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National Nuclear Safety Administration



# **China's Regulatory Approach on New Reactor Commissioning and Transition to Operation**

National Nuclear Safety Administration, P.R.China

Mar. 14, 2018



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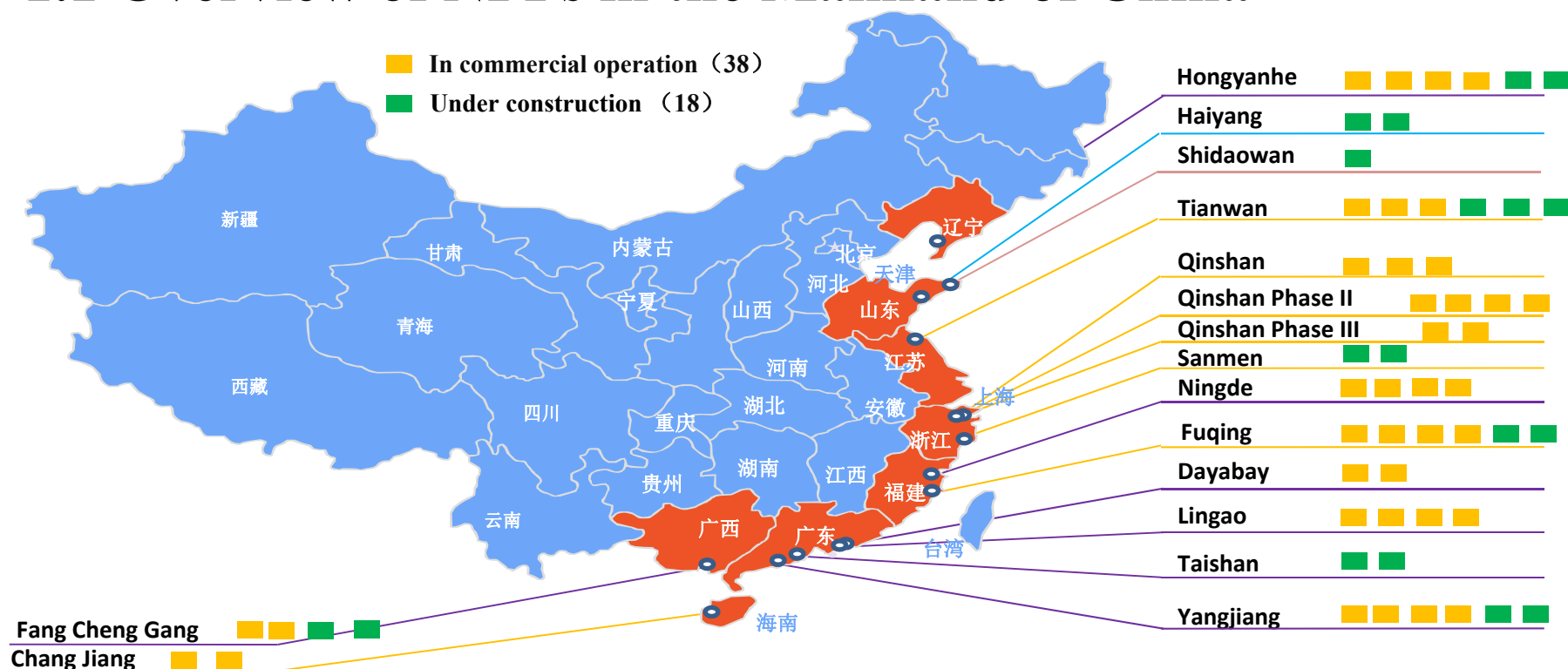
- 1 NPPs in the Mainland of China**
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## 1.1 Overview of NPPs in the Mainland of China





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## 1.1 Overview of NPPs in Mainland of China

### Commercial Operation

**38 units**

- 1 CNP300 unit
- 6 CNP600 units
- 3 VVER units
- 2 CANDU units
- 26 M310/M310+ units

### Construction or Commissioning

**18 units**

- 6 M310+ units
- 1 VVER unit
- 4 AP1000 units
- 2 EPR units
- 4 HPR-1000 units
- 1 HTGR unit



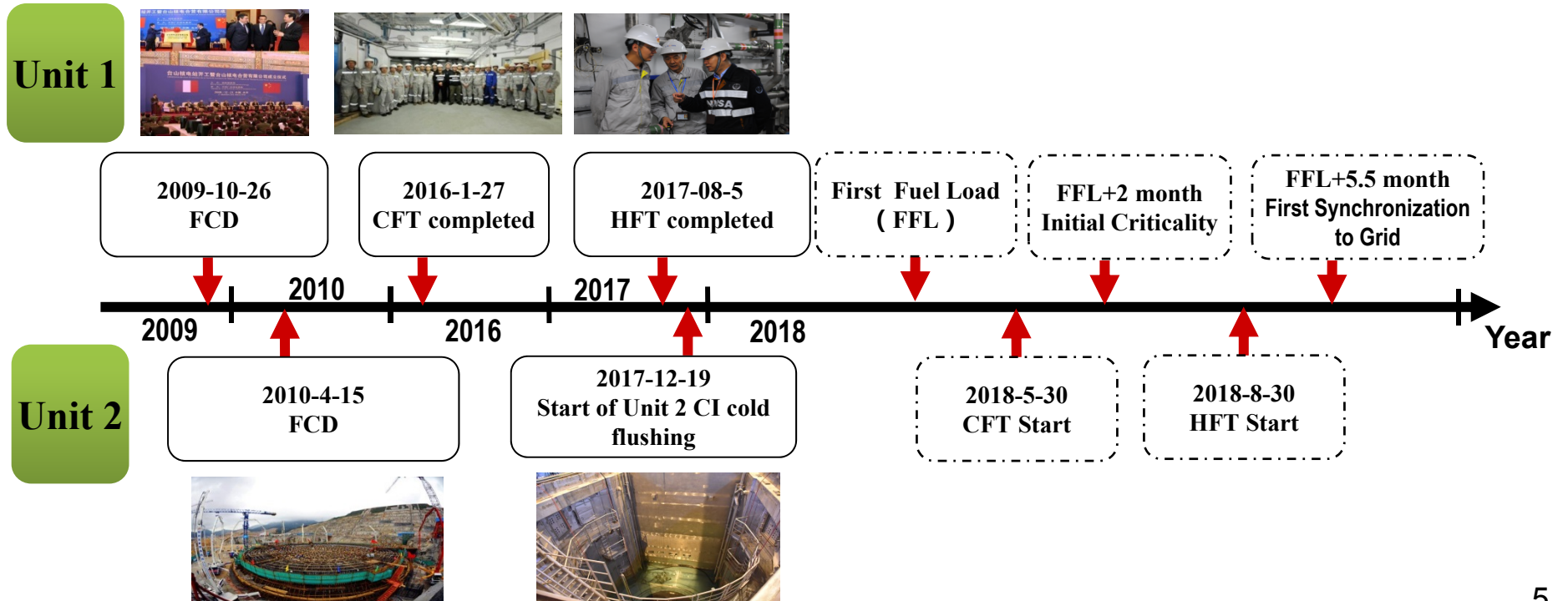


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## 1.2 New Reactor Status of EPR Projects(Taishan)





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## 1.3 New Reactor Status of AP1000 Projects(Sanmen)

Unit 1



2009-4-19  
FCD

2016-5-26  
CFT completed

2017-6-30  
HFT completed

First Fuel Load

FFL+1month  
Initial Criticality

FFL+7 month  
End of Performance  
Test

2009

2010

2016

2017

2018

Year

Unit 2

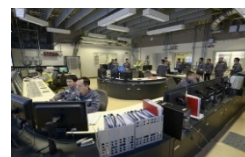
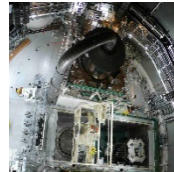
2009-12-15  
FCD

2017-5-17  
Integrated Leak  
Rate Test  
completed

2017-9-17  
CFT  
completed

2018-1-31  
HFT completed

2018-3-31  
First Fuel Load





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## 1.4 New Reactor Status of AP1000 Projects(Haiyang)

Unit 1



2009-9-24  
FCD

2016-7-2  
CFT completed

2017-7-12  
HFT completed

First Fuel Load

FFL+1 month  
Initial Criticality

FFL+5.5 month  
End of Performance  
Test

2009

2010

2016

2017

2018

Year

Unit 2

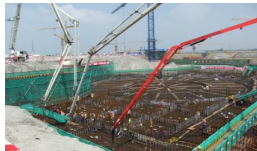
2010-6-20  
FCD

2017-7-21  
Integrated Leak  
Rate Test  
completed

2017-12-27  
CFT completed

2018-2-28  
HFT Start

2018-6-30  
First Fuel Load





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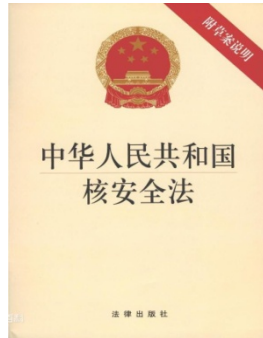
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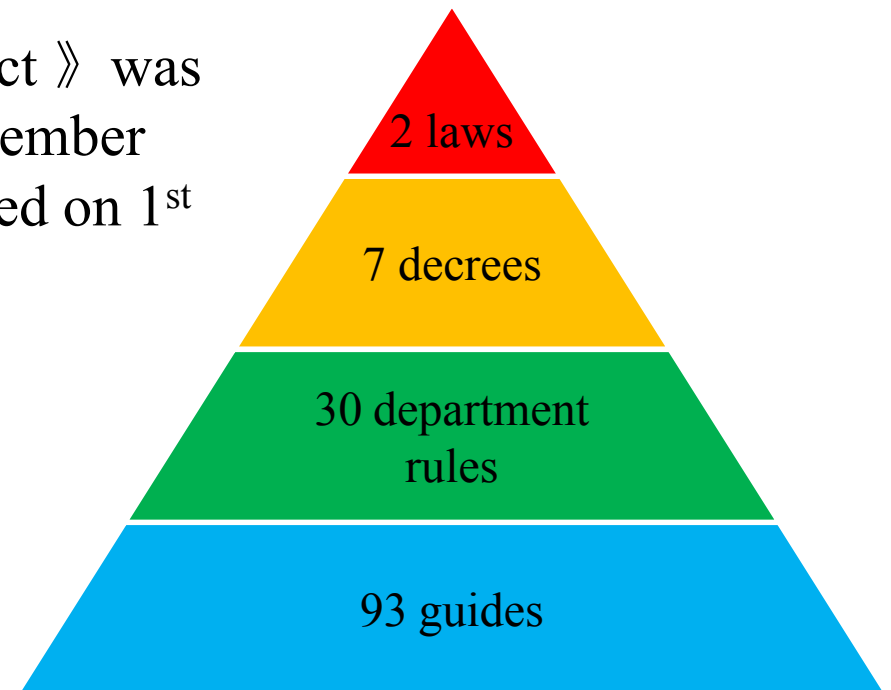




## 2.1 Nuclear Safety Laws and Regulations



- 《Nuclear Safety Act》 was approved on 1<sup>st</sup> September 2017, and was enacted on 1<sup>st</sup> January 2018.





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## 2.2 Licensing review for the first fuel loading

13 documents including:

- FSAR/Final Safety Analysis Report,
- Approval Letter of EIR (operation stage),
- Commissioning Program,
- ISI/In-service Inspection Program,
- Maintenance Program,
- Quality Assurance Program (commissioning stage) ,
- Commissioning Report before Fuel Loading,
- and so on...







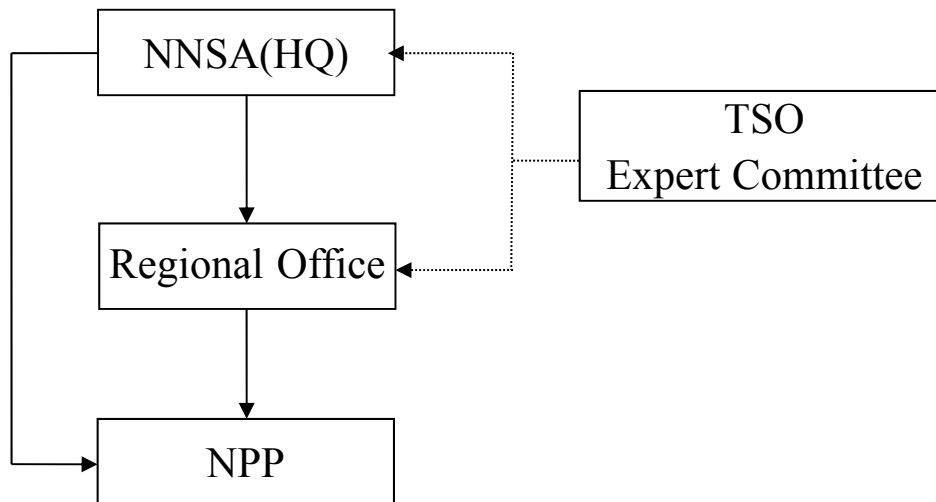
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## 2.3 Supervision and Inspection

### 2.3.1 Organization



- National Nuclear Safety Administration (NNSA HQ)
- South/East China Regional Office of NNSA(SRO/ERO)
- Technical Support Organization (TSO)
- Expert Committee
- technical support
- inspecting



## 2.3.2 Inspection of EPR/AP1000 Commissioning

(1) NNSA approved the Commissioning Program of Taishan and Sanmen Unit 1&2, and the revised edition.

(2) NNSA issued Commissioning Inspection Program of Taishan and Sanmen Unit 1&2 in 2016.





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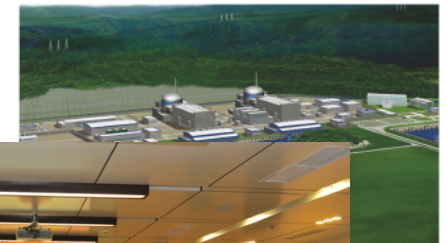
台山核电厂1、2号机组调试审评监督文件汇编之二

## 2.3.2 Inspection of EPR/AP1000 Commissioning

(3) First of a kind test (FOAK) commissioning review surveillance joint-team and expert group were set up.

(4) NNSA and Regional Office (SRO and ERO) draw up commissioning test inspection procedures.

调试监督程序  
(上册)





### 2.3.2 Inspection of EPR/AP1000 Commissioning

(5) International regulators were invited to China to jointly witness the FOAK activities and share regulatory experience.

(6) Extensive international cooperation facilitated common position on key issues and regulation consistency.







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## 2.4 Commissioning Inspection Activity

- NNSA finished two control point inspections, including:
  - Cold hydrostatic test for Reactor Coolant System
  - First fuel loading
- NNSA witnessed 56 commissioning tests for EPR, 47 tests for AP1000.





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## **2.5 Key steps before issuing the first fuel loading permit**

- All remaining questions found during the review must be closed before licensing, if not, a viable action plan must be provided.
- All commissioning items in the Commissioning Program (approved by regulatory authority) must be completed, acceptance criteria must be met.
- Non-conformance or unexpected results during commissioning must be closed.

After the above requirements are met, the results of the review will be submitted to expert committee for consultation, after which the licensee shall obtain the permit for the first fuel loading.





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## 3.1 Inspection Activity after First Loading

- Four control point inspections, including:
  - Initial criticality
  - Before leaving 5% rated power or Before connection to the grid (AP1000 or EPR)
  - Before leaving 50% or 60% rated power (AP1000 or EPR)
  - Before leaving 90% rated power
- Dozens of commissioning tests to witness or review test reports.





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## 3.2 Licensing review for operation permit after one year

- Revised FSAR
- Commissioning Report after Fuel Loading
- Quality Assurance Program (operation stage)

Operation Licensee shall be obtained the operation permit.





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### 3.3 Changes Since the Enactment of the Nuclear Safety Act

➤To improve NNSA's efficiency and optimize regulatory resource allocation , and streamline the licensing process

➤NNSA combined the *First Fuel Loading Permit* and the *Operation Permit* into the *Operation License*.

Operation Licensee shall be obtained *Operation License* before the first fuel loading.





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➤ Optimization of the division of responsibilities between the NNSA headquarters and its regional offices:

- regional offices: Onsite inspection; Hold points review and release such as initial criticality.
- headquarters: license issuance, investigation and handling of major and common problems.

➤ Development of regulatory tools, optimization of the Inspection Program and procedures such as the revision of the Commissioning Inspection Program.



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**Thank You for  
Your Attention!**