



CCOP EPPM: Workshop on UNFC Resource Classification in Cooperation with UNECE

Examples of Application of PRMS and UNFC 2009

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9-10 February 2012, Bangkok



Acknowledgements

- EER, Shell
- UNECE, Charlotte Griffiths
- Jes Christensen, Jan Reffstrup, Martin Hubbig
- John Etherington, SPE OGRC
- Karin Ask

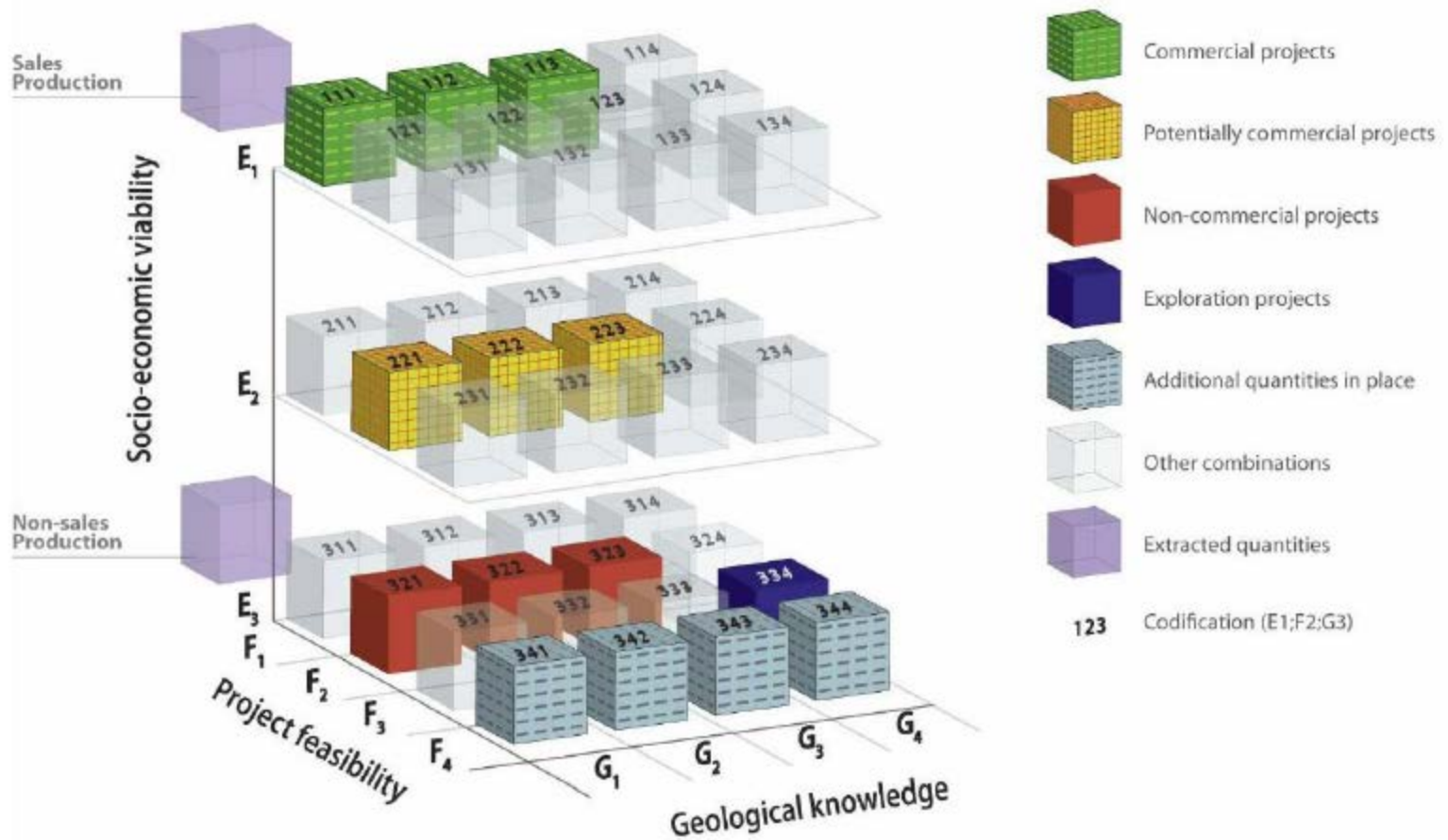
Content

- UNFC 2009 Classification
- Examples
 - DONG
 - RWE Dea AG
- Conclusions

The UNFC Classification

UNFC-2009

UNFC 2009 Classification



UNFC – E Axis

Category	Definition
E1	Extraction and sale has been confirmed to be economically viable.
E1.1	Extraction and sale is economic on the basis of current market conditions and realistic assumptions of future market conditions.
E1.2	Extraction and sale is not economic on the basis of current market conditions and realistic assumptions of future market conditions, but is made viable through government subsidies and/or other considerations.
E2	Extraction and sale is expected to become economically viable in the foreseeable future.
E3	Extraction and sale is not expected to become economically viable in the foreseeable future or evaluation is at too early stage to determine economic viability.
E3.1	Quantities that are forecast to be extracted, but which will not be available for sale.
E3.2	Economic viability of extraction cannot yet be determined due to insufficient information (e.g. during the exploration phase).
E3.3	On the basis of realistic assumptions of future market conditions, it is currently considered that there are not reasonable prospects for economic extraction and sale in the foreseeable future.

UNFC F Axis

Category	Definition
F1	Feasibility of extraction by a defined development project or mining operation has been confirmed.
F1.1	Extraction is currently taking place.
F1.2	Capital funds have been committed and implementation of the development project or mining operation is underway.
F1.3	Sufficiently detailed studies have been completed to demonstrate the feasibility of extraction by implementing a defined development project or mining operation.
F2	Feasibility of extraction by a defined development project or mining operation is subject to further evaluation.
F2.1	Project activities are ongoing to justify development in the foreseeable future.
F2.2	Project activities are on hold and/or where justification as a commercial development may be subject to significant delay.
F2.3	There are no current plans to develop or to acquire additional data at the time due to limited potential.
F3	Feasibility of extraction by a defined development project or mining operation cannot be evaluated due to limited technical data.
F4	No development project or mining operation has been identified.

UNFC G Axis

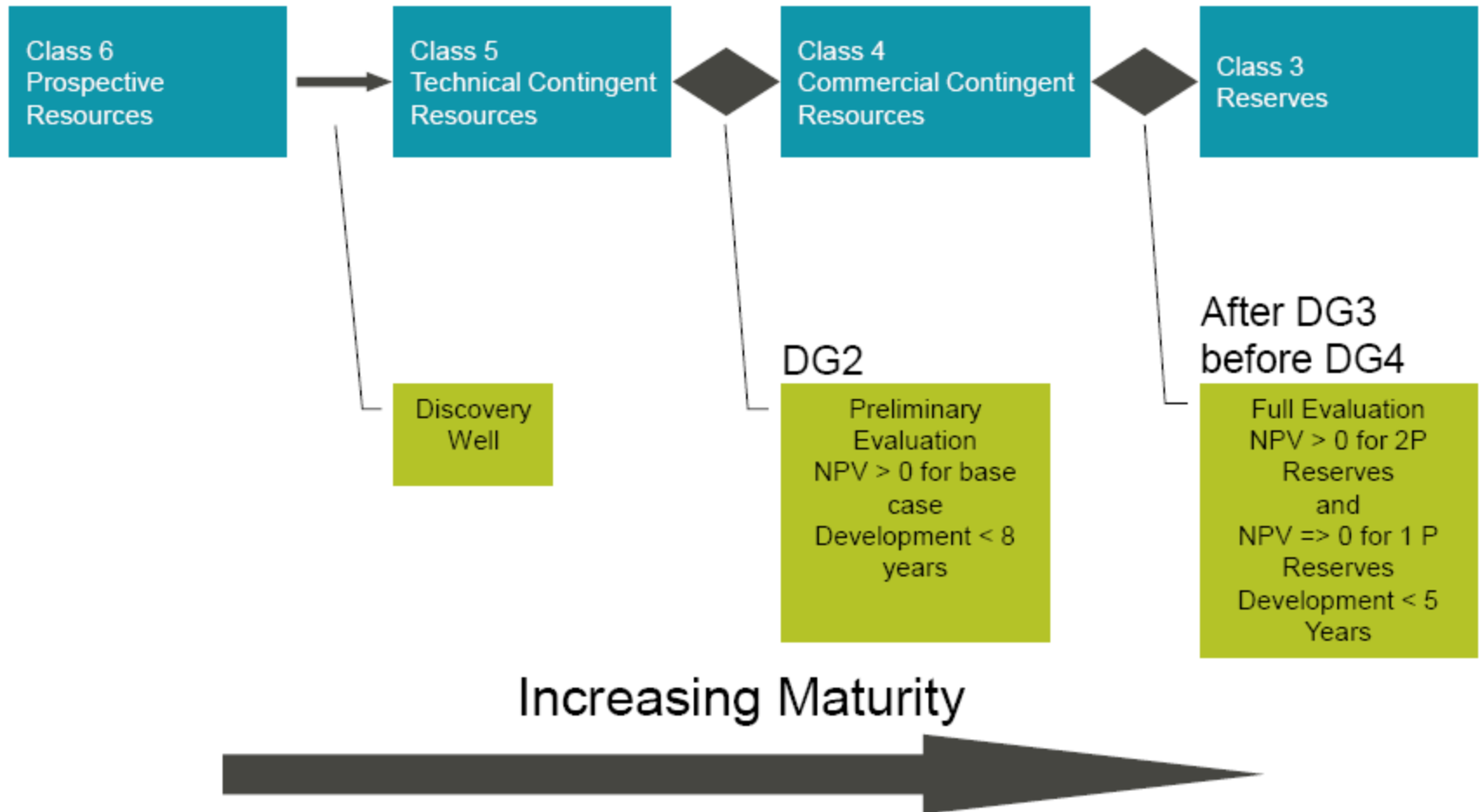
Category	Definition
G1	Quantities associated with a known deposit that can be estimated with a high level of confidence.
G2	Quantities associated with a known deposit that can be estimated with a moderate level of confidence.
G3	Quantities associated with a known deposit that can be estimated with a low level of confidence.
G4	Estimated quantities associated with a potential deposit, based primarily on indirect evidence.

Example* - 1

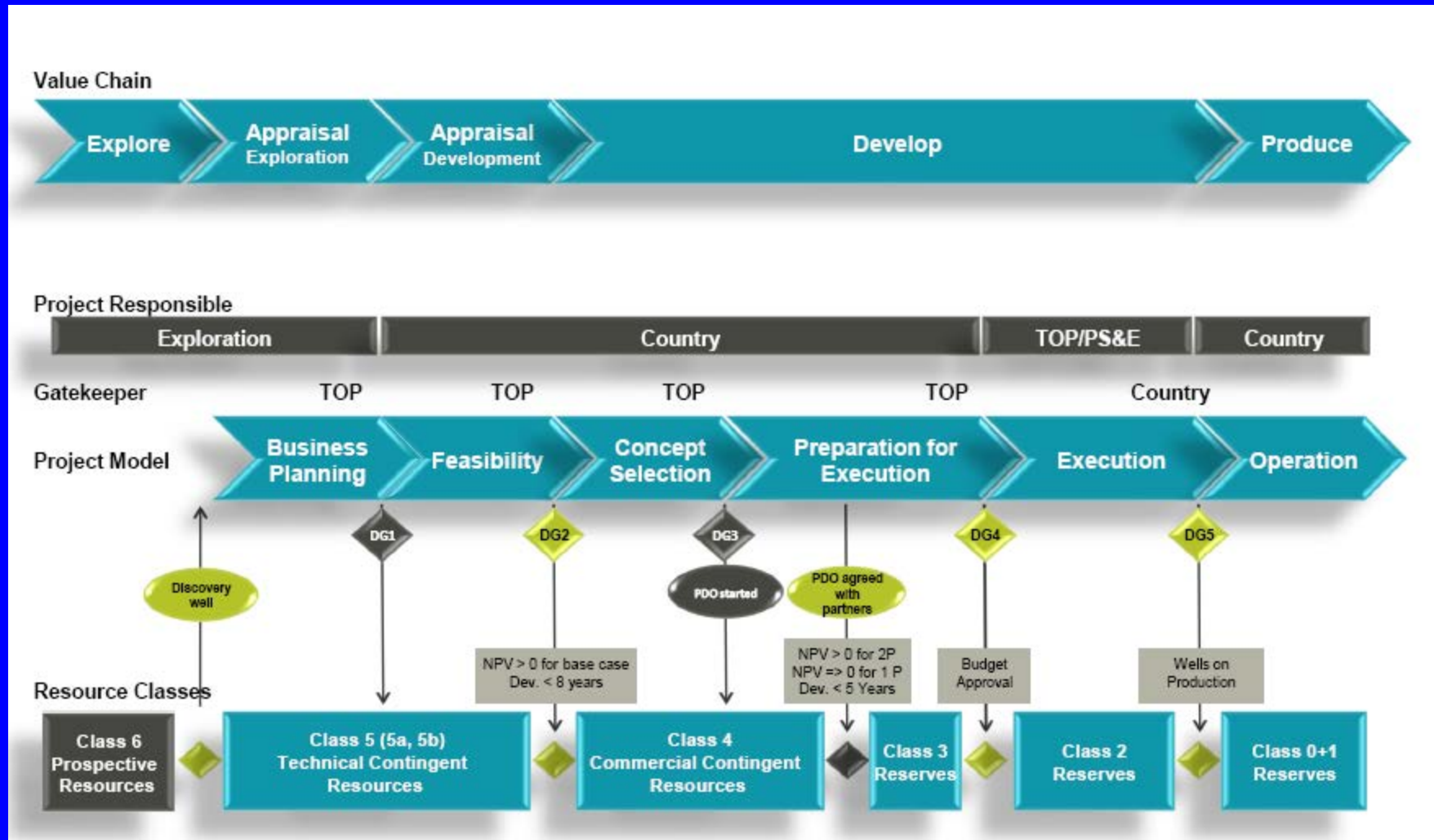
DONG Energy

* From presentation by Jes Christensen and J. Reffstrup at IQPC, London, UK, October 2010

DONG – Decision Gates



E&P Field Development

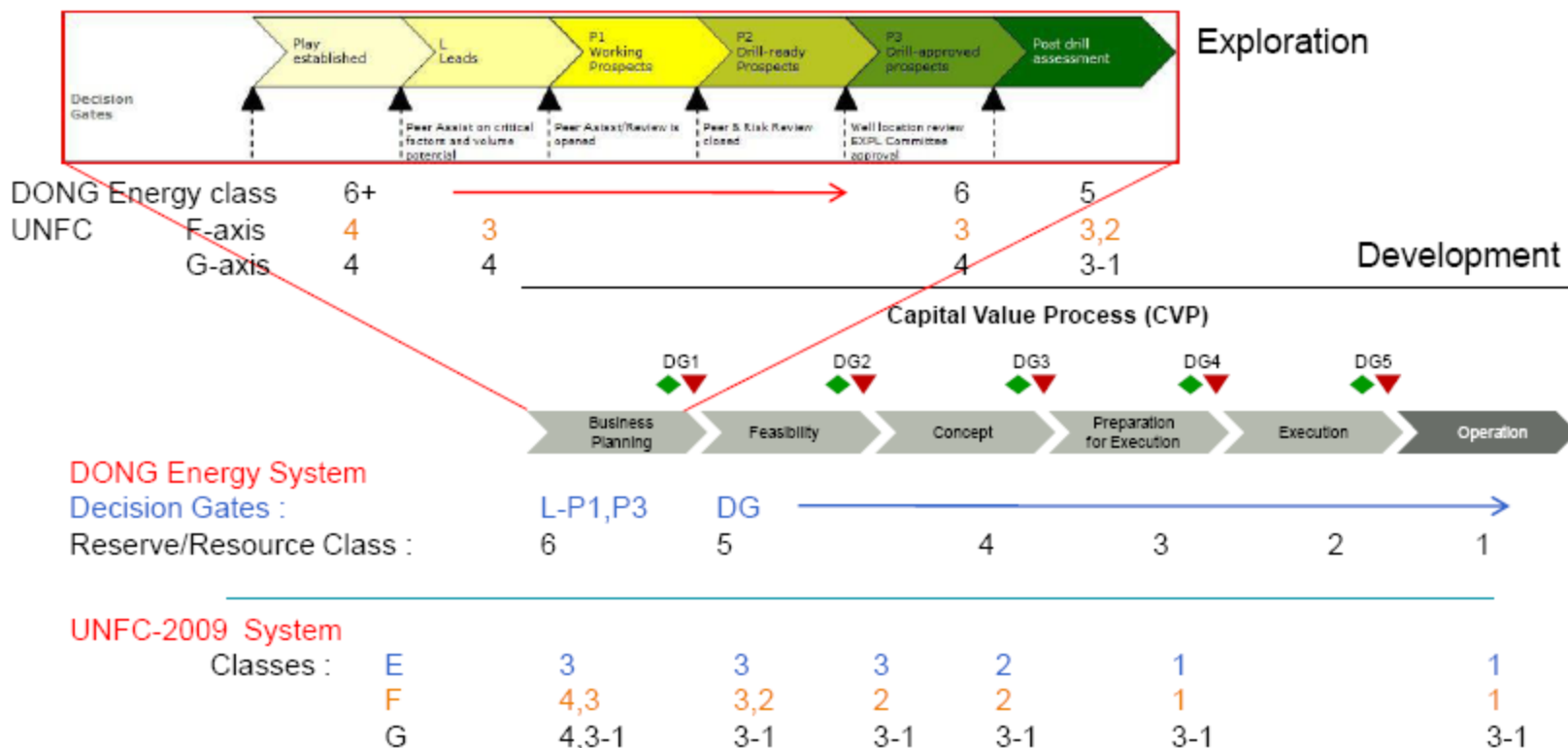


DONG Energy - Classification

DONG apply PRMS

TOTAL PETROLEUM-INITIALLY-IN-PLACE		PRODUCTION			PROJECT STATUS		RISK / MATURITY	Gate Class	
		RESERVES			On Production	C1		LOWER RISK	DG5
DISCOVERED PETROLEUM-INITIALLY-IN-PLACE	COMMERCIAL	PROVED	PROVED plus PROBABLE	PROVED plus PROBABLE plus POSSIBLE	Approved for Development	C2	PROJECT MATURITY ↑	DG4	2
					Justified for Development	C3		↑	3
					CONTINGENT RESOURCES				
DISCOVERED PETROLEUM-INITIALLY-IN-PLACE	SUB-COMMERCIAL	LOW ESTIMATE	BEST ESTIMATE	HIGH ESTIMATE	Development Pending	S1	PROJECT MATURITY ↑		4
					Development on Hold	S2		DG1	5
					UNRECOVERABLE				
UNDISCOVERED PETROLEUM-INITIALLY-IN-PLACE		LOW ESTIMATE	BEST ESTIMATE	HIGH ESTIMATE	PROSPECTIVE RESOURCES		HIGHER RISK		
					Prospect	E1		P3,A	6+
					Lead	E2		P1	
		UNRECOVERABLE							
		← RANGE OF UNCERTAINTY →							

Mapping of DONG System to UNFC-2009



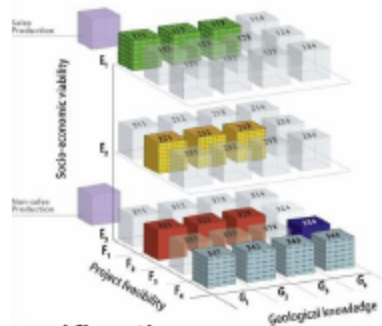
Possible further definition of G-axis would benefit Exploration
(low, high cases not easily mapped clearly)

Field - Example

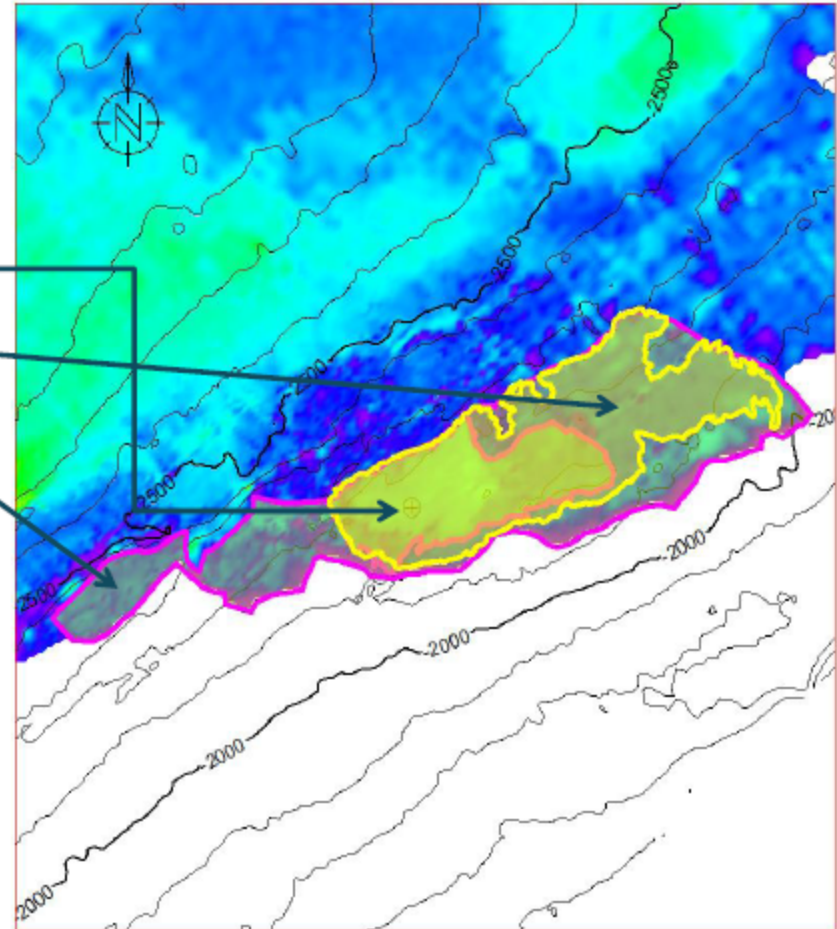


Dong Energy	UNFC-2009
Class 5 low	221
Class 5 mid	+122 (& 222)
Class 5 high	+123 (& 223,233)

Classification depending on commercial status



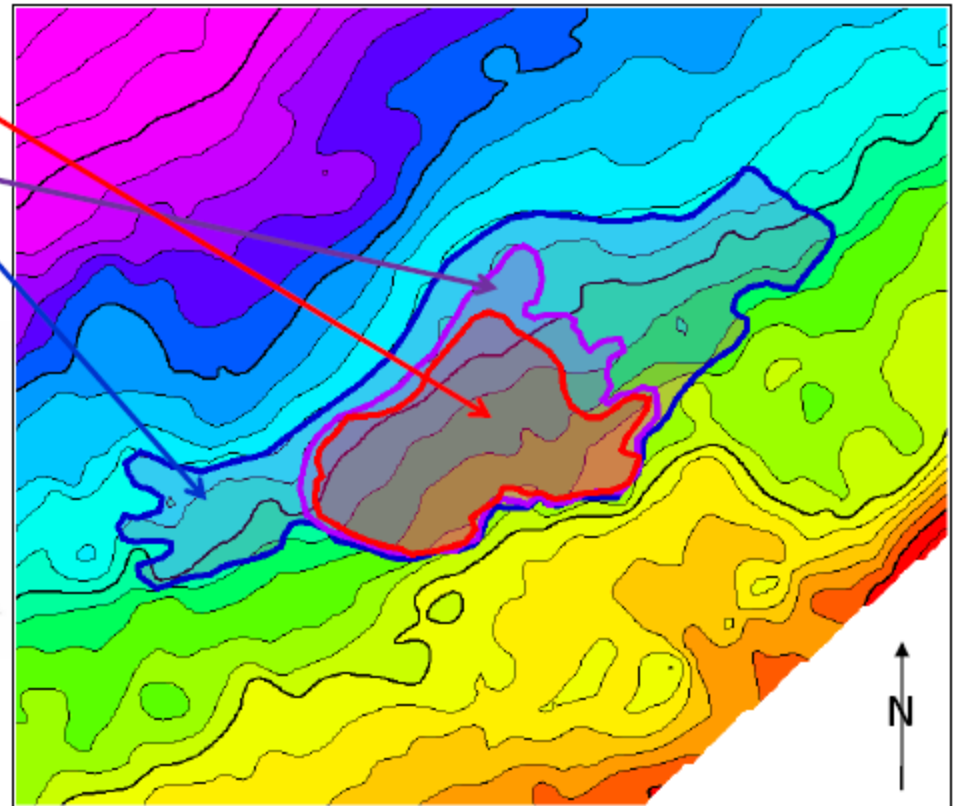
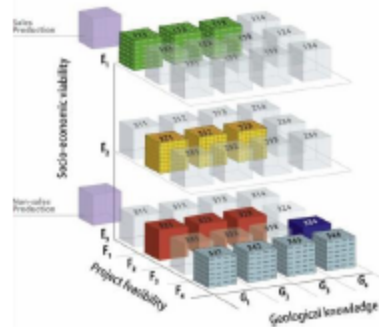
low case define classification status in DONG System for mid/high cases ('112' not possible without '111')



Example - Exploration

Dong Energy	UNFC-2009
Class 6 low	334
Class 6 mid	334
Class 6 high	334 (or 234)

Classification very similar for DONG Exploration projects

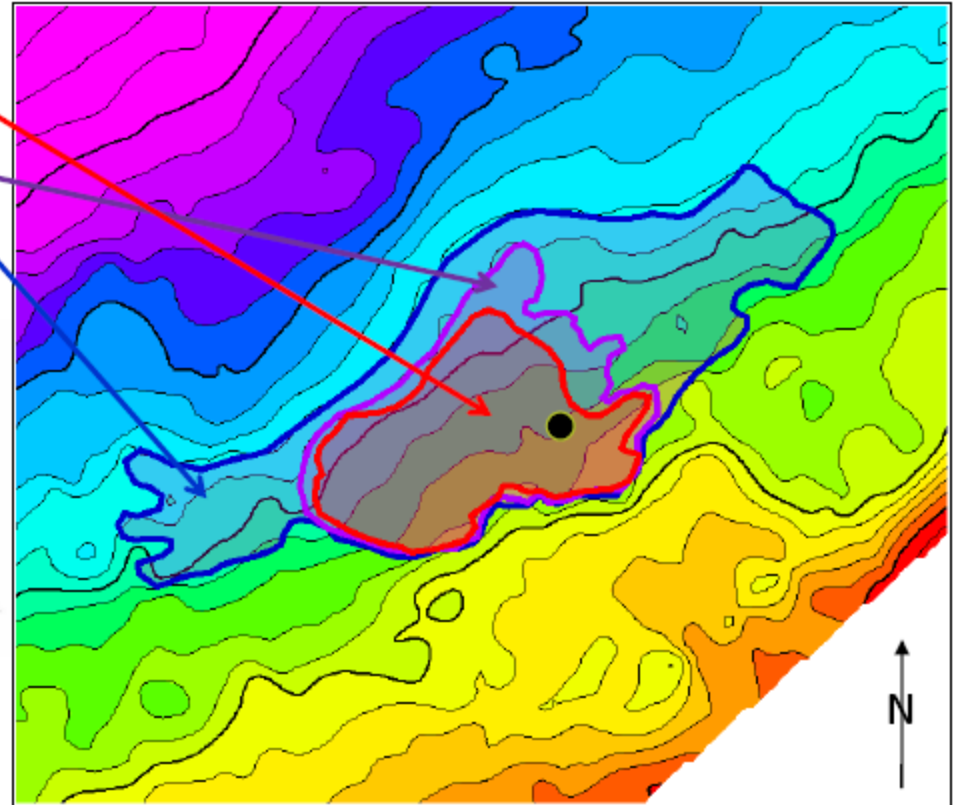
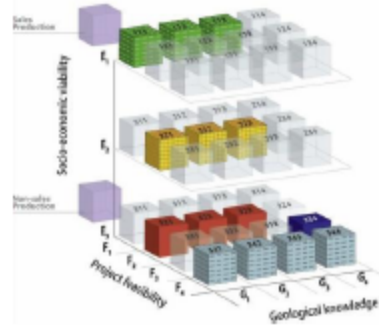


Geological definition less well defined, making ranges (high & low) difficult to show clearly
This is currently being looked at via the UNFC Task Force specification work

Example - Discovery

Dong Energy	UNFC-2009
Class 5 low	331
Class 5 mid	+332
Class 5 high	+333 (or +233)

Classification options suiting well for DONG development projects



Summary of DONG Examples

- Company system can be mapped to UNFC 2009 without major modifications
- No major differences in booked numbers within major categories for the Examples tested
- Some differences between DONG system and UNFC for exploration
- 3D system generally considered more difficult within the company
- UNFC is well suited for comparing volumes between different systems

Example – 2*

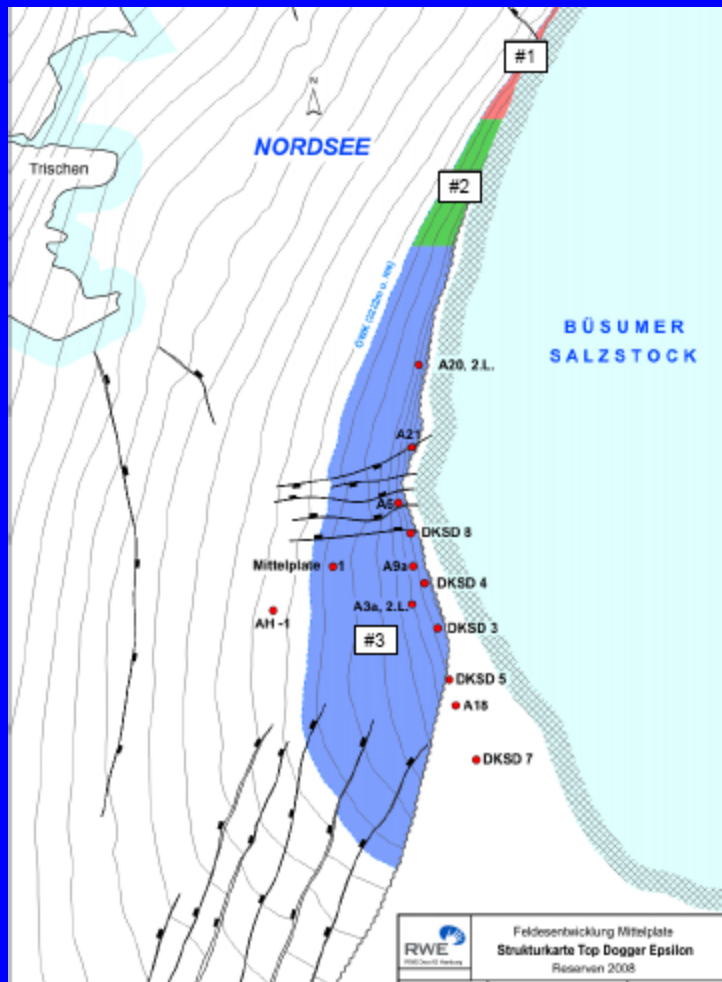
RWE Dea AG

* From presentation by Martin Hubbig at UNFC Workshop, Almaty, Kazakhstan, December 2009

RWE Dea-SPE PRMS Classification

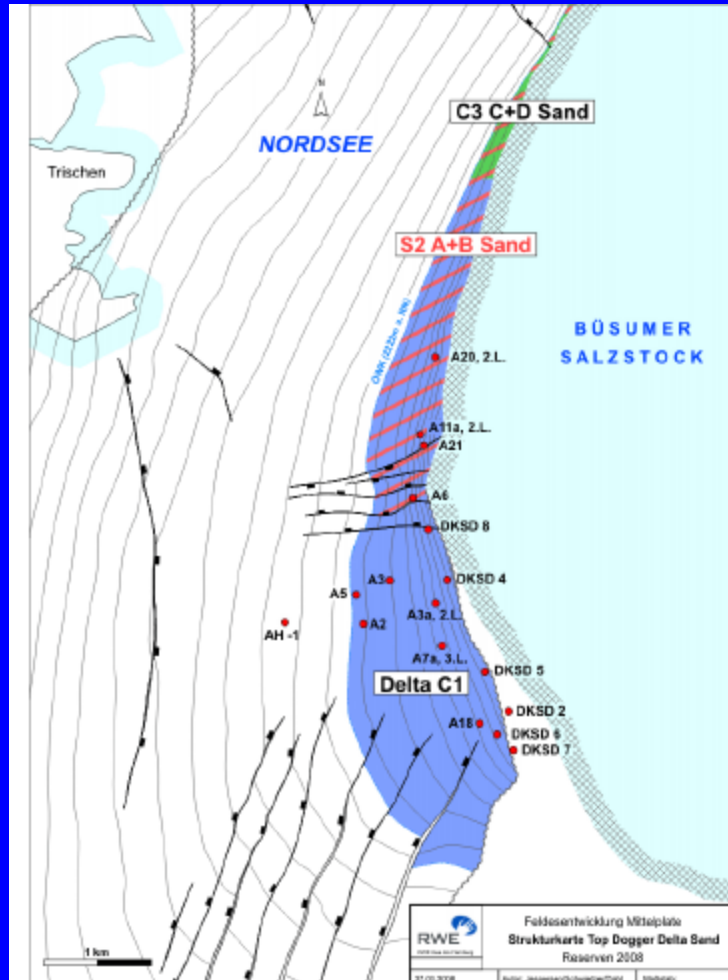
TOTAL PETROLEUM-INITIALLY-IN-PLACE		PRODUCTION			PROJECT STATUS		PROJECT MATURITY ↑
		RESERVES			On Production	C1	
DISCOVERED PETROLEUM-INITIALLY-IN-PLACE	COMMERCIAL	PROVED	PROVED plus PROBABLE	PROVED plus PROBABLE plus POSSIBLE	Approved for Development	C2	PROJECT MATURITY ↑
					Justified for Development	C3	
		CONTINGENT RESOURCES					
DISCOVERED PETROLEUM-INITIALLY-IN-PLACE	SUB-COMMERCIAL	LOW ESTIMATE	BEST ESTIMATE	HIGH ESTIMATE	Development Pending	S1	
		UNRECOVERABLE			Development on Hold	S2	
		PROSPECTIVE RESOURCES					
UNDISCOVERED PETROLEUM-INITIALLY-IN-PLACE		LOW ESTIMATE	BEST ESTIMATE	HIGH ESTIMATE	Prospect	E1	
		UNRECOVERABLE			Lead	E2	
		← RANGE OF UNCERTAINTY →					

Mittelplate Dogger Epsilon



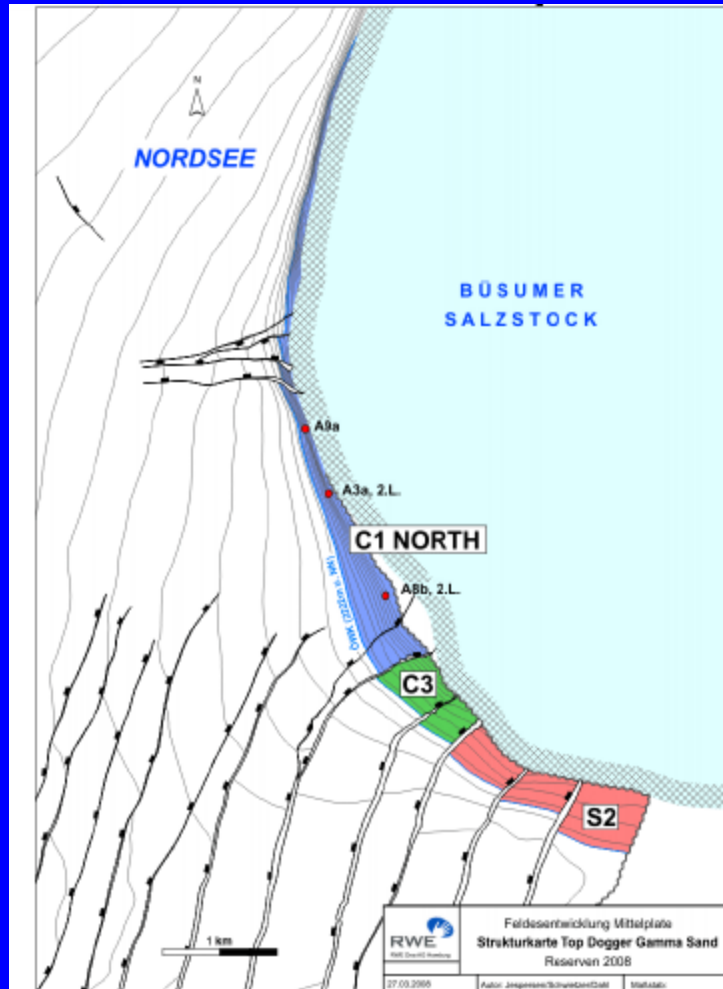
					E F G	SPE Status
#3	P90	P50	P10		112	C1 On Production
	E1.1	F1.1	G1	G2 G3		
#2	P90	P50	P10		222	S1 Dev. Pending
	E2	F2.2	G1	G2 G3		
#1	P90	P50	P10		342	S2 Dev. On Hold
	E3.3	F4	G1	G2 G3		

Mittelplate Dogger Delta



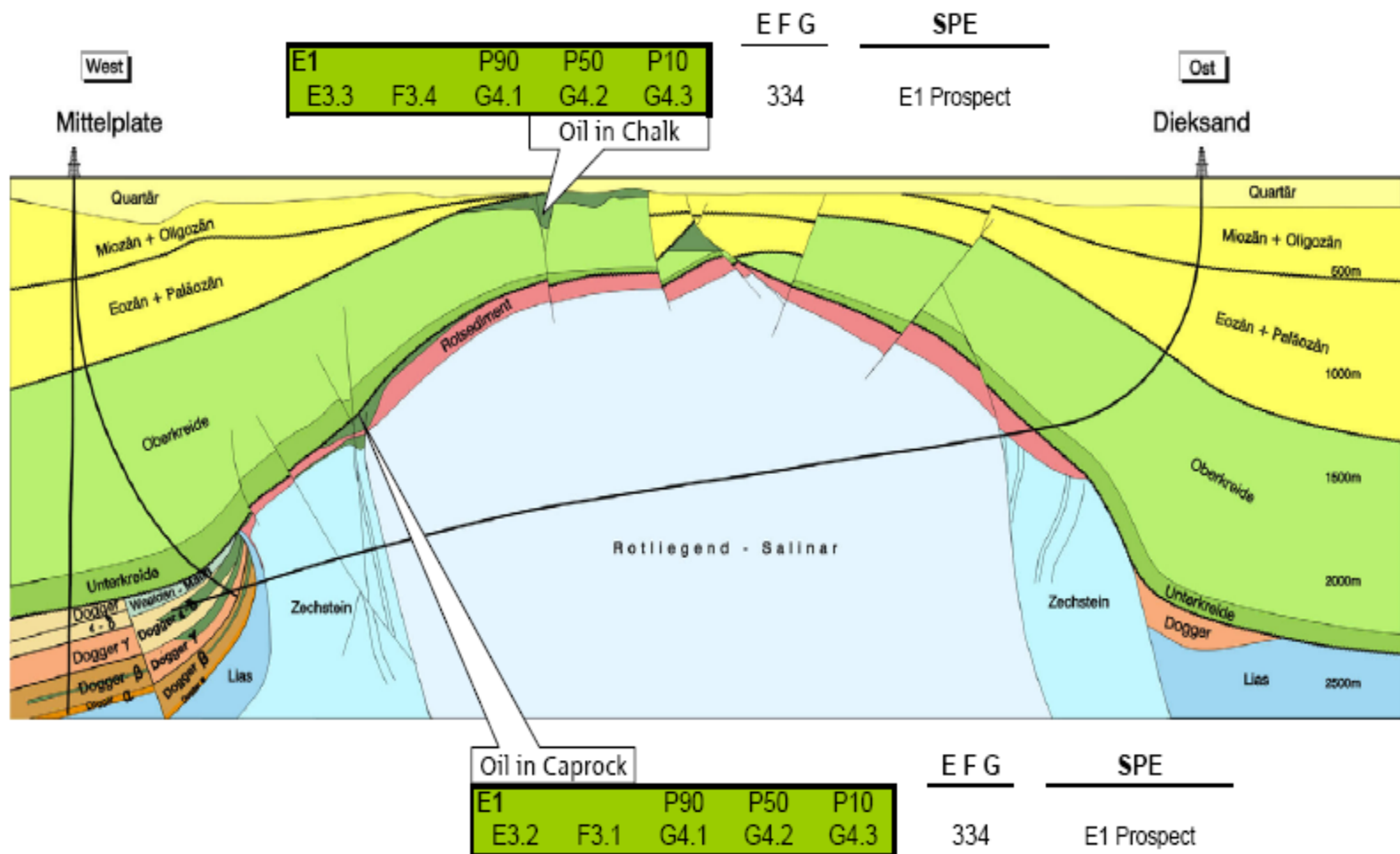
					E F G	SPE Status	
C1					P90	P50	P10
E1.1	F1.1	G1	G2	G3	112	C1 On Production	
C3 C+D North					P90	P50	P10
E2	F2.1	G1	G2	G3	222	C3 Just. f. Dev.	
S2 A+B					P90	P50	P10
E3.3	F2.3	G1	G2	G3	322	S2 Dev. On Hold	

Mittelplate Dogger Gamma



					E F G	SPE Status
C1 North						
E1.1	F1.1	G1	G2	G3	112	C1 On Production
C3						
E1.1	F2.1	G1	G2	G3	122	C3 Just. for Dev.
S2						
E3.3	F2.3	G1	G2	G3	322	S2 Dev. on Hold

Mittelplate W-E X-Section



RWE Dea AG - Conclusions

- Transforming SPE PRMS results to UNFC is possible without much effort
- Reserves status preserved in 3-digit UN code
 - Information loss in beta by using 3 digit code
- Volumes seem not be affected and therefore are similar in both systems