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NUCLEAR POWER – THE SPECTRUM OF PERSPECTIVES

Abstract. Approaching sixty years since the introduction of nuclear power for electricity generation, the spectrum of its various perspectives is broader, hotter and more colorful than ever. Although in the midst of maturity, hardly any of its aspects stands firmly/undisputable – these are rather subject of challenges, denials, doubts, controversies, passionate debates... Experts and public are separated by the ever growing abyss of misunderstanding and mistrust. Why is it so? Why is nuclear power not progressing the way it objectively deserves? Why is it lingering far behind poorer performing competitors, coal for instance? A number of reflections is briefly outlined – occasionally in a somewhat deliberately and in-good-will provocative form.

FROM HERO TO OUTLAW

A brilliant/amazing new technology from the fifties – culminating from the series of possibly brightest scientific ideas and greatest fundamental discoveries ever – nuclear power (NP) was initially welcomed with huge enthusiasm and seen as the solution of energy problems for the mankind. The euphoric belief went that with nuclear power electricity would become “too cheap to meter” (L. L. Strauss, chairman of the U. S. Atomic Energy Commission, 1953–1958). This never came through. However, contrary to NP opponents mocking nowadays with Mr. Strauss’ words, it does not mean he was wrong! It might be well those who took the nuclear sector over, who could be blamed...

After steep growth/expansion in the sixties and seventies, NP witnessed the two-decade stagnation in the aftermath of Three Mile Island and Chernobyl accidents. In 2010 NP represented only 13% of global electricity production and 6% of total energy production; in 2011, these figures will be still lower. Long waited “nuclear renaissance”, whatever this coinage meant in the past 5–10 years, is now – before giving fruit – seriously challenged by recent events in Japan.

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In the meantime, from initial general acceptance and a hero status, NP became the “bad guy in the city” and subject of strong anti-nuclear sentiments and movements – resulting frequently in political opposing, arbitrary shut-downs, humiliating referendums, legal bans and phase-outs. In some countries, especially in Europe, where half of the world nuclear electricity is produced, NP is *de facto* and/or *de jure* an outlaw.

Was/is the change spontaneous or orchestrated? If spontaneous, what triggered/caused it? Note that the change started in organized manner well before major nuclear accidents happened. If orchestrated, why? And who was/is the conductor?

PUBLIC PERCEPTION AND ITS CONSEQUENCES

It is easy to claim bluntly that public perception about NP is wrong, as it seems obvious from experts’ standpoint – the issue is pretty complex for comprehension, indeed. It is more difficult to say what should be done to “rectify” it. And to do it eventually will be really cumbersome.

NP is regarded as extremely dangerous. It is the only technology which has no right to fail occasionally. Risks and consequences of NP operation – not to speak of nuclear accidents – are compared to those of other energy generating technologies with bias, prejudice, disproportion and different standards. More often, and even worse, it is not compared at all – NP makes apart category on its own.

In a democratic society, poor public acceptance transforms (more or less fluently) into political will and subsequently into hostile legal/regulatory conditions for NP. Paradoxically enough, a less democratic society might turn out to be a friendlier environment.

TWIN BROTHER SHADOW

NP never truly came out of the horrifying shadow of its military twin brother – nuclear weapon – at least not in the perception of common people, which means the majority of people. Whatever accident or just a problem with NP, Hiroshima is revoked, even compared with (!?). Many still believe nuclear reactor can explode like nuclear bomb. This absurd fear, like other nonsense beliefs/myths about NP, is a substantial ingredient of anti-nuclear sentiment.

Hiroshima–Fukushima rhyme as words; this logic will rhyme them as metaphors.

A USEFUL COMPARISON: NUCLEAR INDUSTRY VS. AVIATION INDUSTRY

When talking of NP to those not familiar with the subject, a comparison with aviation is illustrative, appealing and useful. Both industries are based on extremely sophisticated and complex technologies. Investments are huge, affordable only to the biggest/richest. Utmost competence, regulation, discipline and long term

stability of many parameters are required. Safety and security are absolute paramount. When properly operated, the output is surpassing by far any competition.

Yet, accidents happen, likewise in any other technology or human activity. These are relatively rare, but attract much public attention, even collective horror – disproportional to other disasters with similar/comparable consequences. Learning from accidents is painful, but most efficient learning. Aviation owes much of its current excellence to such lessons; these happened much more in hundred years of aviation history than those of NP.

A surprising conclusion, hard to say, may be that NP has not had enough bitter opportunities to learn.

MATURE, YET SHY

When two blocks at Kozloduy (Bulgaria) NP plant were shut down couple of years ago, as a part of Bulgarian accession to EU deal, prices of electricity in the region nearly doubled within months. Nobody was willing to openly connect these two facts. In 1987 Italians voted at a referendum – while Chernobyl was still smoking – for immediate closure of their four NP plants. Again, nobody said they were about to be paying the most expensive electricity in Europe afterwards. New referendum, intended to reverse the situation is about to take place... This time Fukushima is still smoking and outcome is predictable again.

Negative implications (even direct/explicit as the above ones) of nuclear bans/closures are rarely exposed to public the same way as NP risk/drawback. The latter are actually being much smaller and only of potential nature. In general, nuclear sector is shy – surely not agile enough, not to speak of being aggressive – in promoting advantages of NP and disadvantages of competing modalities of energy production. Hereby, abundant cheap NP electricity, so beneficial for the living standard of citizens and competitiveness of national economies, is just an illustration, not the only NP advantage, of course.

The simplest, but worst supporting argument is eventually being exploited more and more: “NP will progress, because there is no other viable alternative to meet growing energy demands!” This may be true. However, it actually approves anti-nuclear reasoning – implicitly admitting that NP has nothing better to show/offer – and should therefore be avoided or used only with big brackets.

EXPENSIVE BUT CHEAP

NP electricity is reliable and very cheap to produce in abundance; fuel costs are close to insignificance. However, plants are extremely expensive to build. This cheap-expensive balance proved to be quite unstable and fragile, hence treacherous. Consequently, despite undeniable profitability and economic benefits of NP, nuclear build became the investor’s nightmare, as well as his banker’s “stay-away” suspicion – planned front end capital (already in billions) easily grows twofold or threefold, the same as construction time, for reasons out of investor’s control. For instance, investor bares the risk of hard/devastating impact of political and social

volatility, not to speak about legal and regulatory pitfalls. In this sense, unpredictable “one-affects-all” effect is a considerable risk (e. g. in case of major NP accidents).

CLUB EXCLUSIVE

NP technology is limited to a relatively small number of developed countries. Perspectives that this will substantially change in the foreseeable future are not clear. It is even less clear whether such situation is considered good or bad. Is the club really enthusiastic about enlarging?

WAITING FOR THE NEW GENERATION

Progress on introducing new generation of nuclear reactors (featuring intrinsic passive safety, high fuel efficiency and small remaining nuclear waste – goals set decades ago) is surprisingly slow. 35 or more years of operational experience were not enough, for instance, for fast breeders to break through. Investments in NP research are far below those for prospecting new oil/gas fields or coal mines. Governmental incentives/subsidies go regularly to “friendlier” or “more promising” technologies. Legal and regulatory requirements, understandably/justly becoming more stringent towards protecting people and environment, are not paralleled with similar/analogous ones for other (competing) sources of energy.

In order to prosper, NP must be accepted by the society and governments. It cannot progress being regarded as an outlaw, however affirmative nuclear sector might be autistically thinking of its own. New generation of reactors, clearing the drawbacks and suspicion about the current ones – particularly about safety and waste – should be brought to light as a matter of urgency.

HIGHS AND LOWS OF NUCLEAR WISDOM

NP is heavily a knowledge based-technology. Immense nuclear knowledge and expertise have been accumulated over decades of research, development and experience. However, this wisdom is remaining pretty enclosed within nuclear community. Nuclear community on its turn hardly ever succeeded in really convincing general public about NP benefits largely outweighing risks and drawbacks; NP is commonly regarded as a question of sentiment (dominantly aversion and fear, even phobia), not a rational issue. Instead of discussing the arguments, NP debates most often turn into a black-and-white picturing, i. e. opponents vs. supporters confrontations. Needless to say, supporters are regularly being defeated by phraseology, disqualification, outnumbering... Many experts are therefore reluctant of publicly appearing in favor of NP, further contributing to the vicious circle of poor NP perception and decline of public opinion.

Nuclear industry is hence highly demanding in various kinds of knowledge and expertise; the same is valid for nuclear-related institutions and organizations. All these are embracing/enrolling not only nuclear experts (e. g. scientists and engineers), but many, many others, too. Yet again, it seems that nuclear wisdom re-

tains somehow in technological phase, thus declining (sometimes sharply) towards higher deciding levels (managerial and political). This fact is largely overlooked, dismissed or just reluctantly admitted... and ignored. It means, in effect, that the fate of NP is dominantly not in hands of NP experts – quite a different situation from “NP golden age”, 1960’s and early 1970’s.

If there is, as it seems, shortage of initiative, momentum, innovation, daringness, openness, enthusiasm, pride, confidence and self-confidence, vision or charismatic leadership in nuclear sector, this is where the roots are likely to be found.

CONTEMPLATION ON MISSED OPPORTUNITY AND BACK TO REALITY

What the world could have looked like if only NP had switched its place with coal, i. e. if NP had reached 50% of global electricity production – as it seemed imminent and quickly approaching back in 1975 – with coal dropping to, say, 10–15%? The answer to this hypothetical (but not ridiculous) question, together with an additional small step in deriving subsequent conclusions, may shed some light on why it never happened.

Opponents may firstly think of more Chernobyls. However, far more important/ impressive would have been be a drastic reduction in air pollution, with tens of millions spared human lives (at least one million people worldwide die every year due to consequences of coal burning, according to WHO), not to speak of CO₂, green house effect and changed climate. Plentiful and cheap nuclear electricity could have boosted global economy and reduced its dependence on oil and gas – resulting in different geopolitical map of the world. Some of the biggest contemporary structural (e. g. fossil fuel) monopolies might have been dissolved, global power redistributed, oil wars avoided, poverty suppressed ...

If we scratch on sensitivity–reluctance–opposition to NP, we may find sensitivity–reluctance–opposition to the above changes that never happened.

Back to reality: whatever former, current and future pros and cons about NP were, the fact is that dirty old black coal – abundant, fairly widespread and easily accessible – keeps firmly not only current dominant position, but also brightest perspective as main energy source in XXI century. This is bad news for human kind. Nuclear community believes it is the mission of nuclear sector to pursue for change.

However, if nuclear sector will look for the change/renaissance, it should first look at its own. Spring cleaning is how spring begins.

