

Energy Security Challenges in Iran

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German-Iranian Energy Security Dialogue

IPIS-FES

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Role of Energy

- Energy is central to improved social and economic wellbeing
- Indispensable to most industrial and commercial wealth generations
- It is the main factor for:
 - Relieving poverty
 - Improving human welfare
 - Raising living standards
- Energy has a fundamental role in moving toward:
 - Sustainable development
 - Social actualization in modern age

History of Iran's Energy

- Unprecedented concession granted by Nāṣer-al-Din Shah in 1872 to Baron Julius de Reuter
- The concession covered the entire territory of Persia
- Gave Reuter the exclusive rights and monopoly, to exploit all mineral resources, for 70 years
- D'Arcy Concession, a petroleum oil concession
- Signed in 1901 between William Knox D'Arcy and Mozzafar al-Din Shah
- The oil concession gave D'Arcy the exclusive rights to prospect for oil in Persia
- They were about to give up but eventually struck large commercial quantities of oil in 1908.

APOC to BP

- After the large commercial quantities of oil were found, the Anglo-Persian Oil Company took over the concession in 1909
- The Anglo-Persian Oil Company (APOC) was a British company founded in 1908 following the discovery of a large oil field in Masjed Soleiman, Iran
- The first company to extract petroleum from Iran
- In 1935 APOC was renamed the Anglo-Iranian Oil Company (AIOC)
- in 1954 it became the British Petroleum Company (BP)
- Now, Beyond Petroleum

Main Events in Iran's Energy Sector

- 1909, Establishment of APOC, Concession, 14% net profit for Iran
- 1933, Revising of Contract, 16% net profit for Iran
- 1951, Nationalization of Iranian Oil Industry
- 1953, Contract with Consortium, Concession, 50% net profit
- 1979, Islamic Revolution, rejecting Concession in Iran's Constitution
- 1979-2015, Age of Contract Services, Buy Back Agreements
- 2016: New Iran Petroleum Contract (IPC)
- Caspian: Production Sharing Agreement (PSA)

Background of Energy Security

- War as Usual
- Cold War Era (No War and No Security)
- Distributed Security vs./or/and Global Sustainable Security:
 - Tangible dangers:
 - Increase in energy prices
 - increased world competition for energy resources faced with the rapid emergence of some huge economies: BRICS
 - Lack of equitable distribution between major powers, sometimes at the expense of less developed countries
- Security paradigm: the equilibrium paradigm.
 - Equilibrium is a condition of security; it is a pattern goes across
 - Mechanics, Thermodynamics, Chemistry, Biology, economics, sociology, Linguistics, & Art
 - Mathematics of the idea of equilibrium gives the foundations: From Lagrange's analytical mechanics to the Nash equilibrium in the theory of strategic games.

Different Definitions

5 Ss:

- *Supply*: Having resources, such as fossil fuels, alternative energy and renewable energy
- *Sufficiency*: Adequate quantity of fuel and services from these sources
- *Surety*: Having access to them
- *Survivability*: Resilient and durable sources of energy in the face of disruption or damage
- *Sustainability*: Reducing waste and limiting damage to the environment

Different Definitions II

4 As

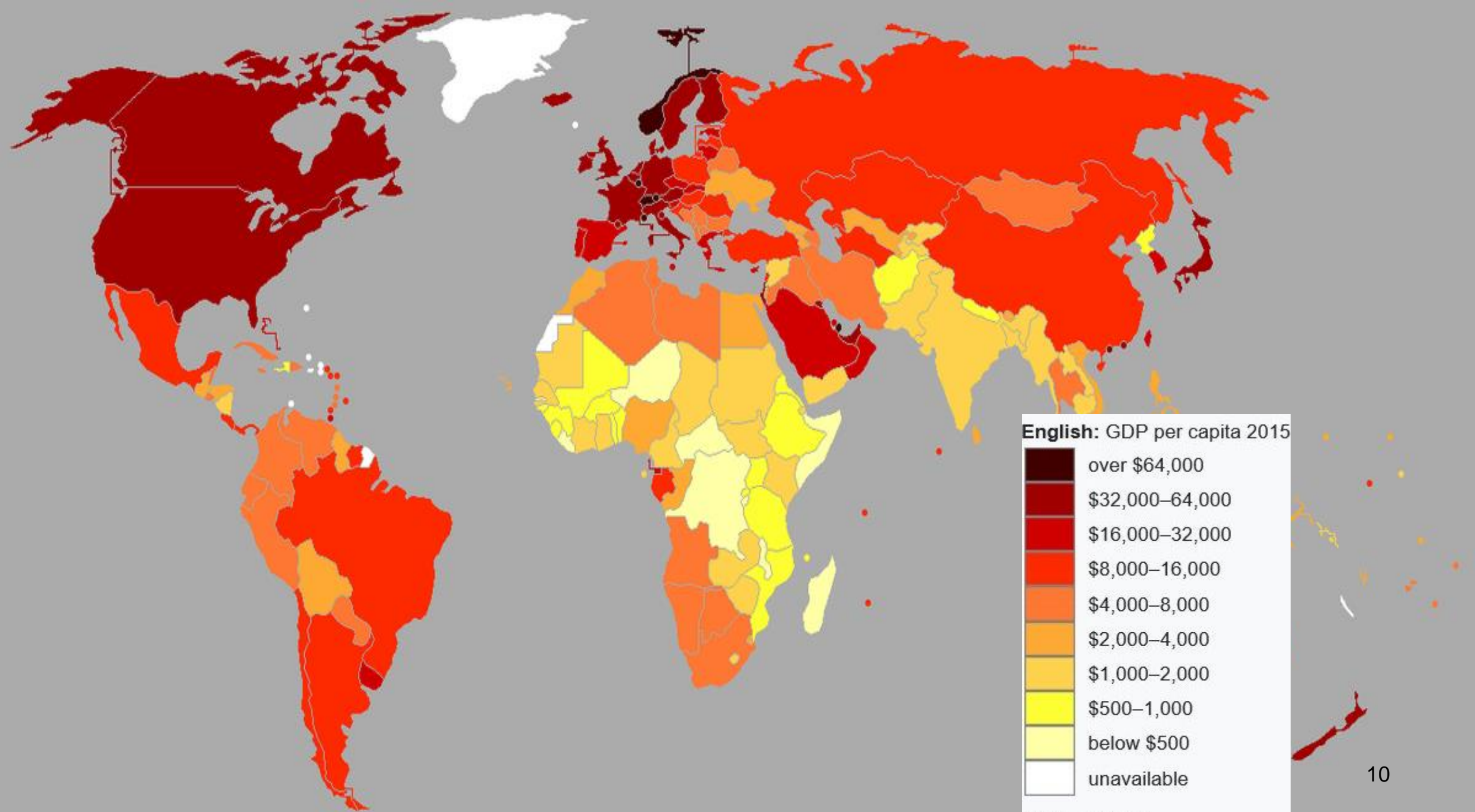
- Availability
- Accessibility
- Affordability
- Acceptability

Energy security - definition

Usually 3 components are included:

- Reliability
- Affordability
- Environmental friendliness

Different perspectives of the consumer,
supplier and transit country



17 March 2016

Aggregate Oil and Gas Proven Reserves

| | Oil Proven Reserves (bb) | Gas Proven Reserves (tcm) | Gas Proven Reserves (bbe) | Total Oil and Gas (bbe) | % of World Proven oil & gas Reserves |
|---------------|--------------------------|---------------------------|---------------------------|-------------------------|--------------------------------------|
| Russia | 109.5 | 32.3 | 199 | 308.5 | 10.8 |
| Iran | 158.4 | 33.5 | 206.4 | 364.8 | 12.8 |
| Saudi Arabia | 266.5 | 8.4 | 51.7 | 318.2 | 11.1 |
| Qatar | 25.2 | 24.3 | 149.7 | 174.9 | 6.1 |
| Venezuela | 300.9 | 5.7 | 35.1 | 336.0 | 11.8 |
| United States | 48.0 | 8.7 | 53.6 | 101.6 | 3.6 |
| World | 1706.7 | 186.6 | 1149.5 | 2856.2 | 100 |

Iran's Energy Security

- Energy Supply Security: as a consumer
- Energy Demand Security: as an exporter
- Middle East traditional producer
- An Asian player

Middle East Sub Region

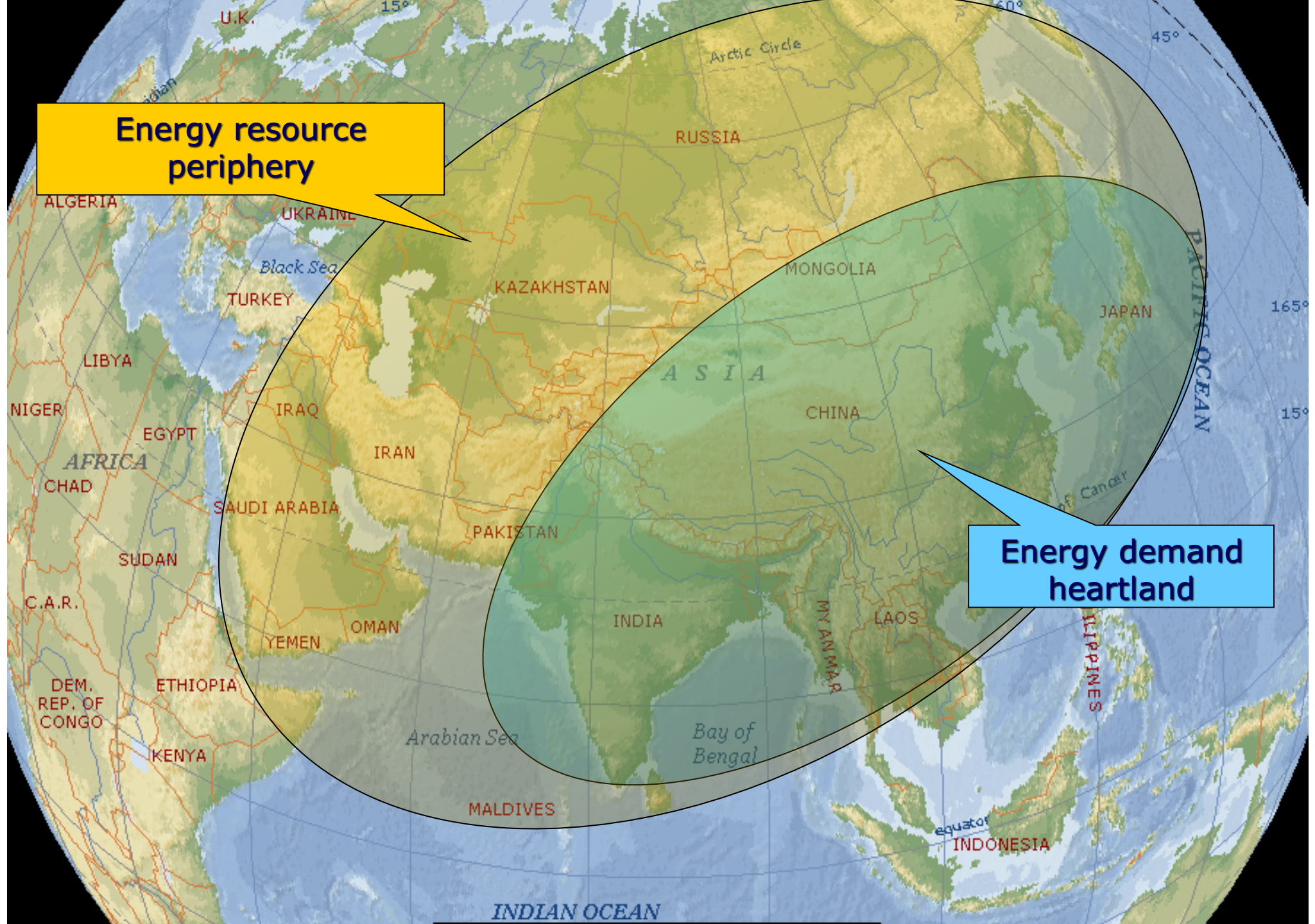


Asian Identity



Iran & Asia

- Asia is producing, trading and consuming a growing proportion of the world's energy.
- In terms of consumption, the economic growth of East and South Asian economies will translate into a massive increase in demand for energy.
- China's consumption of oil will increase by 156 per cent by 2025
- India's oil consumption will rise by 152 per cent over the same period.

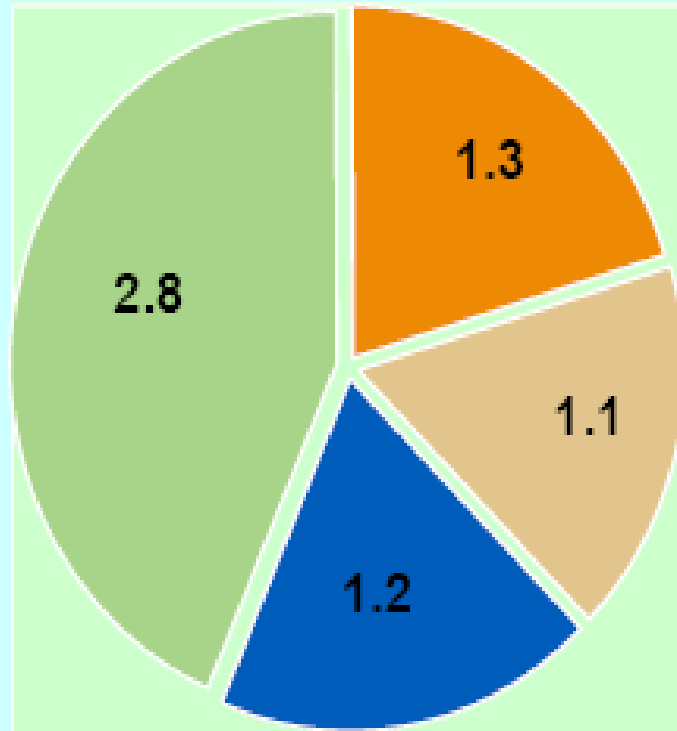


Energy resource periphery

Energy demand heartland

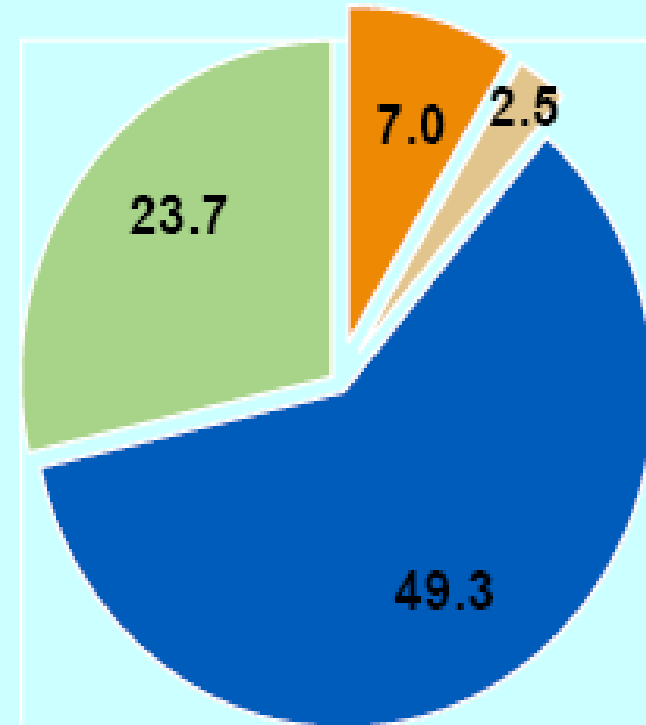
China and India rise to materiality changes everything; conventional supply cannot match trend demand

**World Population
(Billion in 2005)**



China India
More Developed Less Developed

**Oil Consumption
(MMBD in 2005)**



China India
More Developed Less Developed

West-East Asia

- The proportion of oil and gas in the total energy mix of Asia's developing economies is projected to rise, and most major economies in North, Southeast and South Asia will rely on imports of oil and gas.
- West and Central Asia provide an increasing proportion of global oil and gas production, as estimates of reserves predict that other sources will run out sooner and will be unable to provide surplus capacity

Trade Regionalization

- Because of globalization and transparency of global energy trade:
- Transport costs and logistical considerations had been major shapers of energy commerce
- Major energy importers in East and South Asia are increasingly relying on West Asian exporters for their oil and gas
- North America moves towards Atlantic basin supplies
- Europe towards Central Asian, African, and Atlantic Basin supplies

Energy & Investment in Asia

- West Asia has emerged as the ‘natural supplier’ of Pacific Asia
- Asia– Pacific takes 60% of West Asia’s oil and gas production, 66% of its exports
- Imports 80% of its oil from West Asia.
- interdependent investment patterns, with East Asian economies beginning to invest in upstream energy-producing operations in West Asia
- West Asian investors buying into downstream refining and distribution in East Asia

Central Asia

- Energy importers in South and East Asia are also showing increasing interest in Central Asian sources of oil and gas production.
- Although lagging behind the level of trade and investment with West Asia, the East and South Asian presence in Central Asian energy markets is growing
- The energy trade demonstrates, more clearly than any other commodity, the growing integration among Asia's sub-regions

Energy in CA&C

- Energy is one of the resources that could support the development
- But the geopolitics of pipelines is the key factor for the phenomenon of new dependency to other countries
- Russia is trying to dominate all of energy infrastructure in Eurasia

Energy Routes at a Glance



Overlapping of One Belt and North South Corridor

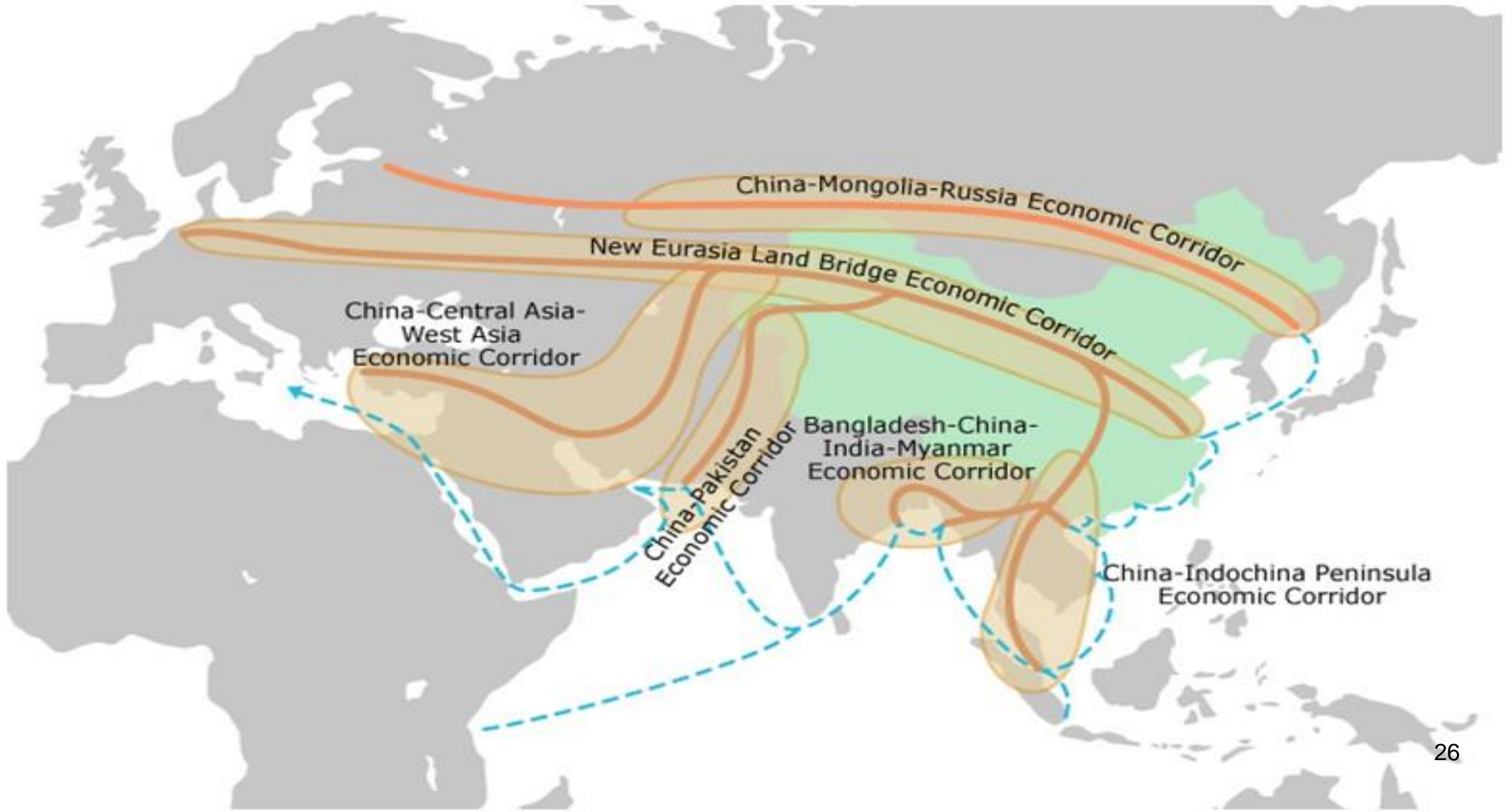


Several routes are proposed for the 'new Silk Road.'

--- Silk Road Economic Belt - - - 21st Century Maritime Silk Road



The Belt and Road Initiative: Six Economic Corridors Spanning Asia, Europe and Africa



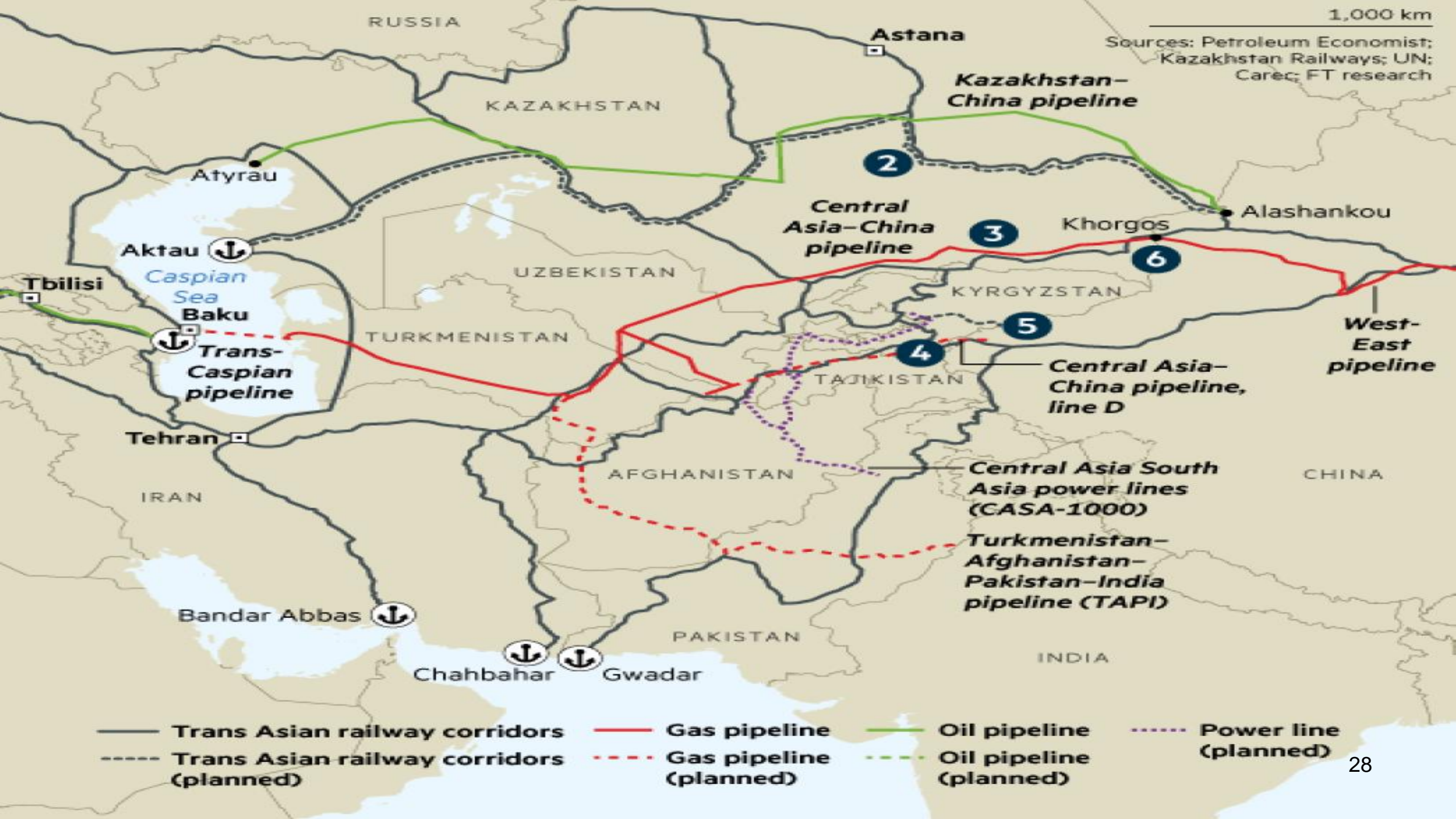
1,000 km

Sources: Petroleum Economist;
Kazakhstan Railways; UN;
Carec; FT research

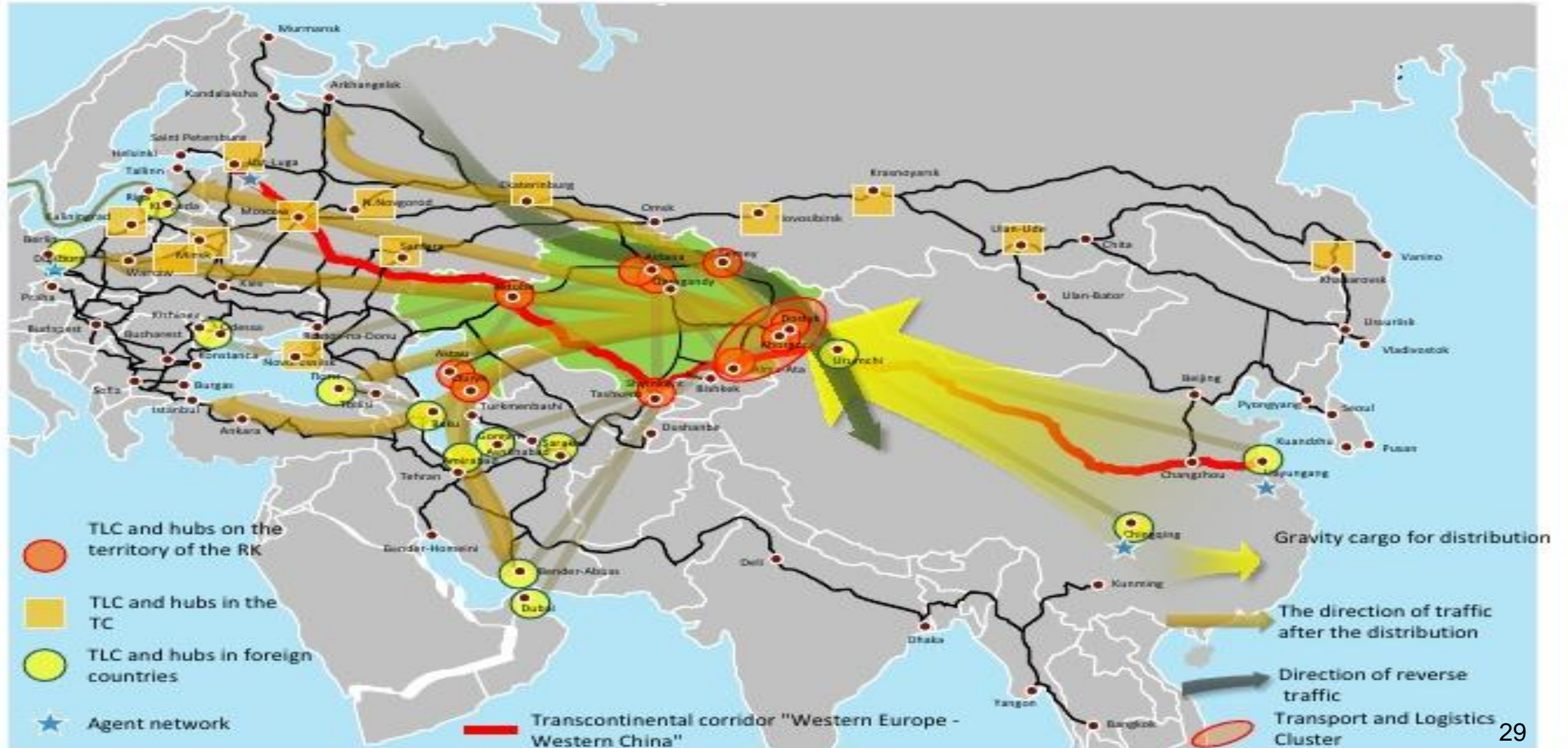
Moscow-Kazan Fast Train



- Trans Asian railway corridors
- - - - Trans Asian railway corridors (planned)



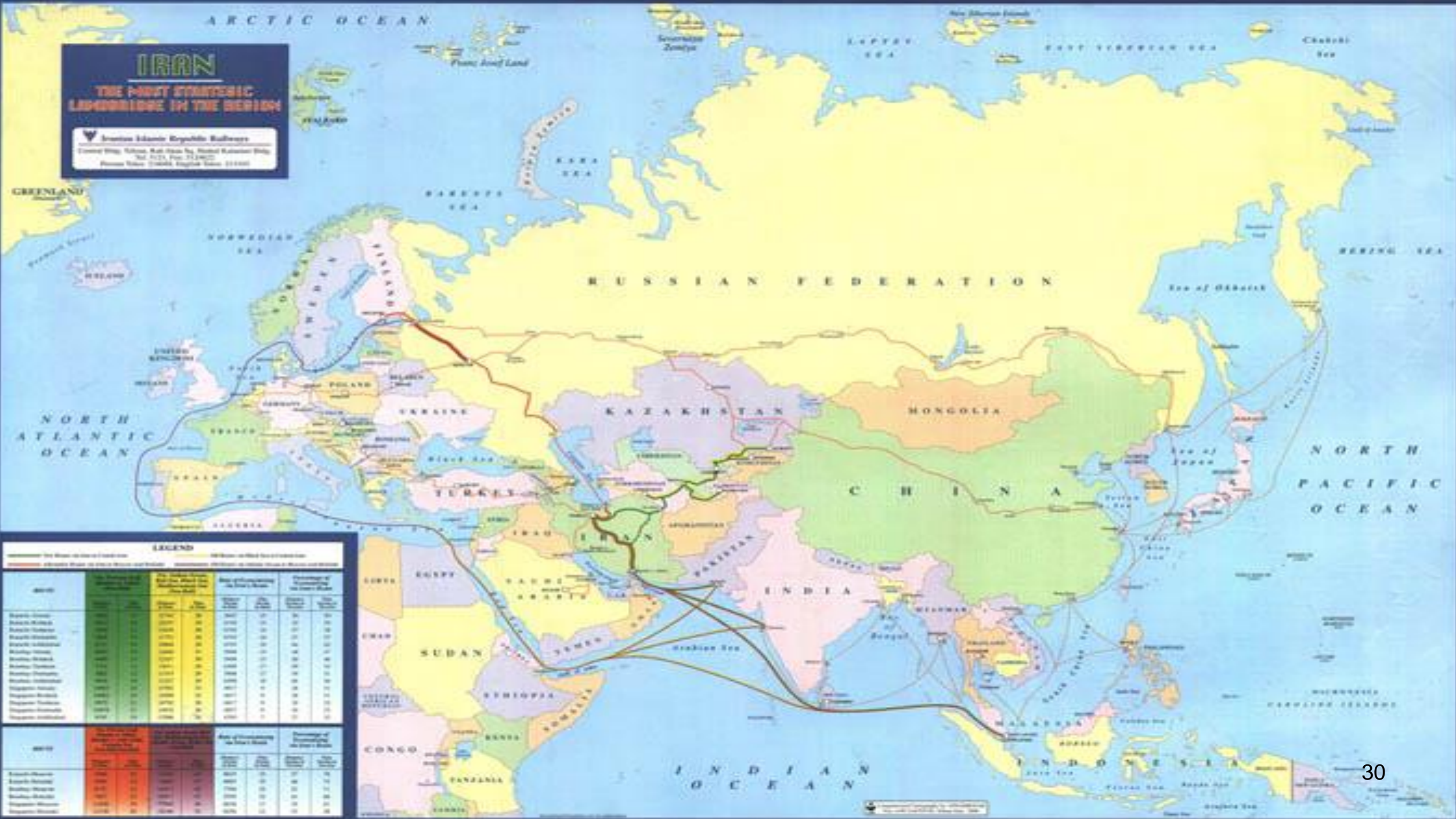
Transportation and logistics hub "Khorgos – East Gate"



ARCTIC OCEAN

IRAN
THE MOST STRATEGIC
LANDMASS IN THE MIDDLE EAST

Iranian Islamic Republic Railways
 Central Hwy. Tehran, Nat. Hwy. No. 1, Tehran
 P.O. Box 113, Post 113, Tehran
 Phone No. 22445, English No. 22445



LEGEND

| Color | Route Name | Length (km) | Through | Through | Through | Through |
|-------|----------------|-------------|---------|----------|--------------|------------|
| Red | Trans-Caspian | 1,000 | Iran | Russia | Central Asia | China |
| Blue | Trans-Caucasus | 1,500 | Iran | Georgia | Armenia | Azerbaijan |
| Green | Trans-Iranian | 2,000 | Iran | Pakistan | India | China |
| Brown | Trans-Asian | 3,000 | Iran | China | India | Japan |

PREVIOUS ROUTE

45-60 DAY: TIME TRAVEL

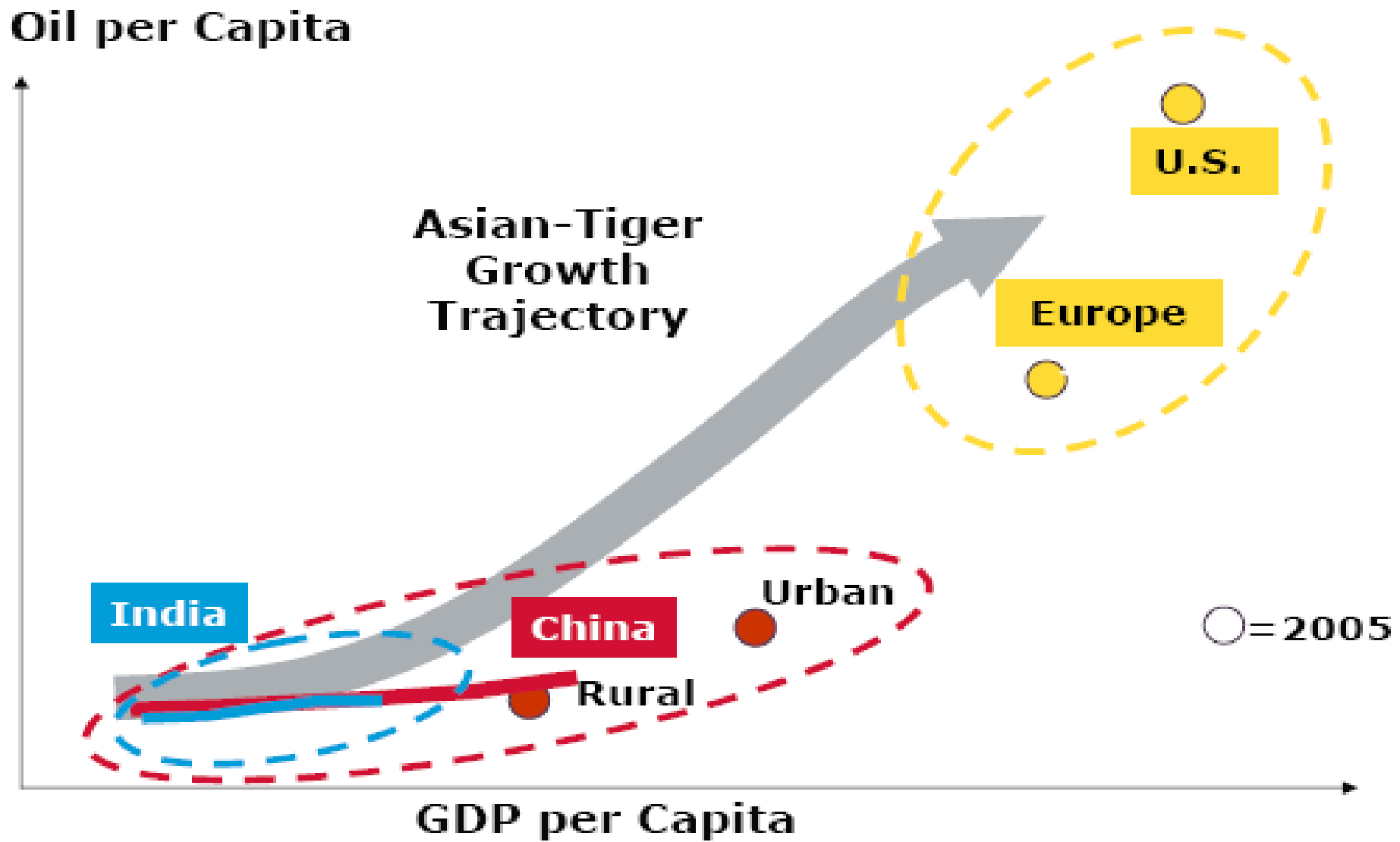
I.N.S.T.C.

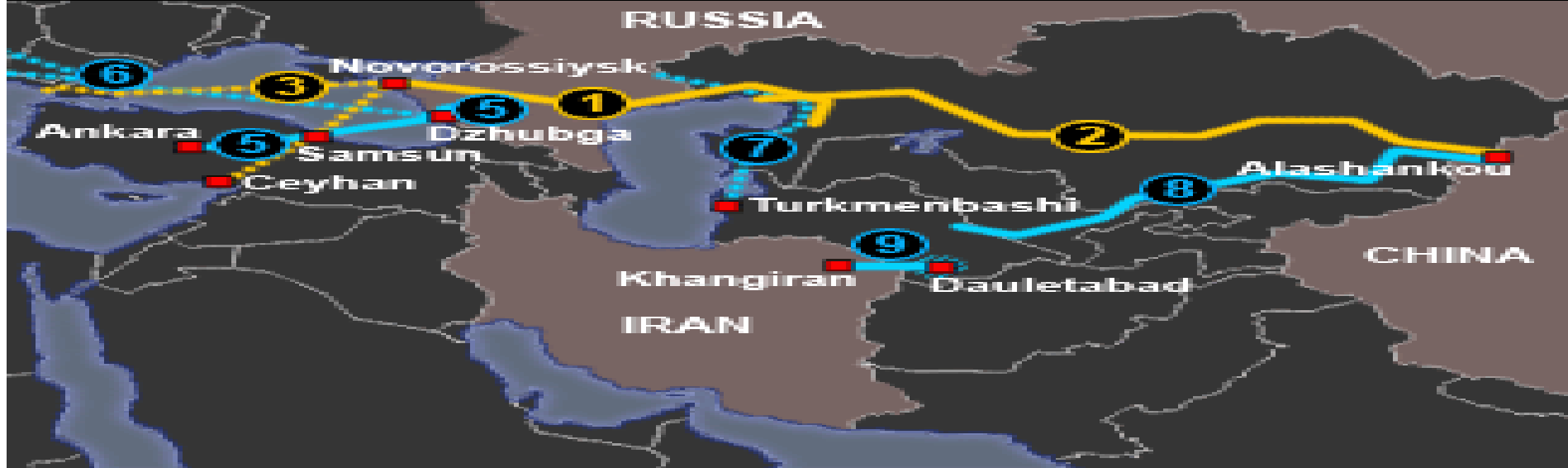
25-30 DAY: TIME TRAVEL

40% Shorter & 30% Cheaper



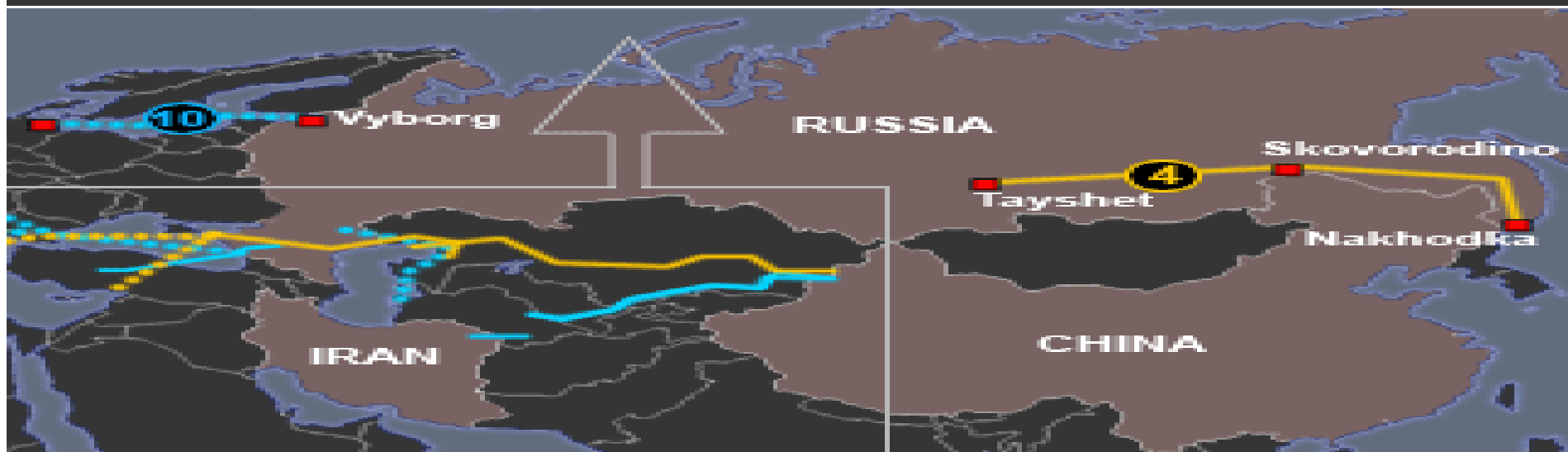
Income Expansion Underpins Growth in Energy Demand





THE RUSSIA-CHINA-IRAN ENERGY NEXUS

- | | | |
|------------|------------------------|-----------------------|
| Oil | 1 Kazakhstan-Russia | 6 Russia-Europe |
| New routes | 2 Kazakhstan-China | 7 Caspian Coastal |
| Proposed | 3 South Stream | 8 Turkmenistan-China |
| Gas | 4 East Siberia-Pacific | 9 Dauletabad-Khaniran |
| New routes | 5 Blue Stream | 10 North Stream |
| Proposed | | |



Energy security – vulnerability of transport routes

- Vulnerable energy transport chokepoints

Strait of Hormuz

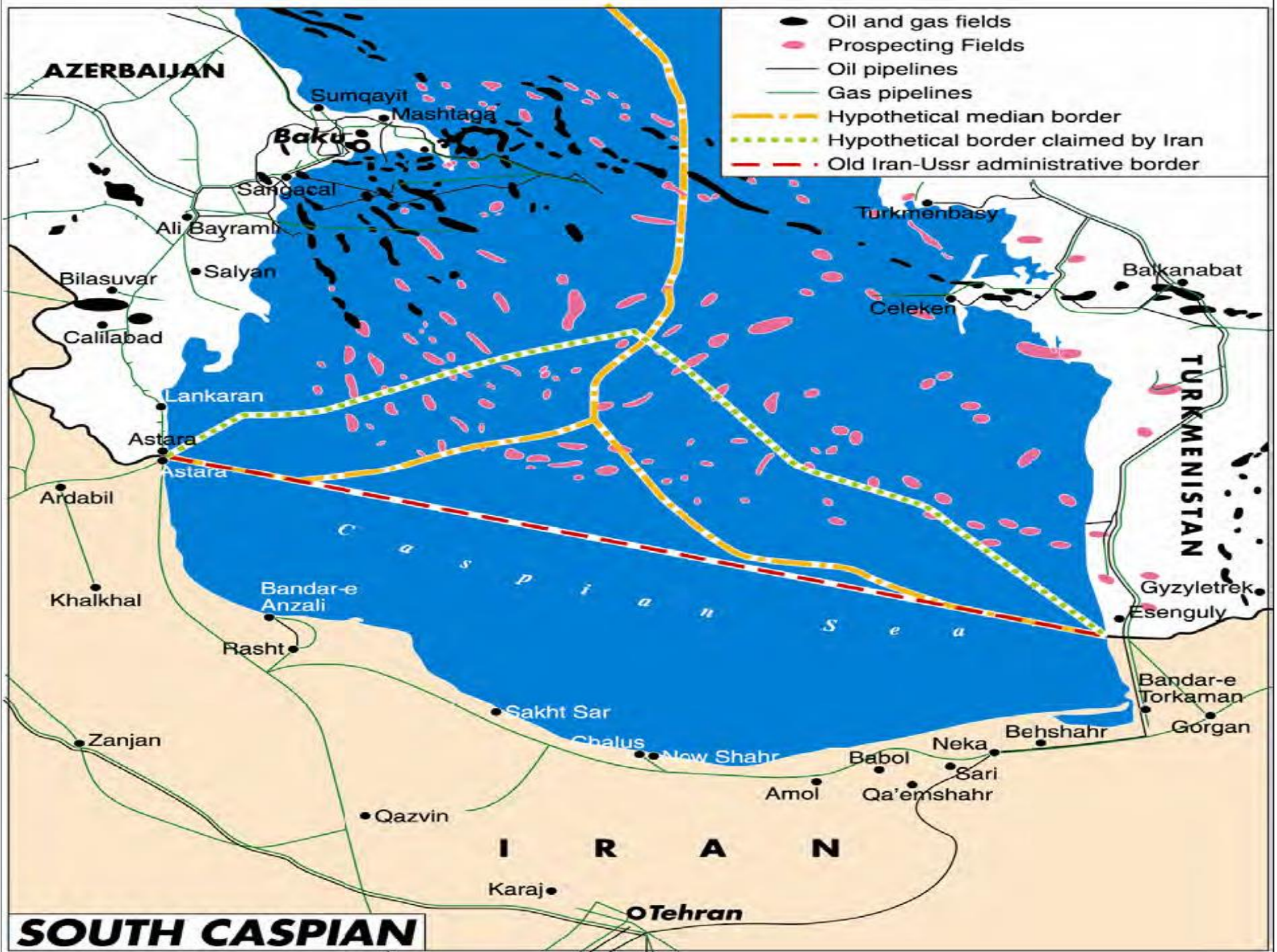
Strait of Malacca

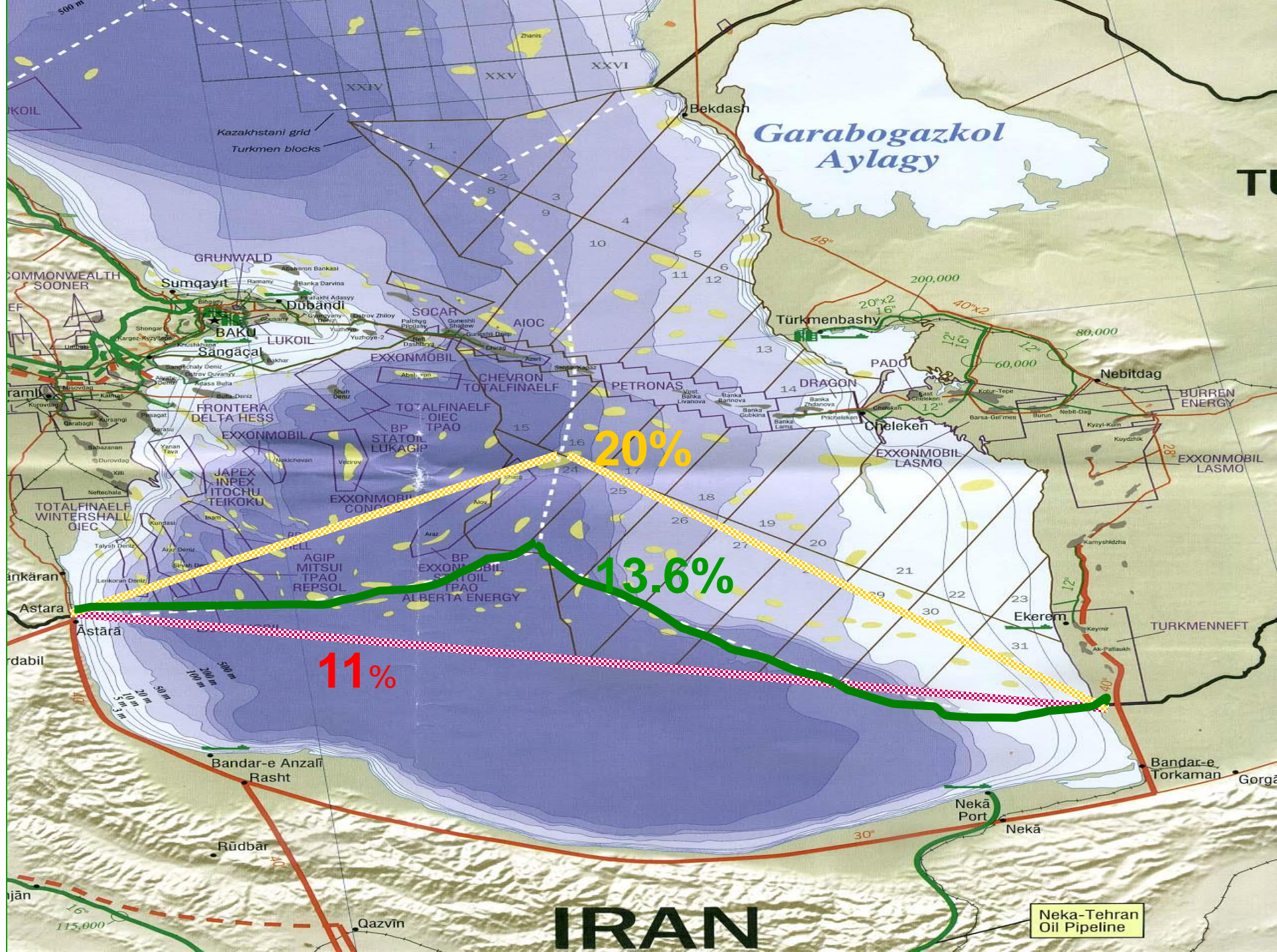
Bosporus Strait

- Terrorism and vulnerability of energy infrastructure









Caspian Oil Terminals and Neka



Neka-Ray Old and New Pipeline



Europe

- Role of energy in the process of European integration
- Energy resources

1% of world's proven oil reserves

2% of world's proven natural gas reserves

4% of the world's proven coal reserves

By 2020 2/3 of European energy consumption is expected to be imported

EU is the 2nd largest consumer of energy in the world

EU

- TPEC

42% oil

24% natural gas

14% nuclear energy

13% coal

6% renewables

Portion of natural gas in TPEC
rose rapidly over last 3
decades

- Electricity mix

31% nuclear

30% coal

20% natural gas

4% oil

Member states split on the issue
of nuclear energy

To ensure energy security, the European Union proposes:

- to diversify energy supply sources
(expanding the range of foreign suppliers,
using renewable energy sources);
- to promote energy-saving development;
- to develop cooperation with traditional
energy suppliers, primarily with Russia.

For the European Union, the energy dialogue provides opportunities for:

- access Russian energy resources, primarily oil and gas;
- creation conditions for diversifying energy imports;
- enhancing the sustainability of energy supply to the EU.

Iran and Europe

- Iran and Europe have had contacts with each other from old centuries.
- The history of Iranian peoples in Europe stretches back as far as 750 BC, when a Proto-Scythian culture thrived in Eastern Europe
- As for the Iranians, Europe has in the past 150 years been associated simultaneously with its potential threats to Iran's national security
- As a shield to its sovereignty and national interests from foreign adversaries.

Iran: OPEC Member

- Iran is obliged to OPEC share and therefore is avoiding flooding the market with its oil.
- Player between OPEC and None-OPEC

Russian oil companies wanted to recover market shares lost since the demise of the Soviet Union.

- OPEC and Non-OPEC cut 600,000 b/d each in the second quarter of 2016.

NIOC

International Performance

MOU

- 22 MOUs have been signed
- 6 IOCs are negotiating for signing MOU

HOA

- Contract

Tender

- Contract

- Total Investment: \$200 b
- Upstream: \$130 b
- Petrochemical \$70 b

Priorities of NIOC- MOU

Developing Common Fields

- South Azadegan
- South Pars Oil Layer
- Darkhowein- 3rd Phase
- Sohrab,
- Bande-Karkheh
- Arvand

IOR/EOR

- Ab-Teymour
- Ahwaz-Bangestan
- Mansouri-Bangestan
- Salman
- Aban
- Paydar
- Danan
- West Paydar
- Cheshmeh-Khosh
- Dalpari
- Naft Shar
- Sumar
- Dehloran
- Balal

Great Khorasan Routes

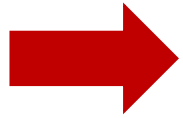


BONDS AND OPPORTUNITIES: THE REGIONAL PICTURE



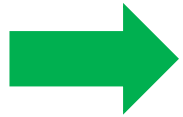
Natural Gas Iran

Pipelines



Import

- Azerbaijan & Turkmenistan



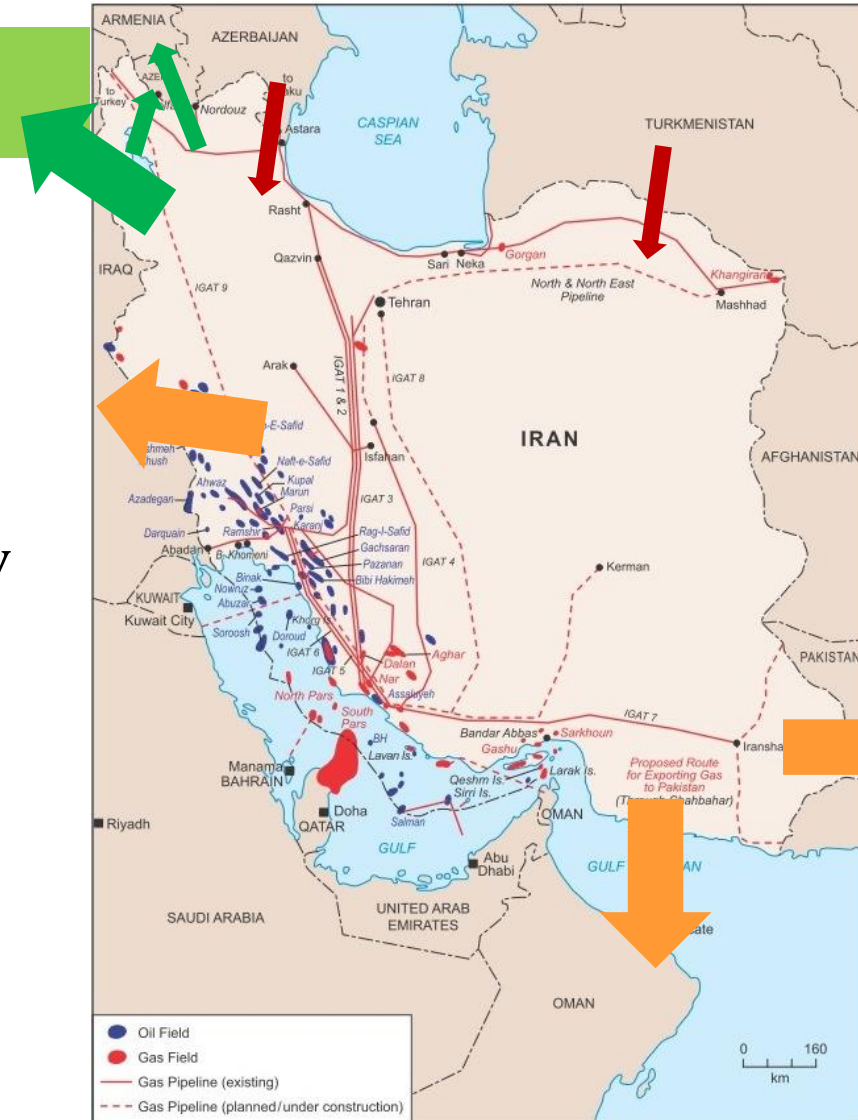
Export

- Armenia, Azerbaijan & Turkey



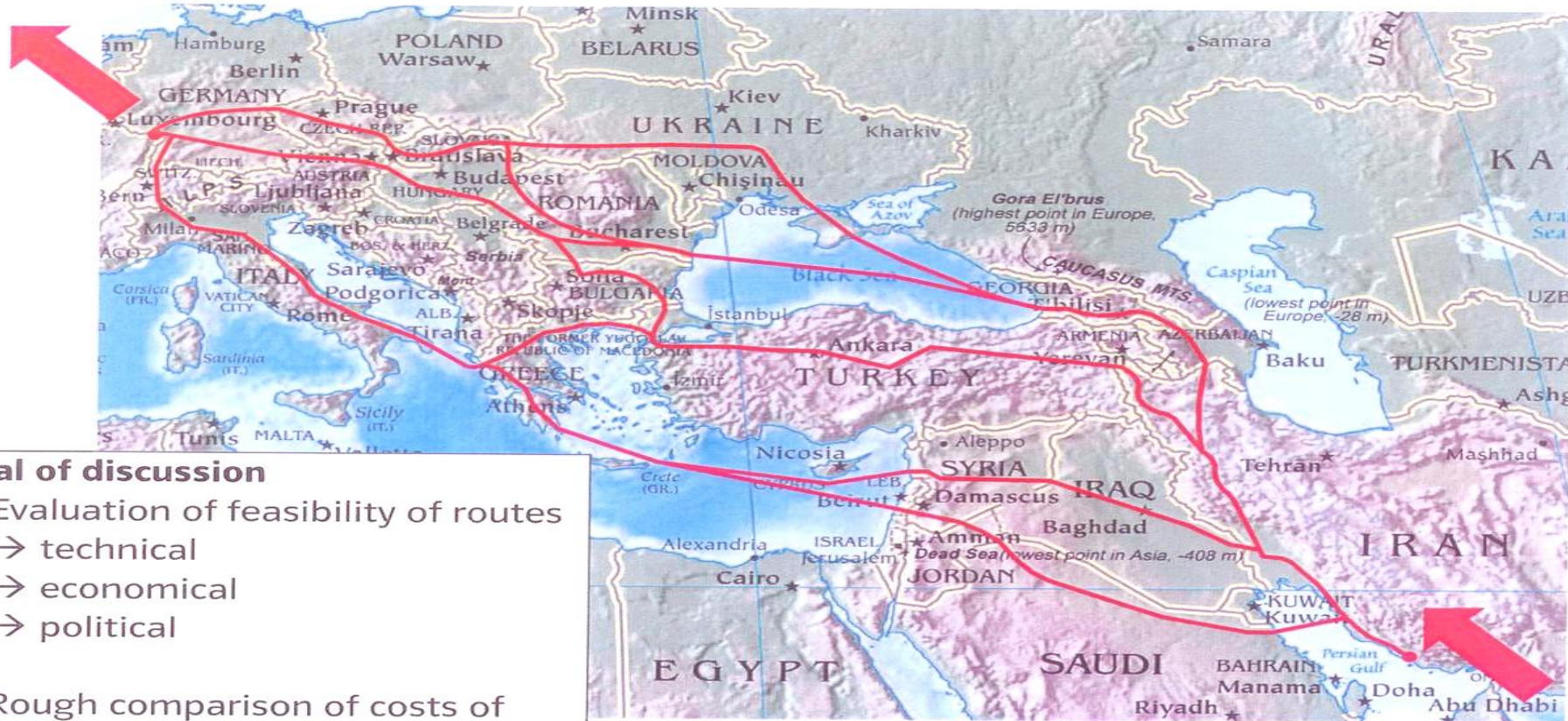
Possible Export

- Pakistan, Iraq & Oman



Source: Adibi and Fesharati (2011; updated)

Potential pipeline routes from Iran to Germany



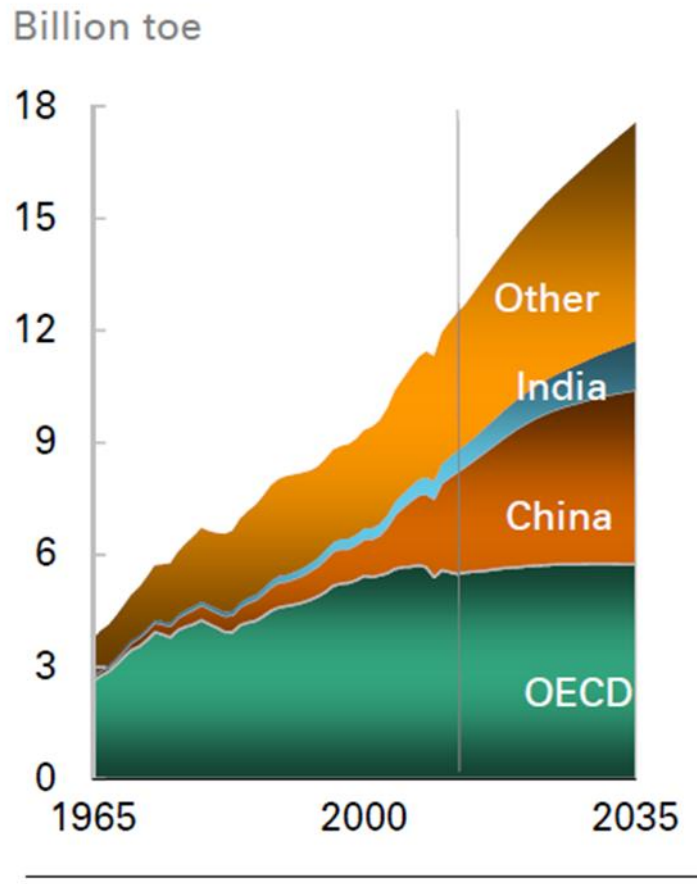
Goal of discussion

- Evaluation of feasibility of routes
 - technical
 - economical
 - political
- Rough comparison of costs of investment

World Energy Markets is going to be changed

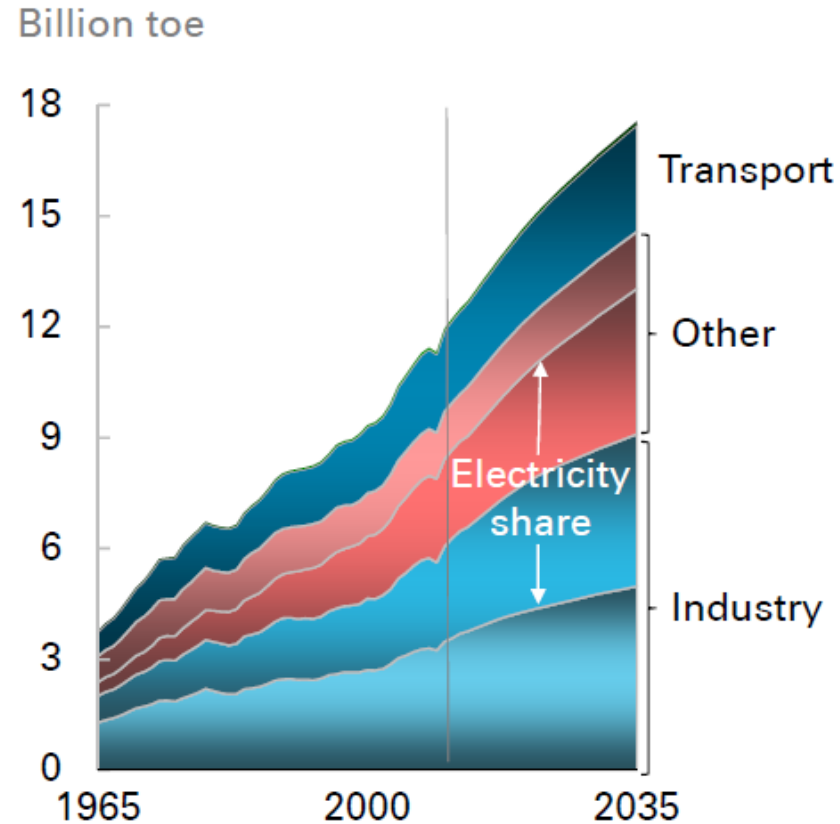
Europe is not the main energy consumer in Future

Consumption by region

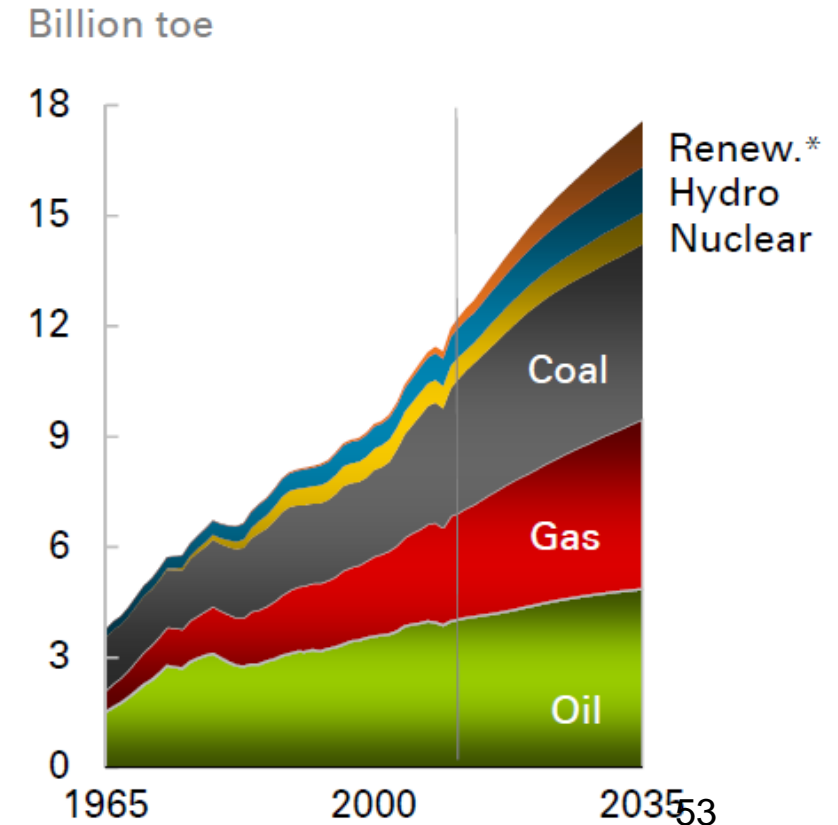


Energy Outlook 2035

Consumption by sector



Consumption by fuel

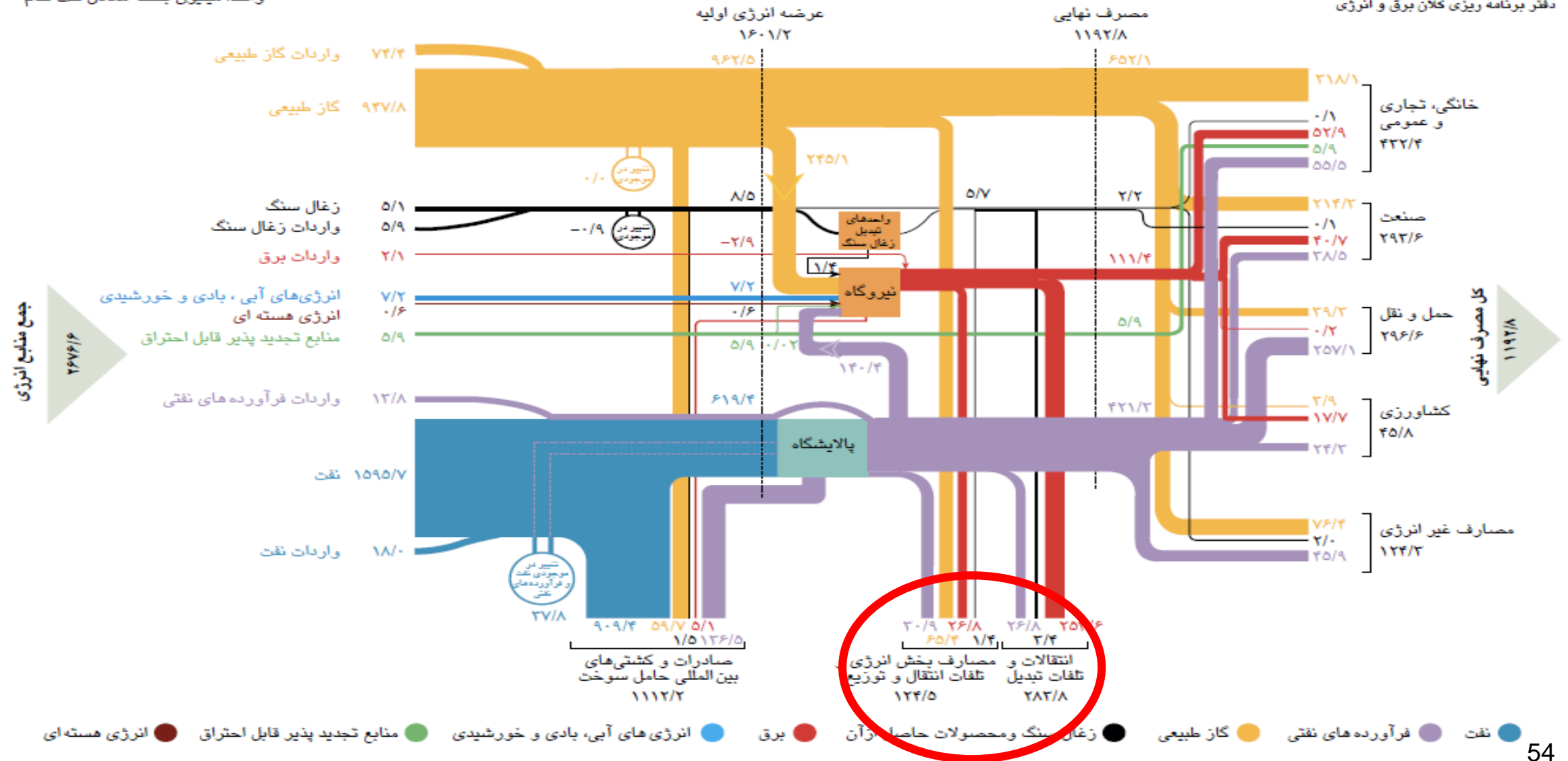


*Includes biofuels



نمودار جریان انرژی ایران - سال ۱۳۹۰

واحد: میلیون بشکه معادل نفت خام



Recommendations Iran's Energy Policy

- Iran can cooperate with Europe on crude oil export business as usual from 1900
- Iran is better to find new ways of reducing energy losses in its energy system, increase efficiency, upgrade productivity, and promote its industrial effectiveness.
- Iran should consider to join Energy Charter again
- There is no gas for exporting to Europe in short and medium term horizon
- It is recommended for Iran to look at Asia as the most reliable market for energy cooperation
- Especially cooperation along Silk Road is durable and more profitable

Recommendations (2)

- It is better for Iran to change its attention to gas markets in Asia and Persian Gulf. By two ways, pipeline to China and India, LNG for Japan, and other Asian markets.
- Despite rivalry between Russia and Iran in some fields, I urge Iran's government to deal with Russia on oil selling and swaps ceiling to 100,000 b/d
- Europe can show its good will by resuming TCA talks again
- Electricity