

From Energy Dependence to Gas Exports?



Driving Ukraine's Gas Production Potential



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JKX Oil & Gas (JKX LN)

E&P growth portfolio across Central/Eastern Europe



- ✓ **Ukraine:** Large-scale field development opportunity coupled with high-value production base
- ✓ **Russia:** Stable cash-generating operations with upside potential
- ✓ **Hungary/Slovakia:** Significant exploration potential
- ✓ **Team:** New board and executive management focused on modern development approach



Country	Production 2016			Reserves mmboe		Contingent Resources mmboe
	Gas mmcf/d	Oil kb/d	Total kboe/d	1P	2P	3C
Ukraine	18.5	0.9	4.0	10	28	435
Russia	36.1	0.1	6.1	45	82	119
Hungary	1.5	30	0.3	-	-	1
Slovakia	-	-	-	-	-	-
Total	54.6	1.0	10.1	55	110	555

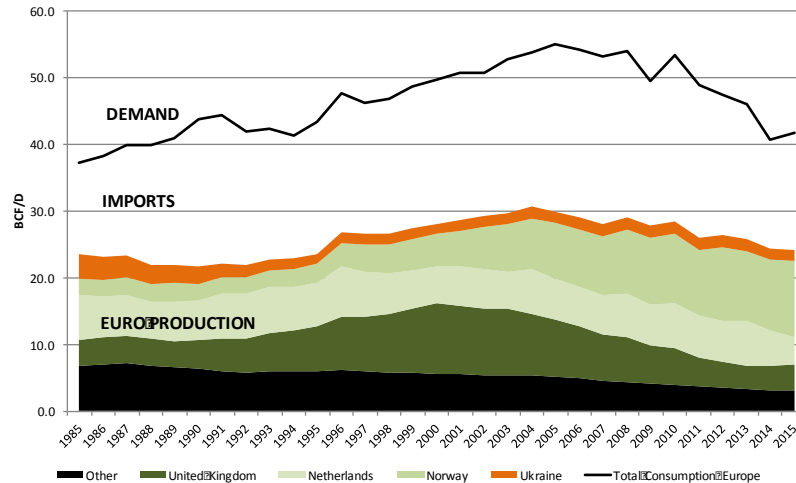
*Source: Company data, Reserves and Contingent Resources are DeGolyer and MacNaughton estimates as of 31 December 2014 (Ukraine, Hungary) and as of June 30, 2016 (Russia). Reserves were not adjusted for production and revisions.

Why Ukraine?

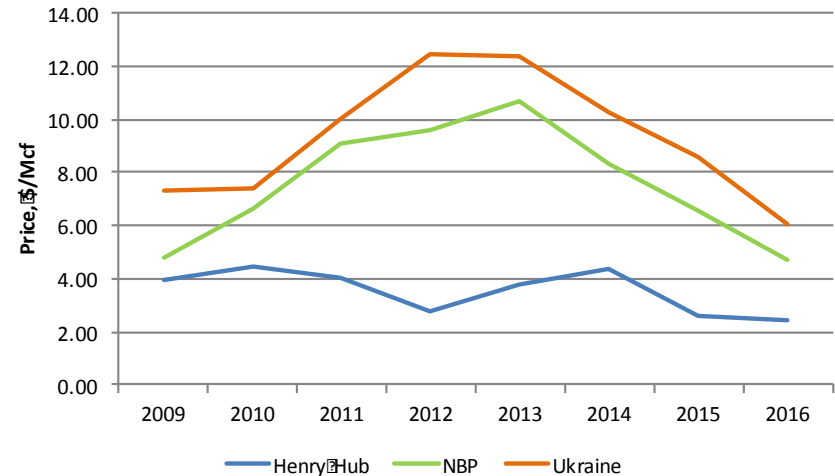
Large, attractive gas market in the midst of meaningful reform



Import dependent Europe's 4th largest gas producer



Europe's premium pricing underpins supply & imports



Developed infrastructure supports market access



Ukraine's Attractive Natural Gas Market

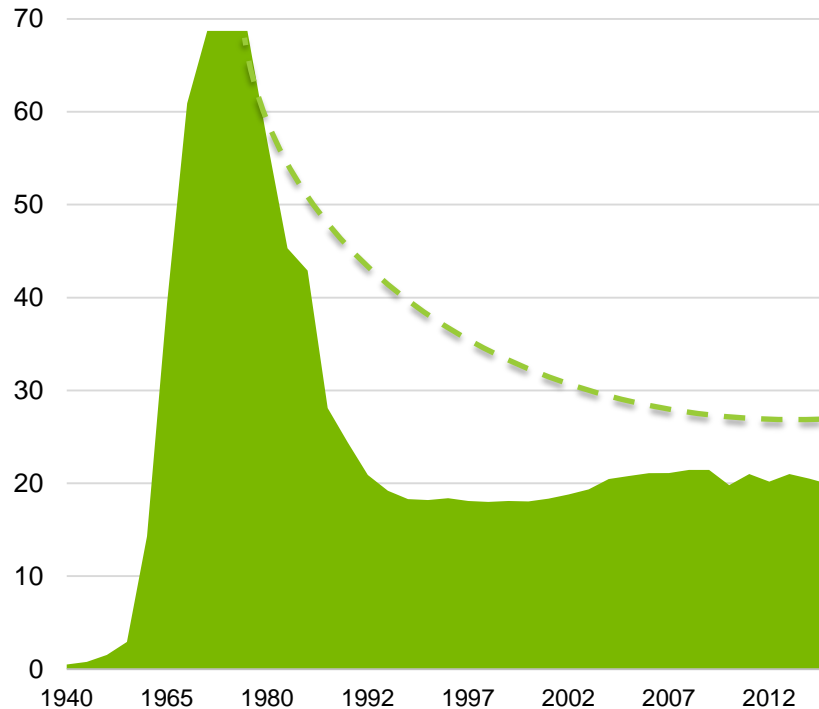
- 4th largest European producer after Norway, Netherlands and the UK
- Premium pricing to Europe & US
- Developed pipeline and natural gas infrastructure
- Significant progress in gas market reform
- **Ukraine Government strategic target for energy independence by 2020**
- **Official gas production plan calls for production increase to 27bcma (40% increase)**

Ukraine's Natural Gas Resources Support Growth

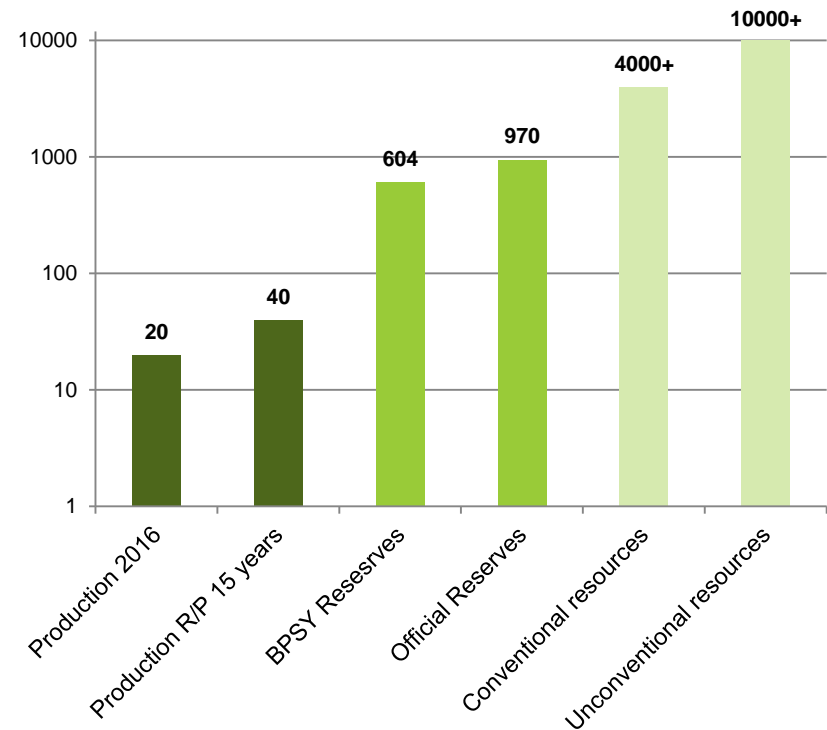
Evidence of significant production acceleration potential



Ukraine's 'abnormal' production history (Bcm)



Reserves, Resources and Production Potential (Bcm)



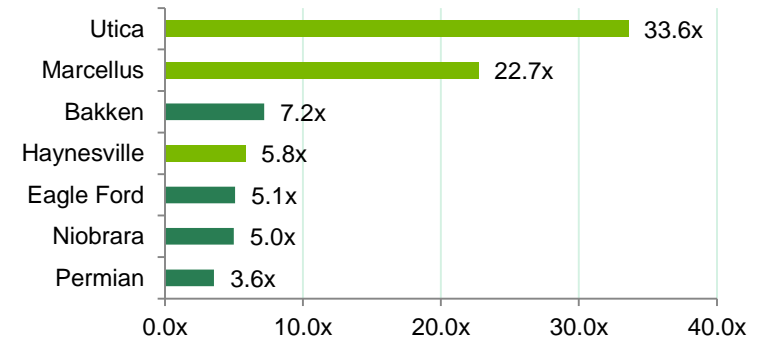
Opportunity to Grow Gas Production in Ukraine

Technology transfer is key



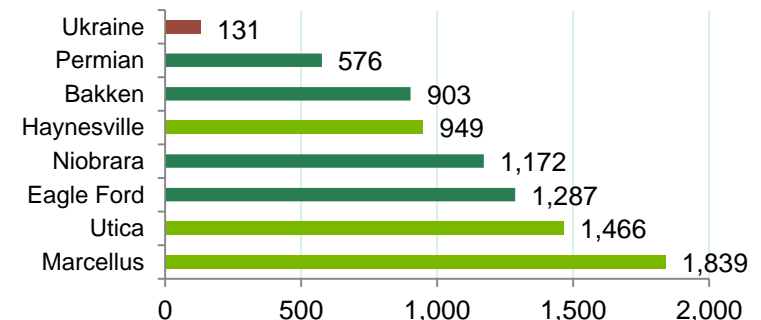
- Productivity of gas extraction technology in the US increased by up to 33 times in the past decade
- Ukraine's reservoir quality is 10-100 times better than US shale plays
- But rig productivity is much lower
- Investment in new production combined with technology transfer can help significantly increase gas production in Ukraine

Rig efficiency gains in US were dramatic since 2007, specifically for gas plays – need only to replicate success in Ukraine



Average monthly production from newly drilled wells in Ukraine is significantly lower vs. US, specifically compared with gas plays (in green)

New-well production per rig, boepd



Sources: EIA, PetroSkills, Company analysis

Rudenkivske Full Field Development (FFD)



- **Concept:** Modern drilling and completions using North American-style manufacturing approach to production

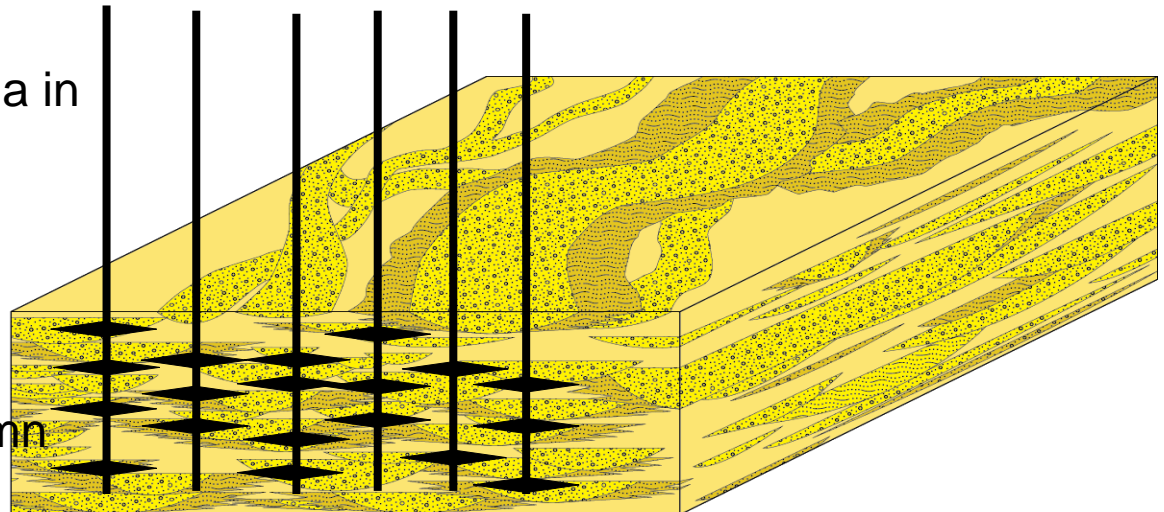
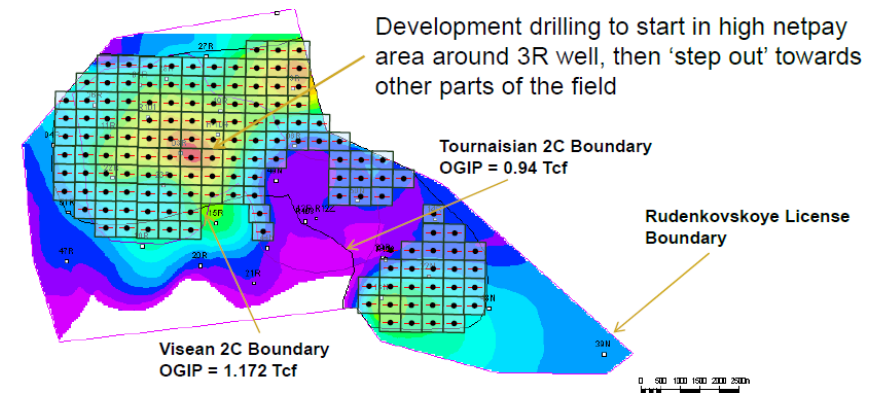
- **Reserves:** 80 Bcm in place, ~17Bcm recoverable volumes

- 1-2% recovery (Ukraine est.)
- 25-50% recovery (US est.)

- **Production** peak at ~1 bcma in 2020-2021

- **Field Development Plan** includes 135 wells with anticipated capex of ~\$660mn

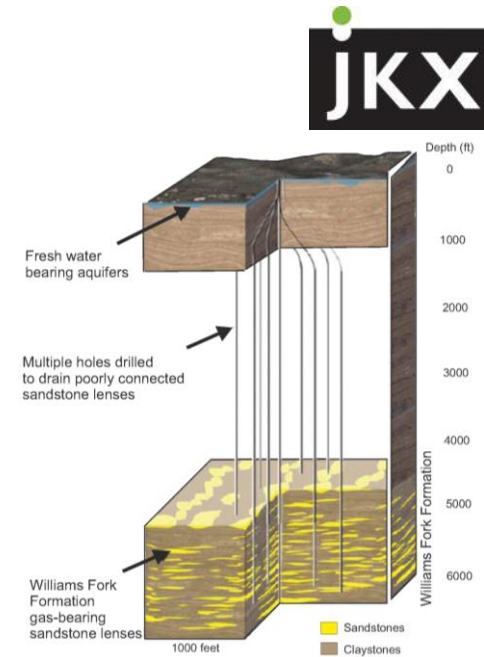
Schematic drilling locations at Rudenkovskoye field



Rudenkivske Analogues

Transferring success to Ukraine

- Williams Fork formation in Piceance Basin in Colorado close analog for the Rudenkivske
- The field was discovered in the 1970s, but abandoned due to economics until 1990s as application of multi-stage fracturing reduced costs
- Cost reduction through adoption of manufacturing-style approach to drilling and completion essential for economic development of the field



Parameter	Rudenkivske, Dnieper Donets basin	Williams-Fork, Piceance basin	Utica, Appalachian basin	Deep Bossier, East Texas Basin	Lance Pool, Pinedale/Jonah Field, Green River Basin
Gas saturation	55-80%	35-55%	40-65%	50-95%	65-75%
Clay Content	10-20%	5-21%	20-40%	10-22%	10-15%
Total Porosity	6-17%	6-8.5%	3-10%	5-14%	6-12%
Permeability	>0.1mD	<0.1mD	0.0001mD	<0.5mD	<0.1mD
Pressure (psi)	5600-8900	3000-7000	3100-8600	>10,000	3000-7800
Gross Thickness (metres)	300-800m	600-1000m	50-300m	300-760m	700-1000m+
Depth (metres)	3000-4500m	2000-3500m	600-4000m	>5000m	2600-4400m
Average IP rates	10 – 12MMscf/d	1 – 2MMscf/d	5 – 47MMscf/d	2 – 15MMscf/d	6 – 7.5MMscf/d
Average EUR (per well)	4 – 5Bcf	1 – 2Bcf	2.5 – 5Bcf	5 – 7Bcf	4 – 9Bcf

Rudenkivske Development Plan

Low-cost test of concept using existing wells/infrastructure



✓ Preparation (2016-2017)

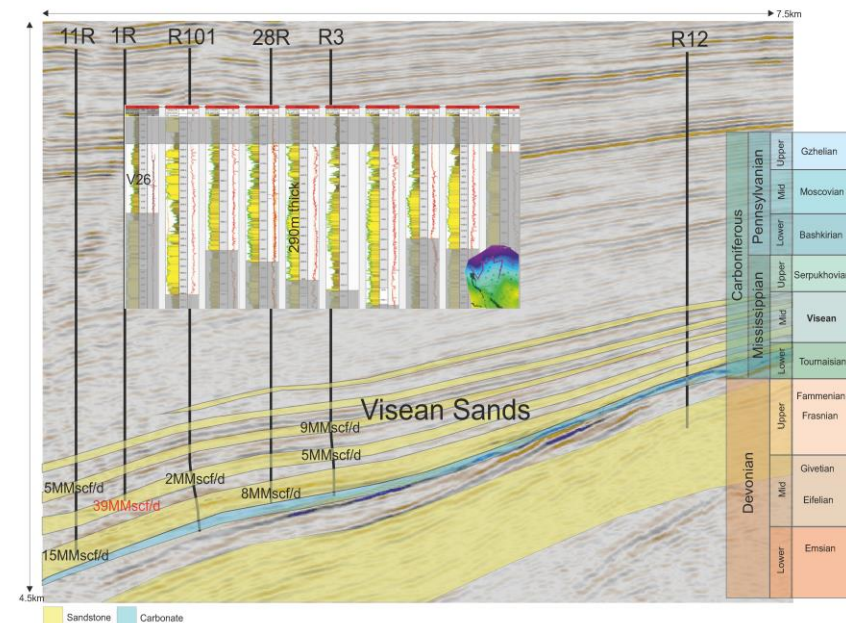
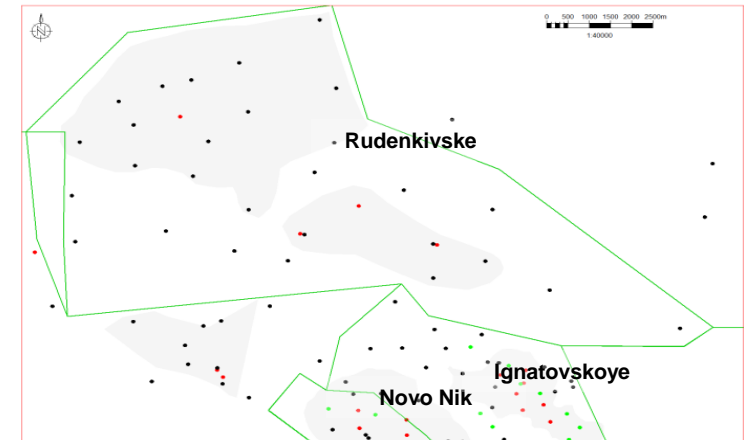
- ✓ New technical team and philosophy
- ✓ Field Development Plan (focus on Visean)
- ✓ 13 of 32 old wells selected for enhancement
- ✓ 2 well workovers (NN16, NN47)

• Proof of concept (2017)

- ✓ 'Clean up' 11 old wells selected for enhancement
- Stimulation of selected wells by Schlumberger (Starting May 2017)
- Use results to fine tune FFD

• Full Field Development

- Pad-based drilling to decrease costs and minimize impact on environment
- Manufacture-style drilling, completion and stimulation of vertical / deviated wells



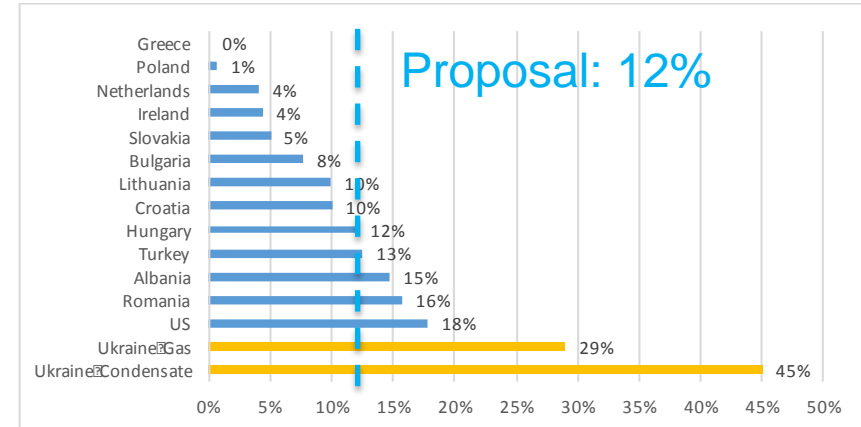
What is Required?

Way towards energy independence followed by gas exports



- **Step 1:** An attractive, simple and stable tax regime to make outside investors take notice
- **Step 2:** Regulatory reform to reduce entry barriers for new investors (simple licensing and well permitting; upstream data available to all)
- **Step 3:** Increase share of foreign private producers through new licensing and privatization

Royalty rates in Ukraine are significantly higher than peers



State Remains Dominant in Gas Production

Gas Production 2016 (Bcma)

