

4IR And Energy Sector Of Bangladesh

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The Fourth Industrial Revolution (4IR) is the ongoing process of integrating digital technology, artificial intelligence, and automation to alter our society and economy. It is characterized by the blending of technology that causes the distinctions between the biological, digital, and physical worlds to become blurry. The energy industry, which is undergoing enormous changes to fulfill the demands of a more technologically advanced and networked world, is an essential part of this transformation.



Bangladesh has been making strides in its energy sector to embrace the opportunities presented by the 4IR. The success is starting the journey from almost no electricity and infrastructure at the time of its independence to 100% electrification with quality electricity and adequate generation. Even many countries in South Asia have not achieved 100% electrification.

The Fourth Industrial Revolution, also known as Industry 4.0, is characterized by the combination of various advanced digital technologies such as artificial intelligence (AI), the Internet of Things (IoT), Blockchain, digital twins, and automation in various sectors. This integration is leading to significant changes in the way businesses operate, and the energy or electricity sector is no exception.

There are two basic requirements for the successful implementation of the 4th Industrial Revolution.

- Country-wide electricity infrastructure with 24/7 supply.
- Countrywide internet connectivity network preferably high speed.

The Bangladeshi energy sector is directly linked to the Fourth Industrial Revolution and has the potential to significantly advance the country's growth. The Fourth Industrial Revolution, which is characterized by the convergence of digital technologies, is transforming numerous industries, including the energy sector.

The energy industry is the prime sector of any nation's ability to promote economic growth and raise living standards. A chance exists to improve energy efficiency, advance renewable energy sources, and support sustainable development with the advent of the Fourth Industrial Revolution.

Technology developments and the use of digital technologies can enhance energy management systems, allowing for improved energy usage monitoring, control, and optimization. By providing consumers with real-time energy data, smart grids, and advanced metering infrastructure can increase efficiency,



lower losses, and improve the supply of electricity.

The potential for Bangladesh's use of renewable energy sources including solar, wind, and hydro is enormous. The national grid can more easily include these clean energy sources, broadening the energy mix and lowering dependency on fossil fuels. This is made possible by the fourth industrial revolution. Furthermore, advances in energy storage technology can assist dependable renewable energy deployment while addressing difficulties with intermittency.

Furthermore, demand response programs, energy trading, and distribution of energy can all be optimized through digital platforms and artificial intelligence. For both urban and rural regions, these technologies can promote improved energy affordability, accessibility, and dependability.

Bangladesh has to prioritize investments in digital infrastructure, make it sustainable, skill development, and policy frameworks that promote innovation and collaboration to fully realize the potential of the Fourth Industrial Revolution in the energy industry. International cooperation and public-private partnerships can be extremely important in expediting the adoption of cutting-edge energy technologies.

Bangladesh can develop an energy in-

dustry that is more robust, sustainable, and inclusive by embracing the Fourth Industrial Revolution and utilizing digital technology. This will help Bangladesh meet its environmental and overall economic growth goals.

Bangladesh is proud to own Satellite Bangabandhu 1 (BD-1). The first geostationary communications satellite of Bangladesh was developed by the Bangladesh Telecommunication Regulatory Commission (BTRC). The satellite was launched into geostationary earth orbit (GEO) in May 2018. As a result, Bangladesh could develop digital instruction all over Bangladesh. Its benefit was especially felt during the pandemic when offices could not be physically attended. It was a digital network all over Bangladesh with an electrical network that allowed people to work through Zoom and other meeting sites and use digital files or e-file.

Smart grid solutions are being developed and deployed in the energy sector thanks to Industry 4.0. Smart grids use technologies like artificial intelligence (AI) and the Internet of Things (IoT) or the Internet of Energy to increase the efficiency, dependability, and flexibility of the electrical supply. Power generation and consumption should always be balanced when it comes to electricity distribution. Otherwise, the system can be out of balance, which could cause a widespread blackout. Bangladesh has

experienced widespread blackouts due to such technical lapses. By better balancing supply and demand, smart technologies can produce higher-quality, more dependable electricity while costing less. They also facilitate the utilization of renewable energy sources like solar and wind energy. Smart grid systems can optimize the balance between the supply and demand for electricity, which helps eliminate the need for additional energy sources.

Internet of Energy uses IoT technology to collect data and manage operations at many points in the power grid's infrastructure. Sensors within the energy industry's IoT support the diagnostic, analytic, optimization, and integration processes.

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Another key aspect of Industry 4.0 in the energy sector is the use of advanced automation and robotics in the development and operation of power plants and other energy infrastructure. Advanced sensors and control systems can be used to monitor and optimize the performance of power generation equipment, reducing downtime and increasing efficiency. Additionally, the use of drones and robots for maintenance and inspection can help improve safety and reduce costs. Also, electricity outage is reduced. Drones can easily access areas that humans cannot easily access. This is especially beneficial in the case of grid-connected high-voltage tower fault identification and maintenance. Digital twins lead to accurate simulation and improved quality power supply.

The smart grid is only one example of how Bangladesh's energy industry is embracing smart technologies. Decentralized energy systems, which enable local power generation and distribution through the use of cutting-edge technologies like blockchain and Distribu-



ted Ledger Technology (DLT), are also beginning to develop. This could improve the grid's resiliency, lessen reliance on centralized power generation, and make it possible to integrate renewable energy sources more successfully.

Challenges for Achieving 4IR in Bangladesh

Achieving the Fourth Industrial Revolution (4IR) in Bangladesh is a complex task that involves several challenges. Some key challenges are:

Digital Infrastructure: Bangladesh needs to strengthen its digital infrastructure, including reliable internet connectivity, high-speed broadband, and widespread access to technology. Limited infrastructure can hinder the adoption and implementation of advanced technologies necessary for the 4IR. Uninterrupted quality electricity supply is also a necessity.

Bangladesh has a sizable digital gap, with different population groups having unequal access to technology and levels of digital proficiency. To guarantee that every one may take part in and benefit from the 4IR, this divide must be addressed.

Developing a competent workforce that can take advantage of developing technologies is crucial. Bangladesh must make investments in high-quality educational initiatives and programs for professional development that emphasize digital competencies such as data analysis, artificial intelligence, cybersecurity, and programming.

Digital Divide: There is a significant digital divide in Bangladesh, with unequal access to technology and digital literacy among different segments of the population. Addressing this divide is crucial to ensure that everyone can participate in and benefit from the 4IR.

Skill Development: Developing a skilled workforce capable of leveraging emerging technologies is essential. Bangladesh needs to invest in quality education and vocational training programs that focus on digital skills, including data analysis, artificial intelligence, cybersecurity, and programming. Language is also another barrier or challenge.

Research and Development (R&D): R&D activities must be encouraged if innovation and technical improvements are to occur. Bangladesh should promote academic, business, and governmental partnerships to support R&D activities and promote innovation in important industries.

Regulatory Framework: To facilitate and oversee the adoption of 4IR technologies, a suitable regulatory framework must be established. It entails dealing with ethical and legal issues, protecting data privacy, fostering an innovative and entrepreneurial atmosphere, and maintaining data security.

Entrepreneurship and Start-Up Ecosystem: Supporting a healthy start-up ecosystem and encouraging entrepreneurship can spur innovation and develop technology. Bangladesh must provide a favorable regulatory environment and an environment that provides access to capital, mentorship, and other resources for new businesses.

Sustainable Development: It is essential to incorporate sustainability into the 4IR agenda. Bangladesh should encourage the adoption of technologies like renewable energy, intelligent agriculture, and effective resource management that solve environmental issues and support sustainable development.

Collaboration and Partnerships: To achieve the 4IR in Bangladesh, cooper

ation between the public and private sectors, as well as between academia and international organizations, is crucial. By leveraging resources, knowledge exchange, and expertise, partnerships can hasten the nation's implementation of 4IR.

Industrial Revolution (4IR) opposition in Bangladesh is fueled by a variety of issues that are unique to the local environment. Here are some potential viewpoints:

Unemployment and Job Displacement Especially in labor-intensive industries where Bangladesh has historically relied on a big workforce, people may worry that the adoption of cutting-edge technologies and automation in businesses may result in severe job losses. They might be concerned about how it might affect people's livelihoods and employment prospects.

The Mindset of People: The mindset of people against the implementation of the Fourth Industrial Revolution (4IR) in Bangladesh can encompass various concerns specific to the country's context. Here are some possible perspectives:

Education and Skill Challenges Critics can claim that the nation's educational system and workforce development initiatives fall short of preparing people for the digital era. They might voice worries about Bangladesh's capacity to compete internationally due to a huge skill gap and a lack of the technological know-how required to prosper in the 4IR.

Impact on society critics may be concerned that the distinctive sociocultural fabric of Bangladesh would be disrupted by the rapid breakthroughs in technology and the growing reliance on automation. They might stress the importance of preserving local identity, culture, and conventional employment sectors.

Challenges with Infrastructure and Connectivity Like many developing nations, Bangladesh has poor infrastructure and poor connections in rural areas. Opponents may contend that the nation should focus on resolving these under-



lying issues before fully adopting the 4IR since a lack of a reliable infrastructure could obstruct the successful adoption of cutting-edge technologies.

Socio-Cultural Impact Bangladesh has a unique socio-cultural fabric, and critics may worry that rapid technological advancements and increased reliance on automation could disrupt traditional ways of life and values. They may emphasize the need to preserve local culture, identity, and traditional employment sectors.

Expertise Shortage as a Bottleneck on the Way to 4IR

The shortage of expertise can indeed act as a bottleneck on the way to achieving the Fourth Industrial Revolution (4IR). Here's how expertise shortage can pose challenges:

Insufficient Skilled Workforce A workforce with specialized capabilities in fields like robotics, cybersecurity, machine learning, data analytics, and artificial intelligence is needed for the 4IR. The adoption and application of 4IR technologies may be hampered by a lack of qualified people in these sectors.

Inadequate education and training to keep up with the most recent innovations, it is necessary to undergo ongoing training and education due to the 4IR's quick technological breakthroughs.

However, a shortage of experts and

trainers to provide specialized training programs can limit the acquisition of necessary skills among the workforce.

Insufficient industry-university collaboration. To close the knowledge gap, industry, and academia must work together. The transmission of information, the commercialization of research, and the wide-scale use of new technologies can all be hampered by a lack of professionals who can organize and lead such collaborations.

Brain Drain: High-skilled people frequently leave their home country in pursuit of greater chances in regions where there is a shortage of expertise. This could make the skills gap worse and slow down the nation's progress toward the 4IR.

Addressing the expertise shortage requires a multi-faceted approach:

Investing in Education and Training: Governments, academic institutions, and industry partners need to work together to create specialized educational initiatives and training programs that concentrate on the 4IR's skill requirements. In this, upskilling possibilities for the current workforce, career training programs, and curriculum creation may all be included.

To attract and keep professionals in important technological fields,

governments should provide infrastructure, subsidies, and incentives for R&D top priority. Collaboration between the academic, industrial, and research communities can also promote creativity and knowledge exchange.

Promoting Talent Retention: It's crucial to create an environment that encourages specialists to stay and contribute to the development of the nation. This may entail providing competitive pay, chances for career advancement, and a supportive environment for innovation and entrepreneurship.

In addition to the previously listed issues, Bangladesh's energy sector has particular obstacles and difficulties when implementing the Fourth Industrial Revolution (4IR). These are some crucial elements:

Limitations in the infrastructure: It's possible that Bangladesh's power production, transmission, and distribution networks aren't sufficiently evolved to handle the integration of cutting-edge technologies. Inadequate infrastructure and obsolete grids might make it difficult to integrate smart grids, renewable energy sources, and energy management systems effectively.

Limited Research and Development: The energy industry in Bangladesh may have made only a small investment in 4IR technology research and development (R&D). The nation's capacity to create and implement novel solutions catered to its particular energy demands, such as cutting-edge energy storage systems or effective energy management tools, may be hampered by this lack of R&D concentration.

Financial Restrictions: The energy sector frequently needs to make substantial investments in equipment, infrastructure, and human resources to implement 4IR technology. Bangladesh may find it difficult to allocate enough money for the required technical upgrades and capacity-building programs due to a lack of re-



sources and competing priorities.

Framework for Regulation and Policy: There may be a lack of comprehensive regulatory frameworks and policies that support and encourage the adoption of 4IR technologies in the energy industry. Regulations that are inconsistent or out-of-date might make investing risky and prevent the adoption of modern energy technologies.

Integration of Renewable Energy Sources: The integration of renewable energy sources, such as solar and wind power, into the national grid, poses technical challenges. Bangladesh needs to invest in grid modernization, energy storage solutions, and advanced forecasting systems to effectively manage intermittent renewable energy generation and ensure grid stability.

Public Acceptance: The successful application of 4IR technologies depends on their widespread public acceptance and knowledge. Public awareness of the advantages and potential effects of innovative energy solutions can aid in gaining support and resolving issues with cost, sustainability, and reliability.

Cyber Security Concern: The Fourth Industrial Revolution (4IR), characterized by the integration of digital technologies into various aspects of society and industry, brings significant advancements but also introduces new cybersecurity concerns. Some key cybersecurity concerns associated

with implementing 4IR technologies:

Increased Attack Surface: The widespread adoption of interconnected devices, Internet of Things (IoT) devices, and smart systems in 4IR can significantly expand the attack surface for cybercriminals. Each connected device becomes a potential entry point for cyberattacks. The Bangladesh utilities do not have many experts in this field.

Data Breaches and Privacy: With the massive collection, storage, and processing of data in 4IR, the risk of data breaches and privacy violations increases. Cybercriminals may target sensitive personal information, intellectual property, or valuable data, leading to financial losses and reputational damage. As such pirated copies of various software should be strongly discouraged.

IoT Vulnerabilities: The proliferation of IoT devices in 4IR introduces vulnerabilities, as many of these devices have limited security features or lack regular patching and updates. Compromised IoT devices can be exploited to gain unauthorized access to networks or launch DDoS attacks. The Utility people should understand various levels of vulnerabilities.

Malware and Ransomware Threats: 4IR technologies can be targeted by malware and ransomware attacks. Malicious software can infiltrate systems, disrupt operations, encrypt data, and demand ransom payments for its release. Bangladesh already has a bitter experience of such attacks.

Insider Threats: As organizations embrace digital transformation in 4IR, insider threats become a significant concern. Insiders with authorized access, such as employees or contractors, may misuse their privileges or intentionally leak sensitive data. The top bosses should maintain their security codes and should not hand them over to others for use.

Lack of Skilled Cybersecurity Professionals: The rapid pace of techno

logical advancements in 4IR often outpaces the availability of skilled cybersecurity professionals. This shortage can create gaps in organizations' ability to effectively detect, respond to, and mitigate cyber threats.

Artificial Intelligence (AI) Vulnerabilities: AI and machine learning technologies used in 4IR can also be targeted. Adversaries may attempt to manipulate or poison training data, exploit vulnerabilities in AI algorithms, or launch AI-powered attacks with greater sophistication. Bangladesh has to prepare its workforce accordingly.

Lack of Standardized Security Protocols: As 4IR technologies continue to evolve, there is often a lack of standardized security protocols across different devices, platforms, and systems. Inconsistent security practices can create vulnerabilities and hinder effective security measures.

To address these concerns, organiza-

tions, and individuals should prioritize cybersecurity measures, including robust network security, regular software updates, and patching, employee awareness and training, encryption of sensitive data, secure coding practices, and incident response planning. Collaboration among industry stakeholders, policy-makers, and cybersecurity experts is also essential to establish best practices and regulations that promote security in the 4IR era.

Collaboration between government agencies, business players, academic institutions, and foreign partners is necessary to overcome these obstacles. To build an environment that is conducive to the adoption of 4IR technologies in Bangladesh's energy industry, it is necessary to prioritize investments in infrastructure, R&D, skill development, and regulatory reforms. Regular training of all concerned and updating are necessary to solve this issue.

Conclusion

Several obstacles stand in the way of Bangladesh's energy sector fully utilizing Industry 4.0's advantages. The need for significant investment in the creation and implementation of new technologies and infrastructure, the requirement for qualified personnel to use and maintain cutting-edge technology, worries about cybersecurity and data privacy, and the requirement to increase the proportion of renewable energy sources in the nation's energy mix is some of these challenges. It's also important to solve the problems associated with energy efficiency and storage. Government, business, and the research community will need to collaborate actively to create policies and solutions that support the integration of Industry 4.0 technologies in Bangladesh's energy sector to overcome these obstacles.

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জাতীয় গ্যাস সঞ্চালন গ্রিডের মাধ্যমে দেশের সকল অঞ্চলে
সুষ্ঠুভাবে নিরবচ্ছিন্ন গ্যাস সরবরাহ আমাদের লক্ষ্য



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বিনা কারণে গ্যাসের চুলা জ্বালিয়ে রাখা
আর বিপদকে ডাকা একই বিষয়

ওদ্ধাচার চর্চা করি সমৃদ্ধ সোনার বাংলা গড়ি

- প্রাকৃতিক গ্যাস একটি অতি গুরুত্বপূর্ণ জাতীয় সম্পদ।
- প্রাকৃতিক গ্যাস অফুরন্ত কোন সম্পদ নয়। এ সম্পদের অপচয় রোধ করা ও সুষ্ঠু ব্যবহার নিশ্চিত করা দেশের প্রতিটি নাগরিকের একান্ত দায়িত্ব ও কর্তব্য।
- গ্যাস ব্যবহারে সশরী হোন এবং সময়মত গ্যাস বিল পরিশোধ করুন।
- বন্ধ ঘরে গ্যাসের চুলা জ্বালান না। দূর্ঘটনা এড়াতে রান্নার পর গ্যাসের চুলা নিভিয়ে ফেলুন।
- আপনার আঙ্গিনায় গ্যাস রেগুলেটর বা লকিং কক লিক হলে সাথে সাথে সংশ্লিষ্ট কার্যালয়ের মাধ্যমে পরিবর্তনের ব্যবস্থা নিন।
- জালালাবাদ গ্যাসের অনুমোদিত ও তালিকাভুক্ত ঠিকাদার ব্যতীত অন্য কারো মাধ্যমে গ্যাস বিষয়ক কোন কাজের পদক্ষেপ নেবেন না।
- অবৈধভাবে গ্যাস ব্যবহার এবং তিন মাসের অধিক বকেয়া বিল পরিশোধের ব্যর্থতায় গ্যাস সংযোগ বিচ্ছিন্ন করা হচ্ছে।
- "বাংলাদেশ গ্যাস আইন" ২০১০ অনুযায়ী গ্যাসের অবৈধ ব্যবহারের জন্য সর্বোচ্চ ৫ (পাঁচ) বছর কারাদন্ড, অর্থদন্ড অথবা উভয়দন্ডে দণ্ডিত হওয়ার বিধান রয়েছে।



সিলেট বিভাগের আর্থ-সামাজিক উন্নয়নে প্রাকৃতিক গ্যাস সরবরাহ ও বিপণন কাজে নিয়োজিত।

জালালাবাদ গ্যাস ট্রান্সমিশন এ্যান্ড ডিস্ট্রিবিউশন সিস্টেম লিমিটেড

(পেট্রোবাংলার একটি কোম্পানী)
গ্যাস ভবন, মেদিনাঘাট, সিলেট।

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