

Shale in SE Europe

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The N. American landscape...

Introduction- Recent US developments

- Shale revolution transformed US's energy outlook, ended oil production's long decline, cut NG prices by 2/3 fm '08 peak, cheap energy sustains US manufacturing recovery
- Apr '14 US EIA: 'US producing > 10 pct of world's crude oil supply'
- Impact on US consumer prices: gas prices for residential consumers ↓ fm pre-'08 peak, industrial & power sector gas prices ↓ ~ 50% fm '08 peaks
- Q1 '14: US steel imports surge ~26 pct on shale boom
- July: Texas oil production set to overtake Iraq
- Aug: US June crude oil exports highest since 1957
- US LNG terminals transformed fm import to export

...The N. American landscape ...

US Shale Gas Plays, Lower 48 States, API, 2014



...The N. American landscape ...

Introduction- Recent US developments

- May 8 '14: Exxon & Chevron losing out in US shale boom, small companies win
- May 9: EPA eyes new disclosure rules for fracking [HF] chemicals
- May 21: Santa Cruz 1st California county to ban HF, but May 29 California Senate rejects again a bill to halt HF
- June 3: Cuomo ponders NY drilling as HF bans reach top court but July 1 New York Court rules that towns can prohibit HF
- July 11: Chevron acknowledges just how much water is needed for oil shale development
- July 14: N. Carolina lifts HF moratorium

Global implications: a very large divergence of NG prices between the US -- & EU, Japan, China

...The N. American landscape ...

Foreign investment attracted by US shale

April 10, '13 SABIC of S. Arabia announced plans to exploit US shale boom to *'capitalise on cheap US feedstock prices in light of the US SG boom by developing at least one new cracker in the country'*

Apr '14: Royal Dutch Shell & China National Petroleum Corp [CNPC] signed deal to boost cooperation in sectors like...LNG & shale

May '14: Japanese Mitsubishi, Mitsui, Itochu, other trading houses to invest in N. American SO, SG fields

...The N. American landscape ...

Will the US export shale oil/gas...and would it matter?

FT Feb '14: 'American gas will flow mainly to Asia... The most useful thing that Europe could import is not American gas itself but **the open economic model** that enabled US natural gas industry to thrive'

Mar: Louisiana Cameron Parish terminal obtains NG export permit

EU *July 29*: economic sanctions on Russia, including arms embargo & limits on access to European capital markets for Russian state-owned banks

US Jul: Obama: a new round of US measures will affect 'key sectors of the Russian economy'

Sept 12: new EU Russia sanctions

...The N. American landscape ...

Will the US export shale oil/gas...and would it matter?

The US & Europe banned technology exports for Russian deepwater, Arctic & SO exploration.

Sept 15, '14: US to export condensate for 3rd month to Europe, S.Korea

Sep 21: US shale gas exports to hit Gazprom revenue. Shale boom significant impacts on world gas markets, by removing US need for LNG imports, freeing supplies fm Qatar etc to go to Europe/Asia. Longer-term, Gazprom could lose 18 pct of its revenues due to competition fm US LNG exports [FT].

...The N. American landscape

Canada

- US, Canada only major producers of tight oil
- Development concentrated in British Columbia, Alberta
- July '14: N. Rockies Regional Council in BC sent letter to federal & provincial govts 'HF the only viable method of accessing SG'

Mexico

- Infrastructure needed for the oil/gas industry
- June '14 package of 9 initiatives, including 8 new laws and modifications to 12 others on fossil fuels, water, electricity & oil funds...has not placed controls on use of chemicals in unconventional fossil fuel extraction
- July '14 SG Japanese govt to join devt in Mexico

Global implications

IEA Medium-Term Oil Market Report 2014 :

- Global oil demand growth slowing, OPEC capacity growth facing headwinds, growing regional imbalances in gasoline/diesel markets
- By 2019, tight oil supply outside US could reach 650 kb/d, incl 390 kb/d fm Canada, 100 kb/d fm Russia, 90 kb/d fm Argentina
- 3/5 of OPEC's expected growth in capacity by 2019 to come fm Iraq n
- China profiting fm US shale technology with jv s

Russia and the Ukraine ...

Geopolitics

2006, 2009: Gazprom cut off supplies to Ukraine -- the 2nd time, this created shortages in Europe, too. Europe increased imports from Norway, Qatar.

2010: Russia reduced supplies to Belarus, threatened Moldovans with the same if they did not abandon plans to sign a free-trade accord with the EU

April '14: Russia files dispute with WTO against 'the EU's Third Energy Package is inconsistent with obligations it signed up to in the General Agreement on Trade in Services [GATS]', a treaty to remove trade barriers among WTO members

...Russia and the Ukraine ...

April '14: France's Total gets rights to explore and develop Russian shale oil, joining ExxonMobil/Statoil /Shell

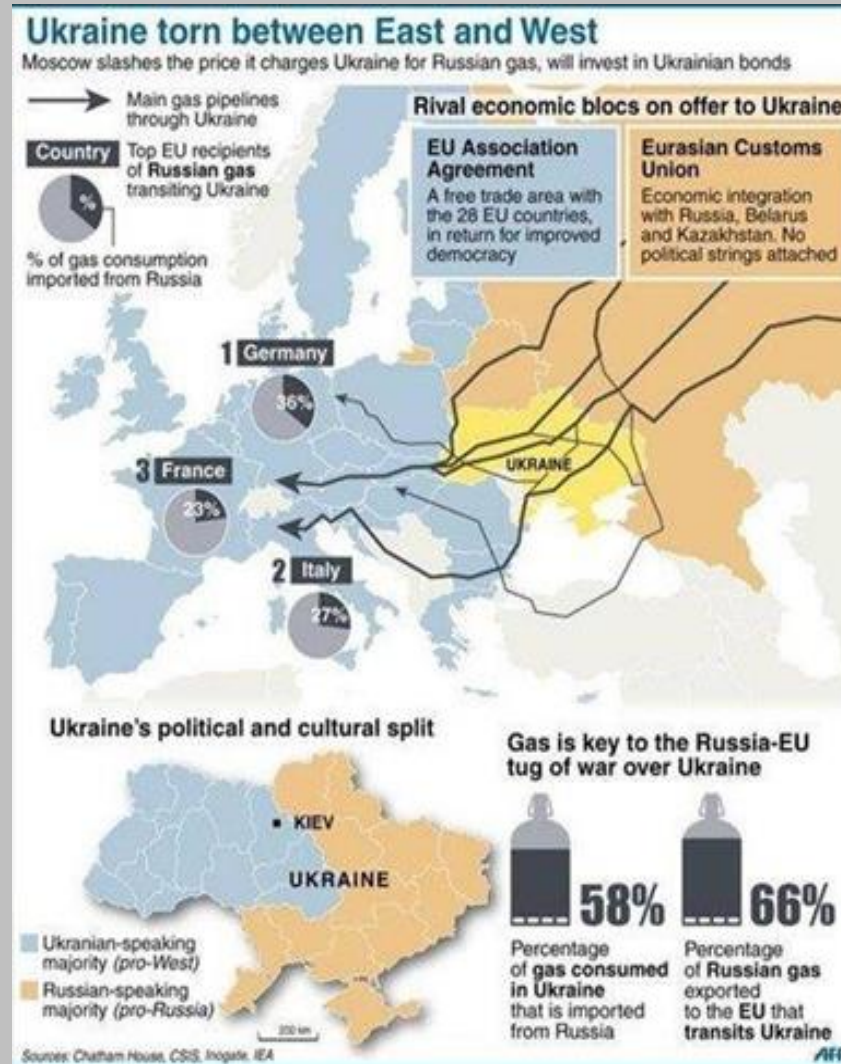
May: Putin spokesman: 'no connection between annexation & energy resources, Russia did not even care about Crimean oil/gas'

Exxon Mobil, Shell, other major oil companies already explored the Black Sea, some analysts say its potential may rival North Sea

May 25: BP confirmed commitment to Russia, signing shale oil deal w/ state-owned Rosneft, despite US govt-led sanctions; June: BP's CEO in Moscow 'sanctions have had no impact on working in Russia yet'

...Russia and the Ukraine ...

Ukraine



...Russia and the Ukraine

Ukraine

- Possibly biggest shale potential on European soil – *see next slide*
- Shell, Chevron had signed production-sharing agreements w/ Yanukovich govt
- Robert Bensch, energy/energy security expert, Mar '14: with Crimea, Ukraine loses some prospective offshore oil and gas territory in the Black Sea, but does not lose any shale. All shale is in Ukraine's east & west
- June '14: Shell halted drilling for SG in E. Ukraine
- Sept 18: EU-Turkey energy relations after 2014 Ukraine crisis gain in importance

The EU ...

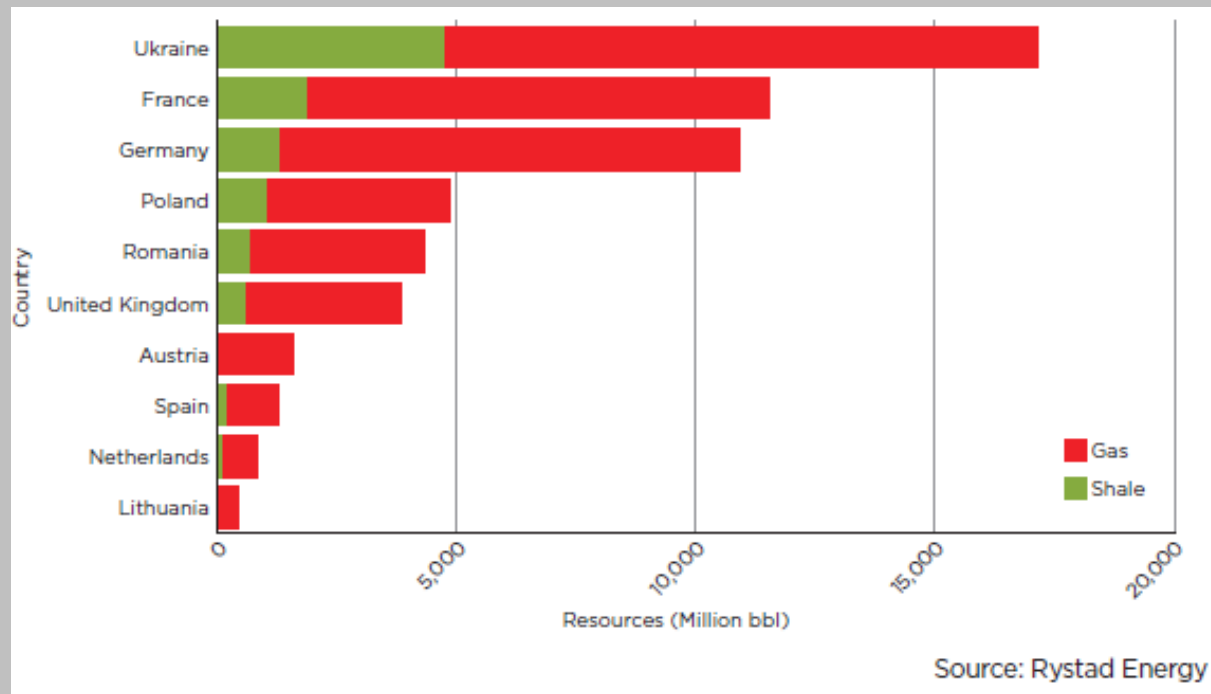
Policy up to member-states

Euromines position paper

European shale potential

10 most promising shale holder countries in Europe

Economically recoverable shale resources, by gas and liquids, Rystad Energy



...The EU ...

The UK

- June '14: govt legislative plans for next year, Queen Elizabeth said bill would be proposed to 'enhance UK's energy independence. Companies planning to drill onshore need to obtain consent from every landowner whose property a well may pass under → new law will remove this need
- July: UK shale extends to ~ 30% of England & Wales - BGS geologist Rachel Bell
- July: govt published launches 14 licensing onshore round, referring to SG & an online planning guidance, a regulatory roadmap and an illustration of onshore licences
- Sept 24: Cameron expected to say at NY UN summit that SG can be part of the solution to tackling climate change, must not be restricted by 'green tape'

...The EU...

Poland

Apr '14: Total has not renewed its only SG exploration licence

May: Poland's Baltic Ceramics Investments plans to produce ceramic proppants

June 11: Lower House of Parliament passed hydrocarbons bill facilitating exploration/extraction of unconv resources w/ single E&E permit

Sept 17: 3Legs pulls out

Spain

Autonomous Communities banning use of HF in their territories

Dec '13: new Environmental law includes mandatory environmental impact assessments for all SG projects incl exploration

Sept 17, '14: Ministry supports fracking despite opposition fm Autonomous Communities

...The EU

Lithuania

- 2014: a tax break for the first 3-4 years of SG exploration, later to be followed by 15 pct of tax
- May '14: Valentinas Mazuronis, Environment minister: country's depths are oil shale-rich, not full of SG
- July 8: Chevron leaves as SG prospects remain uncertain
- Aug 28: Deputy Envnt Minister D. Matonienė: new tender to be announced parliament passes legislative package
- Sept 24: PM Algirdas Butkevicius to meet w/ Chevron in Oct on country's amended 'investor-friendly' SG regulations

Greece, Romania, Bulgaria

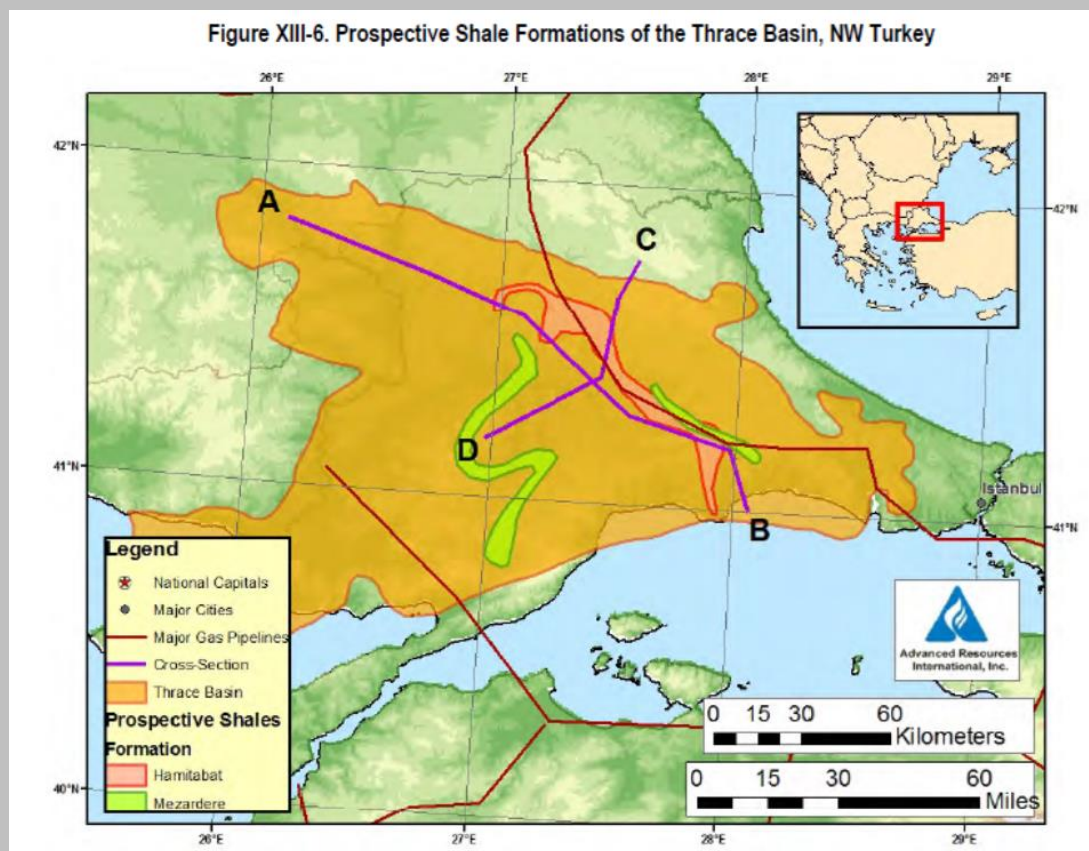
see next slides on SE Europe

SE Europe...

Greece

‘Encouraging preliminary findings of SG existence, esp. N. Greece’: Vice-Minister Papageorgiou, EU Energy Ministers, Dublin

- Thrace [Alexandroupolis – Orestiada], Lemnos
- Kavala - Prinos
- Axios Basin - Thermaikos
- W. Greece: Epirus, Katakolo, Akarnania
- Grevena



...SE Europe...

Bulgaria

- Moratorium since '12
- May 19, 14: Chevron exits BG after protests against SG
- July 23: Bulgarian Institute for Market Economics: 25,000 new jobs if Bulgaria embraces shale
- Sept 19: Bulgaria in talks on gas deliveries from Greece's Revithoussa terminal
- Sept 24: protests in Sofia, Plovdiv, Varna against prospecting for shale and coal gas & extraction in NE Dobrudzha region: 'envnt & econ ministries issued permits to a US-based company to prospect for & extract gas near Vranino in violation of the ban'. Ministries: 'permit relating only to prospecting, not extraction.'

...SE Europe

Romania

- Romania not to exploit shale gas in next 5 years, says Ponta, May 4, '14
- Romanian county court reverses ban on shale gas exploration , July 4, '14: Vaslui County Court rejected as illegal a decision passed by the local councilors of the Puiesti commune, in Eastern Romania, who banned shale gas exploration and production within the village perimeter
- Greenpeace activists block Chevron shale site in Romania, July 7, '14

Turkey

- Nov '11: TPAO agreement w/ Shell for hydrocarbon exploration in Mediterranean and southeast area. Shell began exploration at the Saribugday 1 field in Aug '12.
- June '14 ExxonMobil in talks with state-run Turkish Petroleum Corporation over shale gas exploration

Conclusions

- **A revolution in the US...& Canada, w/ economic & geopolitical repercussions**
- **US success story based on geology, spaces, legal framework, open economic model, attitudes**
- **Now spreading to China, Russia, Argentina,...**
- **Russia/Ukraine problems accentuate need for EU sources eg shale**
- **...but geological and social impediments**
- **The EU's industrial revival could be based on shale...**
- **...provided environmental best practices are applied**
- **All above are especially applicable to SE Europe!**

Relevant work by Natural Resources GP

- **‘Hydraulic Fracturing & the Growth of Shale Gas and Shale Oil Internationally’, a Report by Natural Resources GP, 2014**
- **Articles in Industrial Minerals Magazine, Institute of Energy for South East Europe**
- **Presentations in international conferences: Minneapolis USA, London, Plovdiv, Hammamet Tunisia, Athens**

Thank you very much!
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