



The Abdus Salam  
**International Centre  
for Theoretical Physics**



**2473-25**

**Joint ICTP-IAEA School on Nuclear Energy Management**

*15 July - 3 August, 2013*

**Understanding the Milestones and Roles in NP Infrastructure Development**

M. Ferrari

*IAEA, Vienna, Austria*

# **Understanding the Milestones and Roles in Nuclear Power Infrastructure Development**

**Marta Ferrari,  
Integrated Nuclear Infrastructure Group  
Nuclear Energy Department**



**IAEA**

International Atomic Energy Agency

**IAEA Nuclear Energy Policy  
Management School  
Vienna, 24<sup>th</sup> July 2013**

# IAEA and Newcomers



*“The Agency has a key role to play in ensuring that this expansion in nuclear power takes place in an efficient, responsible and sustainable manner.”*

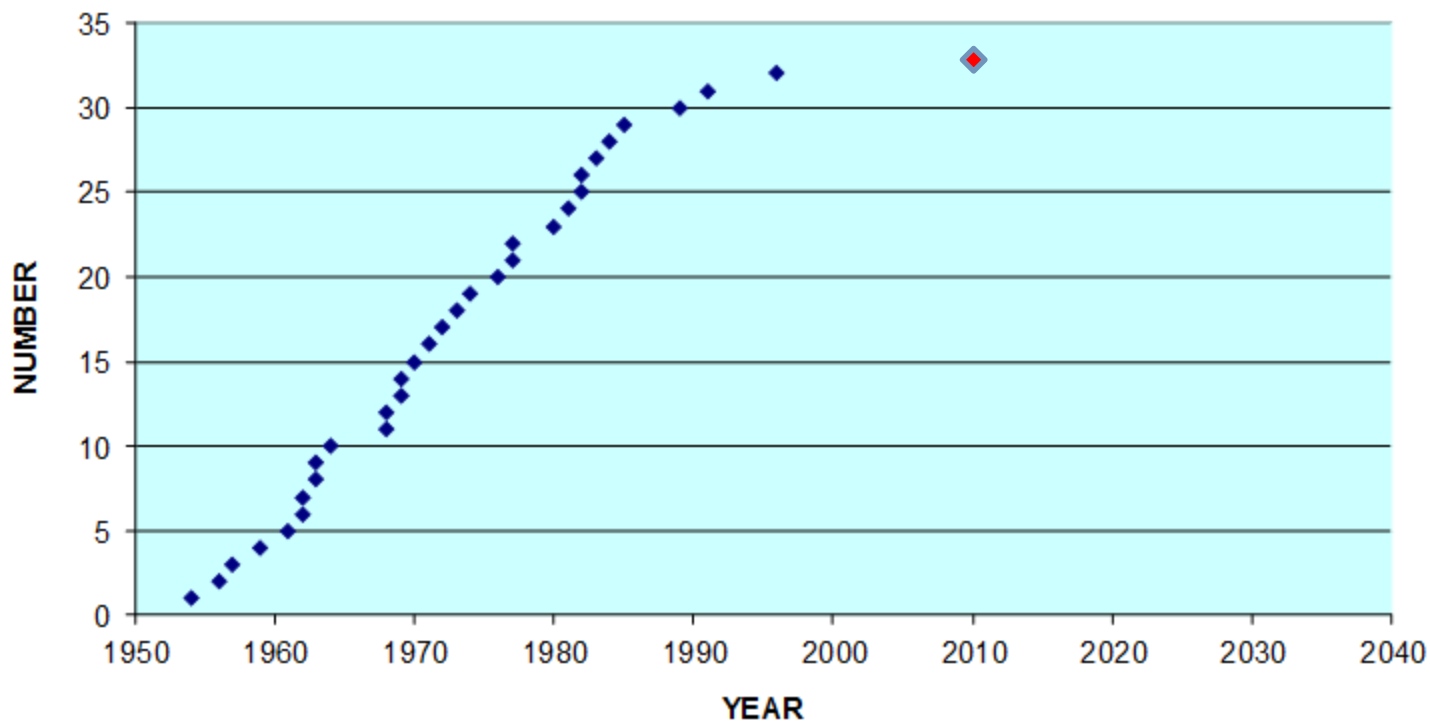
*“Assistance to newcomers, especially those which are most advanced on the road to having operational reactors, will remain a high-priority issue.”*

Yukiya Amano

IAEA Director General

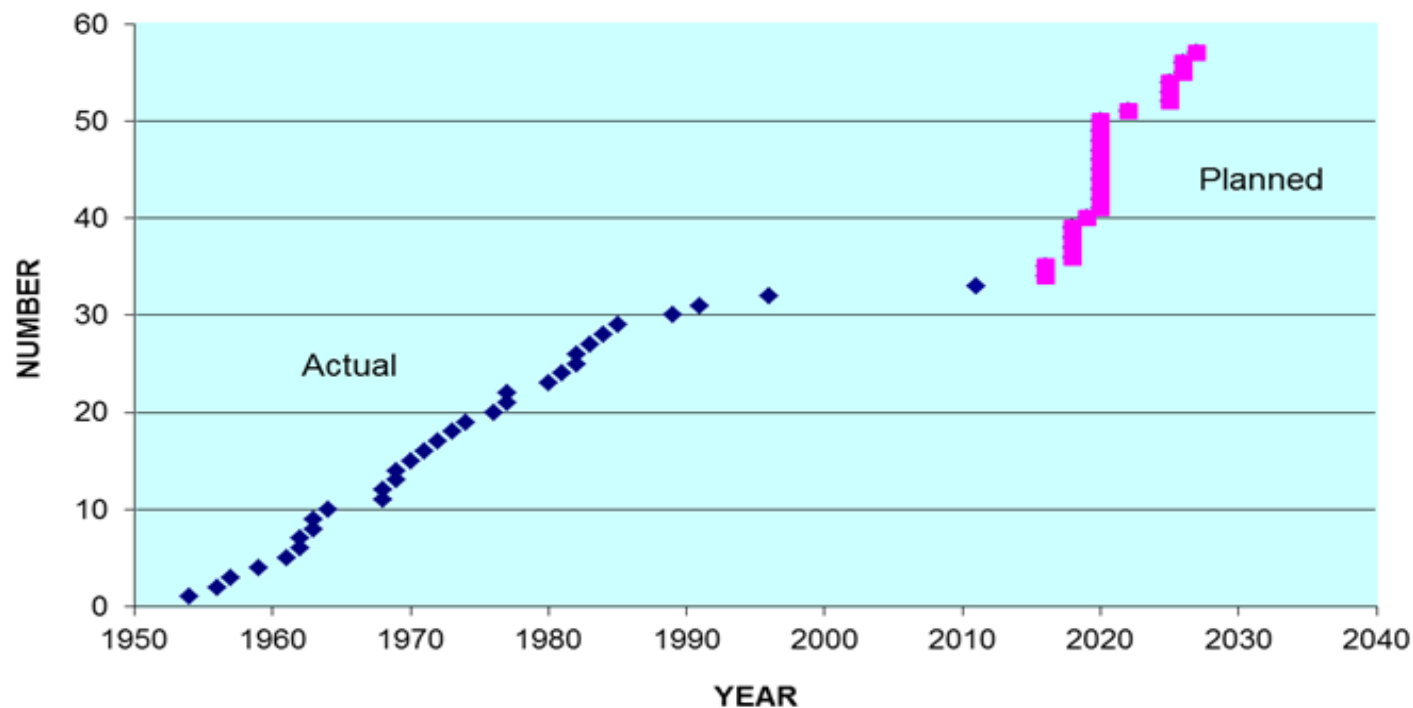
# Newcomers to Nuclear Power

**First NPP Commissioning by Year**



# Newcomers to Nuclear Power

First NPP Commissioning by Year



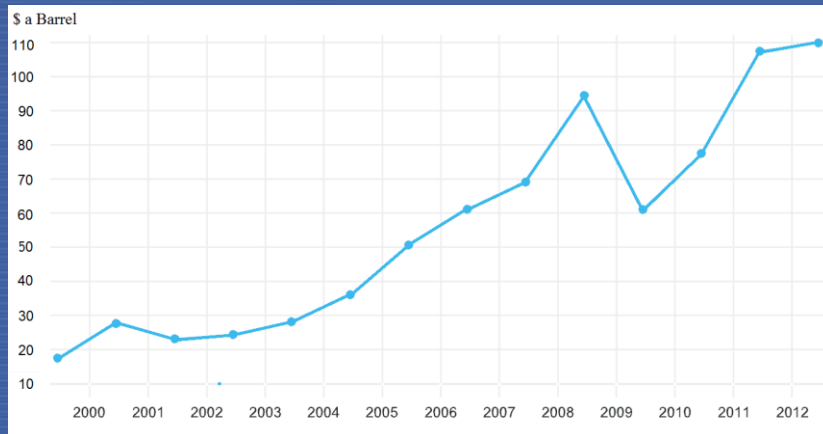
# Newcomers Post-Fukushima

		2010	2011	<b>2012</b>
Phase 3	First nuclear power plant started construction/under construction	1	0	<b>1</b>
Phase 3	First nuclear power plant ordered	2	3	<b>2</b>
Phase 2	Decided to introduce nuclear power and started preparing the appropriate infrastructure	10	6	<b>6</b>
Phase 1	Active preparation for a possible nuclear power programme with no final decision	<b>7</b>	<b>6</b>	<b>6</b>
Phase 1	Considering Nuclear Power Programme	<b>14</b>	<b>14</b>	<b>13</b>

# Newcomers Post-Fukushima

Drivers for consideration of nuclear have not changed:

- Energy independence
- Volatile fossil fuel prices
- Climate change
- Increased demand for energy



**OPEC Oil Basket Price History**

[http://www.opec.org/opec\\_web/en/data\\_graphs/40.htm](http://www.opec.org/opec_web/en/data_graphs/40.htm)



**Hurricane Sandy**

picture from National Post

<http://news.nationalpost.com/2012/10/29/hurricane-sandy-strengthens-remains-on-course-to-hit-canada-monday-bringing-7-metre-waves-to-great-lakes/>



# Newcomers Post-Fukushima



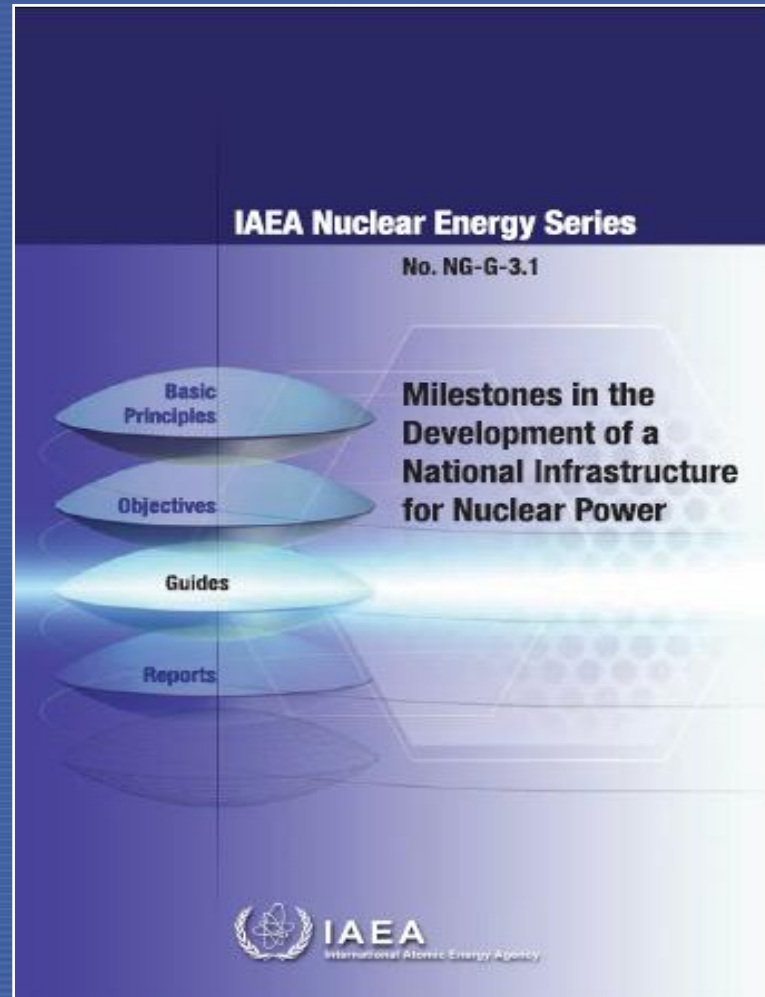
Earth at Night  
More information available at:  
<http://apod.nasa.gov/ap081005.html>



Astronomy Picture of the Day  
2008 October 5  
<http://apod.nasa.gov/>



# The Milestones Approach to Nuclear Power



# The Milestones Approach to Nuclear Power

## Phase 1: **Decide!**



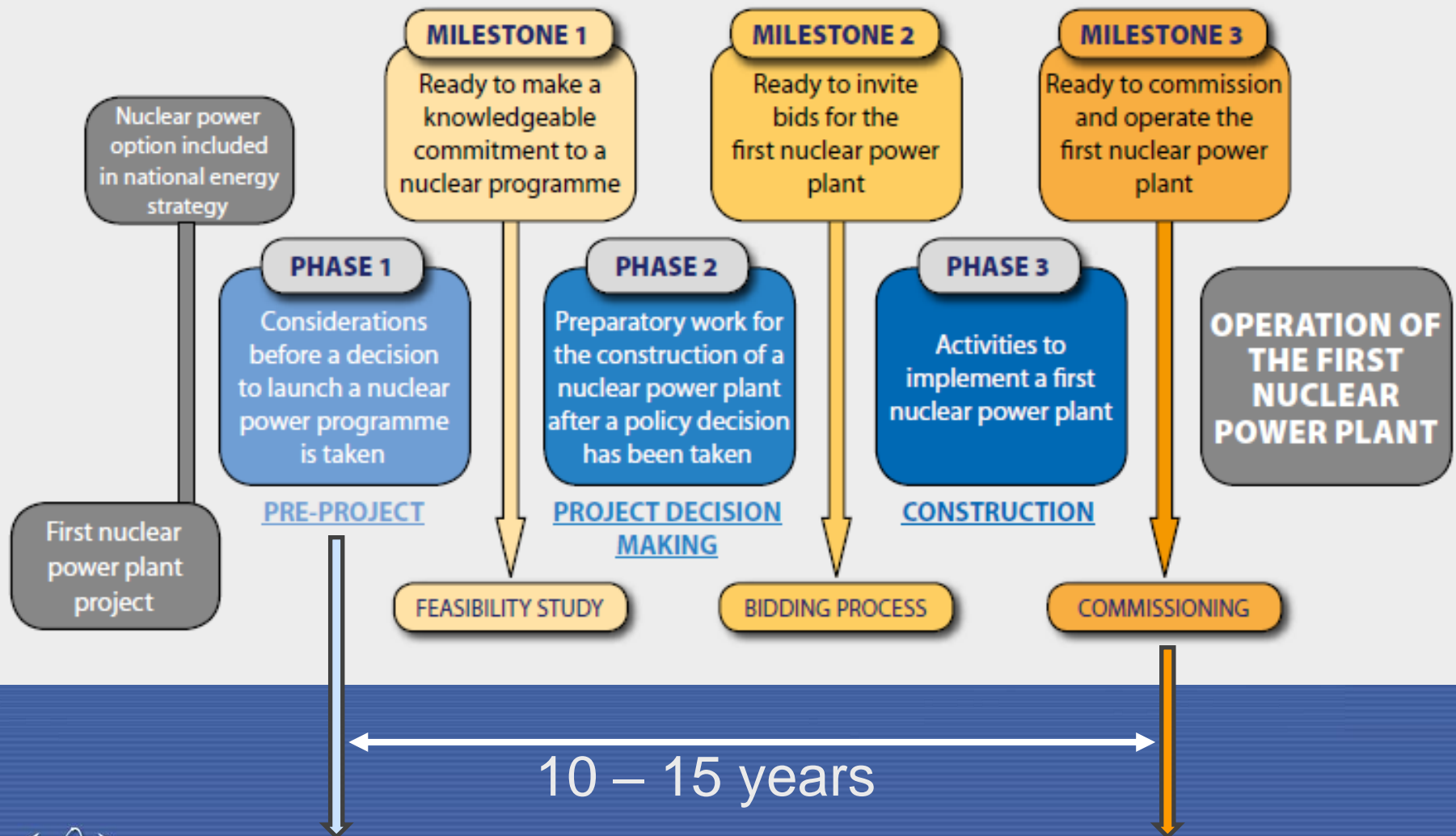
## Phase 2: **Prepare!**



## Phase 3: **Construct!**



# Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1)



# Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1)

- National position
- Nuclear safety
- Management
- Funding and financing
- Legislative framework
- Safeguards
- Regulatory framework
- Radiation protection
- Electrical grid
- Human resources development
- Stakeholder involvement
- Site and supporting facilities
- Environmental protection
- Emergency planning
- Security and physical protection
- Nuclear fuel cycle
- Radioactive waste
- Industrial involvement
- Procurement

# Phase 1: The Newcomer Challenges



# Newcomers' Top Issues

- How do I start?
- Is there public support?
- Do I have the people?
- Can I find the money?
- What am I going to do with the waste?
- Is it safe? Can I manage if there is an accident?

A pre-feasibility study should provide high level answers to all these questions and allow a **knowledgeable decision**

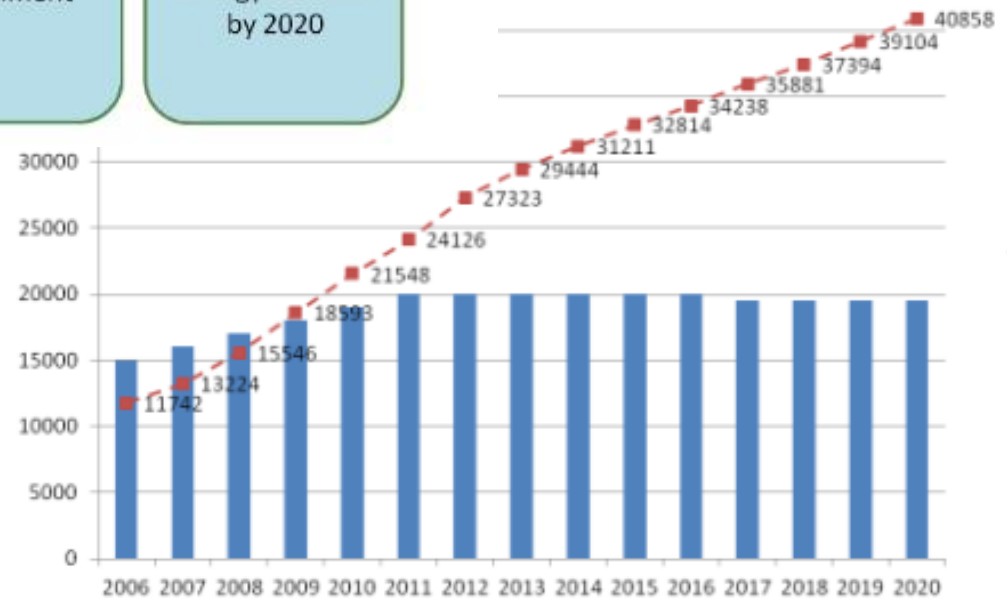


# Phase 1: Energy planning



■ Total UAE Committed Capacity  
- ■ - Total UAE Projected Demand

<http://www.uae-mission.ae>



# Phase 1: Public acceptance



Protests in Jordan against the nuclear power programme organized by a local Greenpeace branch and a coalition called Irhamouna made of residents of the city of Mafraq (Arabic for "Have Mercy on Us"), 2011

# Phase 1: National position



**King Abdullah of Jordan**



**Deliberations in Parliament, Jordan, Jan 2012**

Photo by Hassan Tamimi - <http://m.jordantimes.com/no-nuclear-reactor-deals-will-be-signed-without-parliament-approval---toukan> Jan 11, 2012



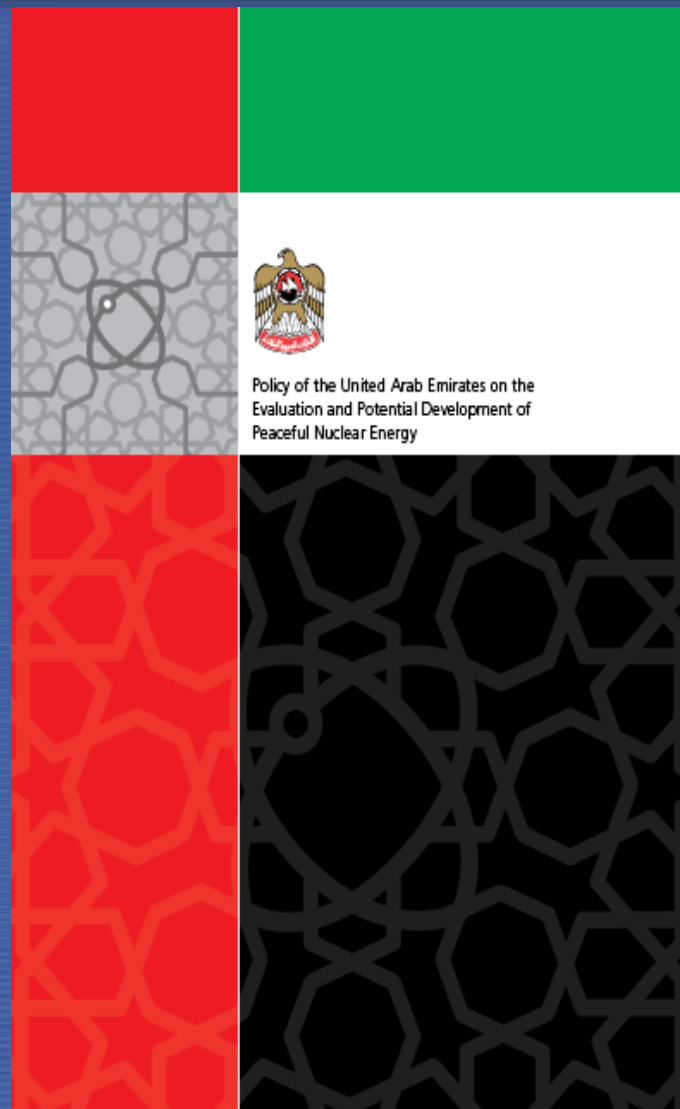
# Phase 1: National position



UAE Signing of Additional Protocol to  
Safeguards Agreement  
Vienna, April 2009



UAE Signing instruments of accession to  
the Vienna Convention on Nuclear Liability,  
Vienna, May 2012



# Phase 2 - The Newcomer Challenges



Photo Credit: [kateoverseas.wordpress.com](http://kateoverseas.wordpress.com)



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# Phase 2: Building the institutions



Government

Coordinates



Supervise



Regulatory Authority

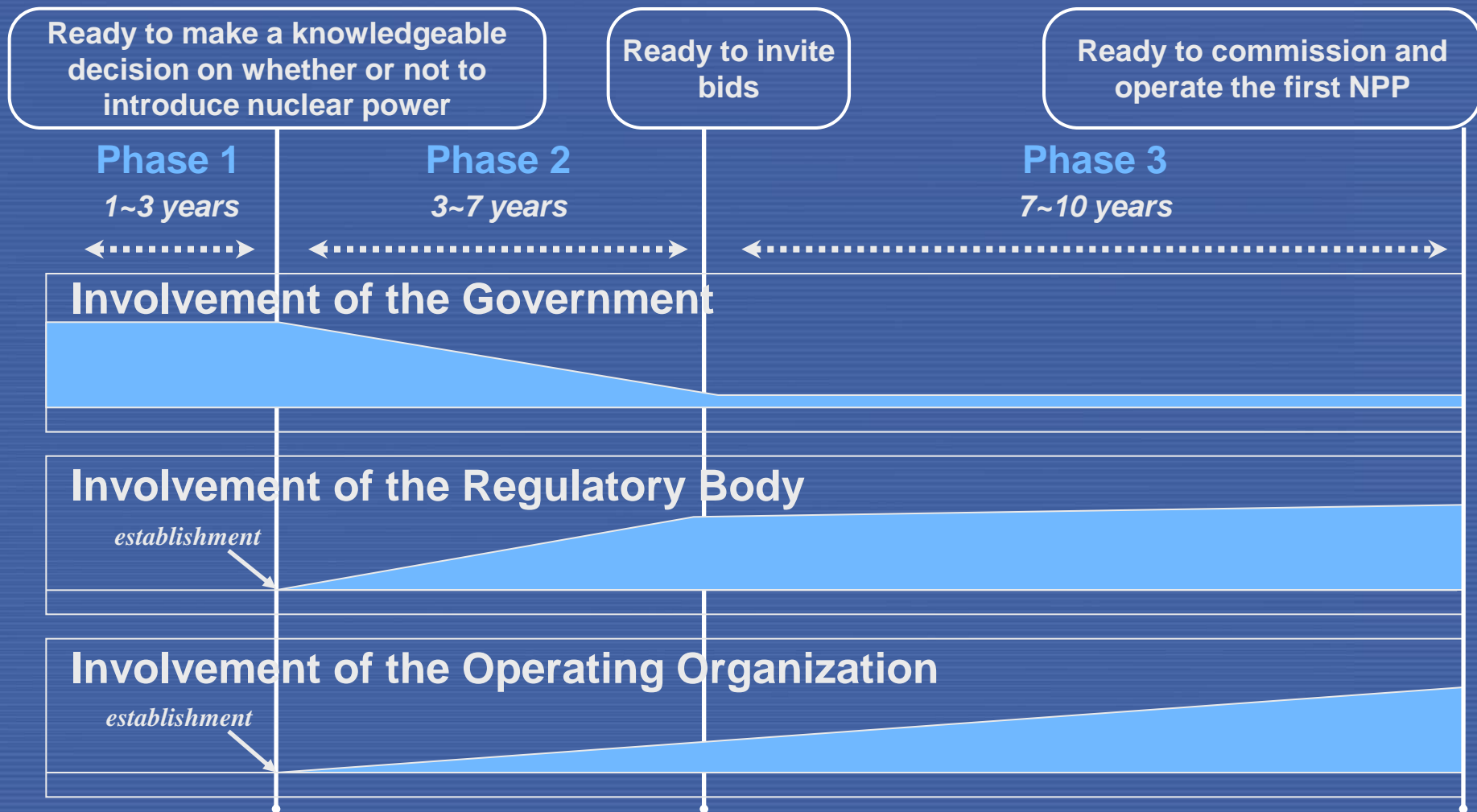
Promote



Owner - Operator



# Phase 2: Coordination



# Phase 2: Coordination



**Mr Vladimir Semashko,  
Belarus Deputy Prime Minister**



**Belarus NEPIO Representatives During the  
INIR Mission, June 2012**

# Phase 2: Human Resources



UAE Regulatory Authority Management Team, July 2012



# Phase 2: Electric Grid





# Phase 2 - Financing



**Bangladesh and Russia NPP Agreement, Nov 2011**  
**Sergei Kiriyenko, head of Rosatom, and Yafesh Osman,**  
**Bangladesh's minister of state for science**

[http://www.world-nuclear-news.org/NP-Russia\\_agrees\\_to\\_build\\_Bangladeshi\\_nuclear-0211114.html](http://www.world-nuclear-news.org/NP-Russia_agrees_to_build_Bangladeshi_nuclear-0211114.html)



**IAEA**

# Phase 2: Financing – New Model



Prime Ministers of the Russian Federation and Turkey sign the Intergovernmental Agreement for the Akkuyu project, May 2010  
[www.akkunpp.com](http://www.akkunpp.com)



# Phase 2: Project Schedule vs. Infrastructure Development



	Phase 1	Phase 2	Phase 3
1. National position			
2. Nuclear safety			
3. Management			
4. Funding and Financing			
5. Legislative framework			
6. Safeguards			
7. Regulatory framework			
8. Radiation protection			
9. Electrical grid			
10. Human resource development			
11. Stakeholder involvement			
12. Site and supporting facilities			
13. Environmental protection			
14. Emergency planning			
15. Security			
16. Nuclear fuel cycle			

# Phase 3: Construction



**UAE, Barakah Unit 1,  
Under Construction as of July 2012**

<http://www.iaea.org/newscenter/news/2012/uaenewcomer.html>

# Summary – Take Away Points

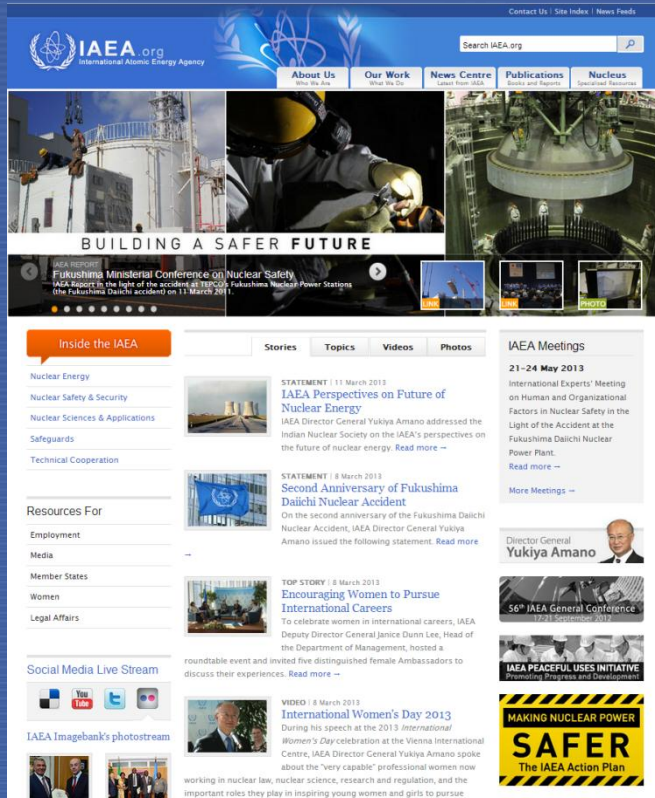
- Even after Fukushima, some countries continue with **plans to start** NPP programmes
- The decision is not technical, it is a policy decision, with strong **political implications**
- Infrastructure involves a wide range of issues and institutions and effective **coordination** contributes to success
- Having a **master schedule** gets all players working toward one goal
- Project vs infrastructure **timescale**



# Getting Informed About Nuclear

## Website IAEA and newcomers

[www.iaea.org/NuclearPower/Infrastructure](http://www.iaea.org/NuclearPower/Infrastructure)



## E-learning about nuclear power

<http://www.iaea.org/NuclearPower/Infrastructure/elearning/index.html>



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