UBS

Global Equity Research

Europe Including UK

Oil Companies, Major

Sector Comment

UBS Investment Research

European Oil & Gas

Frontier Basin Update: Guyana-Suriname

11 February 2011

www.ubs.com/investmentresearch

Melanie Savage
Analyst
melanie.savage@ubs.com
+44 20 7568 7280

Jon Rigby, CFA
Analyst
jon.rigby@ubs.com
+44-20-7568 4168

- **Continuing our dive into frontier basins**

This is the third in a series of notes looking at various frontier basins in which we expect to see significant exploration activity. Over the past few years we have seen several small E&Ps transformed by discoveries in frontier regions.

- **Exciting exploration period in Guyana-Suriname basin set to begin**

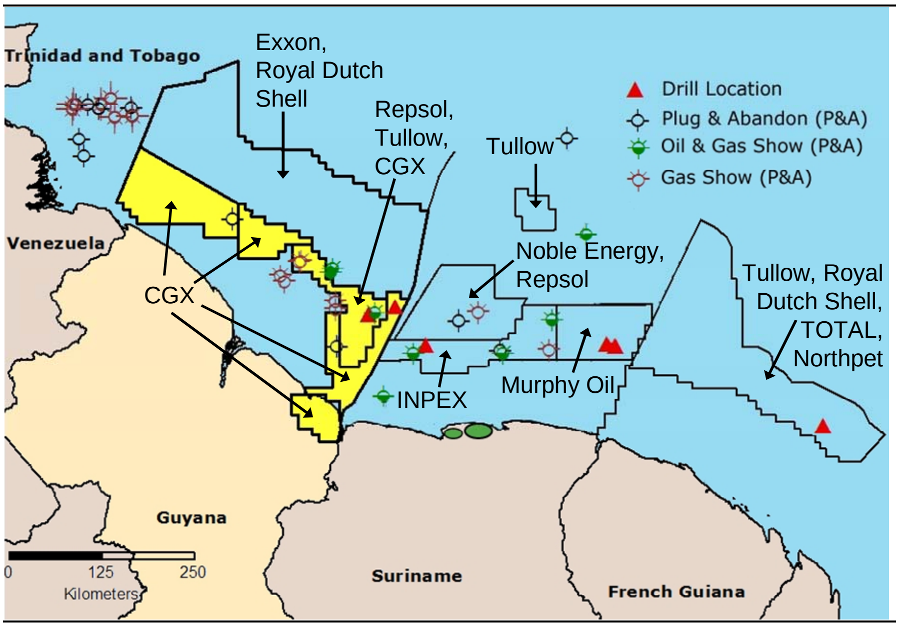
With Tullow's Zaedeus prospect in French Guiana due to spud towards the end of 1Q, focus on the Guyana-Suriname basin is likely to intensify. In 2011 a P50 case of >1.0bn boe is targeted, with a P10 case of >2.9bn boe. Success for Tullow's drilling would see 6% upside to NAV, and a P10 success case would add 18%.

- **Jaguar (Repsol, Tullow), Zaedyus (Tullow, Shell, TOTAL) look promising**

The two high profile wells to be drilled in 1Q and 2Q, Zaedyus and Jaguar, look exciting – Tullow believes that Zaedyus has structural elements which are similar to those seen on Jubilee, where there is a nose-like structure that should help to focus migration of hydrocarbons into the trap. On Jaguar, the prospect appears to be sitting above the source kitchen, therefore the lack of migration apparent at Murphy's Caracara prospect should not be an issue. We believe the main risk associated with this play is that prospects could be gas prone.

- **Tullow offers best exposure in coverage universe; increasing PT to 1570p**

Exposure to the wells drilling in 2011 can be gained via Tullow (B, 1570p), Repsol (B, €24), Royal Dutch Shell (B, 2350p), TOTAL (B, €42), Murphy Oil (N, $70), Inpex (N, Y530000). Other companies exposed include CGX and Northern Petroleum (not covered by UBS).



Source: CGX Energy

Frontier Basin Update: Guyana-Suriname

This is the third in a series of notes looking at various frontier basins in which we expect to see significant exploration activity. Previous notes '*European E&Ps – The next frontier*, *10 May 2010*' and '*Global Oil & Gas – Transforming the West African Margin*, *9 October 2009*' looked at frontier basins on a global scale, and the West African transform margin, respectively. We like exposure to frontier basins given that over the past few years we have seen several small E&Ps transformed by discoveries in frontier regions.

Tullow, Shell and TOTAL will begin drilling the 230-700Mboe Zaedyus prospect in the Guyana-Suriname basin at end February/early March, kicking off a potentially basin/play opening drilling campaign for Tullow, where we believe the company can begin to highlight significant upside if successful.

- Amongst our coverage universe, Tullow offers the highest exposure to Guyana-Suriname exploration.
- We have increased our Tullow NAV to 1424p from 1388p as we believe that the company will highlight the P10 upside on its prospects if drilling is successful, hence we have added P10 upside on a risked basis.
- We have increased our price target on Tullow to 1570p and reiterate our Buy rating.

Figure 1: Guyana, Suriname and French Guiana in South America

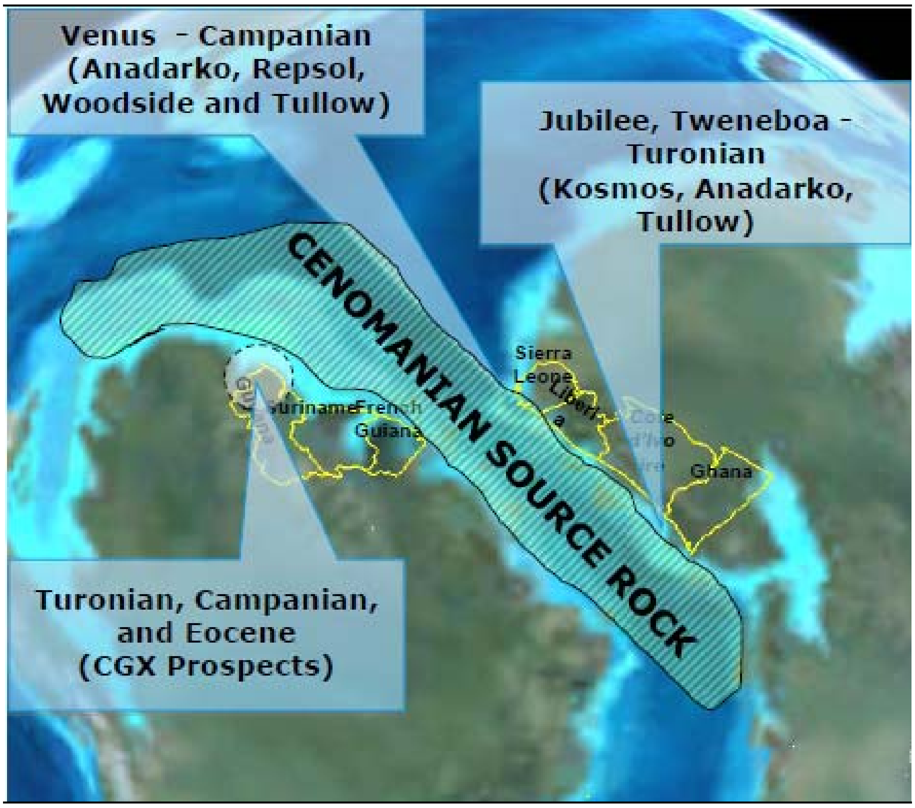
Source: Tullow Oil

While very few wells have been drilled in the Guyana-Suriname frontier area to date, seal, reservoir and source rock potential seen in the Tertiary and Upper Cretaceous thus far is encouraging. These elements have yet to be found together in one prospect but we believe that Tullow's superior analysis can unlock the potential.

We believe the geology of the Guyana-Suriname basin points to what should be a highly prospective hydrocarbon province, with Cenomanian-Turonian source rock responsible for many large hydrocarbon deposits around the world, the erosion of sands with the resultant deposition of what we expect to be high quality turbidite fans (with reservoir properties of a very similar nature to those seen in Ghana). Oil seeps and oil shows whilst drilling indicate that the source rock is mature for oil.

The Guyana-Suriname basin is coincident with the Sierra Leone basin (not strictly Ghana as is commonly believed), a 'twin' basin which has seen the Mercury discovery and was de-risked by the Venus well. Similarities should extend to source and reservoir rock deposition in this case. The USGS estimates risked resource potential in the Guyana-Suriname basin to be 15bn boe and 37Tcf.

Figure 2: Schematic of Africa and South America to show relative position of basins



Source: CGX Energy

In our view the main risk is that prospects are gas prone, with the Berbice River loading sediment offshore Guyana, and possibly sediment loading from the Amazon impacting French Guiana.

In this note, alongside geology and hydrocarbon potential, we look at ways investors could gain exposure to the Guyana-Suriname basin via small, medium or large companies, and the upcoming catalysts for these companies.

Companies exposed to Guyana-Suriname exploration

Table 1: Exposure by company

Company	Rating	Price target	Country exposure	Drilling	Prospects	Importance to the company
Drilling in 2011						
Tullow	Buy	1570p	French Guiana, Guyana, Suriname	1Q, 2Q	Zaedyus, Jaguar, Coronie	This year, Tullow will be drilling in three frontier basins, Guyana-Suriname, Mauritania and East Africa (Tanzania and Ethiopia). We believe that Tullow's strength in exploration should allow the company to open up these frontier basins to provide significant follow-on potential. Tullow's 1H11 drilling in Guyana-Suriname is high impact, with unrisked upside of 18% to NAV, based on the P10 success case.
Shell	Buy	2350p	French Guiana	1Q	Zaedyus	Royal Dutch Shell has a relatively high exploration budget (around $3bn in 2010). This designed to begin to rebuild the conventional oil and gas 'hopper' and we believe high impact exploration will be key. Much of the recent access has been focussed around a reinvigorated GoM effort and also Alaska, both put on hold because of Macondo and the resulting permitting issues that face the industry. Hence while a single well does not have a material impact on a large integrated it is important for sentiment.
TOTAL	Buy	€ 42	French Guiana	1Q	Zaedyus	TOTAL has not been very active in high risk/high reward exploration but this is beginning to change. It has taken significant steps towards new frontier exploration with Guyana as well as Mauritania, Angola pre-salt, Brazil, Vietnam and Brunei. High profile success in any of these will be important for sentiment in showing the process of renewal is underway.
Repsol	Buy	€ 24	Guyana	1Q	Jaguar	Repsol YPF has had notable success in turning its E&P business around with a focus on the drill bit. Brazil has obviously been a standout but it has had success in Venezuela and Liberia/Sierra Leone. Guyana forms part of another active year of exploration with wells in West Africa, Brazil and Cuba as well as Jaguar likely to be high profile.
Murphy Oil	Neutral	$70	Suriname	1Q	Aracari	Following earlier news of 3 unsuccessful wildcats in Congo, another dry hole at the massive Caracara prospect in Suriname is disappointing given material investor interest around MUR's high impact 4Q exploration program. We expect the stock to sell off in the near term, although downside may be limited pending results from the Semai II well in Indonesia & Aracari in Suriname by the end of 1Q11.
Inpex	Neutral	Y530000	Suriname	1Q	No details provided	
CGX Energy	not covered	-	Guyana	2Q, 4Q	Jaguar, Eagle	
Northern Petroleum	not covered	-	French Guiana	1Q	Zaedyus	
Wessex Exploration	not covered	-	French Guiana	1Q	Zaedyus	
Exposed but no drilling plans						
Exxon	Neutral	$81	Guyana	n/a	-	
Noble Energy	Neutral	$90	Suriname	n/a	-	

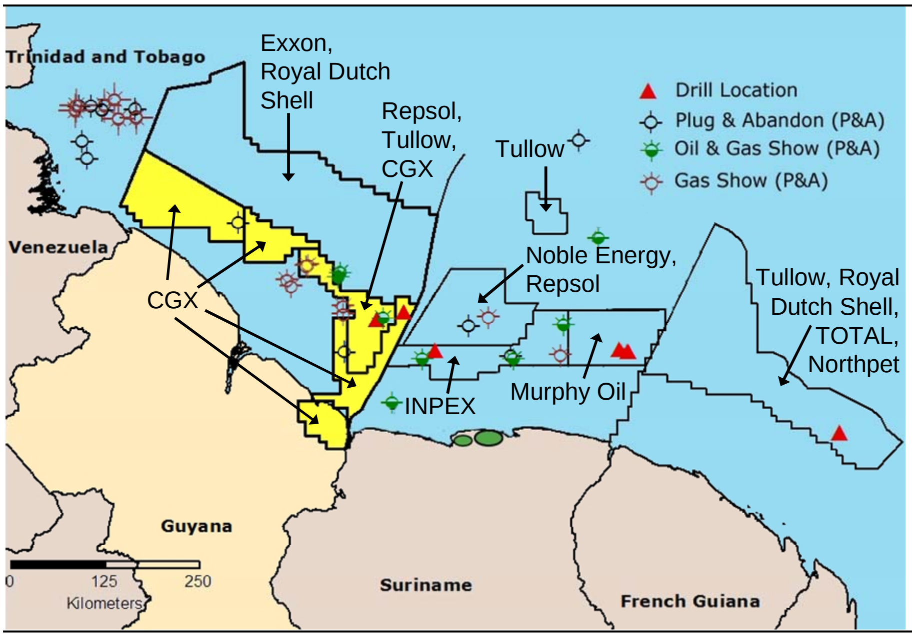
Source: UBS, company data

Wells to watch

- **1Q11**
  - **Murphy Oil** will drill the **200-550Mbbl Aracari** Palaeocene (Tertiary) prospect offshore **Suriname**. This is de-risked to some extent by the oil shows in the shale the company saw whilst drilling the Caracara prospect. This shale is in a similar age sand to the Aracari prospect, which indicates that oil could have migrated laterally into Aracari.
  - **Tullow, Shell, TOTAL and Wessex Exploration and Northern Petroleum** will be drilling the **230-700Mboe Zaedyus prospect** in **French Guiana**. The Zaedyus prospect is thought to be very similar to Jubilee in a structural sense, in that the prospect sits on a conically shaped fan system, thereby creating a structure which should help to deliver the charge into stratigraphic traps in the same way that the South Tano Nose helped focus sediment/charge into the Jubilee fan. **We estimate a success could see 64p upside to Tullow's NAV (5%), a success on the P10 case could add 191p, 13%.**
  - **Tullow** and partners plan to drill a low impact **5 well program** onshore **Suriname**.
  - **Inpex** will be drilling a well which could be targeting the **Albian** (early Cretaceous). If this well is successful this de-risks a play type which is a carbonate reef draped with Cenomanian source rock detailed by CGX and seen in its blocks.
- **2Q11**
  - **Repsol, Tullow and CGX** plan to drill the **230-700Mboe Jaguar prospect** in **Guyana**, the target depth is c5.6km. One scenario could be that the Jaguar and Eagle Deep prospects sit on top of the mature source rock hence migration risk is low. Updip seal however is a risk, which we believe Tullow has the expertise to reduce, as we believe it has been very successful in mapping turbidite fans in Ghana. **We estimate success could see 35p upside to Tullow's NAV (2%), a success on the P10 case could add 104p, 7%.**
- **4Q11**
  - **CGX** is targeting the **315-693Mboe Eagle prospect**, the 1.3-3.3bn boe Eagle Lower Turonian prospect and the 1.2-3.9bn boe Eagle Upper Turonian prospect and will drill the smaller Eagle prospect late 2011 due to well cost constraints (with a second well planned for 2013).

The Atwood Beacon jackup rig is drilling one further well for Murphy and one well for Inpex before moving on to the Jaguar prospect.

Figure 3: Acreage positions across Guyana-Suriname-French Guiana offshore



Source: CGX Energy

Acreage positions

Table 2: Block holdings in the Guyana-Suriname basin (* = operator)

		Tullow	Shell	TOTAL	Repsol	Exxon	Noble Energy	Inpex	Murphy Oil	CGX Energy	Northern Petroleum	Wessex Exploration	Paradise Oil
Guyana													
Stabroek	Deep water		25%			75%*							
Corentyne	Shallow water									100%*			
Pomeroon	Shallow water									100%*			
Corentyne Annex	Shallow water									100%*			
Georgetown	Shallow water	30%			45%*					25%			
Suriname													
Block 31	Shallow water							100%*					
Block 32	Deep water						100%*						
Block 30	Shallow water				40%*		60%						
Block 37	Shallow water								100%*				
Block 47	Deep water	100%*											
Coronie Block	Onshore	40%											60%*
Uitkijk Block	Onshore	36.5%											63.5%*
French Guiana													
Guyane Maritime	Deep water	27.5%*	45%	25%							1.25%	1.25%	

Source: Company data, UBS

How is the basin de-risked for hydrocarbon potential?

With the information gained from wells drilled in the basin to date, as well as some de-risking due to being part of a 'twin' basin to the West Africa Transform Margin we have used this to examine the potential risks of drilling in the Guyana-Suriname basin.

Approximately 37 wells have been drilled offshore Guyana, French Guiana and Suriname. A large number of these were shallow offshore. Wells drilled in the Guyana-Suriname basin generally haven't targeted the Turonian depths (c95 million years old) that Tullow and partners are planning to drill (Turonian-

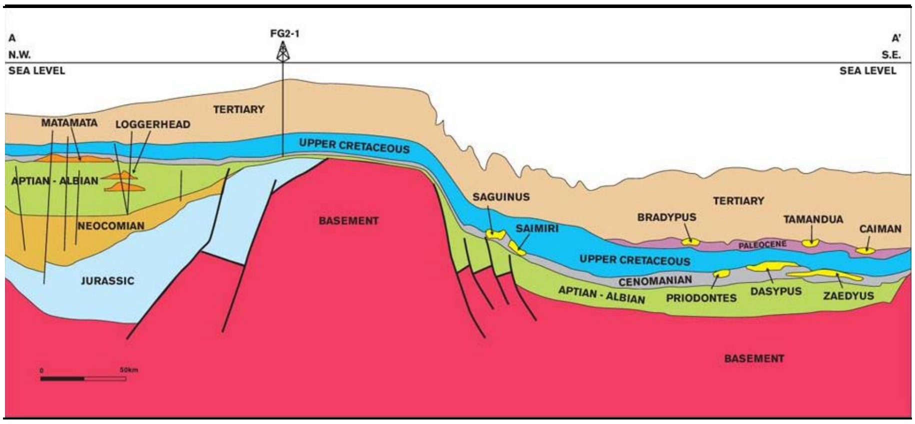
Campanian), however a handful have, and signs for this renewed phase of exploration are positive, as we describe below. Despite this, we would still class the basin as frontier.

- **Source maturity:** Oil shows in wells drilled to date de-risks oil generation potential in the basin, plus de-risking from being a twin with the West Africa Transform Margin means this is low risk in our view. Sediment loading from present day rivers may have caused source rock in some locations to become overmature hence we believe there is risk of gas.
- **Migration:** Oil shows in wells drilled at shallower levels, but there is higher risk for wells drilled far away from the zone of hydrocarbon generation. Risk varies depending on prospect location.
- **Reservoir:** High quality reservoir rock mentioned for most prospects drilled, plus the de-risking given the basin is a 'twin' to the West Africa Transform Margin means this is low risk.
- **Seal:** Wells drilled to date demonstrate that there are thick shale beds, which would act as seal rocks for reservoirs but the location and integrity of these beds relative to prospects varies. This is key, and something that we believe Tullow has expertise in assessing. We believe this is medium risk.

While the Jaguar, Zaedyus and Eagle Deep wells are targeting the Turonian, other wells drilled in the region have seen varying results, but details that stand out are good quality reservoir rock and shales which provide a seal. The missing factor in these wells appears to be migration of oil into the reservoir. This can perhaps be circumnavigated by drilling a well closer to the source kitchen, as planned with the Jaguar prospect.

- **Shell's Abary-1 well** was drilled to lower Tertiary/Upper Cretaceous horizons (Maastrichtian) and encountered oil and gas shows with excellent seal rock and 23ft of turbidite sand however the well was overpressured and drilling was discontinued.
- **CGX's Horseshoe West** drilled to Lower Tertiary/Upper Cretaceous but had no shale trap. The well encountered high quality reservoir rock.
- **Elf's Coronie-1 well** was drilled into Turonian sandstones in shallow waters, but was a dry hole.
- Murphy drilled the **Caracara** well into mid-Cretaceous levels. They saw oil shows in shale sections higher up in the well but drilled into high quality reservoir that had not been charged. An interpretation of this is that the prospect was not in the oil migration pathway, whereas the Jaguar and Eagle Deep prospects are very close to what CGX believes is mature source rock.

Figure 4: Cross section of Guyane Maritime acreage



Source: Wessex Exploration

Risks to drilling success

We believe the main risk to a success in the near term drilling program is that the prospects could be gas prone.

Gas

The rocks containing the Jaguar prospect will have seen overloading by sediment as the prospect is situated at the mouth of the Berbice River – this overloading could have pushed the source rock through the oil maturation window into the gas maturation window.

The Zaedyus prospect is towards the edge of the Foz de Amazonas basin, with the Demerara Plateau separating Guyana-Suriname from French Guiana. There is a risk that sediment loading from the Amazon has caused the shelf to subside in this area, with oil mature source being buried into the gas maturation zone. With the Demerara Plateau providing a distinct break between source rock deposition in the two sub-basins, and a lack of wells drilled offshore French Guiana, this leaves it difficult to establish vitrinite reflectance and hence source rock maturity estimates.

Seal

While CGX's Horseshoe well saw no shale trap (and no evidence of residual hydrocarbons), the company thinks that this is localised to the Berbice Canyon area (as the formation of a canyon will have eroded layers of overlying rock). However, the proposed Jaguar well lies at the base of this canyon – this is likely a place where a significant amount of sand has pooled to form a turbidite fan, but there is a risk of further erosion of this by later sand flows, which may have caused erosion of the overlying shale trap.

Migration

We believe that for the younger prospects such as Eagle and Aracari, the risk is related to migration – even in what should be a prospective area updip of the main zone of source generation for CGX's Horseshoe well, the reservoir showed no traces of oil.

Geology of the Guyana-Suriname basin

Source rock – world class

The source rock of the basin was deposited at a time when drift between Africa and South America had just begun, and the basin at this time was restricted, hence there was limited influence of oxygen-rich ocean water. These anoxic conditions precipitated the deposition of thick layers of carbon-rich source rock, known locally as the Canje formation. The age of this source rock is Cenomanian-Turonian, the same age as that found along the West Africa Transform Margin, which is to be expected given that the Guyana-Suriname Basin formed at the same time as the basins off the coast of West Africa.

Twinned with Sierra Leone-Guinea basin

A look at the relative positioning of Africa and South America indicates that the Guyana-Suriname basin was coincident with Guinea-Sierra Leone. The part of South America twinned with Ghana is the Northern coast of Brazil, however, we presume that with the mass of sediment deposited by the Amazon River, any similar source rocks are buried deep into the gas window.

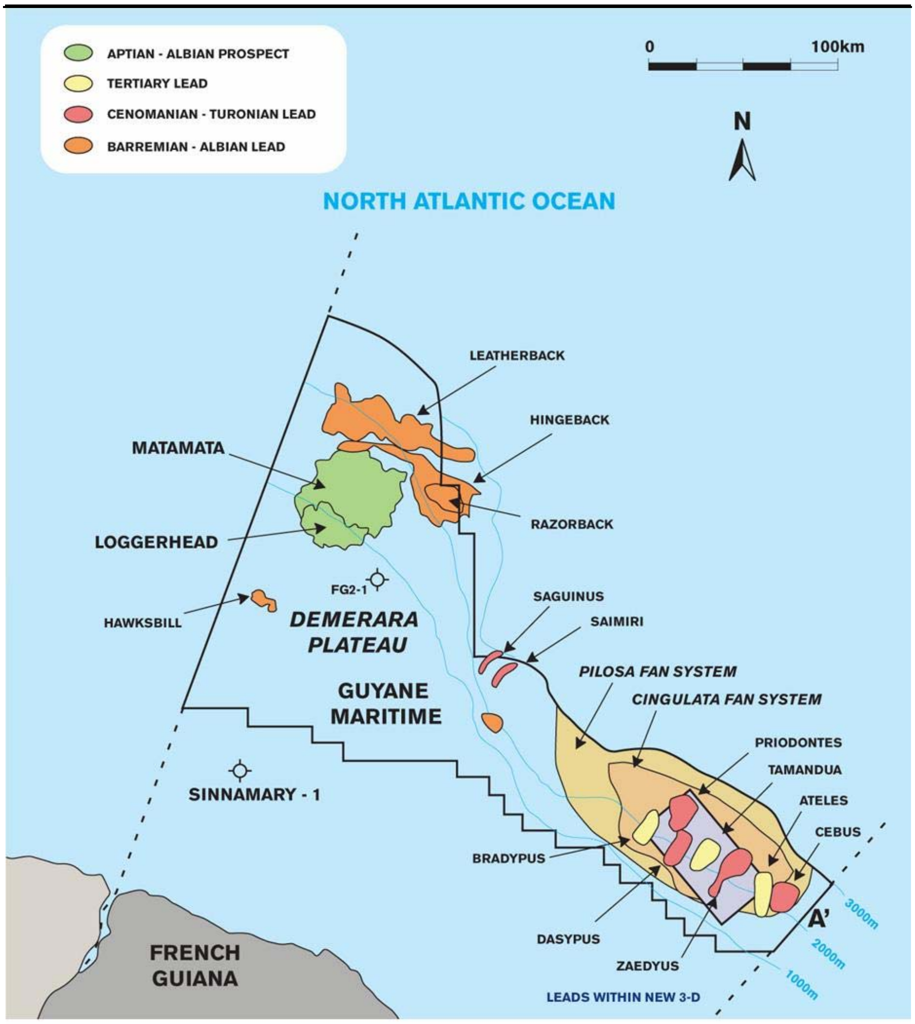
Expect very good quality reservoir rock

As with any deepwater basin, the formation of turbidite channels and fans is a given where rivers drain the landmass. Because Africa and South America were once part of the same continent, we can expect that the reservoir source rock is very much the same on both sides of the Atlantic; hence we expect similar quality reservoir rock to be displayed on both sides, with the same Late Cretaceous age. Importantly, rivers were draining into the Guyana-Suriname basin, creating sand-rich turbidite fans until the mid-Tertiary, when relative movements on the Pacific and South American plates caused an eastwards tilt of South America. This meant that the path of the Amazon shifted and consequently cut off the rivers that were draining into the Guyana-Suriname basin.

Further prospectivity offered in deeper rock layers

In addition to turbidite fan plays of Turonian to Tertiary age, there is an older play, specifically Albian age carbonate reefs (which are also present in the West Africa Transform Margin, but undrilled to date). This play type may be what Inpex is targeting. While the Cenomanian-Turonian source rock was deposited after the Albian reefs, CGX's seismic analysis shows that this is draped over the reef structures and therefore migration into the reef structures may have taken place.

Figure 5: Guyane Maritime acreage offshore French Guiana showing different play types



Source: Wessex Exploration

No similarities to Campos and Santos basins

A difference between the limestone-rich Campos and Santos basins and the sandstone-rich Guyana-Suriname basin is due to the level of thermal subsidence that both experienced. Subsidence in the Guyana-Suriname basin was low, with a large amount of clastic (sandy) material washed offshore by rivers. The Campos and Santos basins saw the opposite effect, with high thermal subsidence and limited clastic input due to the direction of rivers away from these basins. This allowed for a greater level of limestone accumulation.

Table 3: Tullow NAV

NAV		P50 gross resources	P50 working interest	P50 entitled reserves	EV/bbl working interest	EV/bbl entitled	Risk weighting	Unrisked EV	Risked EV	Risked EV	Risked EV/sh ($85LT)	% of group value ($85LT)	Unrisked EV/sh ($85LT)	NAV upside
Country	**Field**	**mmboe**	**mmboe**	**mmboe**	**$/boe**	**$/boe**	**%**	**$m**	**$m**	**£m**	**p/sh**	**%**	**p/sh**	**p/sh**
Ivory Coast		**49**	**11**	**6**	**24.0**	**45.8**	**100%**	**253**	**253**	**163**	**18**	**1%**	**18**	**0**
Equatorial guinea		**176**	**25**	**22**	**28.6**	**32.7**	**100%**	**717**	**717**	**463**	**52**	**4%**	**52**	**0**
Gabon		**135**	**17**	**13**	**18.9**	**24.2**	**100%**	**315**	**315**	**203**	**23**	**2%**	**23**	**0**
Congo		**152**	**17**	**11**	**27.1**	**41.6**	**100%**	**452**	**452**	**291**	**33**	**2%**	**33**	**0**
Mauritania		**15**	**3**	**2**	**33.1**	**40.2**	**100%**	**97**	**97**	**62**	**7**	**0%**	**7**	**0**
UK		**50**	**22**	**22**	**8.7**	**8.7**	**100%**	**191**	**191**	**123**	**14**	**1%**	**14**	**0**
Bangladesh		**68**	**20**	**11**	**2.9**	**5.2**	**100%**	**59**	**59**	**38**	**4**	**0%**	**4**	**0**
Ghana UNIT	Jubilee Phase 1&1a	470	163	163	17.8	17.8	100%	2902	2902	1872	211	15%		
Ghana UNIT	Jubilee P50 remainder- (2013)- Phase 1b/1c	230	80	80	12.2	12.2	100%	977	977	630	71	5%		
Ghana UNIT	Jubilee- Associated gas	53	19	19	5.1	5.1	100%	95	95	61	7	0%		
Ghana UNIT	Southeast Jubilee P50	300	69	69	10.1	10.1	100%	695	695	448	51	4%		
Ghana WC3	Odum P50	100	23	23	8.1	8.1	100%	186	186	120	14	1%		
Ghana WC3	Teak P50	100	23	23	10.1	10.1	80%	232	185	120	14	1%	17	3
Ghana DWT	Tweneboa-1 P50	300	142	142	8.1	8.1	100%	1151	1151	742	84	6%		
Ghana DWT	Tweneboa 3 - Ntomme	230	109	109	8.1	8.1	100%	882	882	569	64	5%	64	0
Ghana DWT	Enyenra (Owo)	200	94	94	10.1	10.1	100%	955	955	616	70	5%		
Ghana		**1983**	**720**	**720**	**11.2**	**11.2**	**99%**	**8074**	**8028**	**5179**	**585**	**41%**	**588**	**3**
Uganda	Kasamene	50	43	16	5.0	13.3	85%	213	181	117	13	1%		
Uganda	Ngassa 2	100	85	32	5.0	13.3	85%	425	361	233	26	2%		
Uganda	Other block 2 discoveries	150	128	48	5.0	13.3	85%	638	542	350	39	3%		
Uganda	**Block 2**	**300**	**255**	**96**	**5.0**	**13.3**	**85%**	**1275**	**1084**	**699**	**79**	**6%**		
Uganda	Mpoyo 1 (Crocodile)	100	85	32	5.0	13.3	85%	425	361	233	26	2%	31	5
Uganda	Warthog	100	85	32	5.0	13.3	85%	425	361	233	26	2%		
Uganda	Buffalo / Giraffe	300	255	96	5.0	13.3	85%	1275	1084	699	79	6%		
Uganda	**Block 1**	**500**	**425**	**159**	**5.0**	**13.3**	**85%**	**2125**	**1806**	**1165**	**132**	**9%**		
Uganda	Block 3A Kingfisher	200	170	64	5.0	13.3	85%	850	723	466	53	4%		
Uganda		**1000**	**850**	**319**	**5.0**	**13.3**	**85%**	**4250**	**3613**	**2331**	**263**	**18%**	**310**	**46**
Commercial NAV		**3628**	**1684**	**1126**	**8.6**	**12.8**	**95%**	**14408**	**13725**	**8855**	**1000**	**70%**	**1050**	**50**
Mauritania	Tevet	65	12	9	5.2	6.9	50%	64	32	21	2	0%	5	2
Mauritania	Labeidna	10	2	1	5.2	6.9	20%	10	2	1	0	0%	1	1
Mauritania	Tiof	250	54	40	5.2	6.9	50%	281	140	91	10	1%	20	10
Mauritania	Banda- PSC area A	283	69	52	5.2	6.9	50%	358	179	116	13	1%	26	13
Mauritania	Faucon	17	6	5	5.2	6.9	20%	33	7	4	0	0%	2	2
Mauritania	Aigrette	117	19	14	5.2	6.9	20%	98	20	13	1	0%	7	6
Mauritania	Pelican	70	11	9	5.2	6.9	30%	59	18	11	1	0%	4	3
Mauritania	Cormoran	100	16	12	5.2	6.9	30%	84	25	16	2	0%	6	4
Mauritania		**912**	**190**	**142**	**5.2**	**6.9**	**43%**	**988**	**423**	**273**	**31**	**2%**	**72**	**41**
Namibia	Kudu	500	155	155	0.7	0.7	60%	115	69	44	5	0%	8	3
Namibia		**500**	**155**	**155**	**0.7**	**0.7**	**60%**	**115**	**69**	**44**	**5**	**0%**	**8**	**3**
Sierra Leone	Mercury	150	15	15	12.0	12.0	50%	181	90	58	7	0%	13	7
Sierra Leone		**150**	**15**	**15**	**12.0**	**12.0**	**50%**	**181**	**90**	**58**	**7**	**0%**	**13**	**7**
Pakistan	Kohat- Shekhan 1	97	39	39	1.0	1.0	50%	39	20	13	1	0%	3	1
Pakistan		**97**	**39**	**39**	**1.0**	**1.0**	**50%**	**39**	**20**	**13**	**1**	**0%**	**3**	**1**
UK	K4	25	6	6	12.9	12.9	85%	73	62	40	5	0%	5	1
UK	Bure N	2	1	1	12.9	12.9	85%	14	12	8	1	0%		
UK	Harrison	20	2	2	12.9	12.9	85%	25	21	13	2	0%	2	0
UK		**47**	**9**	**9**	**12.9**	**12.9**	**85%**	**112**	**95**	**61**	**7**	**0%**	**7**	**1**
Netherlands	Epidote	4	1	1	6.4	6.4	50%	8	4	3	0	0%	1	0
Netherlands		**4**	**1**	**1**	**6.4**	**6.4**	**50%**	**8**	**4**	**3**	**0**	**0%**	**1**	**0**
Contingent NAV		**1559**	**394**	**346**	**3.2**	**3.6**	**48%**	**1261**	**610**	**394**	**44**	**3%**	**91**	**47**
Liberia	Cobalt	217	54	54	8.3	8.3	30%	449	135	87	10	1%	33	23
Liberia		**217**	**54**	**54**	**8.3**	**8.3**	**30%**	**449**	**135**	**87**	**10**	**1%**	**33**	**23**
Sierra Leone	Jupiter	83	8	8	12.0	12.0	30%	100	30	19	2	0%	7	5
Sierra Leone		**83**	**8**	**8**	**12.0**	**12.0**	**30%**	**100**	**30**	**19**	**2**	**0%**	**7**	**5**
Ghana DWT	Enyenra upside	350	165	165	10.1	10.1	60%	1671	1002	647	73	5%	122	49
Ghana DWT	Tweneboa 4 upside	320	151	151	8.1	8.1	60%	1227	736	475	54	4%	89	36
Ghana WC3	Teak P10 upside	100	23	23	10.1	10.1	60%	232	139	90	10	1%	17	7
Ghana WC3	Southeast Jubilee P10	150	71	71	10.1	10.1	30%	716	215	139	16	1%	52	37
Ghana DWT	DWT	528	249	249	10.1	10.1	25%	2519	630	406	46	3%	184	138
Ghana WC3	WC3P	678	155	155	10.1	10.1	25%	1570	393	253	29	2%	114	86
Ghana UNIT	Jubilee unit area recovery factor upside	300	105	105	10.1	10.1	30%	1064	319	206	23	2%	77	54
Ghana		**2426**	**919**	**919**	**9.8**	**9.8**	**38%**	**8999**	**3434**	**2216**	**250**	**18%**	**656**	**405**
West Africa	3/6 Jubilee analogues derisked by Venus	4500	1044	1044	9.1	9.1	30%	9548	2864	1848	209	15%	696	487
West Africa (incremental)		**4500**	**1044**	**1044**	**9.1**	**9.1**	**30%**	**9548**	**2864**	**1848**	**209**	**15%**	**696**	**487**
French Guiana	Guyane Maritime- Zaedyus	233	64	64	11.9	11.9	20%	761	152	98	11	1%	55	44
French Guiana	Zaedyus P10 upside	467	128	128	11.9	11.9	10%	1522	152	98	11	1%	111	100
Guyana	Georgetown- Jaguar	233	70	39	8.5	15.2	20%	597	119	77	9	1%	43	35
Guyana	Jaguar P10 upside	467	140	79	8.5	15.2	10%	1194	119	77	9	1%	87	78
Suriname	5 well campaign	83	33	9	1.1	4.0	20%	36	7	5	1	0%	3	2
South America		**1483**	**436**	**319**	**9.4**	**12.9**	**13%**	**4110**	**550**	**355**	**40**	**3%**	**299**	**259**
Uganda	Block 1- Jobi East 1- exploration	80	68	25	5.0	13.3	40%	340	136	88	10	1%	25	15
Uganda	Block 1- Jobi East 2- exploration	80	68	25	5.0	13.3	40%	340	136	88	10	1%	25	15
Uganda	Block 1- Jobi East 5- exploration	80	68	25	5.0	13.3	40%	340	136	88	10	1%	25	15
Uganda	Block 1- Leopard- exploration	80	68	25	5.0	13.3	40%	340	136	88	10	1%	25	15
Uganda	Block 1- Ngiri-3 appraisal	50	43	16	5.0	13.3	40%	213	85	55	6	0%	15	9
Uganda	Block 1- Ngiri-4 appraisal	50	43	16	5.0	13.3	40%	213	85	55	6	0%	15	9
Uganda	Block 2- Kasamene-3- appraisal/devt	50	43	16	5.0	13.3	40%	213	85	55	6	0%	15	9
Uganda	Block 2- Nzizi-3-appriasal/devt	50	43	16	5.0	13.3	40%	213	85	55	6	0%	15	9
Uganda		**520**	**442**	**166**	**5.0**	**13.3**	**40%**	**2210**	**884**	**570**	**64**	**5%**	**161**	**97**
Mauritania	Block 6- Gharabi	233	52	39	5.2	6.9	20%	272	54	35	4	0%	20	16
Mauritania		**233**	**52**	**39**	**5.2**	**6.9**	**20%**	**272**	**54**	**35**	**4**	**0%**	**20**	**16**
Gabon	Maroc North	17	1	1	3.9	5.1	50%	5	2	2	0	0%	0	0
Gabon	Falcon North	22	7	5	0.8	1.0	50%	5	2	2	0	0%	0	0
Gabon		**38**	**8**	**6**	**1.3**	**1.6**	**50%**	**10**	**5**	**3**	**0**	**0%**	**1**	**0**
Netherlands	E13b- Muscovite	5	1	1	6.4	6.4	30%	5	2	1	0	0%	0	0
Netherlands	E15c- Seahorse	5	1	1	6.4	6.4	30%	6	2	1	0	0%	0	0
Netherlands		**10**	**2**	**2**	**6.4**	**6.4**	**30%**	**12**	**4**	**2**	**0**	**0%**	**1**	**1**
Exploration NAV		**9511**	**2965**	**2557**	**8.7**	**10.1**	**31%**	**25709**	**7960**	**5136**	**580**	**41%**	**1873**	**1293**
Less exploration costs		0	0	0	0.0	0.0	0%	-1114	-1114	-719	-81	-6%	-81	0
Net exploration NAV		**9511**	**2965**	**2557**	**8.3**	**9.6**	**28%**	**24595**	**6847**	**4417**	**499**	**35%**	**1792**	**1293**
Tariff income value	PV of future post tax CF							303	303	195	22	2%	22	0
Hedging value isolated	PV of future hedging profit / loss							67	67	43	5	0%	5	0
Less corporate costs	6x EV/EBITDA + DCF backup							-474	-474	-306	-35	-2%	-35	0
(Net debt) / net cash	UBSE Adjusted 30 June 2010							-1527	-1527	-985	-111	-8%	-111	0
Net financial items								**-1631**	**-1631**	**-1052**	**-119**	**-8%**	**-119**	**0**
Core NAV								**12777**	**12093**	**7802**	**881**	**62%**	**931**	**50**
Contingent NAV								**1261**	**610**	**394**	**44**	**3%**	**91**	**46**
Exploration NAV								**24595**	**6847**	**4417**	**499**	**35%**	**1792**	**1293**
Risked NAV								**38634**	**19550**	**12613**	**1424**	**100%**	**2814**	**1389**

Source: UBS estimates, company data

■ Statement of Risk

The risks associated with our investment thesis include volatility in oil and natural gas prices, margins for global refining, marketing, and chemicals, as well as normal exploration risks associated with the oil and gas business.

■ Analyst Certification

Each research analyst primarily responsible for the content of this research report, in whole or in part, certifies that with respect to each security or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about those securities or issuers; and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed by that research analyst in the research report.

Required Disclosures

This report has been prepared by UBS Limited, an affiliate of UBS AG. UBS AG, its subsidiaries, branches and affiliates are referred to herein as UBS.

For information on the ways in which UBS manages conflicts and maintains independence of its research product; historical performance information; and certain additional disclosures concerning UBS research recommendations, please visit www.ubs.com/disclosures. The figures contained in performance charts refer to the past; past performance is not a reliable indicator of future results. Additional information will be made available upon request. UBS Securities Co. Limited is licensed to conduct securities investment consultancy businesses by the China Securities Regulatory Commission.

UBS Investment Research: Global Equity Rating Allocations

UBS 12-Month Rating	Rating Category	Coverage[1]	IB Services[2]
Buy	**Buy**	49%	40%
Neutral	**Hold/Neutral**	42%	35%
Sell	**Sell**	8%	21%
UBS Short-Term Rating	**Rating Category**	**Coverage[3]**	**IB Services[4]**
Buy	**Buy**	less than 1%	14%
Sell	**Sell**	less than 1%	0%

1:Percentage of companies under coverage globally within the 12-month rating category.
2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.
3:Percentage of companies under coverage globally within the Short-Term rating category.
4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS. Rating allocations are as of 31 December 2010.

UBS Investment Research: Global Equity Rating Definitions

UBS 12-Month Rating	Definition
Buy	FSR is > 6% above the MRA.
Neutral	FSR is between -6% and 6% of the MRA.
Sell	FSR is > 6% below the MRA.
UBS Short-Term Rating	**Definition**
Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
Sell	Sell: Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.

KEY DEFINITIONS

Forecast Stock Return (FSR) is defined as expected percentage price appreciation plus gross dividend yield over the next 12 months.
Market Return Assumption (MRA) is defined as the one-year local market interest rate plus 5% (a proxy for, and not a forecast of, the equity risk premium).
Under Review (UR) Stocks may be flagged as UR by the analyst, indicating that the stock's price target and/or rating are subject to possible change in the near term, usually in response to an event that may affect the investment case or valuation.
Short-Term Ratings reflect the expected near-term (up to three months) performance of the stock and do not reflect any change in the fundamental view or investment case.
Equity Price Targets have an investment horizon of 12 months.

EXCEPTIONS AND SPECIAL CASES

UK and European Investment Fund ratings and definitions are: Buy: Positive on factors such as structure, management, performance record, discount; Neutral: Neutral on factors such as structure, management, performance record, discount; Sell: Negative on factors such as structure, management, performance record, discount.
Core Banding Exceptions (CBE): Exceptions to the standard +/-6% bands may be granted by the Investment Review Committee (IRC). Factors considered by the IRC include the stock's volatility and the credit spread of the respective company's debt. As a result, stocks deemed to be very high or low risk may be subject to higher or lower bands as they relate to the rating. When such exceptions apply, they will be identified in the Company Disclosures table in the relevant research piece.

Research analysts contributing to this report who are employed by any non-US affiliate of UBS Securities LLC are not registered/qualified as research analysts with the NASD and NYSE and therefore are not subject to the restrictions contained in the NASD and NYSE rules on communications with a subject company, public appearances, and trading securities held by a research analyst account. The name of each affiliate and analyst employed by that affiliate contributing to this report, if any, follows.

UBS Limited: Melanie Savage; Jon Rigby, CFA.

Company Disclosures

Company Name	Reuters	12-mo rating	Short-term rating	Price	Price date
ExxonMobil Corp.[3, 5, 6b, 7, 16, 18]	XOM.N	Neutral	N/A	US$82.55	09 Feb 2011
INPEX Corporation[2, 4, 16]	1605.T	Neutral	N/A	¥545,000	10 Feb 2011
Murphy Oil Corporation[16]	MUR.N	Neutral	N/A	US$68.07	09 Feb 2011
Noble Energy, Inc.[5, 6a, 6c, 7, 16]	NBL.N	Neutral	N/A	US$89.09	09 Feb 2011
Repsol YPF[2, 4, 5, 16]	REP.MC	Buy	N/A	€23.40	09 Feb 2011
Royal Dutch Shell[3, 4, 5, 6a, 16, 22]	RDSa.L	Buy	N/A	2,144p	09 Feb 2011
TOTAL[2, 4, 5, 6a, 12, 16]	TOTF.PA	Buy	N/A	€43.00	09 Feb 2011
Tullow Oil[5, 16]	TLW.L	Buy	N/A	1,403p	09 Feb 2011

Source: UBS. All prices as of local market close.
Ratings in this table are the most current published ratings prior to this report. They may be more recent than the stock pricing date

2. UBS AG, its affiliates or subsidiaries has acted as manager/co-manager in the underwriting or placement of securities of this company/entity or one of its affiliates within the past 12 months.
3. UBS Ltd is acting as financial advisor to Royal Dutch Shell plc and ExxonMobil Corporation on the sale of certain underground gas storage facilities in Germany to GDF Suez
4. Within the past 12 months, UBS AG, its affiliates or subsidiaries has received compensation for investment banking services from this company/entity.
5. UBS AG, its affiliates or subsidiaries expect to receive or intend to seek compensation for investment banking services from this company/entity within the next three months.

6a. This company/entity is, or within the past 12 months has been, a client of UBS Securities LLC, and investment banking services are being, or have been, provided.

6b. This company/entity is, or within the past 12 months has been, a client of UBS Securities LLC, and non-investment banking securities-related services are being, or have been, provided.

6c. This company/entity is, or within the past 12 months has been, a client of UBS Securities LLC, and non-securities services are being, or have been, provided.

7. Within the past 12 months, UBS Securities LLC has received compensation for products and services other than investment banking services from this company/entity.

12. Directors or employees of UBS AG, its affiliates or subsidiaries are directors of this company.

16. UBS Securities LLC makes a market in the securities and/or ADRs of this company.

18. The U.S. equity strategist, a member of his team, or one of their household members has a long common stock position in Exxon Mobil Corp.

22. UBS AG, its affiliates or subsidiaries held other significant financial interests in this company/entity as of last month`s end (or the prior month`s end if this report is dated less than 10 working days after the most recent month`s end).

This report was sent to the issuer prior to publication solely for the purpose of checking for factual accuracy, and no material changes were made to the content based on the issuer's feedback.

Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

For a complete set of disclosure statements associated with the companies discussed in this report, including information on valuation and risk, please contact UBS Securities LLC, 1285 Avenue of Americas, New York, NY 10019, USA, Attention: Publishing Administration.

Global Disclaimer

This report has been prepared by UBS Limited, an affiliate of UBS AG. UBS AG, its subsidiaries, branches and affiliates are referred to herein as UBS. In certain countries, UBS AG is referred to as UBS SA.

This report is for distribution only under such circumstances as may be permitted by applicable law. Nothing in this report constitutes a representation that any investment strategy or recommendation contained herein is suitable or appropriate to a recipient's individual circumstances or otherwise constitutes a personal recommendation. It is published solely for information purposes, it does not constitute an advertisement and is not to be construed as a solicitation or an offer to buy or sell any securities or related financial instruments in any jurisdiction. No representation or warranty, either express or implied, is provided in relation to the accuracy, completeness or reliability of the information contained herein, except with respect to information concerning UBS AG, its subsidiaries and affiliates, nor is it intended to be a complete statement or summary of the securities, markets or developments referred to in the report. UBS does not undertake that investors will obtain profits, nor will it share with investors any investment profits nor accept any liability for any investment losses. Investments involve risks and investors should exercise prudence in making their investment decisions. The report should not be regarded by recipients as a substitute for the exercise of their own judgement. Past performance is not necessarily a guide to future performance. The value of any investment or income may go down as well as up and you may not get back the full amount invested. Any opinions expressed in this report are subject to change without notice and may differ or be contrary to opinions expressed by other business areas or groups of UBS as a result of using different assumptions and criteria. Research will initiate, update and cease coverage solely at the discretion of UBS Investment Bank Research Management. The analysis contained herein is based on numerous assumptions. Different assumptions could result in materially different results. The analyst(s) responsible for the preparation of this report may interact with trading desk personnel, sales personnel and other constituencies for the purpose of gathering, synthesizing and interpreting market information. UBS is under no obligation to update or keep current the information contained herein. UBS relies on information barriers to control the flow of information contained in one or more areas within UBS, into other areas, units, groups or affiliates of UBS. The compensation of the analyst who prepared this report is determined exclusively by research management and senior management (not including investment banking). Analyst compensation is not based on investment banking revenues, however, compensation may relate to the revenues of UBS Investment Bank as a whole, of which investment banking, sales and trading are a part.

The securities described herein may not be eligible for sale in all jurisdictions or to certain categories of investors. Options, derivative products and futures are not suitable for all investors, and trading in these instruments is considered risky. Mortgage and asset-backed securities may involve a high degree of risk and may be highly volatile in response to fluctuations in interest rates and other market conditions. Past performance is not necessarily indicative of future results. Foreign currency rates of exchange may adversely affect the value, price or income of any security or related instrument mentioned in this report. For investment advice, trade execution or other enquiries, clients should contact their local sales representative. Neither UBS nor any of its affiliates, nor any of UBS' or any of its affiliates, directors, employees or agents accepts any liability for any loss or damage arising out of the use of all or any part of this report. For financial instruments admitted to trading on an EU regulated market: UBS AG, its affiliates or subsidiaries (excluding UBS Securities LLC and/or UBS Capital Markets LP) acts as a market maker or liquidity provider (in accordance with the interpretation of these terms in the UK) in the financial instruments of the issuer save that where the activity of liquidity provider is carried out in accordance with the definition given to it by the laws and regulations of any other EU jurisdictions, such information is separately disclosed in this research report. UBS and its affiliates and employees may have long or short positions, trade as principal and buy and sell in instruments or derivatives identified herein.

Any prices stated in this report are for information purposes only and do not represent valuations for individual securities or other instruments. There is no representation that any transaction can or could have been effected at those prices and any prices do not necessarily reflect UBS's internal books and records or theoretical model-based valuations and may be based on certain assumptions. Different assumptions, by UBS or any other source, may yield substantially different results.

United Kingdom and the rest of Europe: Except as otherwise specified herein, this material is communicated by UBS Limited, a subsidiary of UBS AG, to persons who are eligible counterparties or professional clients and is only available to such persons. The information contained herein does not apply to, and should not be relied upon by, retail clients. UBS Limited is authorised and regulated by the Financial Services Authority (FSA). UBS research complies with all the FSA requirements and laws concerning disclosures and these are indicated on the research where applicable. **France:** Prepared by UBS Limited and distributed by UBS Limited and UBS Securities France SA. UBS Securities France S.A. is regulated by the Autorité des Marchés Financiers (AMF). Where an analyst of UBS Securities France S.A. has contributed to this report, the report is also deemed to have been prepared by UBS Securities France S.A. **Germany:** Prepared by UBS Limited and distributed by UBS Limited and UBS Deutschland AG. UBS Deutschland AG is regulated by the Bundesanstalt fur Finanzdienstleistungsaufsicht (BaFin). **Spain:** Prepared by UBS Limited and distributed by UBS Limited and UBS Securities España SV, SA. UBS Securities España SV, SA is regulated by the Comisión Nacional del Mercado de Valores (CNMV). **Turkey:** Prepared by UBS Menkul Degerler AS on behalf of and distributed by UBS Limited. **Russia:** Prepared and distributed by UBS Securities CJSC. **Switzerland:** Distributed by UBS AG to persons who are institutional investors only. **Italy:** Prepared by UBS Limited and distributed by UBS Limited and UBS Italia Sim S.p.A.. UBS Italia Sim S.p.A. is regulated by the Bank of Italy and by the Commissione Nazionale per le Società e la Borsa (CONSOB). Where an analyst of UBS Italia Sim S.p.A. has contributed to this report, the report is also deemed to have been prepared by UBS Italia Sim S.p.A.. **South Africa:** UBS South Africa (Pty) Limited (Registration No. 1995/011140/07) is a member of the JSE Limited, the South African Futures Exchange and the Bond Exchange of South Africa. UBS South Africa (Pty) Limited is an authorised Financial Services Provider. Details of its postal and physical address and a list of its directors are available on request or may be accessed at http:www.ubs.co.za. **United States:** Distributed to US persons by either UBS Securities LLC or by UBS Financial Services Inc., subsidiaries of UBS AG; or by a group, subsidiary or affiliate of UBS AG that is not registered as a US broker-dealer (a **'non-US affiliate'**), to major US institutional investors only. UBS Securities LLC or UBS Financial Services Inc. accepts responsibility for the content of a report prepared by another non-US affiliate when distributed to US persons by UBS Securities LLC or UBS Financial Services Inc. All transactions by a US person in the securities mentioned in this report must be effected through UBS Securities LLC or UBS Financial Services Inc., and not through a non-US affiliate. **Canada:** Distributed by UBS Securities Canada Inc., a subsidiary of UBS AG and a member of the principal Canadian stock exchanges & CIPF. A statement of its financial condition and a list of its directors and senior officers will be provided upon request. **Hong Kong:** Distributed by UBS Securities Asia Limited. **Singapore:** Distributed by UBS Securities Pte. Ltd [mica (p) 039/11/2009 and Co. Reg. No.: 198500648C] or UBS AG, Singapore Branch. Please contact UBS Securities Pte Ltd, an exempt financial advisor under the Singapore Financial Advisers Act (Cap. 110); or UBS AG Singapore branch, an exempt financial adviser under the Singapore Financial Advisers Act (Cap. 110) and a wholesale bank licensed under the Singapore Banking Act (Cap. 19) regulated by the Monetary Authority of Singapore, in respect of any matters arising from, or in connection with, the analysis or report. The recipient of this report represent and warrant that they are accredited and institutional investors as defined in the Securities and Futures Act (Cap. 289). **Japan:** Distributed by UBS Securities Japan Ltd to institutional investors only. Where this report has been prepared by UBS Securities Japan Ltd, UBS Securities Japan Ltd is the author, publisher and distributor of the report. **Australia:** Distributed by UBS AG (Holder of Australian Financial Services License No. 231087) and UBS Securities Australia Ltd (Holder of Australian Financial Services License No. 231098) only to 'Wholesale' clients as defined by s761G of the Corporations Act 2001. **New Zealand:** Distributed by UBS New Zealand Ltd. An investment adviser and investment broker disclosure statement is available on request and free of charge by writing to PO Box 45, Auckland, NZ. **Dubai:** The research prepared and distributed by UBS AG Dubai Branch, is intended for Professional Clients only and is not for further distribution within the United Arab Emirates. **Korea:** Distributed in Korea by UBS Securities Pte. Ltd., Seoul Branch. This report may have been edited or contributed to from time to time by affiliates of UBS Securities Pte. Ltd., Seoul Branch. **Malaysia:** This material is authorized to be distributed in Malaysia by UBS Securities Malaysia Sdn. Bhd (253825-x).**India :** Prepared by UBS Securities India Private Ltd. 2/F,2 North Avenue, Maker Maxity, Bandra Kurla Complex, Bandra (East), Mumbai (India) 400051. Phone: +912261556000 SEBI Registration Numbers: NSE (Capital Market Segment): INB230951431 , NSE (F&O Segment) INF230951431, BSE (Capital Market Segment) INB010951437.

The disclosures contained in research reports produced by UBS Limited shall be governed by and construed in accordance with English law.

UBS