“Legacy” of Prof. B.P. Weinberg – science and mutual understanding underlie success

The history of science knows many examples of brilliant works and ideas that were ahead of their time, the time of practical realization of which came many years later (as well as ideas forgotten or still waiting for their time). One of the brightest representatives of scientists whose works anticipated the future was Professor Boris Petrovich Veinberg[1] (1871–1942) of the Tomsk Technological University. His encyclopedic knowledge and broad culture (his father, Pyotr Isaevich[2], was a famous poet and translator) allowed Boris Petrovich not only to understand the problem of climate change long before today’s eco-activists, but also to propose a number of unique solutions, somehow related to minimizing the impact on the climate and to renewable energy. These include, for example, works on the justification of magnetically levitational transport technology[3] “maglev”[4] (a number of projects on this basis are currently being implemented in China and Japan), as well as works on solar energy[5].

What distinguished Prof. B.P. Weinberg’s approach to the study of the most diverse problems and tasks related to the impact on climate and environment? First of all, he recognized the “social role of the experimental sciences”[6] and the consequent responsibility of scientists for proposed solutions. This required both a broad general erudition and a deep immersion in various scientific disciplines, as well as the desire to learn and take into account the practical consequences

[1] See, for example, *Weinberg B.P.* Snow, hoarfrost, hail, ice and glaciers. Odessa: Tipography of M. Shpentzer, 1909, 127.

Veinberg B.P. Experience of the methodology of scientific work and preparation for it. Moscow: “Worker of Education”, 1928, 94 et al.

[2] *Ostrovskaya G.V.* Petr Isaevich Veinberg – poet and translator. St. Petersburg: Publishing House of Polytechnic University, 2013, 136.

[3] *Weinberg B.P.* Motion without friction (airless electric path). St.-Petersburg: Publishing house “Estestvoistytatel”, 1914, 56. *Weinberg B.P.* People of life, think about future generations. Social Tasks of Experimental Sciences. Moscow: Izdatelstvo I.D. Sytin, 1907, 39.

[4] Maglev – transportation that moves without contacting the track structure due to the effect of magnetic levitation; in this case, the force of gravity is balanced by the force of the magnetic field, and an adjustable air gap is formed between the train and the rails. https://ru.wikipedia.org

[5] *Weinberg B.P.* Possible use of solar installations for industrialization of the Tajik SSR// Academy of Sciences of the USSR. Council for the Study of Productive Forces Materials of the first conference on the study of productive forces of the Tajik SSR. Issue. 1. Leningrad: Publishing House of the Academy of Sciences of the USSR, 1933, 20–23.

[6] *Weinberg B.P.* People of life, think about future generations. Social Tasks of Experimental Sciences. Moscow: Izdatelstvo T-Va I.D. Sytin, 1907, 39.

of the measures taken. It was due to the latter that Boris Petrovich became one of the organizers of the Institute for the Study of Siberia[7], whose work we have repeatedly referred to on the pages of the journal. In his understanding of "climatically" conditioned management, he undoubtedly relied on the knowledge gained, among other things, by listening to the lectures of the great Siberian and Russian Dmitry Ivanovich Mendeleev[8].

Thus, back in the early twentieth century, B.P. Weinberg wrote: "…To understand what questions science should solve, let us pay attention not only to the cycle of oxygen, carbon and nitrogen in nature, but also to the inseparably connected with it energy cycle… The population of the earth is increasing, the area of unploughed land is decreasing, and salvation from the coming overcrowding of the earth must be sought in the solution by mechanics, physics, chemistry and natural science of four basic problems: the decomposition of carbonic acid, the assimilation of nitrogen, the capture of solar energy, and the transmission of energy over a distance… The solution of these problems is closely connected with the general development of the experimental sciences, and it is no exaggeration to say that every advance in these fields, however remote it may be from these practical problems, contributes more or less to their solution[9].

As shown on the pages of the thematic selection of this issue of the journal, the practical issues of "carbon dioxide decomposition, nitrogen assimilation, and solar energy capture" were put on the agenda of human civilization almost a century after the prophetic thoughts and proposals of Professor B.P. Weinberg. Moreover, these issues are solved by our contemporaries, as a rule, on a "global scale" and in an extremely generalized form – the dynamics of temperature rise and reduction of carbon dioxide emissions.

As a result of the lack of "concretization", practice suffers. It is no coincidence that in the early 2020s, a report of the World Economic Forum noted: "Despite some progress in some areas, climate policy steps and measures show modest effectiveness: only 35% of greenhouse gas emissions are covered by commitments to achieve zero emissions by 2050, and only 7% … are supported by appropriate measures… are supported by appropriate regulatory measures; less than 20% of the world's top 1,000 companies have science-based steps and measures in the context of not exceeding a temperature increase of more than 1.5 °C,

[7] Proceedings of the congress on the organization of the Institute of Siberian Research // Published under the supervision of the chairman of the congress Professor B.P. Veinberg. Tomsk: Provincial Printing House, Siberian Railroad Printing House, 1919. 121 +129 + 139 + 123 + 42 + 32.

[8] *Weinberg B.P.* From Memories of Dmitri Ivanovich Mendeleev. Tomsk: Gubernaya typography, 1910. 42 c.

[9] *Weinberg B.P.* People of life, think about future generations. Social Tasks of Experimental Sciences. Moscow: Izdatelstvo T-Va I.D. Sytin, 1907, 21, 36.

less than 10% have detailed programs to move in this direction; almost 40% of companies have no climate commitments to reduce emissions… to zero; those technologies recommended for the near future will only achieve half of the emission reductions needed to keep temperature rise within 1.5 °C; more than half of climate finance needs remain unfunded, with the situation particularly dire … in low/middle-income countries. Despite the leading role of governments, private companies bear the burden of primary responsibility and are the main initiators of climate initiatives … Despite their initiative, the overall outcome so far leaves much to be desired"[10].

The 2024 report is somewhat more optimistic, but the overall picture changes little (paper by N.I. Suslov)[11].

As the papers of our thematic collection, as well as real trends in the countries of the world and on different continents show, the consideration of specific geographical, and even cultural and historical conditions and circumstances is of great importance in the "decomposition of carbon dioxide, nitrogen assimilation, solar energy capture".

For example, the so-called "rut effect" is one of the key problems in the transition of a significant part of the Russian economy to "climate-oriented" technologies. The role of previously created fixed assets (paper by V.V. Karginova-Gubinova) and, as a consequence, political traditions aimed at achieving sustainability of socio-economic development is significant (paper by H.A. Konstantinidi and A.M. Pakhalov). That is why it is more than expedient to create some "islands of the future" here: "carbon polygons" and climate hubs (paper by S.N. Bocharov, N.V. Gorbacheva and I.A. Ganieva).

In addition, the implementation of both environmental and climate projects requires enormous financial resources (paper by T.S. Remizova, D.Y. Taburov and D.B. Koshelev, and N.I. Suslov).

At the same time, for example, China demonstrates an explosive growth of "new energy" (primarily solar and wind) and a rapid decline in specific emissions of both pollutants and greenhouse gases (but with their absolute growth caused by economic growth). Among the main reasons, we can note, perhaps, two: 1) the low starting level of the beginning of the formation of the modern Chinese economy (about 20–30 years ago); 2) an extremely flexible and balanced policy of economic transformation in the country. The essence of the latter consists not in following "universal" dogmas and postulates (as was the case during the

[10] Net-Zero Challenge. The supply chain opportunity – WEF- 2021, 45.

https://www.weforum.org/publications/net-zero-challenge-the-supply-chain-opportunity/

[11] The Cost of Inaction. A CEO Guide to Navigate Climate Risk. – WEF –2024, 57.

https://www.weforum.org/publications/the-cost-of-inaction-a-ceo-guide-to-navigating-climate-risk/

transformation reforms in Russia), but in implementing a "two-track approach": the new is built not instead of, but alongside the old, first complementing it, and only then gradually replacing what has long outlived its usefulness.

"At the turn of the 1980s, China escaped shock therapy. While other countries were experiencing severe economic decline and deindustrialization … China's two-pronged reform laid the institutional and structural foundations for its economic recovery under tight political control … The core of China's economic system was not destroyed by the 'big shock'. On the contrary, it has been fundamentally transformed by the dynamics of growth and globalization under the active leadership of the state"[12]. In China, transformational processes and addressing the climate agenda have gone side by side, complementing and in many ways reinforcing each other.

The movement of both the world economy and the economies of individual countries (including Russia) in the direction of greening and increasing attention to sustainable development issues, including "decomposition of carbon dioxide" (in the terminology of Professor B.P. Weinberg), obviously has no alternative. At the same time, the development of practical steps and measures in this direction each time requires scrupulous consideration of local features and conditions. This, in turn, is unthinkable without a high degree of mutual understanding and mutual support. It is categorically wrong and inappropriate to assess and consider different countries within the framework of a "one-size-fits-all" approach. Otherwise, no matter how sophisticated methods of reducing climate emissions are applied, success is unlikely to be achieved. But it is in the formation and development of an atmosphere of trust and mutual support that the main problems seem to be concentrated today.

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[12] *Weber I.M.* How China Avoided Shock Therapy: Debates on Market Reform / translated from English by Anna Vasilieva. Yerevan: Fortis Press, 2024, 520. [439].