

## Public Opinion about Nuclear Energy – Year 2023 Poll

**Radko Istenič, Igor Jencič**

Institut "Jožef Stefan"

Jamova cesta 39

1000 Ljubljana, Slovenia

[radko.istenic@ijs.si](mailto:radko.istenic@ijs.si), [igor.jencic@ijs.si](mailto:igor.jencic@ijs.si)

### ABSTRACT

Public information activities of the Nuclear Training Centre ICJT at the Jožef Stefan Institute started 30 years ago. We inform the visitors about nuclear energy in general and about Krško Nuclear Power Plant by live lectures, by an exhibition and by radioactivity workshops.

The main target group of information activities are schoolchildren and their teachers. Most of them are from the 8th and 9th grade of elementary school, aged 14 to 15. The visitors can choose between live lectures on nuclear technologies (fission and fusion), a lecture about use of radiation in medicine, industry and science and a lecture on stable isotopes. For younger visitors, a lecture about energy and an energy workshop is available. The visit includes a demonstration of radioactivity and a guided tour of a permanent exhibition.

In the pre-Covid-19 decade, we had between 6000 to 7000 visitors per year and we monitored the opinion trends by polling some 1000 youngsters every year. Last school year (2022/23) we polled 1023 visitors. The poll is always conducted before the lecture or visiting the exhibition, in order to obtain an unbiased opinion. There are 10 questions in the poll and they remain unchanged for several years in order to follow the trends.

As always, this year's poll results show poor comprehension of nuclear energy, radiation and radioactive waste. A relative majority of youngsters consistently recognizes that NPP Krško would be difficult to replace by renewables. More youngsters are in favour of the second unit of NPP Krško than against it.

### 1 INTRODUCTION

Each year since 1993 we send invitations to all elementary and high schools in Slovenia to visit the ICJT Information Centre. The response of schools and the coverage of communities in Slovenia is reasonably good (Figure 1).

The mainstays of the visit are a live lecture about nuclear energy, explanation of basic facts of radioactivity in a demonstration lab and a guided tour of the permanent exhibition about nuclear technology. The bilingual (Slovenian/English) "Mini Encyclopaedia of Nuclear Energy" is freely available for every visitor. Interested visitors can tour the research reactor TRIGA and/or the Tandetron ion accelerator on site. The depth of explanation is adapted to the level of visitors.

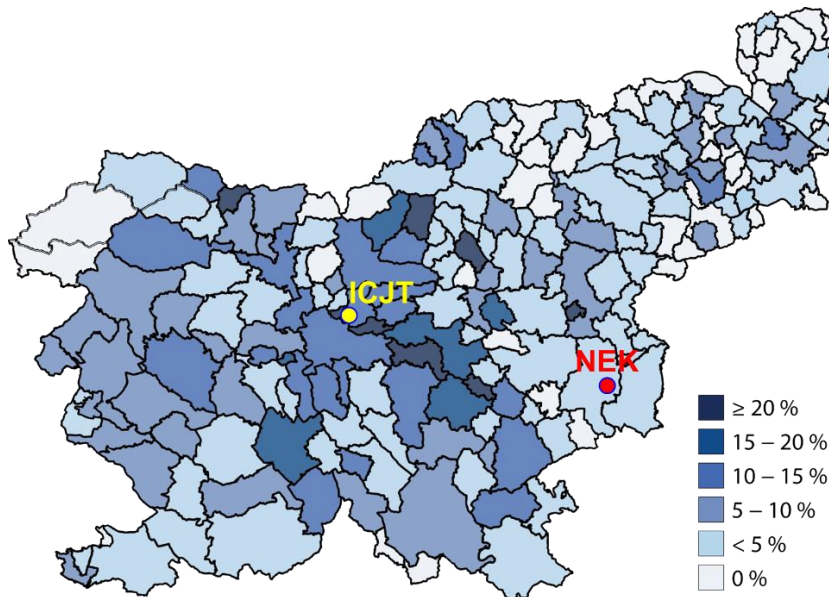


Figure 1: Percentage of population of local communities that have visited ICJT since 1993

The poll has been conducted and the results have been reported for 30 years [1, 2] using several basic questions derived from the early public opinion research of the Faculty of Social Sciences in Ljubljana thirty-seven years ago [3] with some questions updated in 2004 and 2008. The average results in the interval 1993 (or 2004, 2008, respectively) – 2020 and their standard deviation represent the “baseline” for comparison with the results from the last 3 years’ polling.

We conduct the poll every spring and always at the beginning of the visit to obtain unbiased opinions based on the knowledge from the school and everyday life.

Youngsters’ poll is not representative for general population of Slovenia, but it gives valuable results, in particular monitoring possible trends. Youngsters’ perception of risks may be more relaxed than the perception of the adults. Still, their positions reflect opinions they hear in their families and media information. As already stated, the important point is that the unselective sampling method introduces no bias in terms of polled population.

Figure 2 shows the age distribution of polled population where the high school youngsters prevail in all observed years.

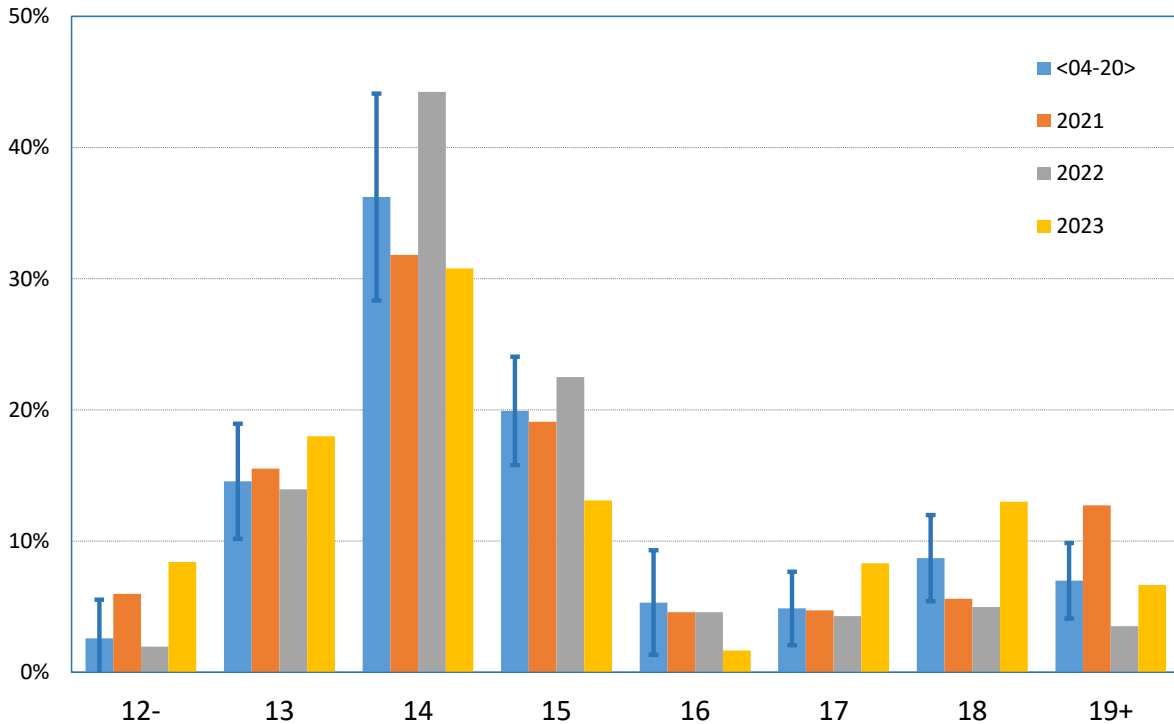


Figure 2: Age distribution of polled population

## 2 RESULTS OF THE 2023 POLL

In school year 2022/23 we polled 1023 youngsters (42.5% female, 57.5% male) out of 5558 visitors between January 18th and April 19th 2023.

Graphs and comments according to the questions in the questionnaire show the results divided into five groups covering:

- General relative perceptions of risks and environmental dangers,
- Knowledge and understanding of several basic facts of nuclear energy and radioactive waste,
- Reasons for/against nuclear energy,
- Agreement with the potential unit 2 of NPP Krško and awareness about the limitations of other sources of electricity,
- Position towards nuclear energy and sources of information.

Our observation is, that neglecting scatter in the results, the opinion of youngsters turns out surprisingly consistent over 30 years of polling implying some mid-term stability regardless of changes or events (e.g. Fukushima accident in Japan in 2011) in the nuclear sphere.

## 2.1 General questions about risks, environment and acceptability

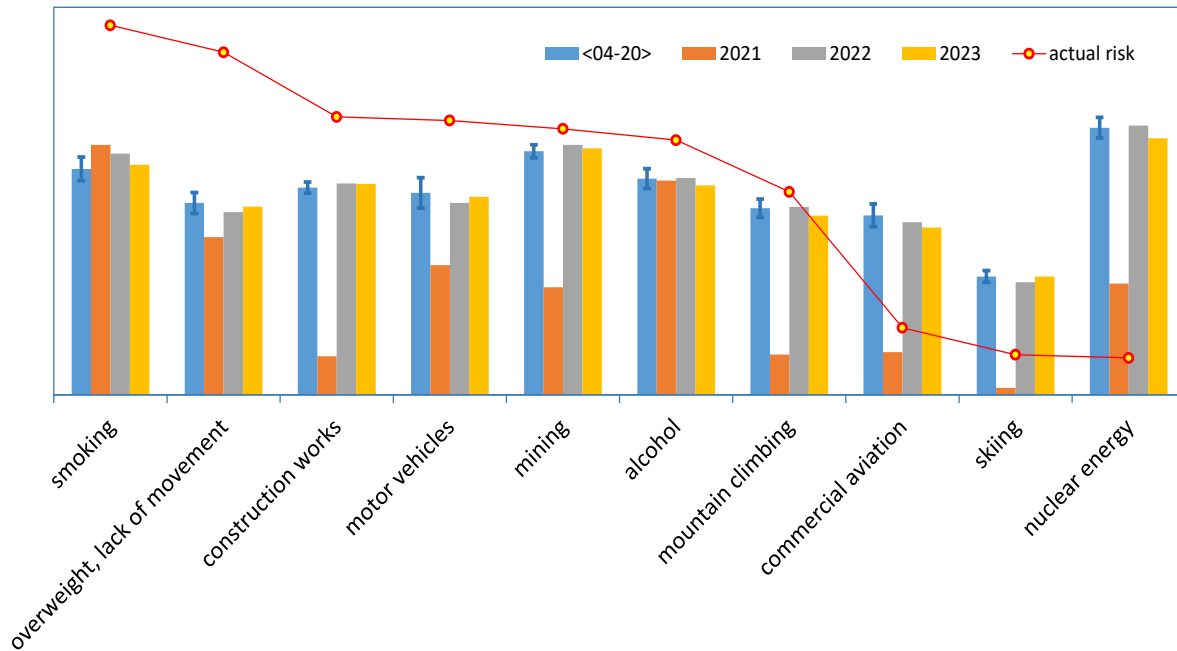


Figure 3: Ranking of human activities by perception of risk  
(Actual risk based on calculated Loss of Life Expectancy [4])

Disparity between the actual risk and the perceived risk as rated by the youngsters is consistently highest for nuclear energy (Figure 3), like in most countries. Youngsters rate other risks, like smoking, alcohol, traffic etc. considerably more realistically as compared to risks based on Loss of Life Expectancy [4]. Excluding the year 2021 when a web application was used for polling there is no substantial difference in rating over the years.

## 2.2 Understanding basic facts about nuclear energy, radiation and radioactive waste

Respondents have to answer whether some statements about nuclear energy are true or false. For the left half of statements, the correct answer is “true”, and for the right half, the correct answer is “false” (in the actual paper questionnaire, the statements are given in random order). Figure 4 shows the percentage of agreement (belief) with respective statements. Several results are disappointing and do not change much over the years. Some 50% of respondents believe that radiation from radioactive waste (RW) repository is detectable 1 km from the site and 30% think that NPPs cause acid rain. Just about 30% know that NPPs do not contribute to the greenhouse effect. This is probably due to lack of information about nuclear energy and radioactivity in the elementary school curriculum.

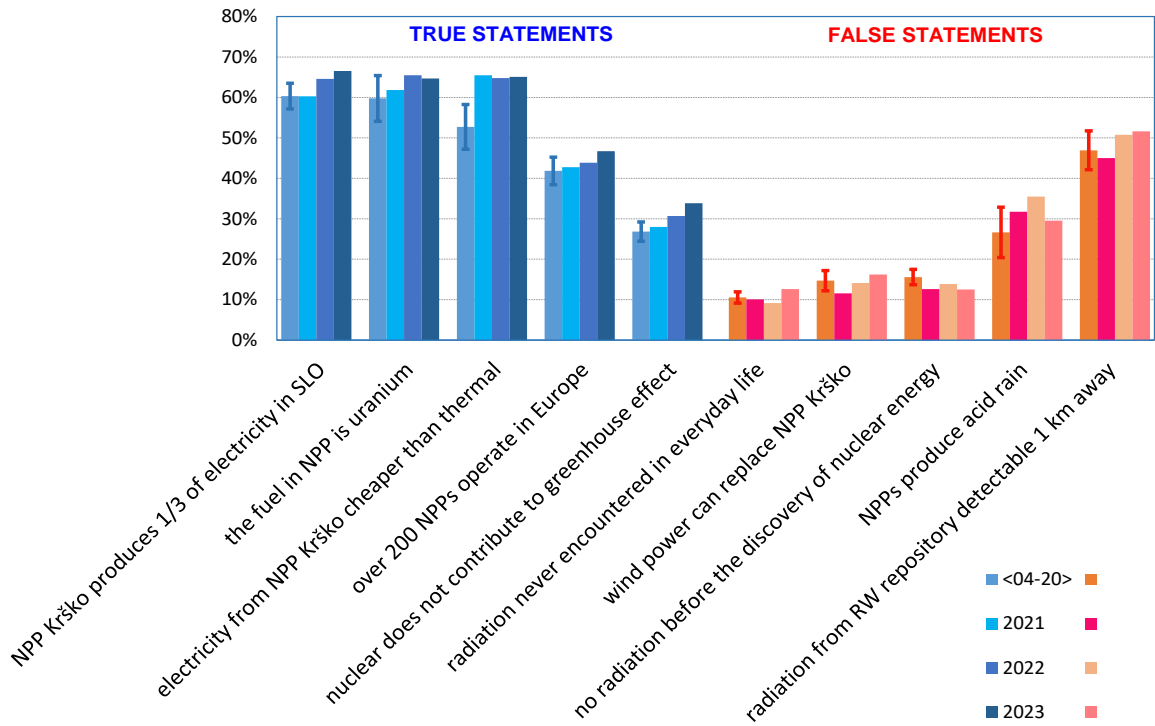


Figure 4: Agreement with the statements – knowledge about nuclear energy

On the other hand, most youngsters know that NPP Krško produces 1/3 of electricity in Slovenia, which is cheaper than electricity produced in thermal power plants. This is probably due to unproblematic operation of NPP Krško where economic news prevails in the media.

### 2.3 Reasons for/against nuclear energy

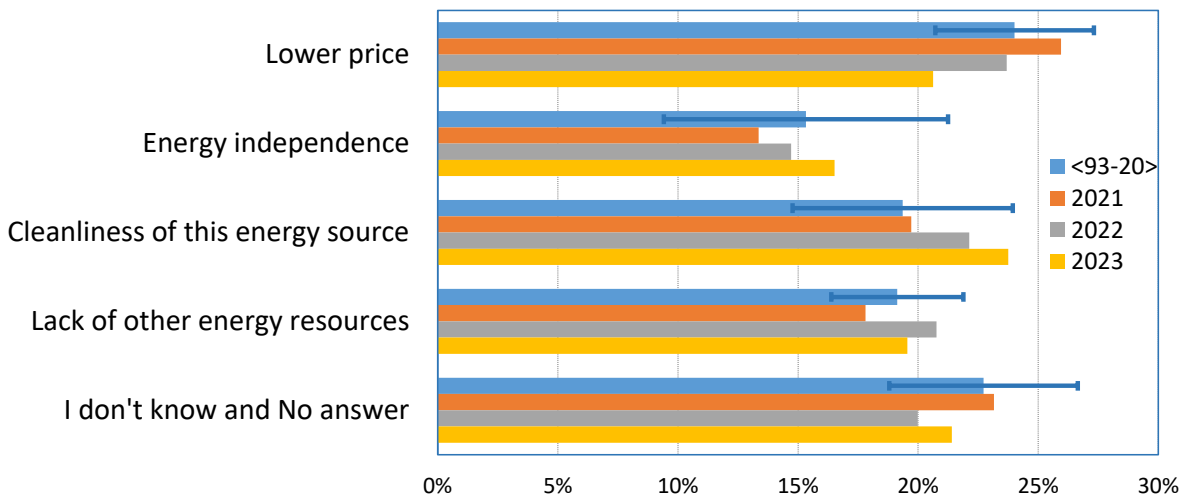


Figure 5: What are the reasons for use of nuclear energy? (One answer possible)

Lower price used to prevail in previous years (Figure 5). The scatter in the results is very high and any meaningful conclusion is difficult.

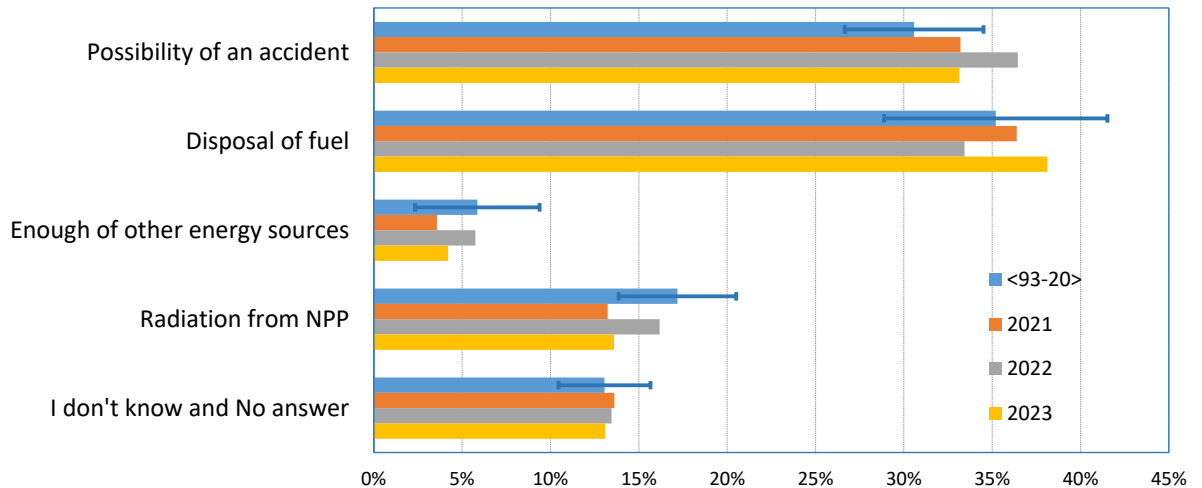


Figure 6: What are the reasons against nuclear energy? (One answer possible)

Possibility of an accident and spent fuel disposal are perceived as main reasons against nuclear power (Figure 6) which is consistent with the result about radiation from the radioactive waste repository (Figure 4).

## 2.4 Position towards NPP Krško

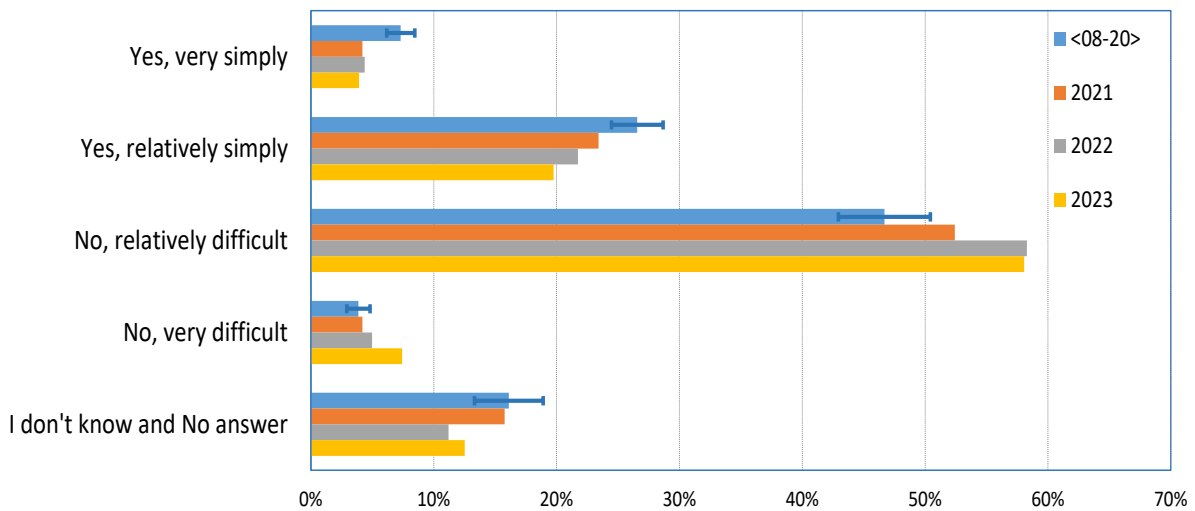


Figure 7: Do you believe that other sources (e.g., renewables) can replace NPP Krško?

In recent years majority of youngsters recognizes that NPP Krško would be relatively difficult to replace by renewables (Figure 7). The steady decrease of "relatively simply" is nice to see but can't yet be interpreted as a permanent trend.

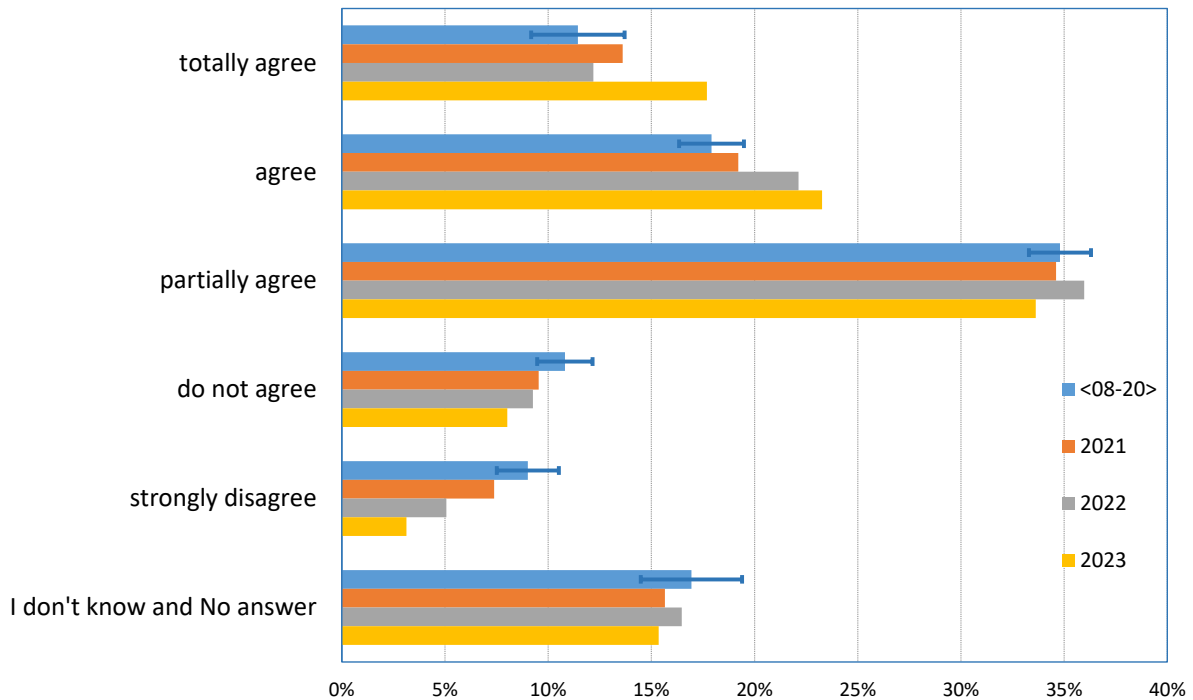


Figure 8: To what extent do you agree with the second NPP in Krško?

The share of “partially agree” stands out and does not change much over years (Figure 8). Important is that the sum of more definite answers “totally agree” + “agree” decisively exceeds the sum of answers “do not agree” + “strongly disagree”.

## 2.5 Position towards nuclear energy and sources of information

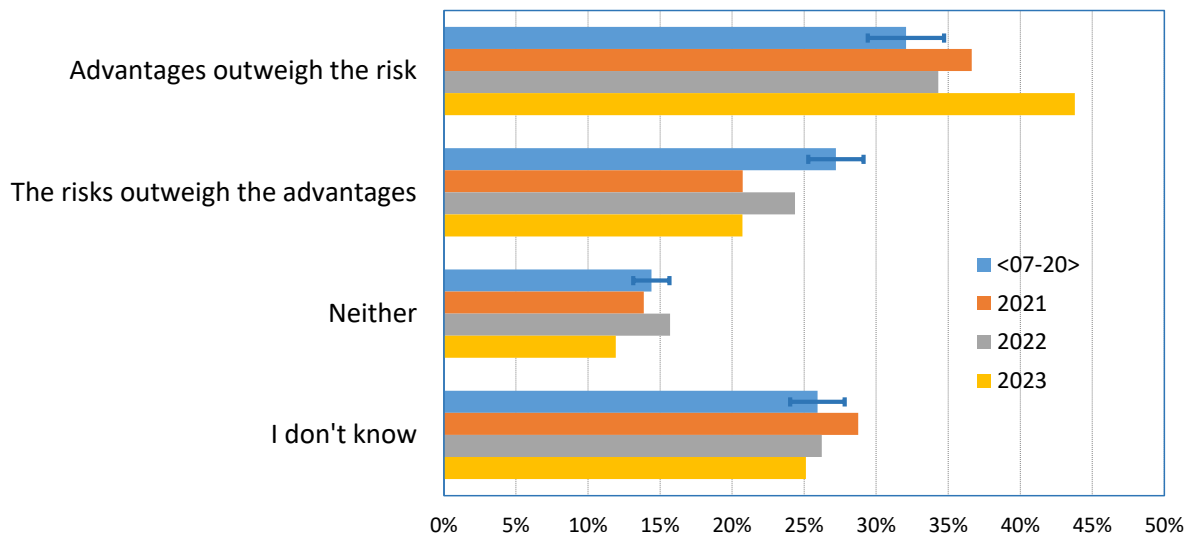


Figure 9: What is your general opinion on nuclear energy?

The category “Advantages...” consistently leads in front of “risks...” (Figure 9). Nevertheless, the sum of “Neither” + “I don’t know” remains an important category of opinions in observed years and warrants ongoing education and information activities.

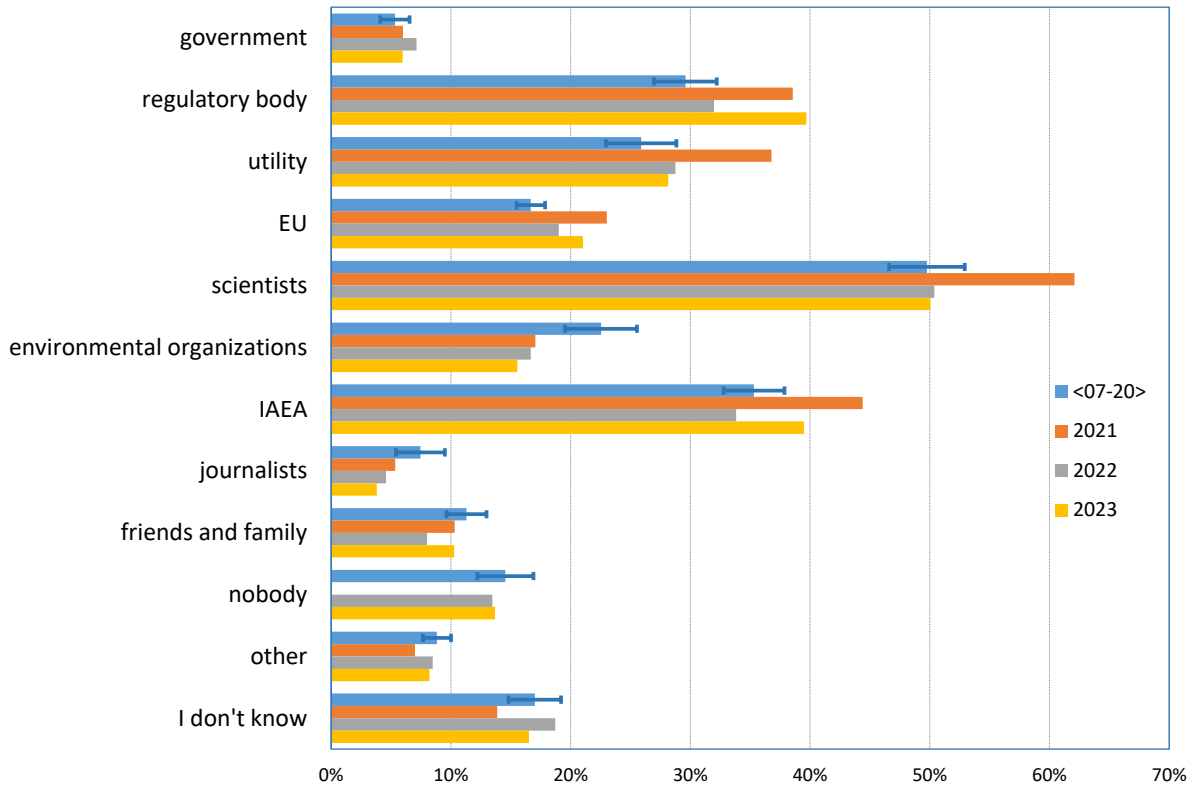


Figure 10: Which three of the following would you trust most to give you information about nuclear safety?

Scientists consistently enjoy the highest trust among information sources relevant to youngsters (Figure 10). International Atomic Energy Agency, regulatory body and utility have a relatively good credibility over the years, substantially better than environmental organisations. Credibility of government and journalists is low.

### 3 CONCLUSIONS

The aim of this paper was to look for indications that would serve as a feedback for ongoing information activities of the Information Centre at the Jožef Stefan Institute:

- Comprehension of nuclear energy and radiation remains deficient, risk of nuclear energy is overrated as compared to risks in everyday life.
- Youngsters perceive spent fuel disposal and possibility of an accident as main reasons against nuclear energy.
- Youngsters are aware about the limitations of renewables. The second NPP in Krško has more supporters than opponents. Similarly, the advantages of nuclear energy exceed the perceived risks.
- Scientists are consistently the most trusted source of information while government and journalists are the least trusted source of information.

We observed no major change in youngsters' opinion compared to previous years. Neglecting scatter in the results, the opinion of youngsters turns out surprisingly consistent over 30 years of polling implying some mid-term stability regardless of changes or events in the nuclear sphere (e.g. Fukushima accident).



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