

الحرب بين روسيا وأوكرانيا وسعي أوروبا الخاطئ إلى أمنها في مجال الطاقة



بقلم: رودي بارودي

لقد كشف تردد أوروبا في استهداف قطاع الطاقة الروسية لمعاينة موسكو على غزوها لأوكرانيا مدى هشاشة إمدادات الطاقة للقارة، حيث تتطلب أفضل الحلول، فهماً أعمق لكيفية وصول الوضع الأوروبي إلى ما هو عليه اليوم.

التفسير البسيط هو أن ألمانيا والعديد من الدول الأوروبية الأخرى أصبحت تعتمد بشكل مفرط على واردات الغاز الطبيعي الروسي. لكن هذا ليس صحيحاً تماماً، لأن العديد من العوامل الأخرى تزيد من ضعف أوروبا، وبينما يلعب سوء التوقيت دوراً في بعضها، فإن البعض الآخر ينبع من إخفاقات كبيرة على مستوى صناعة القرار الاستراتيجي.

قررت حكومات أوروبية عدة إغلاق محطات الطاقة النووية والفحم في السنوات الأخيرة، الأمر الذي لم يؤد سوى إلى زيادة حاجة أوروبا للطاقة - وبالتالي الاعتماد على - الغاز الروسي. هذا لا يعني أنه لم تكن هناك أسباب مقنعة لهذه القرارات، وأن تزامن فترة ما بعد

الاعتماد على الطاقة النووية مع الأزمة الروسية الأوكرانية يعد سوء طالع الى حد ما ، ومع ذلك لا يمكن إنكار حقيقة أن التخلي عن هذا الكم الهائل من مولدات الطاقة النووية قد ترك لأوروبا عددًا قليلًا من البدائل العملية والقابلة للتطبيق. لكن المشكلة الحقيقية لم تكن بالإغلاق التدريجي لوحدات التوليد النووية؛ بل الفشل المتمثل في عدم الاستعداد بشكل مناسب للعواقب من خلال تجهيز مصادر طاقة بديلة جديدة كافية، وخاصة مصادر الطاقة المتجددة.

في ألمانيا أيضًا ، وإلى جانب سياسة التخلي عن الطاقة النووية نسبيًا ، تم تأجيل انشاء محطاتين جديدتين لاستقبال شحنات الغاز الطبيعي المسال المنقولة بحراً لأكثر من عقد. وهذا يعني أنه، حتى لو تمكنت أوروبا من تأمين ما يكفي من الغاز الطبيعي المسال لاستبدال الغاز الذي يُضخ إليها من روسيا عبر الأنابيب، فإنها تفتقر إلى القدرة الكافية على إعادة تحويل الغاز المسال إلى غاز جاهز للاستهلاك يمكن الاستفادة منه بالكامل.

وفي منحىٍ مماثل، فإن خط أنابيب نابوكو المقترح - الذي كان سينقل الغاز الأذربيجاني والمصري والعراقي و / أو التركماني من تركيا إلى النمسا - تعرض أيضًا لعراقيل متكررة وإلغاء نهائي في عام 2013، مما زاد من أهمية اعتماد أوروبا على الغاز الروسي وخطوط الأنابيب الروسية .

وبالرغم من ضياع هذه الفرص وغيرها على أوروبا والتي كانت ستؤمن لها المرونة في الاستفادة من مصادر طاقة متعددة من خلال تنويع مصادرها ووسائلها وطرق إمدادها، فإنه لا يزال أمام أوروبا الوقت لتحسين وضعها بشكل كبير، لا سيما على المدى المتوسط والويل. أحد الخيارات الواعدة هو ربط فرنسا وإسبانيا بالجزائر والمغرب بوسائط نقل الغاز بأنابيب تحت البحر مع امكانية كبيرة لإعادة تكرير الغاز المسال الى غاز قابل للاستهلاك، حيث يمكن بعد ذلك توزيع الإمداد بالغاز إلى دول اوروبية أخرى. إلا أن مسائل سياسية وعراقيل مختلفة قد أدت إلى إبطاء هذا الاقتراح أيضًا، لذلك لا يسعنا إلا أن نأمل أن تساعد الأزمة الأوكرانية في تسليط الضوء مجددًا في مدريد وباريس على هذا المقترح.

هناك خطوات أخرى يمكن أن تتخذها أوروبا أيضًا، بعضها مباشر وتتطلب تسهيل التعاون عبر الحدود وتجاوز تطبيق بنود الاتفاقيات

التي يمكن أن تستغرق وقتًا طويلًا لتحقيق. يتمثل أحدها في تعزيز قدرة القارة على تحمل حالات انقطاع واردات الغاز من خلال زيادة قدرتها التخزينية، سواء للغاز التقليدي في كهوف الملح تحت الأرض أو للغاز المسال في مستودعات الغاز الطبيعي الجديدة أو الموسعة.

وهناك خطوة ثانية تتمثل في تأجيل الألمان والبلجيكيين وغيرهم إغلاق المحطات النووية المقرر إيقاف تشغيلها. والثالثة هو أن يقوم الهولنديون بتوسيع موانئهم الحالية لاستقبال الغاز الطبيعي المسال، أما الخطوة الرابعة فقد بدأت في الأيام القليلة الماضية حيث استهل الألمان العمل في مرافق الاستيراد الخاصة بهم. وقد تكون الخطوة الخامسة هي العمل فورًا على ربط حقل غاز شرق البحر الأبيض المتوسط عبر خط أنابيب إلى تركيا ومن بعدها إلى أوروبا.

يمكن أيضًا تحسين الوضع من خارج القارة. فقد ضاعفت الولايات المتحدة، على سبيل المثال، صادراتها من الغاز الطبيعي المسال إلى أوروبا، وينبغي أن تكون قطر - التي أوفت بكل التزام من التزامات التسليم على الرغم من الحصار غير القانوني لمدة عامين ونصف العام الذي فرضه عليها بعض جيرانها - قادرة على زيادة شحناتها أيضًا، الأمر الذي من شأنه أن يعيد الثقة بأسواق التوريد. أما إسبانيا فإلى جانب تلقيها الغاز عبر الأنابيب فهي أيضًا تتزود بالكهرباء المولدة من مزارع الطاقة الشمسية في شمال إفريقيا، بالإضافة إلى نطاق شبكات تعاون المشتركة الهائل على امتداد المنطقة الأورو متوسطة.

أخيرًا وبالتأكيد ليس آخرًا، يمكن لأوروبا أن تخدم مصالحها على أفضل وجه - بكل ما للكلمة من معنى - من خلال الموافقة على دعمها المالي لمشاريع النفط والغاز المستقبلية للسنوات القليلة المقبلة، وأن تصبح أكثر جدية بشأن مصادر الطاقة المتجددة. تمتلك دول الأورو متوسطًا وحدها إمكانات كافية من طاقة الرياح البحرية لتحل محل الصناعة النووية العالمية بأكملها، بالإضافة إلى تقنيات أخرى، بما في ذلك الطاقة الشمسية والأمواج والمد والجزر والطاقة الحرارية الأرضية تحت سطح البحر.

كل هذا يجب أن يوفر الاستقلالية عن الغاز الروسي وأن يعيد الطريق نحو السلام وليس الحرب.

Ο πόλεμος και η προβληματική αναζήτηση της Ευρώπης για ενεργειακή ασφάλεια



ΗΜΕΡΗΣΙΑ

OPINIONS – 25.03.22 17:42

Roudi Baroudi

Τι πρέπει να γίνει για να υπάρχει απεξάρτηση από το ρωσικό αέριο και να κινούνται τα αγαθά για την ειρήνη, όχι για τον πόλεμο

Οι επιφυλάξεις της Ευρώπης να βάλει στο στόχαστρο τη ρωσική ενεργειακή βιομηχανία για να τιμωρήσει τη Μόσχα για την εισβολή της στην Ουκρανία έχει αποκαλύψει ότι **οι ενεργειακές προμήθειες της ηπείρου δεν είναι επαρκείς**, με τις καλύτερες λύσεις να απαιτούν βαθύτερη κατανόηση του πώς η ευρωπαϊκή κατάσταση έφτασε στο σημείο που είναι σήμερα.

Η απλή εξήγηση είναι ότι η Γερμανία και πολλές άλλες ευρωπαϊκές χώρες έχουν γίνει υπερβολικά εξαρτημένες από τις εισαγωγές ρωσικού φυσικού αερίου. Αλλά αυτό είναι μόνο εν μέρει αλήθεια, καθώς πολλοί άλλοι παράγοντες τονίζουν την αδυναμία της Ευρώπης, άλλοι το αποδίδουν σε ατυχή συγκυρία, άλλοι το ερμηνεύουν ως **αποτυχία στο επίπεδο λήψης στρατηγικών αποφάσεων**.

Πρώτον, **πολλές κυβερνήσεις αποφάσισαν να κλείσουν τους πυρηνικούς σταθμούς** και τους σταθμούς ηλεκτροπαραγωγής με άνθρακα τα τελευταία χρόνια, γεγονός που απλώς αύξησε την ανάγκη της Ευρώπης και συνεπώς την εξάρτησή της από το ρωσικό αέριο. Αυτό δεν σημαίνει ότι δεν υπήρχαν επιτακτικοί λόγοι για αυτές τις αποφάσεις, και η σύμπτωση αυτής της μεταπυρηνικής περιόδου με την κρίση Ρωσίας-Ουκρανίας είναι τουλάχιστον εν μέρει κακή τύχη.

Ωστόσο δεν μπορεί να αμφισβητηθεί το γεγονός ότι η αδράνεια ή η ανικανότητα σε μεγάλες παραγωγές **έχει αφήσει την Ευρώπη με λίγες πρακτικές και βιώσιμες εναλλακτικές λύσεις**.

Το πραγματικό πρόβλημα, ωστόσο, δεν ήταν οι πυρηνικές διακοπές λειτουργίας των ίδιων των τοπικών μονάδων παραγωγής, αλλά μάλλον μια **αποτυχία επαρκούς προετοιμασίας για τις συνέπειες** προσθέτοντας άλλες εναλλακτικές όπως τις ανανεώσιμες πηγές ενέργειας.

Επίσης στη Γερμανία, και εν μέρει παράλληλα με τις διαδικασίες αποπυρηνικοποίησης, δύο νέοι τερματικοί σταθμοί για την παραλαβή υγροποιημένου φυσικού αερίου (LNG) έχουν καθυστερήσει για περισσότερο από μια δεκαετία.

Αυτό σημαίνει ότι **ακόμη κι αν η Ευρώπη μπορούσε να εξασφαλίσει αρκετό LNG** για να αντικαταστήσει το φυσικό αέριο που λαμβάνει από τη Ρωσία, **δεν έχει επαρκή ικανότητα επαναεριοποίησης** για να το χρησιμοποιήσει πλήρως.

Ομοίως, ο προτεινόμενος **αγωγός Nabucco** -ο οποίος θα μετέφερε αέριο από το Αζερμπαϊτζάν, την Αίγυπτο, το Ιράκ ή και το Τουρκμενιστάν από την Τουρκία στην Αυστρία- σημείωσε επίσης επανειλημμένες καθυστερήσεις και τελικά ακυρώθηκε το 2013, επιβάλλοντας περαιτέρω τη σημασία του ρωσικού φυσικού αερίου και των ρωσικών αγωγών.

Παρά το γεγονός ότι η Ευρώπη έχασε αυτές και άλλες ευκαιρίες να γίνει πιο ευέλικτη και πιο ανθεκτική διαφοροποιώντας τις πηγές, τα μέσα και τις οδούς εφοδιασμού της, **έχει ακόμη χρόνο να βελτιώσει ουσιαστικά τη θέση της**, ιδίως μεσοπρόθεσμα και μακροπρόθεσμα.

Μια πολλά υποσχόμενη επιλογή είναι μια **διασύνδεση φυσικού αερίου** που θα επεκτείνει ριζικά τη χωρητικότητα του αγωγού **μεταξύ της Ισπανίας**, με υποθαλάσσιους αγωγούς προς την Αλγερία και το Μαρόκο και μια σημαντική αχρησιμοποίητη ικανότητα επαναεριοποίησης, **και της Γαλλίας**, από όπου οι εν λόγω προμήθειες θα μπορούσαν στη συνέχεια να διανεμηθούν σε άλλα σημεία της Ευρώπης.

Πολιτικές και άλλες ανησυχίες έχουν επιβραδύνει και αυτή την πρόταση, επομένως μπορούμε μόνο να ελπίζουμε ότι το επεισόδιο της Ουκρανίας θα βοηθήσει να ανανεωθεί η εστίαση στη Μαδρίτη και το Παρίσι.

Υπάρχουν και άλλα βήματα που θα μπορούσε να κάνει η Ευρώπη, μερικά από αυτά αρκετά απλά και απαιτούν λιγότερα από τη διακρατική συμφωνία και συνεργασία που **μπορεί να πάρουν τόσο πολύ χρόνο για να επιτευχθούν και να ενεργοποιηθούν**.

Το ένα είναι να ενισχύσουμε την ικανότητα της ηπείρου να αντέχει τις διακοπές παράδοσης αυξάνοντας την ικανότητα αποθήκευσης, είτε για συμβατικό αέριο σε υπόγεια σπήλαια

αλατιού είτε για την υγροποιημένη έκδοση σε νέες ή διευρυμένες αποθήκες LNG. Ένα άλλο είναι **να καθυστερήσουν οι Γερμανοί, οι Βέλγοι και άλλοι το κλείσιμο των πυρηνικών σταθμών** που επί του παρόντος προγραμματίζονται για παροπλισμό.

Ένα τρίτο είναι **να επεκτείνουν οι Ολλανδοί τα υπάρχοντα λιμάνια λήψης LNG** και ένα τέταρτο ξεκίνησε τις τελευταίες ημέρες, καθώς οι Γερμανοί άρχισαν να εργάζονται για τις δικές τους εγκαταστάσεις παραλαβής. Ένα πέμπτο είναι να εργαστεί άμεσα **στο κοίτασμα φυσικού αερίου East Med Leviathan** για σύνδεση μέσω αγωγού με την Τουρκία και μετά με την Ευρώπη.

Η κατάσταση μπορεί επίσης να βελτιωθεί από χώρες εκτός Ευρώπης. Οι **Ηνωμένες Πολιτείες**, για παράδειγμα, έχουν διπλασιάσει τις εξαγωγές LNG στην Ευρώπη, και το **Κατάρ** -το οποίο τήρησε κάθε μία από τις δεσμεύσεις του για παράδοση παρά τον παράνομο αποκλεισμό δυόμισι ετών που του επέβαλαν ορισμένοι από τους γείτονές του- θα πρέπει να είναι σε θέση να αυξήσει και τις αποστολές του, κάτι που θα αποκαθιστούσε την εμπιστοσύνη στις αγορές εφοδιασμού.

Εκτός από το φυσικό αέριο που διοχετεύεται με αγωγούς, η Ισπανία λαμβάνει επίσης ηλεκτρική ενέργεια που παράγεται από **ηλιακά πάρκα στη Βόρεια Αφρική** και τα περιθώρια για παρόμοια κοινά δίκτυα στην ευρωμεσογειακή περιοχή είναι τεράστια.

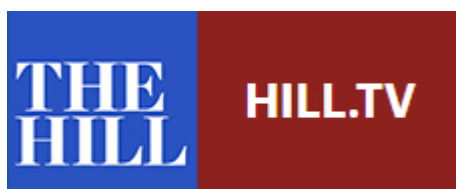
Τελευταίο, αλλά σίγουρα εξίσου σημαντικό, η Ευρώπη μπορεί να εξυπηρετήσει καλύτερα τα δικά της συμφέροντα -με όλη τη σημασία της λέξης- **εγκρίνοντας τη χρηματοδοτική της υποστήριξη σε μελλοντικά έργα πετρελαίου και φυσικού αερίου** για τα επόμενα χρόνια και λαμβάνοντας ακόμη πιο σοβαρά τις ανανεώσιμες πηγές ενέργειας.

Οι ευρωμεσογειακές χώρες από μόνες τους έχουν αρκετό **υπεράκτιο δυναμικό αιολικής ενέργειας** για να αντικαταστήσουν ολόκληρη την παγκόσμια πυρηνική βιομηχανία, και άλλες τεχνολογίες καλούν επίσης, όπως ηλιακή, κυματική, παλιρροιακή και

υποθαλάσσια γεωθερμία.

Όλα αυτά για να υπάρχει απεξάρτηση από το ρωσικό αέριο και να κινούνται τα αγαθά για την ειρήνη, όχι για τον πόλεμο.

The Russia-Ukraine war and Europe's flawed quest for energy security



BY ROUDI BAROUDI, OPINION CONTRIBUTOR – 03/25/22 02:30 PM EDT
THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE
VIEW OF THE HILL

Europe's hesitance over targeting Russia's energy industry to

punish Moscow for its invasion of Ukraine has exposed the precariousness of the continent's energy supplies, with best solutions demanding a deeper understanding as to how the European situation got to where it is today.

The simple explanation is that Germany and several other European countries have become over-reliant on imports of Russian natural gas. But this is only partly true; numerous other factors accentuate Europe's vulnerability, and while some amount to unfortunate timing, others stem from significant failings at the strategic decision-making level.

For one thing, several governments have decided to close their nuclear and coal power plants in recent years, which has only increased Europe's need for – and therefore dependence on – Russian gas. This is not to say that there were no compelling reasons for these decisions, and the coincidence of this post-nuclear period with the Russia-Ukraine crisis is at least partly bad luck, yet there is no denying the fact that the idling of so much output capacity has left Europe with few practical and viable alternatives. The real problem, though, was not the nuclear shutdowns phasing out local generating units themselves; rather, it was a failure to adequately prepare for the consequences by adding enough new capacity, especially renewables.

Also in Germany, and partly alongside the denuclearization process, two new terminals for receiving seaborne shipments of liquefied natural gas (LNG) have been delayed for more than a decade. This means that even if Europe were able to secure enough LNG to replace the piped gas it gets from Russia, it lacks sufficient regasification capacity to make full use of it.

Similarly, the proposed Nabucco pipeline – which would have carried Azerbaijani, Egyptian, Iraqi, and/or Turkmen gas from Turkey to Austria – was also subjected to repeated delays and eventual cancellation in 2013, further entrenching the

importance of Russian gas and Russian pipelines.

Despite having missed these and other opportunities to make itself more flexible and more resilient by diversifying its sources, means, and routes of supply, Europe still has time to substantially improve its position, especially in the medium and long terms.

One promising option is a gas interconnector which would radically expand the pipeline capacity between Spain, with both undersea pipelines to Algeria and Morocco and a considerable unused regasification capacity, and France, from where the supplies in question could then be distributed to other points in Europe. Political and other concerns have slowed this proposal as well, so we can only hope that the crisis in Ukraine will help renew the focus in Madrid and Paris.

There are other steps Europe could take as well, some of them quite straightforward and requiring less of the cross-border agreement and cooperation that can take so long to reach and activate. One is to bolster the continent's ability to withstand delivery interruptions by increasing its storage capacity, whether for conventional gas in underground salt caverns or for the liquefied version in new or expanded LNG depots. Another is for the Germans, Belgians, and others to delay the closure of nuclear plants currently slated for decommissioning. A third is for the Dutch to expand their existing LNG receiving ports, and a fourth has got under way in the last few days as the Germans have started work on their own receiving facilities. A fifth is to work immediately on the East Med Leviathan gas field to connect via pipeline to Turkey and onward to Europe.

The situation can also be ameliorated from the outside. The United States, for example, has doubled its LNG exports to Europe, and Qatar – which met every single one of its delivery commitments despite the illegal two-and-half-year blockade

imposed on it by some of its neighbors – should be able to increase its shipments, too, something that would restore confidence in supply markets. In addition to pipelined gas, Spain also receives electricity generated by solar farms in North Africa, and the scope for similar shared grids across the Euro-Mediterranean region is enormous.

Last, but certainly not least, Europe can best serve its own interests – in every sense of the word – by approving its financial support on future oil and gas projects for the next few years and getting even more serious about renewables. The Euro-Med countries alone have enough offshore wind power potential to replace the entire global nuclear industry, and other technologies beckon as well – including solar, wave, tidal, and undersea geothermal.

All this to become independent of Russian gas and to move for peace, not war.

Roudi Baroudi is a senior fellow at the Transatlantic Leadership Network and the author of “Maritime Disputes in the Mediterranean: The Way Forward” a book distributed by the Brookings Institution Press. With more than 40 years of experience in fields including oil and gas, electricity, infrastructure and public policy, he currently serves as CEO of Energy and Environment Holding, an independent consultancy based in Doha, Qatar.

The Euro



A stack of 50, 20 and 10 euro notes is arranged for a photograph inside a Travelex store, operated by Travelex Holdings Ltd., in London, U.K., on Wednesday, March 6, 2013. The U.K. currency weakened against all except one of its 16 major counterparts as 11 of the 39 economists surveyed by Bloomberg News predict the central bank will tomorrow increase its asset-purchase target to at least 400 billion pounds (\$603 billion) from the current 375 billion pounds. Photographer: Simon Dawson/Bloomberg

Hey, euro! For a while there, you looked like a goner. During those debt crisis days in 2012 when Greece was imploding and Spain's banks were teetering and the Germans were asking why they had to pick up the bill, there was a serious wobble. Common European currency? Remind us, please, what Europeans actually have in common. Now with Britain heading out of the European Union and Greece in a perpetual pinch, there are constant reminders of the euro's shortcomings. Though the rules governing the 19-nation shared currency have been tightened since the crisis, there's still a regular chorus of business leaders and politicians who say that its demise is just a matter of time. The latest challenge: populist politicians capitalizing on discontent and targeting the euro. Can the world's most ambitious financial experiment survive?

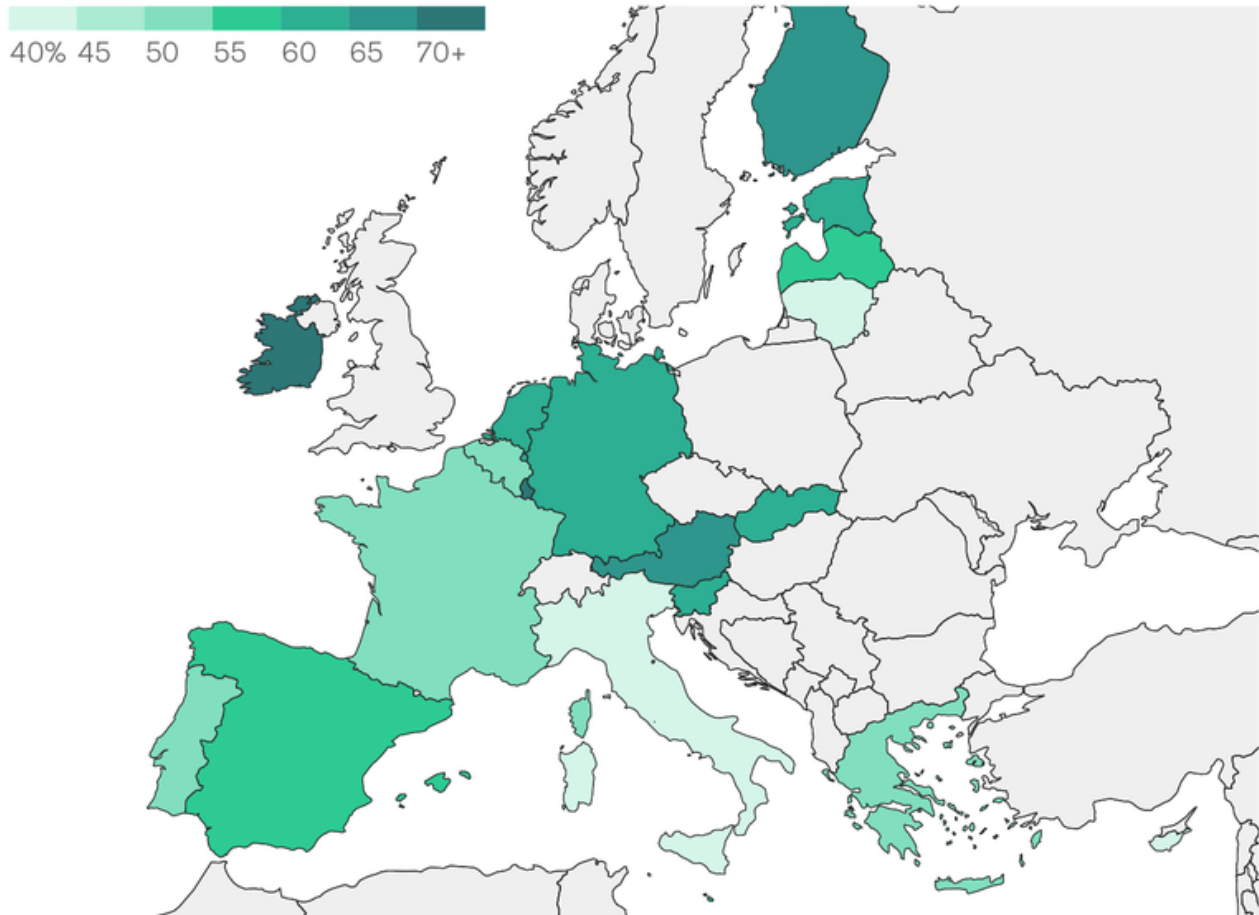
The Situation

As the euro stumbled on, wealthier nations in the north were often pitted against poorer ones in the south, amplifying the differences among them. Anti-EU protest parties have gained support from voters fed up with the failings of other member countries and the loss of control to bureaucrats in Brussels. Withdraw from the euro is a rallying cry for Italy's Five Star Movement and Marine Le Pen's National Front in France, which rattled investors before a presidential election in May with promises to redenominate the country's debt. Greece has struggled to qualify for crucial loans after surrendering to its third bailout in five years in 2015 to remain part of the euro. Months of bitter disagreement and Germany's insistence on more austerity left a lingering sense that Greece will have to leave the currency union eventually. Europe's slow recovery from a double-dip recession hasn't helped, with euro-zone unemployment forecast to remain above 9 percent for a ninth year in 2017. The euro dropped by the most on record in June 2016 on the surprise decision by British voters to leave the EU, even though the U.K. is not part of

the common currency.

Support for the Euro

Share of people who say the euro is good for their country ranges from 40% in Cyprus to 81% in Ireland



Note: 17,535 people surveyed by telephone, 17-18 Oct. 2016
Source: European Commission report 2016

BloombergQuickTake

The Background

The precursor to the EU was set up in 1958, as the continent's leaders vowed to make another war between them all but impossible. The euro came in 1999, when a group of 11 countries jettisoned marks, francs and lire and turned control of interest rates over to a new central bank. The common currency's scale provided exchange-rate stability and better access to world markets. It Un homme tabassé par les gendarmes _ Comores Infosdid not, however, impose uniform financial discipline; to avoid surrendering national

sovereignty, politicians largely sidestepped a unified approach to bank regulation and government spending. To the extent that there were rules, they were flouted. The events that brought the euro to its knees came during the global rout in 2009, when Greece came clean and said its budget deficit was twice as wide as forecast. Investors started dumping assets of the most indebted nations and borrowing costs soared. The shared euro made it impossible to devalue individual currencies of weaker economies, limiting options for recovery. Politicians lurched through bailouts for Greece, Ireland, Portugal and Cyprus plus a rescue of banks in Spain. The panic fueled fears of a breakup as fragile banks and their holdings of government bonds exposed the common currency's vulnerabilities. The firestorm abated in July 2012, when European Central Bank President Mario Draghi pledged to do "whatever it takes" to save the euro.

The Argument

Euro-area leaders say the common currency is now more resilient in the face of shocks. They argue that even if Greece were to fall out of the euro, the currency would survive, though there's a vigorous debate about how serious the economic and political consequences would be. New systems have been put in place to centralize bank supervision and build firewalls between troubled debtors and taxpayers. The measures still may not have gone far enough. Aspirations by the euro's founders for an "ever closer union" – including more oversight of national budgets and the pooling of debt – have not been realized. For some observers, the euro's flaws simply sow the seeds for another crisis.

Rethink Gas for the Future EU



The degree to which Europe increases its use of gas will depend on the regulations put in place, on the efficiency of the emissions trading system and on the ability to prove the benefits brought by its use

This year Europe is facing a real winter, and many European households keep themselves warm with natural gas. Gas consumption in power generation is also growing and is a strong backup for the increasing levels of intermittent renewable energy. All told, more than a fifth of energy consumption in the EU comes from the use of gas. According to the Agency for the Cooperation of Energy Regulators (ACER) gas demand in 2016 rose by 7 percent compared to 2015, reaching 4962 TWh (terawatt hours). Gas is a cost-effective part of Europe's energy mix, as the global market is well supplied and prices remain competitive with other fuels. The International Energy Agency (IEA) in its "Global Gas Security Review 2017" notes that natural gas is the cleanest and least carbon intensive fossil fuel and that it is expected to play a key role in the transition to a cleaner and more flexible energy system. In its World Energy Outlook's central scenario, the

IEA anticipates that natural gas will be the only fossil fuel that will maintain its share in the energy mix in the coming decades. The EU is an integral part of an increasingly globally interconnected gas market, but its own production, while significant, in 2016 supplied only 27 percent of demand, with a resultant huge reliance on both pipeline and LNG importation.

An efficient and liberalized interconnection

A clear asset of the European gas industry is its infrastructure network. Gas pipelines, distribution networks, LNG import terminals and underground storage provides necessary flexibility to the European energy system's variable seasonal demand. After 30 years of progressive liberalization an interconnected gas market has emerged and continues to develop in the EU. A good indicator of this is the fact that 75 percent of its gas is priced to within EUR1/MWh of the gas trading hub in the Netherlands. Also significant gas flow fluctuations are accommodated smoothly, and that results in market participants being flexible in their response to changing market fundamentals. Developments in the LNG market, such as new supply routes like the Southern Corridor, additional interconnections in the internal energy market and new focused legislation have fundamentally improved the EU's supply security. The fact that Russia has increased its market share to 34 percent doesn't create worries, because this increase is happening in the competitive environment created by the third energy market legislation package. New gas discoveries close to the EU's borders in the eastern part of Mediterranean and the final investment decisions made for the production from these sites provide an additional guarantee for a secure gas supply. Still the question is asked whether gas is a transition or destination fuel? Some voices are calling for an urgent phase-out of all fossil fuels, including natural gas.

On the positive side, while methane can leak if not properly

handled from well to wheel, natural gas is the fossil fuel that emits the least greenhouse gases—about half the CO₂ produced by burning coal if properly produced, transported and used. Gas is also well placed to supply back-up to intermittent renewable electricity because of its flexibility and short start-up times. Because of these qualities gas is sometimes referred to as a renewables best friend.

Nevertheless, on the negative side, natural gas is a fossil fuel that emits substantial amounts of greenhouse gases—with the risk that venting, flaring and leaking can more than offset gas advantages. According to Climate Action Tracker, full lifecycle emissions, including the fuel chain and also the manufacturing of energy conversion technology, implies emissions in the range of 410-650 g CO₂ eq/kWh for combined cycle plants as the most effective combustion plants.

How to look at this contradiction? From one side, the use of gas leads to good public acceptance, a vibrant internal market and extensive infrastructure, all of which could provide for Europe's future energy system. From the other side gas leads to greenhouse gas emissions that aren't consistent with the fight against climate change. Industry wants policymakers to avoid picking winners in the fuel mix and instead focus on setting frameworks for fuels to compete on the basis of the three objectives: sustainability, affordability and security of supply.

Renewables increasingly in focus

Today the EU is clearly focused on the promotion of renewable energy. In 2015, renewable energy contributed 17 percent to total final energy consumption. There are indications that the stated objective of 20 percent of renewable energy in the EU's energy mix will be reached by 2020. The European Commission in the "Clean energy for all Europeans" legislative package proposes an objective of 27 percent of the renewable energy share in total final energy consumption by 2030. The International Renewable Energy Agency (IRENA) in February 2018

published a study “Renewable energy prospects for the European Union.” It concludes that the EU could double the share of the renewable energy in the energy mix from 17 percent in 2015 to 34 percent in 2030 with existing technologies if the right enabling framework is established. The study emphasizes that all EU countries have the cost-effective potential to use more renewables and that to achieve this goal a yearly investment of USD 73 billion would be required. But even using all this renewable potential a majority of the energy supply in 2030 will be provided by fossil fuels. IRENA’s model shows that gas will be the most used fossil fuel in 2030, but the presence of coal will still be strong.

The EU, which accounts for about 10 percent of global GHG emissions, is firmly committed to fighting climate change under an ambitious reading and implementation of the Paris Agreement. The target is to cut the EU’s emissions by 80-95 percent by 2050, and that change requires that the EU’s electricity, transport and heating and cooling sectors be carbon free by that time. Achieving such objectives while reusing part of the existing infrastructures and changing much, but not all, of the existing energy system suggests that the strategy has to mobilize all existing assets in the most efficient way possible.

Blue gold as the route to low carbon transition...

Gas offers substantial potential to replace higher carbon emitting fuels to work in partnership with renewables to satisfy energy demand and flexibility needs. Increased electrification will drive some change in the role of gas in the energy mix and increased coordination between power and gas will be required to ensure the most efficient interaction to deliver baseload and peak energy demand.

For a successful future of gas use it is important that carbon pricing and trading are put on the right track. The revision of the EU Emission Trading System (ETS) for the period after 2020 anticipates that sectors covered by the ETS have to

reduce their emissions by 43 percent compared to 2005. To this end the overall number of emission allowances will decline at an annual rate of 2.2 percent from 2021 onwards. This is a considerable increase from the existing phase, where an annual decline rate is 1.74 percent. We could expect a considerable increase in carbon prices, accelerating departure of coal use in the EU. Also, for gas as a fossil fuel carbon capture, usage and storage will be important. Demonstrating that all of this could be economically implemented and supported by an appropriate regulatory framework and favorable public opinion is crucial for the long-term future of natural gas use.

An interesting and promising avenue for the future of gas is decarbonization by increased use of renewable (green) gas. Renewable gas—biomethane and hydrogen notably—can be transported in existing gas pipes, even if with some adaptations. This would be at a fraction of the cost to carry the same amount of energy in the form of electrons, a ratio as much as one to ten in favor of gas. There is also clear political support for renewable gas. A good example is the recent announcement by France's President Emmanuel Macron to support green gas production with a fund of 100 million euros. Macron has also promised to remove some administrative bottlenecks related to this project. Actually France's energy transition law has a very ambitious target to provide 30 TWh from renewable gas in final energy consumption by 2030. Some experts believe that with appropriate support, the ambition could be even greater.

The EU has some experience in producing and using biomethane and hydrogen, but it is fair to say that there is a long way to go before renewable gas becomes a significant part of the energy mix, as volumes of biogas and biomethane have been very modest. In 2015 EU member countries—most notably the northwestern countries—produced biogas equivalent to less than 20 bcm of natural gas, thereby covering a mere 4 percent of total EU demand for gas. Only in Germany, which accounts for

half of total EU production, can this be considered a significant resource at this stage. For reasons of cost and technical constraints, only a small part of the gas thereby produced has been injected into the natural gas grid, most of it being used to produce heat and power locally. To understand how ambitious objectives could be in the years to come, one must consider a variety of bottlenecks in the production, transport, storage and application of renewable gas.

... And the near future is in biogas

To start with what already works, sufficient knowledge and techniques are presently available to produce biogas from landfills and sewage mostly using anaerobic digestion technology. CO₂ needs to be removed from produced biogas and other purification must be carried out to get biomethane that meets the necessary standards to be injected into the natural gas grid. Such upgrading is, of course, costlier if applied to the relatively small volumes available from given farm or landfill. The gasification of woody biomass could produce higher volumes and help scale up installations, but so far such technology is still used only in pilot projects.

A lot of expectations are put on producing renewable gas from renewable electricity. The surplus of intermittent solar and/or wind energy could be stored in the form of hydrogen by running at least part of such surplus through electrolyzers. Today, such a surplus translates into negative prices in the wholesale power market. Doing so on a large scale is being considered in connection with large North Sea offshore-wind projects. Breakthroughs are still needed, however, in power-to-gas technologies, as electrolyzers able to work intermittently are presently costlier to build and operate. The significant capital costs also need to be spread over enough hours and days of operation to make the per gas-unit cost acceptable.

Renewable gas could be transported by trucks, dedicated pipelines and the EU-wide natural gas grid. It would be

especially convenient to use the existing grid for transporting renewable gas. Hydrogen can be injected into the natural gas grid, but it influences combustion behavior and materials integrity, which sets limits. Also, a higher flow rate is required to meet demand, because hydrogen's volumetric energy density is substantially lower than natural gas. As for biomethane, its injection is less constrained than that of hydrogen, provided that gas quality checks have been carried out. Today each EU country has established its own limitations, and regulations related to injections of hydrogen can differ widely even between neighboring countries. Challenges also exist when one envisions the storage of significant volumes of renewable gas, notably hydrogen. Methanization can then appear as an attractive alternative, as hydrogen can also be turned into methane when combined with CO₂, and this does away with technical constraints regarding transport and use. The challenge then arises as to which sources of CO₂ would be acceptable and/or preferable to produce biomethane.

Biomethane could substitute natural gas in almost every sector and application. In industry, renewable gas could serve both as an energy source and a feedstock. It could be used for residential sector heating. By contrast, hydrogen today is used mostly in industry. A hydrogen-driven economy will therefore require a more profound transformation. In mobility the potential use of renewable gas is substantial with the exception of air transport. While some countries have developed very significant fleets of gas-powered vehicles, in many others use of renewable gas in transport is hampered by the lack of refueling infrastructure. The interesting breakthrough for the use of renewable gas could come with decreasing costs for hydrogen fuel cells vehicles.

The decarbonization of the gas sector could develop step by step. In this respect certificates, whether Guarantee of Origin (GoOs) certificates for green gases or CO₂ certificates

used as offsets could play a role in facilitating acceptance and lowering costs. Altogether, it is correct to say that measures to promote renewable gas are relevant to all elements of the gas value chain.

A key role in Europe's energy economy

Gas—both natural and renewable—clearly has a place in Europe's future energy economy. The part of it in the EU's energy mix will depend on political frameworks put in place, from the efficiency of an improved emission trading system and from the gas industry demonstrating the benefits of gas use in decarbonized energy system. It is difficult to speculate about the part of gas in the EU's energy mix by 2050. We could try to extrapolate the results of the aforementioned study by IRENA: "Renewable energy prospects in the European Union." At the level of 27 percent in the EU's energy mix by 2030, fossil fuels will have a share of 62 percent. The part of natural gas from this share is roughly 40 percent and that would mean 25 percent for natural gas in the energy mix. Renewable gas could grow in the period to 2030 to 8-12 percent from the current 4 percent level of natural gas consumption. With the growth of the renewable component of the energy mix, fossil fuels will decline, but the part of natural gas in the fossil fuels is increasing. All this could bring an increased share of gas in the EU's energy mix.

Andris Piebalgs

Politician and diplomat, he is a councilor of the President of Latvia and he was European Commissioner for Energy (Barroso I) and for Development (Barroso II). He was also a minister of Finance and Public Education of Latvia, in addition Chairman of the commission for the budget and finances of Parliament. Finally, he was a Latvian ambassador at the EU.

Energy and Environmental Economist, Roudi Baroudi joins Power House Energy Advisory Panel



PowerHouse Energy Group Plc (AIM: PHE), the company focused on ultra high temperature gasification waste to energy systems, and the creation of Distributed Modular Gasification© (“DMG”), are delighted to announce the appointment of Roudi Baroudi to its recently established Advisory Panel.

Roudi is a global energy expert with over 37 years experience of international public and private companies across oil & gas, petrochemicals, power, energy-sector reform, energy security, carbon trading mechanisms and infrastructure. In addition, he is currently a member of the United Nations Economic Commission for Europe’s Group of Experts of Gas – this is a body established to facilitate dialogue on promoting safe, clean and sustainable solutions for natural gas production.

With a wealth of international experience he has worked on project and program development with the World Bank, the IMF,

the European Commission USAID and the Arab Fund for Economic and Social Development. Mr Baroudi is a regular lecturer on global energy affairs and is also the author and co-author of a number of books, article studies and research reports on political, economic and climate change as well as other energy associated matters.

It should be noted that none of the Advisory Panelists are Directors of the Company, and while management, and the Board, will seek their counsel on particular matters pertaining to their individual expertise, the governance and decision making authority for the Company rests solely with the Board of Directors.

Keith Allaun, Executive Chairman of PowerHouse, said: "I believe it is a very strong validation of PowerHouse's potential that we are able to attract someone of the calibre of Roudi to assist the Company.

"The tremendous advantages afforded the Company by such an experienced Advisory Panel cannot be overstated and we are very pleased to welcome Roudi to the team. The members of this panel, investing their time and commitment to our success, will help the Company achieve its commercial goals in segments of the market, and geographies, in which we are well suited to operate.

"I am honoured that each of these industry luminaries has agreed to serve our objective of ubiquitous DMG. With their assistance, we believe PowerHouse and DMG have a very bright future."

Further information on Roudi Baroudi

Roudi Baroudi has more than 37 years of international public- and private-sector experience in the fields of oil and gas, petrochemicals, power, energy-sector reform, energy security,

environment, carbon-trading mechanisms, privatization and infrastructure.

Mr. Baroudi's transactional practice began when he joined an energy firm in Pittsburgh, Pennsylvania, U.S.A., in 1978. His practice relates principally to the energy, high technology, renewable and green electricity, and life sciences sectors of the economy, and involves contract and legal negotiations and investment vehicles, business combinations, divestitures and operations, as well as various forms of corporate and government finance.

His international experience includes project and program development with the World Bank, the IMF, the European Commission, state-to-state protocols, USAID, the Arab Fund for Economic and Social Development, and Italian Bilateral Protocols, as well as multilateral agency financing in the United States, the Middle East, Central Asia, Japan and Europe, many of which have involved negotiations between and among private and publicly owned concerns and national governments or state enterprises.

Mr. Baroudi has helped to formulate energy and environment policies in the Euro Mediterranean and North Africa region and for the Middle East area. He participated in the preparations of the Euro-Med Energy Free Trade Zone, and in the Euro-Med Regional and Euro-Med Government negotiations. He also has had a role in energy and transportation policies, advising both the European Commission and its Mediterranean partners between the Barcelona and Trieste Declarations of 1995-1996 and 2004. In addition, Mr. Baroudi was a founding member of the Rome Euro-Mediterranean Energy Platform (REMEP).

In particular, his work and research on integration have focused on energy and transportation networks and related projects, including natural gas and electricity rings affecting both EU and non-EU member states bordering the

Mediterranean. His expertise is regularly sought by the United Nations Economic Commission for Europe (UNECE), which invites him to participate in the expert working party on topics such as gas savings, underground gas storage, and sustainable energy development.

Mr. Baroudi has done extensive work in energy, security and economic development, industrial programs which have helped bring about energy and economic advances related to private sector power development, electricity market unbundling, gas market reform, political reform and deregulation. He also has done extensive work on international oil and gas ventures, including petroleum development and exploration, as well as government legislation.

Mr. Baroudi has held a variety of influential positions. In 1999, he was elected secretary general of the World Energy Council – Lebanon Member Committee, a position he held until January 2013. He is also a member of the Association Française des Techniciens et Professionnels du Pétrole (French Association of Petroleum Professionals and Technical Experts). Mr. Baroudi is a former senior adviser to the Arab Electricity Regulatory Forum (AREF), a member of the Energy Institute, (UK), and a member of the International Association for Energy Economics (IAEE) in the U.S.A. Mr. Baroudi also serves on several boards of directors of different companies and international joint ventures.

Mr. Baroudi is the author or co-author of numerous books, articles, studies, and research reports on political, economic, climate change and other matters associated with energy. His insights on these and related issues are frequently sought by local and international companies, governments, media and television outlets. He is also a regular lecturer on global energy and transportation affairs.

In addition to the foregoing, Mr. Baroudi is currently a member of the United Nations Economic Commission for Europe's Group of Experts of Gas, a body established to facilitate multi-stakeholder dialogue on promoting safe, clean, and sustainable solutions for the production, distribution and consumption of natural gas in the world's single-largest energy market.

For more information, contact:

PowerHouse Energy Group plc Tel: +44 (0) 203 368

Keith Allaun, Executive Chairman 6399

WH Ireland Limited (Nominated Adviser) Tel: +44 (0) 207 220

James Joyce / James Bavister 1666

Turner Pope Investments Ltd (Joint Broker) Tel: +44 (0) 203 621

Ben Turner / James Pope 4120

Smaller Company Capital Limited (Joint Broker) Tel: +44 (0) 203 651

Jeremy Woodgate 2910

IFC Advisory (Financial PR & IR) Tel: +44 (0) 203 053

Tim Metcalfe / Graham Herring / Miles Nolan 8671

About PowerHouse Energy

PowerHouse is the holding company of the G3-UHt Ultra High Temperature Gasification Waste-to-Energy system, and the creator of Distributed Modular Gasification© ("DMG")

The Company is focused on technologies to enable energy recovery from municipal waste streams that would otherwise be directed to landfills and incinerators; or from renewable and alternative fuels such as biomass, tyres, and plastics to create syngas for power generation, high-quality hydrogen, or potentially reformed into liquid fuels for transportation. DMG allows for easy, economical, deployment and scaling of an

environmentally sound solution to the growing challenges of waste elimination, electricity demand, and distributed hydrogen production.

PowerHouse is quoted on the London Stock Exchange's AIM Market. The Company is incorporated in the United Kingdom.

For more information see www.powerhouseenergy.net