Managing Mega Projects
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Managing Mega projects

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- Mega projects Challenges
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Information from:
- FLUOR guidelines, procedures and database.
- 2012 AACE INTERNATIONAL TRANSACTIONS RISK.823.4
Mega project definition

- A mega project is an extremely large-scale investment project, typically defined as costing more than US$1 billion.
- Mega projects attract a lot of public attention because of substantial impacts on communities, environment, and budgets.
- Mega projects include oil and gas, petrochemical, mining, aerospace, airports, canals, environmental, information technology, stadium and sporting venues, rail and rapid transportation, bridge and highway, science, space flight, planned cities, dam and hydroelectric and water infrastructure projects.
- Governments invest in mega projects to stimulate the general economy (i.e. Chinese economic stimulus program (2008-2009); the European Union stimulus plan (2008) and the American Recovery and Reinvestment Act (2009).
Mega project elements

MEGA PROJECTS

- FINANCIAL PROFILE
- COST AND SCHEDULES
- OWNER ORGANIZATION
- PART OF A PROGRAM
- COMPLEX ENVIRON. REGULATION
- PROCESS ENGIN. COMPLEXITY
- MAYOR STIR. LABOR MARKETS
- COMPLEX EXECUTION INTERFACE

- FLUOR
- arpel
Mega project Challenges

- Political, security and financial instability
- Economic uncertainty (i.e. recession / devaluation)
- Government licensing and permitting constraints
- Transportation and logistical difficulties
- Extreme climatic conditions / Communications
- Manpower staffing, retention and labor unrest
- Camp and catering facilities
- Emergency preparedness and evacuation
- Healthcare services / medevac capabilities
- Environmental protection and preservation
Mega project Challenges

CHALLENGES IN MAJOR PROJECTS

- BUSINESS PLANNING
- DESIGN DEFIN.
- PROJECT EXECUTION
- ORGANIZ. CAPABILITY
- PROJECT CONTROLS
Driving and executing Mega projects to success

- Business priorities (finance, investment, economic model, time to market, commercial opportunities, business objectives)
- Design Definition (Licensing process, engineering, contracting strategy, procurement, construction, key engineering deliverables completeness)
- Organization Capability (Owner organization, dedicated owner’s team for core engineering and construction disciplines and managing interfaces)
- Project Controls (Level of controls needed, change management, risk management, physical progress attained before moving into next phase)
- Mega project / Program Execution
Mega project Execution (cont.)

- **Program Execution - Risks and Opportunities**
  - **Integrated Stage-Gate Process** (approval of internal and external stakeholders, partners)
  - **Engineering/Construction Interface** (engineering mature before construction starts – evaluate overlap in phases, effective interface management)
    - **Execution approach** (concurrent or phased execution)
    - **Greenfield and Brownfield units/projects**
  - **Construction Costs**
    - **Productivity** (scope, construction management, contract and material management, logistic, weather, site congested, shutdown environment, geographical, local regulations)
    - **Incentives** (safety, schedule)
  - **Cash Flow Constraints** (reworking the execution plan, resourcing requirements, schedule logic, priorities, completion date)
Program Execution - Risks and Opportunities (cont.)

- **Procurement**
  - Start ahead of sanction for long lead items
  - Cancellation terms
  - Bulk quantities (buy down /discounts)

- **Contracting Strategy** (LNTP, LS, LSTK, reimbursable, unit price, OBE convertible to LS)
  - Level of project definition
  - Schedule constraints
  - Market conditions
  - Resources

- **Division of Responsibility**
  - Break down the scope between engineering, construction, suppliers, licensor and owner’s team
  - In alignment with estimate and schedule basis
Gatekeeping is a process, not a single person. It encompasses various steps. Key steps include:

- **Assurance**—checking that project deliverables are accurate and of high quality
- **Endorsement**—a recommendation that the project meets the business need and is ready for execution
- **Financial sign-off**—agreement that the project is aligned with the company’s financial goals and can be authorized for execution

**Financial entities requirements**

- ECAs (Export Credit Agencies)
  - IPA – Independent Project Analysis – VIP (Value Improving practices)
  - PDRI – Project development rate index
  - Surveillance Analysis
Fluor’s Tools and Processes
Front-End Loading Process and Deliverables

- **Market Assessment and Business Case**
- **Business Planning**
- **Facility Planning**
- **Project Planning**
- **Engineering, Procurement and Construction**
- **Turn-over and Start-up**
- **Operations & Maintenance**

### Project Phase

**FEL-1**
- **Market Assessment and Business Case**
- **Business Planning**
- **Facility Planning**
- **Project Planning**

**FEL-2**
- **Engineering, Procurement and Construction**
- **Turn-over and Start-up**

**FEL-3**
- **Operations & Maintenance**

### Objectives and Deliverables

- **Gate A Review**
  - Identify and define process options
  - Test options for consistency with project objectives
  - Select project process scheme
  - Define scope for market, product, capacity, site location
  - Class 5 estimate (Capacity factored)

- **Gate B Review**
  - Further develop selected process option
  - Conceptual Engineering, Define basis of design (BOD)
  - Prepare documentation for authority approval (e.g. EIA)
  - Licensor selection
  - Class 4 estimate (Equipment factored)

- **Gate C Review**
  - Finalize scope of the project
  - Preliminary Engineering, Define Basic Design Package
  - Class 3 estimate (during FEL 3) (Semi detailed)
  - Class 2 estimate and (at the End of FEL 3) (Forced Detailed)
  - Identify resources required
  - Tendering of long lead items
  - Set up of execution plan

- **Gates D,E Review**
  - Detailed Design and Engineering
  - Material & Equipment POs
  - Vendor Documentation
  - Installation Design Drawings (IFC)
  - Final Construction Schedule
  - O&M Manuals
  - Turn-over, Testing and Start-Up Procedures
6 Basic Elements

- Scope of Work (Facilities and Services)
- Cost Estimate
- Schedule
- Execution Plan and Change Management
- Risk Management
- Prime Contract
Fluor’s Tools and Processes
Traditional EPC Concept

CONCEPTUAL ENGINEERING

ENGINEERING

PROCUREMENT

CONSTRUCTION

START UP
Fluor’s Tools and Processes

Fluor’s Integrated EPC Concept

Baseline Centric Execution

Project Controls

Risk Management

Document Control

Materials Control

Contract Management

Site Management

Integrated EPC Value: Predictability: in cost, program and quality
Fluor’s Tools and Processes
Project Integration Approach

Phase 1
Identify & Assess Opportunity

Phase 2
Generate and Select Alternatives (FEL 1)

Phase 3
Define Project (FEL 2 and 3)

Phase 4
Execute EPC

Phase 5
Operate & Evaluate

PMC/Owner

EPC Contractor

Operational Support
Maintenance
Start-up
Construction
Procurement
Design/Engineering
Feasibility
Concept Development
Basic/Design
Process/Planner
Business Planning

Maintenance Training Contractors
Training
Start-up
Construction
Procurement
Design/Engineering
Feasibility
Concept Development
Basic/Design
Process/Planner
Business Planning
Fluor’s Tools and Processes
Program Manager’s Focus

Program Management in Mega Projects must extend across several EPCs in addition to integrating all such EPC into a single Project
Mega project Opportunities

- Uplift employees in developing markets
- Develop skilled local workforces
- Support community outreach programs
- Build and sustain ‘world class’ HSE practices
- Establish strong business relationships
- Leave a positive impression on the societies in which we work
- Improve Owner competitive advantage
- Leave a legacy
Success or Failure?

- There are underlying causes of over budgeted, delayed, and unsafe megaprojects.
- We need to ensure a safe and profitable future for megaprojects.
- There are project best concepts, strategies and practices that, when delivered in a disciplined manner deliver predictably good results.
  - “Good” results:
    - World class safety results
    - Completion in accordance with the contract schedule
    - Costs in accordance with the budget
    - Flawless Project startup
    - High project quality reflected in plant operation
Fluor Overview
Energy & Chemicals in Latin America

Fluor E&C Latin America Project Experience

- **Pemex Exploracion y Produccion**
  - Marine Platforms (EPC)
  - Modular Construction
  - Chicontepec I & II Production Facilities (EPC)

- **Pemex Refinacion**
  - Cadereyta Delayed Coking (C)
  - Cadereyta Clean Fuels (EPC)
  - Madero Clean Fuels (EPC)
  - Salina Cruz Clean Fuels (EPC)
  - Minatitlan Reconfiguration Pkg II (EPC)
  - Minatitlan Clean Fuels (EPC)
  - Salamanca Reconfiguration (FEED, PMC)
  - Tula New Refinery (FEED, PMC)

- **Pemex Gas y Petroquimica Basica**
  - Cryogenic Plant Modules (EPC)
  - Sulfur Plants (EPC)
  - Aromatics Complex (EPC)

- **Pemex Petroquimica**
  - CPG Morelos Ethylene Plant (E)

- **Petroquimica Morelos**
  - PEMOSA Ethylene Plant (FEED)

- **Indelpro**
  - Line 2 Polypropylene Revamp (EPC, COMM)
  - Propylene Splitter / Recovery (FEED, EPC)

- **BASF**
  - New Styrolux Plant (EPC)

- **Braskem-IDESA**
  - Etileno XXI (FEED)

- **Repsol Peru**
  - La Pomplilla Medium Distillates (E)

- **Total**
  - Ichulessi Technical Support (TS)

- **BG Bolivia**
  - IBIBOBO Field Engineering Services (E)

- **Repsol YPF Bolivia**
  - Margarita Field Early Production (EPCM)

- **Degremont**
  - Punta Pereira Engineering Services (E)

- **Petro Monagas**
  - Delta Valve Install / Replacement (S, FEED, E)

- **Petro Anzoategui**
  - Delta Valve Install / Replacement (S, FEED, E)

- **Chevron**
  - Petroindustria Upstream (Pre-FEED)
  - Petroindustria Upgrader (Pre-FEED)

- **Pequiven**
  - Jose Petrochemical Complex (S)

- **Polinter**
  - Ana Maria Campos Complex Olefins III (PMC)

- **BG Trinidad & Tobago**
  - Pointsettia Gas Platform (FEED, EPC)
  - Rhynie Project R. (PPFH)
  - Asset Integrity & Brownfield Execution (EPCM)

- **BP Trinidad & Tobago**
  - Cannonball Production Platform (EPCM)
  - Cashima Field Development (EPCM)
  - Corallita Lanatana Development (S)
  - Savonette Development (EPCM)

- **Chevron Argentina SRL**
  - EL Trapial Upstream Facilities (FEED)
  - EL Trapial Porche Stage 3 (Engineering Services)

- **Dupont Argentina**
  - Civil / Electrical Works in Polymer Plant
  - Production Line Revamp (E)
  - Revamping Lineas de Produccion Beranzategui

- **Pan American Energy**
  - Engineering Services - Conceptual, Basic, Detail (E)
  - Process Engineering (TS)
  - Management Support (PM)

- **Repsol - YPF**
  - Safety Consultancy Services for Refineries (TS)
  - PARS Desfladoro Bayo (E)
  - Ingenieria Basica Extranizacion IIIS (S, E)
  - Extended Basic Engineering PIPA FEL3 (E)
  - Engineering Services for ISOMAX, Catalytic Cracking, Merex, Amines, Hydorgen and Plant Turnaround for Serveral Facilities
  - CO2 Recovery Unit (S, E)

- **Ternium**
  - Engineering Services (E)

- **Dow Chemical**
  - Bahia Blanca Petrochemical LHC-2 (EPCM)
Thanks