

## **Public Education and Outreach for Supporting Nuclear Program in Indonesia**

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### **Abstract.**

Public acceptance is an important aspect in the utilization of nuclear energy. Therefore, efforts to increase public understanding and knowledge on nuclear is one of the important efforts to increase the level of public acceptance. Currently, the trend of rejection of nuclear energy program is seen maybe due to the lack of understanding of the people. To address these challenges, the Indonesian government through relevant institutions and ministries conducts public education and outreach programs to increase public understanding and knowledge on nuclear issues. Public education and outreach programs are designed as a combination of educational and training approaches. Public education and outreach to young generation through education and training are important due to the following outcomes: younger generations may have higher interest to higher levels of education in science and technology, engineering, and math, (STEM), including nuclear science; students may choose a nuclear related career; future generations may have a proper knowledge on nuclear, even their careers are not directly linked to nuclear industry; it can help people and make rational judgments and decisions in their lives.

Activities in the formal education path consists of the introduction of nuclear content in the formal education curriculum at the secondary educational level, and the provision of smart books as a reference for high school teachers. In addition, BATAN provides higher education scholarships in the field of nuclear technology, which significantly contributes the increased interest of students to study nuclear. Training are also held on introduction of nuclear science and technology for high school teachers, practical works for university students in radiochemistry and medical physics. Outreach through informal engagement in the formal education pathway is done through the fostering of young communities, Nuclear Goes to School, Science Day, Facility Visit to Nuclear Science Competition. Public opinion polls are conducted to quantitatively measure the effectiveness of public education and outreach programs on improving community understanding and acceptance. Polls show an increasing trend of public acceptance of nuclear energy programs.

### **1. Introduction**

Nuclear science and technology has played important role for few decades as part of solutions to address global challenges in various fields. The applications of nuclear science and technology has helped Indonesian government in strengthening food security, increasing health quality, providing modern solutions for industrial applications and providing alternative clean energy sources.

Although nuclear science and technology offers benefits to address public needs and national challenges in various fields, it still faces great challenge in terms of public acceptance especially for electricity generation application. For several decades, Indonesian government has been trying to introduce nuclear energy as part of national energy mix to meet national electricity demand, but the program still has not yet been able to be established due to consideration on public acceptance. Lack of public confidence on nuclear energy and false understanding on risks has contributed to public resistance to government nuclear program.

Public perception is very important in nuclear program in any country. Public perception is affected much by political condition as well as media. It was noted that "Politicians and the media have demonized nuclear technology for 50 years. They site safety concerns and security difficulties, but the benefits of nuclear power far outweigh the perceived problems. Engagement with the public is necessary in order to offset political obstruction. Educated grassroots constituents can raise their voices against political correctness, and point out the sound science and engineering behind nuclear technology." [1]

Nuclear communicators have to have awareness on many misperceptions persist about nuclear: fear of radiation, it's security risk, it's not tightly controlled, waste is not well-managed, and mining is not well regulated as well [2]

Public education and outreach are implemented to:

1. Educate and inform the public,
2. Gather important feedback, and
3. Support government program.

### 1. Public Knowledge on Nuclear Energy in Indonesia

Based on public opinion survey conducted by BATAN on 2011 [3] 73.6% of Indonesian citizen express their lack of knowledge or understanding on nuclear energy (*see FIG.1.*). The survey finding also qualitatively showed the lack of public knowledge has significantly impacted public confidence on the use of nuclear energy for electricity generation. The evidence of public rally in several cities, especially from communities living as near identified NPP potential sites could be initiated from the lack of knowledge which affected their confidence on the safety assurance of nuclear power plant.

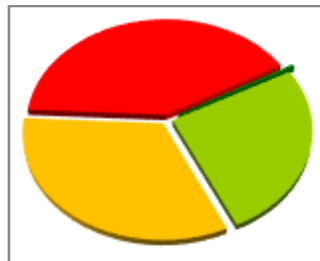


FIG. 1. Indonesia Public Knowledge on Nuclear Energy FY 2011

The survey result also showed another interesting data where majority of Indonesian citizens received information and knowledge on nuclear energy from mass media (*see FIG.2.*), especially television program, printed media and internet. The number of people who accessed information from television (77.5%) was much higher compared to those who received knowledge from formal education (26.7%). This findings suggested the information received from mass media coverage may have played important role on public judgement on nuclear facilities safety, especially most mass media coverage was dominated with negative impact of nuclear energy post Fukushima Daiichi NPP accident occurred in 2011.

### Sources of Information on Nuclear Energy

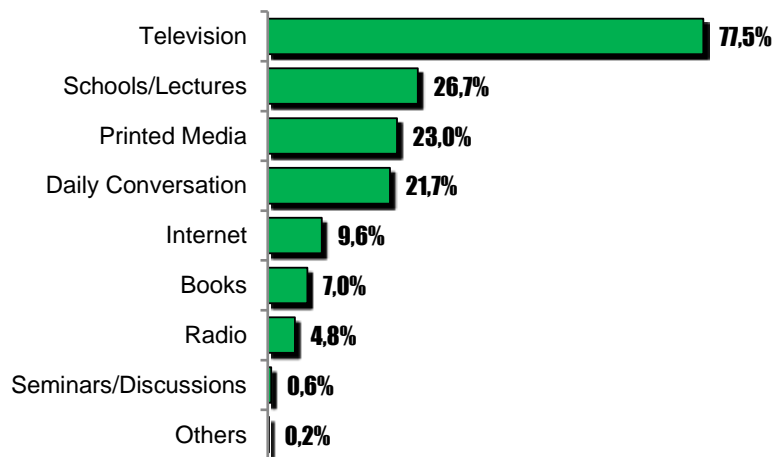


FIG. 2. Indonesia Public Sources of Information on Nuclear Energy FY 2011

#### 1.2. The Importance of Public Education on Nuclear Energy

Public opinion survey findings suggested the importance of increasing public knowledge through other sources of information which could provide a much more transparent, balanced and focused information on nuclear energy, its benefits and risks. Education is one important and potential channel in providing transparent and balanced information on nuclear energy which could give balance perspective to the public to ensure they will take rational judgement and decision towards the use of nuclear energy for electricity generation.

Another benefit of education program is it could help public to learn nuclear science and technology and increase their technical knowledge which offers dual benefits to generate interest in young minds to pursue nuclear science and technology as well as creating a better educated and more broadly informed society. This will help nuclear industry in providing future potential human resource with proper technical knowledge on nuclear science and technology.

#### 2. Government Program on Public Education and Outreach

Knowing the importance of education sector role in increasing public understanding and acceptance on nuclear energy, Indonesian government established public education and outreach program. This program is aimed to empower academic community in delivering information on nuclear science and technology to young generation, increasing their knowledge on benefits and risks and as well as increasing their interest in pursuing higher education and career path in science, engineering and mathematics (STEM) which will provide a better educated and more broadly informed society. By creating educated community, the program is also aimed to create future human resource for national nuclear industry.

Aware of this opportunity, since 2011 BATAN in cooperation with Ministry of Education and Cultural Affairs established public education and outreach program at Indonesia. The program covers several sub programs which empower formal education community and NGOs in educating Indonesian public on nuclear energy issues through various activities [4].

BATAN is also conducting short training course for secondary school teachers, university students, press, and others.

### **2.1. Strengthening Nuclear Education at Secondary Level Curriculum**

The first program launched by BATAN in cooperation with Ministry of Education and Cultural Affairs was strengthening nuclear education at secondary level curriculum. Experts from two organizations joined working group in reviewing science subjects in national education curriculum, especially on those topics which consisted lectures related to nuclear science and technology. The joint workgroup has successfully produced new recommendations to Ministry of Education and Cultural Affairs in establishing a transparent, balanced and interactive methods of delivering topics related with nuclear science and technology, especially in Physics science, Chemistry and Biology topics. The recommendations was further used by the ministry in revision made to national education curriculum for secondary level, which was published as 2013 national education curriculum and now has been implemented at all secondary level schools.

The revisions suggested some new competencies in the curriculum and provide new teaching methods which will motivate young students in learning nuclear science and technology topics in a much more interactive and interesting method. To ensure teacher community will be able in using the new curriculum, Ministry of Education and Cultural Affairs (MoEC) also set up training for trainee program for teachers in this specific topics.

### **2.2. Provision of Teaching Modules and References**

The availability of scientific resources with updated information on current status of nuclear science and technology development is one important key to ensure teaching community ability in delivering transparent and balanced information on nuclear science and technology related topics. To support this, MoEC in cooperation with BATAN provide new teaching modules and references in the form of “Nuclear Smart Book” and “Nuclear Teaching Interactive CD” which are aligned with the latest policy on national education curriculum for secondary level.

The “Nuclear Smart Book” (*see FIG.3.*) was composed by nuclear experts from BATAN and education experts from MoEC and selected schools. The book consists of detailed information on basic knowledge of radiation and nuclear science and also information on latest applications of nuclear technology for peaceful purposes. The use of the book was also supported with interactive content and animations in the “Nuclear Teaching Interactive CD” (*see FIG.4.*) which can be used directly by teachers in giving lectures at classes, aligned with the latest curriculum, giving a more interactive and fun learning atmosphere in the classroom.

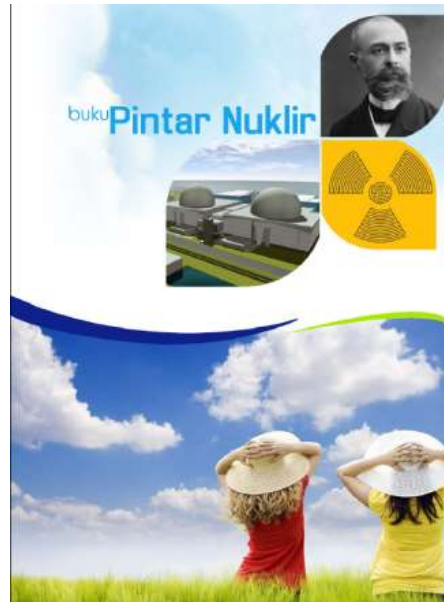


FIG. 3. Nuclear Smart Book provided by MoEC and BATAN

Based on trials conducted at several selected schools at 5 major cities in Indonesia, teachers expressed their satisfaction on the new references provided by MoEC and BATAN, which helped them in delivering nuclear related topics to students. Further development are being conducted by BATAN and MoEC in providing this useful materials for teachers through smartphone application and website access, which will increase teachers accessibility to the resources, especially for those living in remote areas.



FIG. 4. Nuclear Interactive CD provided by MoEC

### 2.3. Scholarship Program for University Degree

As part of the effort in increasing young generation interest in learning nuclear topics to increase their knowledge and understanding, since 2011 BATAN in cooperation with local governments establish scholarship program for university degree majoring in nuclear related studies. The scholarship program initially was aimed for secondary schools students living in the provinces (i.e. Bangka Belitung Islands, West Kalimantan and East Kalimantan) which

are potential in becoming host for nuclear power plant constructions. The scholarship program directly receives positive response from academic community, as hundreds of students applied for the program at the first year. Until this year the program has successfully engaging 137 best students from several provinces joining higher studies at 7 major universities at Jakarta, Bogor, Yogyakarta, Bandung and Semarang. Until today 85 scholars have already graduated from bachelor degree, most of them are working at nuclear related companies and governmental agencies and some also receive scholarship for Master Degree at national and foreign universities.

#### **2.4. Schools Engagement Activities**

To promote the public education program, BATAN also conducts informal engagement activities for secondary level school students. One of the most favourite activity is Nuclear Goes to School, where BATAN brings it's experts and interactive educational equipments to schools, delivering information on nuclear science and technology development and giving real examples of nuclear R&D products for peaceful purposes. The activity is designed in interactive and interesting method to increase students interest and encourage them in learning more on nuclear science and technology. This regular activity is conducted monthly at various schools in many cities, namely Jakarta, Bogor, Surabaya, Yogyakarta, Bangka Belitung, South Tangerang, Bekasi and Malang. BATAN is planning to conduct this regular activity in much broader area, covering several provinces outside Java Island.

Other education activities are also conducted by BATAN to introduce nuclear science and technology to young students and interested stakeholders in the form nuclear facility visits, nuclear science day and science competitions.

#### **2.5. Cooperation with NGO**

Providing transparent and balanced information is an essential key to increase public confidence on nuclear energy program. In effort to provide this in a much more balance method, BATAN conducts cooperation with National Nuclear Youth Community (KOMMUN) or Indonesia Young Generation Network (YGN). KOMMUN which is affiliated to International Nuclear Youth Congress (IYNC) was initially formed by BATAN scholarship program participants. The scholars who already gained proper knowledge and have deep interest on nuclear science and technology initiate several activities through KOMMUN to disseminate their knowledge to other stakeholders especially young students, in effort to increase the targets interest and knowledge.

As NGO, KOMMUN supports government program in educating the public through several informal activities which are effective in increasing public understanding and acceptance. From various activities conducted by KOMMUN, Smart Intensive Class, Nuclear Talks and Nuclear Festival become the most succesful activities in delivering information to the public. These activities are proven very effective in engaging large number of public, by using modern communication channels such as social media and interactive messaging applications which are very popular among young generation in Indonesia.

This succesful achievements has made KOMMUN becomes bigger than initially started by scholars. Today KOMMUN has more than 600 members covering young professionals, university students and students from 12 regions accross nation.

## 2.6. Using Social Media

Many youngsters are now using social media extensively, therefore social media become also potential medium for public outreach. BATAN is using Twitter, Instagram, and Facebook as well. Recently, BATAN develops many VSV (very short videos) on nuclear issues targeting users of social medias.

## 3. Public Opinion Survey

To measure the successful achievements of public education and outreach program, BATAN conducted annual public opinion survey on acceptance on nuclear energy program. The result during last 5 years period, shows the increase of public confidence on nuclear energy and also their acceptance on government program in building nuclear power plant as part of national energy policy.

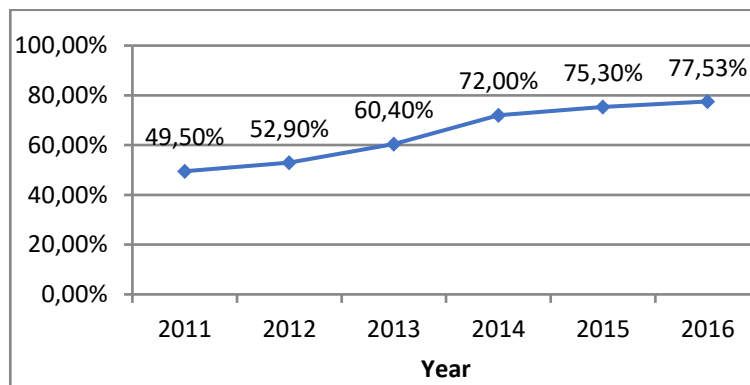


FIG. 5. Indonesia Public Acceptance on Nuclear Energy Program Survey Results [5]

## 4. Conclusions

The implementation of public education and outreach program showed successful achievements in increasing public understanding and knowledge on nuclear science and technology. This achievements are aligned with government program in increasing public acceptance on nuclear energy. The latest public opinion polling survey conducted in 2016 showed 77.5% of Indonesian public expressed their support on national energy program. Sustainable education and outreach program is needed to ensure the number of acceptance remains high and will support the establishment of nuclear energy program at Indonesia.

## 5. References

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