

Roudi Baroudi, CEO, Energy & Environment Holding Qatar Distinguished Confirmed Speaker 9th Mediterranean Oil & Gas Forum 2018



9th Mediterranean Oil and Gas Forum 2018 Overview

The Mediterranean Oil and Gas Forum has been established as the prime industry event of Eastern Mediterranean. It is an annual commercial platform that was inaugurated 9 years ago by the leading Energy Ministers of the region.

U.S. Energy Stream will organize the **9th Mediterranean Oil and**

Gas Forum 2018 on 27 & 28 March, 2018 at the Hilton Park in Nicosia, Cyprus.

The recent upstream gas discoveries in Cyprus, Israel, and Egypt reflect the future growth of hydrocarbons in the region. The Forum is a unique opportunity for energy leaders to engage in a productive dialogue with government decision makers and international investors.

The 9th Mediterranean Oil & Gas Forum 2018 will bring together government and energy leaders to promote American and European energy investments in Cyprus and Eastern Mediterranean.

This year's topic is "The development of East Mediterranean gas and its impact on the European gas market." The focus will be on commercial agreements from American and European oil majors and independents in the Cypriot, Israeli, Egyptian, and Greek gas markets.

The Forum is a private, closed door, off-the record, non-attribution, and non-dissemination meeting enabling private discussions and networking.

**مقترحات للدبلوماسية الأميركية
"أخرى غير خط" هوف**



خلافاً لما تردد بأن وزير الخارجية الأميركي ريكس تيلرسون أعاد التذكير بخط الدبلوماسية الأميركية فريدريك هوف بما يتصل بالنزاع مع إسرائيل على البلوك 9 ضمن المنطقة الاقتصادية الخالصة، تبين من خلال الجولة التي أجراها الجمعة مساعده لشؤون الشرق الأدنى ديفيد ساترفيلد، على المسؤولين اللبنانيين لمتابعة محادثات تيلرسون في بيروت، ان للدبلوماسية الأميركية مقترحات أخرى غير خط هوف الذي يرفضه المسؤولون اللبنانيون، الا ان هؤلاء رفضوا الكشف عن طبيعة هذه المقترحات، أو التأكيد عمّا إذا كانت تتصل بإجراء مفاوضات رباعية مباشرة يُشارك فيها لبنان وإسرائيل والولايات المتحدة والأمم المتحدة على مستوى دبلوماسي لا عسكري، أو الذهاب إلى خيار التحكيم الدولي لبت النزاع مع إسرائيل حول الأراضي لصالحه.

غير ان مصدراً مطلعاً مقرباً من الرئيس نبيه بري في عين التينة التي زارها ساترفيلد بصحبة السفارة الأميركية اليزابيث ريتشارد، بعد لقائهما وزير الخارجية جبران باسيل في قصر بسترس، وقبل لقاء رئيس مجلس الوزراء سعد الحريري في "بيت الوسط"، أوضح لـ"اللواء" ان ساترفيلد طرح تعديلات على "خط هوف" الا ان الرئيس بري أبلغه بأن هذا الطرح مرفوض وغير قابل للدرس.

ورفض المصدر الكشف عن طبيعة الطرح الأميركي الجديد، واكتفى بالتأكيد ان ساترفيلد تبلغ الموقف نفسه من الرئيس الحريري والوزير باسيل.

اما مصادر الخارجية فقد اشارت لـ"اللواء" إلى ان ساترفيلد الذي يتوقع ان يتوجه إلى إسرائيل في الساعات المقبلة لاستكمال وساطته بين الطرفين، نقل أجواء إيجابية عن زيارة تيلرسون إلى بيروت. بمحطاتها الثلاث، وتحديدًا مع الرئيس ميشال عون.

وأضافت ان اللقاء جاء تكملة لاجتماع باسيل مع تيلرسون والذي تركز حول المبادرة الأميركية لحل مشكلة الحدود وترسيمها والنقاط

الخلافية مع إسرائيل، وأن ساترفيلد قدم مقترحات سوف يدرسها باسيل على أن لا تتناقض مع ثوابت المواقف اللبنانية التي اتخذت سابقاً، وأن باسيل أصرّ على أن يكون القرار اللبناني متخذاً تحت مظلة الوحدة الوطنية والإجماع الوطني بعيداً من التفرد.

وكانت مصادر اطلعت على محادثات تيلرسون مع المسؤولين اللبنانيين أوضحت أن المسؤول الأميركي ابلاغهم بأن الاقتراح الذي أشار إليه مساعده ساترفيلد يعطي مكاسب للبنان قد لا تكون مضمونة في حالات "أخرى، إلا أنه لم يسم "خط هوف

وقالت أن تيلرسون أكدّ على ضرورة معالجة الخط الأزرق مع الخط الأبيض لكي يكون ذلك مدخلاً لحلحلة الوضع في الجنوب، مشيراً إلى أن ما قدم من مقترحات في هذا المجال مناسب لحلحلة الوضع، لافتاً إلى أن مصلحة لبنان يمكن أن تتأمن بمثل هذا الحل، مع انفتاح على الاقتراحات يمكن أن تكون مشجعة على تسوية يتم التوصل إليها

خلفاً لما تردّد بأن وزير الخارجية الأميركي ريكس تيلرسون أعاد التذكير بخط الدبلوماسية الأميركية فريدريك هوف بما يتصل بالنزاع مع إسرائيل على البلوك 9 ضمن المنطقة الاقتصادية الخالصة، تبين من خلال الجولة التي أجراها الجمعة مساعده لشؤون الشرق الأدنى ديفيد ساترفيلد، على المسؤولين اللبنانيين لمتابعة محادثات تيلرسون في بيروت، أن للدبلوماسية الأميركية مقترحات أخرى غير خط هوف الذي يرفضه المسؤولون اللبنانيون، إلا أن هؤلاء رفضوا الكشف عن طبيعة هذه المقترحات، أو التأكيد عملاً إذا كانت تتصل بإجراء مفاوضات رباعية مباشرة يُشارك فيها لبنان وإسرائيل والولايات المتحدة والأمم المتحدة على مستوى دبلوماسية لا عسكري، أو الذهاب إلى خيار التحكيم الدولي لبث النزاع مع إسرائيل حول الأراضي لصالحه.

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**ROUDI BAROUDI – Athens Energy
Forum February 15-16, 2018**



ROUDI BAROUDI

Athens Energy Forum February 15-16, 2018 Presentation

New Energy era for Europe “there for the taking”





ATHENS: Offshore gas from the Eastern Mediterranean could usher in a new era of energy independence and economic renaissance for Europe, a regional energy expert told a high-profile industry conference in Athens on Friday.

“Almost instantly, the flow of East Med gas into Europe would mean additional diversification and flexibility of supply, closely followed by enhanced competitiveness for European industry, accelerated economic growth, and dramatic long-term improvements for public finances,” Roudi Baroudi, a veteran of more than 36 years in the oil and gas business, told the Athens Energy Conference.

While “East Med gas would be more of a complement than a competitor to supplies already flowing ... from Russia” and other countries, he explained, other factors were also likely to help Europe diversify its energy supply, putting downward pressure on prices and “reducing the potential impact of possible interruptions elsewhere”.

Baroudi, who currently serves as CEO of Energy and Environment

"Shale gas has made America another energy superpower alongside Russia and OPEC, and liquefied natural gas is now a fully fledged global commodity," he said. "Plus, the East Med producers will be sitting on Europe's doorstep, and several countries are already gearing up to start taking massive LNG shipments. Decades of benefits for hundreds of millions of people, all there for the taking."

Athens Energy Forum 2018

Energy Security and Strategic Investments: The Way Forward



Game-changer: "Shale O&G puts America on global energy stage"

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And expected producer countries like Cyprus, Greece, and Lebanon, Baroudi added, stand to gain even more. "For a variety of historical reasons, most of these countries have not yet achieved the levels of development enjoyed in most of the European Union," he told the conference. "Given the potential rewards for their peoples, the governments involved have nothing less than a moral responsibility to take advantage of propitious circumstances by tapping the oil and gas wealth within their respective social, economic, and geopolitical reaches." Baroudi also has emphasized some of East Med countries are not party to UNCLOS but all countries are signatories to the UN Charter. Therefore, Baroudi reminded that all these countries are under an obligation to "settle their international disputes by peaceful means in such a manner that international peace and security, and justice, are not endangered."

He also sounded notes of caution, however. For one thing, he

stressed the need for producer countries to ensure proper management of the proceeds from gas sales to pay social justice. For another, he reinstated on the same countries to avoid international tensions that might impede development of the sector.

ATHENS ENERGY FORUM 2018 – Energy Security and Strategic Investments: The Way Forward

AGENDA

THURSDAY | February 15

11.30 Participants Arrival – Registration

12.00 WELCOME REMARKS: Achilles Tsaltas, Vice President, International Conferences, The New York Times

12.10 OPENING SPEECH: George Stathakis, Minister of Energy and Environment, Hellenic Republic

12.30 REMARKS: Konstantinos Skrekas, MP – New Democracy Party, Head of Energy and Environment Sector,

1. Minister of Development and Competitiveness, Hellenic Republic

12.40 REMARKS: Prof. Yannis Maniatis, MP, Democratic Coalition, f. Minister of Environment, Energy & Climate Change

Introduction & Chair: Symeon Tsomokos, Founder & Chairman, Delphi Economic Forum

12.50 Panel 1: The Global Geopolitical Parameters

- *Diversification of energy sources to bring about energy independence for the region*
- *The impact of Brexit on EU Security & Energy Policy*

Kate Smith, British Ambassador to the Hellenic Republic

Steven Bitner, Economic Counselor, U.S. Embassy, Athens

Energy sector as a leveraging tool despite geopolitical challenges

Nabil Fahmy, Dean, School of Global Affairs & Public Policy, American University of Cairo, f. Minister of Foreign Affairs, Egypt

Defne Sadiklar-Arslan, Executive Director, Atlantic Council Turkey

Introduction & Chair: **Athanasios Ellis**, Editor in Chief, Kathimerini English Edition

13.45 Networking Break – Light Lunch

14.30 Panel 2: Strategic Privatization Opportunities in the Energy Sector

Laurent-Charles Thery, Director for International Development, GRTgaz

George Longos, Managing Partner, Alantra

Introduction & Chair: **Achilleas Topas**, Journalist, SKAI Media Group Co-hosted by

14.50 Panel 3: Completing the Midstream Puzzle: Exporting Gas from the Eastern Med and the Caspian Sea

- Progress report on IGB and the dynamics of a second LNG

- imports facility in Alexandroupolis
- TAP: Progress Report and Phase 2
- The feasibility of the East Med Gas Pipeline
- The LNG export option

The View from Greece

Dimitrios-Evangelos Tzortzis, CEO, Public Gas Corporation – DEPA, Greece

Sotiris Nikas, President & CEO, Hellenic Gas Transmission System Operator – DESFA, Greece

Panayotis Kanellopoulos, Managing Director, M&M Gas S.A., Greece

The View from the Region

Ron Adam, Ambassador, Special Envoy on Energy, OECD coordinator, Ministry of Foreign Affairs, Israel

Katerina Papalexandri, Country Manager Greece, TAP

Albert Nahas, Vice President, International Affairs, Tellurian Inc., U.S.A.

Dr. Theodore Tsakiris, Assistant Professor, Geopolitics & Hydrocarbons, University of Nicosia, Cyprus & Scientific Adviser Athens Energy Forum

Introduction & Chair: **Alex Lagakos**, Founding Chairman, Greek Energy Forum| Member, Sustainable Energy Committee

United Nations Economic Commission for Europe

16.00 Networking Break

16.30 Panel 4: The Domestic and Regional Electricity Market Dynamics

ADMIE: The day after the ownership unbundling

Manousos Manousakis, Chairman and CEO, Transmission System Planning Department, IPTO S.A., Greece

- *The continuous need for complete market liberalization*
- *Progress report on the Inter-connectivity between the Islands and Mainland Greece*

Prof. Nikos Chatziargyriou, Chairman & CEO, Hellenic Electricity Distribution Network Operator S.A.- HEDNO, Greece

Stavros Goutsos, Deputy CEO, Public Power Corporation, Greece

Dinos Benroubi, General Manager Electric Power Business Unit, MYTILINEOS, Greece

Introduction & Chair: **Dr. Athanassios S. Dagoumas**, Assistant Professor in Energy and Resource Economics, University of Piraeus

17.15 End of the 1st Day of the Forum Co-hosted by

FRIDAY | February 16

09.30 Arrival of Delegates – Coffee/Tea

10.00 KEYNOTE SPEECH: Dr. Stelios Himonas, Permanent Secretary, Ministry of Energy, Commerce, Industry and Tourism, Cyprus

10.15 Panel 5: Regional Upstream Developments: Political, Regulatory and Economic Challenges

- The results of Cyprus' Third Licensing Round and the Onisiphoros Discovery
- Future exploration prospects in Egypt and Israel and Lebanon's untapped potential
- The entry of Exxon and Total in the Greek Upstream market
- Lebanon – The award of 2 offshore Blocks to TOTAL / ENI / Novatek

The national perspective

Yannis Bassias, President & CEO, Hellenic Hydrocarbons Resources Management S.A., Greece

Yannis Grigoriou, General Manager Exploration & Production of Hydrocarbons, Hellenic Petroleum SA

The regional perspective

Dr. Constantinos Hadjistassou, Ass. Professor, School of Sciences & Engineering, University of Nicosia

Bernard Clement, Vice President for Caspian and Southern Europe, Total E&P, France

Roudi Baroudi, CEO, Energy & Environment Holding, Qatar

Introduction & Chair: **Dr. Theodore Tsakiris**, Assistant Professor, Geopolitics & Hydrocarbons, University of Nicosia, Cyprus &

Scientific Adviser Athens Energy Forum

11.15 Networking Break

11.45 Panel 6: Sustainable development – climate change and energy

- Making energy technologies cleaner
- Responsible steps to cut carbon pollution
- Winning the global race for clean energy innovation

The evolving policy framework

Dr. Dionysia Avgerinopoulou, f. Chairman of the Standing Committee for the Environment of the Hellenic Parliament

Konstantinos Xifaras, Secretary General, World Energy Council, Hellenic National Committee

A focus on cleaner and alternative fuels

Dr. Spyros Kiartzis, Manager New Technologies & Alternative Energy Sources, Hellenic Petroleum S.A.

Dionissis Christodouloupoulos, Managing Director, MAN Diesel & Turbo Hellas Ltd, Greece

Introduction & Chair: **Zoi Vrontisi**, Chairwoman, National Center for the Environment & Sustainable Development Co-hosted by

12.30 Panel 7: RES, Energy Efficiency and Technological Innovation

- RES as a means of energy security
- Energy efficiency technologies as a new area for growth
- Overcoming regulatory hurdles for RES development

Harris Damaskos, Associate, EBRD

Professor Xenophon E. Verykios, Managing Director, Helbio Hydrogen & Energy Systems, Greece

Zisimos Daniil Mantas, Chief Business Development Officer, Eunice Energy Group, Greece

Introduction & Chair: **Miltos Aslanoglou**, Energy Regulation Expert, Greece

13.00 End of Forum

Cyprus new gas discovery holds 6 to 8 tcf, ENI says



A natural gas field offshore Cyprus is believed to hold between six and eight trillion cubic feet, Italian energy firm ENI has said.

Speaking at an industry event in Cairo on Monday, CEO Claudio Descalzi said an appraisal well would have to be drilled to understand the real volumes of a recent discovery at Calypso 1, which was announced last week.

Asked whether it is believed to hold around 6 to 8 trillion cubic feet, Descalzi said: "It could be more or in that range... for sure it cannot be less but we have to understand it ... It's a good find that has merit to go ahead with additional investment."

An analysis of data following a collection of fluids and rock samples revealed that Calypso "is a promising gas discovery and confirms the extension of the 'Zohr-like' play" into the Cypriot EEZ, ENI said in a company statement.

Zohr, a supergiant gas field discovered by ENI in 2015 in adjacent Egyptian waters, holds an estimated 30 trillion cubic feet (tcf) of resources in place.

Eni has been present in Cyprus since 2013 and has interests in six licenses located in the EEZ of Cyprus (in Blocks 2, 3, 6, 8, 9 and 11), five of which are operated.

The gas in the new discovery will presumably be exported, since Cyprus's potential for consumption of natural gas is estimated at just 1 BCM annually. Cyprus still uses polluting fuel oil to produce electricity. To abide by the European program for reducing polluting emissions and to switch to using natural gas immediately, Cyprus is gearing up for imports of liquefied natural gas.

Up to now, only one gas reservoir, Aphrodite, has been discovered in Cypriot waters. Aphrodite is owned by Noble Energy and Shell. The reservoir, which contains 4.5 TCF of natural gas, was discovered in 2010, and has yet to be developed.

Renewable energy fast becoming a consumer utility

One step forward and countless steps back. That's the general feeling about the past year. The world's effort to tackle climate change was hindered when the Trump Administration backed out of America's commitment to the Paris Climate Accord whilst

still supporting the use of fossil fuels. But, lost in the kerfuffle of sceptics are great stories of progress and advancements made by nations and private organisations with their warm embrace of renewable energy, many in America itself. Here's a look at 2017's biggest climate change and renewable energy headlines:

- 1) China to invest \$361bn into renewable fuel by 2020 (January 4)
- 4) The world's largest energy market continued its effort to shift from coal to cleaner fuels with a massive \$361bn

investment in renewable energy. Wind, hydro, solar and nuclear will contribute to over half of the new power generated by 2020, along with creating 13mn jobs in the sector. China will also invest over 1tn yuan (~ \$150bn) on solar power, adding close to 1,000 more plants and increasing the solar power capacity by five folds.

2) In the US, there are now twice as many solar workers as coal miners (February 7) Though accounting for just 1.3% of America's electricity, solar power now hires twice as many people as the coal industry.

As more people equip their homes and businesses with solar panels, the labour-intensive nature of installation and maintenance is creating demand for workers.

3) Eleven EU members have already met renewable energy targets (March 14) The EU 2020 strategy, which aims at increasing the renewables share of the gross final energy consumption to 20%, has already been met by 11 members – three years before the 2020 deadline. The members have further committed to raising the EU target to 27% by 2030.

4) Western US states continue pursuit of clean energy despite Trump's policies (April 1) Despite Trump's hell-bent attempt at undoing years of environmental protection regulations and Obama's renewable energy policies, several western US states are pushing ahead with plans to make their economies greener. There is more than politics at stake, as renewable energy is seen as important to the region's health – both economically and environmentally. States like Oregon, California, Colorado and New Mexico plan to reduce carbon emission levels through investments, tax credits and 'cap and trade' programmes.\

5) Germany achieve a new energy record – renewables generating 85% of electricity (May 10) Renewables were the source of 85% of the electricity consumed by Germany on April 30 2017. With the wind, hydro and solar generating most of the electricity

required, the coal-fired power plants had a Sunday's rest. Germany's ambitious 2050 plan to reduce the carbon emission levels to 20% of the 1990 levels seems well within grasp.

6) 100% Renewable Energy By 2035 supported by 1,400 Mayors across the US (June 27th) Some 1,400 mayors from across the USA have joined hands to pass a resolution aiming to make cities completely sustainable by 2035. Renegading against the Trump administration's environmentally regressive proposals – promoting the use of coal and petroleum – the local and state officials are embracing renewable energy instead. It also sends a message to the world, that the local politicians are ready to bypass the federal government to collaborate and lend international support towards a cleaner future. The group also plans to urge Trump and Congress to implement climate change response policies and support off-shore wind development.

7) Nuclear takes a back seat to renewables for the first time since 1984 (July 6) After a span of 33 years, renewables overtook nuclear in the US for the months of March and April. New wind and solar plants; accompanied by heavy snow and rainfall fuelling the hydroelectric generators have spiked the power outputs from renewable energy sources. It also comes at a time when issues over nuclear power's cost and safety have come into question.

8) Study finds renewable energy prevented 12,700 premature deaths over nine-year period, (August 17) In a study by Nature Energy, the expansive adoption of renewable energy and the resulting decrease in environmental pollution have saved 12,700 pre-mature deaths in the period of 2007 to 2015. The lower emissions result in people living healthier lives by avoiding respiratory and cardiac problems associated with breathing polluted air. The improvement in health has saved the US \$220bn, accounting for lower healthcare costs and fewer sick days. According to another study by Quartz, the US spent \$50bn to \$80bn on renewable energy subsidies in the same time period and saw climate and healthcare benefits worth half the

taxpayer's money. Renewables are proving to be a worthwhile longterm investment.

9) Harnessing water evaporation energy could be a promising fresh source of renewable energy (September 26) Wind, solar and hydro are the most commonly talked about renewable energies. There is a new groundbreaking technology in works – harnessing the energy from evaporation. Scientists exploring the idea think the potential for evaporation harvesting is similar to that of wind and solar. The Great Lakes have enough evaporation energy to fulfil 70% of the US' electricity demand. A machine called the Evaporation Engine contains tiny spores spread over water. The spores expand and shrink as they absorb and release water due to the heat. The motion of the spores can be harnessed to produce electricity.

10) Solar power in high demand and the number-one source of new energy (October 4) Solar energy outpaced all other forms of power sources in 2016. While renewables accounted for two thirds of the new power added, solar technology was the most popular. Solar is likely to stay at the top, with high demands from China, India, the USA and Japan.

11) Google is now entirely fuelled by sun and wind (November 30) One of the world's largest Tech Companies, Google, now powers all its infrastructure through wind and solar energy. With depleting costs in wind and solar, Google has completely switched to renewables and is currently the largest corporate customer of clean energy on the planet, with an annual billing of \$3.5bn globally.

12) Elon Musk renewable energy switch on the largest ever lithium-ion battery (December 1) After promising the largest lithiumion battery in 100 days, Elon Musk delivered to South Australia in less than two-thirds of that time. The 129-megawatt battery will store energy generated by the Hornsdale Wind Farm and dispatch electricity during shortages, variability and blackouts; reducing reliance on coalpowered

plants for backups. The highlights from 2017 are an indication of the progress renewables are making as a consumer utility. The unrivalled innovation, adoption and support will carry forward the conversation and help leapfrog clean energies beyond fossil fuels in 2018.

The global economy in 2018

By Michael Spence/Hong Kong

Economists like me are asked a set of recurring questions that might inform the choices of firms, individuals, and institutions in areas like investment, education, and jobs, as well as their policy expectations. In most cases, there is no definitive answer. But, with sufficient information, one can discern trends, in terms of economies, markets, and technology, and make reasonable guesses.

In the developed world, 2017 will likely be recalled as a period of stark contrast, with many economies experiencing growth acceleration, alongside political fragmentation, polarization, and tension, both domestically and internationally. In the long run, it is unlikely that economic performance will be immune to centrifugal political and social forces. Yet, so far, markets and economies have shrugged off political disorder, and the risk of a substantial short-term setback seems relatively small.

The one exception is the United Kingdom, which now faces a messy and divisive Brexit process. Elsewhere in Europe, Germany's severely weakened chancellor, Angela Merkel, is struggling to forge a coalition government. None of this is good for the UK or the rest of Europe, which desperately needs France and Germany to work together to reform the European

Union.

One potential shock that has received much attention relates to monetary tightening. In view of improving economic performance in the developed world, a gradual reversal of aggressively accommodative monetary policy does not appear likely to be a major drag or shock to asset values. Perhaps the long-awaited upward convergence of economic fundamentals to validate market valuations is within reach.

In Asia, Chinese President Xi Jinping is in a stronger position than ever, suggesting that effective management of imbalances and more consumption- and innovation-driven growth can be expected. India also appears set to sustain its growth and reform momentum. As these economies grow, so will others throughout the region and beyond.

When it comes to technology, especially digital technology, China and the United States seem set to dominate for years to come, as they continue to fund basic research, reaping major benefits when innovations are commercialized. These two countries are also home to the major platforms for economic and social interaction, which benefit from network effects, closure of informational gaps, and, perhaps most important, artificial-intelligence capabilities and applications that use and generate massive sets of valuable data.

Such platforms are not just lucrative on their own; they also produce a host of related opportunities for new business models operating in and around them, in, say, advertising, logistics, and finance. Given this, economies that lack such platforms, such as the EU, are at a disadvantage. Even Latin America has a major innovative domestic e-commerce player (Mercado Libre) and a digital payments system (Mercado Pago).

In mobile online payments systems, China is in the lead. With much of the country's population having shifted directly from cash to mobile online payments – skipping checks and credit

cards – China's payments systems are robust.

Earlier this month on Singles' Day, an annual festival of youth-oriented consumption that has become the single largest shopping event in the world, China's leading online payment platform, Alipay, processed up to 256,000 payments per second, using a robust cloud computing architecture. There is also impressive scope for expanding financial services – from credit assessments to asset management and insurance – on the Alipay platform, and its expansion into other Asian countries via partnerships is well underway.

In the coming years, developed and developing economies will also have to work hard to shift toward more inclusive growth patterns. Here, I anticipate that national governments may take a back seat to businesses, subnational governments, labor unions, and educational and non-profit institutions in driving progress, especially in places hit by political fragmentation and a backlash against the political establishment.

Such fragmentation is likely to intensify. Automation is set to sustain, and even accelerate, change on the demand side of labor markets, in areas ranging from manufacturing and logistics to medicine and law, while supply-side responses will be much slower. As a result, even if workers gain stronger support during structural transitions (in the form of income support and retraining options), labor-market mismatches are likely to grow, sharpening inequality and contributing to further political and social polarization.

Nonetheless, there are reasons to be cautiously optimistic. For starters, there remains a broad consensus across the developed and emerging economies on the desirability of maintaining a relatively open global economy.

The notable exception is the US, though it is unclear at this point whether President Donald Trump's administration actually intends to retreat from international cooperation, or is

merely positioning itself to renegotiate terms that are more favorable to the US. What does seem clear, at least for now, is that the US cannot be counted on to serve as a principal sponsor and architect of the evolving rules-based global system for fairly managing interdependence.

The situation is similar with regard to mitigating climate change. The US is now the only country that is not committed to the Paris climate agreement, which has held despite the Trump administration's withdrawal. Even within the US, cities, states, and businesses, as well as a host of civil-society organizations, have signaled a credible commitment to fulfilling America's climate obligations, with or without the federal government.

Still, the world has a long way to go, as its dependence on coal remains high. The Financial Times reports that peak demand for coal in India will come in about ten years, with modest growth between now and then. While there is upside potential in this scenario, depending on more rapid cost reductions in green energy, the world is still years away from negative growth in carbon dioxide emissions.

All of this suggests that the global economy will confront serious challenges in the months and years ahead. And looming in the background is a mountain of debt that makes markets nervous and increases the system's vulnerability to destabilizing shocks. Yet the baseline scenario in the short run seems to be one of continuity. Economic power and influence will continue to shift from west to east, without any sudden change in the pattern of job, income, political, and social polarization, primarily in the developed countries, and with no obvious convulsions on the horizon.

Toyota Clings to Hydrogen Bet While Electric Sales Soar

Toyota Motor Corp., which has made a big bet on hydrogen-powered cars, is looking more isolated as industry rivals double down on plug-in electric vehicles as the dominant technology in the emerging post-fossil fuel era.

Three years ago, Toyota President Akio Toyoda, grandson of company founder Kiichiro Toyoda, unveiled the Mirai, a four-door family sedan powered by hydrogen tanks and fuel-cell technology that emits nothing but heat and water – and none of the gases that contribute to global warming.

However sales of the \$57,500 sedan – available in Japan, California, and parts of Europe – have yet to break the 5,000 mark, compared to some 300,000 of Nissan Motor Co.'s battery-electric Leaf.

Toyota isn't the only player in fuel-cell vehicle development. However, even hydrogen-car backers such as Honda Motor Co., Hyundai Motor Co. and Volkswagen AG's Audi have refocused their zero-emissions car strategies on EVs. Investment in hydrogen power stations has been glacial and technology advances have lowered the cost of batteries and extended driving ranges.

China, the world's biggest car market, nearly doubled the number of charging points last year to 215,000, while the number of hydrogen stations was all of five. It plans to introduce a cap-and-trade emissions policy from 2019, and has joined a growing list of countries seeking deadlines to phase out fossil fuel-powered vehicles.

Tesla Inc. this month unveiled a new Roadster with a 620-mile (998-kilometer) driving range, twice that of Toyota's Mirai. The electric carmaker's CEO, Elon Musk, has

long disparaged fuel cells because of the cost and difficulty of creating, storing and transporting hydrogen.

By contrast, the relative simplicity of EV powertrains has helped open the door to a host of new entrants, including vacuum-cleaner billionaire James Dyson. Bloomberg New Energy Finance sees electric cars reaching price parity with their gasoline-burning cousins as early as 2025, following a 73 percent plunge in lithium-ion battery prices between 2010 and 2016.

“It’s easier for companies to make a profit with EV, and it’s easier for governments to prepare the infrastructure,” said Richard Kaye, a portfolio manager at Nippon Comgest Inc. “For the past few years, it’s been EV that’s been gaining traction. Because of that, it’s EV that’s much closer to becoming reality.”

As such, fuel-cell technology is increasingly being put on the back burner. Honda CEO Takahiro Hachigo said last month he thinks EVs will proliferate faster in the near term, and Hyundai Executive Vice President Lee Kwang-guk said in August that EVs will now be the “mainstay” of the Korean automaker’s eco-car lineup.

Fuel cells were barely a footnote when VW CEO Matthias Mueller announced the group’s aggressive electrification strategy in September.

By contrast, Toyota says its fervor for the technology it began developing in the early 1990s remains undiminished. Fuel-cell and battery-electric vehicles must be developed “at the same speed” because different parts of the world will favor different energy sources based on their specific needs, Executive Vice President Didier Leroy said in an interview at last month’s Tokyo Motor Show, where Toyota was the only Japanese automaker to display hydrogen-powered vehicles.

Read more: Why EVs are the future – a QuickTake explainer

“We know, for example, that the fuel cells in the Japanese society will be much more than just cars,” Leroy said. “In many other places in the world, it will be the same.”

Shares of Toyota rose 0.3 percent to 7,046 yen as of 1:53 p.m. in Tokyo Tuesday. They have advanced 2.4 percent this year compared with a 17 percent gain in the Topix index.

California is currently the main market for fuel-cell vehicles outside Japan, but has just 30 hydrogen stations. Efforts by Toyota and its partners to set up infrastructure on America’s East Coast have been plagued by delays. By contrast, BNEF counted more than 44,000 charging points nationwide in 2016.

Japan has 91 hydrogen stations and is aiming for 160 by 2020 and 320 by 2025. But that’s against more than 28,000 charging points at the end of last year, according to BNEF, whose analysts forecast the high costs and strict regulations governing hydrogen stations will mean the government can only meet 75 percent of its 2020 goal, and an even smaller proportion of its 2025 target.

“Unlike lithium-ion batteries for electric vehicles, there is no existing parallel industry for fuel cells that accelerates the speed of cost reduction,” said BNEF analyst Ali Izadi-Najafabadi. “Fuel-cell vehicles will not achieve the same level of market penetration.”

The gap is widening even as Toyota forges partnerships aimed at promoting fuel cells. One such global entity established at the start of this year, the Hydrogen Council, said this month that the lightest element could supply a fifth of worldwide energy needs by 2025.

Fuel-cell proponents face a chicken-and-egg dilemma: increased infrastructure requires additional vehicles to support it, and vice versa.

Toyota, which leads FCV sales globally with the Mirai, has only shipped about 4,300 since its launch in late 2014. By contrast, Nissan has sold about 300,000 of the Leaf since 2010 and Tesla has delivered more than 250,000 electric vehicles since the first Roadster rolled out in 2008.

The figures at other FCV makers are even starker: Honda has shipped fewer than 700 of the Clarity Fuel Cell since its debut last year, while Hyundai has moved about 900 of its Tucson Fuel Cell since 2013.

Toyota has set a lofty goal of selling 30,000 FCVs annually by around 2020. Achieving that will need not just more infrastructure, but improvements to the Mirai itself, according to chief engineer Yoshikazu Tanaka. The list he gave echoed what Musk has done with his second-generation Roadster, which on top of a 620-mile range can go 0-60 miles per hour in 1.9 seconds.

First, the Mirai's range of about 312 miles under U.S. standards is "not nearly enough," Tanaka said on the sidelines of a conference in Tokyo last month. The other is more abstract. "We don't want people to buy the car just for its environmental credentials, " he said. "We have to make it cool."

LNG trade volume to increase by 489mn tpy by 2040: GECF



This file photo taken on February 6, 2017 shows the Ras Laffan Industrial City, Qatar's principal site for production of liquefied natural gas and gas-to-liquid, some 80km north of Doha. According to the GECF, a boom in LNG trade is seen in the coming years in view of the expansion of Qatar's LNG industry as well as in other GECF member countries in addition to liquefaction facilities coming online in the US and Australia.

*** Current 'LNG Boom' period to continue until 2020; Qatar, GECF countries to drive LNG trade**

The volume of LNG trade will increase by around 240mn tonnes per year (tpy), reaching 498.5mn tpy in 2040, Doha-based Gas Exporting Countries Forum has said in a report.

Currently it is 'LNG Boom' period for the global gas industry, which GECF said would last until 2020. The outlook for LNG export growth is very promising, with an average annual growth rate of 2.8%. The largest contributors to this increase are Australia and the US.

According to the GECF, a boom in LNG trade is seen in the coming years in view of the expansion of Qatar's LNG industry as well as in other GECF member countries in addition to liquefaction facilities coming online in the US and Australia. Rapidly expanding production and trade of pipeline gas and, especially, liquefied natural gas (LNG) has been observed in recent years.

In 2016, global trade of LNG totalled 257.7mn tonnes (MT) – a 15MT increase from the previous year, GECF said in its 'GECF Global Gas Outlook 2017'.

In the medium-term, GECF sees LNG trade soaring to 356mn tpy by 2020 – approximately 100mn tpy more than seen in 2016, when trade totalled 258mn tpy. Most of this boom will come from additional capacity in Australia and the US.

In the early 2010s, the Middle East was the biggest LNG exporter globally, with more than one-third of the region's LNG volumes being exported from Qatar, Oman, the UAE, and Yemen. However, capacity expansion in other regions has eroded its share of the market.

It is forecast that, by the end of 2020, only 28% of total LNG exports will come from the Middle East. However, there is optimism over developments which will increase absolute levels of exports in the region: de-bottlenecking of existing capacity and capacity additions announced in Qatar by 30%; recovering LNG capacity in Yemen; and the entrance of Iran into the LNG export market.

The developments in Qatar and Iran will increase the region's share of LNG exports to more than 30% by 2025.

The share of the GECF countries will drop from 59% in 2016 to 47% in 2020, recovering to around 52% by 2025 and reaching 50% by 2040.

From the demand side, OECD Asia-Pacific will remain the biggest LNG importing region, led by Japan and South Korea. It is anticipated that it will import around 144mn tpy of LNG by 2040, around 25mn tpy above current values. This regional share will level-off to 29% by the end of the forecast period. The GECF also said that unconventional natural gas resources would play an increasingly greater role in global supply. The outlook projects that the share of unconventional gas in total gas production will rise from approximately 16% today, to more than 30% in 2040.

A low-carbon future is emerging as a key concern for the international community, especially with the adoption of the Paris Agreement in December 2015, the GECF noted.

This agreement has galvanised the energy community, with more than 190 countries pledging to mitigate their greenhouse gas (GHG) emissions through Intended Nationally Determined

Contributions (INDCs).

Paving the way to a low carbon future must take into account the compatibility of CO₂ mitigation with sustainable development, including its economic, social, and environmental dimensions, the outlook said.