



The Benefits of a Template for Efficient execution of LNG Projects

*World Gas Conference 2006
Amsterdam, NL
8 Jun 2006*

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Agenda:

LNG Template

Commissioning and Start up

The Benefits of a Template for Efficient execution of LNG Projects

LNG Template

- **Concept**
- **Content**
- **Work Process**
- **Risk Management**
- **Safety Management**
- **Certainty of Outcome**

The Benefits of a Template for Efficient execution of LNG Projects

LNG Template Concept

- Repository of blend of basic configuration with needed developments
- Can leverage previous experience with Project specific needs
- Provides framework to reduce repetitive work
- Not a Xerox copy of previous project
- Not a fixed, non-responsive, non-optimized, intolerant framework

The Benefits of a Template for Efficient execution of LNG Projects

LNG Template Content

- Equipment Configuration
- Documented on PFDs, P&IDs, Equipment List
- Basic Layout of Equipment and Piping
- Instrument and Sampling Details
- Modules for specific needs and other Reference projects specifics
- Line data profiles
- Calculation and Utility templates
- Results from Value Improvement Practice sessions and HAZOPs
- Specific Lessons and Best Practices

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LNG Template Work Process

- Template serves as starting point of Study or Project
- Areas are identified that require Studies to firm up specific packages
 - ▶ Driver size and configuration to fit plant capacity
 - ▶ Heating medium or cooling medium
 - ▶ Product slate and storage requirements
- Apply project specific economics or specifications
- Develop project utilizing best practices and leverage experience
- Feed back to template repository appropriate new base information

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LNG Template Risk Management

- Where is the risk? Commercial, Technical, Process
- Focus on the Changes
- Is there new technology involved or just change of scale?
- Manage by Delta
- Need to look at overall impact
 - ▶ change may extend outside the obvious boundary

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LNG Template Safety Management

- Manage changes to template
- Project Specific Requirements
- Updated Standards
- Evaluate client specific Guidelines
- Review historical data for appropriate information

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LNG Template Certainty of Outcome

- Technology is well understood and easily managed
- Commercial impact is managed on case by case issue
- Engineering impact is carefully evaluated to insure that the cascade effects of the change are captured.

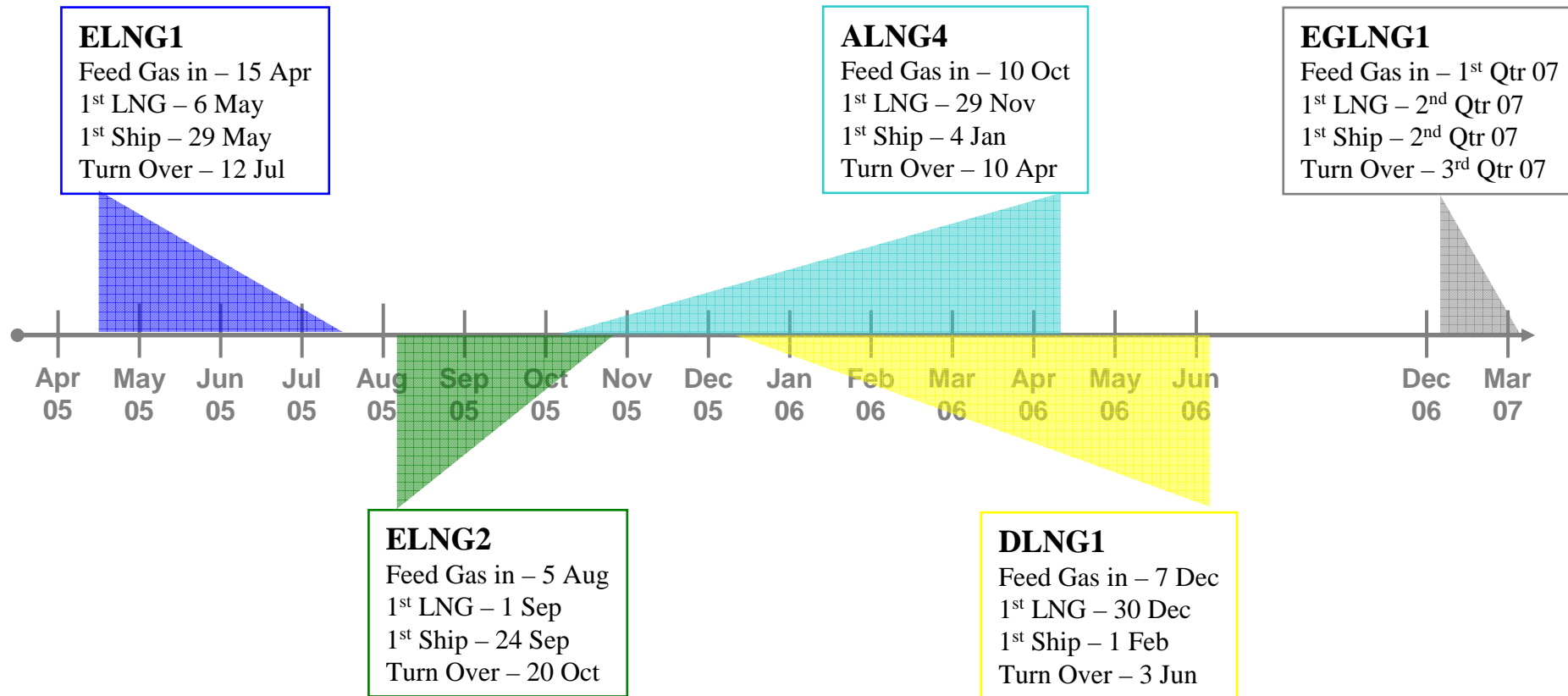
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Commissioning and Start up

- **Operational Time Frame**
- **Project Consistencies**
- **Egypt LNG at Idku, Egypt**
- **Atlantic LNG4 at Point Fortin, Trinidad and Tobago**
- **Darwin LNG at Wickham Point, NT, Australia**
- **Alba Phase III LNG at Bioko Island, Equatorial Guinea**

The Benefits of a Template for Efficient execution of LNG Projects

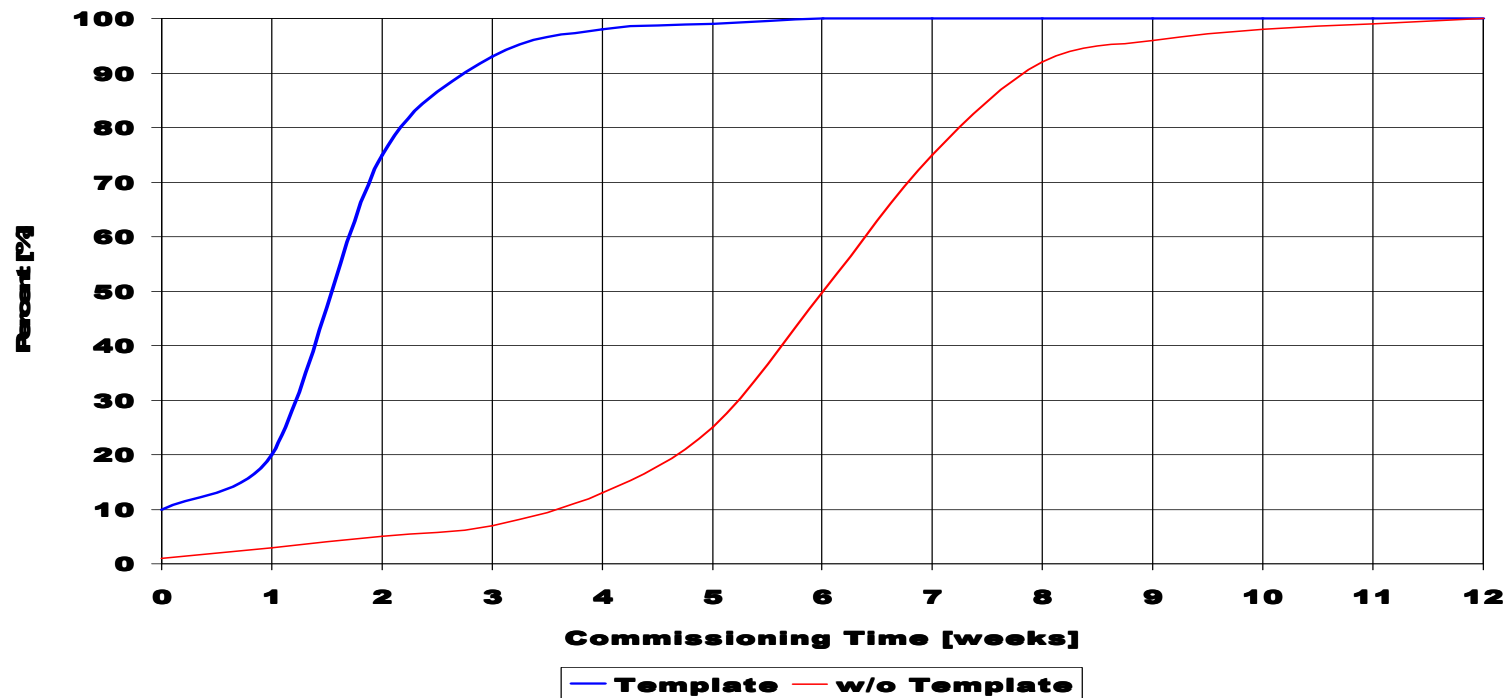
Commissioning and Start up Operational Time Frame



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Commissioning and Start up - Consistencies

Familiarity Curve



The Benefits of a Template for Efficient execution of LNG Projects

Commissioning and Start up - Egypt LNG

- Accelerated Schedule
 - ▶ Changing Critical Path, Parallel Activities
 - ▶ Flexible Sequence plan
- Start up Efficiencies
 - ▶ Refrigerant usage
 - ▶ Cooldown sequence
- Challenges
 - ▶ Ethylene delivery
 - ▶ Feed Composition
 - ▶ Refrigerant transfer pumps
- Tested above Guarantee and turned over ahead of schedule

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Commissioning and Start up - Atlantic LNG4

- Adjusted Procedures from ELNG
- Operated as world's largest capacity plant
- Challenges
 - ▶ Gas Supply
 - ▶ Turbine modification packages
 - ▶ Turndown plant capacity
- Parallel drivers
- Tested above guarantees and turned over ahead of contract schedule

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Commissioning and Start up - Darwin LNG

- Picked up early lessons from Egypt and Atlantic
- Challenges
 - ▶ Aeroderivative LM2500+ (NOx and Power Levels)
 - ▶ Nitrogen Rejection Unit (NRU) Dynamics
 - ▶ Steam system Dynamics (small volumes and large duties)
- Delays
 - ▶ Multiple testing on new units
- Plant tested above guarantees and turned over Jun 3rd

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Commissioning and Start up - Equatorial Guinea LNG

- Adjusting procedures
- Preparing for Training
- Updating the OTS with Darwin lessons
- Planning for Gas in for 1st quarter 2007
- Evaluated Lessons and Best practices from database and recent work

The Benefits of a Template for Efficient execution of LNG Projects

Closing

The end of one Phase leads to the beginning of the next

Pick up the best and worst of the past

Incorporate what was learned into the Template

Prepare for the next project

Continue to Improve

Certainty of Outcome

Delivered on schedule

Perform above capacity requirements

Provided within the budget constraints