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Issues of Electricity Supply in the Water Industry Teaching Methodology

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Abstract: *This article examines the methods used to educate energy supply difficulties in the water and agricultural industries, discusses new energy supply innovation technologies, and offers suggestions based on a comparison of domestic and international experience*

Keywords: *Innovation Technologies Of Energy Science Education, Power Supply, "Smart Water" Technologies, Water Management, "Agricultural Modernization" Project, Vestas Wind Systems A/S, Siemens Gamensa Renewable Energy A/S, Electricity Use In Pumping Stations*

Introduction

The Republic of Uzbekistan intends to use drip irrigation technology over 430 thousand hectares of land in the near future. 3 crore with this. Water conservation is the goal of Metr3. The World Bank has played a crucial role in this. The main goal of this project is to make sure that pumping stations use electrical resources sensibly. The International Energy Agency (IEA) estimates that by 2030, renewable energy sources will account for over 30% of the global energy balance. At least 400 billion rubles were invested in the sector in order to accomplish this aim. ought to comprise the US dollar.

Beginning in 2021, the state will offer agricultural producers incentives to help defray some of the expenses associated with implementing water-saving technology in agricultural production. The resolution states that a single electronic information system for the Republic will be implemented at 1688 pumping stations of the Ministry of Water

Management until December 1, 2021. This system will track the amount of water discharged and the amount of power consumed. Retraining and a qualification system will be implemented in order to prepare professional educational institutions for the adoption and use of water-saving technology starting in the 2021–2022 academic year (ase.org). To effectively transition to a market-oriented and inclusive agricultural sector, the Uzbek government's plan to reform agriculture is supported by the proposed "modernisation of Agriculture" project (Aubakirova, 2024).

A key component of the reform package built along the two primary axes required for this shift is agricultural reform:

i. expanding market and private sector involvement in the economy
ii. enhancing integrity. Evaluation for the years 2016–2020

Methodology

A variety of techniques are used in the water sector's power supply education methodology to help students learn the fundamentals of water facility power supply system design, operation, and management. The following is a description of the methodology's primary components:

1. Instruction in theory

Objectives

- Getting acquainted with the fundamentals of the electric power sector.
- Research on the legal and standard requirements for the water industry's electrical supply.

Techniques:

- Multimedia tool lectures
- Consult regulatory documents (PUE, GOST, SNiPs) and textbooks.
- Examining actual power supply projects for irrigation systems, sewage treatment facilities, and pumping stations.

2. Hands-on activities

The tasks include:

- Theoretical knowledge consolidation.
- The development of abilities for power supply system design and electrical load calculations.

Techniques:

- Resolving power calculation and equipment selection issues (transformers, generators, cables).
- The use of specialised software (AutoCAD, Mathcad, ETAP, etc.) to create power supply plans for water management facilities.

For instance, performing laboratory work

- Researching how pumps' electric motors operate
- An examination of the qualitative features of electricity.

3. Integration with relevant subject specialities
Rationale

- Hydraulics, hydraulic engineering, ecology, and economics are all intimately associated with electricity supply.

Techniques: Multidisciplinary initiatives.

- A discussion of energy conservation and energy supply efficiency tasks in relation to water management.

4. A project-based methodology
Tasks include:

- Project skill development.
- Getting ready for actual professional work.

Techniques:

- Completing graduation and course assignments, such as
- • Creating an electric power supply system for pumping stations.
- Water treatment plant energy consumption optimisation.
- Modelling with actual data from water management facilities.

5. The use of contemporary technology
Among the tasks are:

- Instruction in using contemporary hardware and software.

Techniques:

- Power systems in software complexes are modelled and simulated.

Automated control systems (ACS) are introduced.

- Evaluation of the water sector's efforts utilising renewable energy sources, such as wind and solar systems.

6. Control of knowledge
Techniques:

- Examinations in the discipline's core areas.
- Addressing issues in a pragmatic approach.
- Presenting projects before a commission or teacher for defence.

Training experts with thorough knowledge and useful skills in the area of water management facility power supply is made feasible by the use of this approach.

Result and Discussion

The price increases for hydrocarbon raw materials in many countries in recent years have caused people to consider alternative energy sources. As a result, the production of these stansti in the Middle East has doubled due to the total capacity of photovoltaic plants installed in European countries. There are around 15 million square meters of solar collectors in the United States, 12 million square meters in Japan, and approximately M2 in Israel. Wind energy utilisation is growing in the European Union at a rate of 40–45% each year. The experience of employing renewable energy gadgets demonstrates that, even if they are expensive initially, they soon pay for themselves. The biggest producer of alternative energy systems at the moment is Vestas Wind Systems A/S, a Danish firm. Siemens Gamensa Renewable Energy A/S is in the next places (Arriet, 2024).

The index was -3 for Russia, -1.7 for Turkmenistan, -5.9 for the USA, 10.6 for Switzerland, -12.5 for Singapore, and -4.3 for Indonesia. This accounts for outdated technology, a large proportion of fuel and energy resources used in the manufacturing of goods, relatively low prices for some electricity-fuel types in the nation's exports, and a suitable accounting system for the production and use of electricity resources. By international standards, the equipment employed in many Uzbek power plants is less efficient. Many power plants employ this tool, although by international standards, its usable operating coefficient is low. The equipment's Fik starts to decline in efficiency at the same time due to wear and tear (Pronina, 2023). Uzbekenergo was unable to supply enough money for the fuel and energy complex's required upkeep, rebuilding, replacement, and growth because of its inadequate financial resources.

Like nations in the CIS, Uzbekistan has inherited an economy that relies on outdated technology for agricultural energy generation. Its energy strategy prioritises the best possible balance between planning and environmental policy throughout the shift from administrative control to a market economy. By 2030, the Republic's average annual temperature will have increased by two to three degrees in the north and one degree in the south. Due to evaporation from the water's surface and plant transpiration, climate change causes water losses to rise by 10-15% and 10-20%, respectively. This results in non-reversible water consumption by matching water extraction.

To fulfil the demands of the city's industry and people, water must be supplied and purified using between 2 and 3% of the energy utilised globally. (Mirziyoyev, 2020) By adopting economical strategies to increase the effectiveness of such systems, the energy consumption of the majority of water management systems globally may be decreased by at least 25%.Reducing energy usage in urban water management systems has received little attention up to this point (Buxoro, 2020). Redesign, system reassembly, and equipment improvements are possible steps to address the aforementioned issues: Reducing the size and shape of operational pumps; modernising equipment and minimising leaks; installing pipes with low internal friction; installing pumps with high FIK ka; installing variable speed electric motors; mounting capacitors; installing transformers; enhancing use and maintenance techniques; and treating and reusing water (Jensen, 2019).

Around the world, agriculture uses a lot of energy to meet its water supply demands. The energy consumption of water delivery systems worldwide is about 26 quadrillion (1 quadrillion = 1015 BTB), which is equivalent to the combined energy consumption of Taiwan and Japan and represents 7% of global energy consumption. While the stelyulloza-paper and oil industries use 6% of all power, the water and wastewater treatment sector in the United States uses 75 billion kWh annually, or 3% of all electricity.

Approximately 0.008% of the earth's total water resources, or less than 1% of the world's freshwater resources, are immediately accessible. The average yearly quantity of renewable water per person worldwide fell by 40% from 1970 to 2000, to 7,045 m3, as a result of the growing global population.

▪ Twenty nations, the majority of which are in the Middle East and Africa, experience ongoing water shortages, which hinders their economic growth and makes it more difficult to solve food-related issues. Long-distance water transportation and water discharge from deep subterranean strata both demand higher energy usage .

"Efficient use of energy in agricultural systems" offers a variety of strategies for the efficient use of energy and water, as well as the synergy that arises from the combined management of these resources. Understanding the relationships between water and energy in water supply systems offers many chances to use their own techniques to increase the systems' efficiency by taking the problems of water and energy consumption into account independently of one another.

Brazil's central and northern regions had an electrical supply problem in 2001 as a result of decreased rainfall and hydroelectric dams' inability to provide enough electricity. The 20 percent electricity imbalance created threatened to cause a total power outage in the northern Ceará city of Fortaleza. Potential opportunity scope: the US establishes modest objectives for energy efficiency Texas is unable to address its existing water condition, although it can spend at least 1.6 billion US dollars a year on it. About 200 million m3 of natural gas are anticipated to be saved.

The state administration took a proactive approach to the problem of water efficiency in order to fulfil the increasing demand for water resources. At the same time, the state's community farms have ample supplies to save water and lower energy usage. For the city's and industry's needs, 3.0 billion gallons of water are supplied. Water supply systems consume between 2.8 and 4.8 billion dollars' worth of power annually. Every year, the aquaculture offices supply 180–288 million litres of electricity. doll. is used up. The power needed to produce chemical reagents for treating chlorinated water is equivalent to 0.02-0.10 kWh, which is used to pump 1,000 gallons of water (0.005-0.028 kWh per 1,000 litres). A 5% decrease in water losses in Texas water systems, which supply around US $9–14 million annually, might result in water and energy savings of between 140 and 240 million kWh. The clock saves money and electricity.

An extra $300 million was generated by a 10% improvement in water delivery systems' energy efficiency. kWh conserves power. There is a chance to cut family hot water usage by 10–20%, according to a Texas research on water consumption that was sponsored. Programs that offer incentives for the adoption of energy-efficient equipment have made this possible. As a result of the implementation of these technologies, Texas obtains $1 billion per year. 21 million, 7 billion ft3 of natural gas, and kWh of electricity. saves money in the US. The present rate of industrial suvining is 2.8 billion gallons per day (10.6 crore gallons). and every 1,000 gallons of water used requires 0.5–2.0 kWh of power for pumping and cleaning (0.13-0.53 kWh per 1,000 litres). The annual cost of cutting these expenses by at least 10% is $100 million. kW. The clock conserves power. Human resources are required for water management systems' energy efficiency group. When teaching Smart Water Technologies, the following tenets are used throughout the class.

On the basis of public-private partnerships, 500 MW of solar photovoltaic plants will be constructed in the Bukhara, Namangan, and Khorezm districts. The project is expected to begin in February 2021. On the basis of a public-private collaboration, the Ministry of Energy announced the commencement of the third project, "Scaling Solar 3," which aims to build a solar photovoltaic power station (FES). Three FES with a combined 500 MW of capacity are to be built as part of this project; the investors will be chosen based on the outcome of the tender. This project is expected to begin in February 2021. The areas of Bukhara, Namangan, and Khorezm are where the FES is expected to be built. Masdar (UAE) was the successful bidder for the Scaling Solar 1 project's 100 MW FES construction in the Navoi area on October 18, 2019. The International Finance Corporation and the Uzbek government struck a deal to boost the solar Fes capacity to 1000 MW and attract consultancy services for the Scaling Solar Project. The agreement led to the announcement of a tender in 2020 for the building of two 400 MW "Scaling Solar 2" FES in the regions of Samarkand and Jizzakh (Beradi, 2020).

Conclusion

Before public hearings were held from June to December 2018, a lot of things altered throughout the strategy constellation's development from January to August 2019. The Cabinet of Ministers of the Republic of Uzbekistan issued decisions on March 15, 2019, updating policy in the area of macroeconomic indicators and statistics (decision "on additional measures to ensure openness and transparency of Public Administration, increase the statistical potential of the country"), implementing some reforms, and adopting new regulatory documents (law "on privatisation of land areas not intended for agriculture"). Notwithstanding the aforementioned revisions, the strategy constellation is still applicable in terms of the chosen strategic goals and the overall course of growth. Improving the teaching methods for energy supply concerns in agriculture and water management is a significant factor in this.

References

430 ming gektar maydonda suvni tejaydigan texnologiyalar joriy qilinadi.12.12.2020 20:32 https://review.uz/oz/post/ 430-ming gektar maydondasuvni tejaydigan texnologiyalar joriy qilinadi.

Arriet, A. (2024). Electricity sector impacts of water taxation for natural gas supply under high renewable generation. *Energy*, *294*. https://doi.org/10.1016/j.energy.2024.130787

Aubakirova, N. K. (2024). Increasing the energy efficiency of an enterprise by installing hydroelectric power systems for electricity generationg in its water supply systems. *Sustainable Development of Mountain Territories*, *16*(2), 642–654. https://doi.org/10.21177/1998-4502-2024-16-2-642-654

Buxoro, Namangan va Xorazmda quyosh fotoelektr stanstiyalari quriladi https://www.gazeta.uz/uz/ 2020/12/30/solar/ 30 dekabr 2020, 10:45

Jensen, J. E. (2019). Survival in cold waters - Learnings from participation in cold water exercises - A regulatory perspective related to the Norwegian offshore industry. *IOP Conference Series: Materials Science and Engineering*, *700*(1). https://doi.org/10.1088/1757-899X/700/1/012045

Mirziyoyev, S. (2020). President Shavkat Mirziyoyev's Address to the Oliy Majlis. (Tashkent: Tasvir press, 2020), 41.

Newton, R. G. (2012). Science Of Energy, The Illustrated Edition. World scientific. Wspc. – Newcastle, 2012, P. 112.

O'zbekiston Respublikasining 2035 yilgacha rivojlanish Strategiyasining konstepstiyasi https://uzbekistan2035.uz/wpcontent/ uploads /2019/05/ Konstepstiya – Razvitiya – Uzbekistana - UZB.pdf

Pereira, L. M., McElroy, C. A. Littaye, A. Girard, A. M. (2019). Food, Energy and Water Sustainability:Emergent Governance Strategies (Earthscan Studies in Natural Resource Management) 1st Edition. Routeledge. - London. P. 236.

Pronina, E. V. (2023). Legal issues and peculiarities of risk minimisation in recovery of civil damages incurred by a consumer subsequent to the supply of electricity of improper quality. *E3S Web of Conferences*, *470*. https://doi.org/10.1051/e3sconf/202347001025

Sobirovich, T. B. (2024). The National Idea as a Driving Force behind Ideospheric Transformation in Uzbekistan: Exploring its Implications and Impact. Asian Journal of Applied Science and Technology (AJAST), 8(3), 170-176.

State of Louisiana /Department of Natural resources. http://www.dnr.louisiana.gov/index. cfm?md = page builder & tmp = home & pid = 266

Suv xo'jaligi hisobot beradi. 2018-2019 yillar sarhisobi 2020 yil rejalari. To'plovchilar: O.Norbekov, A.Hayitov. Baktria press, T. 2020. B. 110

S.O.Mirzaev. Methods of teaching the issues of energy supply in agriculture Scientific Bulletin of Namangan State University, 2021, P. 381.

S.O.Mirzaev. Teaching ethics of water use in water economy, 2023, P. 46. Youth, science, education: topical issues, achievements and innovations Prague, Czech.

S.O.Mirzaev. Methods of teaching the issues of energy supply in agriculture and water economy (national and foreign experience) . Academic Journal of Digital Economics and Stability Volume 5, 2021.

S.O.Mirzaev. Forms and Characteristics of Organization of Learning Classes in General Sciences. International journal on orange technology. Volume: 03 Issue: 12|Dec 2021.

Turdiev, B. S. (2024). Balancing national and universal perspectives: the dialectical dynamics in society's ideosphere. Asian Journal of Basic Science & Research, 6(3), 59-65.

Uzbekistan Signs Milestone Agreements with ACWA Power. https://www.bloomberg.com/press-releases/2020-03-05/uzbekistan-signs-milestoneagreements-with-acwa-power 5 times 2020

https://lex.uz/docs/ 4378526

https://www.ase.org/sites/ase.org/files/ watergy_russian.pdf