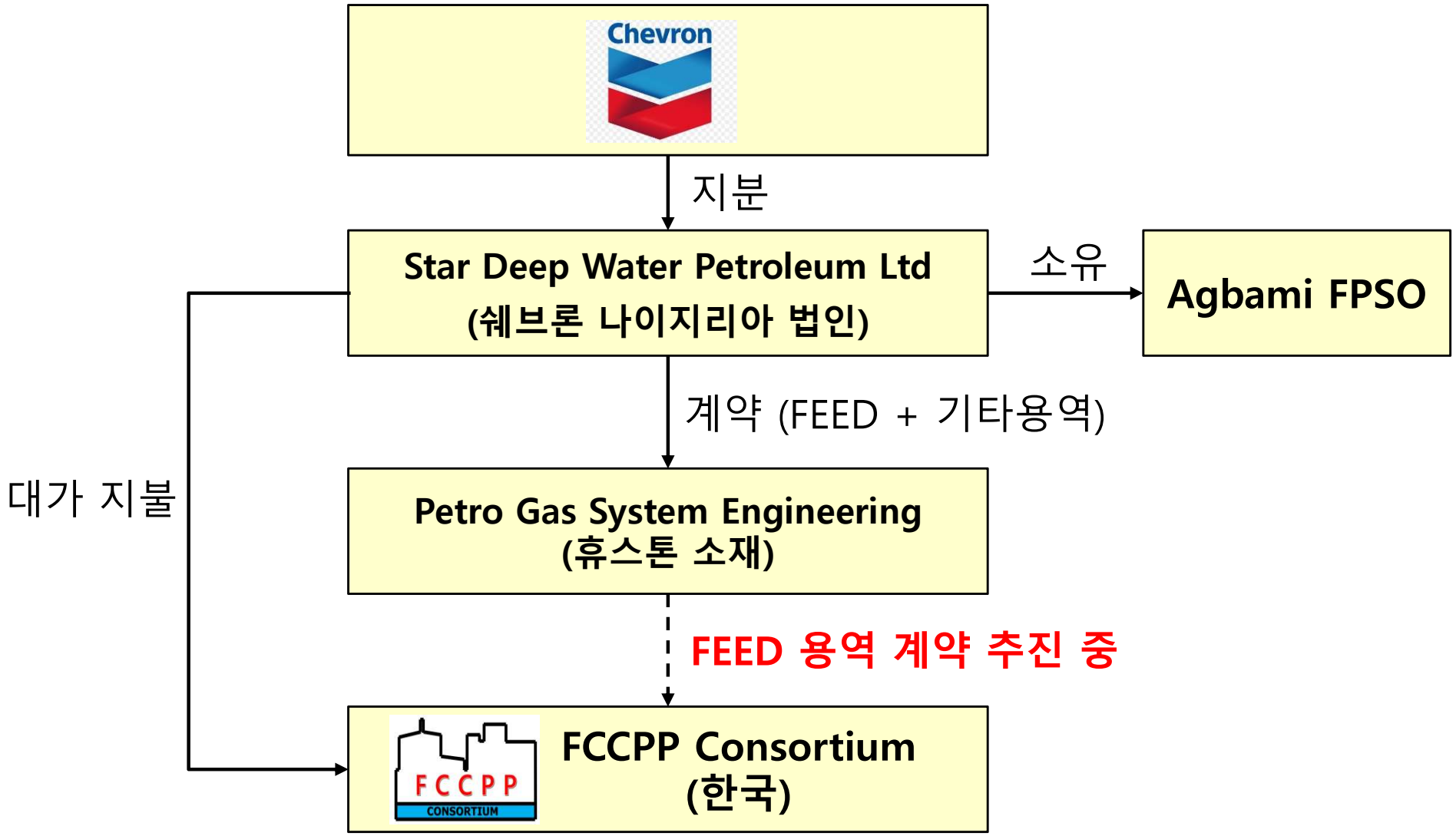
Star Deep Water Petroleum Ltd

Agbami Gas Project

Front-End Engineering Design (FEED) Scope of Work

- Task1: Essential Generator #3 Scope
- Task2: Gas Export Metering Unit
- Task3: Specialized Technical Safety Studies for New GTC Module

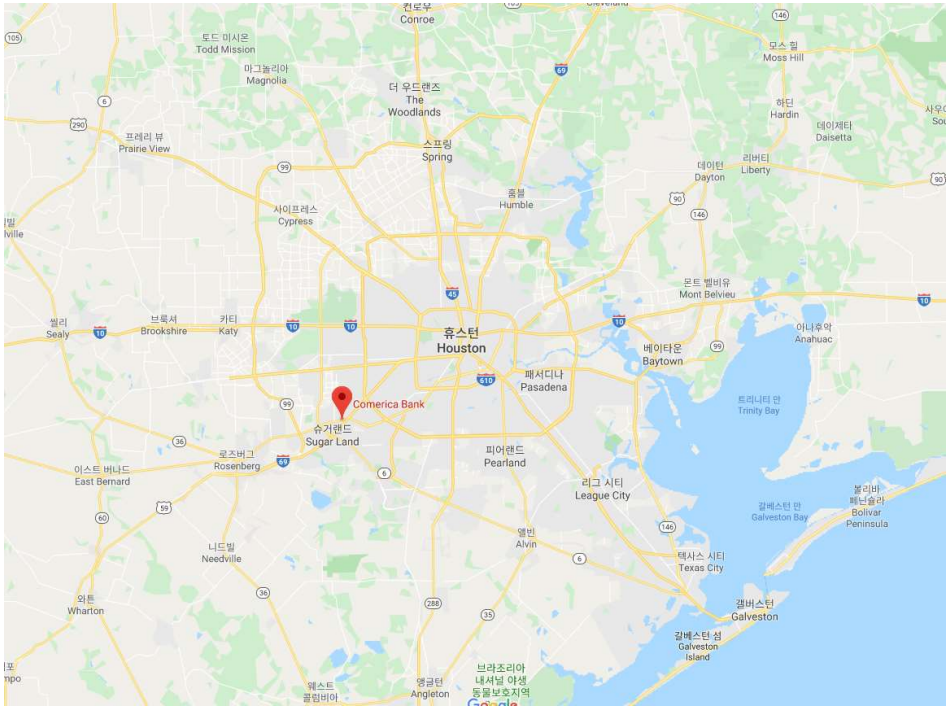
발주 구조

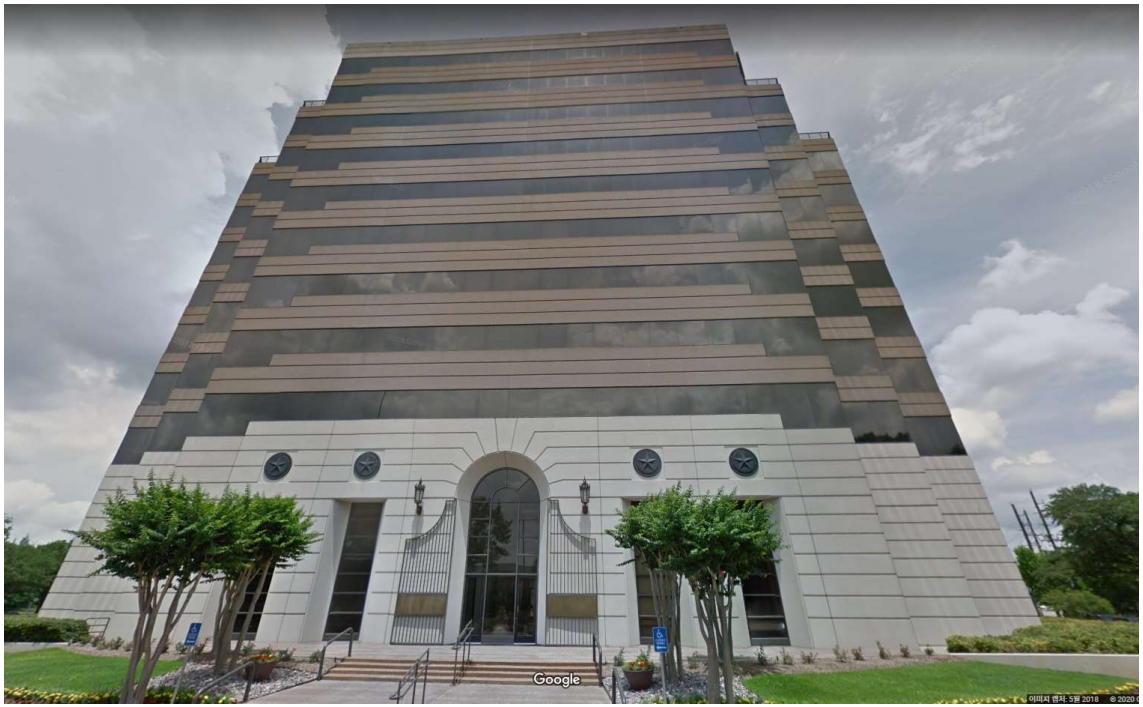


PetroGas System Engineering Inc.

- PetroGas Systems Engineering is a multinational **engineering, procurement, and project and construction management services** firm with offices in Houston, Texas, USA and Lagos, Nigeria.

- Comerica Bank Building, One Sugar Creek Center Blvd., Suite #1065, Sugar Land, Texas 77478





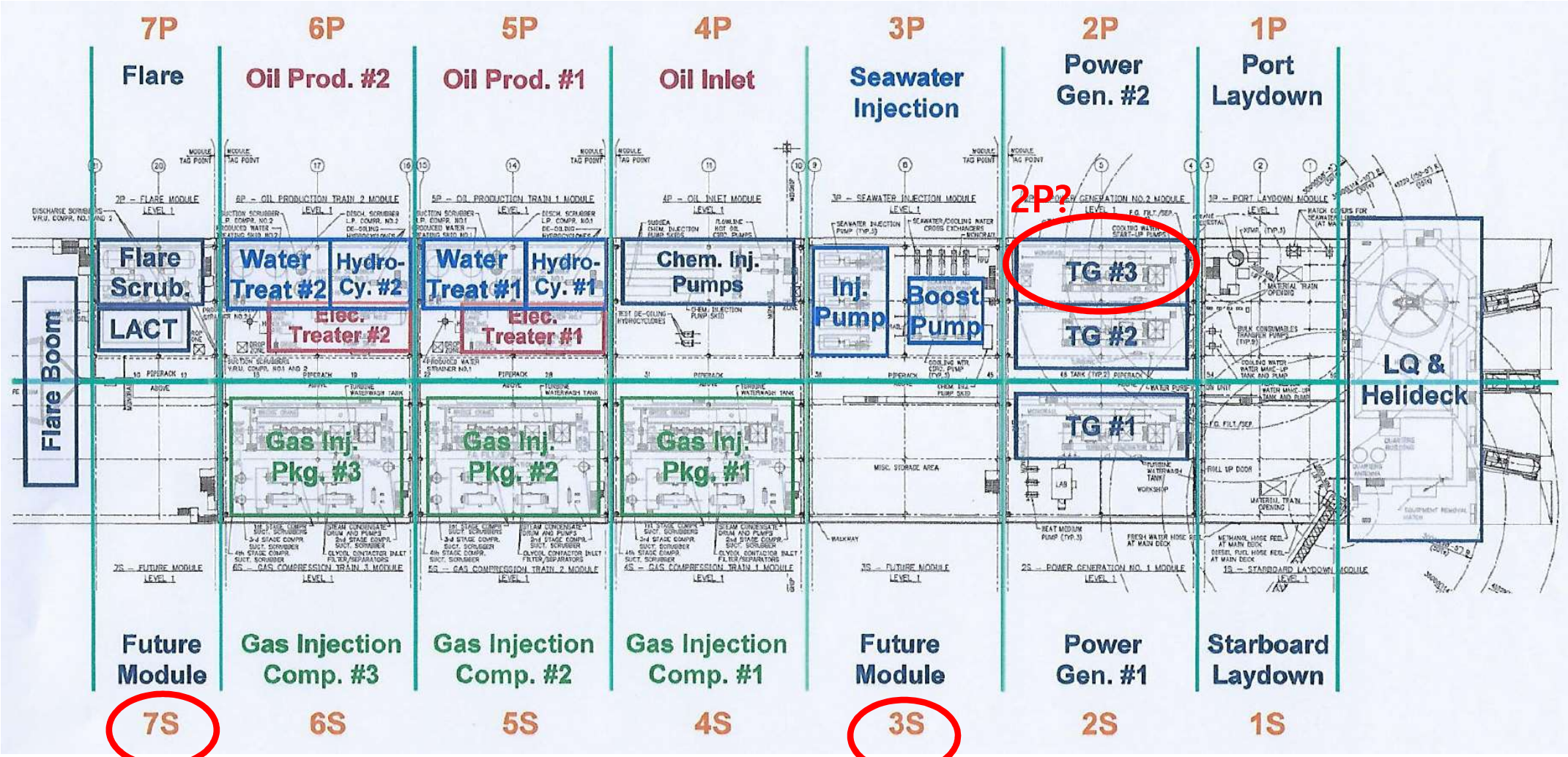
FEED Scope

Essential Generator #3 Scope;

- Option a – Relocation of existing essential generator #3 from FPSO location module 3S to module 7S.
- Option b – Decommission/remove existing essential generator #3 from FPSO location module 3S and install new essential generator #3 on FPSO location module 7S.
  - Design engineering required for Essential Generator #3 options above
  - Identification of tie-ins (including early tie-in requirements) and brownfield modification requirements including but not limited to integration into existing ICSS, FGS and electrical systems, for Essential Generator #3 options above
  - Identify & assess constructability issues related to Essential Generator #3 options above and any other brownfield impacts; provide details in a robust construction execution plan for both options.
  - Develop Class 3 Level Cost and Schedule Estimate for the execution of the Essential Generator #3 options above.

사업 개념

업무 개념 : Class 3 Level Cost and Schedule Estimate



FEED Scope

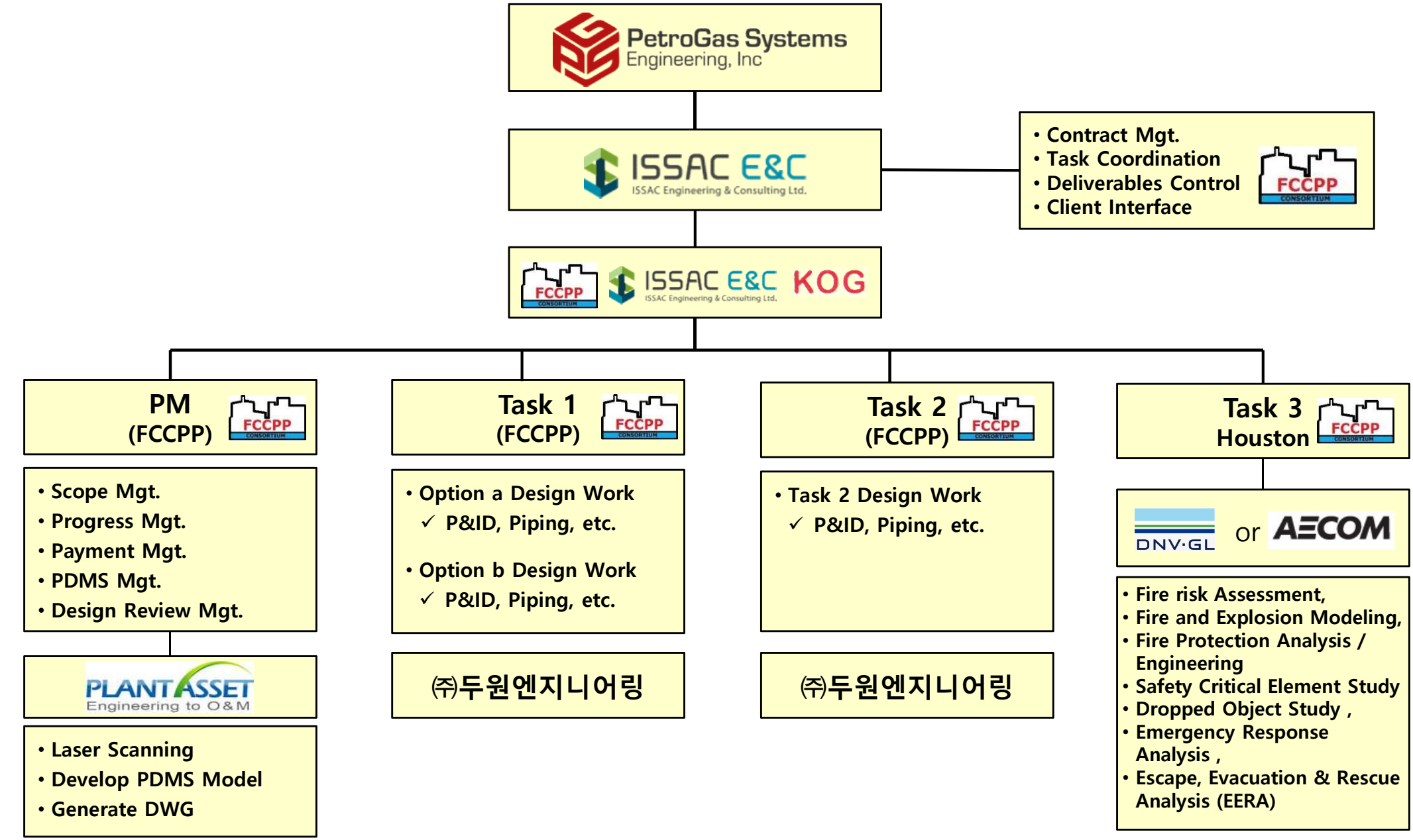
Gas Export Metering:

- Design engineering required for topsides metering unit to support 150 MMSCFD for gas export via existing GMG subsea risers.
- Identification of tie-ins (including early tie-in requirements) and brownfield modification requirements including integration into existing systems.
- Identify & assess constructability issues related to gas export metering skid and any other brownfield impacts; provide details in a robust construction execution plan.
- Develop Class 3 Level Cost and Schedule Estimate for the execution of the gas export metering skid scope of work.

Specialized Technical Safety Studies for new GTC module:

- Quantitative Risk Assessment (QRA) Study;
  - Fire risk Assessment, Fire and Explosion Modeling, Fire Protection Analysis / Engineering , Safety Critical Element Study
  - Dropped Object Study , Emergency Response Analysis , Escape, Evacuation& Rescue Analysis (EERA)

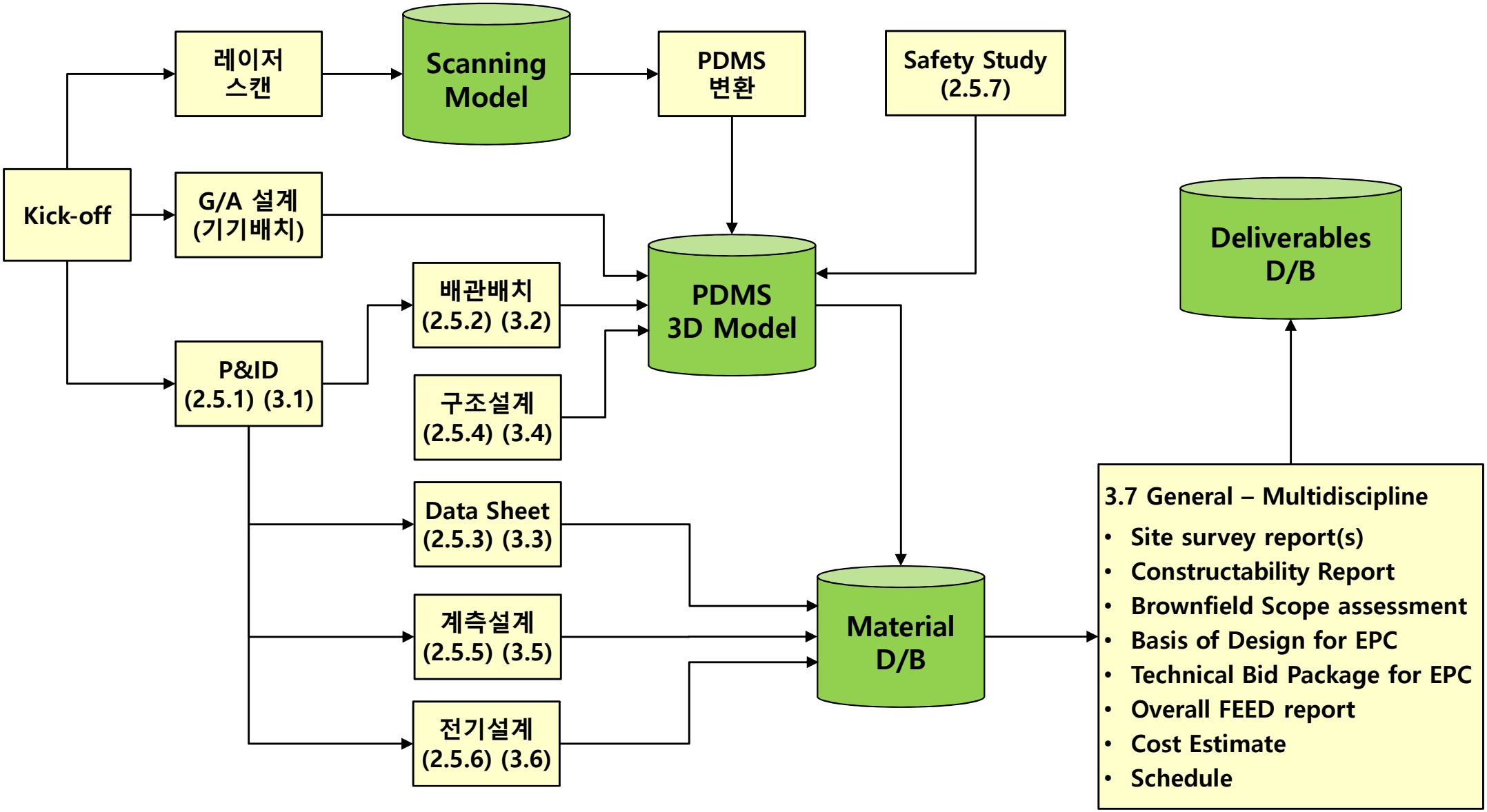
사업 조직



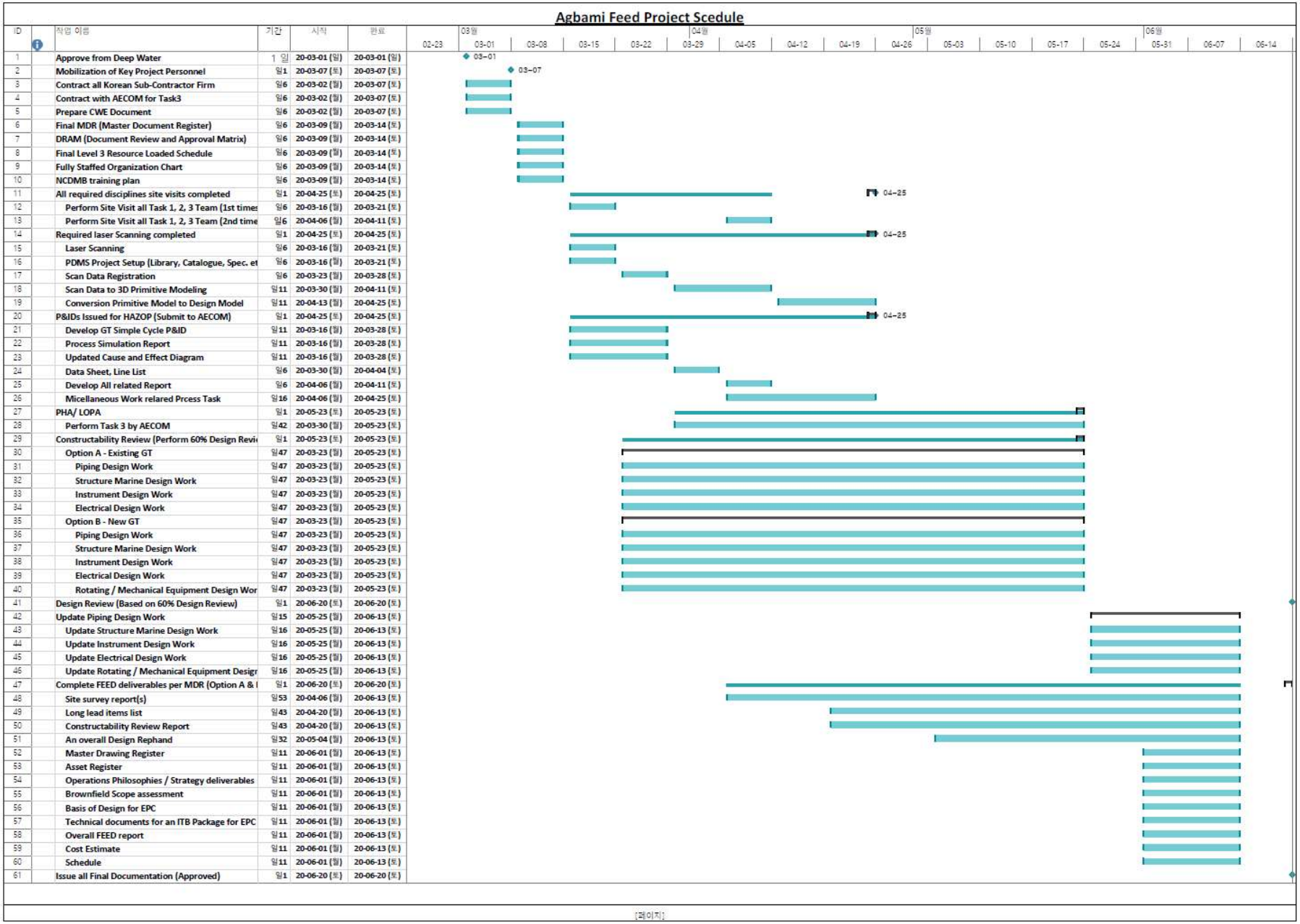
Milestone 일정

항목	세부 항목	Stage1		Stage2													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mobilization	Mobilization of Key Project Personnel																
FEED PMT/ Technical Kick Off	Final MDR (Master Document Register)																
	DRAM (Document Review and Approval Matrix)																
	Final Level 3 Resource Loaded Schedule																
	Fully Staffed Organization Chart																
	NCDMB training plan																
30% 3D Model Review	All required disciplines site visits completed																
	Required laser Scanning completed																
	P&IDs Issued for HAZOP																
P&IDs issued IFC and IFD	PHA/ LOPA																
	Constructability Review																
Final FEED Report	Design Review																
	Complete FEED deliverables per MDR																
	Issue all Final Documentation (Approved)																

설계 프로세스



Schedule



ID	작업 이름	기간	시작	완료
1	Approve from Deep Water	1 일	20-03-01 (일)	20-03-01 (일)
2	Mobilization of Key Project Personnel	일1	20-03-07 (토)	20-03-07 (토)
3	Contract all Korean Sub-Contractor Firm	일6	20-03-02 (월)	20-03-07 (토)
4	Contract with AECOM for Task3	일6	20-03-02 (월)	20-03-07 (토)
5	Prepare CWE Document	일6	20-03-02 (월)	20-03-07 (토)
6	Final MDR (Master Document Register)	일6	20-03-09 (월)	20-03-14 (토)
7	DRAM (Document Review and Approval Matrix)	일6	20-03-09 (월)	20-03-14 (토)
8	Final Level 3 Resource Loaded Schedule	일6	20-03-09 (월)	20-03-14 (토)
9	Fully Staffed Organization Chart	일6	20-03-09 (월)	20-03-14 (토)
10	NCDMB training plan	일6	20-03-09 (월)	20-03-14 (토)
11	All required disciplines site visits completed	일1	20-04-25 (토)	20-04-25 (토)
12	Perform Site Visit all Task 1, 2, 3 Team (1st times	일6	20-03-16 (월)	20-03-21 (토)
13	Perform Site Visit all Task 1, 2, 3 Team (2nd time	일6	20-04-06 (월)	20-04-11 (토)
14	Required laser Scanning completed	일1	20-04-25 (토)	20-04-25 (토)
15	Laser Scanning	일6	20-03-16 (월)	20-03-21 (토)
16	PDMS Project Setup (Library, Catalogue, Spec. et	일6	20-03-16 (월)	20-03-21 (토)
17	Scan Data Registration	일6	20-03-23 (월)	20-03-28 (토)
18	Scan Data to 3D Primitive Modeling	일11	20-03-30 (월)	20-04-11 (토)
19	Conversion Primitive Model to Design Model	일11	20-04-13 (월)	20-04-25 (토)
20	P&IDs Issued for HAZOP (Submit to AECOM)	일1	20-04-25 (토)	20-04-25 (토)
21	Develop GT Simple Cycle P&ID	일11	20-03-16 (월)	20-03-28 (토)
22	Process Simulation Report	일11	20-03-16 (월)	20-03-28 (토)
23	Updated Cause and Effect Diagram	일11	20-03-16 (월)	20-03-28 (토)
24	Data Sheet, Line List	일6	20-03-30 (월)	20-04-04 (토)
25	Develop All related Report	일6	20-04-06 (월)	20-04-11 (토)
26	Micellaneous Work relared Prcess Task	일16	20-04-06 (월)	20-04-25 (토)
27	PHA/ LOPA	일1	20-05-23 (토)	20-05-23 (토)
28	Perform Task 3 by AECOM	일42	20-03-30 (월)	20-05-23 (토)
29	Constructability Review (Perform 60% Design Revi	일1	20-05-23 (토)	20-05-23 (토)
30	Option A - Existing GT	일47	20-03-23 (월)	20-05-23 (토)
31	Piping Design Work	일47	20-03-23 (월)	20-05-23 (토)
32	Structure Marine Design Work	일47	20-03-23 (월)	20-05-23 (토)
33	Instrument Design Work	일47	20-03-23 (월)	20-05-23 (토)
34	Electrical Design Work	일47	20-03-23 (월)	20-05-23 (토)
35	Option B - New GT	일47	20-03-23 (월)	20-05-23 (토)
36	Piping Design Work	일47	20-03-23 (월)	20-05-23 (토)
37	Structure Marine Design Work	일47	20-03-23 (월)	20-05-23 (토)
38	Instrument Design Work	일47	20-03-23 (월)	20-05-23 (토)
39	Electrical Design Work	일47	20-03-23 (월)	20-05-23 (토)
40	Rotating / Mechanical Equipment Design Wor	일47	20-03-23 (월)	20-05-23 (토)
41	Design Review (Based on 60% Design Review)	일1	20-06-20 (토)	20-06-20 (토)
42	Update Piping Design Work	일15	20-05-25 (월)	20-06-13 (토)
43	Update Structure Marine Design Work	일16	20-05-25 (월)	20-06-13 (토)
44	Update Instrument Design Work	일16	20-05-25 (월)	20-06-13 (토)
45	Update Electrical Design Work	일16	20-05-25 (월)	20-06-13 (토)
46	Update Rotating / Mechanical Equipment Desigr	일16	20-05-25 (월)	20-06-13 (토)
47	Complete FEED deliverables per MDR (Option A & I	일1	20-06-20 (토)	20-06-20 (토)
48	Site survey report(s)	일53	20-04-06 (월)	20-06-13 (토)
49	Long lead items list	일43	20-04-20 (월)	20-06-13 (토)
50	Constructability Review Report	일43	20-04-20 (월)	20-06-13 (토)
51	An overall Design Rephand	일32	20-05-04 (월)	20-06-13 (토)
52	Master Drawing Register	일11	20-06-01 (월)	20-06-13 (토)
53	Asset Register	일11	20-06-01 (월)	20-06-13 (토)
54	Operations Philosophies / Strategy deliverables	일11	20-06-01 (월)	20-06-13 (토)
55	Brownfield Scope assessment	일11	20-06-01 (월)	20-06-13 (토)
56	Basis of Design for EPC	일11	20-06-01 (월)	20-06-13 (토)
57	Technical documents for an ITB Package for EPC	일11	20-06-01 (월)	20-06-13 (토)
58	Overall FEED report	일11	20-06-01 (월)	20-06-13 (토)
59	Cost Estimate	일11	20-06-01 (월)	20-06-13 (토)
60	Schedule	일11	20-06-01 (월)	20-06-13 (토)
61	Issue all Final Documentation (Approved)	일1	20-06-20 (토)	20-06-20 (토)

Contractor Work Estimate Submission

- **CONTRACTOR shall submit a CTR/CWE for the FEED Scope of Work Execution.**
- **The expected deliverables to accompany the CWE submission for FEED are:**
  - CWE (Contractor Work Estimate)
  - Preliminary MDR
  - Manpower Histogram
  - Key Personnel List
  - PAAF & CV's of Key Personnel
  - Organization chart
  - Level 3 Schedule (Primavera P6)
  - Clarifications and Exceptions
  - **Project Execution Plan**
  - Preliminary NCDMB Training Plan
  - **Project Controls Plan**
  - **Communication Plan**
  - Mobilization / Demobilization Plan

PEP (Project Execution Plan) 목차

- **Executive Summary**
- **Project Goals, Objectives, and Execution Strategy**
- **Project Baseline (DCM)**
- **Project Management Plan**
  - PDMS system Operation Procedure
  - Design Review Procedure
- **Risk Management Plan**

PCP (Project Control Plan) 목차

- **Project Control Management**
- **Project Breakdown Structure**
  - Work Breakdown Structure(WBS)
  - Organizational Structure (OBS)
  - Cost Breakdown Structure (CBS)
- **Project Schedule (Planning and Scheduling)**
- **Progress Measurement**
- **Estimating Processes**


7S
3S
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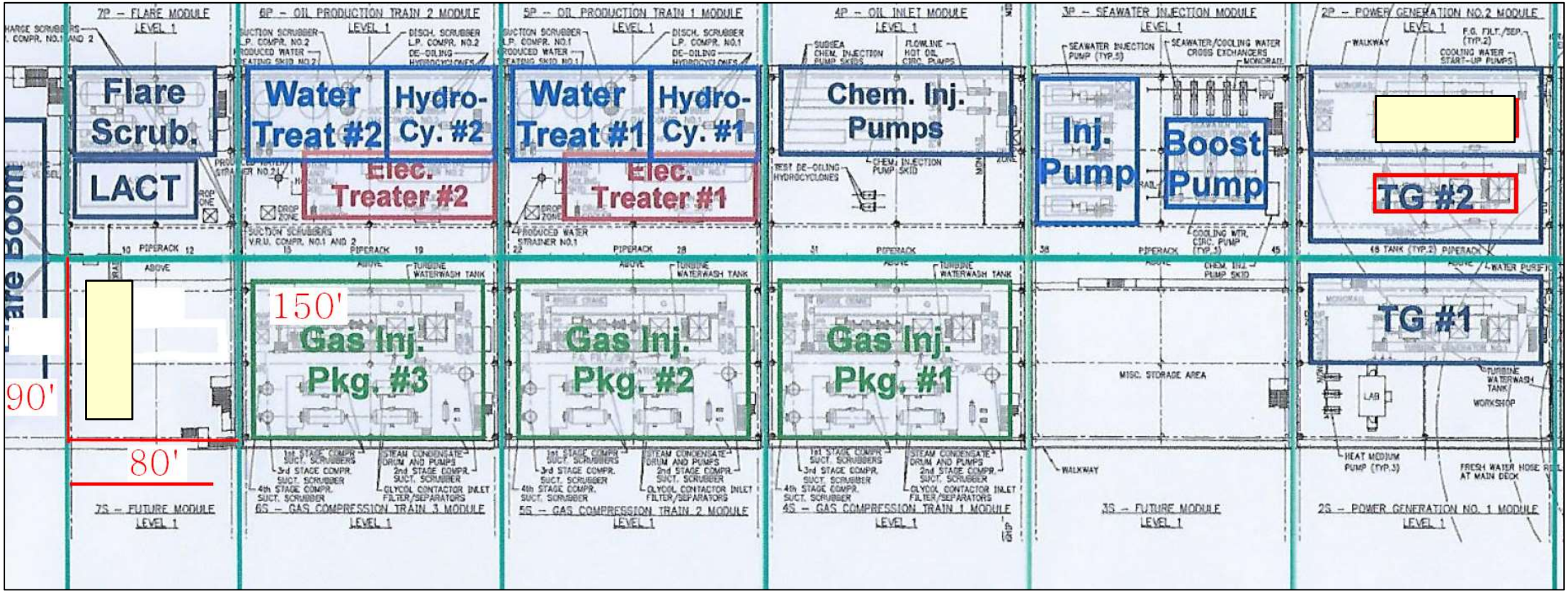
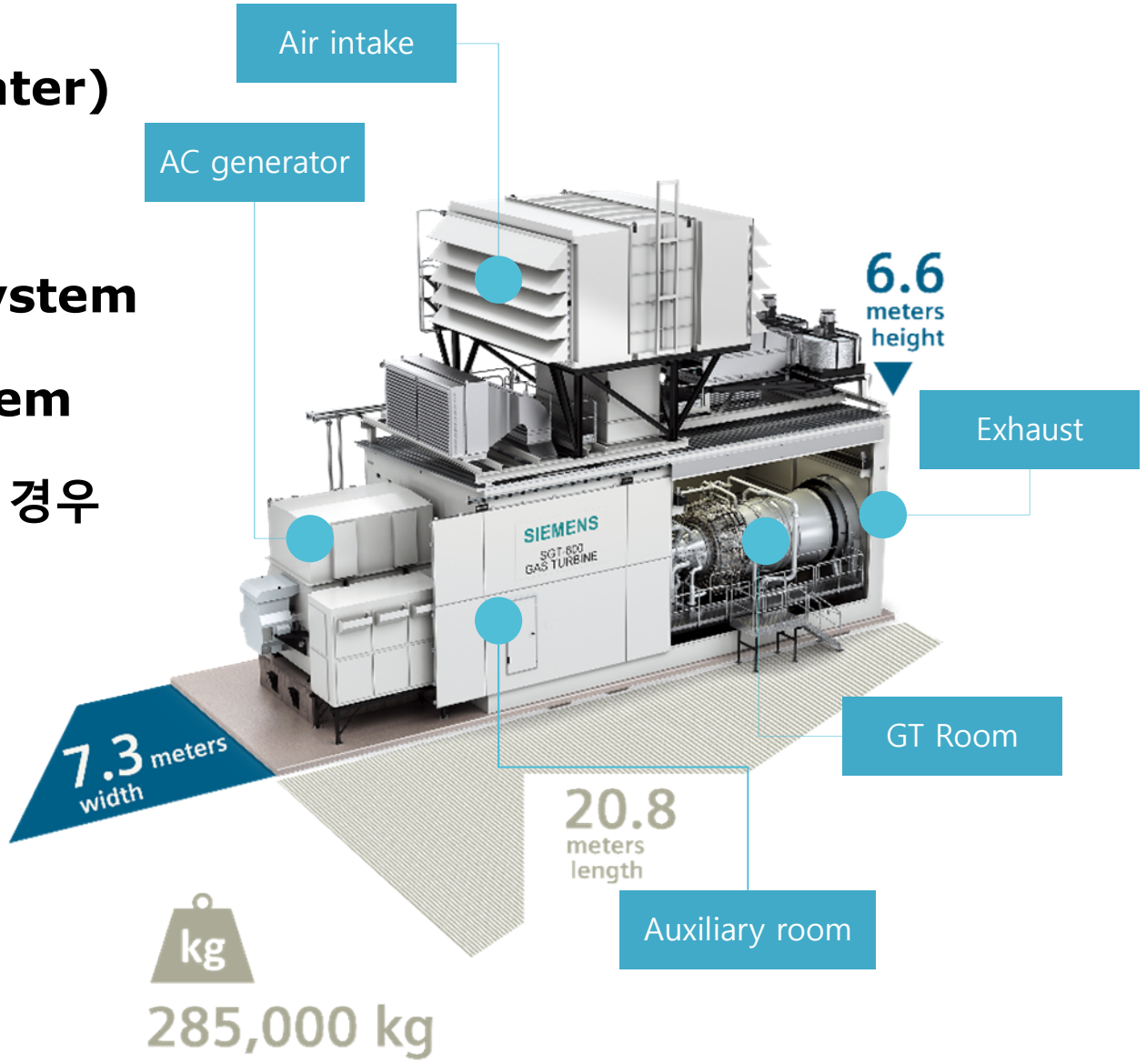
General Arrangement for Topside



Essential Generator (추정) and System

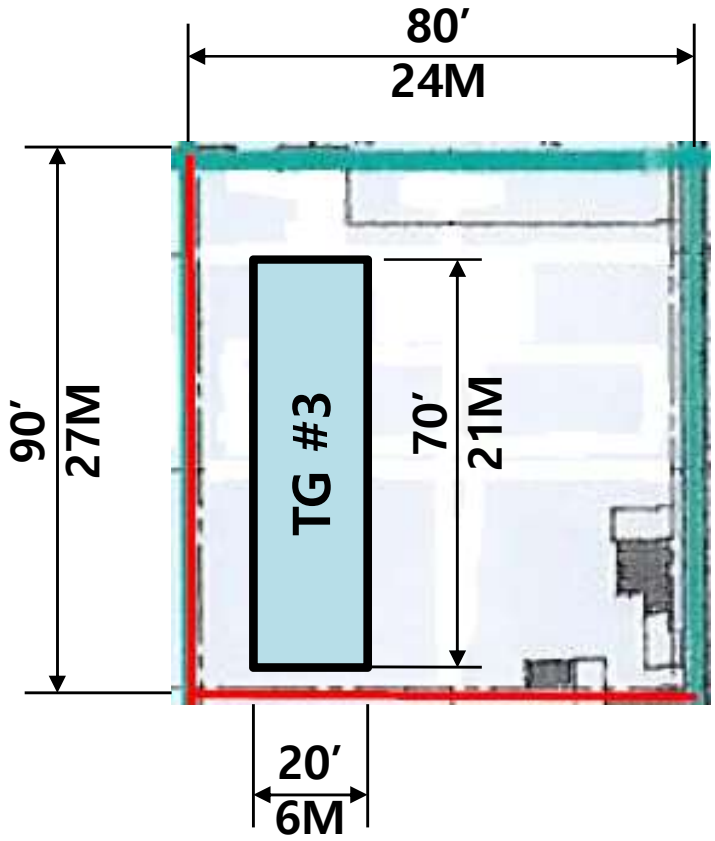
- Fuel supply system (Gas)
- Cooling system (Air or Water)
- Water treatment system
- Waste water treatment system
- Demineralized water system

  Oil firing시 DeNox가 요구될 경우
- Compressed air system

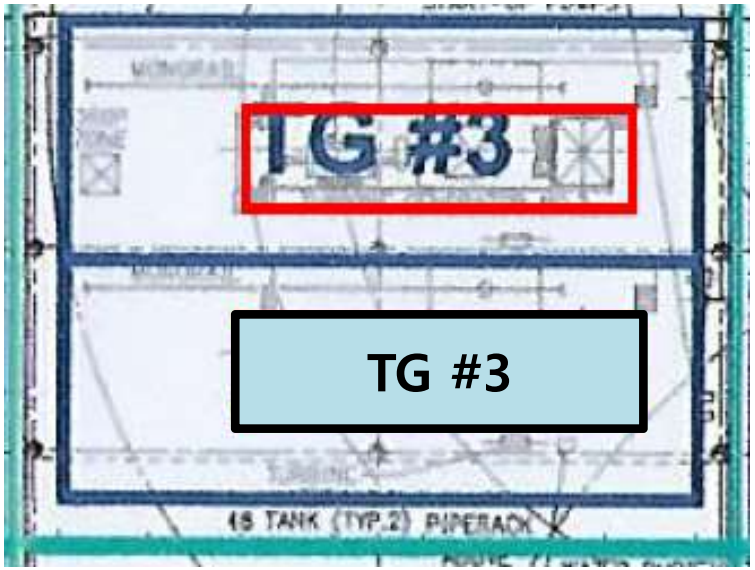


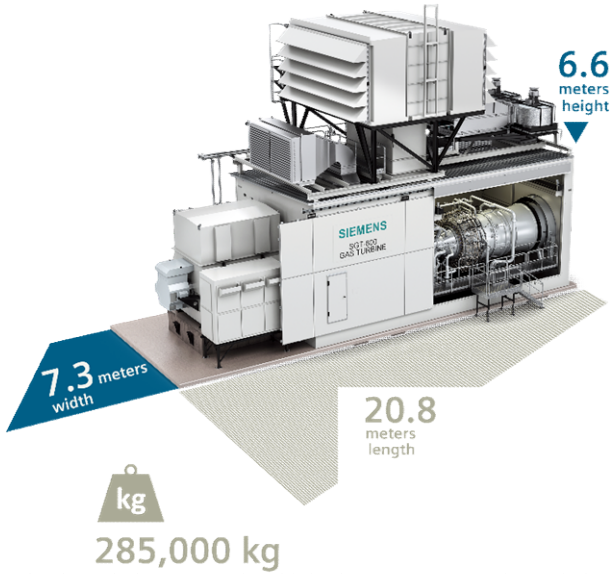
General Arrangement in 7S

7S

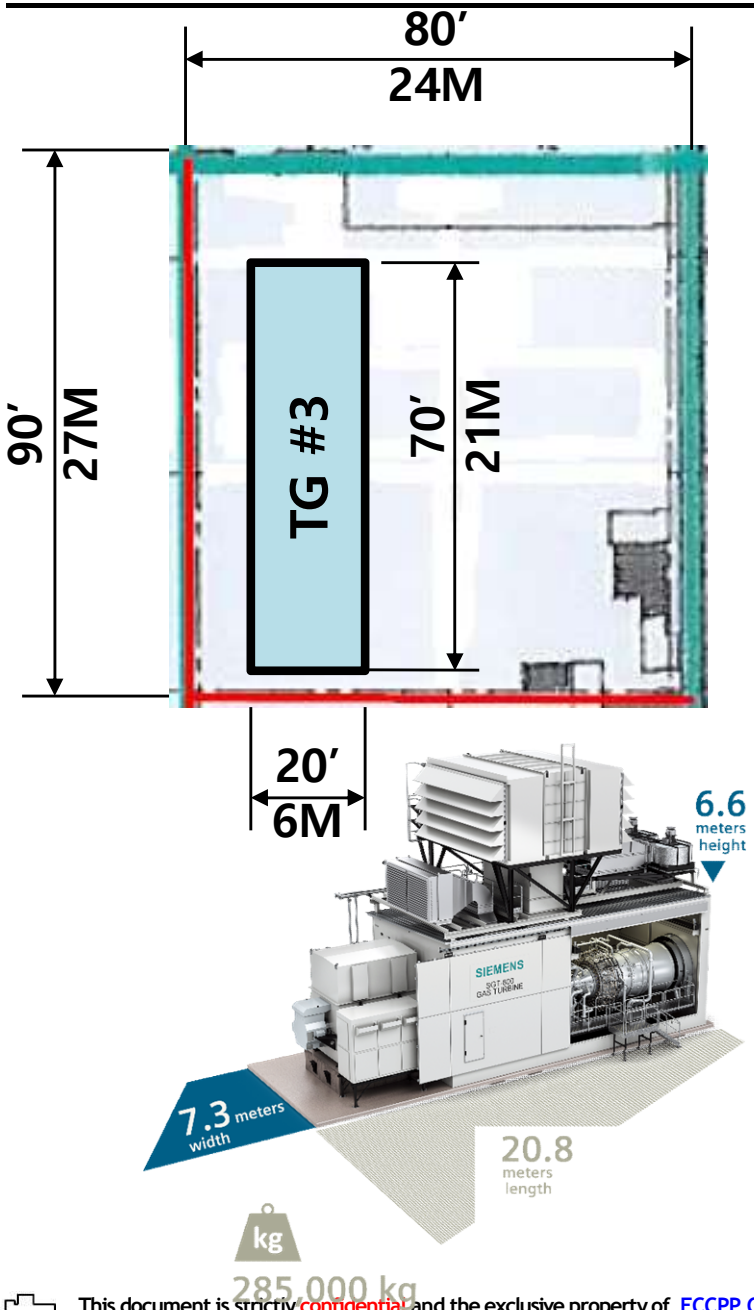


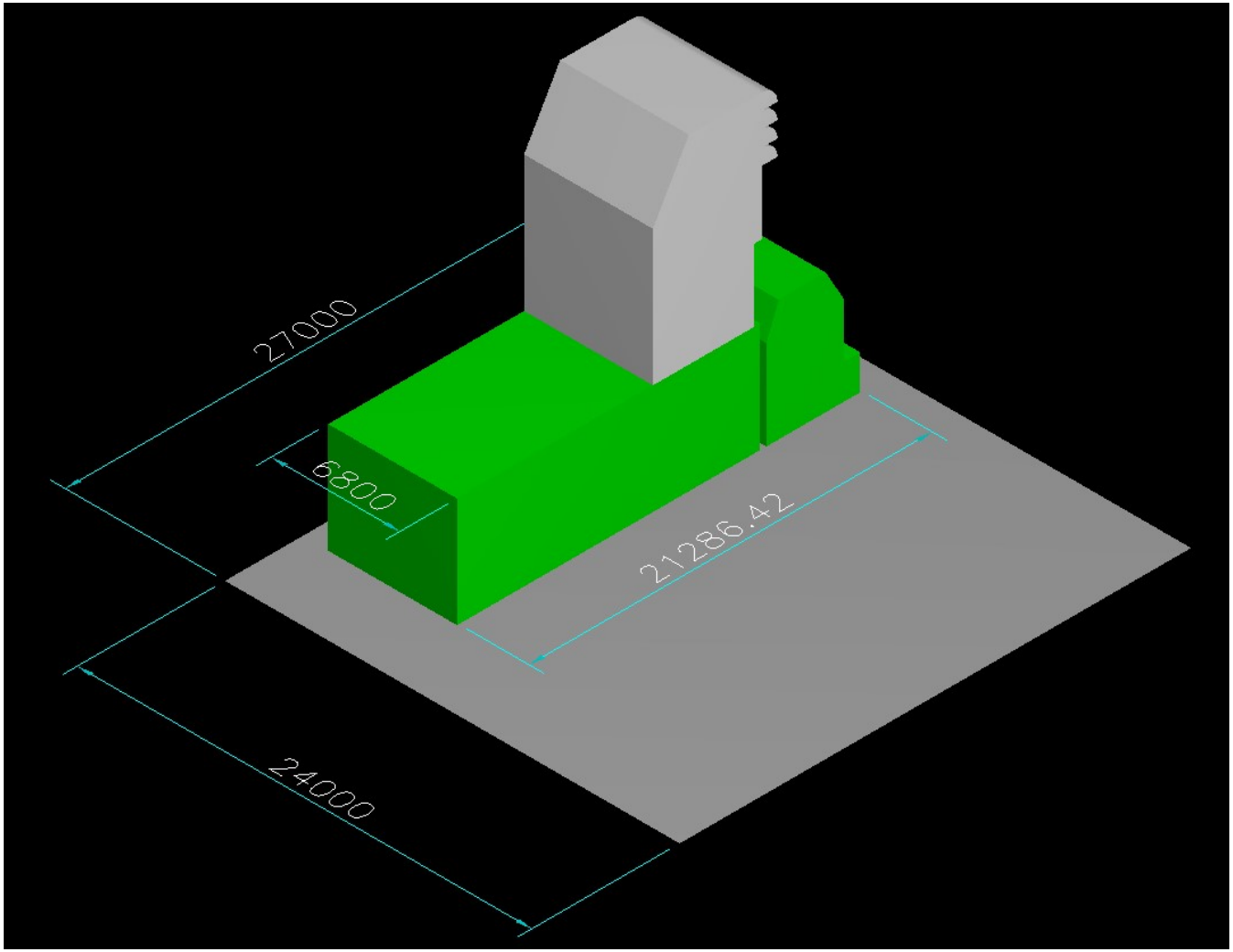
3P





General Arrangement in 7S

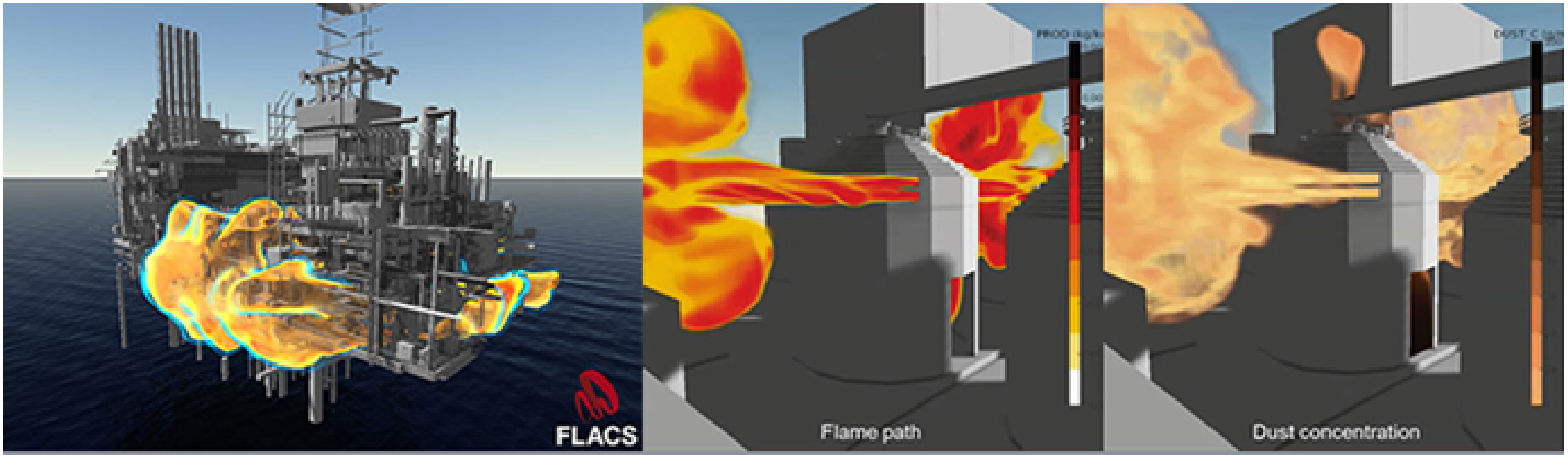




Metering and Measurement of Oil and Gas

FLACS: FLame ACceleration Simulator

- https://www.youtube.com/watch?v=YdNVw7gKYUs&list=WL&index=2&t=0s



- Detailed Geometry Model
- Ventiliation 시뮬레이션
- Dispersion 시뮬레이션
- Fire 시뮬레이션
- Explosion 시뮬레이션
- HVAC 시뮬레이션
- Dust Explosion 시뮬레이션
- Pool Evaporation 시뮬레이션

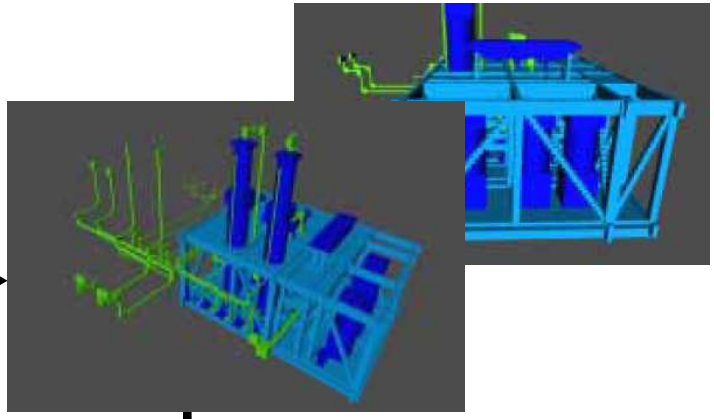
Safety (안전) : 요건 반영 및 검증절차 개발 – 폭발 사례

CAD

안전설계 요건 반영

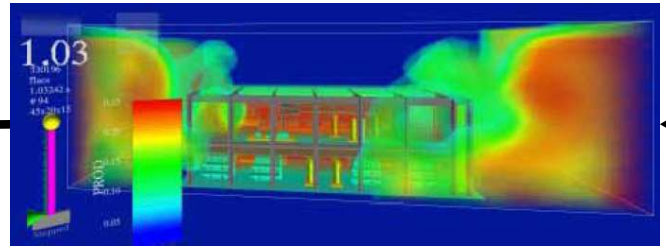
1. 변환

FLACS



2. 해석모델 구축

FLACS 해석



3. 사고 동향 해석 및 분석

4. 설계 반영

설계 변경 최소화

FLACS: FLame ACceleration Simulator


thank you
merci
gracias
danke
謝謝
ngiyabonga
teşekkür ederim
tapadh leat
спасибо
рахмат
Баярлалаа
obrigado
bedankt
dziękuję
go raibh maith agat
mochchakkeram
dakujem
arigatô
grazie
sukriya
kop khun krap
terima kasih
감사합니다
ευχαριστώ
merci
gracias
dank je
teşekkür ederim
mauruuru
hvala
sagolun
takk
taiku
dhanyavad
kiitos
dankie
faafetai lava
vinaka
спасибі
blagodaram
misaotra
matondo
paldies
grazzi
mahalo
хвала
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manana
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