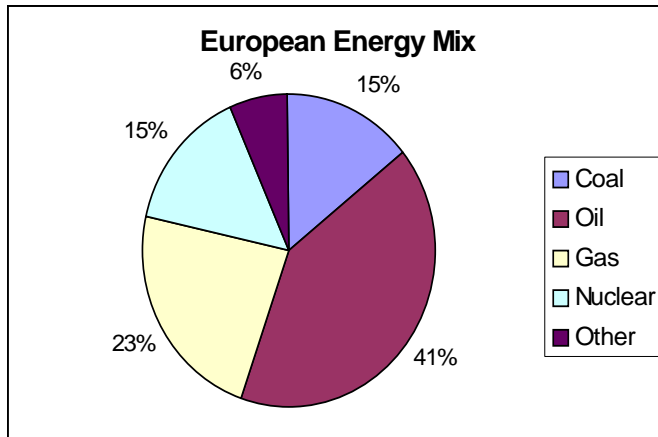
	<u>1970s</u>	<u>2000</u>	<u>2020</u>
Korea	47%	97%	>97%?
EU	65%	50%	70%?
USA	10%	35%	>35%?

Energy Supply in Asia 2000



Source: IEA

Energy Diversity : Security



Source: IEA

Energy Mix



- **Oil & Coal**
 - Liquid market, Mix of contracts, Storage cheap
- **Electricity**
 - Secondary energy source, internal infrastructure, external supply of feedstock, storage not possible
- **Gas**
 - Capital intensive delivery chain, limited traded market, limited storage

Elements of Security of Supply



External

- Supply source diversity
- Supply method
- Supplier Security
- Contract Flexibility
- Fuel type
- Reliable delivery mechanism

Internal

- Infrastructure integrity
- Fuel diversity
- Storage
- Contract flexibility
- Market competition

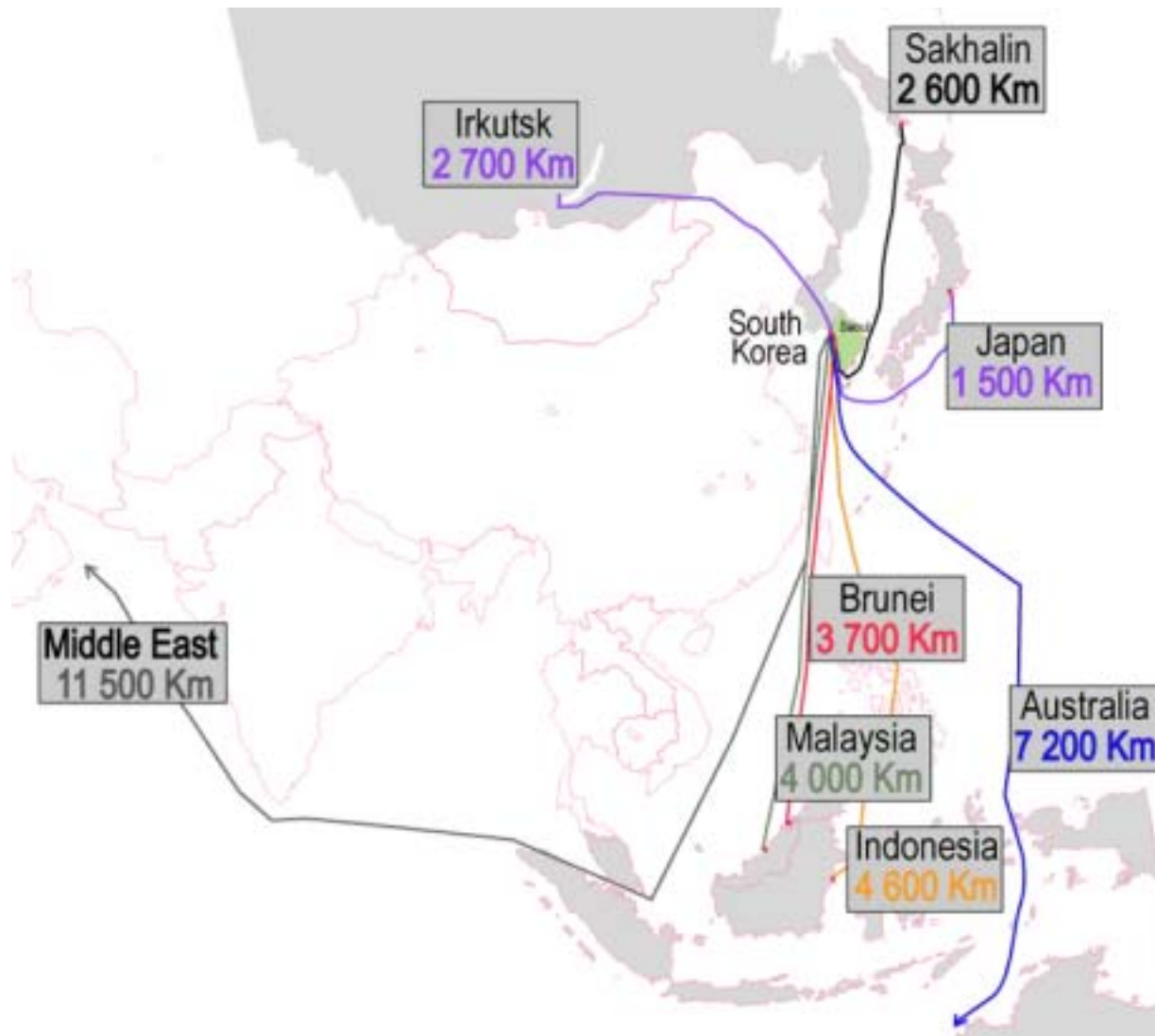


Diversity of Supply gives supply security

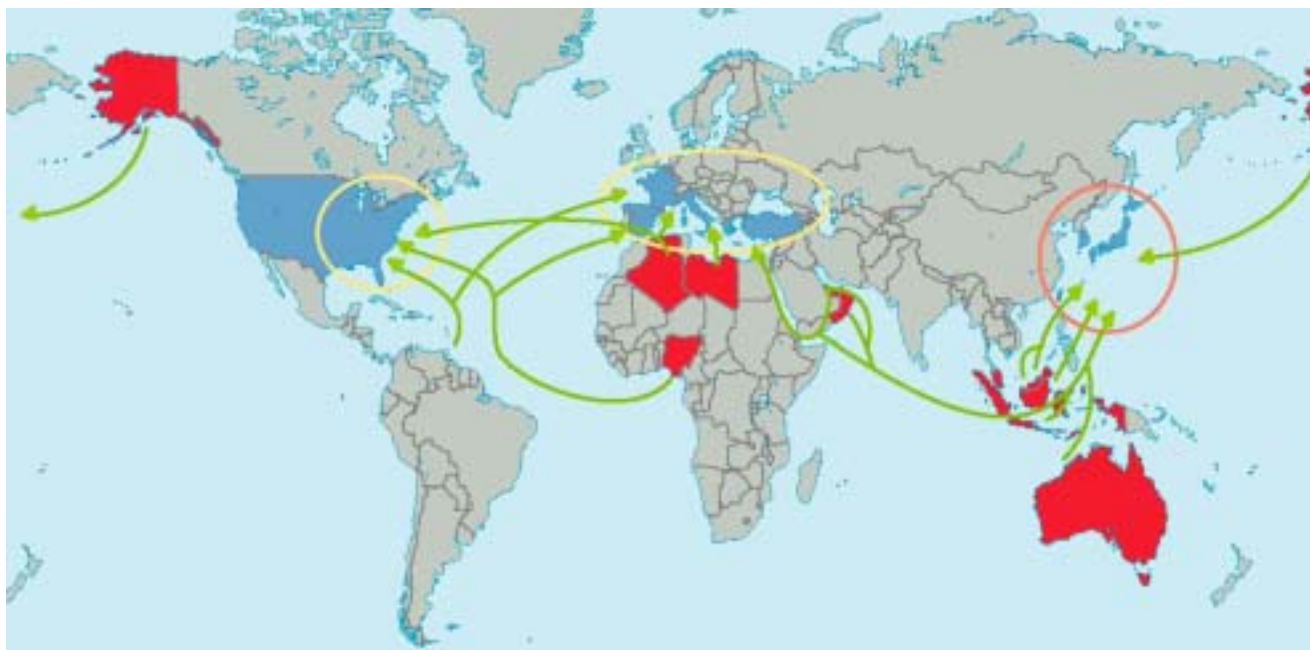


- **Diverse suppliers**
 - **Buyers should encourage the development of projects so as to provide choice**
 - **Different regions/countries**
 - **Shorter-haul suppliers**

Gas Sources for Korea



Supply Infrastructure Open Trading Routes



- **International trade routes need to be open**
 - Trade routes
 - Transit countries

Source: Gas Strategies

Supply Infrastructure

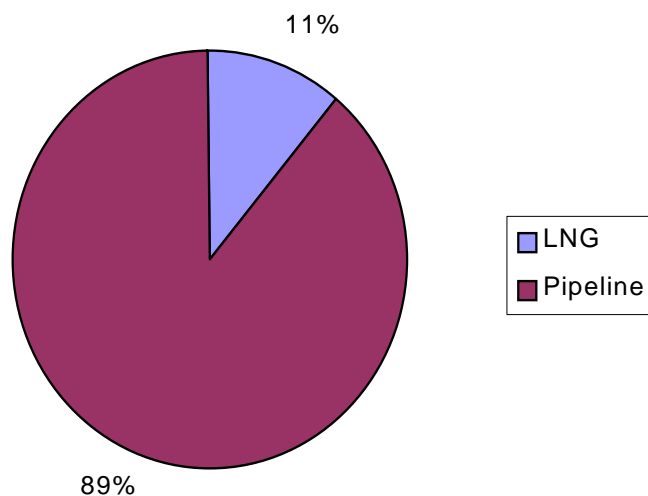


- **Relatively more important in networked energies**
- **Continual investment and maintenance**
 - **LNG & Pipeline gas**
 - **Infrastructure provider needs commitment from transporters**
 - **LNG FOB or ex-ship?**

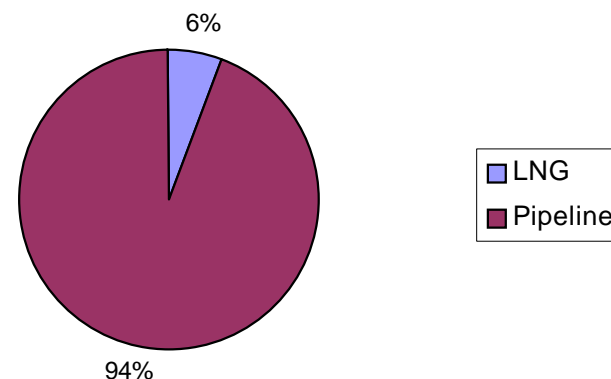
Diversity of supply method

- Not just geographical diversity
- LNG and piped gas
- Crude Oil, Oil products and Coal

EU Gas Imports LNG V Pipeline



USA Gas Imports LNG V Pipeline



Source: IEA

Diversity of Supply – Pipelines and LNG



Source: Neftegzovaya Vertical magazine

Supplier Security gives Supply security



- **Security of offtake is as important as security of supply**
 - **Premise behind long-term take or pay agreements**
- **Seller invests huge sums to provide supply security**
 - **Need for long-term contracts suited to market maturity**

Contract Flexibility gives Security



- **Trend is towards flexible gas purchase agreements**
 - **Volume terms**
 - **Destination choice**
- **Flexible long-term agreements meet buyers short-term requirements and give security**
 - **Short-term volume balancing**
 - **Long-term security**

Security of Supply comes at a Cost



- **Different countries who are net importers of gas prioritise the issue differently**
- **Need to develop policies within acceptable cost boundaries**
 - **Positive investment climate**
 - **Revenue generating transit countries**
- **Dangerous to focus on methods a country cannot afford**

Internal Security of Supply Issues



- **Infrastructure integrity**
- **Fuel diversity**
- **Storage**
- **Contract flexibility**
- **Market competition**
- **Economic incentives**



Infrastructure and Network Integrity – 1



- **Security of Supply dependent on supply chain from border/production to consumer**
 - **Power & gas problems often network related**
 - **Importance of investment in domestic infrastructure**
 - **Importance of economic climate**



Infrastructure and Network Integrity – 2



- **Domestic infrastructure flexibility**
 - **Enable the country to withstand external failure**
 - **Fast efficient movement of remaining resources on robust networks**

Domestic Contract Flexibility and Fuel Diversity



- **Contractual flexibility gives additional security**
 - **Interruptible customers**
 - **Energy product switching**

Domestic Market Competition



- **Market competition and free trade draws new players into the supply market**
 - **Greater supply diversity**
 - **In crisis exchange for supplies**
 - **Signals for correct investment**
 - **Clarify regulators role and responsibility**

Storage



- **Storage varies by country**
 - Operational need
 - Strategic supply concerns
 - Geological possibilities
- **Provide supply security**
 - Strategic stocks - function of supply sources
 - Oil/Coal easier than Gas/Electricity
 - LNG storage is expensive

Source: Kawasaki Heavy Industries Ltd

Conclusions - 1



- **External supply diversity provides supply security.**
 - For Korea, this could mean securing LNG from more sources and diversifying later to Russian pipeline gas.
- **Long-term contracts afford Security of Supply and contract flexibility gives the short-term freedom that the buyer seeks**
- **Do not preclude portfolio of contracts**

Conclusions - 2



- **Internal Security of Supply is key**
 - good internal infrastructure
 - storage
 - domestic contract flexibility
 - market competition / free trade
- **Reliable delivery of gas into the country requires investment – sellers will require commitment**
- **Favourable investment policy**

Sustainable Cost



Security of Supply comes at a cost.

The aim should be to gain “adequate supply of energy at a sustainable cost”



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consult@gas-strategies.com