

# Seismic reflections

## The emerging Niobrara shale play

More evidence has emerged concerning the prospectivity of the US Great Plains shale plays. The latest example concerns Anadarko's announcement that it is confident that its Niobrara play in the Denver basin has a net resource potential of up to 1.5bnboe. In all probability the Niobrara play is emerging as the next major Great Plains shale play. The industry view that shale plays will boost US oil production by 1.5-2.0mmb/d by mid decade is looking increasingly plausible. US oil production could easily exceed the 1970 all-time high of 9.6mmb/d this decade.

### Niobrara background

The Niobrara shale is an Upper Cretaceous formation widely found in the Denver and Powder River basins of north-east Colorado, south-east Wyoming, south-west Nebraska and north-west Kansas. It contains inter-bedded limestones and shales of marine origin between 200 and 400 ft thick and at a depth of around 6,000 ft. The Niobrara overlays the Codell sandstone and Lower Cretaceous J Sandstone formations, which historically have been major sources of conventional oil and gas in the Denver basin, including in the Wattenberg field of north-east Colorado.

### Anadarko's Niobrara play

Anadarko's Niobrara development has been undertaken within the boundaries of the Wattenberg field where it has a large net land position of 350,000 acres. So far, 11 horizontal wells have been drilled targeting the Niobrara and to a more limited extent the Codell formation. Anadarko has achieved excellent well performance combined with a high liquids yield. Key findings include initial production (IP) rates of about 800boe/d, estimated ultimate recoveries of around 450,000boe, a liquids ratio of about 70% and a payout of less than 10 months. These well characteristics compare favourably with the Bakken play in North Dakota. Based on the early results of its Niobrara development programme, Anadarko has concluded that the recoverable resource potential is 500mmboe to 1.5bnboe. Significantly, well costs in the Niobrara at \$4-5m are well under the \$7-8m that typifies the Bakken. The economics of Anadarko's Niobrara play are further enhanced by easy access to infrastructure and ownership of mineral rights. Anadarko has a hefty inventory of drilling locations on its Wattenberg property and is planning to step up drilling activity from 40 wells in 2011 to about 160 in 2012.

### US production

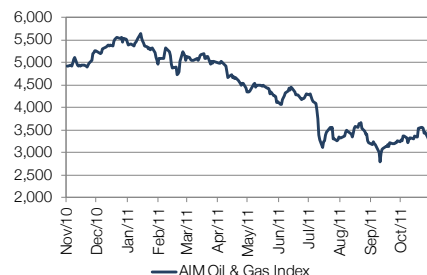
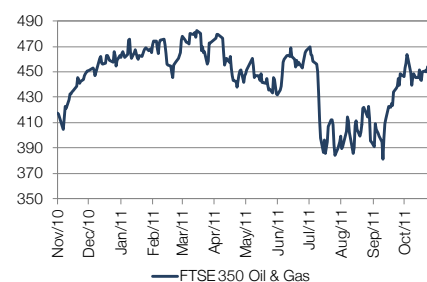
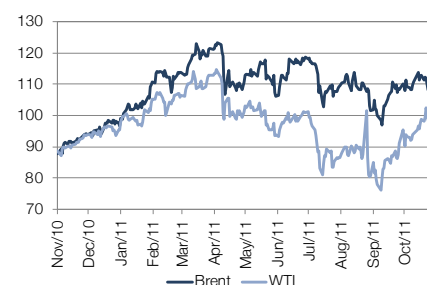
The US is currently producing about 5.7mmb/d of crude of which about 0.7mmb/d is from shale sources (Bakken/TF 0.48, EF 0.15, other 0.05). In addition, the US produces around 2.2mmb/d of natural gas liquids and 1mmb/d of ethanol, so on a broad definition oil production is already pretty close to the 1970 high of 9.6mmb/d.



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**Exhibit 1: Best and worst performers**

		1 week			
No.	Best performers	% change	No.	Worst performers	% change
1	AMERISUR RESOURCES	18.9%	1	FALKLAND OIL AND GAS	(25.2%)
2	DESIRE PETROLEUM	14.9%	2	BOWLEVEN PLC	(24.5%)
3	PETRO MATAD	12.6%	3	SOUND OIL	(22.0%)
4	ZHAIKMUNAI LP	7.8%	4	ASCENT RESOURCES	(20.5%)
5	SERICA ENERGY	7.0%	5	CADOGAN PETROLEUM	(16.9%)

		1 month			
No.	Best performers	% change	No.	Worst performers	% change
1	PROVIDENCE RESOURCES	31.6%	1	ASCENT RESOURCES	(54.8%)
2	ROXI PETROLEUM	29.2%	2	BOWLEVEN PLC	(35.7%)
3	BORDERS & SOUTHERN PETROL	24.6%	3	LENI GAS AND OIL	(34.0%)
4	AMERISUR RESOURCES	23.5%	4	HERITAGE OIL	(30.7%)
5	GULF KEYSTONE PETROLEUM	23.4%	5	ENDEAVOUR INTERNATIONAL	(29.9%)

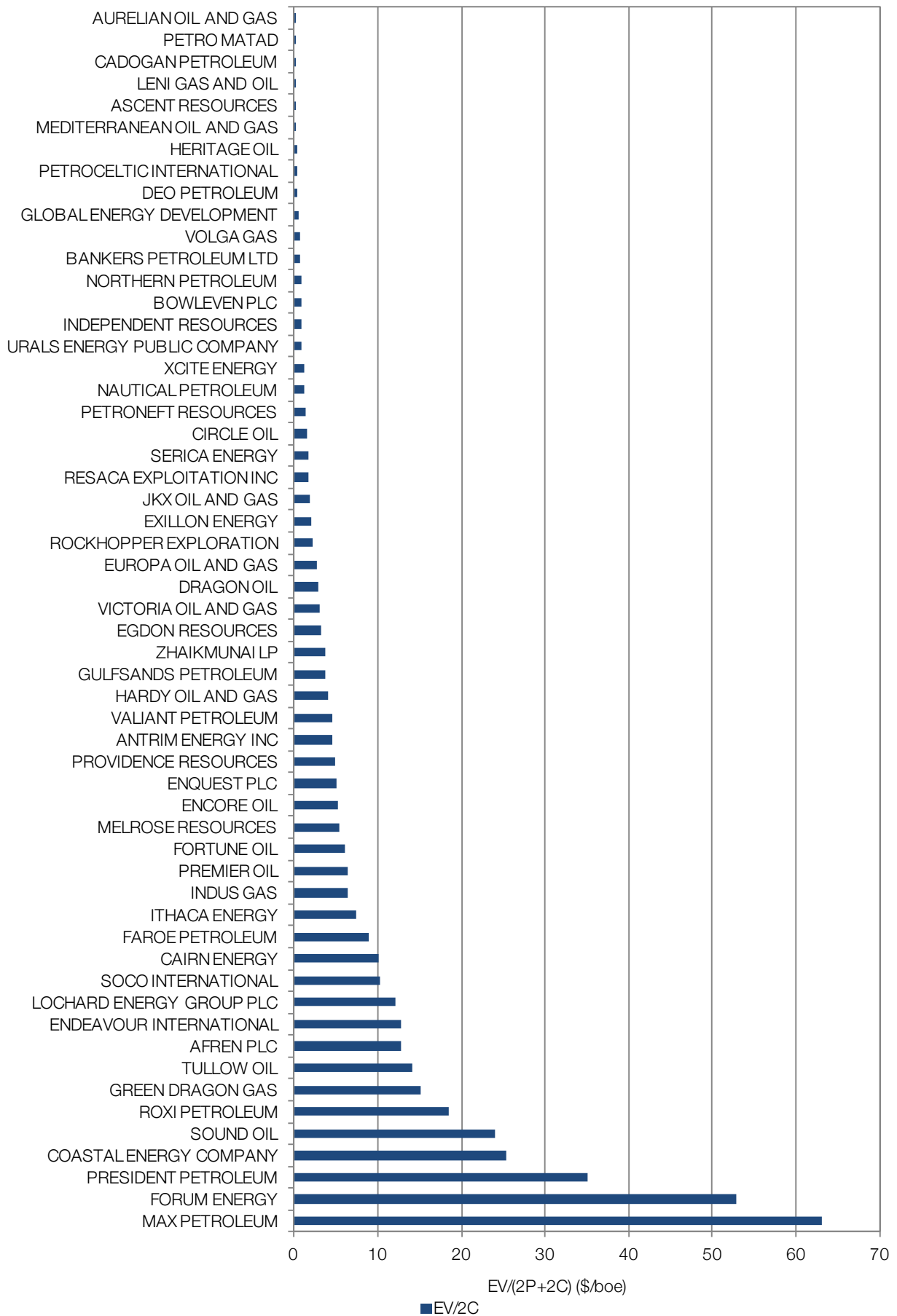
		3 months			
No.	Best performers	% change	No.	Worst performers	% change
1	ENCORE OIL	61.9%	1	PETRO MATAD	(73.1%)
2	DOMINION PETROLEUM	52.9%	2	AURELIAN OIL AND GAS	(61.6%)
3	ROXI PETROLEUM	47.6%	3	LENI GAS AND OIL	(59.2%)
4	PRESIDENT PETROLEUM	42.2%	4	FRONTERA RESOURCES CORPORATION	(56.7%)
5	GLOBAL ENERGY DEVELOPMENT	38.4%	5	AMINEX PLC	(55.4%)

		6 months			
No.	Best performers	% change	No.	Worst performers	% change
1	DESIRE PETROLEUM	114.4%	1	PETRO MATAD	(84.0%)
2	COASTAL ENERGY COMPANY	94.1%	2	BOWLEVEN PLC	(78.1%)
3	GLOBAL ENERGY DEVELOPMENT	91.4%	3	FRONTERA RESOURCES CORPORATION	(76.3%)
4	PRESIDENT PETROLEUM	82.4%	4	LENI GAS AND OIL	(72.3%)
5	ANTRIM ENERGY INC	19.4%	5	EUROPA OIL AND GAS	(71.8%)

		1 year			
No.	Best performers	% change	No.	Worst performers	% change
1	COASTAL ENERGY COMPANY	151.9%	1	FRONTERA RESOURCES CORPORATION	(81.3%)
2	GLOBAL ENERGY DEVELOPMENT	65.5%	2	BOWLEVEN PLC	(80.2%)
3	CADOGAN PETROLEUM	58.0%	3	DESIRE PETROLEUM	(79.0%)
4	RANGE RESOURCES	37.0%	4	PETRO MATAD	(78.9%)
5	INDUS GAS	32.0%	5	NIGHTHAWK ENERGY	(77.3%)

Source: Bloomberg

**Exhibit 2: EV/2P + 2C rankings**



Source: Bloomberg, company releases, Edison Investment Research

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