

**INPRO Dialogue Forum on the Potential of Nuclear Energy to Support the Sustainable Development Goals, Including Climate Change Mitigation
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Enhancing Public Acceptance of Nuclear Power. Experience and Lessons Learnt of Viet Nam

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1. Climate Change Impacts and Viet Nam's Intended Nationally Determined Contribution (INDC)

1.1. Climate Change Impacts in Viet Nam (1)

- Viet Nam is one of the countries severely affected by climate change and its related disasters. The Mekong Delta is one of the deltas in the world most susceptible and vulnerable to sea level rise.
- Over the past 50 years, the average temperature in Viet Nam has increased by approximately 0.5°C and the sea level has risen by about 20cm. Extreme climate events have increased both in frequency and intensity. Climate change has made hazards, especially storms, floods and droughts, more intense.
- According to Viet Nam's climate change scenario (2012), by 2100 the annual average temperature in Viet Nam is expected to increase by 2 to 3°C, precipitation will increase in the rainy season and decrease in the dry season and the sea level will rise between 78 and 100cm.
- Over the past 30 years, the average number of dead and missing people due to natural disasters totaled 500 annually; thousands of people were injured and annual economic losses accounted for approximately 1.5% of GDP.

1.1. Climate Change Impacts in Viet Nam (2)

- The most vulnerable areas, regions and objects are: agriculture, natural ecosystems, biodiversity, water resources, public health and infrastructure; the Mekong Delta, the Red River Delta, the Central Coast; the poor, ethnic minorities, the elderly, women, children and people with disabilities.
- Without implementing climate change adaptation measures, when the sea level rises by 100cm, over 10% of the Red River Delta and Quang Ninh province, more than 2.5% of the area of the central coastal provinces, and over 20% of Ho Chi Minh City will be at risk of being inundated, directly affecting 9% of the population of the Red River Delta and Quang Ninh province, nearly 9% of the population of the central coastal provinces and approximately 7% of the population of Ho Chi Minh City; up to 39% of the Mekong Delta could be submerged, affecting 35% of the population and causing the risk of losing 40.5% of the total rice production in this region.

1.2. Contribution to GHG Emissions Mitigation (1)

- In 2010, GHG emissions of Viet Nam was accounted only for approximately 0.5% of global GHG emissions and GHG emissions per capita were relatively low at 2.84 tonnes of CO_{2e}.
- **Business-As-Usual (BAU) Scenario:** Viet Nam's BAU scenario for GHG emissions was developed based on the assumption of economic growth in the absence of climate change policies. The BAU starts from 2010 (the latest year of the national GHG inventory) and includes the energy, agriculture, waste and land use, land use change and forestry sectors.
 - GHG emissions in 2010: 246.8 million tCO_{2e}
 - Projections for 2020 and 2030 (not included industrial processes):
 - 2020: 474.1 million tCO_{2e}
 - 2030: 787.4 million tCO_{2e}

1.2. Contribution to GHG Emissions Mitigation (2)

- Viet Nam's INDC identifies the GHG reduction pathway in the 2021-2030 period. With domestic resources GHG emissions will be reduced by 8% by 2030 compared to the BAU scenario. The above-mentioned contribution could be increased up to 25% with international support.
- **Unconditional Contribution:** with domestic resources, by 2030 Viet Nam will reduce GHG emissions by 8% compared to BAU, in which:
 - Emission intensity per unit of GDP will be reduced by 20% compared to the 2010 levels;
 - Forest cover will increase to the level of 45%.
- **Conditional Contribution:** The above-mentioned 8% contribution could be increased to 25% if international support is received through bilateral and multilateral cooperation, as well as through the implementation of new mechanisms under the Global Climate Agreement, in which emission intensity per unit of GDP will be reduced by 30% compared to 2010 levels.

1.3. Measures to Achieve the Targets (1)

1. Strengthen the leading role of the State in responding to climate change
2. *Improve effectiveness and efficiency of energy use; reducing energy consumption*
3. *Change the fuel structure in industry and transportation*
4. *Promote effective exploitation and increase the proportion of new and renewable energy sources in energy production and consumption*
5. Reduce GHG emissions through the development of sustainable agriculture; improve effectiveness and competitiveness of agricultural production
6. Manage and develop sustainable forest, enhance carbon sequestration and environmental services; conservation of biodiversity associated with livelihood development and income generation for communities and forest-dependent people
7. Waste management
8. Communication and awareness raising
9. Enhance international cooperation

2. Overview on Economy, Energy and Electricity Development in Viet Nam



2. Overview (1)

■ Projection on Economic Growth

- In 2015: GDP: 193.42 Bill. USD
GDP per Capita: 2,109 USD

| Period | Low Scenario | Base Scenario | High Scenario |
|-----------|--------------|---------------|---------------|
| 2016-2020 | 6.3 % | 7.3% | 7.4% |
| 2021-2025 | 6.0% | 8.2% | 9.0% |
| 2026-2030 | 5.6% | 7.2% | 8.7% |
| 2030-2035 | 5.1% | 5.9% | 7.2% |

2. Overview (2)

■ Projection on Final Energy Demand by Fuels - Base Scenario (KTOE)

| Types | 2020 | 2025 | 2030 | 2035 |
|-------------------|--------|--------|---------|---------|
| Coal | 13,482 | 16,071 | 18,725 | 20,167 |
| LPG | 2,345 | 3,009 | 3,918 | 4,756 |
| Gasoline | 6,532 | 9,102 | 12,551 | 15,859 |
| Airplane Gasoline | 1,344 | 2,071 | 3,165 | 4,761 |
| Kerosene | 88 | 112 | 129 | 128 |
| DO | 12,127 | 15,699 | 19,175 | 20,802 |
| FO | 1,651 | 2,099 | 2,523 | 2,704 |
| Natural Gas | 2,257 | 3,094 | 3,853 | 4,194 |
| Electricity | 20,158 | 30,669 | 43,597 | 58,133 |
| Renewable | 11,353 | 30,669 | 43,597 | 58,133 |
| Total | 71,337 | 91,176 | 115,016 | 137,834 |

2. Overview (3)

■ Projection on Installed Capacity - Base Scenario (GW)

| Types | 2015 | 2020 | 2025 | 2030 | 2035 |
|-----------------------|--------------|--------------|---------------|---------------|--------------|
| Coal-fired power | 12.51 | 25.65 | 48.31 | 57.77 | 58.59 |
| Gas & Oil-fired power | 8.7 | 11.48 | 21.33 | 24.33 | 36.5 |
| Hydro power | 14.46 | 18.63 | 20.79 | 22.52 | 22.87 |
| Renewable | 1.99 | 7.06 | 13.33 | 28.52 | 50.54 |
| Total | 37.66 | 62.82 | 103.66 | 133.14 | 168.5 |



2. Overview (4)

■ Projection on Electricity Generation - Base Scenario (TWh)

| Types | 2015 | 2020 | 2025 | 2030 | 2035 |
|-----------------------|---------------|--------------|------------|---------------|---------------|
| Coal-fired power | 52.98 | 90.26 | 152.25 | 259.15 | 373.83 |
| Gas & Oil-fired power | 44.74 | 64.02 | 110.06 | 128.38 | 121.65 |
| Hydro power | 64.92 | 91.3 | 104.66 | 107.79 | 114.61 |
| Renewable | 0.26 | 9.52 | 21.03 | 56.11 | 131.47 |
| Total | 162.91 | 255.1 | 388 | 551.42 | 741.56 |



2. Overview (5)

■ Share of Renewable in the Total Primary Energy (%)

| Scenarios | 2015 | 2020 | 2025 | 2030 | 2035 |
|-------------------------------------------|------|------|------|------|------|
| Base | 38.3 | 36.4 | 30.2 | 27.5 | 29.8 |
| High | 38.3 | 36.3 | 29.3 | 25.2 | 26.6 |
| Low | 38.3 | 37.6 | 33.6 | 32.5 | 36.6 |
| CO ₂ emission reduction by 8% | 38.3 | 36.9 | 33.1 | 33.4 | 35.8 |
| CO ₂ emission reduction by 25% | 38.3 | 37.6 | 39.4 | 45.6 | 47.8 |



3. Public Acceptance Activities, Experience and Lesson Learnt



3. PA Activities, Experience and Lesson Learnt (1)

- The Government of Viet Nam has paid attention to information and propaganda on research, development and application of nuclear energy. Public information and education activities have been carried out right from the start of studies on the introduction of NP in Viet Nam under variety of forms.
- Since 2000, the Ministry of Science and Technology, the Ministry of Industry and Trade and the Electricity of Vietnam (EVN) cooperated with relevant ministries, localities and international partners to carry out communication activities on the peaceful uses of nuclear energy. These activities include:
 - Organized 4 exhibitions on peaceful uses of nuclear energy in Hanoi (2001), Ninh Thuan, Phu Yen (2002) and Ho Chi Minh City (2003) aimed to introduce to the public the benefits of nuclear energy applications in the areas of health, agriculture, industry, environmental protection and energy production;

3. PA Activities, Experience and Lesson Learnt (2)

- Organized 5 international exhibitions on NP in Hanoi (2004, 2006, 2008, 2010, 2012);
- Organized visits to nuclear installations in domestic and oversea with participation of government officials, correspondents, representatives of the local people and authorities;
- Established two Center for Nuclear Energy Information at Hanoi University of Science and Technology and EVN
- Published magazines, pocketbook, leaflets... on nuclear science and technology to provide scientists, policy makers, students, and the general public;
- Provided information on nuclear energy in the world and in the country through mass media and hold dialogues on television and on the Voice of Vietnam with the topics on human resource development, nuclear safety...
- Organized training on nuclear energy for journalists and editors.

3. PA Activities, Experience and Lesson Learnt (3)

- On 28 Feb. 2013, the PM signed a decision on the implementation of the *National Project on Public Communication on Nuclear Power Development in Viet Nam to 2020*. General objectives of the Project were the raising of awareness and understanding of social classes and relevant organizations about the nature, characteristics, necessity and benefits of NP in ensuring energy security and socio-economic development of the country, as well as the requirements for ensuring safety, security, aimed at contributing to sustaining and improving consensus and supports of the public and international communities for the Ninh Thuan NP Project.
- The main tasks of the Project:
 - To implement the communication on NP development;
 - To implement the dissemination of basic knowledge on atomic energy and NP in general education; and
 - To establish centres for public relation and communication on NP.

3. PA Activities, Experience and Lesson Learnt (4)

- Generally, during a long period, public communication activities have significantly contributed to enhancing public acceptance and political supports for nuclear energy development in Viet Nam.
- However, from the practical activities of organizations and people responsible for the communication on NP, we can draw following lesson learnt:
 - ✓ Too believed and relied on political decisions and have no paid proper attention to improvement of quality, content and forms of communication as well as capacity enhancement of professional staff on NP communication and public relation;
 - ✓ Disregarded the growth of NP-opposed force and people supporting renewable energy, who are also actively carrying out public communication activities and to lobby politicians for their support;

3. PA Activities, Experience and Lesson Learnt (5)

- ✓ Lacked comprehensive surveys and forecast of the changes on awareness of the public and the point of view of top-level leaders to have timely responding approaches and measures;
- ✓ Avoided debates with NP-opposed people and not timely provided top-level leaders with information on the issues that they were concerned, such as economic competitiveness, nuclear safety, radioactive waste management... this led to decrease of public acceptance and political support for NP; and
- ✓ Communication documents were mainly compiled from foreign sources, but lack of deep, highly convincing analyses and assessments meeting actual situation and conditions of Viet Nam. Especially, the role of NP in the implementation of national commitment and responsibility on climate change mitigation has not be emphasized. This is reflected by the fact that NP was not chosen as one of measures to achieve GHG emission mitigation targets of Viet Nam.

3. PA Activities, Experience and Lesson Learnt (6)

- The practice in Viet Nam showed that since 1990s, plan for NP development in Viet Nam has had a long period attained public acceptance and political supports. In November 2009 Viet Nam National Assembly approved resolution on policy for investment to Ninh Thuan NP Project with many supporting policies issued. However, the situation was changed when Viet Nam has to face economic difficulties and due to impact of Fukushima accident. As a result, In November 2016, Viet Nam has to decide to stop the project. This is unexpected decision for Viet Nam's nuclear community.
- The Government said that economic difficulty was main reason of the cease of NP project. But, according to general opinion, there are other key reasons, such that nuclear safety, security, radioactive waste disposal, especially spent fuel, national infrastructure development; and Government's policy on priority for renewable energy development.

3. PA Activities, Experience and Lesson Learnt (7)

- As we know, regarding the concept of sustainable nuclear energy system (NES), INPRO established seven subject areas detailing four dimensions (Economic, Environmental, Social, and Institutional) and the UN concept of sustainable development:
 - Economics;
 - Environment;
 - Waste management;
 - Safety;
 - Proliferation resistance;
 - Physical protection; and
 - Infrastructure.
- Despite the fact that NP has many inherent sustainability features, nevertheless, there are some concerns that have to be addressed in order to further enhance ability of NP to respond the full set of the sustainable development requirements of each country.

3. PA Activities, Experience and Lesson Learnt (8)

- The issues to be considered for communication activities:
 - ✓ Nuclear power being a low-carbon electricity generation technology is recognized by almost public. But contribution of NP to sustainable development is still controversial.
 - ✓ The public and policy-makers receive information from many different sources. Nuclear energy information is usually difficult to understand due to its nature of science and high technology compared to other energy types. Sometime, the public cannot distinguish true or fault information.
 - ✓ The public is easily impacted by severe accidents though their frequencies are very small; and
 - ✓ Nations, localities usually give priorities to their benefits rather than global benefits. due to facing difficulties, many government have to choose temporary solutions/measures to resolve problems in the short term.

3. PA Activities, Experience and Lesson Learnt (9)

- ✓ Establish a communication strategy suitable to the country to address the most concerns of the public in each period;
- ✓ Avoid a bias for NP. Together with propaganda of NP benefit and advantages, need provide information on disadvantages and challenges of NP development and measures to overcome them;
- ✓ Regularly study and conduct survey public opinions as well as arguments of NP-opposed people in a scientific and objective manner in order to provide the public and policy makers with satisfactory answers and explanations through scientific arguments, study results, and comparative assessments of energy alternatives;
- ✓ Rationally resolve relationships of benefits between national international, between short term and long term, between local, regional and global.

4. Conclusions

4. Conclusions (1)

- In view of long term development strategy, on the basis of assessing renewable energy potential and requirement of low-carbon energy use, it can assert that NP is still a potential energy source playing a significant role on diversification of energy sources to ensure energy security contributing to sustainable development and climate change mitigation. We believe that NP will be developed in Viet Nam in the future.
- At present, public communication on NP is facing difficulties, but it should be continued. In addition to address concern of public, communication activities should be improved with emphasizing the role of NP in climate change mitigation - a very important factor to convincing the public because Viet Nam is one of the countries severely affected by climate change and its related disasters

4. Conclusions (2)

- The IAEA continues to play an important role in assisting MS in nuclear energy planning, national infrastructure development, especially providing scientific information and sound arguments on the contribution of NP to sustainable development and climate change mitigation for convincing the public, policy makers, top-level leaders on the benefit of NP development at national and global scopes.
- Last but not least, this is the correlation between nuclear safety and the investment cost for NP project because after the Fukushima accident due to the need of improvement of safety, investment costs are increased dramatically. This situation make NP becoming less economically competitive, reduce feasibility of NP projects, impact to sustainability of NES. Therefore, a cooperation mechanism between technology holder and technology user should be considered and established to enhance public acceptance.

Thank you for your attention

