



Template Driven EAM for the Nuclear Industry

Mr Ma Gang,

China Guangdong Nuclear Power Company

Mr Jeff Briner

PwC

Agenda

1. **Introductions & Project Scope**
2. **SNPM and the PwC SAP for Nuclear Template**
3. **The Chinese Nuclear Industry Today**
4. **CGNPC and DNMC**
5. **Benefits and Value of the Template Approach**
6. **Lessons Learned**
7. **Next Steps**

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Introductions: Mr Ma Gang 马刚

- Currently DNMC ERP project manager ERP项目经理
- Master of nuclear engineering 核工程硕士
- 2 years of field operator 两年现场操作员
- 3 years of reactor operator 3年反应堆操纵员
- 1 year of deputy shift manager and blocking officer 1年隔离经理
- 3 years of shift manager 3年值长
- 1 year of scheduling branch head 一年计划处长
- 1.5 year of deputy plant manager 1.5年副厂长
- Two WANO peer review in Operations 两次运行领域WANO同行评审

Introductions: Mr Jeff Briner

- PwC Director
- Thought Leader for Nuclear Power, EAM, and T&D
- Project Director for the DNMC ERP project in China
- 15 Years Nuclear EAM Consulting
- 10 Years Transmission and Distribution Consulting
- 3 Years Manufacturing and Process Production EAM Consulting

Project Scope / Background

流程清单	流程清单
AA-10 Accounts Payable 应付账款	NP-50 Quality Management 质量管理
AA-20 Accounts Receivable 应收账款	OP-01 Operations Configuration Control 运营配置控制
AA-30 Assets Accounting 固定资产核算	OP-02 Work Clearance Management 工作隔离管理
AA-40 General Ledger 总账	OP-03 Operability / Functionality / Reportability 可操作性/功能性/可报告性
AA-50 Employee Expenses 员工费用	OP-04 Narrative Logs 描述性日志
AA-60 Fuel Accounting 核燃料核算	OP-05 Operator Concerns 运营人员关注点
AA-80 Cash Management 现金管理	OP-06 Plant Labeling 工厂标签
AA-90 Short and Long-Term Planning 长短期计划	OP-07 Operator Rounds 运营人员巡检
AA-100 Overhead Accounting 费用核算	OP-08 Electric Load List 用电负荷清单
AA-120 Projects 项目管理	OP-10 Corrective Action Program 改正行动方案
BI-10 KPI Management 关键绩效指标KPI管理	OP-11 Operating Experience 操作经验
EM-10 Manage EAM Master Data 设备管理EAM主数据管理	OP-12 Human Performance 人员绩效
EM-20 Manage Design Engineering 设计工程管理	OP-16 Quality Control Activities 质量控制活动
EM-30 Manage Testing/Program Engineering 测试/项目工程管理	PG-10 Non Repetitive Maintenance 非重复维修
EM-50 Manage Systems Engineering 系统工程管理	PG-20 Repetitive Maintenance 重复维修
EM-60 Rotable Tracking 旋转跟踪	PG-60 Refurbishment Process 翻新流程
HR-30 HR Benefits / Comp / HRIS 人力资源福利 / 补偿 / HRIS	PG-60 12 Week Rolling Schedule 12周滚动排程
HR-80 Time & Attendance 工时和出勤	PG-70 Outage Management Program 大修管理项目
NP-10 Material Planning 物料计划	CH-20-60 Perform Instrument Maintenance 仪器维护
NP-20 Procurement 采购	HP-30-30 Tracking Respiratory Equipment 追踪呼吸设备
NP-30 Warehousing 仓库	SA-10 Safety 安全
NP-40 Investment Recovery 投资还本	SA-10-10 Processing MSDS 处理材料安全数据表 (MSDS)

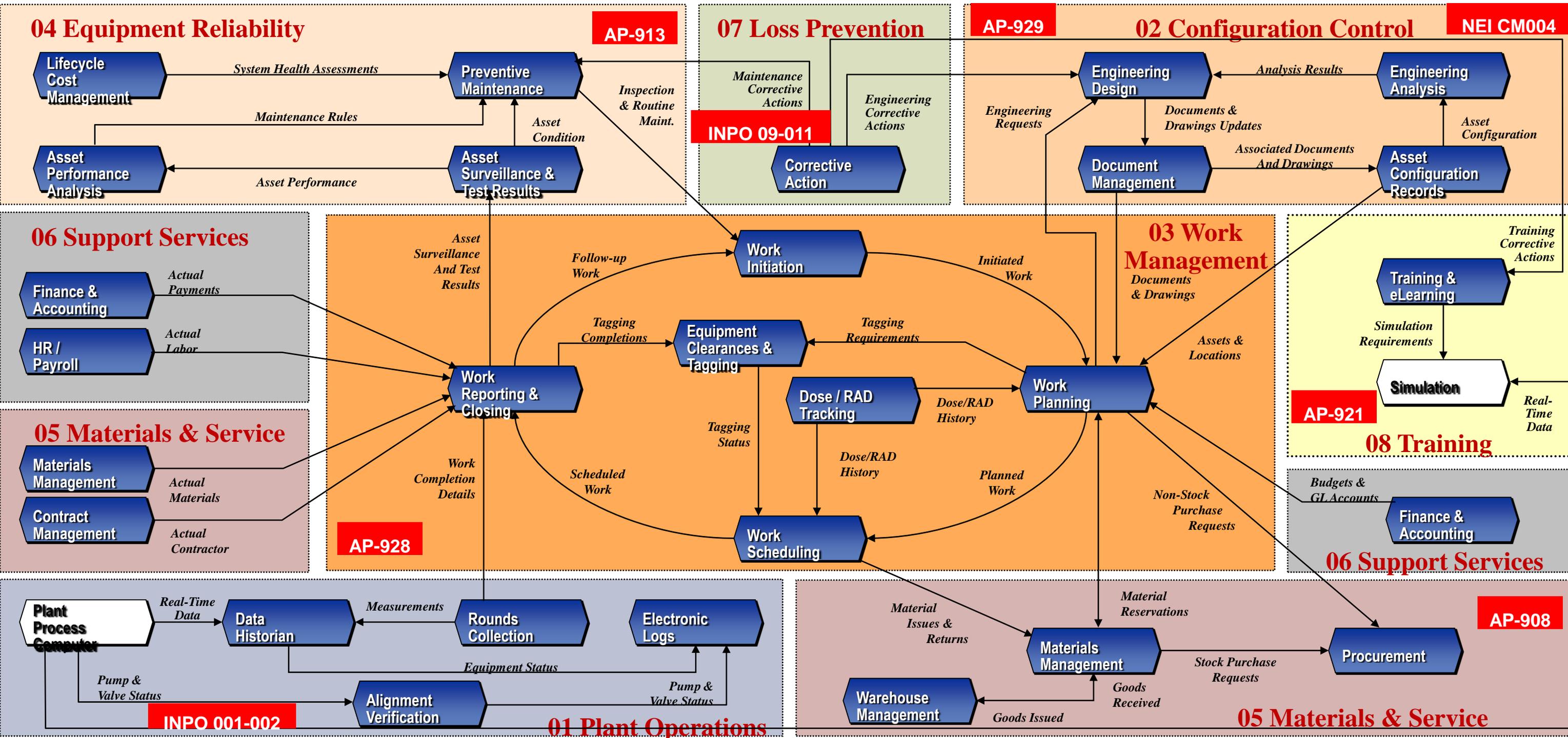
Project Scope / Background

- Preplanning August 2009, Started January 2010
- 6 Nuclear Operating Units on one Site in 18 Months
- SAP Modules: PM, MM, QM, FI, CO, AR, AP, FA, HR, WCM, WEC
- Other Architecture Items: P6, Pipeline, local Chem, Rad, Quals
- 44 Business Scenarios & 200 Business Processes
- 50+ DNMC, 15 PwC US, 10 PwC CN

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SNPM and the PwC SAP for Nuclear Template



SNPM and the PwC SAP for Nuclear Template

- The Nuclear Template Scope Covers:
 - 75 Major Generation & Nuclear Scenarios
 - 450+ Detailed Nuclear Specific and Related Processes
- The Template Contains
 - Sol Man Setup, Enhanced ASAP Methodology and PMO, Process Flows, Functional Requirements Documents, Standard/Typical RICEFWs, Training and Testing Templates, Technical Templates(RICEFW), Control Panels, Performance Panels, KPI / Balanced Scorecard
 - Hundreds of years of collective Nuclear and SAP Implementation Experience

SNPM and the PwC SAP for Nuclear Template

- Integration with leading 3rd party products
- Solutions & Knowledge for traditional Non-SAP areas (Tool Control, Chemistry, Radiation Protection, Quals, Effluents)
- Proven to Support Leading Nuclear Practices and documented Nuclear Standards from NEI, INPO, IAEA, and WANO
- Expanding up the Nuclear Asset Lifecycle into Engineering, Construction, Turnover, and Commissioning

SNPM and the PwC SAP for Nuclear Template

Out of the Box SAP Components

- *** Equipment ***
- *** Functional Locations ***
- *** Material Masters ***
- *** Notifications ***
- *** Orders ***
- *** Catalog Codes ***
- *** Work Centers ***
- *** Nuclear Classes/Characteristics ***
- *** Nuclear Objects ***
- Logs
- Clearances / Tags
- Rounds

Experienced People

- Multiple Implementations
- Bus Transformation Program
- Managers
 - SAP Project Managers
 - Licensed Reactor Operators
 - I&C Technicians
 - Maintenance Managers
 - Work Week Managers
 - CAP Managers
 - Engineers
 - Shift Technicians
 - Planners
 - Schedulers

Tools

- PwC Transform Methodology
- ASAP Methodology
- Unique setup of Solution Manager
- Standard Nuclear SAP Enhancements
- Nuclear Specific Documentation Templates
- Template SAP Configuration

SNPM and the PwC SAP for Nuclear Template

System Help

SAP

PwC Nuclear Template - Main Control Panel

SAP Main Menu My Panel

Project Preparation Business Blueprint Realization Final Preparation Go Live & Support

My Work

Open Complete

Notification Tasks
Order Operations
Notifications I Created

Enter Timesheet
SAP Inbox
Expense Report

Defaults

Work Center **MM** to

System Number to

Unit	Notification Type	Order Type
<input checked="" type="checkbox"/> Unit 1	<input checked="" type="checkbox"/> NC <input type="checkbox"/> ND <input checked="" type="checkbox"/> NG <input type="checkbox"/> NP <input type="checkbox"/> NS	<input type="checkbox"/> NCAP <input type="checkbox"/> NPRV <input checked="" type="checkbox"/> NCOR <input type="checkbox"/> NREC <input type="checkbox"/> NDCS <input type="checkbox"/> NRFB <input type="checkbox"/> NGEN <input type="checkbox"/> NSRV

Processes and Departments

Corrective Action Program
Operating Experience

Operations	Outage Management
Work Management	Engineering
Maintenance	Regulatory Affairs
Planning	Supply Chain

Manage Work

Print an Order
Confirm an Operation
New Notifs - Last 3 days

Open Complete

Notifications
Orders
Notification Tasks

Other Information

SAP Website
NRC Website

Base Transactions

Create Display
Change List Edit

Order
 Notification
 Functional Location

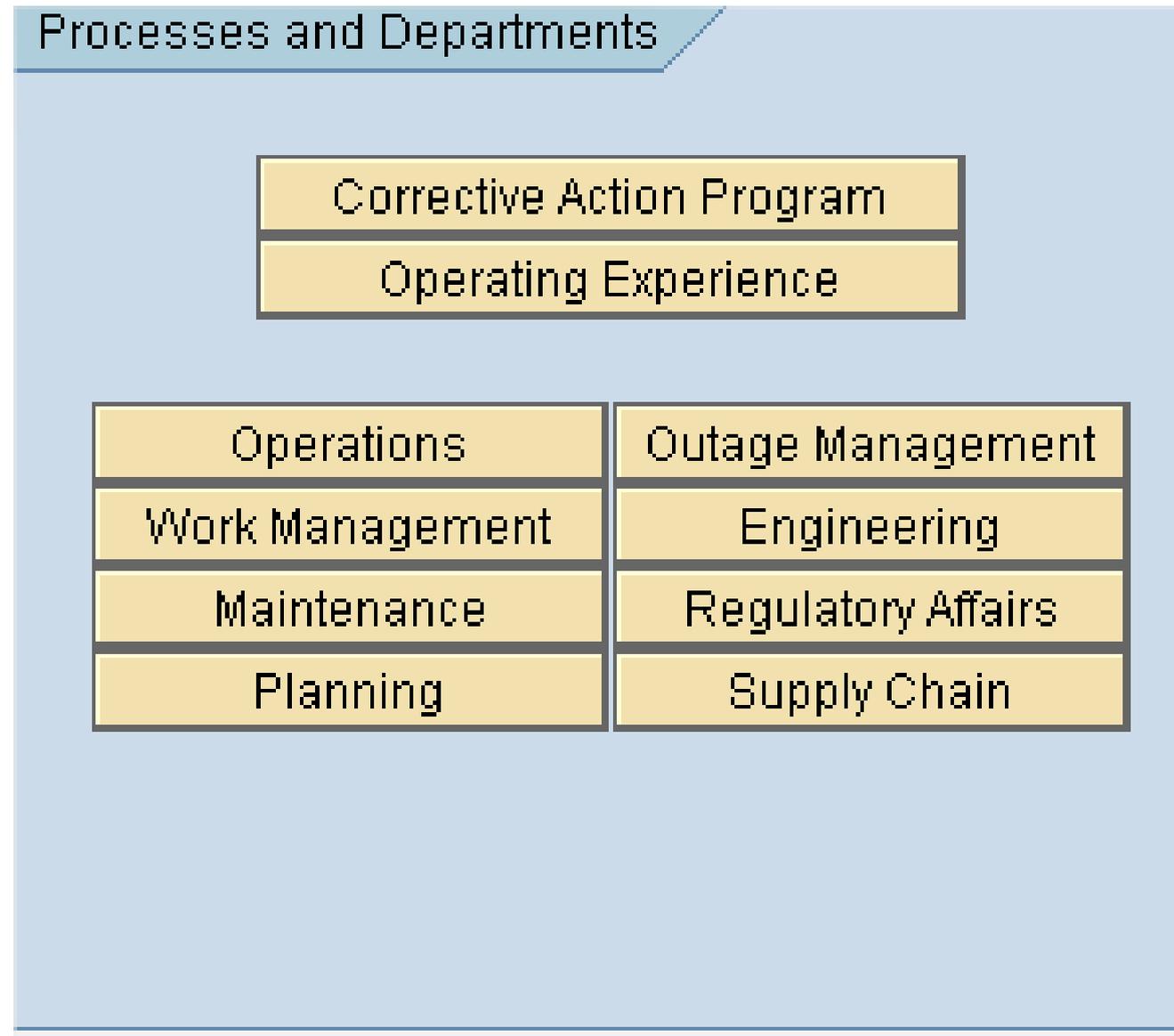
Order Operations

Identify
Report a Problem

ZCPMAIN | ustpa3fasap87 | INS

SNPM and the PwC SAP for Nuclear Template

- Nuclear Plant Departments
- Single Common Interface
- PBDW



- Reduced Change Management
- Less training
- Job Focused

Most Nuclear Workers do not want to be SAP experts, they just want to do their job well and safely.

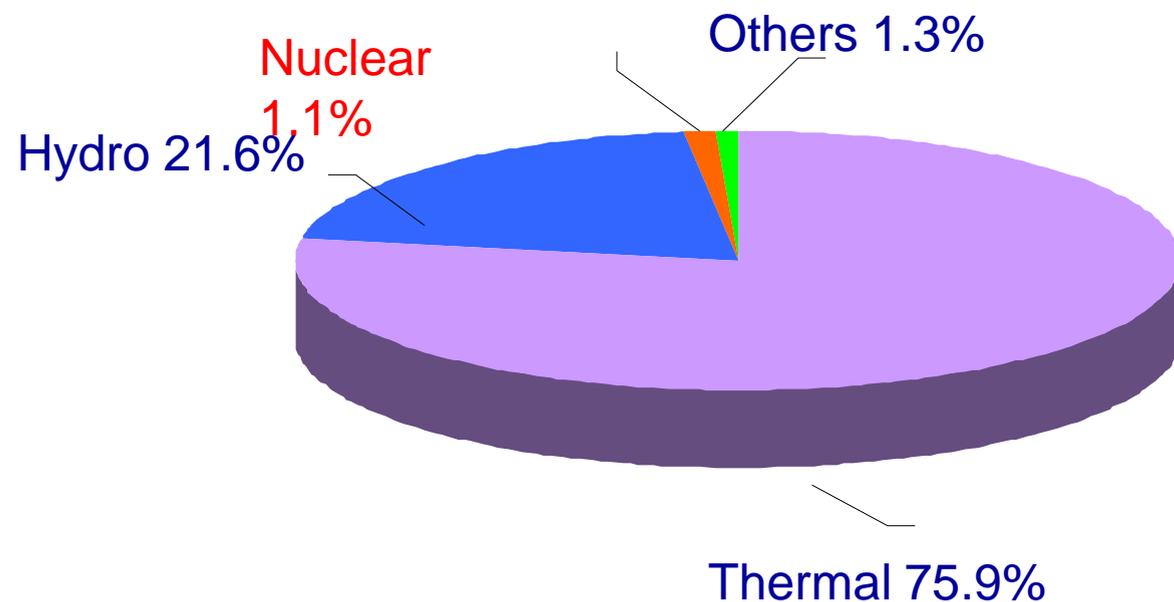
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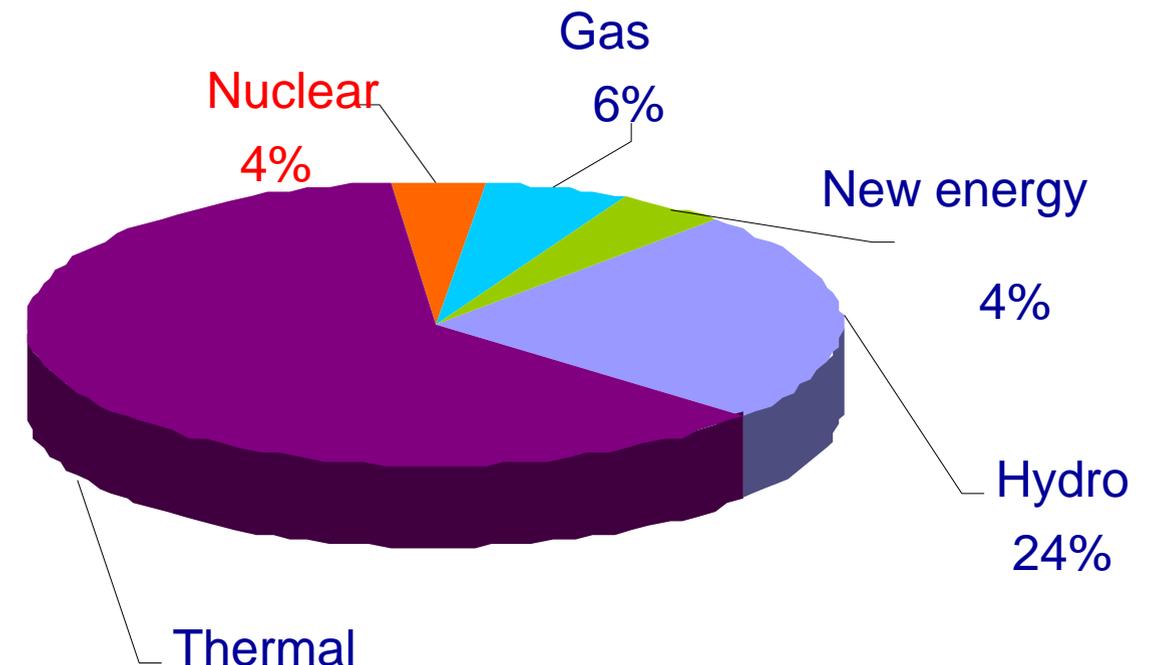
The Chinese Nuclear Industry Today

2010年中国大陆总装机容量9TW
2020 Projected at 25TW

Installed capacity in China in 2008



Installed capacity in China in 2020



- Installed nuclear capacity in China was 1.1% in 2008. As per the development scheme of nuclear power of the country, China plans to increase its nuclear capacity to 4-5% by 2020. Currently, 18 provinces/cities/regions have launched preparations for nuclear power projects, which marks a strategic era of the domestic industry.

The Chinese Nuclear Industry Today

- Reactor Designs Planned or in use:
 - PWR (9 Operating, 22 under Construction)
 - APR (6 in Design and Construction)
 - EPR (2 in Design and Construction)
 - HTGR (1 in Design and Construction)
 - CANDU (2)

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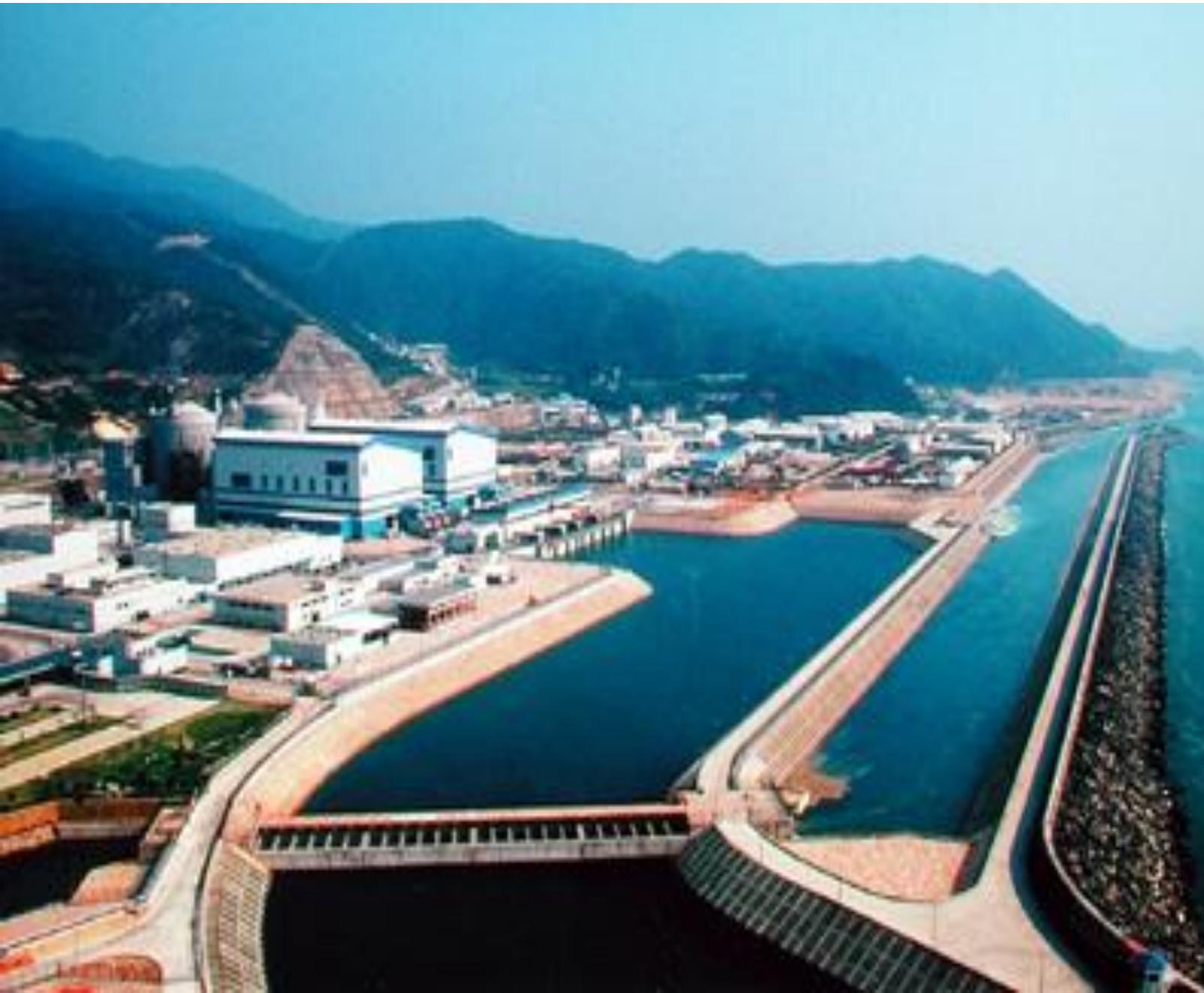
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6 Units, 1 Site: **Daya Bay**, Ling Ao', Ling Dong



Daya Bay

6 Units, 1 Site: Daya Bay, **Ling Ao'**, Ling Dong



LNPS Phase I

6 Units, 1 Site: Daya Bay, Ling Ao', **Ling Dong**



LNPS Phase II

CGNPC Background 中国广东核电集团



- Directly under the leadership of the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), the China Guangdong Nuclear Power Holding Co., Ltd. (CGNPC) was established in September 1994 with nuclear power as its core business and a registered capital of RMB 10.2 billion (~1.6 billion USD).
- CGNPC's strategy: A clean energy group which centers on nuclear power, and supplies safe, environment-friendly and economical electrical power to the society.
- While actively promoting nuclear power, CGNPC make solid progress in clean energy fields such as wind power, hydro power and solar power.

DNMC – Daya Bay Nuclear Management & Operation Company 大亚湾核电运营管理公司



- Established in March 2003 through the joint investment of Guangdong Nuclear Power Joint Venture Co., Ltd. (GNPJVC, GNPS owner) and Ling Ao Nuclear Power Co., Ltd. (LANPC, LNPS Phase I owner)
- Responsible for the preparation, operations, and management of:
 - Daya Bay Units 1 & 2 and Ling Ao (four 1000MWe M310s)
 - Ling Ao Units 3 & 4 also called Ling Dong (two 1000MWe CPR1000s)
 - Yangjiang Units 1 – 6 (six 1000MWe CPR1000s)
 - Xianning Units 1 – 2 (two 1000MWe AP1000s) which are of the joint investment of CGNPC and Hubei Energy Investment Group
 - Fangchenggang Units 1 – 2 (two 1000MWe CPR1000s) which are of the joint investment of CGNPC and Guangxi Investment Group with the former responsible for project construction and operations management

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Benefits and Value of the Template Approach

- A proven template makes DNMC leadership feel safe about their decision
 - Lower Risk because it was successful in other plants
- Cohesive Documentation, Templates, and Methodology
 - The template shows the project team an overview of a running nuclear plant business in SAP
 - Do not have to start from a blank
- Reduced the overall effort of the project
 - Internal Cost, External Cost, Project Duration

Benefits and Value of the Template Approach

- Delivers an operating environment to the end user earlier than general project
 - This makes the change management easier
- Facilitates decision making by selecting from many examples provided in the initial delivered Template configuration
 - Master Data, Catalog Codes, Equipment characteristics, FLOC Structures, Order Types,...

Benefits and Value of the Template Approach

- Nuclear Fleet Process Standardization Support
 - Delivers standard O&M Template across processes and plants
 - Helps mitigate risks related to our projected growth
 - Staffing Experienced Operators
 - Gaining and leveraging plant maintenance experience
 - Training / Skills
 - Regulatory Relations
 - Benchmarking and Performance Management (EUCG)
 - Adherence to Standards (INPO, WANO)

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Lessons Learned

1. An experienced and qualified consulting team is the key to the success of the project
2. The leadership and sponsorship of the project need to be active and involved
3. The degree of involvement of the end users is largely based on the performance of the project team, including super users and consultants
4. Have consultants who have actually worked in industry and have stood in the user's shoes

Lessons Learned

5. The consulting company's desire to succeed is essential to the success of the project.
6. The nuclear safety culture of consulting team is critical for a nuclear EAM project.
7. The project management (the methodology, approach, procedures and the template of the project documents) is the precondition of a smooth project.
8. Project Should be led and driven by the Business, not IT

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Next Steps



Next Steps

1. Focus on the Nuclear Safety, testing, data cleansing / conversion, and training
2. Plan the cutovers for Daya Bay Units 1-2 and Ling Ao Units 1 - 4
3. Plan the solution rollout to other CGNPC sites in China
4. Initiate the design and configuration of SAP to cover more business processes, further leveraging our investment

Questions?





Mr Ma Gang

Daya Bay Nuclear Management Corp

Magang@cgnpc.com.cn

Mr Jeff Briner

ProcewaterhouseCoopers

Jeffrey.D.Briner@US.PwC.Com