



دومین نشست دستاوردهای اساتید و دانش‌آموختگان عمران شریف
پنجشنبه ۲۱ بهمن ماه ۱۳۹۵



Risk-Informed Decision Analysis

Farshad A. Sohi





Education

- **Doctor of Philosophy 2014**
Risk Based Decision Analysis; University of Maryland, College Park/MD
- **Master of Science 2006**
Geotechnical Engineering; Sharif University of Technology
- **Master of Science 2002**
Construction Engineering and Management; Stanford University/ CA
- **Bachelor of Science 1999**
Civil & Environmental Engineering ; Sharif University of Technology



Professional Experience

- **National Iranian Oil Company; 2016-2017**
 - Deputy of Development and Engineering
 - Senior Specialist in Economic Evaluation and Risk Analysis
- **Spectra Energy, Houston, TX; 2014-2016**
 - Department of Risk Management and Economic Evaluation
 - Senior Risk Analyst
- **Saffron Systems, Wash., DC; 2011-2014**
 - Risk Management Consultant



Dissertation: Background



Chernobyl Nuclear Power Plant, 1986

Dissertation: Background



Flixborough Chemical Plant, 1974

Dissertation: Goal

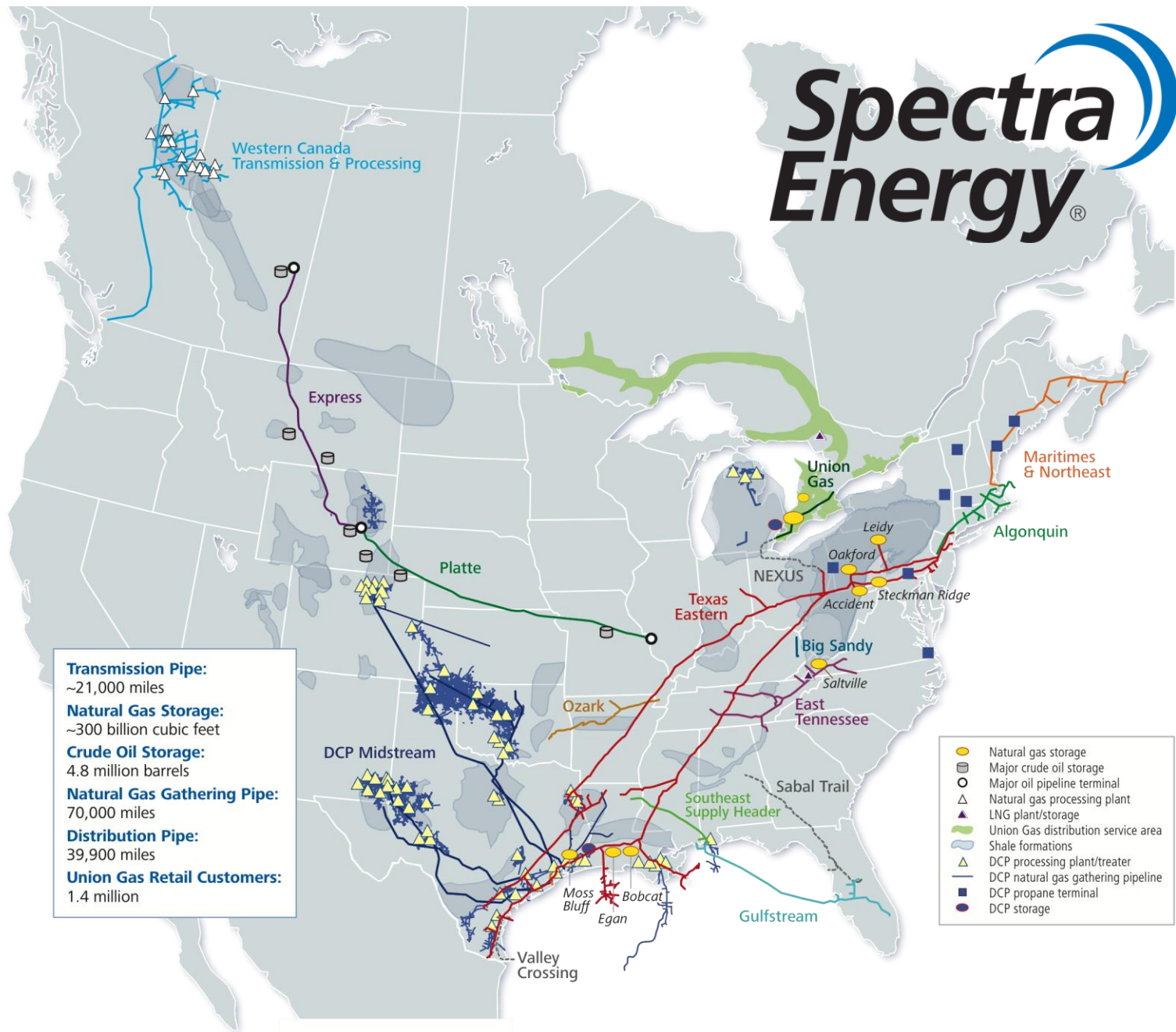


Hurricane Katrina, New Orleans, 2005

Dissertation: Goal



Teton Dam Failure, 1976



AIM Project Facilities
Ramapo to Pts East 342,000 Dth/d
With 433 Compression

Burrillville C/S
Add Mars 90 + Cooling, Generator, &
Repipe one unit (C1) to 24" M/L

Chaplin C/S
Add Taurus 60, Cooling
for all units, & Generator

Cromwell C/S
Add Mars 100, Cooling for all
turbines, Generator, & Repipe
2 Recips (C3 & C4) to 26" M/L

Southeast C/S
Add Mars 90 + Cooling, Generator,
Restage two units (C4 & C5),
15 ppm NOx upgrade and new
compressor body on Mars 90 (C3)

Stony Point C/S
Add Mars 100 & Centaur 50 +
Cooling, Generator, Restage
two units (C5 & C6), & 15 ppm
NOx upgrade on Mars 90 (C7)

West Roxbury Lateral
4.2 mi New 16"
0.6 mi New 24"

E-1 System
9.1 mi L&R 6"w/16"

E-1 System
1.4 mi 12" Loop

Cromwell Discharge
2.1 mi 36" Loop

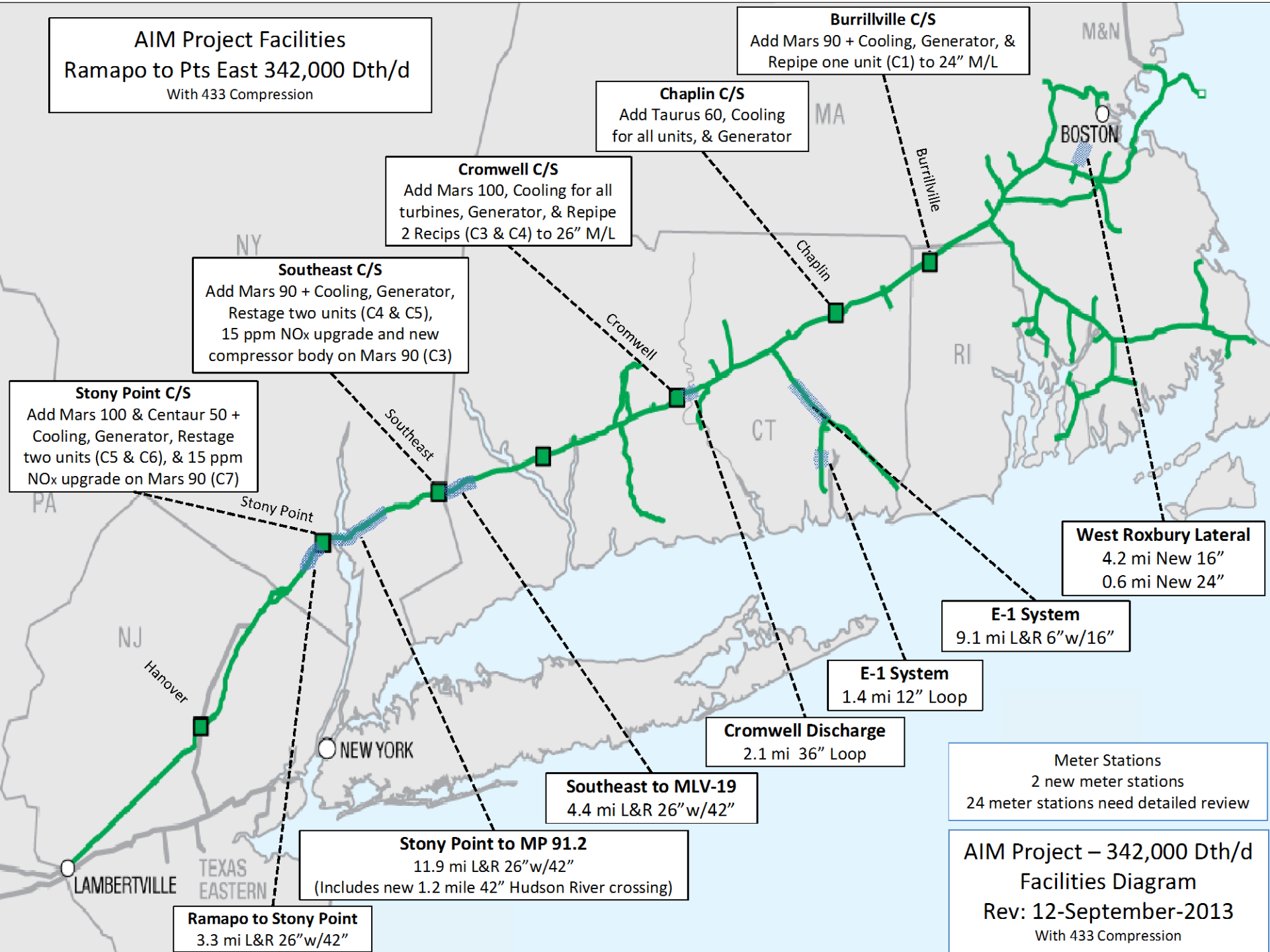
Southeast to MLV-19
4.4 mi L&R 26"w/42"

Stony Point to MP 91.2
11.9 mi L&R 26"w/42"
(Includes new 1.2 mile 42" Hudson River crossing)

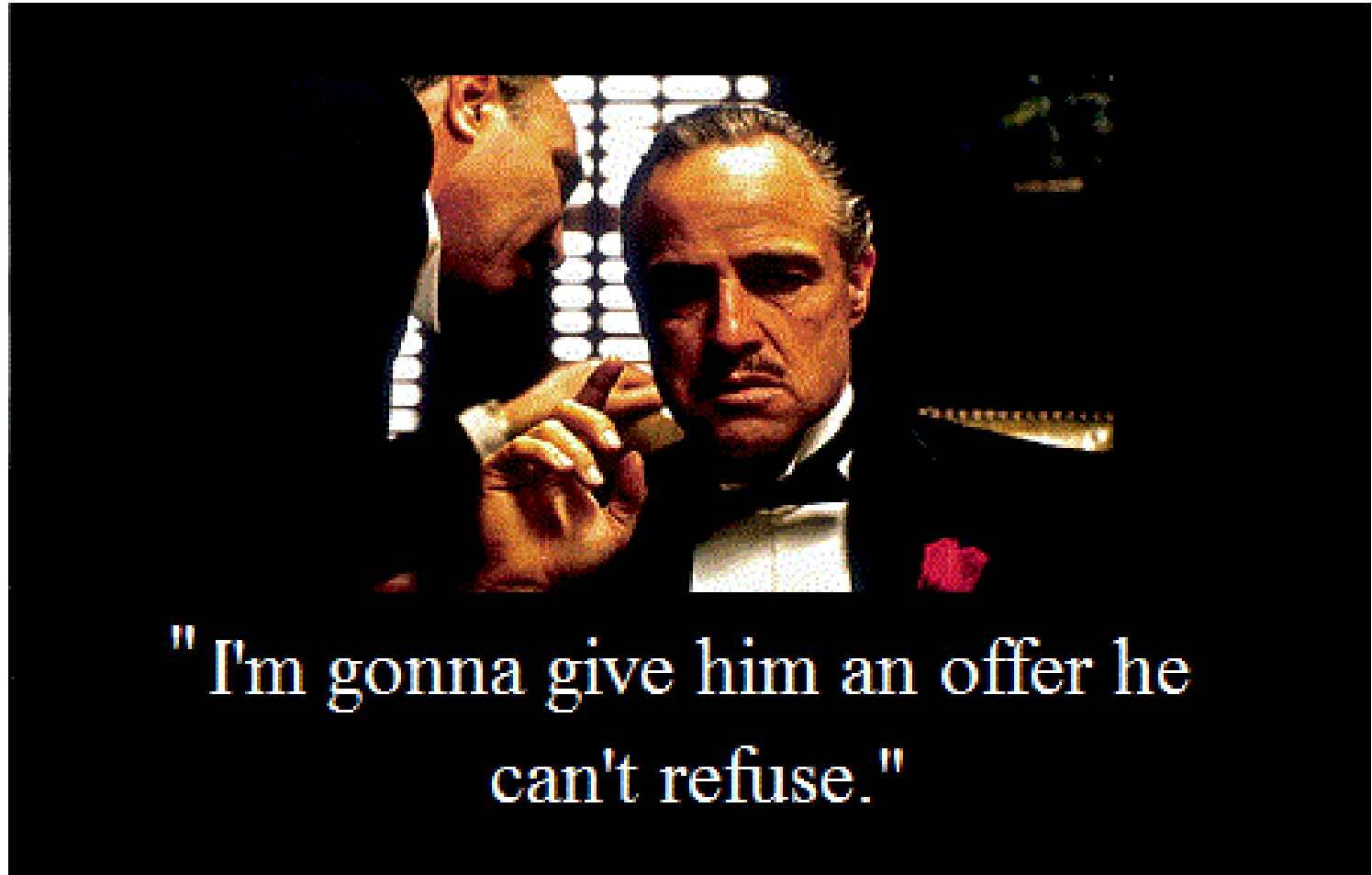
Ramapo to Stony Point
3.3 mi L&R 26"w/42"

Meter Stations
2 new meter stations
24 meter stations need detailed review

AIM Project – 342,000 Dth/d
Facilities Diagram
Rev: 12-September-2013
With 433 Compression



Risk: Right of Way



Risk: Bat Tree Clearing Window



Risk: Demonstrations



Risk: Environmentalists' Protests



Copyright Heriberto Rodriguez

Risk: Native American & First Nations



↑ Native American chamber

↓
First Nations' Map in Canada



Risk: Permits



Risk: Delays Material Delivery



Risk: Severe Weather Condition



Risk 3: Challenges in Laying the Pipe



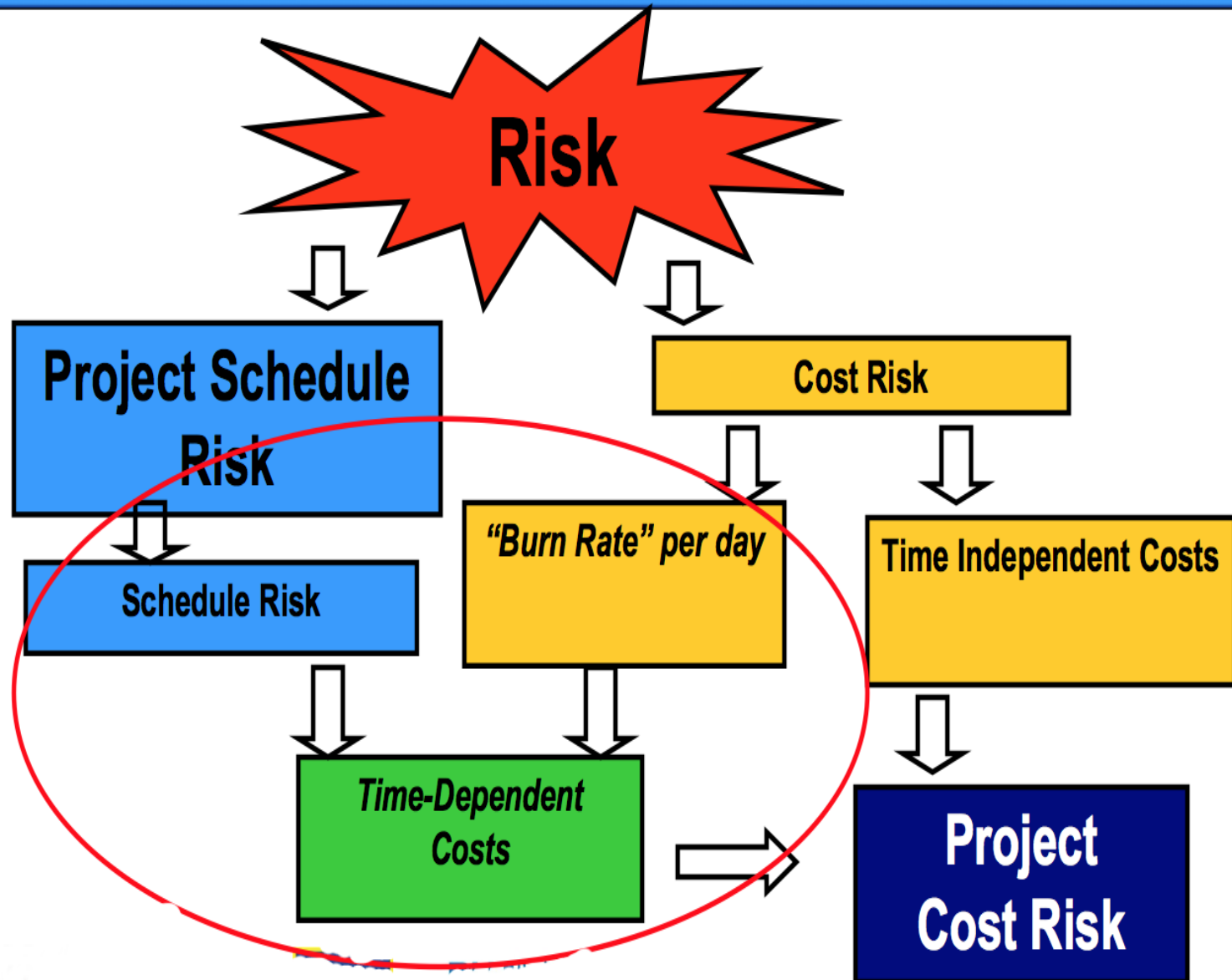
Risk: Dropped Module During Transportation



Horizontal Drilling Accident

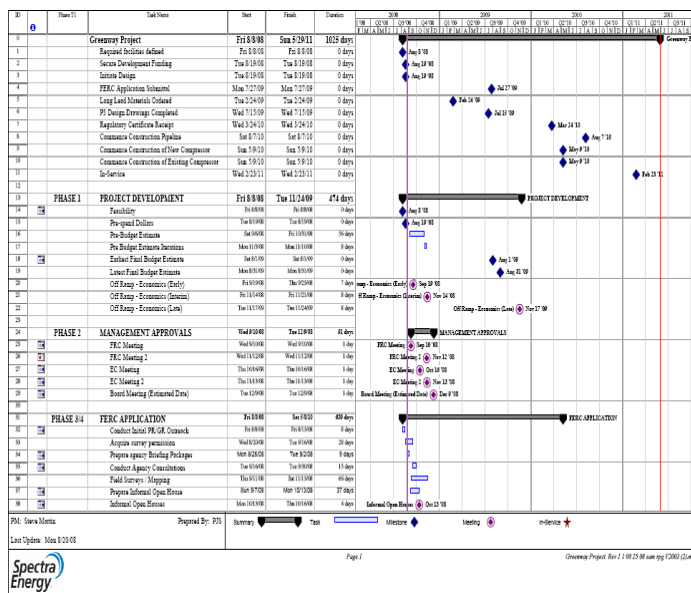


A vertical collage of five images representing different energy sources. From top to bottom: 1. A nuclear power plant with two large cooling towers emitting steam, next to a high-voltage electricity pylon. 2. A large, swirling hurricane or cyclone over the ocean. 3. A large concrete dam with water flowing through its spillways. 4. An oil refinery with several tall distillation columns silhouetted against a bright sunset. 5. An oil pumpjack (jack-o'-lantern) in the foreground, with several other similar structures visible in the background under a cloudy sky.



Integrated Cost & Schedule Risk

	Name	Occurs?	Min	ML	Max	Impact	Unit / comment
	Cost Item		-25%	0%	40%	5%	Percentage Deviation
	Scope Option	50%	500,000	750,000	1,000,000	750,000	Cost
	Schedule Item		4	8	16	9	Week to Complete
	.		.	.	.	.	.
	.		.	.	.	.	.
	.		.	.	.	.	.

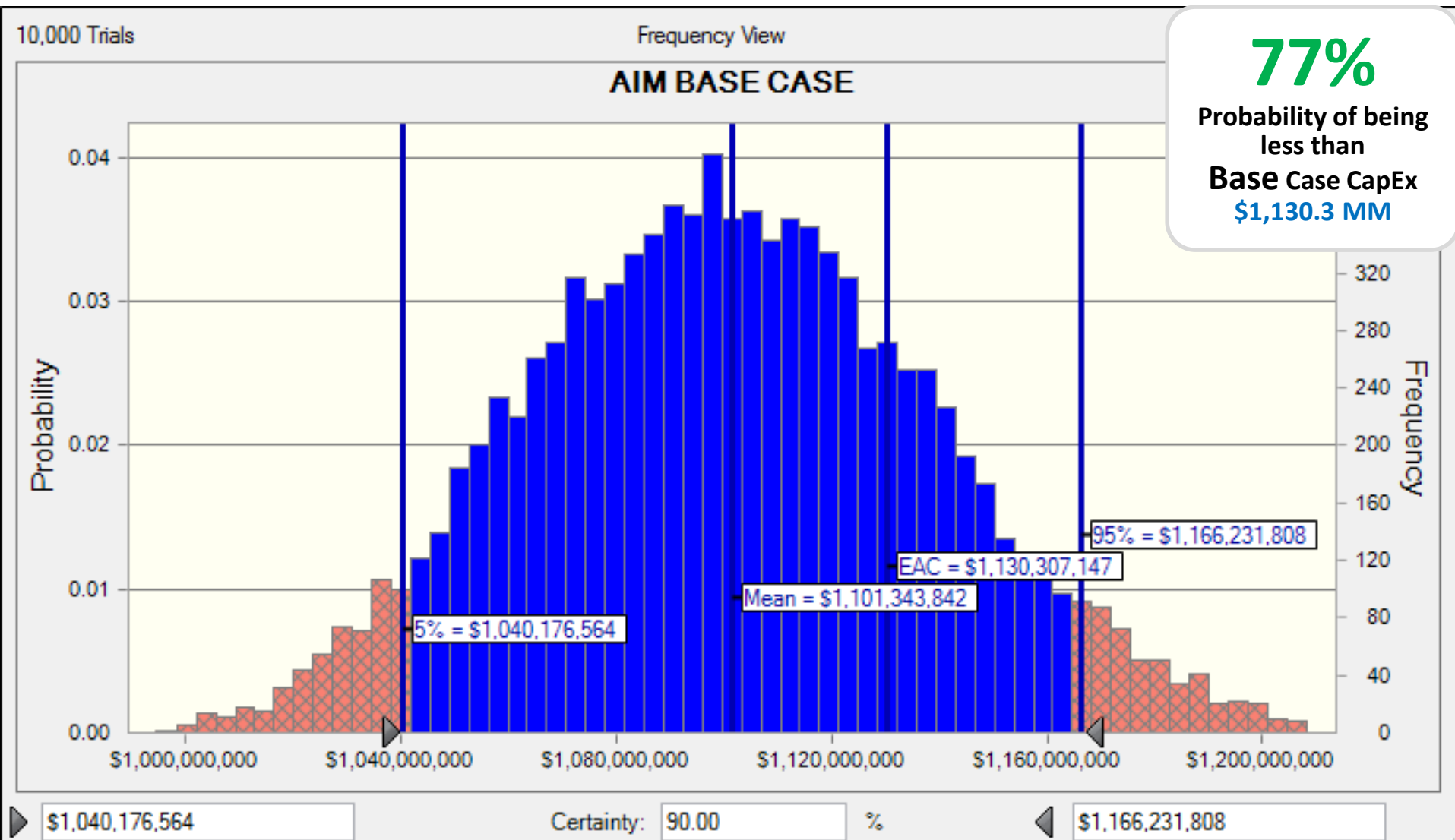


Model

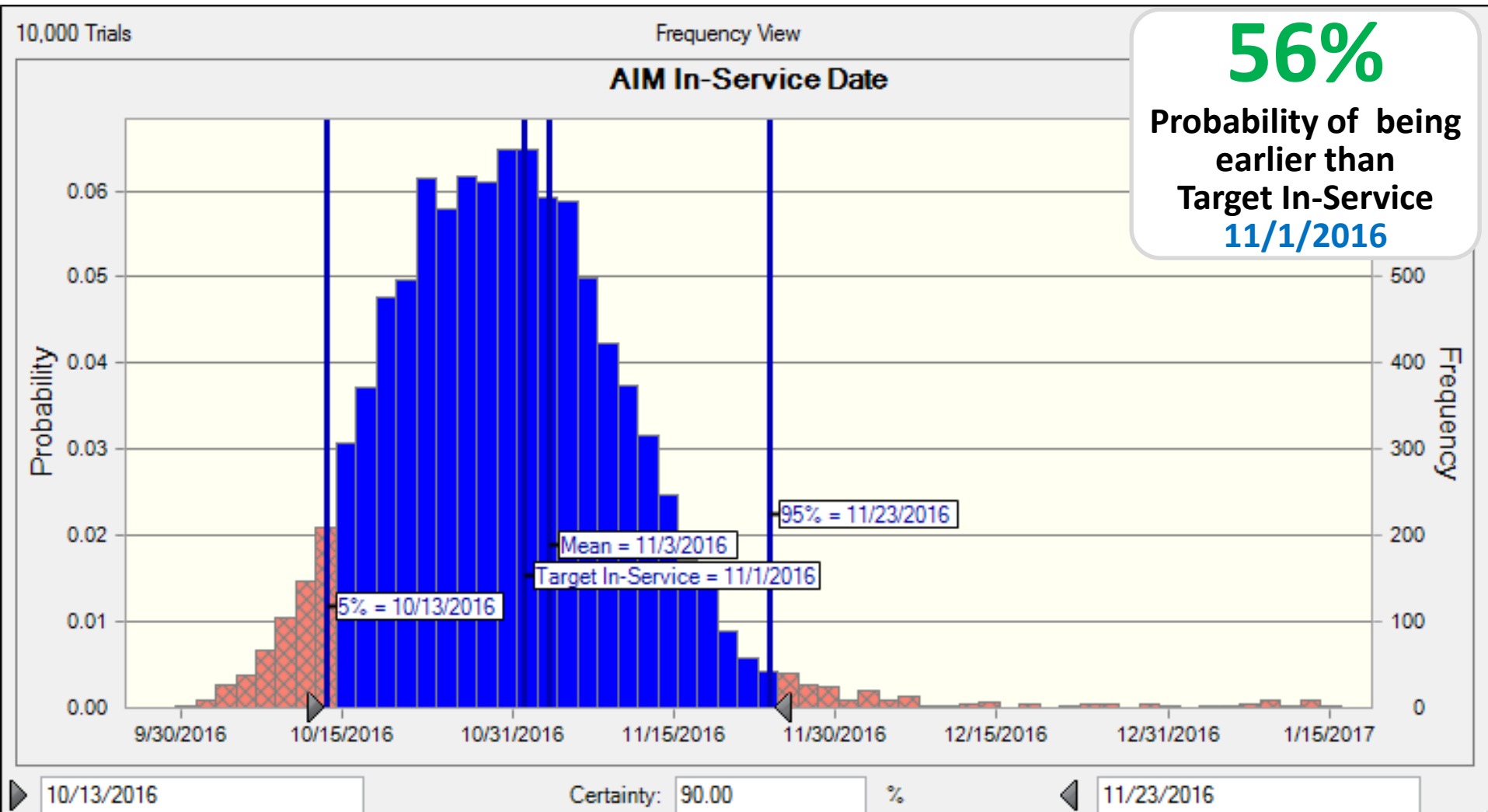
STATION WORK						
Original Estimate	Cost	Monte Carlo				Forecast
		Low	Most Likely	High	Value	

- Contractor Labor & Material	\$2,596,709	\$2,337,038	\$2,596,709	\$3,116,051	\$2,701,793	2,701,793
- 15% Added for Winter Construction					\$9,263,926	\$68,289
- Change Orders @ 5%	\$126,085	\$81,054	\$162,108	\$270,179	\$275,598	\$275,598
- Escalation	\$389,098				18.3%	\$556,313
Subtotal Prime Contractors	\$2,722,794					\$3,045,680

CapEx Monte Carlo Results



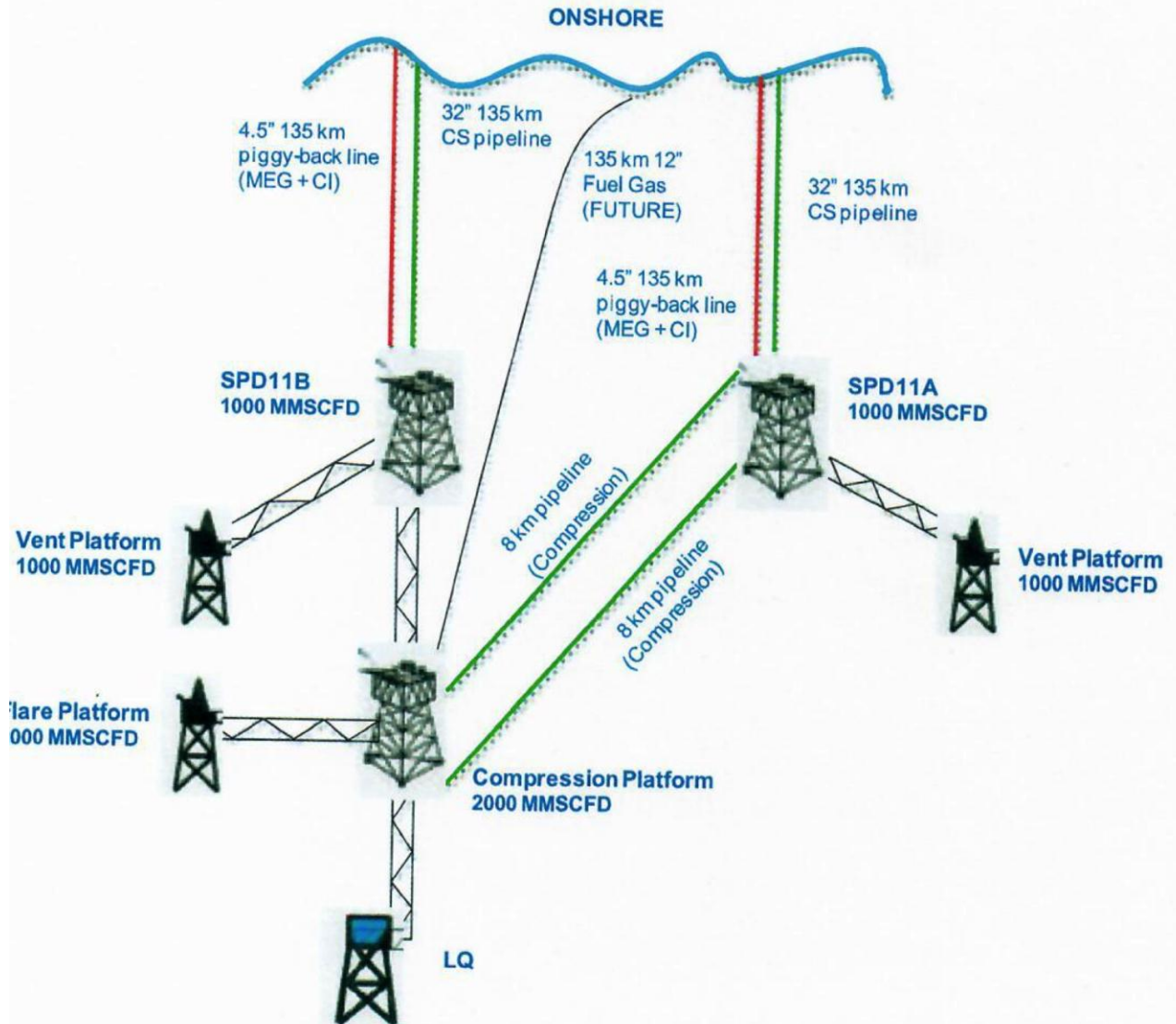
Schedule Monte Carlo Results



South Pars- Phase 11



South Pars- Phase 11

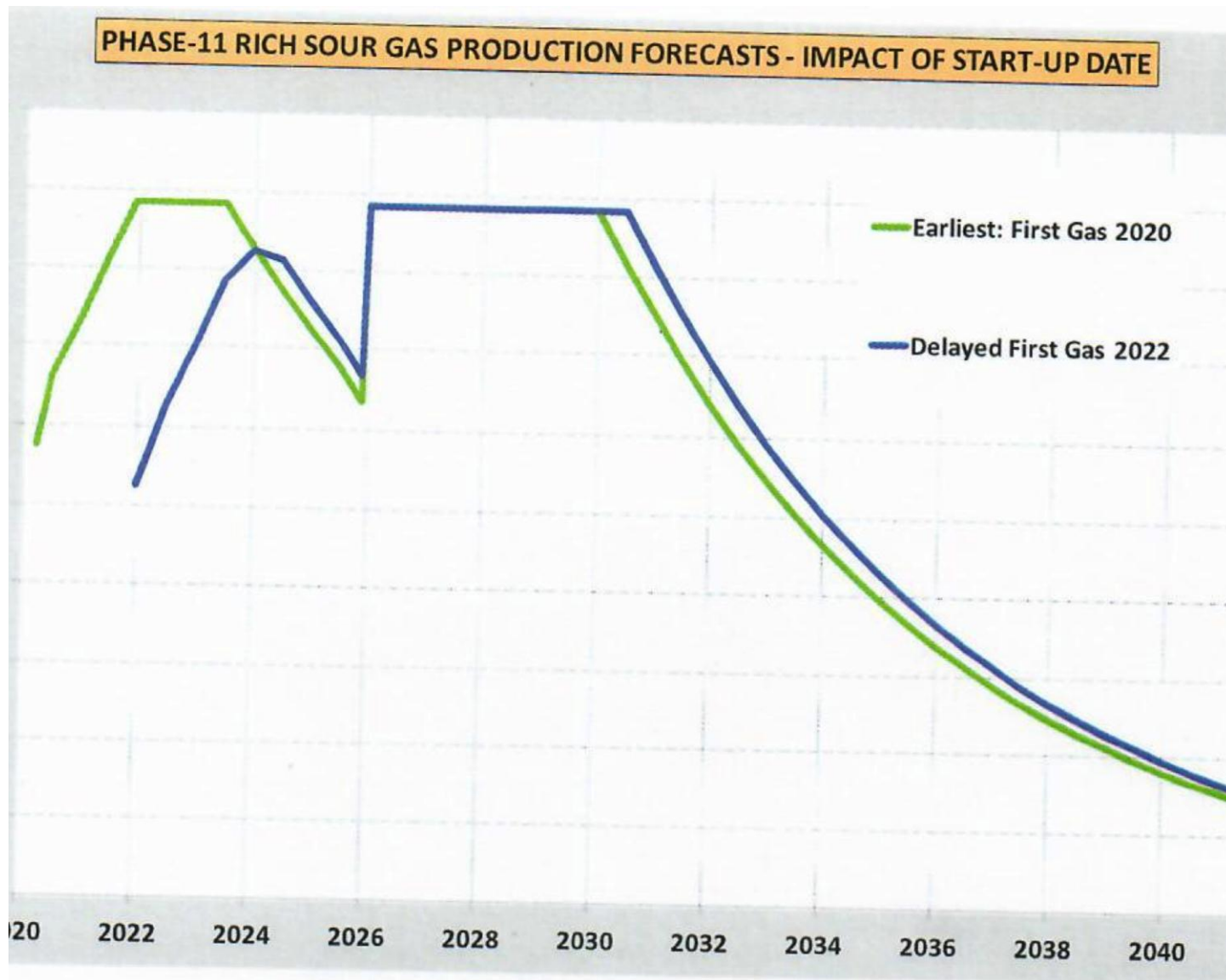




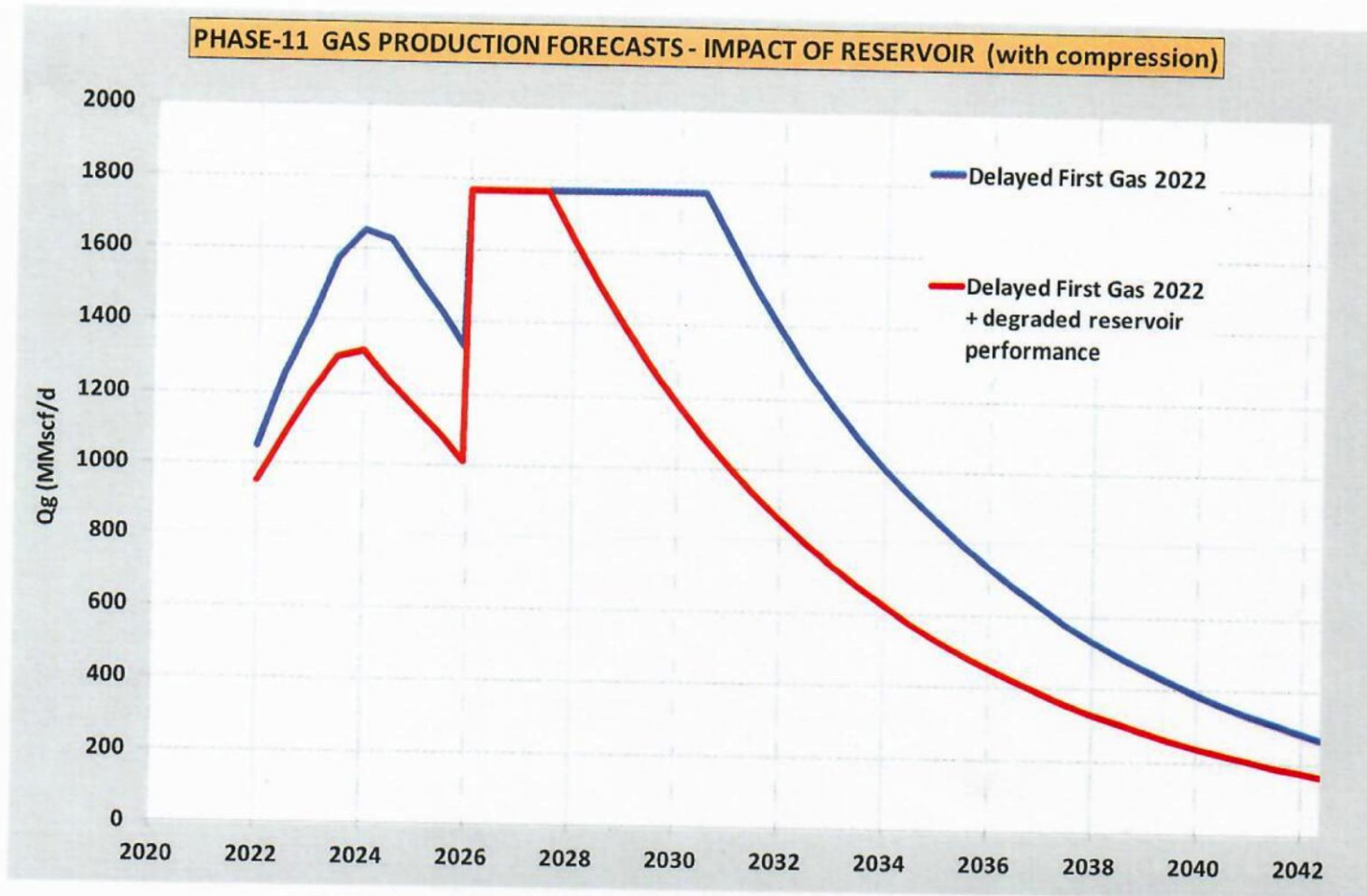
Risks

- Time to First Gas
- Ramp-up time to maximum production
- Maximum production level in phase 1
- Duration of compression platform construction
- Duration of maximum production with compression
- Production decline profile
- Direct capital cost of phases 1 and 2 (DCC)
- Indirect cost of phases 1 and 2 (IDC)
- Operation expenditure (Opex)
- Cost of Money(CoM)
- Contractor expenditure profile in both phases
- Oil price fluctuations

Risks: Start of Phase 1 &2



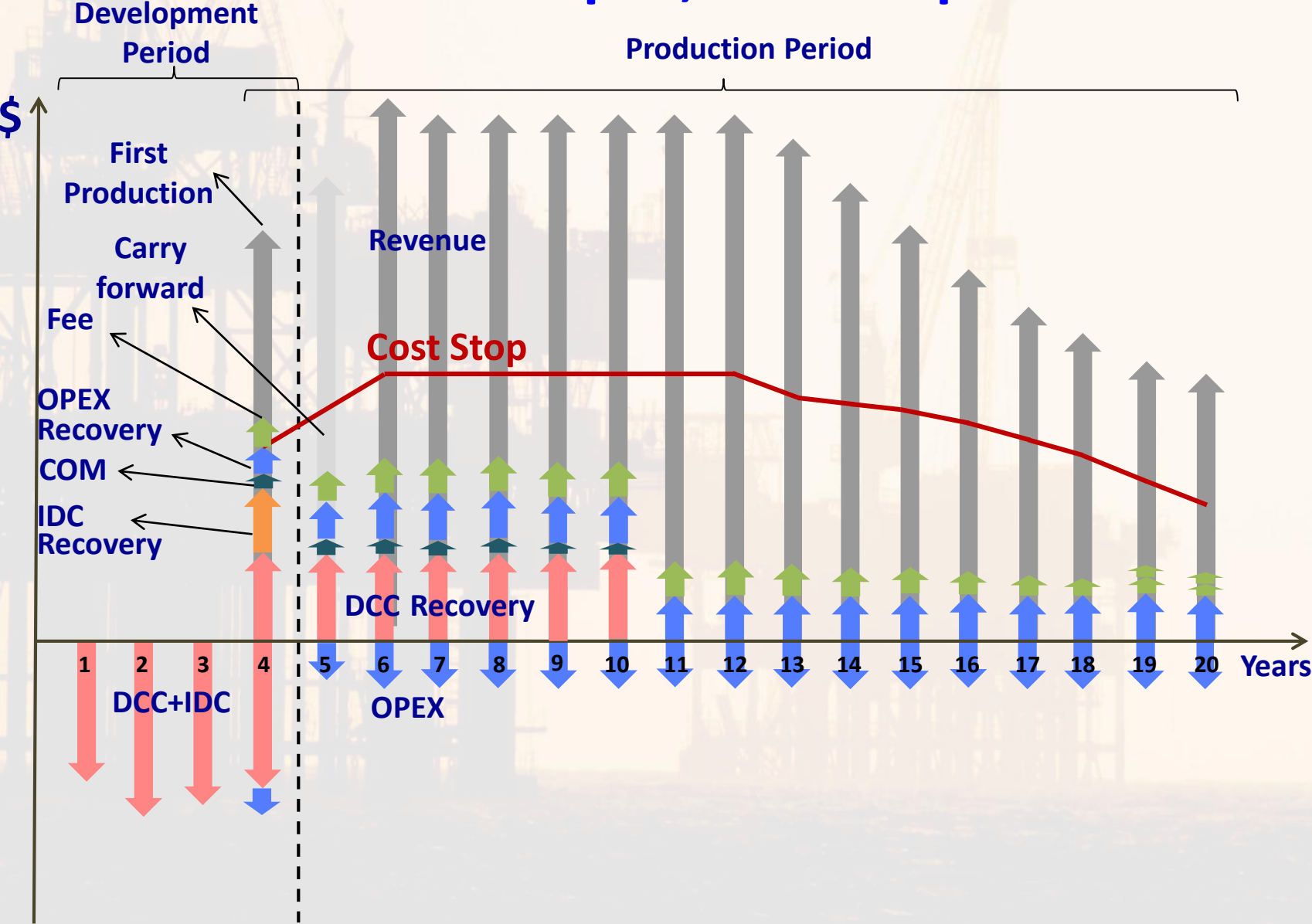
Risk: Reservoir Behavior + Maximum Plateau Production





National Iranian Oil Company

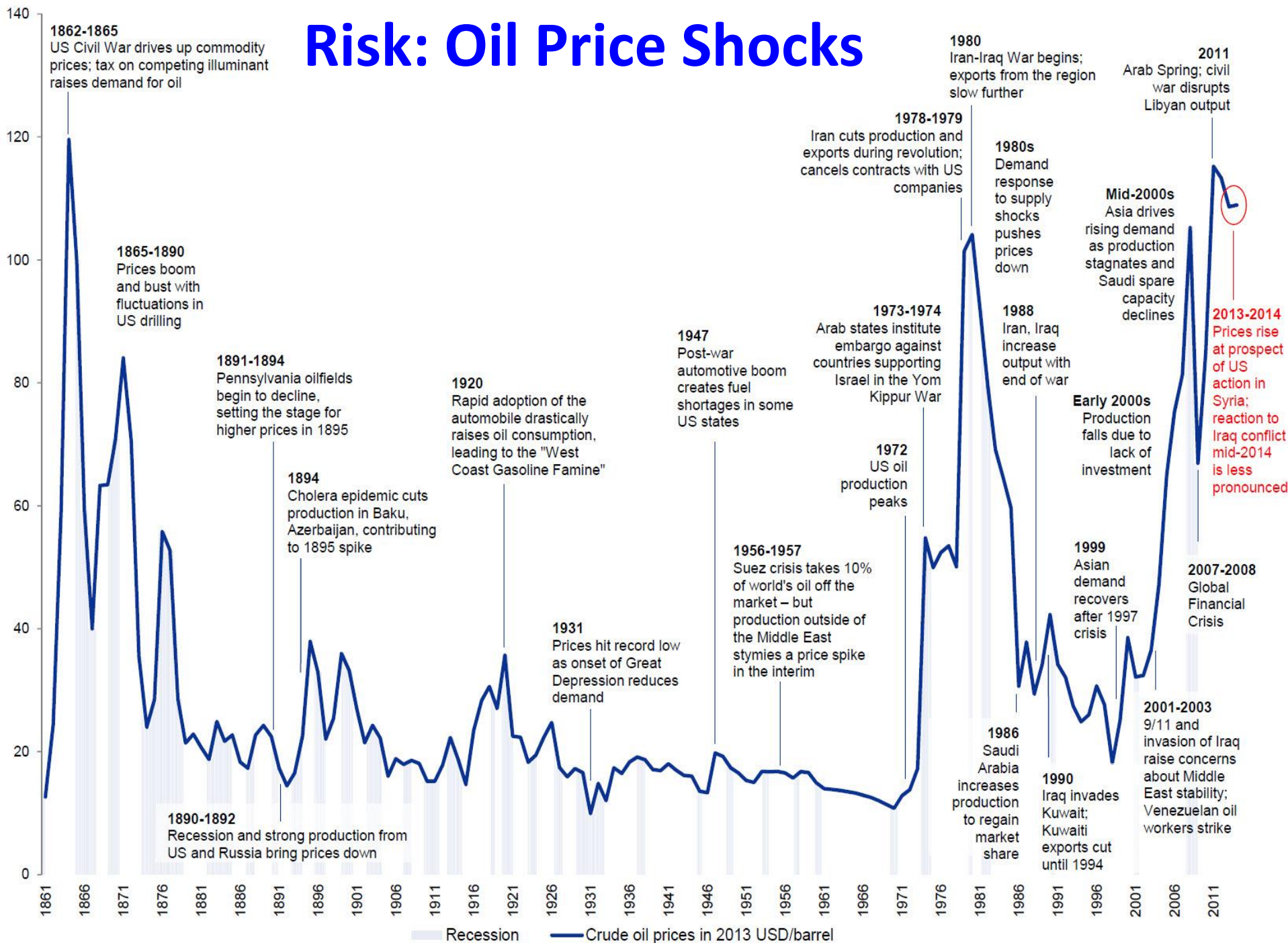
Risk: Direct CapEx, Indirect Cost, OpEx, Cost Stop



Risk: Oil Price Fluctuations



Risk: Oil Price Shocks



Risk: LIBOR (London Interbank Offered Rate)



South Azadegan- Early Production Phase





South Azadegan- Early Production

- The main risk factors:
 - 3 Contractors
 - Material Delivery (Long-Lead Items)
 - Payments to Contractor and Subsequently to Procurement Companies
 - Delivery from Builder's Site to Azadegan Site
 - Construction and Commissioning

Risk: Payments For Procurement



Risk: Shipping



Risk: Customs



Risk: Shipping to Site



Risk: Mines at Site



Risk: Site Operation; Three Contractor



Questions?

