

Global Challenges at the Intersection of Trade, Energy and the Environment

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Natural Gas - The Problem Child of Energy Transport and Trade ¹

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NATURAL GAS - THE PROBLEM CHILD OF ENERGY TRANSPORT AND TRADE

a Presentation to
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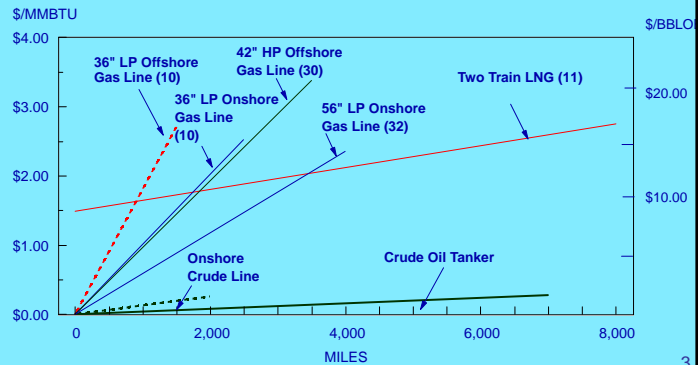
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THE LOW DENSITY OF NATURAL GAS MAKES IT MORE DIFFICULT TO CONTAIN AND TO TRANSPORT THAN OIL

- While it is Almost Always Cheaper to Transport Oil in Tankers Than by Pipeline, Gas Transportation Economics are Much More Complex
- Long Distance Gas Pipelining is Very Costly and Sensitive to Economies of Scale
- But Over Longer Distances Where Marine Movements are Feasible, LNG Tanker Transport is More Economic
- And While LNG Tanker Movements Are Becoming Increasingly Destination-Flexible, the Inflexibility of Pipeline Links Between Gas Sources and Markets Often Create Third Country Transit Problems

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Figure 1
 ILLUSTRATIVE COSTS (2002 PERSPECTIVE) OF
 GAS AND OIL TRANSPORTATION
 SHOWING GAS'S HIGHER COSTS AND THE EFFECT OF SCALE
 (Gas Delivery Capability in BCM)



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PIPELINE TRANSIT ISSUES OFTEN INHIBIT THE DEVELOPMENT OF COST-EFFECTIVE GAS TRANSPORTATION SYSTEMS

- This Is a Growing Problem As Consuming Markets Increasingly Seek More Distant Supply and Some Links Do Not Lend Themselves to Marine Transportation
- Perhaps the Most Obvious Problem is Central European Access to Middle East and Central Asian Supplies
- One of the Early Examples of Attempted European Pipeline Access to Middle East Gas Occurred in 1970
- At the Time, Russia was Considering Supplementing Declining Supplies in the Caucasus with Gas from West Siberia

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Instead it Negotiated a Deal with Iran for Deliveries of Iranian Oil Well Gas to the Caucasus via the Iranian Gas Transport System (IGAT1), Enabling Russia to Divert West Siberian Supply to Europe

The Fact That It Was Effectively a Delivery of Iranian Gas to Europe via Exchange Was Not Lost on European Customers

In 1975, Germany, France and Austria Signed Contracts Directly with Iran For Deliveries by Displacement Through the Soviet Union Via a New IGAT 2 System

In the Fall of 1978, Iranian Oilfield Workers Went on Strike Signalling the Start of the Revolution

Gas Production Plummeted and the Caucasus, Unable to Offset the Losses, Had a Very Difficult Winter, Thereby Effectively Killing the Concept of Middle East Supply to Europe via Displacement

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THE PRIMARY PIPELINE PROBLEMS INVOLVE TRANSIT COUNTRY ISSUES

- Transit Countries Usually Have a Monopoly on the Least Costly Pipeline Route
- They May Also be Less Concerned About Supply Than the Destination Country
- They Thus Have a Strong Bargaining Position in Negotiations Over Transit Rights

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THE PRINCIPAL TRANSIT PROBLEM ISSUES

- Geopolitical Issues with Intervening Countries
- Transit Fees
- Transit Pipeline Tariffs
- Offtake Problems

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GEOPOLITICAL ISSUES WITH INTERVENING COUNTRIES

- Often Neighboring Countries Have Political Issues with One Another
- These Have Sometimes Caused Problems or in Some Cases Thwarted Proposed Pipelines
- Problem Examples
 - Iran/Pakistan/India
 - Russia/Ukraine/Europe 1990s, 2006, 2009
 - Bolivia/Chile/LNG (A Proposed LNG Export Plant on the Chilean Coast)
 - Eastern Russia/Mongolia/China

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TRANSIT FEES FOR GOVERNMENTS - CAN BE VERY DIFFICULT TO NEGOTIATE

- Payment for Transit Rights - Can be in Cash or in Kind
- If in Kind and at Buyer's Option, They May Complicate Supply Planning
- Are Often Fixed But Sellers May Want Tie to Gas Prices
- But There Are Often Significant Differences in Levels
- Examples:
 - Our "Default" Assumption - \$0.02/MMBtu/100Km
 - 2008 - India Bid - \$0.013, Pakistan Offer - \$0.051
 - 2009 - Russia (Ukraine) Charge - \$0.043, 2010 - Russia Proposed - \$0.073/\$0.076

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TRANSIT TARIFFS FOR PIPELINES

- Tariffs are Fees Paid to the Pipeline for Transportation
- They are Commonly Set on a "Cost-of-Service" Basis - Permitting Recovery of Costs Plus a Reasonable Return
- Different Styles - Postage Stamp, Distance Related, Zonal, Point to Point or Entry/Exit
- Costs Vary by Size of Line and by Date of Construction
- Since They All Aggregate Costs Distributing Them Among Customers, the Potential for Discrimination is Large
- A Goal of the Energy Charter Treaty (ECT) is to Prevent Discrimination Favoring Local Markets Over Transit

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- Because of the Complexity of Tariff Design and the Potential for Discrimination, it is a Difficult Task
- In a Recent Study, The ECT Secretariat Found Many Examples of Transit Tariffs That Were Higher Than Domestic Tariffs
- Some of the Examples Included:

Austria	Poland
Belgium	Slovakia
Germany	Russia

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TRANSIT COUNTRY OFFTAKE ISSUES

- Possible Preemption of Flows (Russia/Ukraine)
- Russia Has Pricing Issues with the Ukraine, It Has Attempted to Resolve the Issue by Cutoffs; Ukraine Has Preempted Volumes Destined for Others - There Were Severe Problems in Europe, Especially in Romania and Bulgaria, Last Winter
- "First in Line" Supply Claim (Turkey/Nabucco Pipeline)
- Turkey Wants Gas for Growth, But Nabucco Has Problems Assembling Enough Supply to Make Pipeline Economic

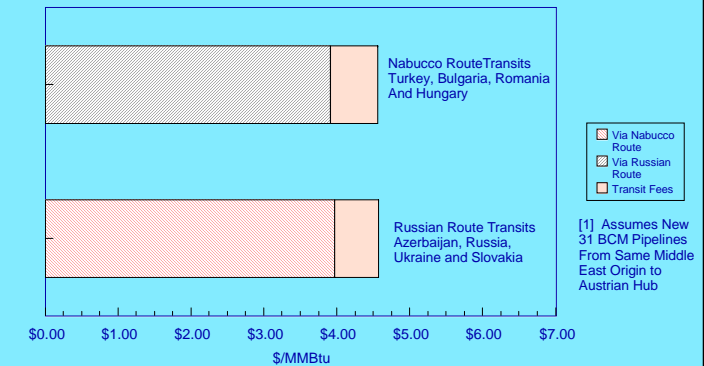
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THE POSSIBILITY OF EUROPEAN PIPELINE ACCESS TO THE MIDDLE EAST REMAINS ELUSIVE

- But It Still Involves Transit of Many Countries, Some of Which Pose Significant Geopolitical Problems
- And the Costs Are High, Emphasizing the Value of Cost-Effective Pipeline Routing

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Figure 2
COMPARISON OF THE COST OF MOVING MIDDLE EAST GAS TO EUROPE VIA TWO HYPOTHETICAL [1] PROJECTS USING EITHER NABUCCO OR RUSSIAN ROUTES



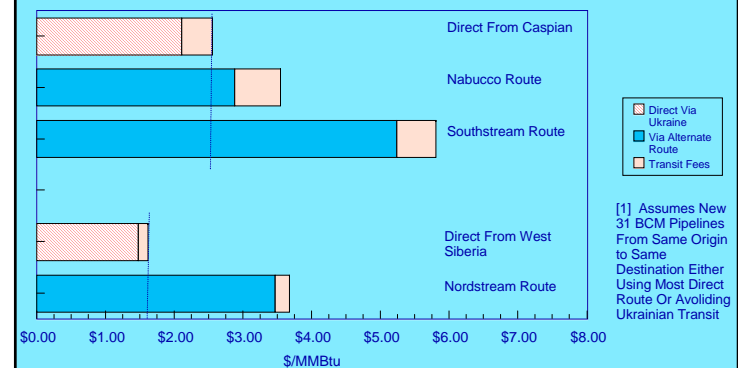
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ONE OF THE MOST DIFFICULT TRANSIT ISSUES HAS BEEN THE PERIODIC DISPUTE BETWEEN RUSSIA AND THE UKRAINE

- Periodic Russian Delivery Curtailment to the Ukraine Has Disrupted Deliveries to Other European Customers
- To Bypass the Ukraine, Russia Built the Yamal Line Through Poland in 1997, and Has Proposed Two New Lines - Nordstream from West Siberia via the Baltic and Southstream From the Caspian via the Black Sea
- Both Are High Pressure, Marine Lines (Southstream a Deep Water Line) and Thus Expensive Alternatives to Direct Ukrainian Transit
- Southstream Also Competes with Nabucco, the EU's Preferred Route from the Caspian

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Figure 3
THE COST OF TRANSIT AVOIDANCE
COMPARISON OF HYPOTHETICAL [1] EUROPEAN PROJECTS TRANSITING OR AVOIDING THE UKRAINE



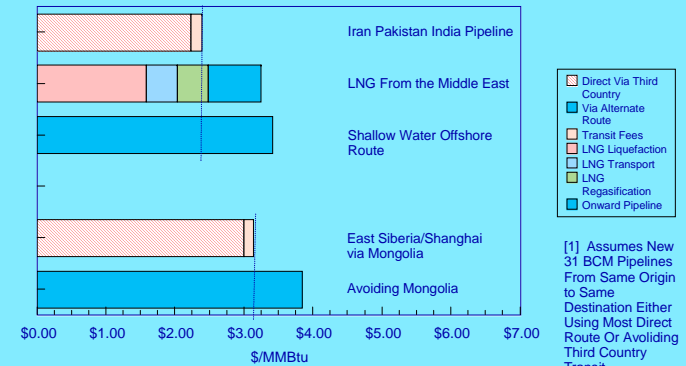
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EUROPE IS NOT THE ONLY REGION WITH TRANSIT ISSUES THAT POTENTIALLY INCREASE THE COMPLEXITY AND COST OF DELIVERY TO DESTINATION COUNTRIES

- The Proposed Iran-Pakistan-India Pipeline Was Close to Conclusion at One Point, But It is Now Inactive
- Although There Have Been Deep Water and Shallow Water Lines That Would Bypass Pakistan, India Has Recently Favored LNG
- And a Direct Line From Irkutsk (Kovykta) in Eastern Siberia to Shanghai Transiting Mongolia Has Been Shelved in Favor of an All Russia/China Alternative

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Figure 4
THE COST OF TRANSIT AVOIDANCE
COMPARISON OF HYPOTHETICAL [1] PROJECTS
TRANSITING OR AVOIDING A THIRD COUNTRY



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CONCLUSION

- The Problem of Negotiating Third Country Pipeline Transit Has Slowed the Growth of Pipeline Trade and at Times Fostered LNG AS A More-Flexible Alternative
- It Has Also At Times Frustrated New Pipelines or Led to More Costly Gas Transportation Systems
- One Agency Tackling the Problem Has Been the Energy Charter Treaty Secretariat, But the Issue Remains Challenging
- It Would Also Appear to be a Natural Role for the World Trade Organization, Given its Charter to Foster World Trade, and a Membership That Includes a Diverse Group of Countries

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