



XIV Rice Global E&C Forum

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2011: The Challenge of doing EPC Project in Thailand

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PTT Phenol Company Limited

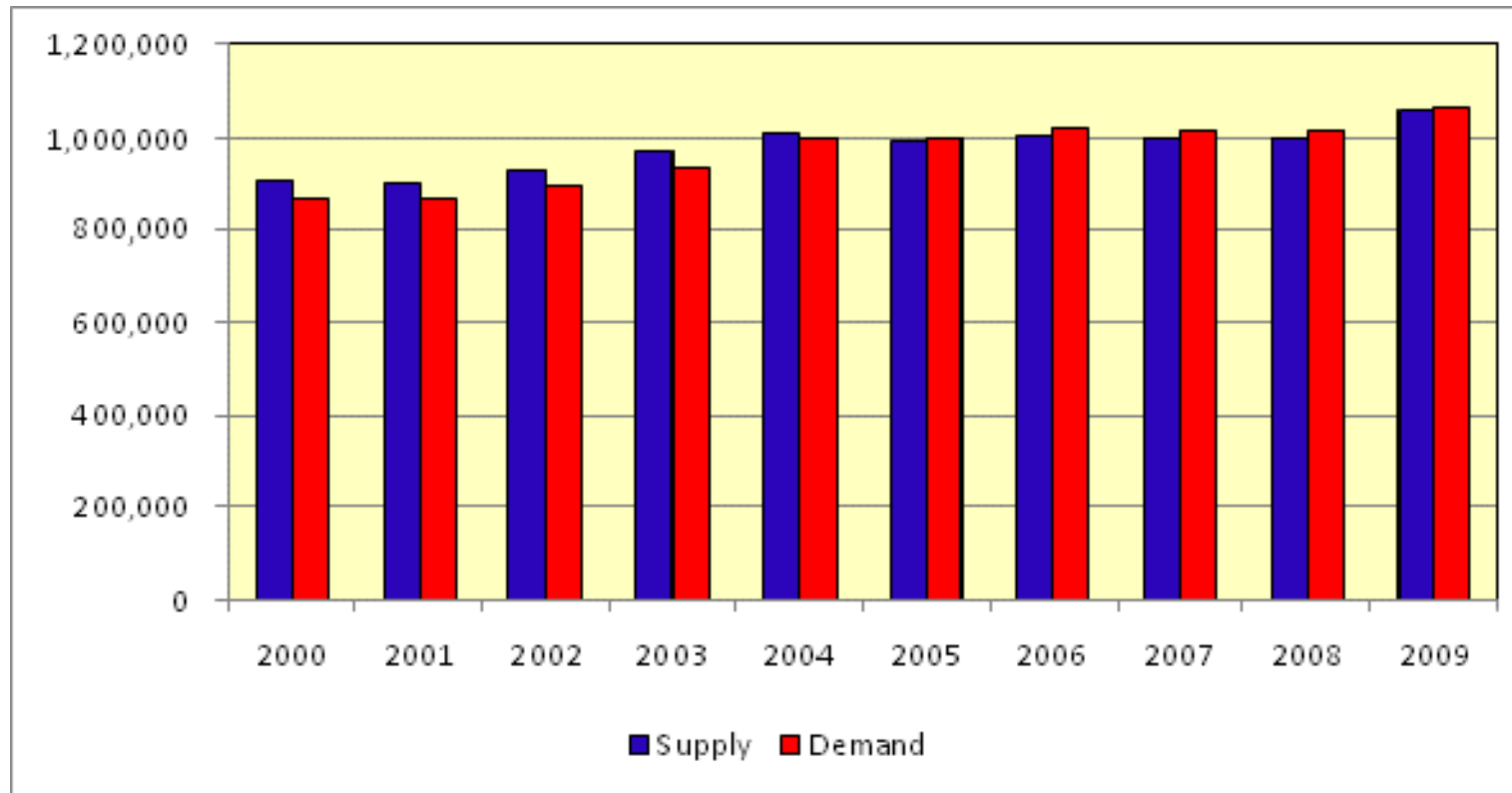
1. Introduction to Thailand energy, gas and oil
2. PTT Group
3. EPC Projects in Thailand; History and Outlook
4. Comparison of Tier 1, 2 and 3 Contractors
5. PTT Phenol Project learning experience
6. Q/A

Thailand: Top 10 Petrochemicals Complex



- 75% the size of Texas (198,116 square mile)
- Population 2011 = 65 million (2.6 time that of Texas)
- GDP = 24th (on par Saudi, Egypt)
- 2010 = 7,8% Economic Growth
- GDP by Industry:
 - Agriculture 10%
 - Manufac. 40%
 - Construction/mining 4%
 - Others (tourism etc.) 46%
- World scale petrochemicals complex ranking 6th worldwide

Supply and Demand of Oil products in Thailand (barrels/day)



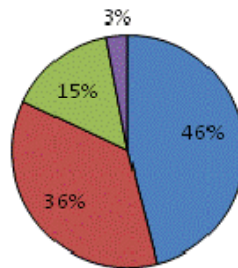
Source: EPPO

- From 2005 demand exceeds supply by average 13,000 barrels/day
- Crude import volume in 2010 was 803 KBD down 0.1% but higher cost

Thai Electricity Generation by Fuel Type

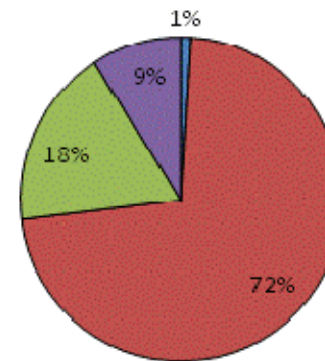


**2000 - Thai Energy Generation
(98,487GWh)**



■ Oil ■ Natural Gas ■ Coal/Lignite ■ Hydro/Renewable

**2010 - Thai Energy Generation
(150,000GWh)**

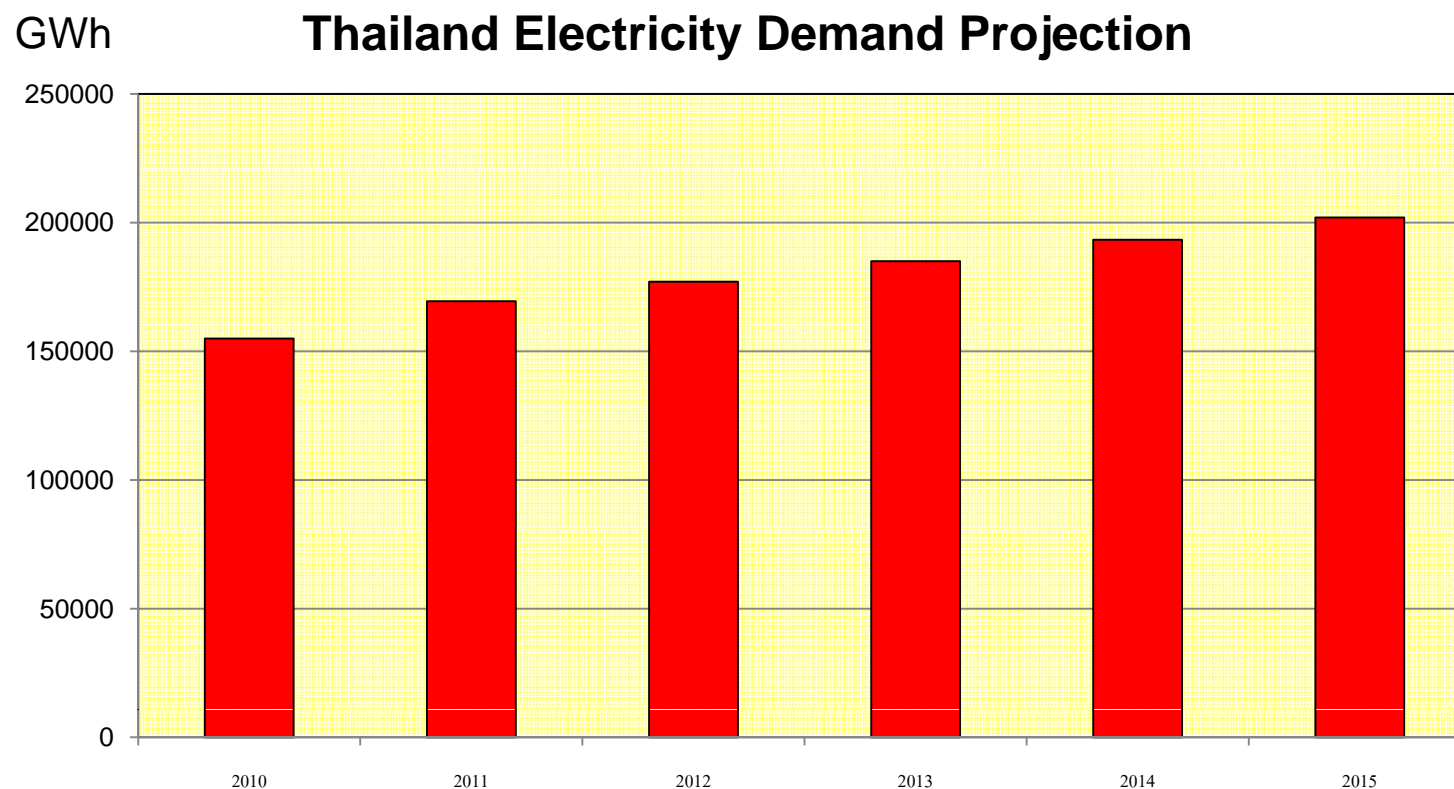


■ Oil ■ Natural Gas ■ Coal/Lignite ■ Hydro/Renewable

Source: EPPO

- Not enough local Natural Gas for electricity generation
- New Natural Gas Source or new fuel type needed by 2020

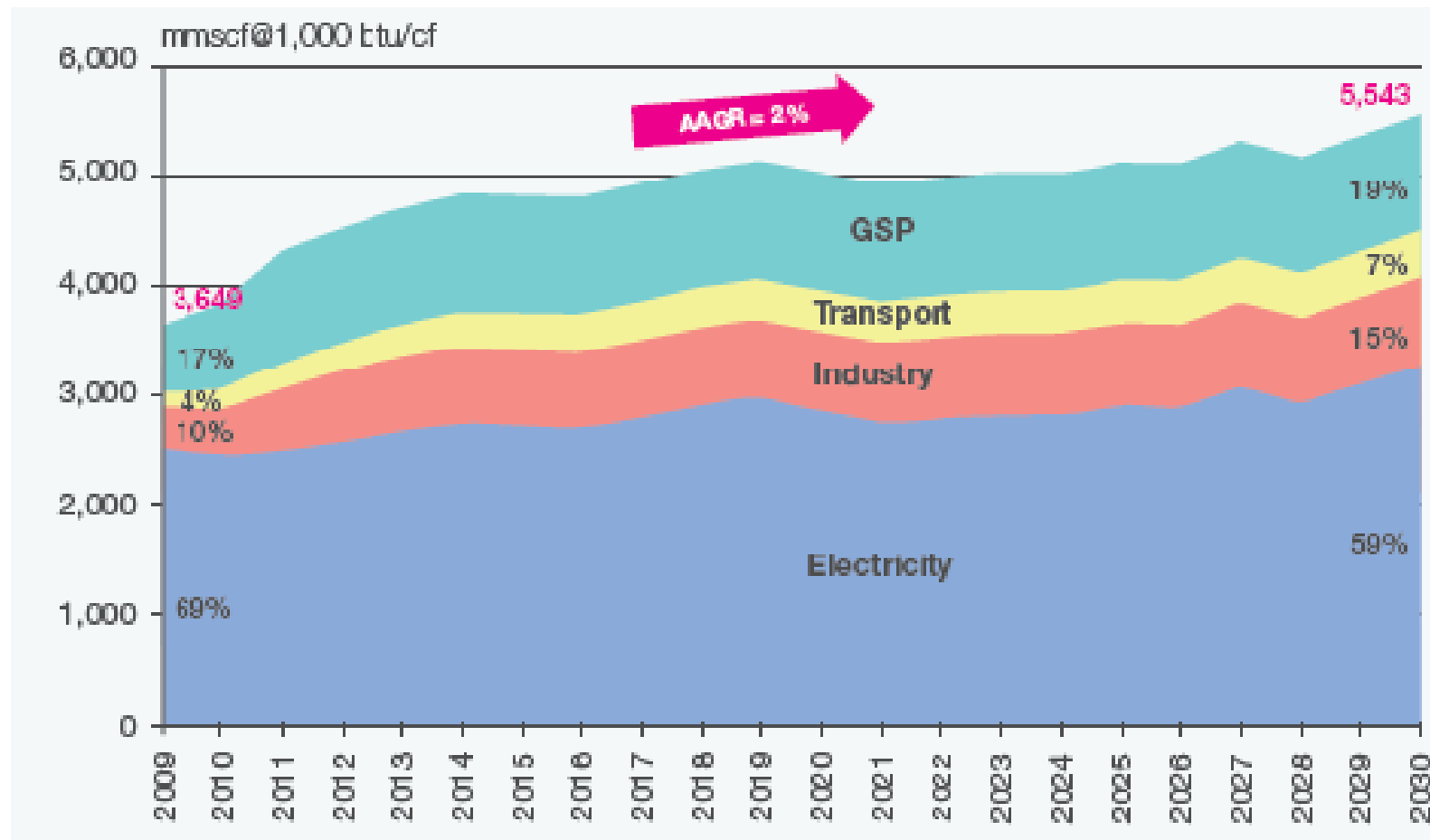
Thai Electricity Demand



Source: EPPO

- Electricity demand expected to reach 201,998 GWh in 2015
- At least 5 nuclear power plants needed by 2020

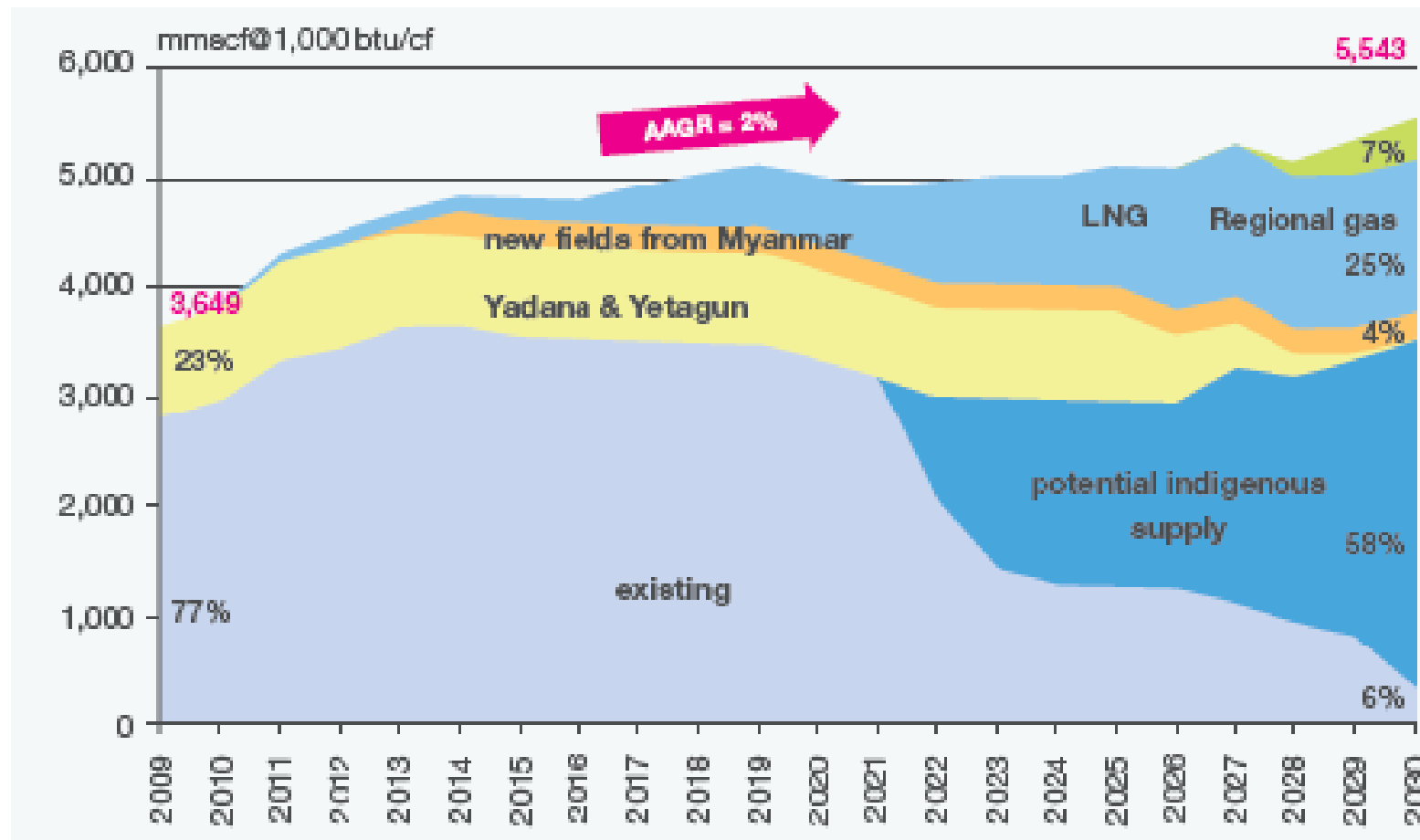
Thailand Natural Gas Demand Outlook



Source: PTT

- Natural Gas for Electricity will increase if no new nuclear plants
- New LNG terminal already constructed to handle imports

Thailand Natural Gas Supply Outlook



Source: PTT

- Local field to be depleted within 10-12 years
- Neighboring supply not reliable due to stiff Chinese & Indian demand
- Possible New Gas from shale deposits in onshore sedimentary basins?

- Largest Thai Gas, Oil and Petrochemicals Company
 - 2010 Net revenues (consolidated) = US\$ 63 billion
 - 2010 Net Profit (consolidated) = US\$ 2.76 billion
 - Income by Group Oil = 73%; Gas = 24%; Petrochem 3%
 - Shareholders:
 - Thai Ministry of Finance = 51.36%
- Current Global 500 ranking = 128 (Target 100 by year 2020)

Predominant Infrastructure & Networks :

Allow for Profit Maximisation & Well Positioned for Organic Growth

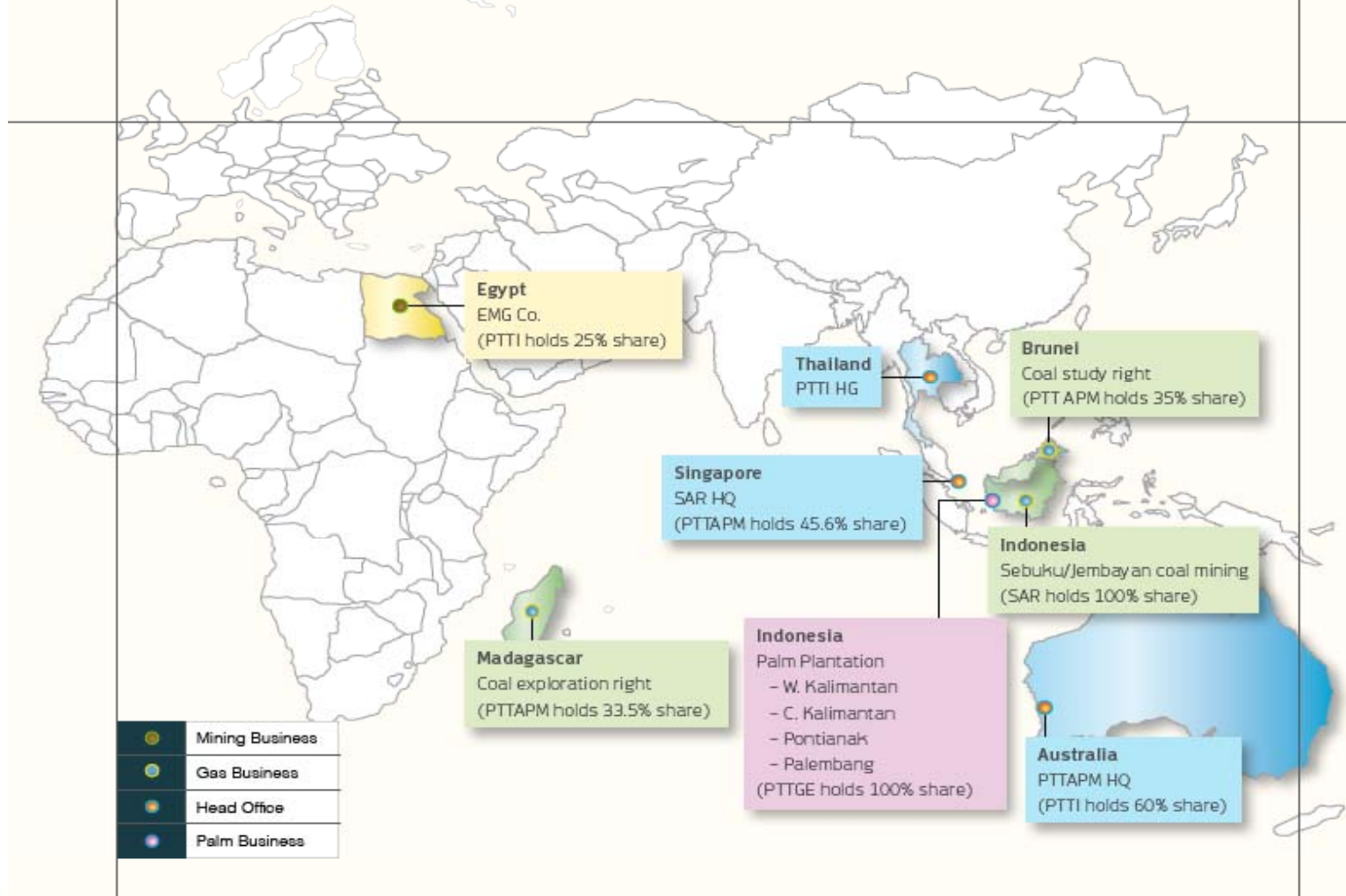


- A fully extended net work and infrastructure enables PTT to gain advantages over its competitors and maintain its leadership position
- **Storage capacity**
 - Crude oil & Products 9.6 MM BBL
 - LPG 75,500 tonnes
- **1,398 service stations (excluding 8 LPG service stations for vehicles)**
- **23 Depots**
 - Petroleum 6
 - Oil 15
 - LPG 2
- **15 Aviation depots**
- **2 JV Multi products pipelines (613 KBD)**

PTT Group – Overseas Investment



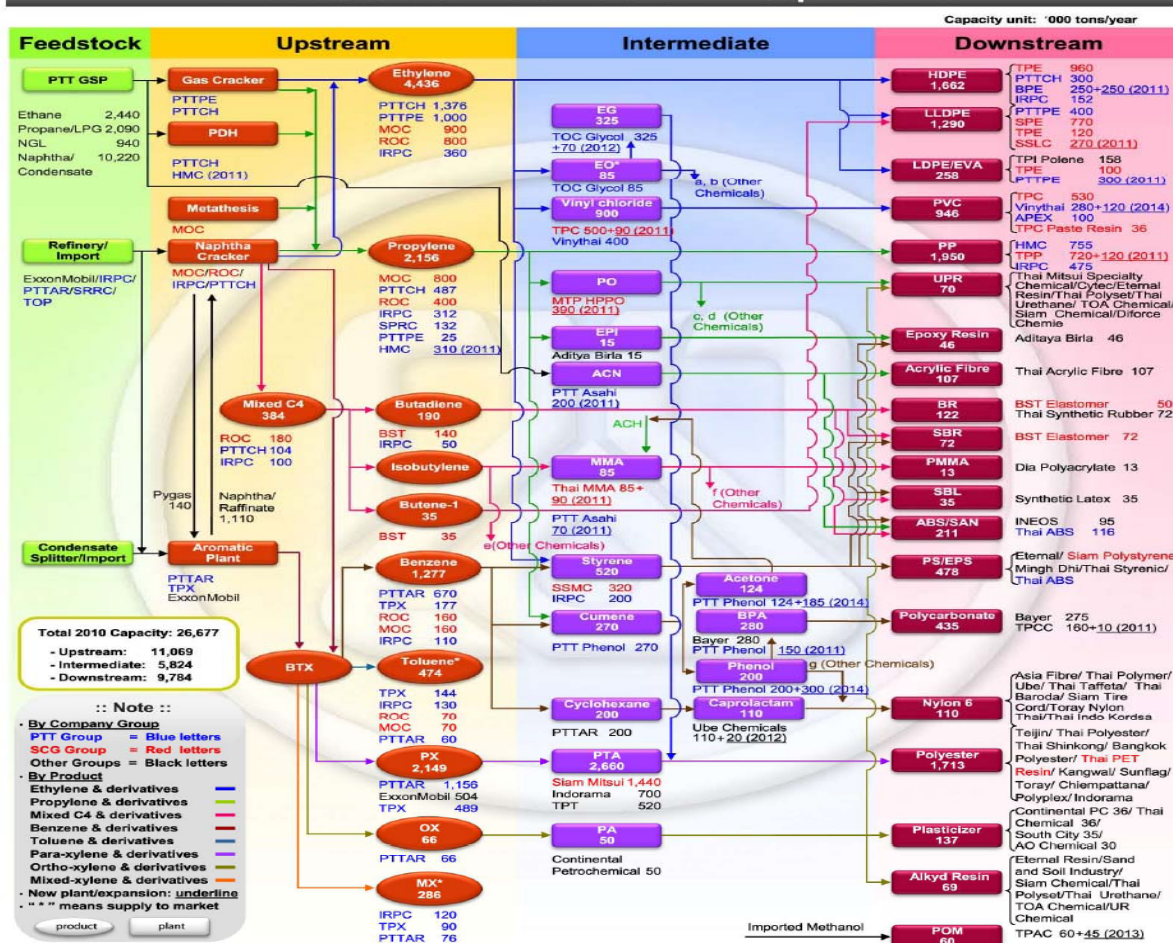
PTTI & PTTGE Current Investment



PTT Petrochemicals by Numbers



2010 Thailand Petrochemical Complex Flow



Chemical	Capacity (mil Ton)
Ethylene	2,73
Propylene	0,95
Benzene	0,95
EG	3,25
HDPE	0,70
PP	1,11

Source: PTIT 2011

History of E&C in Thailand - Petrochemicals

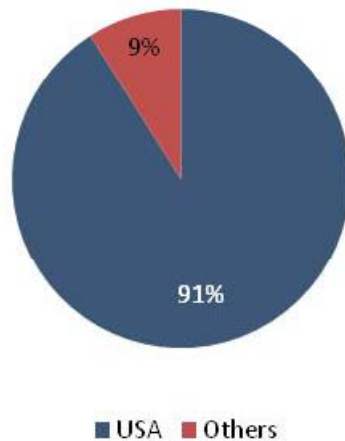


- 1970's First PVC Plant 15,000MTPY – German Contractor, LSTK, located 30 km from downtown
- 1980's Petrochemical Phase1: USA, Japan, German Contractors, LSTK and some Cost Reimbursable, PMC (US, UK, German) a must
- 1990's Petrochemical Phase 2: USA, Japan, Germany, French, Korean, Taiwan and Thai Contractors, PMC (US, German)
- 2000's Domination by Korean, Taiwan, Thai Contractors

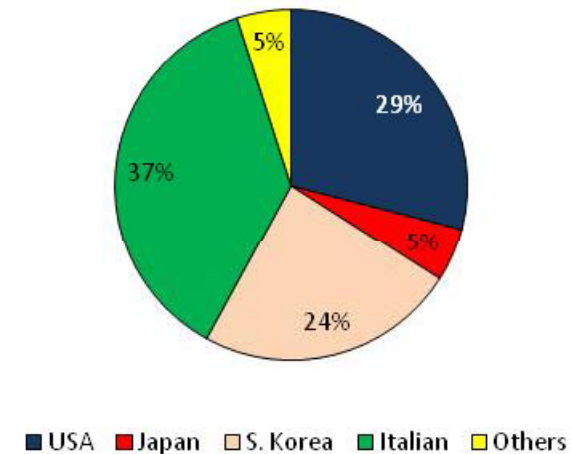
Thai Pipeline projects - Offshore



Thai Offshore Gas Pipelines Engineering (2860 km)



Thai Offshore Gas Pipelines Construction (2860 km)



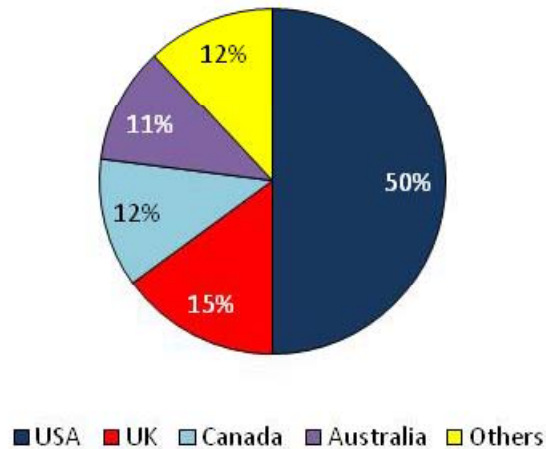
- Engineering 91% USA ; Construction : Italian, Korean, Japan
- Average depth 45 meter (147 ft)
- Pipe size 42 – 18 in.

Source: PTIT

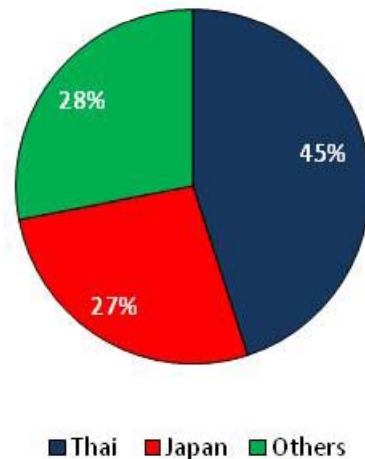
Thai Gas Pipelines Onshore



Thai Onshore Gas Pipelines Engineering (1,979 km)



Thai Onshore Gas Pipelines Construction (1,979 km)



- Engineering USA 50%
- Construction Thai 45%
- All work 90% for PTT
- Pipe 42- 10 in.

E&C for PTT GAS Separation Plant- Historical



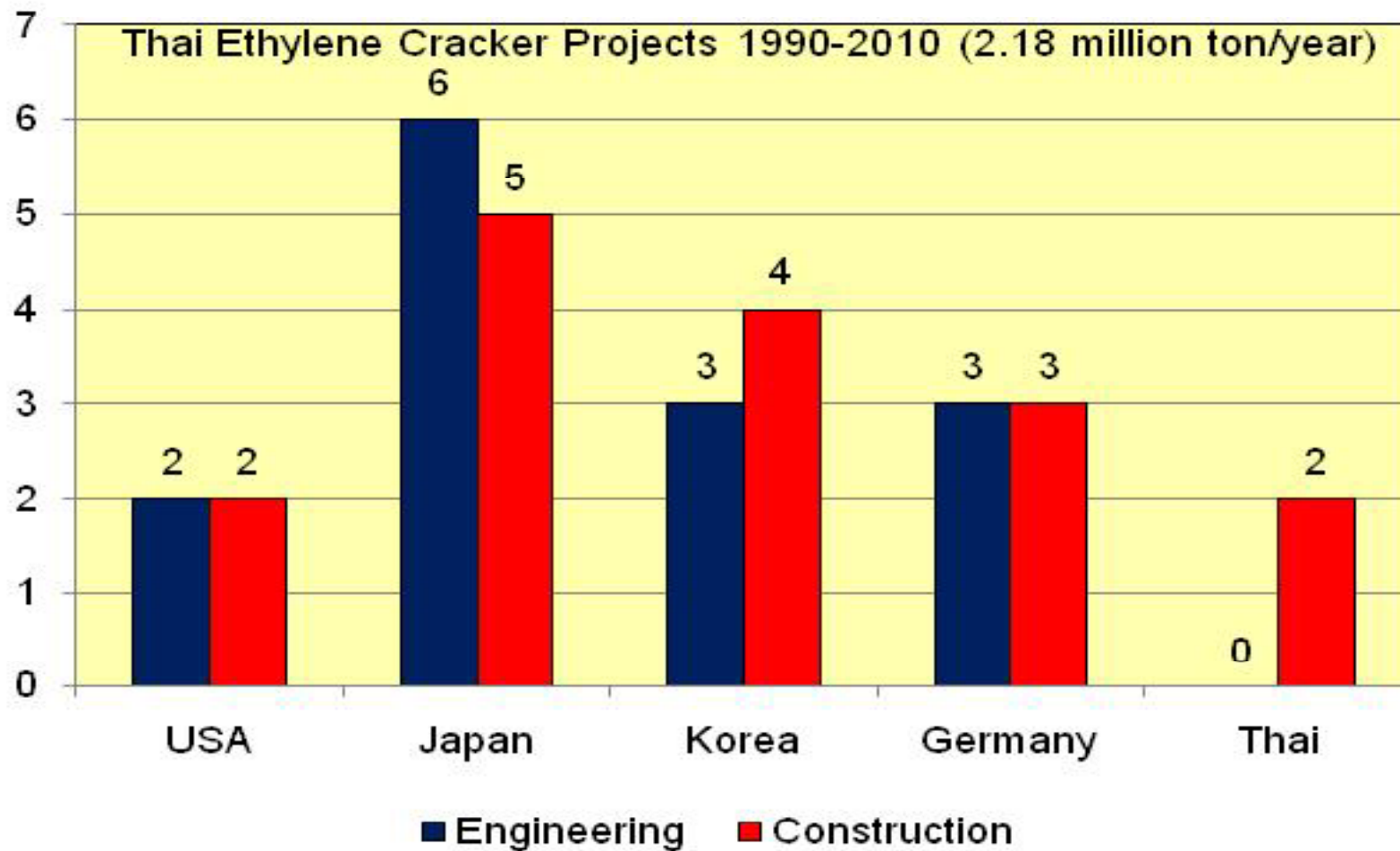
GAS SEPARATION PLANT (as of April 2011)

Company	Operation Unit	Location	Capacity (MMSCFD)		Start-up Year	Engineering	Contractor
			Existing	Future			
PTT	GSP 1	Rayong	390		1984	Linde AG	Toyo Engineering, Randall, Mitsui
	GSP 2	Rayong	320		1990	Linde AG	Nippon Kokan (NKK), Fish International, Toyo Menka, Vattana Phaisal Eng., NKK
	GSP 3	Rayong	430		1996	Linde AG	Toyo Engineering Hitashi Zosen
	GSP 4	Khanom; Nakhon Si Thammarat	190		1995	Linde AG	Samsung Engineering Samsung Corp., Fish International
	GSP 5	Rayong	530		2005	Foster Wheeler	Samsung Engineering
	GSP 6	Rayong	800		2011	Foster Wheeler	Samsung Engineering
	ESP	Rayong			2010	Fluor Daniel	Samsung Engineering
PTTEP Siam	Phalang Phet	Kamphaeng Phet	45		1990	Randall	Sino-Thai
TTM	GSP 1	Songkhla	425		2006	Kvaerner	Samsung Engineering

Source: PTIT's Industry Survey

- Contractors are predominantly Japanese and Korean

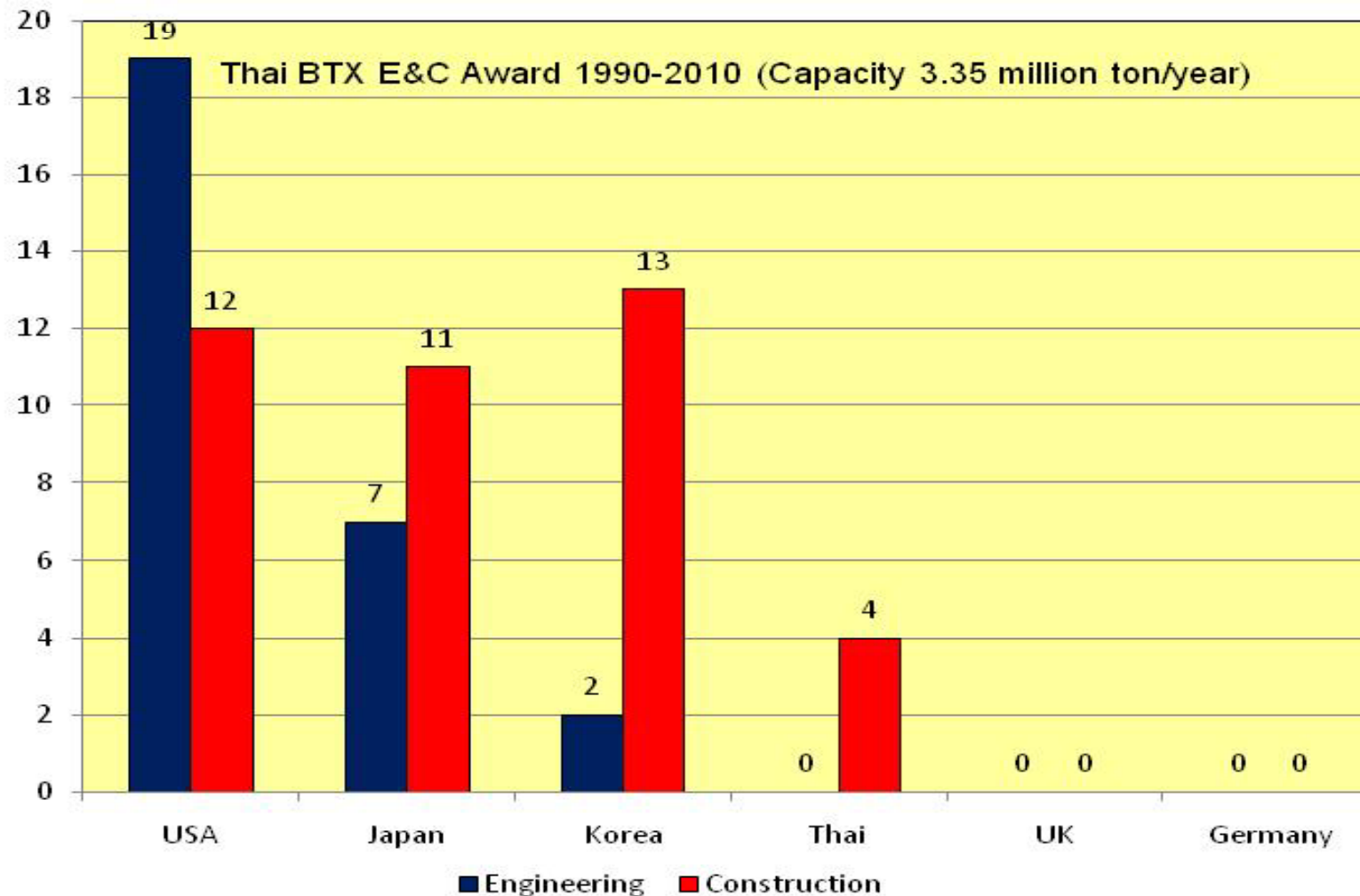
E&C for Thai Ethylene Cracker Project 1990-2010



- No clear cut winner for cracker construction but..
- Korean contractors are gaining awards

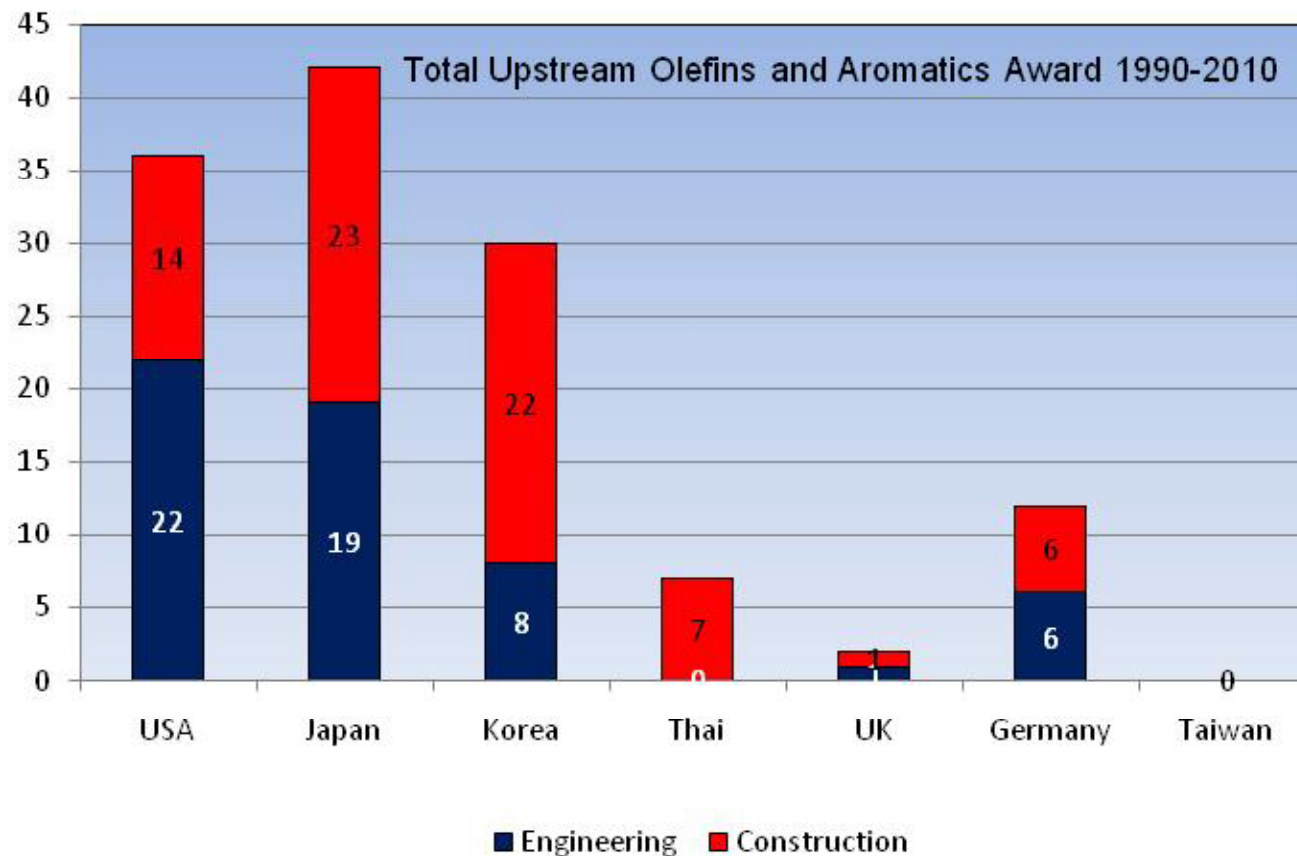
Source: PTIT

E&C for Aromatics Project in Thailand 1990-2010



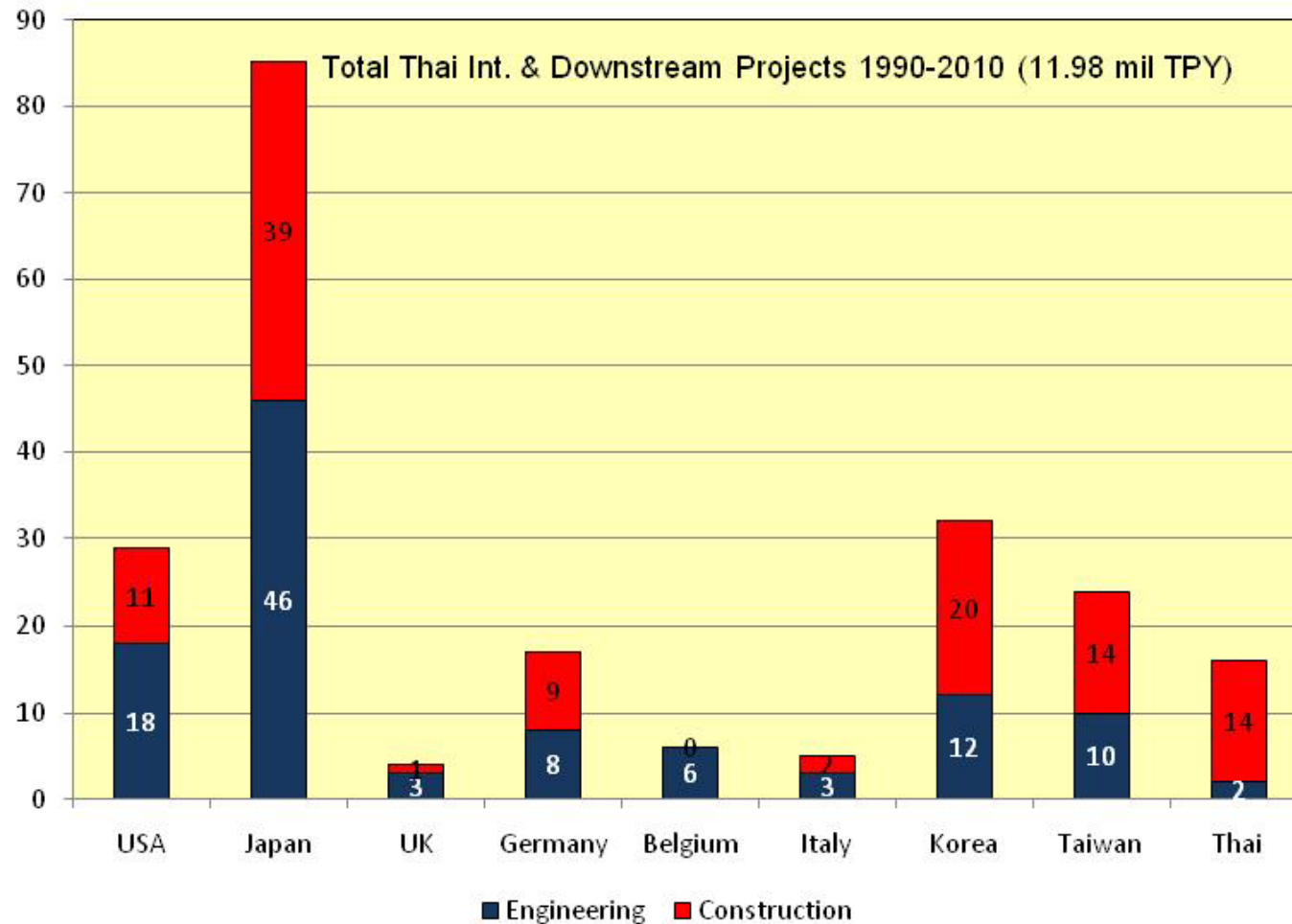
- USA is still the leader in BTX engineering and construction
- Korean constructions aggressive and rising

For the past 20 years at Map Tha Phut for olefins & aromatics



- Korean contractors equal to Japanese for awards
- Local Engineering Contractors are yet to be established

Different story for Intermediate and downstream projects



- Japanese Contractors high due to process technology usage
- Korean, Taiwan and Thai contractors getting more competitive

CONTRACTOR SCORECARD* (1 to 5 , where 5 is the best)



Contractor by Country	Eng	Proc	Const	HSE	Sched.	Cost Control	Customer	Price
USA	5 	5 	5 	5 	5 	5 	3	3
Japan	4	4	5 	4	5 	5 	4	3
Korea	4	4	4	3	5 	4	5 	4
Taiwan	3	3	3	2	3	3	5 	5
Thai Hybrid	3	2	3	2	4	3	5 	5

*Based on experience in Thailand EPC LSTK projects



- Name Plate Capacity = 150,000 MTPY
- Technology – Mitsubishi Chemicals Corporation, Japan
- 100% Utilization of Acetone/Phenol from PTT Phenol
- Startup – April 2011
- Market : Domestic – 70%; Export- 30%
- Project Management Consultant – Foster Wheeler
- EPC Contractor – Toyo Thai Corporation Public Company
- Project Cost – US\$ 300 million

PTT Phenol – BPA Project, Thailand



EPC Lump Sum Turnkey ; Payment in US\$ and Thai Baht

Pros:

- Schedule control
- Equipment warranty and repair after initial acceptance
- Clear cut budget allocation
- Others

Cons:

- Higher cost due to additional risk marked up in price
- No direct control during procurement and construction
- Owner learn less
- Others

PTT Group prefers LSTK over cost reimburse

Prequalification of EPC Bidders – Bisphenol-A Project



What we look at:

- Past experience in Aromatics Phenol, BPA Chain project
- Financial record past 4 years
- Reference work
- Safety track record
- Project Attitude

We PQ 4 EPC Contractors; all were
allowed to proceed in Bid submission

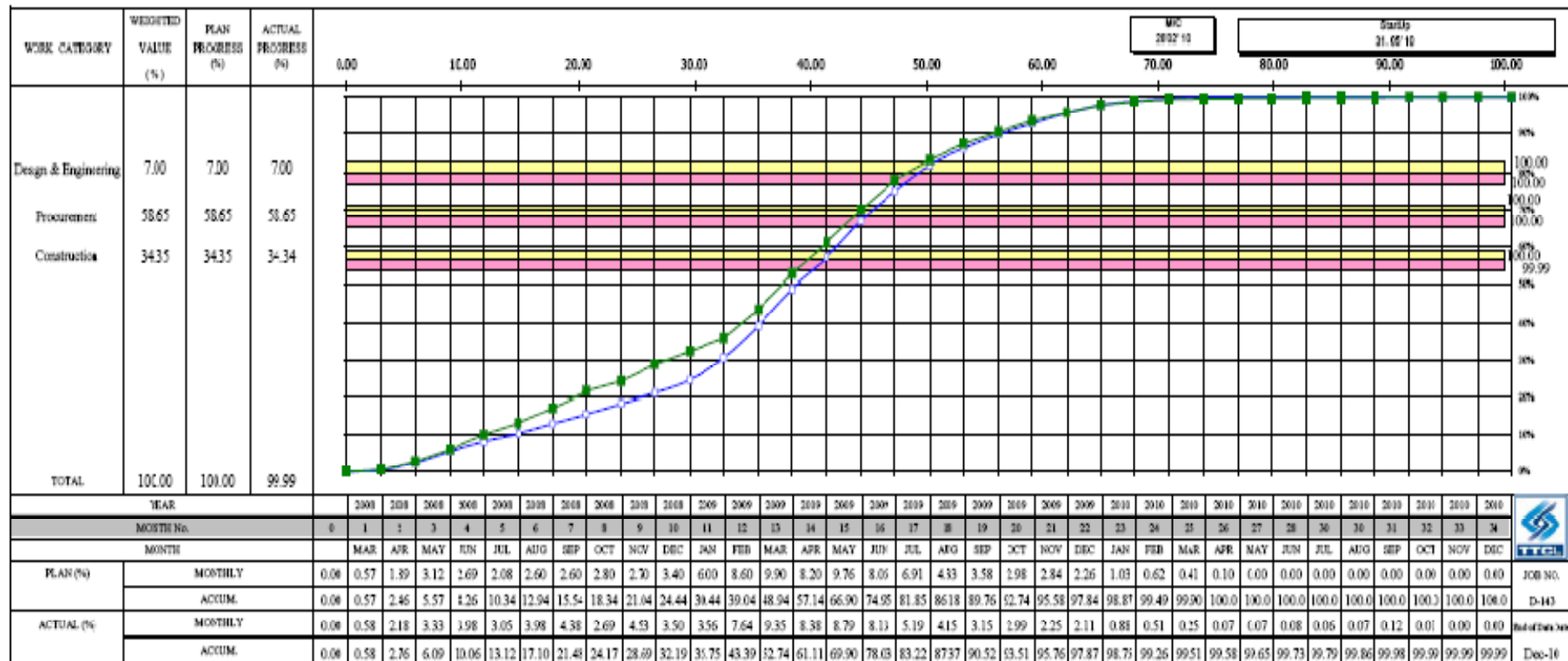
2 Korean, 1 Taiwan, 1 Thai Contractor

What we look for:

- ITB Compliance
- EPC Capability, track record, manpower quality, Fairness, Flexibility
- Top Management commitment to schedule
- Others

Winner: Thai Contractor by a thin margin

Bisphenol-A Project S-Curve



- Construction was stopped by court due to EHIA at 75% progress
- Political turmoil created delay in commissioning

Problems encountered during project



- New Constitution (year 2007) Clause 67.
All new projects must pass HIA and EIA.
- No Law passed to regulate HIA... all 76 Projects freeze
by Central Admin Court – Dec 2009
- PTT Phenol files petition for permission to continue BPA
construction – Jan 2010
- Court overturned initial verdict and allowed BPA to
resume construction Feb 24, 2010
- Political Unrest during construction create unnecessary
work stoppage

- NGO and public 's role in new investment will be more pronounced
- Allowed ample time for EHIA; recommend extra 12-18 months
- Advance PR and CSR will play a pivotal role
- Environmental friendly project will proceed faster
- Higher project cost for Thailand

PTT Phenol BPA Plant Location



We are here, 170km E of BKK



Undisturbed Luxury....



Q & A

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