

# China's future energy prospects: Nuclear Energy

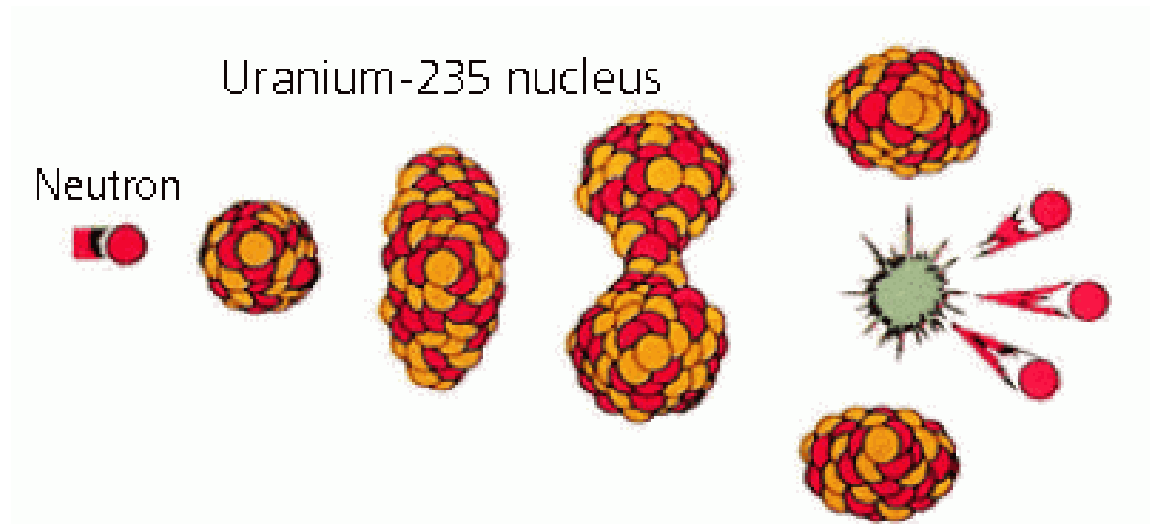
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# Content Overview

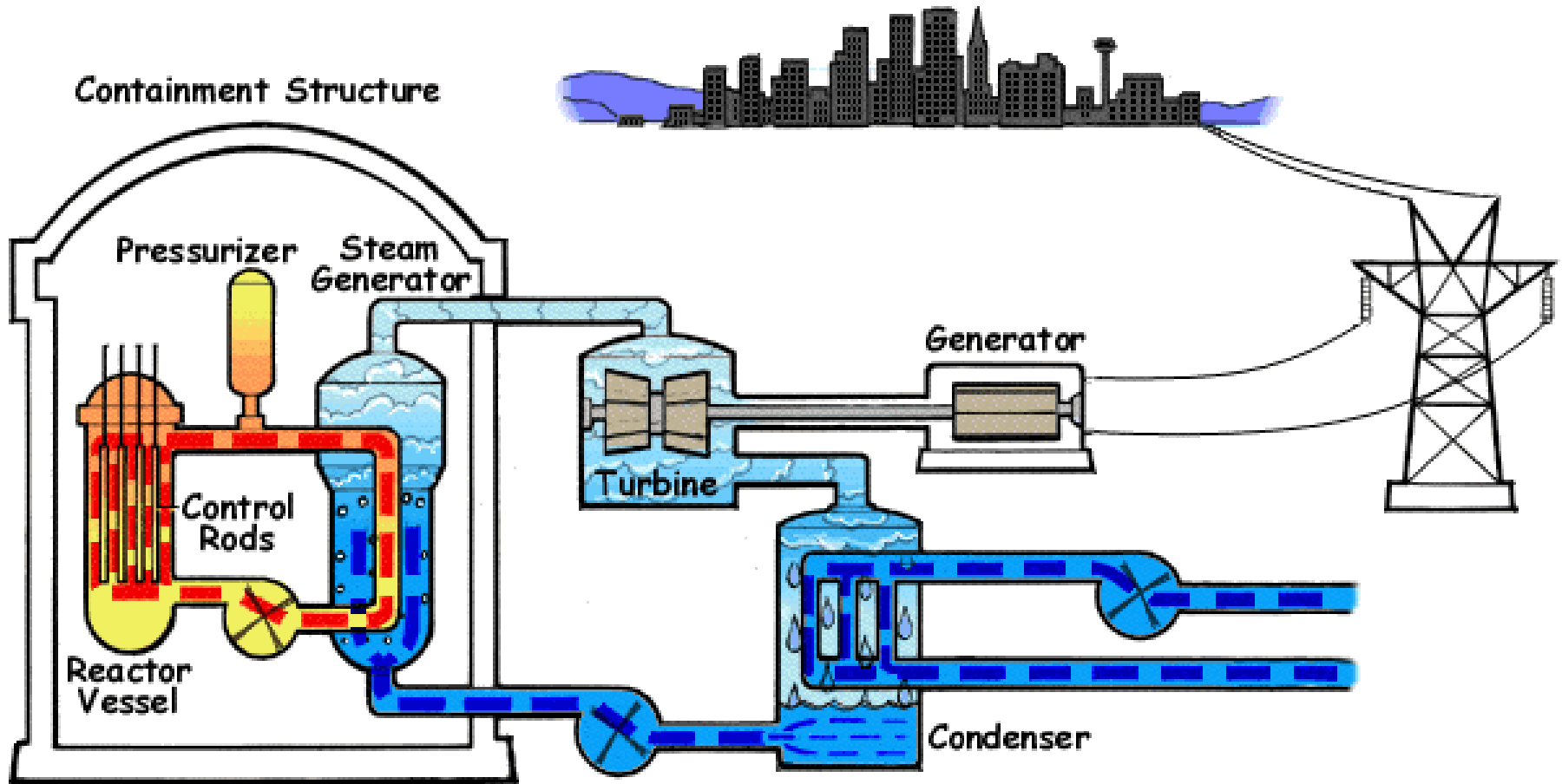
1. Introduction: Nuclear energy
2. China's current energy situation
3. China's nuclear energy policy
4. Policy analysis: Opportunities & Challenges
5. Proposed suggestions

# Nuclear energy

- Use of nuclear fission reactors to generate electricity from nuclear fuel for civilian purposes
- “One atom splits into two and releases energy”
- Uranium



# Nuclear Power Plant

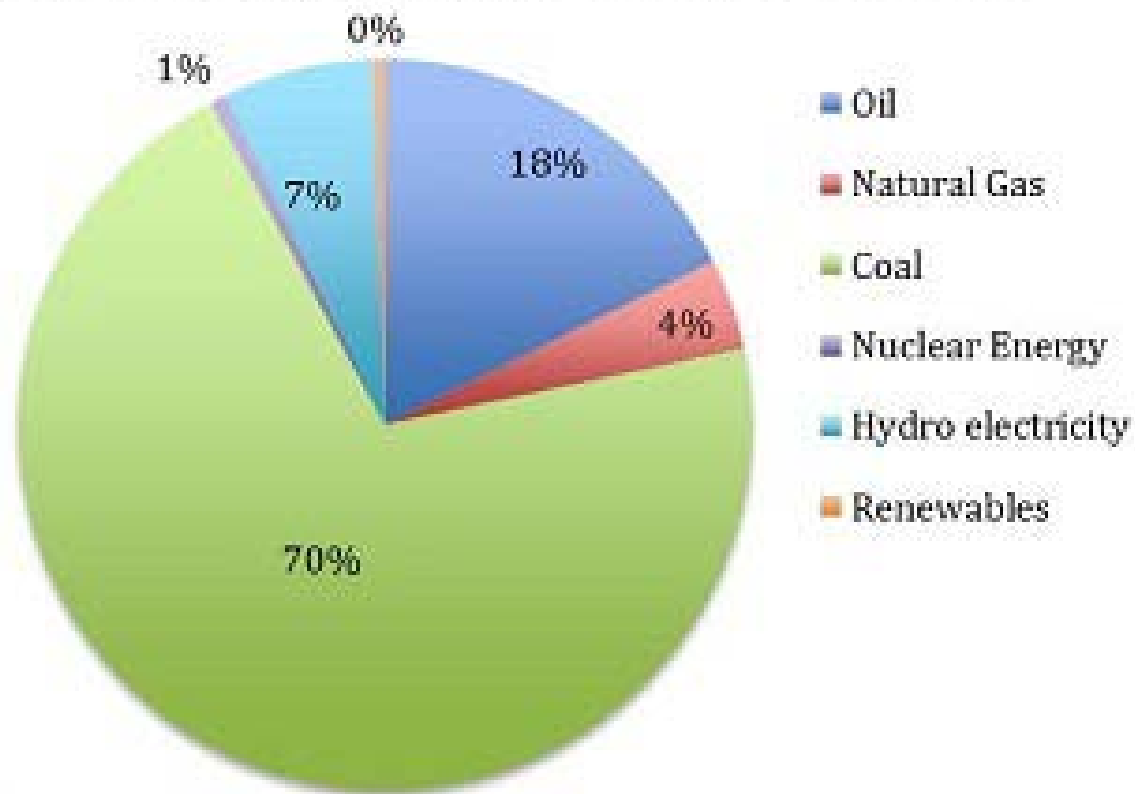


# Development of Nuclear Energy

Time	Event
1930's	Discovery of nuclear fission
1940's	Nuclear weapons
1954	USSR's Obninsk Nuclear Power Plant
1970	China's first nuclear power plant
1991	Qinshan Nuclear Power Plant

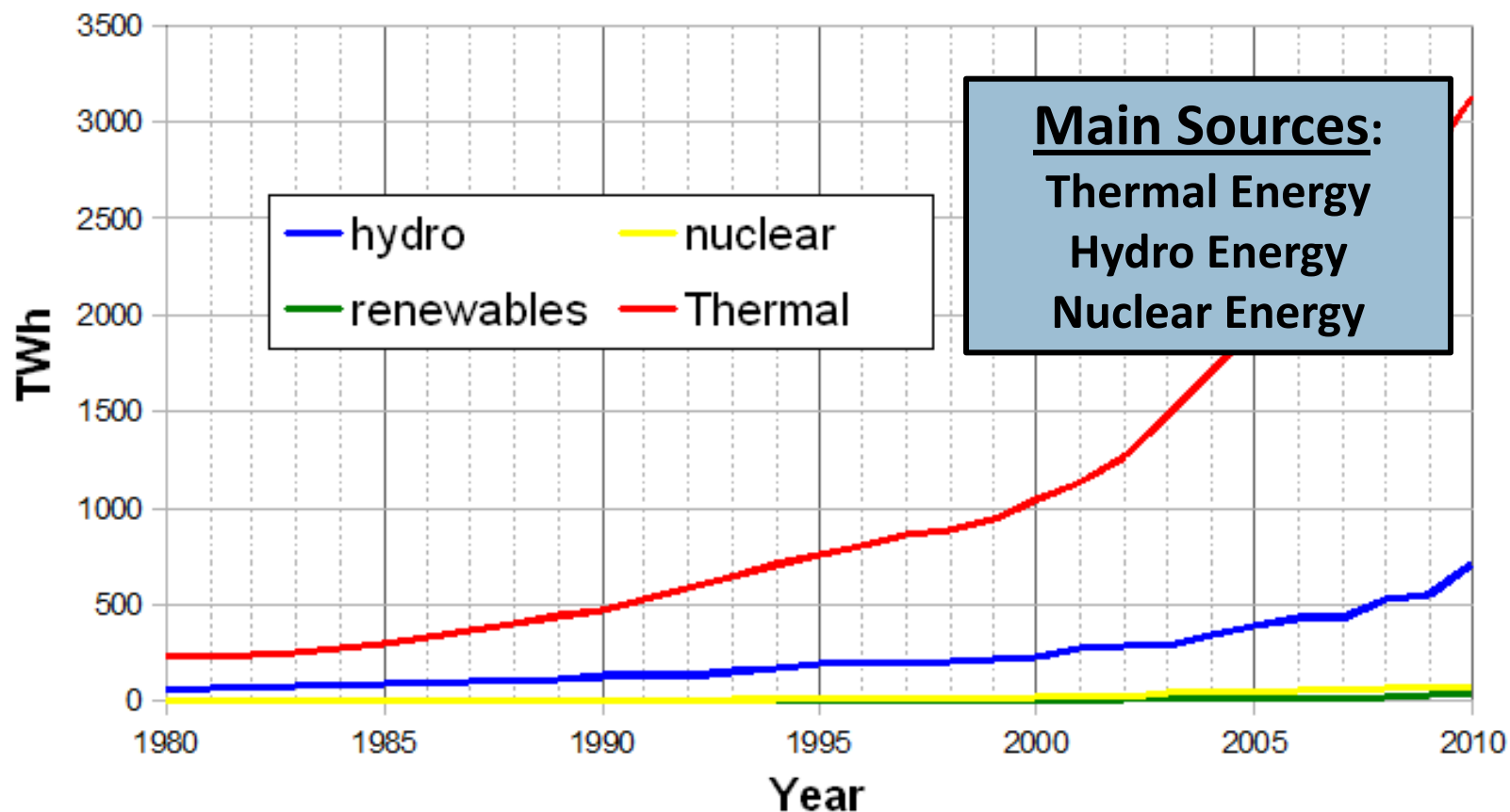
# China's Current Energy Situation

**China: Energy Consumption By Fuel (2010)**



# China's Current Energy Situation

## China's Electricity Production by Source



Source: US Energy Information Administration

# China's Nuclear Energy Policy

- 2012: 16 nuclear reactors over 4 separate sites
- 26 others under construction
- CPR-1000, AP-1000, Pebble Bed Reactor
- 12's Five-Year Plan:
  - i. Nuclear Energy increase from 1% to 6% by 2020
  - ii. “More efficient development of nuclear power under the precondition of ensured safety”

Expansion Policy





# Comparison

	<b>Thermal</b>	<b>Hydro</b>	<b>Nuclear</b>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Low cost of production</li> <li>• Efficient energy production</li> </ul>	<ul style="list-style-type: none"> <li>• Renewable &amp; Clean</li> <li>• Lower cost of maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient energy production</li> <li>• Lower cost of power generation</li> <li>• Minimal air pollution</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• High level of pollution</li> <li>• Depleting resources</li> </ul>	<ul style="list-style-type: none"> <li>• Geographically restrained</li> <li>• High cost of power generation</li> <li>• Lack of water</li> </ul>	<ul style="list-style-type: none"> <li>• High capital cost for construction &amp; safety equipment</li> <li>• Nuclear &amp; radiation accidents</li> </ul>
<b>Amount of investment (2009)</b>	<b>↓ 11.11%</b>	<b>↑ 2.33%</b>	<b>↑ 74.91%</b>
<b>Potential</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>

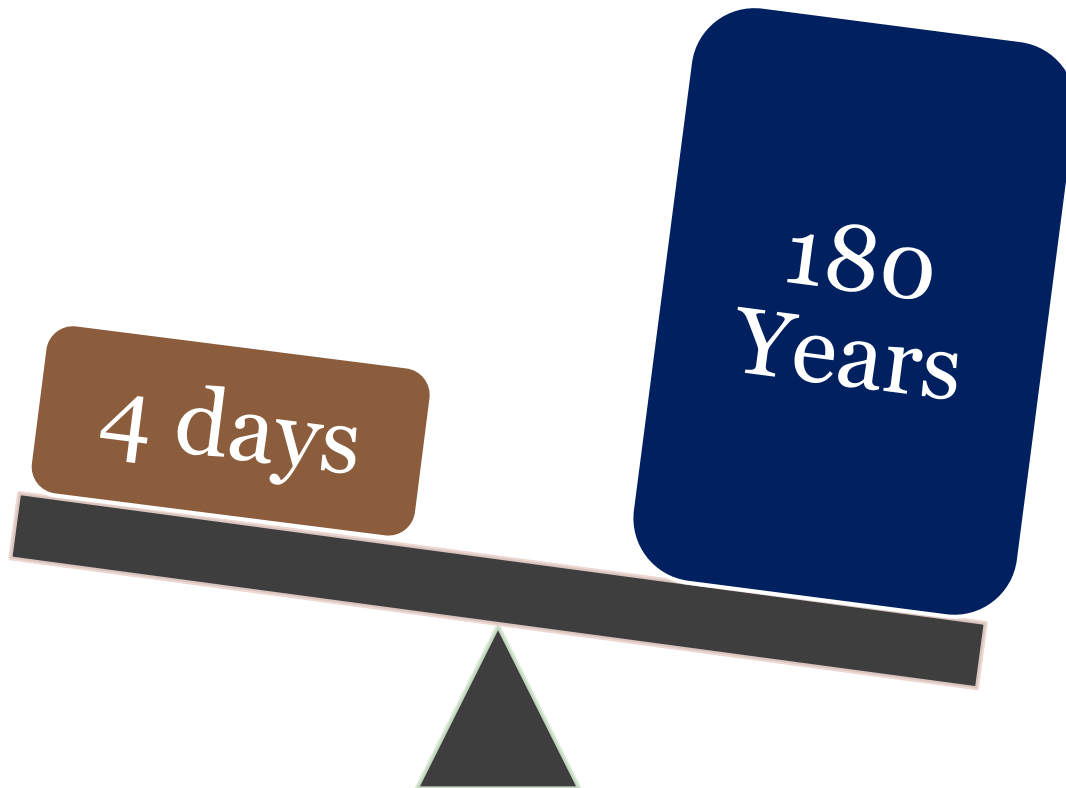
# Comparison

1kg of  
Coal

1kg of  
Uranium

4 days

180  
Years



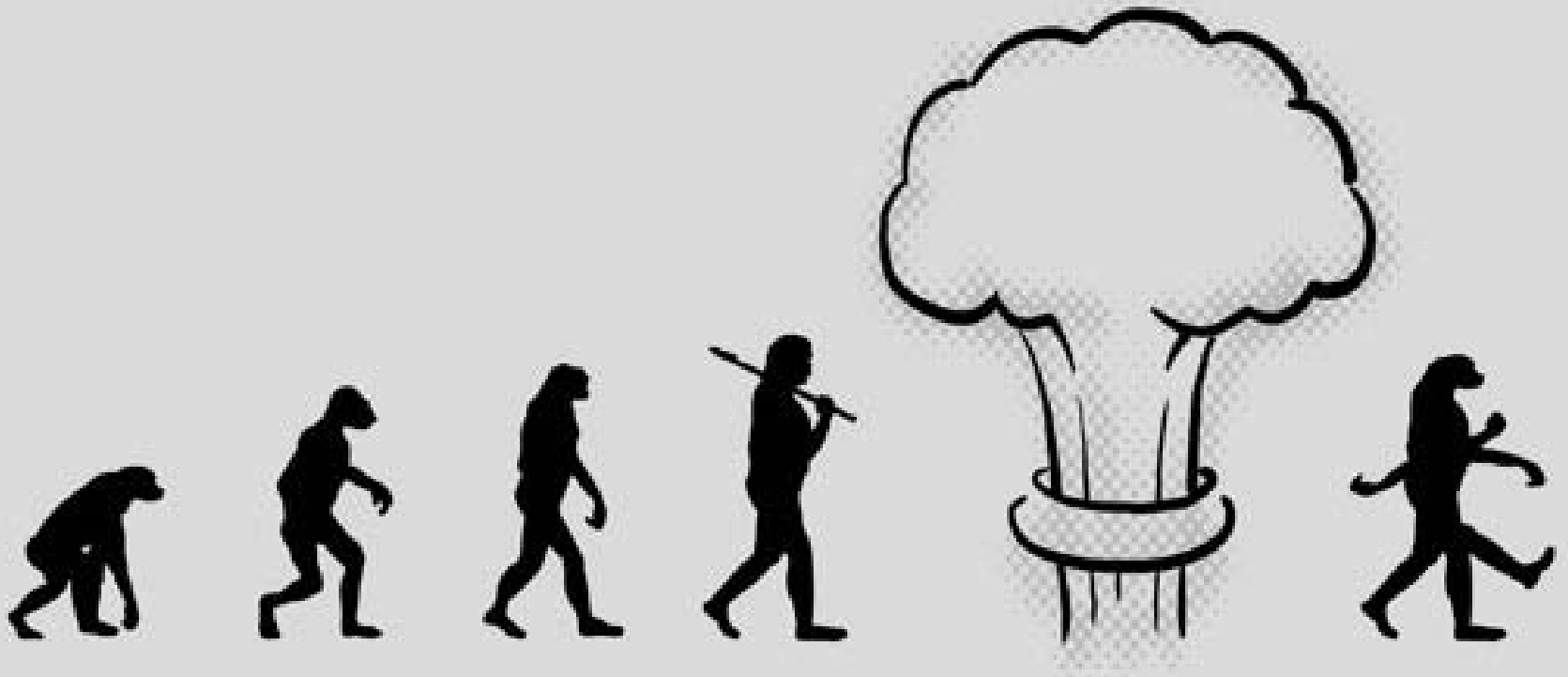


- Active Plants
- Under Construction Plants
- Firmly Planned Plants

Hongyanhe  
HTTR  
Hongshiding  
Haiyang  
Shidaowan  
Tianwan  
Wuhe  
Qinshan  
Sanmen  
Ningde  
Fuqing  
Daya Bay  
Taishan  
Langjiang  
Changjiang  
Fangchenggang  
Xiaomoshan  
Pengze  
Xianning

# Qinshan Nuclear Power Plant





**Is it really worth it?**

# Policy Analysis: Opportunities

## 1. Decreased dependency on coal and oil

- Higher cost of production

## 2. Decarbonized Economy

- Reduce greenhouse gas emissions
- Goal of 15% non-fossil generation by 2020

## 3. Higher economic & national security

- Rapid development of economy
- Desired economic alternative

# Policy Analysis: Challenges

## 1. Lack of domestic uranium

- Known resources: 166,000 tU
- Supplies less than  $\frac{1}{4}$  of nation's nuclear needs
- Import from Kazakhstan, Namibia, Niger, Australia

## 2. Nuclear Safety

- Rapid expansion of nuclear plants
- Threat of natural disaster
- Post Fukushima: International dispute

## 3. High Capital Cost

- Import, Construction, Safety

# Proposed Suggestions

1. Improve R&D for plant construction
  - Gen II to Gen III
  - Deterrence from natural disasters
2. Develop higher level of safety regulations
  - Ongoing process
3. Reduce speed of nuclear plant expansion
  - Ensured safety
4. Increase renewable energy consumption
  - Solar energy, wind energy



# Conclusion

## **China's future energy prospects in nuclear power:**

- Short run: Expansion Policy
- Long run: Increase resistance towards natural disasters, decrease human error





*Thank you*

NUCLEAR WINTER

Graphic: Keith Washburn Copyright © 2009

# References

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