Swiss Re

Oil and petrochemical industry
Regional Differences

CSB Washington **28 Jan**

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OPC from a reinsurers view

Swiss Re

Content

Project findings of selective U/W (ernst)

- Regional differences of operational hazards
- Loss burden in 4 global clusters
- Loss burden US vs rest of world

Impact on SwissRe risk Assessment (Ueli)

- New risk elements from Operational hazards
- Explanation of new elements
- Examples of risk assessment with new elements, US refinery, and eg. Asian refinery

OPC from a reinsurers view

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Content

- The Static of Incident Causation
- SwissRe Model
- The Dynamic of Incident Causation
- Regional differences
- Different Loss Burden 4 Clusters
- Losses USA vs Rest of the World
- Next steps

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OPC from a reinsurers view

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Causes of Large Losses in Refineries

- 22 Large Losses in 10 Years with a Loss Amount USD 3,3 bn.
- In 11 cases (Half of all cases) Human Factor plays a decisive role
- The 22 events penetrated through 79 Layers of Protection, i.e. per incident 3,6 Layers
- 20 (25%) of the 79 Latent Failures were caused directly by the Human Factor

Different Loss Burden acc. to cluster of countries

Countries	USA, Canada, UK, Australia	Europe, Singapore, S-Korea, Japan, Saudi Arabia, Gulf States, Egypt	Russia, Former Soviet Union, Eastern Europe	S-America, Africa, Maghreb, other Middle East, rest of Asia,
No of refineries	170	161	144	177
Average capacity (bpsd)	127 800	166 700	116 600	125 800

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Different Loss Burden acc. to cluster of countries

Countries	USA, Canada, UK, Australia	Europe, Singapore, S-Korea, Japan, Saudi Arabia, Gulf States, Egypt	Russia, Former Soviet Union, Eastern Europe	S-America, Africa, Maghreb, other Middle East, rest of Asia,
Total refining capacity **Million BPD**	21.7	26.8	16.8	22.2
Average FCC capacity as a measure of complexity BPD	39800	26200	9800	16100

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Different Loss Burden acc. to cluster of countries

Countries	USA, Canada, UK, Australia	Europe, Singapore, S-Korea, Japan, Saudi Arabia, Gulf States, Egypt	Russia, Former Soviet Union, Eastern Europe	S-America, Africa, Maghreb, other Middle East, rest of Asia,
Number of losses **1985-2006**	417	267	23	259
Loss burden (ref, petro & gas) pa [refining only] BI and PD (million USD)	977.9 538	356.4 229	14.6	258.6

Different Loss Burden acc. to cluster of countries

Countries	USA, Canada, UK, Australia	Europe, Singapore, S-Korea, Japan, Saudi Arabia, Gulf States, Egypt	Russia, Former Soviet Union, Eastern Europe	S-America, Africa, Maghreb, other Middle East, rest of Asia,
Loss burden per refinery pa, BI and PD (million USD)	3.165 100%	1.425 45%	Not enough data	Not estimated
Loss burden per refinery per 1000 bpd BI and PD (million US)	0.0248 100%	0.0085 34%	Not enough data	Not estimated

Different Loss Burden acc. to cluster of countries

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Countries	USA, Canada, UK, Australia	Europe, Singapore, S-Korea, Japan, Saudi Arabia, Gulf States, Egypt	Russia, Former Soviet Union, Eastern Europe	S-America, Africa, Maghreb, other Middle East, rest of Asia,
Loss burden per plant (ref, petro & gas) pa (million USD)	5.752 100%	2.214 38%	0.101?	1.461 25%
Loss burden per 1000 bpd (ref, petro & gas) pa (million US)	0.0450 100%	0.0133 30%	0.0009	0.0108 24%

Different Loss Burden
USA and Rest of the World

Countries	USA,	Rest of the world
No of refineries	131	521
Average capacity **(bpsd)**	130 700	135 300

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Different Loss Burden
USA and Rest of the World

Countries	USA	Rest of the world
Total refining capacity **Million BPD**	17.1	70.5
Average FCC capacity as a measure of complexity BPD	43500	18300

Different Loss Burden USA and Rest of the World

Countries	USA,	Rest of the world
Number of losses **1985-2006**	221	348
Loss burden (ref, petro & gas) pa [refining only] BI and PD (million USD)	785.4 421	822.2 536

Different Loss Burden
USA and Rest of the World

Countries	USA	Rest of the world
Loss burden per refinery pa, BI and PD **(million USD)**	3.216 100%	1.038 32%
Loss burden per refinery per 1000 bpd BI and PD (million US)	0.0246 100%	0.0076 31%

Different Loss Burden USA and Rest of the World

Countries	USA	Rest of the world
Loss burden per plant (ref, petro & gas) pa (million USD)	5.995 100%	1.578 26%
Loss burden per 1000 bpd (ref, petro & gas) pa (million US)	0.0459 100%	0.0117 25%

Differences in Loss Burden seem to confirm differences in mode of operation

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Fact:  different 

Loss burden per 1000 BPD

US cluster more than 3 times than EU cluster

Loss burden per plant

Us cluster 2.6 times the EU cluster

What to do?