

Practical Implementation of Turkmenistan's
Methane Emission Reduction Program
by Bayrammyrat Pirniyazov
Director, Scientific Research Institute
of Natural Gas of State Concern "Turkmengaz"

From gas to green - Bridging
the Energy Connectivity Gaps
Between Central Asia and EU
Murman Margvelashvili
Director, Energy Studies,
World Experience for Georgia

China's latest Natural Gas
Development
prepared by
Natural Gas World

Page 13

Page 19

Page 30

TURKMEN ENERGY

Quarterly newsletter

VOL 6 | October 2024 edition | www.ogt-turkmenistan.com

 **OGT 2024**
INTERNATIONAL CONFERENCE & EXPO

We proudly present our exclusive quarterly newsletter, offering unparalleled insights into the latest research and advancements in the oil, gas, and energy sectors. Our newsletter is dedicated to keeping our readers informed about the cutting-edge developments shaping these industries, providing valuable perspectives on topics such as investment opportunities in the Turkmen energy sector, energy transition, global energy trade, and methane emissions. This edition of our newsletter will be devoted to OGT 2024 international conference and exhibition.

Turkmen Energy Newsletter Editorial Team





OGT 2024

INTERNATIONAL CONFERENCE & EXPO



ORGANISERS



PREMIER PARTNER



DIAMOND PARTNER



PLATINUM PARTNERS



PETRONAS

GOLD PARTNER



SILVER PARTNERS



BRONZE PARTNERS



OGT 2024

INTERNATIONAL CONFERENCE & EXPO

KNOWLEDGE PARTNER



TECHNICAL PARTNERS



MEDIA PARTNERS



CO-ORGANISER





Dear Delegates,

We are pleased to welcome you to the XXIX International Conference and Exhibition «Oil and Gas of Turkmenistan - 2024» (OGT 2024), which brings together leading national and international oil and gas companies, as well as experts and financial institutions that shape the future of the oil and gas industry both nationally and throughout the region.

The purpose of the Conference and Exhibition is to strengthen the dialogue on further sustainable development of the energy sector, review the latest trends in the global energy system, and expand opportunities for attracting foreign direct investment in the oil and gas industry of Turkmenistan.

In an epoch when the world is striving for a large-scale transition to new types of energy, Turkmenistan is changing too. The country can offer a wide field of activity for investors: from the development of one of the largest onshore gas fields, Galkynysh, to favorable natural and climatic conditions for the effective development of solar and wind energy. Turkmenistan's rich resource potential will be the focus of OGT 2024, where leading energy companies of Turkmenistan will provide extensive opportunities for foreign investors in this strategically important area.

Dear delegates,

We are confident that OGT 2024 will further strengthen relations between Turkmen national and international oil and gas companies and will serve as a good platform for attracting foreign investment to the country. We wish you fruitful and successful work within the framework of this International Conference!

Welcome to Turkmenistan!

OGT 2024 Organizing Committee

Interview for Turkmen Energy Newsletter



MAKSAT BABAYEV

State Minister - Chairman,
SC «Turkmengaz»

Exclusively for Turkmen Energy Newsletter

How does Turkmengaz envision its role in energy transition?

Turkmenistan is a major player in Asia's oil and gas market. The country's hydrocarbon reserves are estimated at over 71 billion tons of oil equivalent, of which more than 20 billion tons are oil and over 50 trillion cubic meters are natural gas. According to these figures, Turkmenistan currently ranks fourth in the world in proven natural gas reserves after Russia, Iran, and Qatar.

It is no secret that natural gas is a key fuel in the energy transition and will continue to play an important role in reducing air pollution and greenhouse gas emissions by shifting from high-emission fuels such as coal and oil to lower-emission natural gas, especially in power generation. Even with the active transition to renewable energy sources, according to the International Energy Agency, natural gas is currently the most cost-effective option for addressing supply disruptions, serving as a suitable alternative both environmentally and throughout the entire technological chain from extraction to processing.

It is widely known that Turkmenistan has a powerful resource potential, opening up vast opportunities for cooperation and capable of meeting the growing demand for blue fuel in the region. The main resource base for gas exports is the unique Galkynysh field.

You mentioned the Galkynysh gas field. Can you elaborate on the investment opportunities that this field presents for international investors?

The Galkynysh gas field is the world's largest onshore natural gas field, and its combined reserves, including the nearby Yashlyar and Garakel fields, are estimated at 27.4 trillion cubic meters.

Given the vast size and reserves, a phased development strategy has been adopted. To ensure the sustainable use of the country's natural resources, experts from GaffneyCline and the Scientific Research Institute of Natural Gas under Türkmengaz State Concern have developed a seven-phase development plan for the Galkynysh gas field spanning several decades. Each phase is developed within the context of specific projects, focusing on long-term cooperation. Currently, the Galkynysh field is in the pilot industrial operation phase of the first development stage, within which Petrofac, CNPC, and Hyundai Engineering have equipped facilities to produce sales gas.

To ensure planned supplies of an additional 25 billion cubic meters of gas per year to China, the second phase of the Galkynysh field development will be commissioned soon. Negotiations and agreements on the timing of well drilling and the development of the second phase are currently at the active stage of contract detail clarification. I would like to draw the attention of international investors to the third phase of development, which will serve as a source for supplying 33 billion cubic meters of marketable gas per year under the Turkmenistan-Afghanistan-Pakistan-India (TAPI) international gas pipeline project. On September 11, construction began on the Serhetabat-Herat section, which is a key stage in implementing the TAPI gas pipeline project.

How important is environmental sustainability for Turkmengaz?

Turkmenistan pays great attention to environmental aspects of hydrocarbon resource development and is actively developing the renewable energy sector.

Turkmenistan joined the Global Methane Commitment last year and since then we have been consulting with international organisations and partner states within the framework of existing projects and programmes aimed at practical implementation of the conditions arising from the Global Methane Commitment.

We are actively cooperating with key international organisations on the reduction of methane emissions and are actively cooperating with various UN structures on this important issue.

As I said earlier, natural gas will be a key element in the transition to a low-carbon future and has an important role to play in reducing air pollution and greenhouse gas emissions by switching from high-emission fuels such as coal and oil to lower-emission natural gas, especially in power generation.

As is already known, thanks to the export of Turkmen gas to China, the environmental situation in this country has improved a lot. According to the calculations of S&P Platts experts, 30 billion m3 of gas exported annually to China is equivalent to 60 million tonnes of coal, so you can imagine how much greenhouse gas emissions in the Celestial Empire have decreased thanks to supplies from Turkmenistan.

KAYRROS' report "Global Methane Commitment, Three Years On: Partial Progress Report" was recently published, stating that 'Turkmenistan's total methane emissions from its eastern and western producing regions, despite a short-term increase in 2021, have trended downwards since that peak, even as oil and gas production has increased. Cumulative emissions in 2023 are down 10 per cent from 2020, which is more than the 9 per cent notional reduction required in linear progression to the 2030 targets.' So progress in reducing methane emissions is in sight.

OGT 2024 will kick off in just a few days, what are your expectations from this major regional energy event?

We are truly delighted to see how OGT is attracting more and more delegates and high profile speakers from year to year. This year we will host more than 800 delegates representing 250 companies, international organizations, media, financial institutions, and academia from over 52 countries. This clearly shows the growing importance of this event for the global energy community.

I expect that the OGT 2024 Conference and Expo will strengthen the dialogue on further sustainable development of the Turkmen energy sector, serve as a platform for reviewing and discussing the latest trends in the global energy system, and expand opportunities for attracting foreign direct investment in Turkmenistan's oil and gas industry.

Taking this opportunity, I would like to highlight and invite international investors to actively participate in the following key investment projects for the State Concern Turkmengaz:

- Development of next phases of the Galkynysh gas field;
- Participation in the development of offshore blocks in the Turkmen sector of the Caspian Sea;
- Investment projects for optimizing gas production at mature fields;
- An investment project for the chemical utilization of oil and gas;
- Construction of an underground gas storage facility;
- EPC contracts for large-scale industrial projects.

The main factors contributing to Turkmenistan's growing attractiveness to foreign investors include its stable economic and political situation, legal framework, and government guarantees. We look forward to hosting OGT 2024 delegates in Ashgabat!



« OGT conference presents an excellent opportunity to get the latest updates from the Turkmen energy sector. The 2024 agenda reflects the realities of the changing global energy landscape, with the need to accelerate the energy transition and attract investment in developing more gas fields to deliver much-needed clean energy to global markets »



CLS

CASPIAN LOGISTICS SOLUTIONS

WE MAKE LOGISTICS EASIER





Interview for Turkmen Energy Newsletter



GUVANCH AGAJANOV

Chairman,
SC «Turkmennebit»

Exclusively for Turkmen Energy Newsletter

Can you outline investment projects that SC «Turkmennebit» can offer to foreign investors?

The development of hydrocarbon resources in the Turkmen sector of the Caspian Sea is one of the priority areas in which the concern welcomes direct foreign investment.

At present, more than 30 offshore blocks have been licensed by Turkmenistan's legislation, for which there is various geological and geophysical information, including 3D seismic surveys. The concern is ready to consider investors' interest in any blocks by transferring information in the prescribed manner. All petroleum operations in Turkmenistan are carried out under the law of Turkmenistan «On Hydrocarbon Resources».

Can you tell us more about Turkmenistan's law on «Hydrocarbon Resources»?

The law of Turkmenistan, «On Hydrocarbon Resources» (the Law), provides for the conclusion of many types of oil contracts, such as Production Sharing Agreements, Concession Contracts (Tax and Royalty), Joint Activity Agreements, and Risk Service Contracts, as well as their combinations, depending on the nature of oil operations and other circumstances, which are well-known in the international oil and gas industry. The provisions of this Law comply with international law, including the norms of the Energy Charter Treaty. Furthermore, the provision of this Treaty related to the promotion and protection of investments, taxation, and other norms were considered when drafting the Law.

The Law provides fundamental guarantees and rights for foreign investors in conducting petroleum operations and amendments to the Law

that allow investors, along with the extraction of hydrocarbons, the opportunity to process them.

One of the main advantages of this Law is the provision of taxation for the Contractor. When conducting Petroleum Operations, the Contractor pays only income tax. The tax rate remains unchanged throughout the term of the Agreement, even if this rate changes in the Tax Code of Turkmenistan. This Law regulates both the financial and fiscal regime, as well as the customs regime, under which goods, materials, and equipment imported by the Contractor for conducting Petroleum Operations, as well as products exported by the Contractor from Turkmenistan and owned by the Contractor under the Agreement, including volumes of extracted hydrocarbons, are exempt from taxes, fees, and payments.

In addition, when conducting Petroleum Operations, the Contractor is exempt from all other types of taxes, fees, duties, and other mandatory payments established by Turkmenistan's legislation. The Contractor's taxable profit is determined under international accounting and reporting practices accepted in Petroleum Operations and the Agreement's provisions.

The above provisions also apply to the Subcontractor. A comparative analysis with similar laws of other states shows that the Law of Turkmenistan «On Hydrocarbons» provides a huge advantage in the fiscal sphere. The Law also establishes currency, customs, and exchange benefits for the Contractor.

What is the State Concern «Turkmennebit» view on environmental aspects of the production of hydrocarbons?

The State Concern «Turkmennebit» pays particular attention to the environmental aspects of its activities, striving to minimize the negative impact on the environment and rationally use natural resources. The search for ways to implement practical measures to reduce the impact of pollutants on the environment is a priority task for the oil industry of Turkmenistan.

Turkmennebit uses all the associated petroleum gas produced for gas lift oil production and is working towards replacing various outdated gas distribution equipment to ensure its efficiency.

We cooperate with various international organizations and partners to reduce methane emissions during operation and planned maintenance, production, transportation, and storage through continued and comprehensive modernization of all technological equipment.

What are the State Concern «Turkmennebit» strategic goals for developing the oil sector?

We consider strategic partnerships with leading international oil and gas companies offering advanced and innovative technological solutions based on mutually beneficial cooperation as a key success factor in implementing large-scale investment projects such as the development of hydrocarbon resources in the Turkmen sector of the Caspian Sea, investments in optimizing production at mature fields, and the continued modernization of the Turkmenbashi and Seydi refineries.

Turkmenistan's energy sector is preparing to host the OGT 2024 this week. What are your expectations from the upcoming event?

As for the OGT 2024 conference and exhibition, I'm pleased to see that it serves the purpose of strengthening the regional dialogue on the further sustainable development of the energy sector and expanding opportunities for attracting direct foreign investment into Turkmenistan's oil and gas industry. This year, over 800 delegates from 51 countries have registered to attend the OGT 2024 conference and expo, which I'm sure will provide an excellent platform for discussing the latest developments in the global energy sector and regional and global trends affecting the industry. We look forward to hosting all international delegates in Ashgabat and will make every effort to make your OGT experience positive and productive! Welcome to Ashgabat!





50
YEARS

Passionate about Progress

A global energy player with presence in more than 100 countries.

www.petronas.com



The Global Methane Pledge, Three Years On: Partial Progress Report



KAYRROS
a leading energy data
analytics firm

This report is published in the Turkmen Energy Newsletter with permission from Kayrros

«Three years ago, the US and EU launched the Global Methane Pledge at COP26 in Glasgow. It was the first major attempt to tackle this extremely potent greenhouse gas, which has been responsible for an estimated 30% of global warming to date. How much progress have the signatories made towards reaching their 2030 methane-emission reduction targets?»

To answer this question, we measured annual methane emissions from 13 large fossil-fuel basins spread across nine major producing countries, including six GMP signatories. The countries were selected according to two main criteria: the size of their production and the availability of high-integrity, reliable data. They include large producers from a wide range of geographies, including North America (the US), the MENA region (Iran, Iraq, Kuwait and Algeria), Central Asia (Turkmenistan and Uzbekistan), Sub-Saharan Africa (South Africa) and Australia.

The results overall are sobering.

Aggregate methane emissions from the sample are continuing to increase, not decrease. This is cause for concern: the longer we take to reduce emissions, the steeper the abatement curve will have to be to achieve 2030 targets. Further delays risk compromising the chances of delivering on the Pledge, while severely undermining the confidence of civil society in methane reduction policies.

In most fossil-fuel producers in the sample, methane emissions are up significantly from 2020 levels (the reference year). “Worst-in-class” performers – countries where emissions have risen at the fastest pace since 2020 – include all three non-signatories of the GMP in the sample, as well as the US. South Africa shows the steepest rise in methane emissions, with coal-mine emissions up nearly 40% in 2023 versus 2020.

Among GMP signatories, the US stands out as the one with both the largest level of emissions overall and the steepest emissions growth, likely due to fast-rising oil and gas production. Aggregate emissions from three of its largest basins – the Permian, Anadarko and Appalachian – increased by 20% from 2020 levels. The methane intensity of US oil and gas production edged down in 2023, however, as output increased faster than associated emissions. The Permian also outperformed the other basins, achieving the steepest decline in emissions in 2023 despite consistently showing the fastest production growth since 2020.

Two countries outshine the others in emission cuts: Australia and Turkmenistan. Both countries joined the GMP in 2023. Australian emissions from the Bowen Basin, a major coal producing region, dropped by 27%. Turkmenistan methane emissions have been trending lower and are now expected to fall steeply in the wake of new commitments and policy measures.

The window of opportunity to tackle methane emissions is narrowing. Delayed action will only make the challenge of meeting the 2030 goal all the steeper. Although abatement may soon accelerate as new policies enter the implementation phase, regulations that would specifically target super-emitters as a priority would presumably achieve faster results. Earth observation technologies will play an even more important role in this new phase than they have in enabling new methane policies and regulations in the first place.

The Global Methane Pledge, launched by the US and EU at COP26 in Glasgow, marks the first major concerted effort to tackle man-made emissions of methane, a potent greenhouse gas responsible for some 30% of global warming to date. Signatory countries, of which there are now 158, are committed to the goal of cutting global anthropogenic methane emissions by 30% by 2030 from 2020 levels. The fossil fuel industry is responsible for an estimated 40% of anthropogenic emissions and presents the best abatement potential, and consequently has been the main target of methane policies to date.

Earth observation (EO) technologies have been foundational to the Global Methane Pledge since its very launch, thanks to the spotlight they have cast on man-made methane emissions and the unprecedented abatement opportunities this new transparency has unlocked. At the launch ceremony in Glasgow in 2021, US Climate Envoy John Kerry pointed in his presentation to a groundbreaking article that The Washington Post had just published on Russian methane emissions. That article had received significant input from Kayrros and heavily relied on our detections of super-emitters from Russia's Yamal and Brotherhood gas pipelines.

Three years later, we again leverage EO technologies to assess how far along signatory countries are in reaching the 2030 goal. Rather than focusing on super-emitters, in this case we measure annual basin-wide emissions from 13 major fossil fuel basins (coal, gas and oil) spread across nine countries, including six signatories of the Pledge. Our findings are sobering.

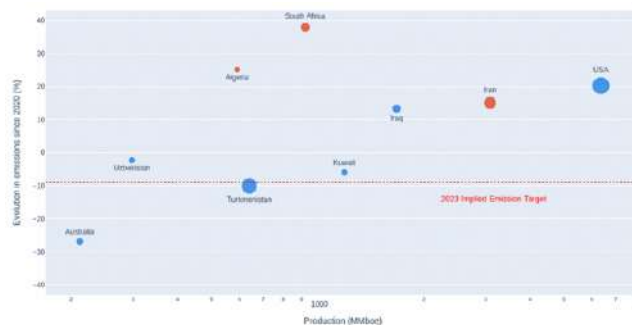
Methodology

Kayrros assessed basin-wide emissions from 13 major coal, oil and gas basins using basin inversions based on data from the Tropospheric Monitoring Instrument (TROPOMI) on board the Sentinel-5 Precursor satellite, part of the European Space Agency's Copernicus constellation. TROPOMI orbits Earth and takes frequent, detailed measurements of methane concentrations in the atmosphere. We use these measurements, along with other data such as wind patterns and known methane sinks, in complex mathematical models. These models "invert" the problem: instead of predicting methane concentrations from known emissions, they estimate emissions based on observed concentrations. A peer-reviewed description of the methodology was published in *iScience* in 2023 and can be found at: <https://www.sciencedirect.com/science/article/pii/S2589004223024525>

An Alarming Trajectory

Overall emissions from the basins and countries under review are continuing to increase, not decline. This is cause for grave concern, given the extreme urgency of reducing methane, which has more than 80 times the global warming power of carbon dioxide in the first 20 years. Any delay in reducing methane emissions will clearly make the challenge of achieving 2030 reduction targets all the more daunting, and will gravely compromise our attempts to avoid the most catastrophic effects of global warming. It also risks undermining public confidence in methane abatement policies. Overall, emissions from the sample of basins and countries under study increased by 7% in 2023 versus levels observed in the 2020 reference year, a headline figure that admittedly conceals distinct patterns across geographies.

This continued growth in overall methane emissions from fossil fuels has occurred despite undeniable advances on the policy front, notably in the US and EU, with the passage of landmark legislation designed to rapidly curb emissions. By mid-2024, however, most of these regulations had yet to enter their implementation phase and had not had a visible impact on emissions levels. Additionally, these legislations have not specifically targeted the lowest-hanging fruits, i.e. measures that could potentially have yielded faster results, such as an outright ban on methane super-emitters.



Diverging patterns

In the chart above, the red dotted line indicates the notional level of emissions which individual countries should have achieved in 2023 if they were on a linear path to reach a 30% reduction in domestic emissions by 2030. (Note that the Global Methane Pledge does not specifically set a 30% domestic reduction target for each signatory country but a global one.) Only two of the GMP signatories in the study are below the line, Turkmenistan and Australia. All others are above it. Perhaps unsurprisingly, the "worst" performers of our sample include all three countries in this group that have not yet signed onto the Global Methane Pledge, namely South Africa, Iran and Algeria. Perhaps more surprisingly, the U.S., one of the main driving forces behind the Pledge, also stands out as both the country in the sample with the highest level of aggregate emissions and the GMP signatory with the fastest methane emission growth. Two countries have succeeded in reducing emissions but not at the pace required by a notional linear progression towards the 2030 goal.

Source: Kayrros (Emissions), EIA (Production)





YUG-NEFTEGAZ





Practical Implementation of Turkmenistan's Methane Emission Reduction Program



BAYRAMMYRAT PIRNIYAZOV
Director, Scientific Research Institute of Natural Gas of State Concern «Turkmengaz»

in co-authorship with

MRS. IRINA LURYEVA
Head of the Laboratory, ScD, Scientific Research Institute of Natural Gas of SC «Turkmengaz»

Exclusively for Turkmen Energy Newsletter

Efforts to monitor and reduce methane and other greenhouse gas emissions into the atmosphere in Turkmenistan are being conducted in accordance with international and national programs:

The United Nations Framework Convention on Climate Change; Turkmenistan's National Climate Change Strategy; Turkmenistan's Nationally Determined Contribution (NDC) towards the implementation of the Paris Climate Agreement; the fulfillment of tasks arising from international obligations; and in connection



with Turkmenistan's accession to the Global Methane Pledge, which was announced by the esteemed President of Turkmenistan, Serdar Berdimuhamedov, during his speech at the 28th session of the UN Climate Conference in Dubai on December 1, 2023.

To study global practices in reducing methane emissions, specialists of our Institute participate in joint events, meetings, conferences, and seminars with authoritative international organizations such as the UN and the OSCE, as well as various companies with extensive experience in this field. In collaboration with the American companies Tetra Tech ES, Inc. and Deloitte & Touche LLP, field studies were conducted at the beginning of 2024 to identify sources and quantify methane emissions at 14 facilities of the State Concern «Turkmengaz».

The results of these studies revealed lower methane emission levels compared to satellite data.

After conducting analytical work, specialists at the Institute have determined that the main sources of methane emissions into the atmosphere during natural gas extraction are:

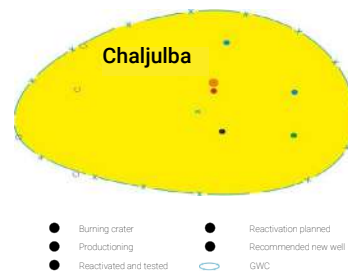
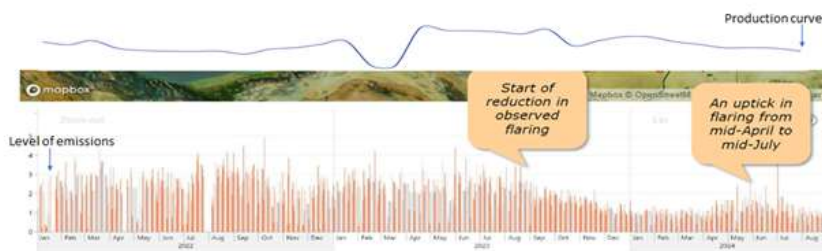
Organized emissions, that is,

those that are an integral part of the production process. These include the combustion of methane on technological flares during gas-dynamic studies and well development after the completion of drilling and repair work. Additionally, emissions of exhaust gases occur as combustion products of hydrocarbon fuels from various units such as engines, compressors, and power installations.

Unorganized emissions, which are largely caused by emergency situations or uncontrolled leaks. These involve the depressurization of equipment under operational conditions due to leaks in threaded and welded joints; leaks from shut-off and control valves of surface equipment; and accidental damage to equipment and pipelines caused by corrosion.

It is evident that organized emissions can be avoided by improving gas extraction technology and well operation, while unorganized emissions can be minimized through constant monitoring and control of equipment conditions and timely replacement of worn and damaged components.

Unorganized emissions also include the burning of the Chaljulba crater. In 1963, an exploratory well was drilled on the Chaljulba structure of the Zeagli-Derveze group of fields. However, at a



relatively shallow depth, an accidental release of natural gas occurred, resulting in the collapse of the upper soil layers and the formation of a crater. To prevent poisoning of people and animals by gas, the crater was ignited. It was assumed that the gas would burn out within a few days or that the productive layer would become flooded, as had occurred in other structures 5–7 kilometers away, where two more craters exist. The mud crater has almost dried up, and the water crater is filled with azure-colored water with a smooth surface. However, because the Chaljulba structure is a multilayered field, the supply of gas to the crater continues to this day.

Nowadays, with Turkmenistan's accession to the Global Methane Pledge, concrete steps are being taken to contribute to collective efforts to reduce global methane emissions by at least 30% by 2030 compared to 2020 levels.

Currently, only one well is operational at the Chaljulba field, while decommissioned exploratory wells are under conservation.

However, studies conducted by specialists at the Scientific Research Institute of Natural Gas of the State Concern «Turkmengaz» have shown that gas extraction has already yielded noticeable results—the intensity of combustion has significantly decreased. Previously, a vast blazing glow was visible for many kilometers around, but now only small combustion sites remain.

This fact is confirmed by satellite imagery data from Capterio, which clearly demonstrate a significant reduction in combustion (by more than two times) during the period from September 2023 to February 2024, when intensive gas extraction was carried out in the autumn-winter period.

In the summer, due to seasonal fluctuations in gas consumption leading to reduced production, satellite images show a slight increase in combustion intensity. Subsequently, with the increase in the flow rate of the producing well in early autumn, a decline in combustion levels was observed. In July 2024, a short-term significant increase in combustion was recorded—this was the result of commissioning a well that was previously in the observation fund, as the standard commissioning procedure involves flaring the well for 48–72 hours. A high inflow of low-pressure gas was obtained from a depth of 200 meters. Low reservoir pressure is another indicator that the gas supply feeding the burning crater is decreasing, and the only correct solution is to intensify the process of gas extraction from the field.

As previously proposed, the drilling of a new well near the crater has been completed. This well has been tested, yielding a high-flow influx of low-pressure gas. The next stage of work involves reactivating two additional existing decommissioned wells.

By utilizing a total of five wells, it will be possible to intensively extract gas from the upper productive layers and halt the influx of natural gas into the crater. According to numerous forecasts by major analytical centers, oil and natural gas will maintain their roles in the global energy balance at least until 2050. However, a more pressing question is not only how much oil and gas will be needed and where to discover new fossil resources but also how to rationally extract already explored reserves and use them while reducing emissions harmful to the environment, wildlife, and humans. Today, on the eve of COP29, we can take pride in the fact that scientifically substantiated management of gas filtration pathways has led to a significant reduction in flaring and methane emissions.



-TGI-

Aspiring Excellence Through Innovation



Dragon Oil wide focus on performance, profitability, efficiency, and people while maintaining the highest standards of safety, environment protection, and asset integrity. Growth remains essential for the company's sustainable future.

Ali Al Jarwan
CEO

Member of the ENOC Group

dragonoil.com



Celebrating progress on flaring and methane in Turkmenistan



MARK DAVIS
CEO, Capterio

Exclusively for Turkmen Energy Newsletter

Strategically positioned between East and West, Turkmenistan is endowed with abundant hydrocarbon reserves and significant renewable energy potential.

To strengthen its economy and actively engage in the energy transition, Turkmenistan has a significant opportunity to accelerate recent progress in reducing emissions from flaring and methane. There is significant potential in the short term (yielding significant climate benefits) to reduce waste and monetise this gas, whether for domestic consumption or export, or electricity generation. In the longer term, Turkmenistan could lead energy transition initiatives, including exporting power to Europe or neighbouring countries via cable, monetising sulphur, becoming a regional hub for carbon capture and storage (CCS), expanding wind and solar energy, and building export industries around green hydrogen and other green products - and more.

Recent research from Capterio and Kayrros highlights encouraging progress in recent months.

As we approach COP29 in Baku, now is the time to not only reflect on these developments but also celebrate the achievements.

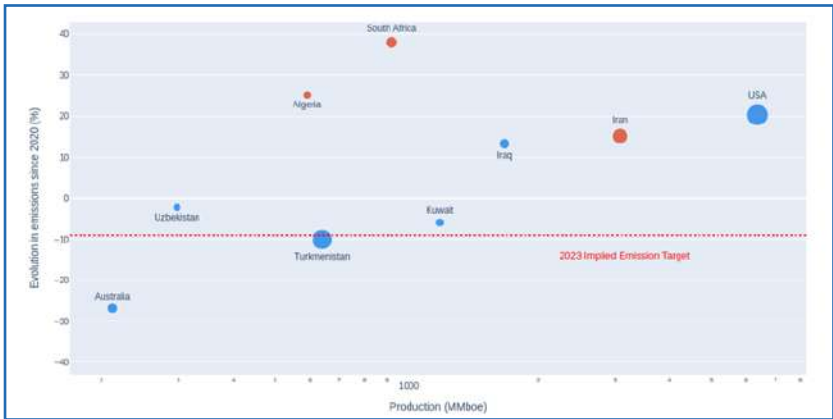
Take flaring as an example: more than 80 flares burn 1.3 billion cubic metres of gas per year (according to

the World Bank). Capterio's FlareIntel Pro technology platform, which tracks flares daily at every asset, offers a powerful tool that helps (a) to improve visibility, (b) to drive operational excellence, and (c) to prioritise investment opportunities.

We are pleased to see continued progress at the Darvaza Crater (first highlighted by Capterio in April), where flaring has significantly reduced compared to a year ago, thanks to the leadership and recent interventions of Turkmengaz.

Our satellite analytics confirm that flaring at Darvaza has decreased by approximately 1 million standard cubic feet per day. This recovered gas could enhance regional gas supplies and generate a few megawatts of electricity, whilst also reducing emissions of CO₂ and methane. Looking ahead, there are further opportunities to develop flare capture projects, as shown on the map. This is especially important for operators that have endorsed to the World Bank's "Zero Routine Flaring" (by 2030) programme.

Now consider methane, emitted from unlit flares, incomplete combustion, vents, and leaks. Since methane is a highly potent greenhouse gas, making reductions here is imperative for the climate. The International Energy Agency's Global Methane Tracker estimates that methane emissions from venting and leaks amount to



Above: chart from Kayrros report highlighting progress (or lack of) by country. Turkmenistan and Australia alone show material reductions.

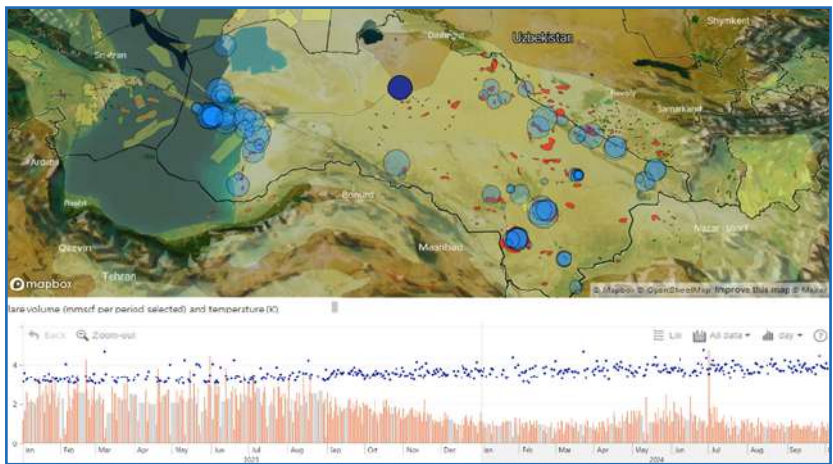
5 million tonnes annually (7.5 BCM/a), equivalent to 150–420 million tonnes of CO2-equivalent emissions annually.

A recent Kayrros report notes that Turkmenistan is one of the few countries to have reduced its emissions (by roughly 10%) since signing the Global Methane Pledge three years ago (see chart).

There are clear opportunities to accelerate this progress, helped in part by the UN's International Methane Emissions Observatory (IMEO) programme. Unlit flares and vents should be a priority for short-term action, as burning methane to produce CO2 has far less impact on the climate than releasing methane itself. This will become even more critical when the EU introduces its methane performance standard on imported gas, and reductions could potentially be monetised through international carbon markets.

These advancements are a testament to the leadership and dedication of both national leaders, international partners and operators on the ground. Now, more than ever, we must not only applaud their progress but also provide the support and investment needed to ensure we can achieve even greater outcomes—together.

For more information about how Capterio's helps companies to reduce flaring, create value, improve energy security and accelerate the transition, please see www.capterio.com.



Above: chart from Capterio's FlareIntel Pro tool highlighting the significant reduction in flaring at the Darvaza Crater since August 2023, driven by Turkmengaz's interventions



«As the world accelerates its efforts to combat climate change, Turkmenistan shines here as a beacon of inspiration. With COP29 set to take place in this region, it is an opportune moment to recognise recent progress»



CNPC

ОТДАЧА ЭНЕРГОРЕСУРСОВ
СОЗДАНИЕ ГАРМОНИИ

www.cnpc.com.cn



From Gas To Green – Bridging the Energy Connectivity Gaps Between Central Asia and EU



**MURMAN
MARGVELASHVILI**

Director, Energy Studies,
World Experience for Georgia

Exclusively for Turkmen Energy Newsletter

EU Energy Security and Climate Challenges

As climate change accelerates, the pressure to phase out fossil fuels and develop renewable energy grows. The EU, with its 2050 Net Zero goal, is recognized as a global leader in climate policies and an attractive market for green electricity and low-carbon fuels. However, despite this decarbonization push, Europe’s demand for natural gas remains critical to stabilize energy security. Russia’s invasion of Ukraine has further disrupted gas supplies, prompting the EU to urgently seek alternative sources. Natural gas must therefore serve as a transitional fuel in Europe’s energy shift and pipeline gas can be a more predictable alternative compared to LNG being developed globally.

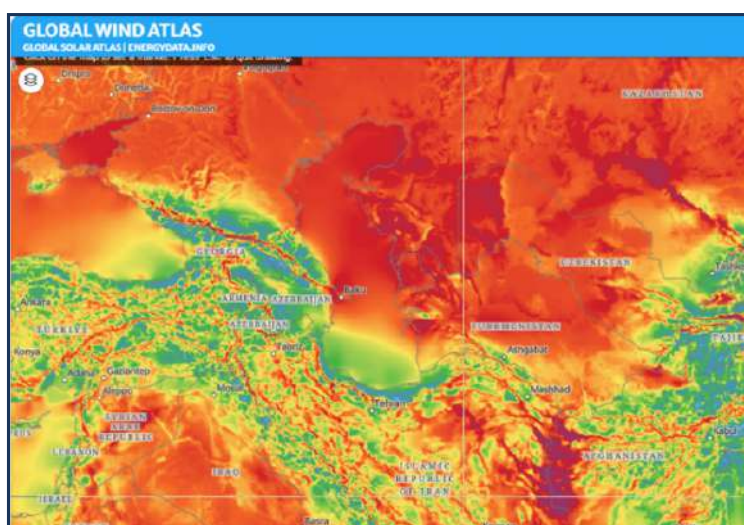
EU’s Focus on the East

The EU is increasingly turning to the

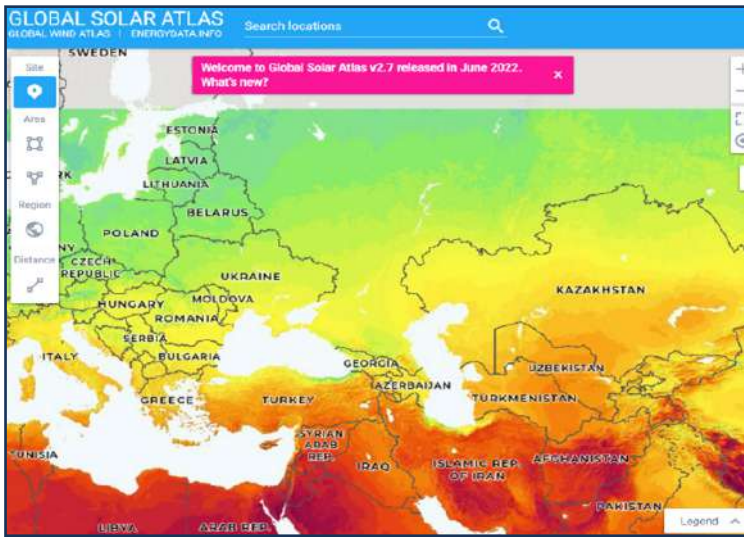
Caucasus and Central Asia (CCA), where Azerbaijan and Turkmenistan possess significant gas reserves that could provide short- to medium-term relief for energy security. A memorandum of understanding with Azerbaijan of 2022 aims to double gas supplies to EU through the Southern Gas Corridor by 2027. The EU has also shown interest in connecting to Turkmenistan, and Turkey is active in bringing Turkmen gas to the EU. Yet, developing new gas infrastructure remains challenging due to investor uncertainty over future demand and the risk of stranded assets, given the global move toward renewables. Financing large-scale projects like the Trans-Caspian Gas Pipeline (TCP), whether for 30 bcm/y or a smaller 8-10 bcm/y version, remains uncertain. Additionally, the further routes from the TCP to the EU remain to be defined.

Renewable Energy Potential in Central Asia

Central Asia is not only rich in gas but also has outstanding potential for renewable energy. The region’s large, wind-swept plains and sunny semi-deserts next to low salinity Caspian Sea are ideal for generating solar and wind power and exporting vast amounts of electricity, hydrogen, and ammonia, making the CA a competitor to Australia, Chili, and other prospective green energy hubs globally. There is already an HyrAsia One project with announced 40GW plans, starting with 2GW, in Kazakhstan, the similar projects or production of blue hydrogen from natural gas and carbon storage could be initiated in Turkmenistan. However, the feasibility of these projects hinges on the development



Wind map of CCA region



Solar map of CCA region

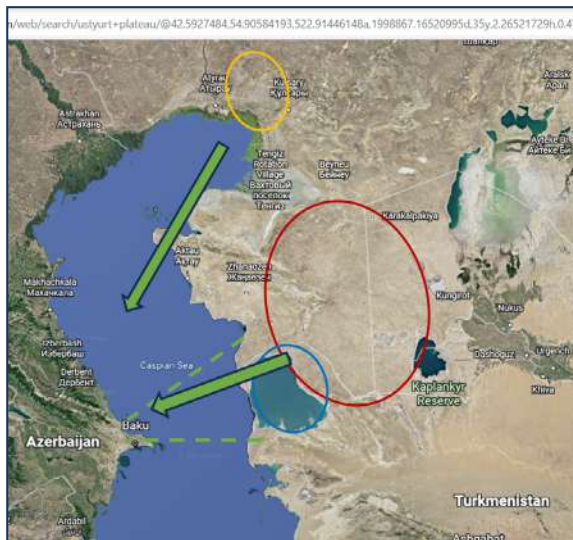
of efficient evacuation routes—whether pipelines or alternative transportation methods—which are challenging to finance and implement due to their scale and the uncertainty in future demand.

Dual-Use Infrastructure as a Solution

A viable solution for financing both natural gas and low-carbon projects could be the development of dual-use infrastructure—pipelines and facilities initially designed for gas transportation but convertible to hydrogen or ammonia. The Trans-Caspian Gas Pipeline could be constructed with this flexibility in mind, which would ease its further integration through the Black Sea or Turkey. There can be various options to consider. E.g. the original size 30 bcm/y TCP could be extended by the White Stream pipeline over the Black Sea or by TANAP 2 over Turkey, both adaptable for hydrogen. A smaller TCPs of 8-10 bcm/y capacity could be connected to the Black Sea LNG export terminal (AGRI) through a new pipeline along the Baku-Supsa route (WREP2) - convertible to ammonia. Additionally, the 1-1.5GW Black Sea power cable could export green electricity from CCA. Thus, a new Gas to Green Energy Corridor could be created with the diversified set of energy carriers, transportation routes and diversified political and security risks.

Challenges Ahead

Developing such flexible infrastructure is not without challenges either. Pipelines like White Stream, which would run across the bottom of the Black Sea, and a parallel TANAP2 across Turkey would require significant investment and technical solutions for adaptability. Moreover, the uncertainty around future hydrogen demand adds risk to such projects. A major challenge of agreement between various multinational stakeholders may render this task formidable. However, the pressing urgency of responding to climate change is likely to be an increasingly compelling argument for such decisions, thus unlocking the green energy hub of regional and global importance and addressing energy security problems together. This opportunity warrants deeper exploration and political engagement to realize mutually beneficial solutions for the countries involved.



Potential flows of low carbon and green energy



Potential Dual-Use convertible projects in CCA region





Geothermal Energy Innovations



REJEPMYRAT
ISHANKULYEV

Candidate of Technical Sciences, Associate Professor,
Department of Technical Sciences, Military Institute of the
Ministry of Defense of Turkmenistan

The transition from fossil fuels to renewable energy sources is an imperative for humanity in the fight against greenhouse gases.

This is due to the frequent and devastating weather catastrophes occurring worldwide, caused by greenhouse gases, which inflict enormous damage on humanity. Despite significant advancements in harnessing solar and wind energy, their growth rates are insufficient to combat greenhouse gases. As a result, the average global temperature continues to rise by an average of 0.01°C per year and has reached 1.5°C this year.

The last two decades of renewable energy development have shown that reducing greenhouse gas emissions and transitioning to clean energy is impossible without utilizing the Earth's thermal energy, which is abundant and sufficient to produce green hydrogen, electricity, and thermal energy in the quantities needed to meet human demand. This is evidenced by the results of research conducted by the Massachusetts Institute of Technology, which found that 2000 ZJ of usable thermal energy is released from the Earth's core to its surface annually. Meanwhile, the total amount of energy consumed by humanity each year is only 0.025% of this energy. Despite this, according to the International Energy Agency, the share of geothermal energy in the global energy balance is only 0.3%, and in 2030, it will be only 0.5%.

Modern geothermal energy for electricity generation primarily utilizes hydrothermal resources, characterized by heat, permeability, and a heat transfer fluid (steam, steam-water mixture, or hot water) to extract the Earth's thermal energy.

The reasons for the low utilization of the Earth's thermal energy are related to the heat transfer fluid:

- Insufficient resource and/or flow rate of

the heat transfer fluid in the geothermal resource.

- Contamination of steam with carbon dioxide (CO₂), hydrogen sulfide (H₂S), ammonia (NH₃), methane (CH₄), and other gases.
- Contamination of the steam-water mixture with gases, sodium chloride (NaCl), boron (B), arsenic (As), mercury (Hg), and other chemical elements and compounds.
- High mineralization of hot water.
- Temperature of the heat transfer fluid below 107°C.

There are significantly more dry areas with hot rocks on Earth, containing vast amounts of thermal energy.

Enhanced Geothermal Systems (EGS) are seen as a promising avenue for developing geothermal energy, offering opportunities to harness the thermal energy from these areas.

A recent breakthrough in EGS technology comes from Fervo Energy (USA). The company has pioneered the use of two horizontal wells in hard rock to create fracture zones between them. This method addresses some of the previous drawbacks of EGS, such as the loss of steam in geothermal reservoirs. However, the electricity produced by EGS is currently not cost-competitive.

Based on this analysis, to develop geothermal energy, innovative methods of generating geothermal energy that are independent of the heat carrier in geothermal sources need to be created. One such method is the Gas-Based Geothermal Power Generation, where the heat carrier is a boiling liquid. This method requires the following conditions for electricity generation:

- Heat, with a ground temperature of 600°C or more. In conditions of low negative ambient temperatures, the ground temperature may be below 600°C.
 - A well depth of up to 2000 meters, depending on the ground temperature at the bottom of the well.
 - A well diameter of 500 mm or more.
- As can be seen, this innovative method of

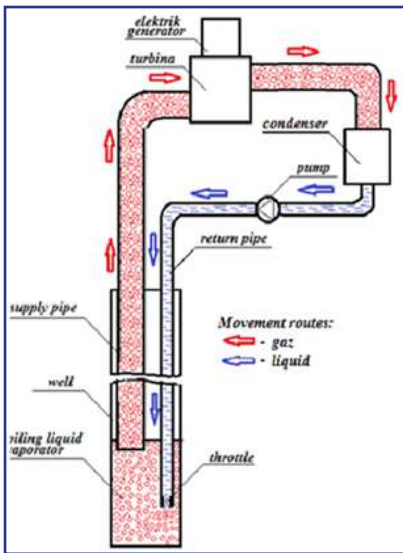


Fig. 1. Principle of operation of a Geothermal Power Plant (GPP)

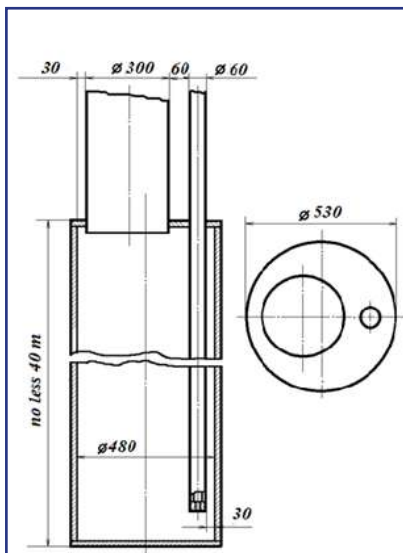


Fig. 2. Example of a geothermal power plant evaporator design

geothermal power generation depends solely on the well parameters. At a depth of 2000 meters, the ground temperature is usually more than 600°C. Therefore, there is an opportunity to organize the production of geothermal electricity in a larger part of the Earth.

The Gas-Based Geothermal Power Generation is based on the principle of operation of the invention WO 2024/047406 A2 Geothermal Power Plant operating on a boiling liquid (hereinafter referred to as the Geothermal Power Plant) (Fig. 1).

In the Geothermal Power Plant, the Earth's thermal energy is extracted using a boiling liquid gas formed in the

evaporator located at the bottom of the well. The liquid in the return pipe before entering the evaporator is under high pressure created by gravitational force. For example, at a well depth of $h = 2000$ m, the liquid pressure is $p = 10-15$ MPa, depending on the density of the boiling liquid. In the evaporator, the pressure of the throttled liquid drops significantly and it vaporizes. Heat exchange between the ground surrounding the evaporator housing and the gas allows the production of gas with the necessary working pressure and temperature for generating electricity (Fig. 1).

The movement of the liquid and the boiling liquid gas in the Geothermal Power Plant in a closed loop «evaporator - turbine - condenser - pump - evaporator» is carried out due to natural forces - gas pressure and the force of gravity of the liquid (Fig. 1).

Figure 2 presents an exemplary design of a geothermal power plant evaporator.

The energy transition will be complete with the global energy sector's shift to green hydrogen. However, the development of hydrogen energy faces significant challenges. The primary challenge is the high cost of green hydrogen. According to the IEA, it currently ranges from \$3 to \$7.5 per kilogram.

The high cost of green hydrogen is due to the high electricity consumption of the water electrolysis process. For example, producing hydrogen through high-temperature electrolysis of water is the most productive technology. However, it requires significant electrical and thermal energy; for instance, producing 1.1 tons of hydrogen requires 39.4 MWh.

Various attempts to provide the water electrolysis process with cheap electricity produced by renewable energy sources have so far been unsuccessful. This problem can be solved by producing hydrogen using geothermal energy according to the scheme.

This operating scheme is the basis for the principle of operation of invention WO 2024/052735 A2 - Geothermal Hydrogen Production Complex. In the complex, the liquid and gas of the boiling liquid circulate in a closed loop «boiling liquid evaporator - turbine - compressor - water evaporator - water heater - water preheater - boiling liquid evaporator».

In the complex, the gas is extracted from the turbine and compressed by a compressor, resulting in an increase in gas temperature.

The thermal energy of the gas is used to generate steam from water sourced from a natural body (ocean, sea, lake, or river). The water is preheated in a preheater and heated to 800°C in a heater. The hot water is converted into steam by injecting it through spray nozzles into the water evaporator chamber with a temperature exceeding 1200°C. Steam from the water evaporator is fed to a high-temperature water electrolysis unit using a compressor and heated to 800-1000°C by electric heaters for electrolysis using electricity generated by the complex's electric generator.

To organize the production of green hydrogen, it is advisable to utilize the thermal energy of magmas from supervolcanoes, volcanoes, and tectonic faults located at depths of 2-4 km.

Economic calculations performed using methodologies developed by Verkís Consulting Engineers and the Iceland GeoSurvey (ISOR) have determined the cost of electricity and green hydrogen produced by the described geothermal installations. A comparison of the cost of electricity generated by the Geothermal Power Plant at \$0.04/kWh with the cost of electricity at \$0.03-\$0.05/kWh as established by the US Department of Energy shows that it falls within promising values. Comparing the cost of green hydrogen produced by the Geothermal Hydrogen Production Complex at \$1.71/kg with the cost of hydrogen produced from natural gas at \$1.7/kg indicates that it is competitive.

Therefore, large-scale deployment of Geothermal Power Plants and Geothermal Hydrogen Production Complexes will allow for the production of competitively priced electricity and green hydrogen, enabling the completion of the energy transition from fossil fuels to renewable energy sources by 2050. To achieve this, it is necessary to start active development and field testing of pilot projects for Geothermal Power Plants and Geothermal Hydrogen Production Complexes this year, as the increasing frequency and severity of destructive weather events leave no time for prolonged deliberation.



OUR GOAL IS TO DESIGN A
BETTER FUTURE FOR PEOPLE

TIF 2024 | TURKMENISTAN INVESTMENT FORUM

TURKMENISTAN INVESTMENT FORUM



On September 10 -11, Ashgabat hosted the Turkmenistan Investment Forum 2024 (TIF 2024), a significant platform for discussing the country's development and investment prospects and strengthening international ties. Over the two-day forum, 18 agreements and memorandums were signed covering various sectors of Turkmenistan's economy, including energy, the chemical industry, textiles, transport, and environment protection.

TIF 2024 brought together over 600 delegates from 46 countries, underscoring the international community's interest in cooperating with Turkmenistan. More than 100 bilateral meetings were held to strengthen economic and investment ties.

The business program of TIF 2024 encompassed key topics of Turkmenistan's economic development, such as public-private partnerships, digital transformation, and environmental sustainability. The forum opened with a plenary session on investment prospects in the country, where government representatives and international organizations discussed the growth strategy. Discussions on developing a green economy, digital technologies, and smart agriculture took center stage, underscoring Turkmenistan's commitment to innovation.

Representatives of many international companies attended TIF 2024, including major players such as Mitsubishi, Sumitomo Corporation, Hyundai Corporation, Wirtgen International GmbH, Petronas, CNPC, Caspian Logistics Solutions, and many others. Japanese corporations, like Mitsubishi and Sumitomo, expressed interest in developing Turkmenistan's chemical industry and automotive market.

Other participants included DAEWOO Engineering & Construction Co. Ltd., the Korean Association of Shipbuilding and Offshore Engineering (KOMEA), and numerous Turkish companies, such as Astaş Endüstri Tekstil Makinaları Sanayi ve Ticaret A.Ş. and Calik Energy.

International organizations like USAID and S&P Global shared their vision for developing agriculture and the green economy. Particular attention was paid to the prospects of applying smart technologies in Turkmenistan's agricultural sector, which could significantly reduce costs and increase efficiency.

One of the key highlights of the forum was the opening of new projects on the Turkmen-Afghan border, including the Serhetabat-Turgundi railway bridge, the foundation for the "Shatlyk-1" gas compressor station, and the groundbreaking of the Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline's section from Serhetabat to Herat. An optical fiber communication line and other infrastructure projects were also initiated, further strengthening regional connectivity.

The forum also served as a platform for discussing Turkmenistan's role in global initiatives, such as the digitalization of customs procedures and the country's accession to the World Trade Organization. We are delighted to share a presentation made by the deputy chairman of SC "Turkmenogas" Myrat Archaev and Head of the Renewable Energy Development Department of the State Energy Corporation «Turkmenenergo» Dovlet Allayarov.



Turkmenistan's Energy Transition: Expanding the Role of the Oil and Gas Industry



MYRAT ARCHAYEV
Deputy Chairman, SC «Turkmengaz»

The Government of Turkmenistan, under the leadership of the Esteemed President, is committed to enhancing the country's oil and gas industry as a vital player in the international energy transition. As one of the largest energy-rich nations globally, Turkmenistan boasts substantial proven gas reserves, particularly highlighted by the Galkynysh gas field, recognized as the second largest in the world. This remarkable field was validated by the independent British firm Gaffney, Cline & Associates, further solidifying Turkmenistan's position as the fourth-largest holder of proven gas reserves globally.

Development of the Galkynysh Gas Field

The development of the Galkynysh gas field is structured in several phases. In the initial stage, three gas purification and processing plants were constructed and are currently operational. Presently, Turkmenistan is in negotiations with leading global oil and gas companies to advance the second and third phases of development, in accordance with the nation's Law on Hydrocarbon Resources.

To enhance the country's gas pipeline system and create new flow routes, Turkmenistan has successfully built the East-West gas pipeline. Spanning 800 kilometers with an annual capacity of 30 billion cubic meters, this pipeline connects the gas-rich eastern region of Turkmenistan with the western areas, enabling natural gas

transport to the Caspian Sea shores.

A significant milestone was achieved with the recent laying of the foundation stone for the Shatlyk gas compressor facility within the Shatlyk gas complex. This facility is poised to play a crucial role in boosting the export capacity of Turkmen natural gas derived from key fields, including Galkynysh, Dovletabat, and Yashlar.

Future Projects and International Collaboration

Looking ahead, the Turkmengaz state concern has ambitious plans to implement various large-scale gas projects. These include the construction of underground gas storage facilities and the Zakli-Derweze gas purification facility within the Central Garagum gas and gas condensate complex. Additionally, modernization initiatives such as the installation of data collection and SCADA systems, smart gas metering devices, and the renovation of existing gas compressor facilities are on the agenda. These projects will be executed in partnership with foreign contractors selected through international competitions.

Turkmengaz is actively seeking collaboration with large foreign companies and financial institutions to attract investments for these critical projects, including the strategic Turkmenistan-Afghanistan-Pakistan-India (TAPI) gas pipeline.

Legal Framework for Investment

Turkmenistan's legal framework is designed to provide reliable protection for investors and their capital. The laws governing Hydrocarbon Resources, Foreign Investments, the Circulation of Foreign Funds, and Investment Business align with international legal standards, ensuring a stable environment for business ventures.

Invitation to Global Partners

The Turkmengaz state concern extends an invitation to global business partners to engage in investment opportunities across various oil and gas projects. By fostering international collaboration, Turkmenistan aims to reinforce its position in the global energy landscape while contributing significantly to the international energy transition.

In summary, Turkmenistan's dedication to developing its oil and gas sector, coupled with robust legal protections and a focus on international partnerships, positions the nation as a pivotal player in the future of global energy supply.



AUGUSTE
OIL & ENERGY

LEADING THE FUTURE

We are renowned for supplying industrial equipment such as power plants, turbines, reactors, generators, filtration systems, and general plant facilities from major global manufacturers.

In addition to providing the sophisticated operational maintenance of large-sized equipment, both at a customer's site and authorized service centers.

Partner with Auguste International to anchor, enhance and strengthen your presence in Turkmenistan and the region beyond.

Auguste International
Office No: 109-0 119-132
Shaikha Mariam Building
Dubai, UAE.

+971 56 635 9328
contact@augusteint.com
www.augusteint.com





Turkmenistan's Commitment to Renewable Energy: A Sustainable Future



DOVLET ALLAYAROV

Head of the Renewable Energy Development Department of the State Energy Corporation «Turkmenenergo»

Legal Framework for Renewable Energy

In March 2021, the Law of Turkmenistan “On Renewable Energy Sources” was adopted, establishing a comprehensive legal, economic, and social foundation for the use of renewable energy. This legislation aims to regulate the relationships arising from renewable energy utilization, paving the way for a more sustainable energy landscape.

To further this commitment, a research and production center focused on renewable energy sources was established at the State Energy Institute in Mary. This center plays a crucial role in training specialists, exploring new technologies, and fostering international collaboration in renewable energy development.

International Collaboration and Membership

Turkmenistan is an active member of the International Renewable Energy Agency (IRENA) and collaborates with various international organizations, including the United Nations Development Program, the Organization for Security and Cooperation in Europe, and the Asian Development Bank. This cooperation enhances the country's capacity to implement effective renewable energy strategies and access global expertise.

National Strategies and Programs

To bolster fuel and energy supply routes, improve living conditions in remote areas, and support sustainable development goals, Turkmenistan has approved several strategic documents. Notable among these are the «National Strategy of Turkmenistan for the Development of

Renewable Energy Sources until 2030» and the «Program for the Development of Energy Diplomacy in Turkmenistan for 2021-2025.» These initiatives align with the objectives of the Paris Agreement on Climate Change, emphasizing the transition to clean and affordable energy.

In recent years, the government has introduced significant programs to enhance energy efficiency and innovate in renewable technologies. This includes the «State Program on Energy Saving for 2018-2024» and the «Concept of Development of the Turkmen Lake Region 'Altyn Asyr' for 2019-2025.» As part of the latter, a solar and wind power plant with a total capacity of 10 megawatts has been successfully established in the Gyzylarbat district.

Advancements in Energy Production

In 2018, Turkmenistan commissioned a combined cycle power plant with a capacity of 1,574 megawatts at the Mary State Power Plant, utilizing harmful waste heat from gas turbines to generate approximately 550 megawatts. This innovative approach not only enhances energy production efficiency but also contributes to waste reduction.

Furthering its commitment to renewable energy, Turkmenistan initiated the construction of another combined cycle power plant in the Balkan velayat in November 2023. Plans are also underway to transition the Ahal and Dashoguz state power stations to compatible circulation systems, aligning with the national goals for renewable energy.

«Turkmenistan's electric power industry serves as the backbone of its national economy, driving progress across all sectors of life. This vital industry not only meets domestic demands but also facilitates electricity exports to neighboring countries, underscoring its significance in the nation's development strategy. As Turkmenistan advances, the government prioritizes sustainable practices that ensure environmental protection and responsible resource management for future generations»

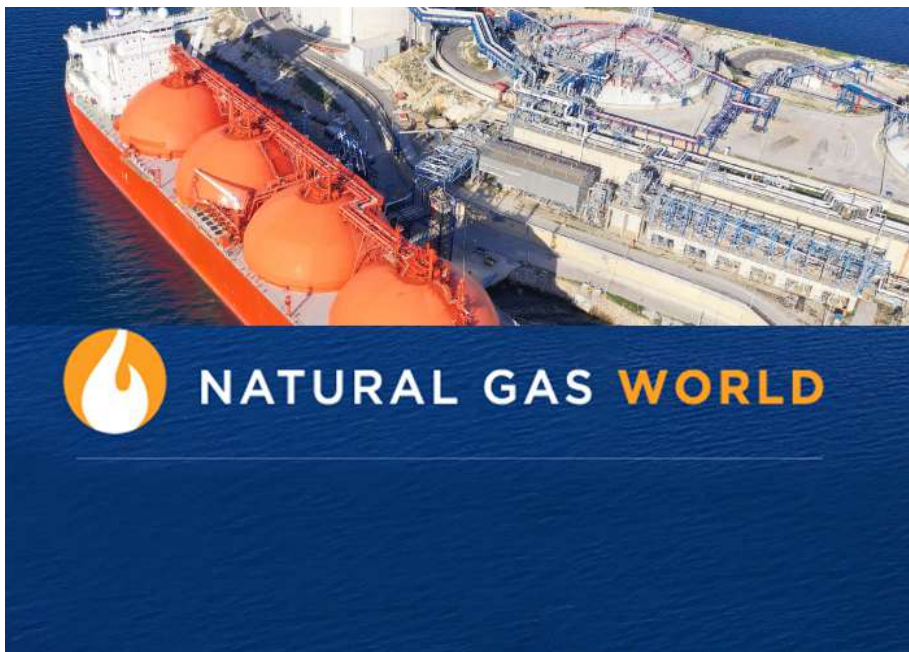
Challenges and Future Directions

Transitioning to fully renewable energy sources presents challenges for all nations. It necessitates the exploration and development of new technologies for harnessing renewable energy. Turkmenistan recognizes the importance of innovative approaches to minimize environmental impact and reduce hazardous waste.

By focusing on renewable energy development, Turkmenistan not only aims to enhance its energy security but also positions itself as a responsible player in the global fight against climate change. The government's proactive strategies and investments reflect a commitment to creating a sustainable future that benefits both the economy and the environment.

In conclusion, Turkmenistan's dedication to renewable energy development exemplifies a holistic approach to economic growth and environmental stewardship. Through legislative measures, international collaboration, and strategic investments, the country is poised to lead in sustainable energy practices, ensuring a brighter future for generations to come.





NATURAL GAS WORLD

China's latest Natural Gas Development



In collaboration with
Center on Global
Energy Policy at Columbia
University | SIPA

Exclusively for Turkmen Energy Newsletter

China's latest Natural Gas Development Report shows the nation made gains last year in efforts to restructure its natural gas market, increasing domestic production and consumption; boosting imports of liquefied natural gas; adopting technologies to boost domestic exploration and production and cut emissions; and reforming pipeline transmission tariffs. The new tariffs are likely to help grow natural gas supplies, reduce end-user costs and increase consumption. The world's top importer of natural gas now supplies about 60 percent of its demand with domestic supplies, thanks in part to reforms aimed at increasing domestic supplies and consumption. As the world takes on many challenges from climate change and energy transition, China's use and views of natural gas in its energy mix are critically important. In this blog, the authors explore these key takeaways from the 2023-2024 report.

Industry and city-gas drove China's natural gas consumption in 2023

In 2023, China consumed 394.5 billion cubic meters (bcm) of gas, a year-on-year increase of 7.6 percent. Industry and city gas, which includes residential and transport use, accounted for most of the incremental demand growth of 28.2 bcm. While industry was the largest contributor to this growth (12.3 bcm) and the largest sectoral consumer, city gas was the fastest-growing

sector (Table 1). Its double-digit increase was partly due to the "explosive growth" of heavy-duty trucks powered by LNG. Indeed, 152,000 LNG-powered heavy-duty trucks were sold in 2023, a year-on-year increase of 307 percent. This growth continued in the first half of 2024, with sales of LNG-fueled heavy-duty trucks surging by 104 percent year-on-year. These sales contributed to an 8.7 percent year-on-year increase in China's natural gas consumption to 210.8 bcm in the first half of 2024. Sales continued to grow year-on-year in July but fell in August due to the increase in LNG prices, the narrowing of oil and gas price differentials and the absence of new policy support.

More than 40 percent of Chinese domestic gas production was from unconventional sources in 2023

In 2023, China produced 232.4 bcm domestically, an increase of 12.3 bcm or 5.6 percent over 2022. Domestic output met some 59 percent of China's total demand, keeping import dependence at 41 percent, unchanged from last year. According to the report, 43 percent of domestic gas production, 97 bcm, was from unconventional sources (Figure 1).

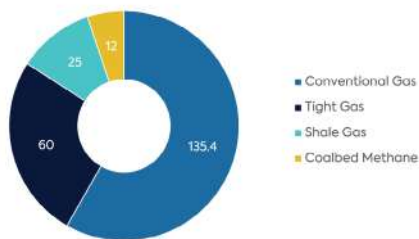
China has been investing heavily in domestic oil and gas exploration, development and production (E&P) since 2019, partly due to Chinese leader Xi Jinping's July 2018 instruction to China's national oil companies (NOCs) to increase domestic E&P.[6]

Table 1: China natural gas consumption by sector in 2023

Sector	Consumption (bcm)	Increase 2023 vs 2022 (bcm)	% China Total	% Change Over 2022
Industrial fuel	165.7	12.3	42%	8%
City gas	130.2	11.8	33%	10%
Power generation	67.1	4.4	17%	7%
Fertilizer	31.6	0.0	8%	0%
Total	394.5	28.2	100%	7.6%

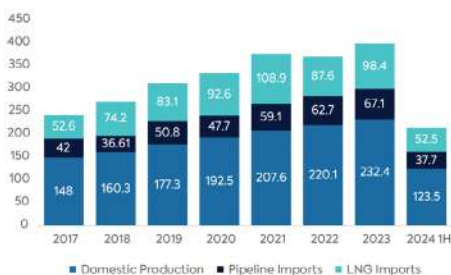
Source: China Natural Gas Development Report (2024)

Figure 1: China Gas Production 2023 (Total 232.4 bcm)



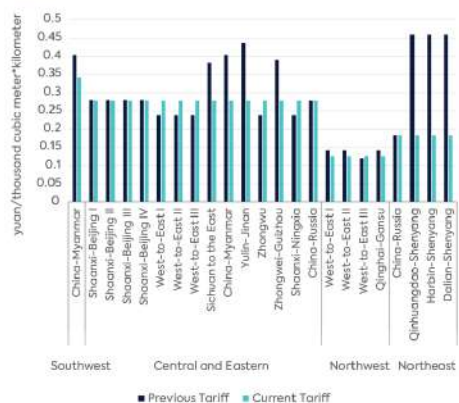
Source: China Natural Gas Development Report (2024)

Figure 2: China Gas Supply from 2017-2024 1H (in billion cubic meters)



Sources: China Natural Gas Development Reports

Figure 3: Changes in Transmission Tariffs for Select Pipelines



Source: "China to Cut Gas Pipeline Transmission Tariffs from Jan. 1, 2024," Mysteel, January 1, 2024, <https://finance.sino.cn/futuremarket/gsxz/2023-12-29/detail-imzsuqiw3464304.d.html?source=hfquote>

In 2019, the three major NOCs released their first ever seven-year plans to intensify E&P in 2019-2025. Xi subsequently announced that China must reduce dependence on imported oil and gas. Chinese NOCs have implemented this strategy with significantly higher capital investment in domestic E&P. The three major NOCs collectively increased their domestic gas production by 43 percent in 2018-2023, setting new production records last year.

China's LNG imports rose by over 12 percent

China continues to import more LNG than pipeline gas (Figure 2). In 2023, 59 percent of China's natural gas imports of 165.5 bcm were LNG and 41 percent were pipeline gas. The country's LNG imports rebounded by growing 12.3 percent, and China replaced Japan as the world's

- largest LNG importer on an annual basis.
- However, China LNG imports remained below their peak of 108.9 bcm (or 79.5MT) in 2021.
- Australia, Qatar, Russia, and Turkmenistan supplied nearly three-quarters of China's natural gas imports. New long-term supply contracts signed by Chinese buyers and growth in China's regasification capacity indicate that China's LNG imports will probably continue to grow. Chinese imports increased by over 14 percent during the first half of 2024.

China made technological breakthroughs to promote natural gas production and consumption

The report highlighted a number of technological breakthroughs consistent with China's emphasis on independent research, design and production of key equipment to counter the perceived risk of potential Western technology export bans directed at China. Four new technologies are worth noting. The first two aim to facilitate energy transition and emission reduction, while the second two aim to explore and develop oil and gas either in deepwater settings or deep-seated reservoirs:

1. Simultaneous power generation using geothermal energy from hot water, encountered in deep oil and gas development wells
2. Power generation by using pressure differentiation from natural gas. [14] This is claimed to be a net zero emission technology.
3. Independently developed "Hai-Jing" system[15] to reduce noise levels to conduct high-resolution 3D seismic surveys in ultra-deepwater (>3,000m) areas such as the South China Sea.
4. Automated rigs for ultra-deep (>12,000m) drilling, deployed in the Tarim Basin in western China.

Pipeline transmission tariff reform moves forward

On January 1, 2024, China implemented a new pipeline transmission tariff system for inter-provincial pipelines operated by PipeChina, which controls more than 60 percent of the country's oil and natural gas pipelines. The new system replaces 20 tariffs with one each for four zones: Northwest, Northeast, Southwest, and Central and East. It aims to further the objective for which Beijing established PipeChina in 2019 – the creation of a unified national pipeline network to increase supplies, lower end-user costs and boost consumption.

Although the new system has reduced tariffs across China, some pipelines now have higher tariffs while others have lower ones (Figure 3). The Northwest is the zone with the lowest tariff, probably because it is a strategic import channel

for natural gas from Central Asia. The second lowest tariff is for the Northeast, which is a strategic import channel for Russian gas. The highest tariff is for the Southwest; it only contains the China-Myanmar pipeline, the tariff for which has declined by 15 percent. Several pipelines in the Central and East, the country's main natural gas consumption center and a transit zone, now have higher tariffs.

The new system is likely to lead to an increase in China's natural gas supply and consumption. The zonal tariffs should make it easier for downstream companies to shop around for cost-competitive supplies because it is easier to compare prices. This, in turn, should lead to lower upstream costs as producing companies compete against each other to secure customers.

Gas market conditions in 2024 seen as favorable to China's goals

China sees a well-supplied global gas market, leading to a volatile but generally declining price environment it believes will be supportive of the "recovery and improvement" of its gas market. The report anticipates lower global gas demand growth due to weak global economic recovery, especially in the manufacturing sector. There are, however, a number of risk factors such as geopolitical tensions, sanctions and anti-sanction moves, and extreme weather conditions.

The report projects that China will consume 420 – 425 bcm of gas in 2024, an increase of 6.5 – 7.7 percent over 2023. It also expects domestic gas production to reach 246 bcm, and imports to rise to 174-179 bcm. As Table 2 indicates, these projections indicate that China gas demand might grow more slowly in 2024 than in 2023 and the previous six years, whereas growth in total gas imports might be significantly lower than in 2023 and in the past 6 years, as domestic production continues to rise at a pace higher than that of 2023.



On the road to COP29: What to expect? [Global Gas Perspectives]



PREPARED BY
NATURAL GAS WORLD

Exclusively for Turkmen Energy Newsletter

The top priority for COP29 is to agree to a new climate finance goal, known as the New Collective Quantified Goal (NCQG). COP29's president-designate Mukhtar Babayev confirmed that the NCQG is the main priority of the COP29 Presidency. It is for this reason that COP29 has been dubbed a "Finance COP." But the Summit Action Agenda, announced by Babayev, lacked any direct mention of transitioning away from fossil fuels.

The message from Simon Stiell, UN climate chief, to governments mid-October was that COP29 should be "an enabling COP, delivering concrete outcomes to start translating the pledges made in last year's historic UAE Consensus into real-world, real-economy results". He called for a "quantum leap" in climate finance – "a new deal between developed and developing countries."

The top task for this year's COP is to agree a new climate finance goal to start in 2025. But that will not be easy. For a start, globally money is tight, and climate finance needs are huge and rising. And on top of this there is increasing pressure on richer developing countries, such as China, Saudi Arabia, the UAE, India and Brazil, to step in to help out poorer countries, but this is meeting a great deal of resistance.

Even Europe, the largest contributor to climate finance, is facing problems, with pressure to cut public spending increasing. Both the UK and France have cut their foreign-aid budgets. As Stiell admitted, "it's hard for any government to invest in renewables or climate resilience when the treasury coffers are bare, debt servicing costs have overtaken health spending and new borrowing is impossible." A view in Europe is that "rich countries would only step-up funding if China starts paying-up."

An additional challenge is that many developing countries are calling for more international public climate finance to be provided in the form of grants, rather than loans, something that rich country voters will balk at. In fact, Indian environment minister Bhupender Yadav said developing countries need more than \$5 trillion to meet their climate goals by 2030.

There are signs of convergence on how a new global climate finance goal should be structured and towards a big funding pot – well above \$1tn annually – that will include wider sources, such as private-sector investments and loans and "anything else that can be counted," in addition to public funding. As a climate activist put it, "if they could, rich countries would probably like to count the sun, the moon, and grandpa's old socks as climate finance too." Nevertheless, success depends greatly on ensuring that political and economic realities are taken into account. This is expected to go to the wire.

An additional concern -given the uncertainty introduced

by the forthcoming presidential elections- is that the US has not yet defined a funding level or a timeline, but has said that it expects contributions from all sources, including from the richer developing countries.

Another priority for COP29 is to agree on the long-awaited rulebook for a new UN carbon market. This appears to have taken a step forward following the approval earlier in October by the UNFCCC Supervisory Body of carbon market safeguards to protect environment and human rights. Under new rules, "developers of projects under the UN's new Article 6.4 carbon crediting system will be required to identify and address potential negative environmental and social impacts as part of detailed risk assessments," through the adoption of a new "Sustainable Development Tool."

The Supervisory Body also agreed on guidance for the "development of carbon-credit methodologies and carbon removal activities aimed at ensuring that emission reductions claimed by projects are credible." But these still need to gain approval at COP29.

With the Paris Agreement requiring parties to put forward new NDCs every five years, 2025 will be a crucial year for the submission of NDCs and National Adaptation Plans (NAPs). These are expected to enhance ambition across all pillars of the Paris Agreement. As Stiell said: "The new national climate plans due early next year will be among the most important policy documents produced so far this century, as will adaptation plans."

Babayev confirmed that COP29 priorities include "contributing to transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, as governments agreed to do at COP28 last year." This was a first, but in the recent Bonn climate talks countries struggled to make further progress. A key group, with the unlikely name of "Like-Minded Group of Developing Countries" (LMDCs), which includes China, Saudi Arabia and India, frustrated any discussions on the subject. As a result, not much progress is expected to be achieved this year, despite pressure from Europe.

The Bonn talks also failed to reach agreement on the Mitigation Ambition and Implementation Work Programme (MWP), a key programme to cut emissions and limit warming, forcing Stiell to warn of "a very steep mountain to climb to achieve ambitious outcomes" at COP29.

This will be an implementation COP, with the presidency focusing on turning COP28 pledges into concrete actions. There is an urgent need to secure increased funding for the Loss and Damage, the Green Climate and the Adaptation Funds. Without such increased funding flowing to projects in developing countries, Stiell warned that "we will quickly trench a dangerous two-speed global transition." "We need a new climate finance deal."

The US/China factor

Critical to a deal and the success of COP29 will be the US/China factor – how the world’s top polluters and energy users cooperate. The US top climate diplomat John Podesta met China’s Liu Zhenmin in September and discussed their new targets to cut greenhouse gas emissions by 2035, as well as climate finance.

Podesta pressed China to come up with ambitious plans to cut greenhouse gas emissions by 2035, while Zhenmin impressed the US to “maintain consistency with policies and make concerted efforts with China to cope with global challenges.” They discussed their efforts to tackle methane and nitrous oxide emissions and committed to co-host a summit on these topics at COP29. They also expressed their intention to continue discussion and cooperation in advancing efforts to halt and reverse forest loss by 2030.

Podesta and Zhenmin committed to support Azerbaijan for successful outcomes at COP29, including agreeing a new NCQG on climate finance and making breakthroughs in texts for Article 6 under the Paris Agreement.

However, the global competition between China and the US in energy transition technology, and the related commodity challenge and China’s commanding position in the supply chains for clean energy, require that the two countries find an acceptable level of coexistence in the global energy system.

China will be going to COP29 from a position of strength. It has already met its 2030 renewables targets and it looks as if its greenhouse gas emissions are on the way to peak this year. But it is still rolling out new coal-fired power plants.

COP29 takes place between November 11 to 22, just after the US presidential elections on 5 November, under the shadow of the threat by Donald Trump -if elected- to “withdraw from global climate action.”

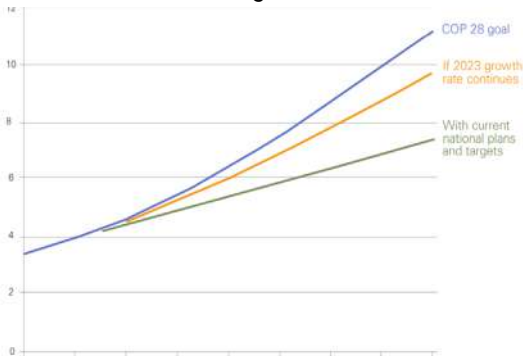


Figure 1: Renewable energy projections

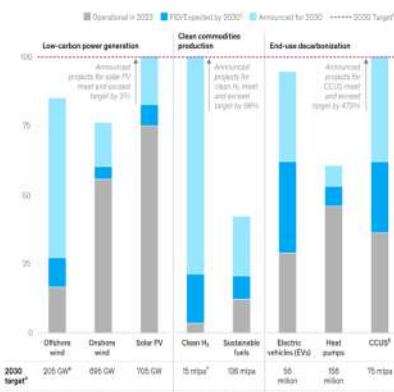


Figure 2: Technology deployment pipeline in EU and the US

World is off track for COP28 renewable and energy efficiency targets

During COP28 about 200 countries committed to a target to triple renewables by 2030, considered to be a critical step towards achieving net zero by 2050. A report this year by the International Renewable Energy Agency (IRENA) warns that despite record growth in renewables in 2023, current national plans will only deliver half of the growth needed to achieve this target (see figure 1).

IRENA added that annual investments in renewables are just over a third of the \$1.5 trillion needed each year until 2030. The IEA also warned that meeting COP28 goals requires a doubling of clean energy investment by 2030 worldwide. With deep divisions still persisting on agreeing a new climate finance goal, NCQG, achieving the 2030 renewables target remains a challenge.

IRENA also said that little progress has been made in boosting energy efficiency, still stuck at an improvement rate of 2%. The needs to double to at least 4% annually through 2030 in order to meet the COP28 target.

These challenges were confirmed in a timely new report, *The energy transition: Where are we, really?*, released by McKinsey Global Institute in August. This sheds light on the current status of the energy transition in the US and Europe based on assessing “the alignment between ambitious climate targets and actual progress on the ground.”

The report warns that “many clean energy projects touted as signs of progress on decarbonisation remain unfinished, creating a ‘reality-gap’ between the perceived uptake of new technology and the actual capital invested.” It states “across several key technologies, clean hydrogen and carbon capture utilisation and storage (CCUS) were found to have the widest gap between the number of projects planned and those really taking shape” (see figure 2)

Many projects have not reached their final investment decisions, the analysts say, and are at risk of being cancelled or scaled back.

The question remains whether the world’s much-needed commitments can be translated to action

McKinsey’s analysis of targets and announcements highlights a potential disconnect between climate ambitions and what is likely to be achieved in practice – at least based on the current course and speed.

McKinsey concludes that even though a lot of progress has been made since the 2015 Paris Agreement, “at the current pace Europe and the US risk missing important 2030 climate targets across critical technologies.”

“Right now, we’re only at about 10% of the deployment of ‘physical assets’ -technologies and infrastructure- that we will need to meet global commitments by 2050. This is not an abstract dollar number, or goal, or theoretical pathway. It’s the physical world that exists around us today. So, despite all the momentum, we’re still in very early stages of the energy transition.”

Facing this hard truth, innovation and policy resets will be needed, including the pace of transitioning away from oil and natural gas.

Despite the progress made by renewables, they are not growing fast-enough to keep-up with the growth in global energy demand resulting from improving living standards, increasing cooling needs and AI data centers.

Evidently, during the energy transition oil and gas will continue to be important to the global energy mix, especially as, despite massive investments, the penetration of renewables in sectors other than electricity is very low.

As Energy Institute’s Statistical Review of World Energy has shown, globally, electricity demand grew by 2,5% in 2023, much the same as in 2022, and comprised 17,4% of global primary energy demand, only marginally up on the 17,3% in 2022. At this rate, energy transition will be a long-drawn process.

The bottom line is that natural gas is hard to replace and will have a key role to play in global energy consumption all the way to 2050 and likely beyond. But more effort should be made to reduce emissions – now at an all-time high – and make natural gas use as efficient as possible. Replacing coal with natural gas and eliminating methane emissions must be a priority.

At a joint meeting in June, the IEA and the COP29 Presidency focused on turning COP28 pledges to cut methane emissions into action, Babayev said “tackling methane emissions will be essential to delivering the COP29 Presidency’s plan to enhance ambition and enable action...through finance and technology so that we can deliver our promises.”

Maintaining oil and gas reserves and production to support this demand is critical to global energy security. The oil and gas majors have been making this point for a while, but, importantly, major international banks and lenders are coming to a similar conclusion.

In the meanwhile, COP29 is expected to be a lower-profile summit than COP28. Many are already “looking ahead to COP30 in Brazil, which – given the submission of new NDCs in 2025 – is anticipated to carry greater significance.”



NATURAL GAS WORLD



The peril of underestimating energy demand [Global Gas Perspectives]



PREPARED BY
NATURAL GAS WORLD

Exclusively for Turkmen Energy Newsletter

The International Gas Union (IGU) has warned of energy shortages arising by the end of the decade, while also cautioning against too much reliance on “target-orientated scenarios” published by the International Energy Agency (IEA) and other institutions to determine future energy demand.

Energy demand has surged, as developing regions need more of it for urbanisation and industrialisation, and growth in demand in developed nations continues in spite of efficiency gains and structural declines in certain sectors, the IGU, which represents more than 150 members in over 80 countries covering more than 90% of the global gas market, said in its Global Gas Report 2024 on August 27. Other factors driving growth include the expansion of power-intensive technologies and rising temperatures that increase cooling demand, along with the ongoing electrification of transport and buildings.

The rise in demand challenges assumptions underpinning “target-orientated scenarios,” as mapped by institutions like the IEA, the IEEJ and Rystad Energy, the IGU said.

“If energy use continues to evolve as it has in recent years, actual demand will significantly diverge from scenario pathways, potentially leading to a significant gap between demand and planned supply of gas and low-CO2 demand,” the IGU said.

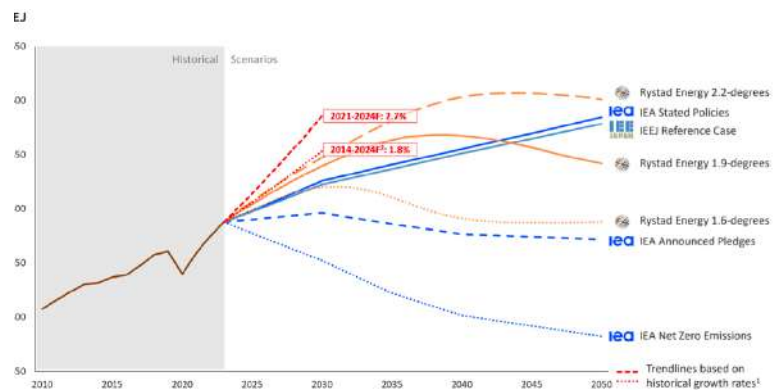
Between 2021 and 2024, global energy demand has risen by 2.7% annually, and if that growth rate continues, the world will be consuming 586 EJ by the end of the decade, it said.

However, “all the diverse energy demand scenarios examined ... assume that the growth rate of global energy demand will significantly decelerate towards 2050,” the report said. These scenarios assume “a flattening and eventual decline in demand,” but this has not been seen except in periods of severe disruption such as during the COVID-19 pandemic, which triggered a slump in economic activity and energy demand.

Notably even in Europe, where developed

countries have experienced weak economic growth and industrial decline in recent years, in part because of the high cost of energy, demand for energy continues to grow, the IGU said. In North America, demand is now higher than it was in 2019 and continues climbing, driven by increased use in the transport sector and the rise of AI data centres. In Asia, demand is also surging, particularly as a result of industry growth in India and China. Africa’s energy demand is growing at a faster rate than most other regions, supported by urban development. But there is still not enough energy access, and this is also a significant challenge in parts of South America.

Global final energy demand scenarios from various institutions



Great uncertainty

The IEA's scenario, which aims to plot a course towards net zero emissions from the energy sector by 2050, puts global energy demand at 452 EJ by 2030. This is 134 EJ higher than the IEA's forecast based on the trend seen in the last few years, and this difference is twice the annual consumption of Europe. Even according to the IEA's state policy scenario, described as "a more conservative benchmark for the future," the gap is 60 EJ, so roughly the same as Europe's demand.

The IGU also noted that even in the Japan-based IEEF's "reference scenario" and Rystad's outlook that factored in previous trends in energy consumption, the difference in projections reaches 64 EJ. Rystad's scenario that limited global warming to 2.2 C had the smallest gap, of 39 EJ.

The high level of uncertainty about energy demand "has profound implications for investment decisions, energy infrastructure development and technology planning, and reconciling scenarios with forecasts is necessary to inform prudent policy."

Ultimately, scenarios are not forecasts and rely on assumptions about the ability of policy to impact energy consumption patterns, behavioural changes and technology adoption rates, the IGU said.

"Scenarios are analytically informed proposals of a possible future. Forecasts, on the other hand, project energy demand based on research into trends observed in actual historical demand to determine the most likely outcome for the future," it said. "Neither of those instruments are a perfect predictor of the future, but when planning investment, it is critical to consider both."

Fragile equilibrium

Following great upheaval, the global gas market is now in a "fragile equilibrium," the IGU said. Demand is rising steadily – by 1.5% in 2023 and predicted to climb by a further 2.1% this year – but supply growth is limited. Asia remains the key driver of demand growth, while North America and the Middle East are leading the increase in exports. Since the energy crisis began in late 2021, the overwhelming majority of newly-sanctioned LNG export capacity has been in the US and Qatar. If gas demand continues growing at the same pace as in the last four years and there is no additional production, there will be a 22% shortfall in supply by 2030, the IGU said. If demand rises faster, the shortfall will be even greater, it warned, stressing the need for investments to be scaled up.

The amount of coal that is burned globally increased more than ever last year, with the fuel remaining the biggest source of energy emissions.

"Natural gas today provides an immediate opportunity to cut emissions from coal by 50% and from oil by 30% through cost-effective switching," the IGU said.

Biomethane, a direct substitution for natural gas, is also being developed at significantly below its potential, it added. Biomethane currently accounts for around 1% of the gas market, and it is mainly produced in North America and Europe, although new production hubs are emerging in China and India. Likewise CO2 capture capacity is still far below the level needed, even though it will be critical for a successful energy transition, the IGU said, and the same is true for low-carbon hydrogen.

"These technologies will play a critical role in decarbonising energy supply (especially in hard-to-abate sectors) and ensuring its resilience. Scaling them is essential, calling for urgent investment and enabling policies to start building the growing volumes of project proposals."

Natural gas plays a pivotal role in balancing the energy trilemma of sustainability, security and affordability, the IGU said in its conclusion. "As we look ahead, the potential supply and investment gap in gas and other low-CO2 energies calls for immediate attention. It is essential to cross-check scenario pathways with actual forecasts to avoid misalignment and ensure that the energy supply keeps pace with evolving demand."



NATURAL GAS WORLD

TURKMEN ENERGY EVENT IN 2025 INCLUDE:



TEIF 2025

TURKMEN ENERGY INVESTMENT FORUM

Turkmen Energy Investment Forum

23-24 April, 2025



TESC 2025

TURKMEN ENERGY SCIENTIFIC CONFERENCE

Turkmen Energy Scientific Conference

5 June, 2025, Ashgabat, Turkmenistan



OGT 2025

INTERNATIONAL CONFERENCE & EXPO

**The 30th “Oil & Gas of Turkmenistan - 2025”
International Conference & EXPO**

22-24 October, 2025, Ashgabat, Turkmenistan