

THE ECONOMIST'S NARRATIVE ON THE END OF THE AFGHANISTAN WAR AND ITS IMPLICATIONS FOR US GLOBAL STANDING

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Abstract

This paper attempts to survey key assessments of the causes and consequences of the strategic failure of American foreign policy in Afghanistan, without giving a comprehensive or detailed account of all proximate and longer-term causes for the US changing stance in international affairs after this withdrawal. To this end, it summarizes the opinions of eminent experts in the field of foreign policy and international relations that were invited to participate in the Economist's special rubric on the aforementioned topic. The findings suggest that there are agreed upon reasons for the United States' failure in Afghanistan, among which is the impossible mission of exporting democracy to this country as well as America's refusal to engage in creative diplomacy.

Keywords: narratives, foreign policy, international relations, discourse analysis

JEL: F59; H 56; Z13

Introduction

This paper attempts to survey key assessments of the causes and consequences of the strategic failure of American foreign policy in Afghanistan. This paper does not aim to give a comprehensive or detailed account of all proximate and longer-term causes for what was admittedly a debacle for the US administration. To this end, it summarizes the opinions of eminent experts in the field of foreign policy and international relations. In the period June – September 2021 *the Economist* published a series of commentaries on the topic of the changing role of the United States after the withdrawal from Afghanistan. Before considering this specific topic, some issues concerning the United States' hegemony in the post- World War II period should be given due attention. In terms of methodology, this political discourse lies within the realm of narrative.

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US hegemony

The issue of US hegemony and its possible decline has invariably been on the agenda of public and scholarly debate since the United States established it, especially after the collapse of the Soviet Union. This issue has admittedly entered the research debate in International Relations literature since the 1970s (for details see Santa-Cruz, 2020). Influential works on this topic were published by a number of researchers in the field as well as by historians such as Rosecrance, Cox, Gilpin, Keohane, Paul Kennedy, to mention but a few, though the authors did not address the same questions and some discrepancies were noted (Santa-Cruz, 2020, p. 8). Some emphasized the importance of material resources, others – of leadership or rule-setting. One of the reasons for these discrepancies was the varied interpretation of the very word *hegemony*.

In the first chapter of his book *US Hegemony and the Americas: Power and Economic Statecraft in International Relations*, Arturo Santa-Cruz sets out to explore the different perspectives from which US hegemony was achieved. In the researcher's view, some authors highlight the wealth of material resources the United States had in place and the exercise of economic power. According to others, Santa-Cruz argues, hegemony was mainly the result of the special recognition US allies conferred to America (Santa-Cruz, 2020, pp. 9-10). The researcher finally contends that legitimacy was an issue of prime importance.

Santa-Cruz also discusses the phases of US hegemony, claiming that there was general consent among scholars that the United States emerged as a hegemonic power from World War II and that the country enjoyed this status for 25 years. During this period America not only played a key role in establishing the international organizations, but also was the prime engine behind their development (Santa-Cruz, 2020, p. 11). However, there was a turnabout in the US global role in the 1970s resulting mainly from the revived competition on the part of countries such as Germany and Japan, as well as the increasing competition from the countries of the communist bloc. Expectedly, the next turning point is said to be the collapse of the Soviet bloc in 1989, as a result of which the United States admittedly re-claimed its hegemonic position (Santa-Cruz, 2020, p. 12). In the early 2000, the emergence of BRICS, as well as the unilateralist policy of George W. Bush's administration and the war in Iraq, largely precipitated the next phase of decline in the US global role.

In the context of ups and downs in the world leadership of the United States, it is interesting to see which prominent political analysts and researchers the Economist, as a global leader in shaping public opinion (see details in Bratanova, 2020 and 2021), invited to take part in its special rubric on the war in Afghanistan interpret the latter's impact on the US relative decline in the sphere of international relations.

Another relevant issue pertaining to the theoretical and methodological framework of analysis employed in this paper concerns that of narratives and story-telling.

As the aim of this piece of research is to examine some of the important narratives surrounding US withdrawal from Afghanistan, the theoretical and methodological framework centers on the concept of narrative. Allegedly narratives tend to help people “order disordered experience and impart meaning to themselves and their world” and, more importantly, the narrative “is a powerful force shaping either national security debate or policy outcomes” (Krebs, 2015, pp. 2-3). The narrative about the US war waged in Afghanistan some 20 years ago as part and parcel of the post-9/11 story-telling not only contextualized the events of the War on Terror, but also framed the debate on United States’ standing in the world of international affairs.

In this context, two are the questions that should be addressed herein: *what is the dominant narrative about the pullout from Afghanistan? How is the United States depicted as a well-defined actor on the global stage of foreign relations?*

When authoritative speakers seize an opportunity to express themselves in the rhetoric of storytelling, they shift debate back into a relatively settled narrative zone. Considering the debate on the US surge in Afghanistan, there have been both supporters and opponents of this decision to invade this country and both occupied some ground on the narrative terrain. They reached an agreement that this decision was forced upon the United States by “ideologically-driven terrorists who had struck without cause at America and its freedom on 9/11 (Krebs, 2015, p. 6).

Language, narratives, politics

Back during ancient times, Aristotle suggested that language and the human ability to communicate through language lies at the core of politics. There is no doubt this has invariably been the case. Every aspect of politics, including foreign policy, is expressed through the linguistic articulation of ideas. Hence political actors, whether states or individuals, have been engaged in the art of persuasion and of utilizing the linguistic means and devices through which political debate, both in terms of scope and substance, is shaped and defined. So political discourse lies within the realm of narrative.

Narratives are “essential to how human beings make meaning, to how they make sense of, and order, messy experience”. Hence at a very early age children tend to “organize their life experiences into narratives” (Krebs, 2015, p. 10). Furthermore, they are the vehicle through which human beings shape understandings of self and other (identity) and of what self and other want (interest).

Quoting Osgood (1953), Krebs suggests that “American exceptionalism has been sufficiently flexible to have sustained policies that are diametrically opposed – from George Washington’s valedictory warning against ‘artificial ties’ and foreign entanglements, legitimated with reference to European moral corruption and the priority of maintaining America’s purity, to Woodrow Wilson’s crusade to remake world order, similarly legitimated with reference to America’s superiority, but now confident that values would stream only east across the Atlantic”. He goes on to maintain that Americans debate “*how* they should advance their national mission of spreading freedom and democracy, but not *whether* they are so obligated” (Krebs, 2015, p. 14). From this brief introduction to the art of story-telling, we will proceed with the narratives that the Economist in the period August-September 2021 has brought to our attention on the specific implications that the withdrawal from Afghanistan has for the US role in global politics.

Discussion

In his commentary former US State Secretary Henry Kissinger (the Economist, 2021c) identifies two factors that largely determined US foreign policy debacle in Afghanistan. The first one involves the lack of competence and understanding among the American authorities about Afghanistan’s possible transformation into a western-type democracy. The second factor pertains to the lack of *creative* diplomacy, considering that the pullout decision was taken without any notice or coordination with the allies or with the American people. In Kissinger’s opinion, the US efforts failed (as they did in Vietnam and Iraq) because such efforts should presumably be guided by combined geostrategic and purely political goals. The strategic ones are connected with clarifying the circumstances under which military action is taken and carried out, whereas the political ones suggest the ability to define such a governance framework that could yield sustainable results within both Afghanistan and on the international arena. The top diplomat goes on to elaborate upon the US administration’s impotence to see the link between military goals that are in effect unachievable and political goals that are overly abstract and vague. As a result the United States tends to get implicated in military conflicts that have a hazy temporal horizon, while at home the goals of these conflicts get “dissolved in the swamp of domestic controversies”.

Kissinger claims that the lengthy operation in Afghanistan lost its strategic focus. According to the power-holders in the United States, it was only Afghanistan’s transformation into a modern state with democratic institutions and a constitutional government that could have prevented the establishment of new terrorist bases on the country’s territory. Such a goal by itself cannot possibly have a clear horizon in time. Furthermore it requires that account should be taken of the domestic-policy processes unfolding within the United States itself. Taking

into consideration Afghanistan's geographical location and ethnic and religious characteristics, such a goal is doomed to failure. What it more, it was the country's "fractiousness" and "inaccessibility", combined with the lack of a central authority that facilitated Afghanistan's becoming a base for terrorist networks. What was understated in the US was the bitter experience in the region of both Great Britain (in 1842) and the Soviet Union (in 1989). In Kissinger's view the Americans should have focused their efforts on containing the Taliban's influence rather than on their complete destruction. Furthermore, US diplomacy could have taken advantage of the favourable geopolitical situation in the region, given that all neighbouring countries could feel the threat of Afghanistan's terrorist potential. The United States could have coordinated their efforts with those of India, China, Russia and Pakistan. Instead the "rash" withdrawal stoked disappointment among allies, "encouraged adversaries" and "sowed confusion" among political analysts.

According to foreign policy analyst and Stanford University faculty member Francis Fukuyama (the Economist, 2021a), the United States remains a super-power, yet whether the country is able to preserve its position on the international arena and its global clout depends on its ability to address and resolve domestic policy issues. In the analyst's view, the United States used to enjoy its full hegemony in a period of 20 years – from the fall of the Berlin Wall in 1989 until the onset of the global financial crisis in the years 2008 – 2009. "The height of American hubris" was marked by the operation launched in Iraq in 2003, when America harbored the ambition to win a victory not only in Afghanistan but in the whole Middle East. Yet the analyst also deems that the US authorities overrated the possibility to provoke a fundamental transformation in a country by resorting to military means and action.

In Fukuyama's view, the US politics in Afghanistan is unlikely to have a serious impact on America's foreign-policy role in a world that has become multipolar thus succeeding the unprecedented unipolar model. This is due to the economic, cultural and value-driven advantage that the United States still enjoys. In the analyst's opinion the far more serious challenge that America is facing is connected with domestic policy: the strongly polarized society in which various cultural identities and increasingly marginalized social groups are fighting for dominance. In this context even the measures targeted at curbing the global pandemic are interpreted as a political rather than a health issue. The civil identity with which the American society used to take such pride in for years on end has now given way to discourses pertaining to whether this identity is based on slavery or the struggle for freedom, which all takes us back to the American reality of the 17-18 century. Such polarization was manifested in the public assessment of the 2020 presidential elections, which ranged from the fairest

in US history to most massive electoral fraud. This polarization had a direct effect on American foreign policy in which the differences took shape between Democrats and Republicans with regard to Russia, Ukraine and the EU, and even with regard to Hungary.

Fukuyama states his opinion that with the pullout from Afghanistan, US President Joe Biden has shown his resolve to focus his attention on more serious challenges such as Russia and China. It is thus that America will manage to contain its geopolitical opponents and get committed to the causes of its allies. By way of conclusion the analyst argues that it is neither likely nor necessary for the United States “to regain its hegemon status”. It is far more important that, together with its allies, the United States should be able to maintain a global order in which the values of democracy prevail. The latter depends mostly on the recovery of the sense of national identity and of national interest.

According to one of the most outspoken critics of US foreign policy, Noam Chomsky (the Economist, 2021d), the United States remain unsurpassed in terms of military and economic power. America is an indisputable world leader with regard to military spending and yet there is no immediate threat to its security. The same holds true in terms of economic development and growth. As per the third dimension – soft power – the United States lost some of its influence long before President Donald Trump dealt his serious blows against the country’s reputation. It was back in time, during the mandate of Bill Clinton and Barack Obama, according to various international public opinion polls, that the United States was regarded as the biggest threat to world peace. Chomsky draws the conclusion that the future of America and of the world depends on both the cooperation between America and China in resolving global problems (such as global warming and the threat of nuclear war) and on the well organized and mobilized society that could possibly counteract private or governmental power centers that in defending their own short-term interests may bring mankind on the brink of survival.

According to the Russian military and political analyst Dmitri Trenin (the Economist, 2021e), the age of the unipolar world order has long gone and the United States should reconsider very carefully its relations with China and Russia. In the analyst’s view, the downfall of the legitimate Afghan government supported by the United States puts forward yet again the long debated issue of America’s declining role in international relations. The decline of American power is “relative” and is rooted in the “basic unevenness of national development”. Another reason for the decline is the United States’ economic and domestic-policy issues – the collapse of the American economic model, which largely brought about the global financial crisis of 2008 – 2009. Furthermore this was prompted by the collapse of the political system during Donald Trump’s term in office as well as that of the social system, which no longer serves the interests of

the middle class as the backbone of American society. The Covid-19 pandemic laid bare certain problems pertaining not only to health care but also that have caused deep divisions with regard to social values and race-related issues.

Trenin goes on to argue that against such a background, the outcome of the years long conflict in Afghanistan has come to expose the lack of substantiation of a major belief held in the wake of the Cold War – that the United States are in a position “to remake the world in its own image”. Even though the official authorities in Washington are not fully aware of it, the imposition of Western democracy and liberal values has run into “insurmountable barriers” in many places across the globe – from Afghanistan and Iran to China and Russia.

According to the Russian analyst, “for the first time in over 100 years the country faces the certainty of losing its position as the world’s top economy and potentially its technological primacy as well”. The major foreign-policy priority of the United States is to contain China’s growing clout, considering that this country is the most serious contender for global domination. Hence the new world order is defined as “multi-layered” and “multidimensional” where two superpowers – China and the United States – have emerged, even though the former has no claims to this.

Trenin refers to this new reality in international relations as “a new chilly war”. Amid the latter, Russia is making attempts to preserve its position as an independent actor on the global stage, as well as that of a superpower. Just as the United States, its identity is “inextricably wedded to global superiority”. The prominent Russian analyst goes on to suggest that the United States should maintain “an equilibrium – though hardly equidistance – in the face of America-China confrontation. Being sucked into that fight could be as detrimental, or worse, for Russia than was its fateful entry into the First World War”.

According to Robert Kaplan (the Economist, 2021b), the prominent American foreign-policy analyst and researcher in the field of international relations, the United States will invariably succeed in recovering after suffering failures such as the ones in Iraq and Afghanistan, and the major reason for this is their geographical location (Kaplan, 2012). As the father of the theory of political realism, Hans Morgenthau, argues, a country’s geographical location is an essential component of national power. In Kaplan’s opinion, “America is a vast and wealthy continent densely connected by navigable rivers and with an economy of scale, accessible to the main sea lines of communication, yet protected by oceans from the turmoil of the Old World” (the Economist, 2021b). The researcher goes on to claim that the United States have a wealth of natural resources in place, and do not have powerful neighboring countries such as China and Russia. It is this geographical location and characteristics that account for why the United States can afford to suffer a failure in many of the wars they have engaged in throughout the years

and yet manage to recover shortly after. It is no accident that after its debacle in Vietnam, America managed to win a victory in the Cold War. Hence all assumptions about the United States' declining role in international relations are overstatements. Even though the country has withdrawn from the Middle East and Afghanistan, the US naval and air forces "still patrol large swaths of the planet as the bulwark of alliance systems in Europe and Asia". As Kaplan notes, it is rather the controversies at home and the division of American society that pose a threat to the United States' leadership in world order, and the wrong interpretation of its historical past is the major factor for such polarization. From a diachronic perspective, chaos and anarchy in international relations have been curbed by the superpowers and the empires. Kaplan goes on to argue which of the great powers – the United States, China or Russia – will ultimately lose clout at a faster pace than the other two. Furthermore, it is equally important to see which of these great powers boasts a bigger rate of adaptability and flexibility of its political structures than the other. The researcher winds up his commentary by arguing that it is only American democracy that has proven throughout the years its historical ability to adapt and rediscover itself.

Conclusions

Summing up *the Economist's* commentaries and opinions provided by the eminent experts in the field of foreign policy and international relations, the following conclusions should be drawn:

- In the wake of the longest war ever led by the United States that lasted for 20 years, cost more than 2 trillion of USD in government spending and that took a heavy death toll of 2,400 American servicemen, the administration of George Bush Jr should presumably be attributed the highest responsibility for the debacle in Afghanistan. The succeeding Presidents Barack Obama and Donald Trump admitted to this foreign-policy failure, while ultimately it was Joe Biden who assumed all negatives.
- It turned out that at its very onset back in 2001 the mission, the transformation of Afghanistan into a Western type of democracy, was impossible. Regrettably, military interventions fail to establish democracy, particularly in societies that suffer from extreme poverty or deeply embedded social, ethnic and religious divisions. The American and European militaries were seen as invaders, and accordingly their efforts to bring about recovery in the Asian country failed. Furthermore, the many years spent on military training did not facilitate the creation of capable and effective armed forces in Afghanistan.

- Among the serious reasons for the failure in Afghanistan is the reluctance on the part of the United States to get committed to serious and creative diplomacy.
- It turned out that among the insurmountable problems was the covert support that the Taliban enjoyed from Pakistan.
- The major problem basically pertains to US domestic policy. Is it possible for a broad bipartisan team of foreign policy experts to agree on clearly defined national interests and reach a political consensus in the field? What should be included in the national interests is the maintenance of a favourable balance of powers both in Europe and in the region of Asia and the Pacific ocean, together with the adoption of a strong and effective economic policy.
- A priority of the incumbent US administration admittedly is that the United States should preserve their technological advantage, together with developing the relations with China and other developed countries to address issues of global concern such as climate change. Furthermore, American democracy should be transformed into a suit to follow yet again.
- According to US President Joe Biden, the United States has brought to an end the era of carrying out large-scale military operations in other countries and have focused their efforts on soft power and diplomacy.

By way of conclusion, the following is worth highlighting. In addressing the headlined question, some longer-term causes of US failure in Afghanistan have been identified. What is more, this debacle has exposed a certain risk that the United States may possibly lose part of their clout on the global stage in the multipolar world order.

Other possible objects for follow-up research in this field include the post-9/11 mission creep that resulted in unattainable strategic goals, the failure of the Afghanistan government over twenty-years and the inability of regional actors to effectively and positively support the stabilization of Afghanistan.

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GREEN HYDROGEN – THE MISSING PIECE IN THE EUROPEAN ENERGY MIX

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Abstract

The potential of Green (clean) hydrogen is huge. In Europe, total hydrogen demand is expected to grow to more than 45 million tons by 2050. Many sectors – from transportation to heating to heavy industry – are likely to turn to it as they seek to de-carbonize over the next few decades, with investments in the technology already soaring.

Clean hydrogen will become a cornerstone of the energy transition and de-carbonization efforts in Europe and around the globe. Green hydrogen (H₂) can be used as a renewable fuel or feedstock in all major CO₂-emitting sectors, including those where direct electrification is not possible.

The paper looks at the potential of green hydrogen becoming the solution, being the missing piece to the Green Deal ambitions of Europe. Europe possesses the technology and certainly can afford to create the right infrastructure to become a leader in applying, producing and the distribution of green hydrogen.

Keywords: transport, renewable energy resources, green hydrogen, de-carbonization, intelligent pipelines

JEL: O13, Q01

Introduction

The paper aims to provide economically viable conclusions that green hydrogen could be an effective solution for Europe's energy mix and could also support the transition towards green energy in a cost effective and socially just manner. The paper also looks at the potential of green hydrogen to be employed in the transportation sector.

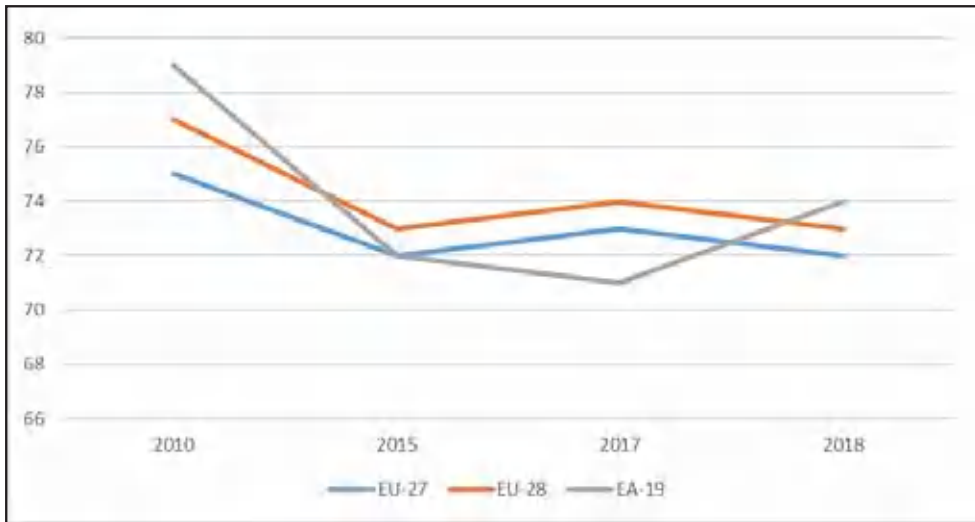
The research also looks at the longer-term prospects for the storage and transportation of green hydrogen supplies and the costs involved to secure them as well as the decision-making process required to take place to realize them.

The methodology employed in the current analysis is based on putting together and analyzing the available and most recent developments in Europe concerning:

- Methods for producing green “clean” hydrogen
- The current so called back stoppers of the process

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- Efficient ways of transporting green hydrogen
- Employing green hydrogen in the transportation sector



Source: The author (Eurostat, 2021).

Figure 2: Electrolysers capacity target (in tens of GW) by 2024 in some leading EU countries

Resources are (funds and R&D efforts) pouring into green (clean) hydrogen as policymakers and private investors realize that this fuel will soon become a cornerstone of the energy transition and de-carbonization efforts.

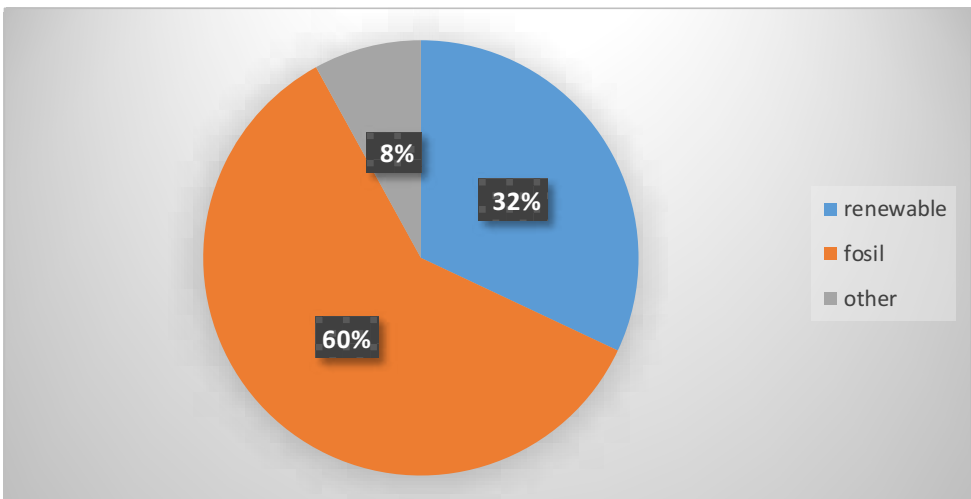
Having said that, a key component of the clean hydrogen economy has been overlooked – this is large-scale transportation to move clean hydrogen from production sites to points of use. The connectivity between production sites and demand sites is a serious pending problem. In most cases the favorable production locations are in remote, renewable-rich areas, whereas the heavily industrialized areas are usually in densely populated areas.

Clean hydrogen offers a path to de-carbonization provided it can be transported. There are three main hydrogen carrier technologies: “liquefied hydrogen, ammonia and liquid organic hydrogen carriers (LOHC). There’s no single solution in terms of the balance between use and price, usually juggling between the tree is necessary (Berger, 2020).

Green hydrogen transportation

Green energy is an important part of the electricity mix, its share in the overall electricity flow continues to be meager. Renewable energy sources contribute only 38% to the European electricity mix in 2020, substantially overtaken by fossil fuels.

But the share of electricity in global final energy consumption was only 19% in 2018, and stagnating. Sectors such as heavy industry, with huge energy needs to process heat from burning fossil fuels, for example, making them difficult to electrify, and a lack of grid infrastructure to transport green power from areas of production to areas of demand, are largely to blame.



Source: The author (Eurostat, 2021), shows figuratively the disproportion in usage of fossil to renewables for electrify generation.

Figure 3: Total electricity generation for 2018 in EU-28

The wide expansion of renewable energy sites and therefore the optimization of electrolysis methods have made hydrogen (or hydrogen-gas mixtures) a very attractive solution for the transport and storage of energy with zero pollution and CO₂ emissions.

Getting hydrogen from global production sites to end users at the lowest possible cost will be key to the success of the green economy. The potential for onsite green hydrogen production in European demand centers is limited.

Distributing renewable energy. Energy supply and demand don't seem to be compatible. For centuries, industry and governments have developed energy

transport and transit systems that carry fossil-fuel based energy (predominantly oil, gas and coal) from resource rich to resource poor regions.

Globally, we need to transition from distributing unsustainable fossil-fuel based energy to sustainable, renewable energy. Some countries are not well positioned to generate renewable energy, whereas others have excess capacity and potential. Hydrogen and its compounds have a high energy density and can be easily stored and transported, (re)distributing renewable energy efficiently and flexibly.

Developing pipelines for transporting hydrogen and hydrogen gas mixtures from renewable energy sources seems to be a perspective to consider. There's an urgent need for viable, large-scale clean hydrogen transportation solutions. Four hydrogen transportation technologies have the best potential: Pipelines that transport gaseous hydrogen; hydrogen transported as ammonia; liquefied hydrogen (LH2); and hydrogen stored in liquid organic hydrogen carriers (LOHC). The three non-pipeline technologies are referred to as hydrogen carriers.

PIPELINES (GASEOUS H₂) – Gaseous hydrogen may be transported in pipelines, like fossil fuel. Before injection, the hydrogen is mechanically compressed to the operating pressure of the pipeline. Considering the pipeline's characteristics and native conditions, the hydrogen must be recompressed at certain distances along the pipeline before it reaches its destination.

Instead of building new pipelines, existing fossil fuel pipelines are often repurposed to move hydrogen. Bulgaria Gas Interconnector line pipe may be a recent example for a pipeline suited to carry hydrogen.

The selection of suitable materials for the construction of a hydrogen transport pipeline, as well as the certification of a product that will guarantee its long-term safe use in full operating conditions is a research priority for European industry and academia. A wide range of research collaborations is also being developed with gas distribution companies, international forums, such as European Pipelines Research Group (EPRG), and international research centers related to the subject.

Speaking of transportation, the transport sector itself is one of the main emitters of CO₂. The De-carbonizing transport sector is a challenge on its own. In 2019, transport accounted for nearly 30% of the global final energy use and 23% of the total energy sector direct CO₂ emissions. Reducing oil use and CO₂ emissions in long-distance transport modes – heavy-duty trucking, maritime shipping and aviation – are particularly difficult because of their energy and power density requirements (Freymüller, 2021).

Battery electric vehicles (BEVs), Hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEVs) are already reducing vehicle emissions, particularly in passenger vehicles.

However, fully decarbonizing transport would require deployment of green hydrogen-powered electric cell electric vehicles (FCEVs) and battery electric vehicles (BEVs). Green Hydrogen is the leading technology to decarbonize the transport sector, including trucking and shipping. Additionally, to lowering CO₂ emissions, this can support local air quality improvements and noise reductions (Lust, 2021).

Conclusion

Europe has the opportunity to be the leader-continent (the think-tank) in generating and applying new green technologies to cut back emissions and improve people's quality of life. The problems that the Green Deal is facing are often invisible to us but real figures and statistics show something different. In 2019, pollution was liable for 6.67 million deaths worldwide, including the premature death of 500,000 babies, with the worst health outcomes occurring within the developing world.

Renewable energy comes from sources or processes that are constantly disposable, but unreliable enough. These sources of energy include solar power, wind energy, geothermal energy, and hydroelectric power.

The investments to empower the renewable resources are quite high indeed but the return is fairly long-term to justify it. Europe is one of the richest continents, which makes it even more achievable to invest in the switch from fossil fuels to clean energy for the sake of the quality of the people's life.

Green hydrogen is perhaps a bigger part of the solution due to its efficiency and the existing options for storage, unlike other renewable sources. As concerns about climate change drive the energy transition, green hydrogen will likely be the solution of choice across a number of high-emission sectors (Forrest, 2021).

Hydrogen plays a key role within the energy mix towards energy transition, but only if this is based on renewable hydrogen produced by clean fuel. Not all hydrogen is the same. The molecule is the same irrespective of how hydrogen is produced, but if hydrogen is produced from gas or coal, or with electricity generated by burning gas or coal, then there is nothing clean or green about it. In fact, the CO₂ emissions from fuel hydrogen production are so high that they render the entire emissions footprint of a hydrogen electric cell beyond a standard combustion engine.

While the majority of emissions can be reduced using electrification generated by renewable power, other emissions are hard to electrify, due either to greater technical challenges or the nature of the production process.

Two areas that are hard to electrify are heavy industry and heavy-duty transportation. Both have high energy demands, and in many cases, high heat

requirements or particular feedstock with strong emission profiles like: the steel production process, petrochemicals, and manufacturing aluminum etc.

Nowadays we are experiencing faster energy transition and it is required even more and more. We are experiencing historical transitions between major energy sources. Most of these shifts lasted over a century or longer and were stimulated by resource scarcity and technological innovations. As the energy mix is constantly being enriched by classical and new energy sources, the production of energy evolved significantly (Zinoviev, Nikolov, 2021).

Hydrogen policy, markets, industry and related infrastructure should be designed to support green hydrogen primarily. Green hydrogen must be prioritized and differentiated from all forms of fossil fuel and fossil fuel-derived hydrogen, including blue hydrogen. The world economies are still pouring direct and indirect subsidies for fossil fuels. These certainly have regressive social outcomes and devastating environmental impacts. Energy sector policies that promote non-green hydrogen are reinforcing these distortions.

European governments should work towards eliminating unnecessary regulatory barriers and harmonize standards across sectors. Public support for research and development is essential to lower costs and increase efficiency, including for electrolyzers, fuel cells and hydrogen-based fuels.

Green (clean) hydrogen can soon become the key part of the energy transition and de-carbonization efforts. More importantly it can serve for socially just transition of the EU economies and can mitigate the risks of social exclusion.

Green hydrogen (H₂) can be used as a renewable fuel or feedstock in all major CO₂-emitting sectors, including those where direct electrification is not possible. By producing the gas using electrolysis powered by renewable sources, green power becomes easier to store and transport as an energy carrier, enabling sector coupling. (RNG works,2021).

Clean hydrogen can then be used as a combustion fuel in industrial or mobility applications, or be reconverted to electricity in a fuel cell.

Green Hydrogen enables reliable renewable energy:

- ✓ Electricity from renewables is variable, and residential and industrial demand is often not well matched with supply. Electrolysis can convert excess electricity into hydrogen during times of oversupply and release it when demand peaks.
- ✓ Hydrogen can also be used for long-term, carbon-free energy storage as an energy buffer and strategic reserve.
- ✓ Underground storage of hydrogen is a well-established industry practice. Hydrogen can be stored over long periods of time and scales compatible with seasonal energy storage, making it a leading candidate to enable the seasonal balancing of renewable power sources.

Government support should be redirected toward more efficient, equitable and sustainable options such as the green hydrogen. This will stimulate investment and job creation.

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