Monograph 141-B

Vital resources and energy resources. Repercussions for security

High Defence Studies College (EALEDE)

MINISTRY OF DEFENCE

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General Introduction

Vicente López-Ibor Mayor

This study seeks to address an eloquent and somewhat challenging title: vital resources and energy resources. No mean task, as in my view, all forms of strategic approach require precise knowledge of the terrain, which involves identifying the situation on the ground and the essential data, so as to be sufficiently informed to offer an interpretation of possible scenarios, necessary methods of approach and desirable options.

Therefore, the first mission is that of recognising the field of study, creating an inventory of the parameters and problems.

We speak of vital resources, and in doing so we are mainly referring to water, while the reader will understand that energy resources are also directly included within this perimeter that relates to such supplies considered essential in any human community, and therefore, vital, in the sense that without their existence, adequate availability and usability, the structure of social life would be materially damaged, or forced into situations of severe hardship and very serious limitations for any basic development.

This Workbook intends therefore to address a central aspect of the economic order of security strategies: resources that serve as a material prop to economic and human development and a physical and operative basis for the configuration of political and strategic reality.

This monograph is divided into three assignments that study separately, but in an interrelated manner, different aspects of the vital and strategic resources of prime importance: water and energy, where the analysis takes as its geographical point of reference: Spain, the European Union and, thirdly, another geographical scenario apparently far-distant from our national reality and even from that of Europe but nevertheless, in our view, one of considerable interest in terms of understanding and efficiently evaluating continental Europe's energy strategies and the new cartography of vital resources together with the multiple problems they pose in the context of international dialectics.

While energy is an essential commodity necessary both in societies on the road to development, which will not really achieve their goal if they lack the provision, technology and at least a minimal energy model, or an adequate political structure, there are, for instance, cases where, despite the existence of natural resources, their benefit is not proportionally applied to internal social development (let us not forget that half of the world's population with the least purchasing power, live in countries rich in hydrocarbons and minerals) while developed societies pursue greater material welfare and growth; for this reason the study and analysis of the energy phenomenon in the framework of international relations, also offers an undeniable geopolitical and geostrategic dimension.

We only need to contemplate the significance of the so-called "energy revolution" in the US, brought on by the exploitation of fields in the unconventional hydrocarbons sector with techniques like fracking, shale gas and shale oil, that have focused a large part of the geo-energy debate on the consequences of the use of these new reserves and technologies for the energy equation, not only domestically, within the United States, but across the entire American continent, in the Atlantic basin, in the framework of political and energy relations with Russia, in energy relations with the countries of the Middle East, and in the balance and priority needs of businesses in the sector energy.

Colonel Sánchez de Rojas aptly broaches his subject with a necessary pedagogical approach to the concepts involved: geopolitics, resources and security. Thus, he points out that geopolitics is not a static reality like geography, but rather one that is in slow but permanent evolution. In its connection with resources, he affirms that the scarcity of energy, water and food resources, essentially linked to access to the markets of emerging countries, has restructured the global architecture and introduced new geopolitical priorities in our time. Priorities that are not unfamiliar with a fundamental fact: the international presence of the major powers will depend more and more on their policy on obtaining resources.

Thus, Sánchez de Rojas begins with the affirmation that the geographical distribution of resource centres and lines of communication assigns val-

ue to every location in accordance with its strategic importance. Therefore, the globalisation idea supports the belief in a gradual reduction of the role of geography and geopolitics in the states, the reality being that the exclusive control over routes and resources cannot be replaced by the «market», which is why geography and geopolitics are as important today as they were in the past. In this way, geopolitics does not express itself in strategic terms as a constant, but as a variable, describing the changes in the geographical distribution of routes and natural economic resources.

After dissecting the concept and central classifications of resources according to their most representative characteristics, Sánchez de Rojas underlines that all natural resources –including renewables- are finite, and their distribution in the world is neither symmetric nor equitative, and, using data on international security, he points out how an analysis of all pre-2001 conflicts confirmed that a quarter of them were directly related to the struggle to obtain or maintain resources.

But, logically enough, resources vary in terms of demand and use requirements, depending on the social development and the population of those laying claim to them. And, in this sense, the data speak for themselves: the demand for food, water and energy, will increase by approximately 35, 40, and 50 per cent, respectively, as a result of an increase in world population and a middle class in expansion. Moreover, climate change will worsen the availability prospects for these critical resources. In such a context, water is a critical, constraining factor when it comes to food production, but is also fundamental for the production of energy, and not only in countries with significant hydraulic energy. The water-energy equation is permanent. And, as we know only too well, without water there is no energy and without energy there is no water. Antonio Alonso clearly illustrates this in one of the passages of his work, and he does so by relying on the entire value chain of the energy system. Water is used in the processes of electricity production, in conventional hydrocarbons, not to mention in the new unconventional hydrocarbons, in coal mining to generate bio fuels, in the field of renewables, from mini-hydraulic, to tidal marine, wind, solar photovoltaic and thermal energy.

And the production of food requires energy for the production of fertilisers, for sowing, cleaning, harvesting and transport. Equally, tensions exist between the use of land for animal feeding and the production of fodder, and the production of energy, a dilemma that has been around for a long time.

As a result, coordinated, transversal policies need to be formulated, policies that manage to both appreciate and foment the connections between food, water and energy systems. The way to start is by recognising the interdependence of the systems, therefore questioning the focus on any

single sector that could have undesirable consequences for the future development options of a country.

Sánchez de Rojas reminds us that over two hundred and fifty rivers in the world are shared by two or more countries. These international basins represent around 60 per cent of freshwater supplies worldwide and are home to approximately 40 per cent of the world's population. In spite of an absence to date of water wars on a grand scale, unresolved tensions over water issues irritate relations persistently fuelling other hostilities, and, on occasion, lead to military action that threatens to bring about greater conflict.

But, the author reminds us, from the results of his analysis, conflicts over water issues tend to be concentrated at local level. Global and regional conflicts are not so probable when it comes to fighting over resources, but we cannot say the same for local conflict. Water is a major cause of local violence in many parts of the Southern Hemisphere, in a variety of forms and for a wide range of reasons. A very relevant example, in the present context, is the Nile.

Thus, «water security» could be considered as falling under the «environmental security» genre. In similar vein, water conflicts could be seen as falling under the label «conflicts of resources» (sometimes called environmental conflicts), which have been much discussed in recent years in relation to conflicts over scarce and valuable natural resources.

For his part, Gonzalo Sáenz de Miera delves into the energy-water analysis, from a dual perspective, that of Spain and the European Union. He starts out by admitting that having a general view is especially important in a context such as this, characterised by the growing inter-penetration between energy markets, so that a phenomenon, that is regional in principle, such as the strong development of shale gas in the United States, has changed the worldwide panorama in the natural gas market and has altered the dynamics of other markets, such as that of coal.

In this sense, reports by the International Energy Agency (IEA) constitute an interesting source for diagnosing the global energy model: its challenges and the alternative solutions.

Thus, the long-term global energy context is characterised by increased pressure on energy resources despite the growth of available resources, both of fossil or renewable origin derived from a sustained increase in world energy demands, generating an inevitable upward increase in the price of energy raw materials.

By 2035, according to the WEO 2013, there will be sustained growth in the production of all energy sources. Key to this increased supply will be technological advances increasing the extraction capacity of unconventional fossil resources (oil and gas) and, on the other hand, an increase

in the production of renewable energies, which in turn will substantially improve their competitiveness. But this increase in energy supply (as well as a rise in demand) has to be seen within the framework of an increased electrification of the global energy supply.

Sáenz de Miera follows IEA forecasts in respect of the evolution of the principal energy sources and technologies. The 2013 Agency Report highlights the fact that the only major source of low-cost oil will continue to be the Middle East, which is why it should remain at the centre of any prospective analyses on the long-term oil market, despite the growth of the production of unconventional hydrocarbons in coming years. The evolution of natural gas displays a certain similarity with oil insofar as there is a growth of unconventional resources, which is the principal variable that accounts for a 47% growth in the global production of natural gas by 2035. Nevertheless, the structure of natural gas production acquires greater diversification than is the case with oil in the long term, reducing the role of established agents and increasing the role of regions such as Africa, China and the United States.

In the case of natural gas, the growth of unconventional resources, the increase of Liquefied Natural Gas (LNG) and the modification of contractual conditions between consumers and producers will create a panorama very different to that of the present day, with indications of a greater capacity for reducing consumer vulnerability.

Finally, the increased availability of renewable energy is growing at a greater pace than any other source of energy and this fact is borne out by two factors. On the one hand, a) two thirds of growth takes place in the period 2020-2035; b) a large part of the development takes place in the electricity sector, mainly led by wind and hydraulic technologies.

Global energy demand will register a growth of 33% in the period from 2011 to 2035, although improvements in energy efficiency will mitigate this evolution.

Further on we broach the always sensitive issue of the price of energy raw materials, with the comment that the competitiviteness of the long-term energy supply has taken on a predominant role in European, and Spanish, energy policy brought about internally and, naturally, externally by the pressure of international economic and financial flows in a context of increasingly globalised energy industries and markets.

Regarding the European Union's posture within the international energy panorama, one must remember that the EU represents 6,5% of global energy production and 13,4% of consumption, and that the principal producers of energy in Europe are the United Kingdom, France, Germany and Poland, although with considerable differences in output. The EU covers a large part of its energy needs with imports. Currently it has an external

oil energy requirement of 86,4% and of 65,8% for natural gas. This dependence has been on the increase for all energy sources in recent years.

In relation to instruments for the reduction of emissions, these have been divided into two large blocks: firstly, industrial and energy sectors must conform to the European Union Emissions Trading System (ETS), which sets a European cap and a target for 2020, and secondly, other sectors (transport, residential, commercial, institutions, etc...). In this latter case, the member states have been given concrete objectives for the reduction of emissions and have freedom to define the policies and instruments in order to achieve the desired results.

Support for the development and deployment of renewable energies has been generally more national, although objectives and basic norms have been established at European level.

On the issue of policies designed to improve energy security, Sáenz de Miera points to a series of proposals and recommendations, among which we could highlight the need to draw up an adequate diagnostic of the European energy model and its capacity to provide citizens with a supply that is up to standard in terms of affordability, security, and environmental sustainability. This diagnostic will have to go beyond the mere analysis of energy dependency, using indicators that show the vulnerability of the various economic sectors in the face of energy price shocks or eventual interruptions in supply and that, from a transversal point of view, the improvement of European energy security must stem from a better coordination of the various national regulatory frameworks and achieve a "sole voice" in international dialogue. In this sense, all policies aimed at advancing towards the consolidation of an internal energy market will have a significantly positive impact on energy security.

On the question of demand-side policies, one must underline that these offer the main option for advancement in the sustainability of the energy model in all its aspects: security, competitiveness and environmental sustainability. All measures designed to improve energy efficiency render the European economy less vulnerable to the ebb and flow of international prices for energy raw materials and to potential interruptions in supply.

With regard to Spain, we recall the words of the former Executive Director of the International Energy Agency, Nobuo Tanaka, in 2011, when he underlined that «by means of a root and branch development of its energy infrastructure and its access to various gas supply sources, Spain has resisted an exceptional growth in energy demand. Spain has pursued the reform of its electricity and gas markets: the requisite for unbundling are stricter than four years ago, and both markets now present greater openness and less concentration».

Moreover, it is demonstrated that the launch of MIBEL, the Iberian Electricity Market, represents a considerable step forward. MIBEL will contribute towards increasing security of supply and competence in both countries. A similar process is underway for the gas sector, with MIBGAS. With the cooperation of the EU regulatory authorities, the aim is to also reach greater market integration with France and the rest of central Europe.

Tanaka also highlighted future difficulties and in that sense he affirmed: «despite considerable progress in Spain, challenges remain. In the long-term, the entire planet has to drastically reduce the use of fossil fuels; the challenge, of course, consists in doing so while maintaining a high level of security of supply. The community objectives for 2020 on issues of greenhouse gas emissions, renewable energy sources and energy efficiency also require a shift in policy-making in Spain towards a solution to this complex challenge».

The IEA argues that Spain can guarantee its electricity supply with various other more economical measures than coal subventions, such as demand-related energy efficiency measures, the integration of the electricity network, storage of gas, interconnections and reserves of imported coal from various sources.

Attention is drawn to the fact that the government should continue to open up energy markets and develop social policies with a view to minimising and, as far as possible, eliminating distortions in these markets.

Professor Antonio Alonso Marcos centres his work on the dilemmas of security and natural resources of our European neighbours, specifically in the case of Central Asia.

The author reminds us that Central Asia was a land of transit for a large part of the empires of Antiquity, and all left their cultural and linguistic traces there. With that seed of the past they sowed a relationship of collaboration for the future that stems from these historic roots. Although in past centuries that relationship was anything but symmetrical and based rather on inequality imposed by colonisation and dominance, our present-day international reality cannot permit such asymmetry and must place relations between States on a principle of sovereign equality.

Furthermore, Central Asia is a region very rich in natural resources. Not only in hydrocarbons but also in gold, uranium and rare earth elements. And it also has water, although this is precisely the scarcest resource and the one which could provoke a series of inter-state clashes in the not so distant future. In fact, this is one of the points on our planet with the greatest water stress; and it so happens that the two states situated on the upper banks of the Sir Daria and the Amu Daria and therefore in control of the water stopcock for the rest of Central Asia, are the two

countries almost devoid of energy sources and therefore energy-dependent on the other three states–Kazakhstan, Uzbekistan and Turkmenistan. This means that the states have to make strenuous balancing efforts to satisfy their own domestic demands, and the demands of other bordering countries as well as those of their client states –principally China, Russia, the USA, and other states in the surrounding region.

Apart from the Amu Daria, which passes through the southern part of Central Asia, and the Sir Daria, which passes through the north, there are other important rivers like the Zeravshan, the Karadarya and the Chirchik. As indicated, water is in the hands of Kyrgyzstan and Tajikistan, a fact that is more easily understood when we see on the map that not only do these two major rivers rise in these countries, but that their largest tributaries also rise here: the first rises in Tajikistan and is a tributary of the Amu Daria; the second has over 200 known tributaries, rises in Kyrgyzstan and converges in the Fergana Basin with the river Naryn to become the Sir Daria; and the third rises in Uzbekistan at the confluence of two other rivers, the Chaktal (that rises in Kyrgyzstan) and the Pskem (that rises in the Kazakh glaciers of the Talas Alatau mountain range), which together form the reservoir of Charvak, and later joins the Sir Daria, after irrigating Taskent, the Uzbek capital.

Alonso focuses on the problems deriving from the deficient utilisation of the instruments of water management. Thus, poor water management in Central Asia is due to three main factors: the construction of hydroelectric dams in upstream countries, the abuse of irrigation crops in an arid or semi-arid region and the lack of adequate maintenance of the water transport network. This has brought about floods in summer –when these dams release a greater quantity of water than foreseen in order to off-load the pressure of the reservoirs—, the drying out of some lakes–an example being the case of the Aral Sea and the salinisation and pollution of its waters– especially because with water-logging, the underground waters become contaminated with the fertilisers used and transmit to these waters from the terrain substances such as copper, iron, magnesium, phenols and, above all, sulphates. Global warming and the resulting increase in the speed of the melting of the Tajik glaciers, has merely added to all these factors.

Professor Alonso also presents an in-depth study of the characteristics of leadership in the region of Kazakhstan, followed by Uzbekistan, and the tactical ingredients –based on the catalogue of energy resources available - which they rely on. He also studies the increasingly relevant relationships between Central Asian countries and China, reklations maintained with Russia, which are of special importance in the zone for a wide range of reasons, and the necessary closer ties with the European Union.

On the issue of energy infrastructures, he details the networks of oil and gas pipelines that form the backbone of energy in the region, plac-

ing it at the heart of the strategic supply dynamics to the EU in coming decades.

Our aim in embarking on this study has been pedagogical rather than informative. It is our understanding that what is required is a coherent approach to a problem which, while well-known, is frequently absent from public debate or cross-border reports of strategic content. The Workbook focuses its attention mainly on Spain, because that constitutes its natural mission and its fundamental objective, but it completes that with an analysis of other surrounding realities creating interdependent connections and, occasionally, varying types of conditionality.

Vital resources, in addition to assuring the conditions for habitability and the development of social order, constitute necessary tools for defining and formulating public objectives and policies. In our case we have looked into national and European action and foreseeable scenarios, in line with the official documents examined.

We live in times of uncertainty. Even in developed and technically secure societies, in the broad sense of the term, factors of change, or rather, the variables that could bring about unforeseen changes, are high, not only on account of their potential nature, but for the acceleration vector that could activate them.

Thus it is crucial that we pay constant attention to some of the issues we have analysed in these Workbooks. Essential supplies, vital resources, strategic factors, water and energy, are key resources for any society, and the proper study of their availability, use, management, capacities, interdependencies, objectives, efforts and prospects is imperative. Two sectors undergoing accelerated technological change and management models that are broadening their services, adapting them and presenting a range of offers to the public at large. In this regard, I consider it fundamental to highlight two issues: the role that in the immediate future is reserved for renewable technologies, valued as a whole from the perspective of the inventory of resources and reserves, and the double pairing of urban mobility and energy, brought about fundamentally by the changeover –not accelerated but sustained– to the "electrification" of the car sector; and the pairing of IT technologies and the energy sector, that will procure a field of intangible resources of considerable added value for the energy sector.

Our report has also undertaken an analysis of the critical resources of water and energy in an emerging region at a crossroads between the Asian world, to which it politically and geographically belongs, and the European reality, an alliance framework to which it aspires. The Central Asian region is rich in energy resources, one of the most blessed zones in the world in terms of these resources. But it also exhibits its fair share of

asymmetries, shortcomings, imbalances and challenges for which solution formulas and proposals must be found in the coming years.

I cannot speak highly enough of the great work carried out by all the contributors, their criteria and competence, as well as the excellent work done by Colonel Alfonso Jiménez de la Portilla, in the coordination of these assignments.

Vital resources and energy resources: some basic concepts

Emilio Sánchez de Rojas Díaz

Introduction

Energy, like water, is one of the essential resources of human life and social development. As a raw material, as a resource, but also as a transformation vector of that resource by means of electricity, energy emerges as a leading contemporary player in human communities. Energy is also a scarce commodity and generally highly priced, with the result that societies that get their energy model right will have a much better capacity when it comes to using this industrial and technological "lever" as a necessary instrument of dynamism and benefit for the economic and social reality (López-Ibor, 2007).

At present, one can recognise two fundamental errors underpinning past policies related to natural resource issues and the practice of environmental management. The first error was the implicit assumption that the ecosystem responses to human use are linear, predictable and controllable. The second has been the assumption that human and natural systems can be treated independently. However, evidence that has been accumulating in diverse regions all over the world suggests that natural and social systems behave in non-linear ways, exhibit marked thresholds in their dynamics, and that social-ecological systems act as strongly coupled, complex and evolving integrated systems (Folke, Carpenter, Elmqvist, Gunderson, Holling, & Walker, 2002).

Does the geopolitics of natural resources exist?

Geopolitics is not a static reality like geography; it is in slow but constant evolution. Kattalin Gabriel-Oyhamburu, (2010) affirms that the history of geopolitics is dependent on the historical moment in which it is produced. For a long time it was associated with the State and the principle of national sovereignty, but now it is undergoing a process of reformulation: the shortage of energy, water and food resources, essentially linked to access to markets in emerging countries, has restructured our global architecture and introduced new geopolitical priorities.

The expectations of the powers will depend increasingly on their policy with regard to obtaining resources. Right now practices are being reshaped, the superpowers feel increasingly powerful in their control of these resources. This rivalry introduces new «places», geostrategic nodes, that are coveted both by the United States, and by China. It is not a matter of controlling the «Heartland» or the «Rimland» but that of being present through flexible strategies in zones of strong production of the resources (Gabriel-Oyhamburu, 2010).

> *In this sense, Michael Klare stated in "The new geopolitics" (2001, page 109),*
>
> *By geopolitics or geopolitical competence I refer to the struggle between major powers and aspiring major powers for the control of territories, resources and important geographical positions, such as ports, canals, water systems, oases and other sources of wealth and influence.*

If we study the history of the Cold War from a North American perspective, the open conflicts that took place were consciously inscribed within a geopolitically oriented framework. Michael Klare points out that the United States had to control the Middle East and its oil. This was the basis of the Truman doctrine, and of the Eisenhower doctrine, and of the Carter doctrine. The United States had to control certain parts of Africa on account of its mineral wealth in copper, cobalt and platinum» (Klare, 2001, page 111).

> *Today, we are observing the resurgence of a geopolitical ideology without pretence between the political leaders of the major powers...In fact, the best way of understanding what is currently going on in Iraq and in the rest of the world is to contemplate it through the prism of geopolitics. North American leaders have embarked on the classical geopolitical project of ensuring dominion over the areas richest in resources, these being seen as sources of power and wealth. There is an ideological coherence in what they are doing, and that way of thinking is, indeed, geopolitics (Klare, 2001, page. 111).*

The geographical distribution of centres of resources and of lines of communication, assigns value to each place depending on its strategic importance. The idea of globalisation bears out the belief in a gradual reduction of the role of geography and geopolitics in the states, but the reality is that the exclusive control of routes and resources cannot be replaced by the «market», which means that geography and geopolitics, are as important today as they were in the past (Grygiel, 2006, pages x-xi). Geopolitics is not a constant, but a variable that describes the changes in the geographical distribution of routes and of natural and economic resources (Grygiel, 2006, page 20).

In any case, modern geopolitics identifies the sources, practices and representations that permit the control over territory and the extraction of resources (Flint, 2011, page 35). That is to say, powers, resources, and geography. But, as Willamson Murray indicated some years ago now:

> *Without a basic understanding of how things have evolved to the present-day from the perspective of the historic and cultural uniqueness of the position of its nations, as well as that of other nations, strategists do not know where they are in the present, so any road into the future will be just as it was in the past, with dire consequences. A perceptive understanding of the present based on historical knowledge is an essential first step for thinking about the future (Murray, 2011, page. 16).*

What are resources

The Spanish Royal Academy gives the meaning of resources as: «commodities, means of subsistence» or «combination of elements available for resolving a necessity or carrying out an endeavour». In the *Merriam-Webster* dictionary we find another definition: «the collective wealth of a country or its means of producing wealth»

Resources have three principal characteristics:

- use
- limited availability and
- potential depletion or consumption

Natural resources: scarce commodity and cause of conflict

A natural resource is any element obtained from the environment to satisfy human needs and desires. There is a large variety of categories of resources: renewables- non renewables, potential- real, biotic- abiotic. For our purposes we can initially divide resources into:

- Human resources
- Economic resources
- Natural resources.

We can subdivide natural resources into:

- Vital resources: Water, productive land, food....
- Energy resources: oil, gas, coal, uranium
- Mineral resources.

All natural resources –including renewables– are finite, and their distribution in the world is not symmetric or equitative. Nations which are major consumers of resources have the over-riding need for guaranteed access or control of these essential resources, for their own subsistence as well as for the maintenance of their development levels.

The increase in the consumption of resources, derived from asymmetric population growth worldwide, brings with it a greater degradation of the environment. In the concept of human security broadened in 1994[1], of the seven aspects indicated in relation to human security, there are four directly related to resources: economic security, food security, health security and environmental security.

An analysis of all pre-2001 conflicts confirms that a quarter of them are directly related to the struggle for resources. So, while shortage may not be the only cause of conflicts, it does contribute towards generating or aggravating them.

The abundance of resources in a given zone can also be the cause of conflict ("the curse of resources"). The economic framework fails to develop because there are no incentives for looking for new sources of income. Wealth becomes concentrated in the hands of a few, inequality increases and all of this favours the emergence of less democratic regimes.

What is security

The concept of security can be defined from varying points of view. From a classic perspective, it relates to the integrity of the State in the context of International Law. The entire system of collective security established under the Charter of the United Nations is articulated in support of this concept and is based on the idea of military threat. (Conde Pérez, 2011, page 35). The traditional conception of security has been centred on the State, on its independence and territorial integrity, in the face of external armed aggression in an international anarchical and violent system, to be achieved by increasing military capacity. (Pérez de Armiñon, 2007)

The end of the Cold War and globalisation have made security a multipolar concept, that goes beyond military threats and arises out of complex origins that are political, economic, sociocultural and also ecological in

[1] In 1994, the UNDP published a report that incorporated the concept of «Human Security». The concept of security was broadened as a result.

nature. (Conde Pérez, 2011, page 35). Since the seventies and, above all since the eighties, alternative formulas have arisen that questioned the prevailing approach to security, such as common security, comprehensive, cooperative and global security, etc. These theoretical advances facilitated the articulation of the human security concept, by questioning classic interpretations at different levels. (Pérez de Armiñon, 2007)

The primacy of national security has been weakened by the logic of globalisation and the corresponding changes in the role of the State. With the proliferation of wars between states and the privatization of conflicts in «failed states». The international community began to recognise that in the majority of occasions it is individuals and social groups that need to be protected and not the State, whose disfunctionality is often the principal cause of the insecurity (Hänggi, 2003, pages. 5-6).

The concept of «human security» has been granted significant recognition in the international arena, because it better illustrates the seismic shift of the primacy of national and international security, towards that of transnational security, sub-national and individual. What is «new» about these «non- traditional» security problems is not that they are really new phenomena, but the fact that they are explicitly characterised as security problems: they are «securitised» (Hänggi, 2003, pages 5-6).

In the opinion of David Baldwin (1997, page 13), one has to ask four questions to describe each approach to security:

- Security for whom? In other words, who or what is the subject being granted security.
- Security for which values? The traditional conception of national security centres on the protection of values such as political independence or the territorial integrity of the State, while the new focus of human security covers a wide range of values, from economic welfare to the health of the people.
- Security from what threats? The sources of threat can vary depending on the values to be protected.
- Security by what means? Depending on the concepts of security, values and threats, the instruments and policies necessary may be diverse: military dissuasion in its classic conception, international cooperation, cooperative security, human development in human security, etc.

During the eighties a new line of thought on security emerged, with different proposals that can be grouped into three types:

- Contributions that maintain a central state focus, but with different adjectives (common, cooperative, collective, comprehensive security).
- Approaches that broaden the narrow orthodox conception of security, centred on the safeguarding of the rule of law, to encompass a multidimensional concept of security.

- Attempts to explore the security agenda beyond the state-centred view, advancing in two directions: upwards, in conceiving it as a global asset that transcends states; and also downwards (Pérez of Armiñon, 2007).

To conclude, the questioning of the traditional model has centred around two main focal points: firstly, questioning the content of security concepts which entailed a greater rapprochement on issues of security and of development. The second area of evolution has been in relation to the object of security, moving away from the classic state-centred view to a stance that is centred more at global or individual level.

The food - water - energy nexus.

The «Global Trends 2030» identifies four megatrends: the fourth of which is the «Growth of the Food, Water and Energy Nexus».

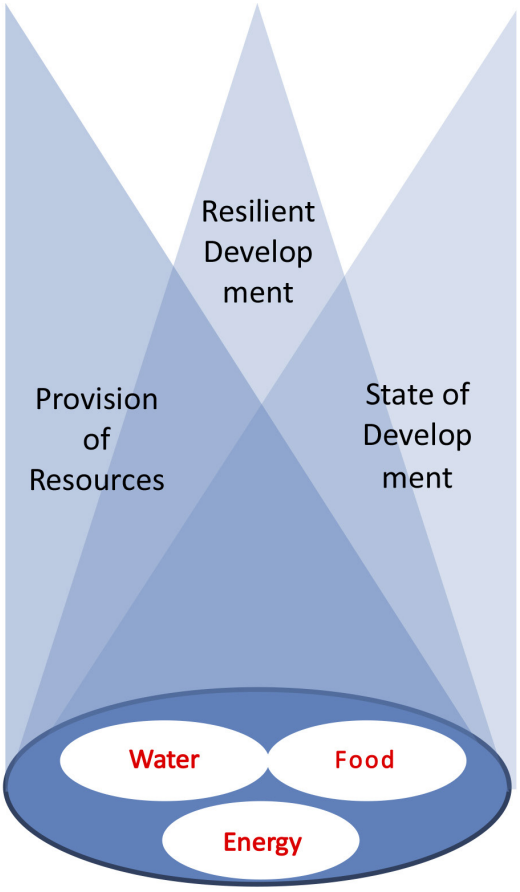
> *Demand for food, water, and energy will grow by approximately 35, 40, and 50 percent respectively owing to an increase in the global population and the consumption patterns of an expanding middle class. Climate change will worsen the outlook for the availability of these critical resources. Climate change analysis suggests that the severity of existing weather patterns will intensify, with wet areas getting wetter and arid areas becoming more arid. Much of the decline in precipitation will occur in the Middle East and northern Africa as well as western Central Asia, southern Europe, southern Africa, and the US Southwest (NIC, 2012, page iv).*

We are not necessarily headed into a world of scarcities, but policymakers and their private sector partners will need to be proactive to avoid such a future. Tackling problems pertaining to one commodity won't be possible without affecting supply and demand for the others. (NIC, 2012, page iv). Food, water and energy systems are connected in some obvious ways, along with many less obvious links between them. Water is a critical limiting factor for food production. But it is also central to energy production – and not just in the countries with significant hydropower. The processing of fossil fuels, including newer sources such as shale gas, is water intensive, as is the electricity generation process itself (WWF & SABMiller, 2014).

Rich, dry countries can solve their most acute freshwater supply problems if they can generate energy cheaply enough to desalinate seawater or process urban wastewater to a high enough standard. Food production requires energy – for fertiliser production, and for planting, weeding, harvesting and transport. Equally, there are tensions between the use of land for food and animal feed production and for energy production, and this is not a new trade-off. Before fossil fuels, fodder crops to generate the

original "horsepower" occupied significant areas of northern European agricultural land. Feeding animals is a major user of cereals, oilseed and grazing land worldwide, and informal biomass is a major contributor to household energy security. (WWF & SABMiller, 2014, page 03).

Nexus policymaking is about designing resilient strategies in ways that take account of the connections between food, water and energy systems. It starts with recognition of the interdependence of those systems, and hence challenges single-sector approaches that can have substantial unintended consequences for a country's future development options. As well as managing those kinds of risks, it points towards opportunities for each country to make the most of its particular mix of resource endowments, systematically aligning its development with the possibilities inherent in that mix (WWF & SABMiller, 2014, page 03).



A Framework for understanding the governmental planning nexus

As a first conclusion: The study of vital resources (water, food) and energy resources, cannot be carried out as independent systems, but must consider their interdependence at micro, meso and macro level. No theoretical framework, however, is providing a response to all the problems, nor to all levels of analysis.

Water system

Precipitation over land surfaces amounts to an average of 113,500 km3/year, which is partitioned into two major flow branches: blue and green. The blue flow branch, which consists of surface and sub-surface flow in rivers, lakes and aquifers, carries an estimated 41,000 km3 of water a year from land towards the oceans. Not all of it reaches the oceans, the difference being the consumptive use of water by humans. The second major flow branch is the return flow of evaporation to the atmosphere, which we have defined as the green water flow. The annual flow of green water from terrestrial surfaces to the atmosphere is estimated at 72,500 km3/year (Falkenmark & Rockström, 2004, page 28).

The field of water resources includes numerous sectors. The majority of research studies into water resources from the mid twentieth to the beginnings of the twenty-first century, are based on the pioneering work of Gilbert White. White broadened this field significantly, which was treated formerly as an engineering problem, to include social issues of individual and institutional behaviour and perceptions (Kates & Burton, 1986).

The Middle East is a classic study case. For the most part political and popular discourse tends to represent the environmental problems of water in the Middle East in naturalist Malthusian terms. Viewed in this way, water shortages and associated ecological tensions are essentially an example of the imbalances in the relationship between natural resources and levels of population (Selby(b), 2005, page 331). In the same sense, Malin Falkenmark (1986), typifies this trend of thought when he writes: «Unfortunately, water resources are limited; therefore, future increases in population therefore imply increased water competition».

Jan Selby (2005 , page 329) in his work provides a further example of this posture: in an article published in the New York Times shortly before the United States-led invasion of Iraq in 2003, the once CIA political analyst Stephen Pelletiere argued that in the process of reconfiguring Middle East geopolitics, the USA should take advantage of the opportunity not only to control Iraq's oil reserves, but also its water resources:

> *We are constantly reminded that Iraq has perhaps the world's largest reserves of oil. But in a regional and perhaps even geopolitical sense, it may be more important that Iraq has the most extensive river system in the Middle East. In addition to the Tigris and Euphrates, there are*

the Greater Zab and Lesser Zab rivers in the north of the country. Iraq was covered with irrigation works by the sixth century A.D., and was a granary for the region. (Pelletiere, 2003).

Evolution of the theoretical framework on water

From the nineties onwards that vision evolved until the present day, via blue integrated water, blue water and integrated green water, reconciling the former with the social-ecological interaction in search of resilience as an objective.

Dominant prior to 1990s	Established in the 90s	Beginning in the 2000s	Resilience of Water for Human Prosperity
Approximation sector blue water	Water IWRM	blue and green integrated water ILWRM	Integrated blue and water green plus the social-ecological interaction and global changes – based on ILWRM resilience
economic and engineering focus for drinking water, and its supply	economic focus of drinking water, including water that flows in the environment	IWRM adding interactions with the land, that is, including the green water of food and ecosystem services	ILWRM , with resilience capacity in the face of the need to maintain precipitation, the interaction between scales and commentaries

Integrated green and blue water management based on resilience capacity (ILWRM) is grounded in the thought process used in policies and governance over the past 30 years, beginning with the predominance of water resources (only blue water) pre-1990, continuing with the introduction of the integrated management of water resources (IWRM) in the early nineteen-nineties. This was followed by an approach more oriented towards systems of water and land - integrated land and water resources management (ILWRM) - in the decade of 2000, but still with an emphasis on the «blue» branch of environmental flows.

Research on water resources

The pragmatic tradition of research into water resources, especially as developed by White, sees the field of choice reduced by individual and collective perceptions, that determine behaviour, which in turn limits or

increases the range of choices. In the opinion of White one obtains an optimal solution via rational discussion, but criticising from the field of realism, he reminds us that social life is not precisely full of rational subjects, nor an intellectual scientific leadership in democratic policies.

For John Dewy, the essential elements to bear in mind in water resources research are the following:

- Learning from experience
- Hazardousness of life
- The practical relevance of research
- Public discourse and democracy (Wescoat, 1992)

Emphasis is centred on the analysis of water projects to inform future water policy; the focus is on flood and other water-related hazards as central to research, with much attention given to policy relevance of inquiry, and allowing free and open debate. This emphasis is particularly important in that it helps us move away from the widespread method of decision-making in water resources based on available conditions, towards the thinking and practices based on the hazardousness of life (Mustafa, 2013, page. 9).

In a very different way, Wittfogel pointed to the historic centrality of the development of water resources in the evolution and maintenance of the political and social structures. He describes water resources management systems as the primary instrument for the state and its defining power structures, to produce and reproduce themselves. His notion of hydraulic civilizations, however, ascribes a causal centrality to waterworks, which is too simplistic and deterministic. (Mustafa, 2013, page. 10)

The concern with the macro-international scale of water resources on water politics has been articulated in the context of the water wars thesis. Thomas Homer-Dixon is one of the more influential proponents of the environment security nexus. The population, environmental scarcity and conflict model has become the dominant paradigm for understanding the environment security nexus, and is at the core of water wars thesis. (Mustafa, 2013, page 10). In one of his later works Homer Dixon argues that the maldistribution of resources, environmental degradation and population growth can all equally contribute to social instability and conflict:

> *Ecological marginalization occurs when unequal resource access combines with population growth, to cause long-term cause migrations of people dependent on renewable resources for their livelihood (Homer-Dixon T. F., 1999, page 177)*

The idea that water scarcity equals conflict over water, and even the concept of wars over water has been criticised. Wolf, argues that, based on empirical evidence, there is a much greater chance of transbounda-

ry conflicts over water being resolved through collaboration than armed conflict (Wolf A. , 2002); while for Amery even in cases like that of the Wazzani Spring on the river Jordan (from which Israel obtains 60% of its water resources) the conflict continues to remain non-violent. (Mustafa, 2013, page 11)

There is a need to redefine «absolute scarcity» since the understanding of virtual water made its previous definition redundant. By applying the definition to a system or locale, one is able to gain greater understanding of the likelihood for relative scarcity to develop into an existential threat and lead to violent conflict (Stewart, 2014, page 102).

A land-water integrated approach. Green water

A conceptual breakthrough that allowed an integrated land-water approach came at a UN Food and Agriculture Organization seminar in January 1993,[12] when the concept of green water was proposed for soil moisture (see Figure 1 at left). According to this concept, rainfall constitutes the basic water resource and is partitioned between "green" water, which is consumed by vegetation, and "blue" water, which constitutes water in rivers and aquifers, accessible for societal use. Thus, green water is important to terrestrial ecosystems.

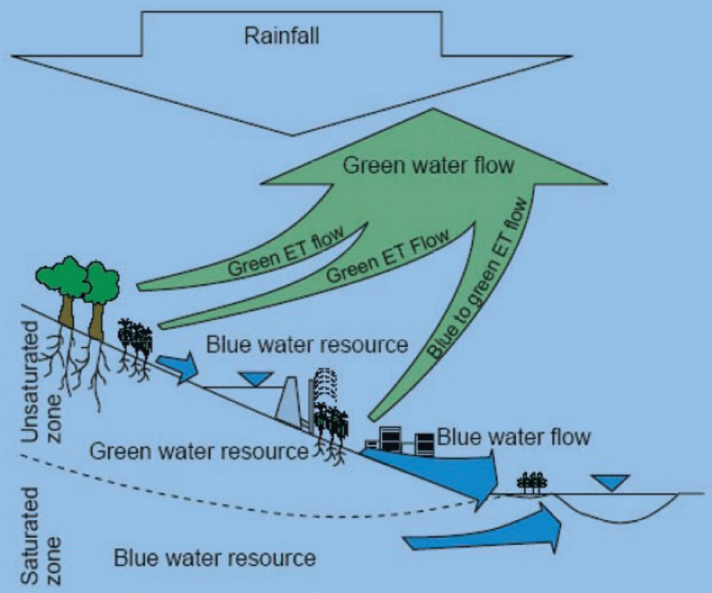
Green water is involved in (rain fed) plant production and, therefore, in the production of food, firewood, bio fuels, timber and forests. Because changes in plant cover alter the partitioning between green and blue water resources, this change in plant cover is a key phenomenon in deforestation and reforestation (Calder, 2005). Blue water, on the other hand, is the base for the household, municipality, industry and irrigated agricultural water supply; a carrier of solutes and silts through water systems and the habitat for aquatic ecosystems. (Falkenmark(c), 2008, page 7)

During the 1990s, an additional difficulty emerged in terms of the consequence in the semiarid regions of the irrigation-based "Green Revolution" that made countries like India become self-sufficient in food production. Since the irrigation water taken up by the plants had been consumed during the photosynthesis process, that part did not return to the river system. Therefore, the multiregional river depletion phenomenon developed. (Postel S. , 1995) (Falkenmark(c), 2008, page 8).

The threat of «hydrocide»

The prevailing focus on water management has been to secure water supply for different sectors in society. Comparatively little concern has been devoted to what happens to water after use. Disposal of wastewater, which is untreated in many parts of the world, has resulted in considerable negative impacts on aquatic ecosystems. (Falkenmark M. , 2005). A

Figure 1. Green and blue water



NOTE: Incoming rainfall generates two types of water resources: green water in the soil, consumed in plant production and returning to the atmosphere as a vapor flow; and the blue water in rivers and aquifers, accessible for human use, including irrigation (by which blue water is transformed into green water). ET=evapotranspiration.

rapid industrial growth in semiarid regions (where the dilution effect is limited during the dry season) is particularly problematic because relatively large volumes of water are required, and the volume of effluents is correspondingly large. Thus, besides the river and groundwater depletion dilemmas, the world now stands in front of the problem of expanding water pollution. (Falkenmark(c), 2008, page 9).

Causes of conflict

In the view of Helga Haftendorn, (2000, pages 52-3) conflicts can arise from the use of common water resources. It would be appropriate to distinguish between conflicts arising through use, and conflict arising through pollution. A conflict of use, for example, could be the construc-

tion of a power-station on the upper course of a river. The possibility of conflict increases where this construction has harmful consequences for the lower-lying states, for example, polluted waste water.

The situation becomes more pronounced when the lower-lying states withhold their consent for such construction because of fears of, for example, water shortages. This could include a situation where the construction of a dam on the upper course of a river, that not only serves the electrical needs but also the major irrigational works of the lower-lying states, threatens to stem the flow of water. A relative conflict of distribution would present itself where a disparity over the use of water exists between the upper and lower-lying states. An absolute conflict of distribution would exist when there simply is not enough water to meet all the legitimate needs of the riparian states.

Conflicts through use

One of the oldest uses of the seas and rivers is shipping. Today this activity rarely leads to conflict between states as a substantial body of agreements regulates shipping traffic in international waters. A conflict through use could nevertheless be found in a situation where one state using the river, for example as a waterway, clashes with another state citing environmental concerns over the other state's activities. Most frequently, activities such as the construction of a dam or the channelling of the river flow leads to international conflict (Haftendorn, 2000, page 53).

A protracted conflict that engaged the international community was the Brazilian-Paraguay dam project on the Parana near Itaipu. The Parana acts as the border between Paraguay and Brazil, flowing through Argentina and then Uruguay before emptying into the La Plata Basin. The project was criticised, most vocally by Argentina, which feared the possible consequences for the lower basin region. Although the five so-called La Plata states-Argentina, Bolivia, Brazil, Paraguay and Uruguay-signed an agreement in 1969 over the economic integration and joint development of the La Plata Basin, altercations between the states regarding the use of the Parana prevailed.

Distributional conflict: relative shortage

The river systems of the Euphrates, Nile and Ganges are characterised by a flow that, although plenteous in the upper basin, is drastically reduced in the lower basin because of the extensive use of the resource among the upper riparians. As a result of this arrangement, the needs of the lower-lying states are not being satisfactorily met. This is especially prevalent in the cases of dam construction, reservoirs or extensive irrigation works which reduce water availability. Examples would include the Anatolian dam project in Turkey, the Ethiopian highlands dam in Ethiopia,

and the construction of the Farakka Dam in India. In these cases we find a conflict over distribution where water flow to the lower-lying regions is seriously hampered.

In contrast to a conflict arising over pollution, which can result in tension between the states, a conflict of distribution can lead towards violence or military threats. In relative distributional conflicts, the situation is aggravated if the lower riparian cannot prevent a detrimental action by the upper riparian. In this case, the survival of the lower-lying state comes into question and this can lead to its use of military action. In the past, conflicts between Syria and Iraq over the Euphrates, between Israel and its Arab neighbours over the Litani and the Jordan water flow have, in the opinion of Haftendorn, led to violence on these grounds (2000, page 56).

Distributional conflict: absolute shortage

Far more acute are situations where there simply is not enough water, independent of its distribution, to meet all legitimate needs. This problem is most extreme in the semi-arid regions of the world, and is intensified in cases where differing levels of development between states lead to varying utilisation levels of water resource. One example is the conflict between Mexico and the USA over the utilisation of the Colorado and Rio Grande. More intense is the Jordan Basin conflict, which, in addition to the problem of the distribution of a scarce water resource in a semi-arid region that only covers 50% of water requirements of the population, is further complicated by the political and security issues of the region. These issues include the Palestinian struggle for an independent state and the political, economical and military security concerns of Israel (Haftendorn, 2000, page. 59).

Hydro-hegemony

For Mark Zeitoun and Jeroen Warner, the increasing structural and physical scarcity of water worldwide calls for a deeper understanding of trans-boundary water conflicts. They argue that control over water resources is not achieved through water wars, but through a combination of power-related tactics and strategies. They believe that the analysis of water conflicts has not received due consideration because of two distinct and important theoretical issues.

The first is the existence of the varying intensities of conflict. Dozens of destructive but largely silent water conflicts lie somewhere between the much feared but non-existent “water wars” and the much lauded examples of trans-boundary water “cooperation”. The reason these conflicts fall short of war and are largely silent may have much more to do with the imbalance of power between the riparians than with a perceived co-operation between them. Power relations between competing riparians,

constitute the second under-considered feature of water conflicts that is a major element in this analysis (Zeitoun & Warner, 2006).

The hydro-hegemon is always able to ensure a positive outcome – at least for itself. From its position of superior power, the hydro-hegemon may choose to enforce either a "negative" form of dominant hydro-hegemony, or a positive form of hydro-hegemonic leadership, whereby all riparians benefit. This choice can be influenced by the actions of the non-hegemon but is ultimately subject to larger political processes. The Framework of Hydro-hegemony provides a reasonably simple, comprehensive and testable structure, as well as an analytical tool for examining the options of riparians at the river basin level, moving away from domination towards partnership.

But before continuing we should define what we understood by hegemony.

What is hegemony?

The Royal Academy of the Spanish Language gives us a clue. Hegemony is the supremacy that a state exercises over another or supremacy of any type. In 1961, Amitai Etzioni suggested the three mechanisms capable of imposing decisions:

- coercive (force or direct threat of force),
- utilitarian (bribes, trades of services) and
- normative agreement (a conscious belief that it is in the non-hegemon's best interest to comply, thereby reinforcing the legitimacy of the hegemon) (Etzioni, 1961).

A fourth mechanism, inspired by Antonio Gramsci, is that of ideological hegemony, that beliefs manufactured by hegemons provide them with «an even more efficient mechanism for eliciting compliance than normative appeals to the legitimacy of state laws and decrees». (Lustick, 2002, pages 23-4)

Hydro–hegemon

It is useful to view riparian interactions over transboundary water resources as lying somewhere between the extremes of genuine cooperation and cut-throat competition. Where water is physically scarce, the interaction could be expected to be a competition fought for control over a greater volume of flows. Where there is an abundance of water, one riparian may seek control over the flows for hydropower while another may seek control for flood-management purposes. In certain cases, control of the resource may be relinquished to achieve politically-affiliated non-water goals. (Zeitoun & Warner, 2006, page 443)

Regardless of the motives for control of the resource, both the strongest and the weaker riparians will find themselves engaged in any of three

situations. Control can be either (a) shared (meaning some form of cooperation exists), (b) consolidated in the stronger riparian's favour (where cooperation is minimal, and the competition is shut-down) or (c) contested (when the competition is at its fiercest). As we see, the form of interaction can be characterised with a distinct nature (i.e. cooperative or competitive), and a particular form of hydro-hegemony. (Zeitoun & Warner, Hydro-hegemony – a framework for analysis of trans-boundary water conflicts, 2006, page 444)

The most stable situation in terms of riparian relations is likely to be when the riparians share control of the resource, as the case whereby the hegemon has negotiated a water-sharing agreement that is perceived positively by all riparians. This can be taken as the 'positive/leadership' form of hydro-hegemony. At the other end of the spectrum, the stronger competitor may seek to attain and consolidate maximum control of water resources, through unilateral action. Such 'negative/dominative', exploitative configurations of hydro-hegemony inevitably lead to the weaker competitor having less control. (Zeitoun & Warner, 2006, page 444)

The dominative form of hydro-hegemony is thus associated with induced relative scarcity for the weaker riparians and unstable hydro-relations. Particularly when the riparians are roughly equal in power, the established control of the resources may become contested, with the resulting competition leading to either a reversal of the dominative form of hydro-hegemony or progression towards a leadership form. (Zeitoun & Warner, Hydro-hegemony – a framework for analysis of trans-boundary water conflicts, 2006, page 444)

Water resource control strategies

Resource capture is said to occur when «powerful groups within a society... shift resource distribution in their favour» (Homer-Dixon T. F., 1999, page 177). A resource capture strategy may be analogous to what Waterbury terms "active unilateralism", «whereby a riparian, in the absence of formal understandings, moves ahead with projects that affect the flow or quality of the resource." (Waterbury, 1997, page 279). As such, resource capture is typically carried out by creating 'facts on the ground' that enable control over access to the resource. These may include land acquisition, land annexation or the construction of large-scale hydraulic works. In cases where a river forms the border between competitors, diversion dykes may satisfy one competitor's demand, leaving the other dry; in the case of trans-boundary groundwater, high-capacity deep wells and pumps can drop water level out of reach of the competitor's shallower, lower capacity wells located on the other side of the border. (Zeitoun & Warner, 2006, page 444)

A state with the ability to plan, construct and operate large infrastructure projects has the physical ability to change the hydrogeology of the

resource, thereby creating new hydro-strategic and hydro-political realities. Turkey, Israel and Egypt with the Dam Alta of Asuan are prime examples of large infrastructure enabling the capture of resources and significantly altering the nature of the competition over water to the advantage of the constructor. A more recent and more widely commented example, is the Renaissance dam in Ethiopia.

Those states perceiving negative forms of hydro-hegemony can resort to a number of counter-hegemony strategies to improve their situation, with the ultimate goal of stable "shared control " of the resource with the hydro-hegemon.

Unilateralism of reservoirs

For Postel and Wolf (Postel & Wolf, 2001, page 61) «The red flag for water-related tension between countries is not water stress per se, but rather a unilateral attempt to develop an international river, usually by a regional power»

Some 261 of the world's rivers are shared by two or more countries. These international watersheds account for 60 per cent of the world's freshwater supply and are home to approximately 40 per cent of the world population. Despite the absence to date of full-scale water wars, unresolved tensions over water have persistently irritated relations, fuelled other hostilities, and occasionally led to military action that risked provoking a larger conflict. Nevertheless the lesson learnt is not that worsening scarcity will lead inevitably to water wars.

It is rather that unilateral actions to construct a dam or river diversion in the absence of a treaty, or institutional mechanism that safeguards the interests of other countries in the basin is highly destabilizing to a region, often spurring decades of hostility before cooperation is pursued. In other words, the red flag for water-related tension between countries is not water stress per se (as is the case within countries), but rather a unilateral attempt to develop an international river, usually by a regional power. In the basin of the river Jordan, for example, violence broke out in the mid-1960s over an "all-Arab" plan to divert the river's headwaters (itself a pre-emptive move to thwart Israel's intention to siphon water from the Sea of Galilee). Israel and Syria sporadically exchanged fire between March 1965 and July 1966. Water-related tensions persisted in the basin for decades (Postel & Wolf, 2001, page 63).

the virtual water thesis

An explanation for the apparent lack of violent conflicts over water is the virtual water thesis. In the context of water shortages experienced in the Middle East and North African countries (MENA), the main candidates at-

tribute the absence of water wars to the hypothesis that these countries overcome their water stress by importing food and agricultural products, which in reality means that they have been importing the water employed in producing them. It is something more than the description of the reality of water employed in the production of biomass, except that it also involves a strongly prescriptive element. Virtual water should be part of a country's water management strategy.

The concept has been received with considerable interest in the field of resources, in particular by practitioners engaged in defining water economy and policies on a sub-national or regional scale. But there have been those who question its true political and intellectual relevance. Wichelns (2010) argues that, in reality, the virtual water thesis is a rational theory that is applied generally at meso and macro levels, with scarce real application at lower levels (community or micro-farms).

Virtual water theory has made the failure of geopolitics and global mediating action a necessary condition of future water wars. This will remain the case until there is insufficient energy available to desalinate and purify alternative water resources, or until the measure of viable global food production areas is so low as to be insufficient to feed the total population (Stewart, 2014, page 102).

Challenges and future obstacles

The world still finds itself in a state of rapid change, manifested not only as population growth, urbanization, rising food expectations, and water quality deterioration, but also as responses to peak oil scenarios (in which finite oil resources can only decline from a particular point in time until their eventual depletion) and climate change. In a situation of widespread river basin closures, the changes involved in human responses demand additional water for replacing fossil fuels with bio fuels and for mitigating foreseen climate change by so-called carbon sequestration (Falkenmark(c), 2008, page 11).

Food production

The future water scarcity dilemma will be reflected in expanding food trade needs. The green-blue approach to water discussed earlier allows a broader view of water requirements as a whole. In two recent Swedish studies, water requirements for food were analysed as they related to potential green and blue water sources by which these requirements might be met. The basic conclusions drawn were that, given realistic improvements of water productivity, horizontal expansion of cropland will be unavoidable and must continue at the same order of magnitude as it presently does. (Falkenmark(c), 2008, page 11).

Bio fuels

Many global scenarios suggest a huge growth in the use of biomass for energy with dedicated bio energy plantations to replace fossil fuels. A common denominator in previous assessments has been a failure to consider water constraints as well as opportunities in different regions. Since bio energy is a considerable water user, increasing its share substantially will be a huge challenge. Already, the bio fuels production in projections from world energy planners represents additional water requirements of the same order of magnitude as agriculture (Falkenmark(c), 2008, page 11)

"Good governance"

Problems arise when we attempt to translate the scientifically based version of the ecosystem approach into policymaking. There has been a slow realization that science may best influence decision-making if it acts within a sanctioned discourse, as mental models are not easily changed. Most of what can be realistically achieved within the decision maker community is to operate around the lowest common-denominator of the two opposing worldviews. This means that what is termed "good ecosystem governance" will have to proceed within "comfort zones"—where action is seen as realistic and, most likely, incremental. (Falkenmark(c), 2008, page 14)

Currently some 800 million people suffer from malnutrition, and among them are 200 million children under five years of age. Other fundamental weaknesses in the developing world are that 1.1 million people still lack an organized water supply to their household for their daily use. 2.5 thousand million people lack safe sanitation, a fact that strongly contributes to the widespread occurrence of infectious diseases transmitted by bacterias and other pollutants from human faeces. All over the world there are examples of unsustainable water withdrawals, which cannot continue. The river Colorado, the Aral Sea tributaries and the Yellow River are the most flagrant examples of large-scale river depletion that seriously impact on downstream regions (Falkenmark(b) & Rockström, 2004).

Besides all these water related problems, the driving forces exacerbating them are extremely strong. Population growth, urbanization, industrialization and globalisation all contribute to increasing the pressure and are continually «squeezing» the planet's life support system and its life elixir, fresh water. Population growth, although having diminished in recent years, is still strong, and current projections indicate that it will continue for the next two decades (UN medium projections). The problem is that it there seems to be a limited overall understanding of these constraints (Falkenmark(b) & Rockström, 2004).

If today we are concerned with a water shortage crisis, how will it be possible to feed another 2-3 thousand million people in the next two or three decades?

Lesson for the policy-maker: secure, avoid, foresee

Water fulfils many parallel functions and our knowledge of the water cycle suggests that an integrated approach must include three policy perspectives. The challenge is to identify policies by means of three questions:

- What has to be secured? It is necessary to secure safe water to keep people healthy, to ensure income generation, and to produce food.
- What has to be avoided/minimised? Avoidable activities and manipulations, in particular, land use activities that cause erosion, and chemical manipulations and pollution resulting from human activities. These latter include bacterial pollution; toxic pollution, which poisons water users and degrades ecosystems; and the excess leaching of nutrients, which makes groundwater undrinkable and also degrades the aquatic ecosystems in rivers, lakes and coastal waters.
- What has to be foreseen or anticipated and met by risk reduction? Floods and droughts and the fact that a land-use decision is also a water decision. It also involves the effects on the continually ongoing transport in water cycle. All these create problems with upstream/downstream relations, making those downstream "prisoners" of those upstream. (Falkenmark(b) & Rockström, 2004, page 23).

Water wars

Not all experts rule out the idea that water shortage triggers war. In the view of David I. Stewart (2014, page 76) it is only likely that violent conflict over water will break out when water itself has become sufficient cause for war and this only becomes likely to occur when it causes an existential threat to a population or a state. In response to the question of virtual water, he calls for a new definition of the serious levels of scarcity, and of absolute water scarcity on the basis of the presence of an existential threat to a population.

For Stewart there are four different basic approaches to the shared use of water resources that represent different grades of interaction and cooperation between riparian countries starting from the idea of sole property, to a more liberal view of water being managed collectively for the common good. There are four different points of view:

- The first is «territorial sovereignty», whereby each riparian state has the right to extract or change the quality of water in its territory to the level it desires. This approach is embodied in the so-called Har-

mon doctrine, based on a sentence laid down by the presiding Attorney-General of the United States in 1895, Judson Harmon, concerning the use for irrigation of the waters of the Rio Grande that flowed from the United States into Mexico (Haftendorn, 2000, page 59). The judgment viewed water in the same way as other natural resources, such as oil or minerals giving ownership to the state where they were found but it was questioned as it ran contrary to a broadly accepted imperative of not doing harm to other countries.

- The second and converse arrangement is that of 'territorial integrity' whereby each nation is entitled to the full quality and amenity that their territory enjoys and should not be subject to the predation of others. This requires an upper riparian to consult with downstream states to an extent that effectively requires their permission to extract or change the quality of water.

These two views are extreme and grossly favour upper- or lower-riparian states, but are alike in that they may be seen to suit a realist view of irreconcilable inter-state competition or a regional/world order dictated by a hegemonic state that is able and willing to disregard the views and needs of their neighbours. Turkey and Egypt represent these cases.

- The third approach is «equitable utilization», and is underpinned by the concept of equal rights for each riparian. This does not mean that each must have an equal share, rather as Marx succinctly put it when describing equal rights to the product of labour: «From each according to his ability, to each according to his needs!». It is the basis of the «United Nations Convention on the Law of the Non-navigational Uses of International Watercourses».
- The fourth and last approach is that of «common management». The complexity of competing needs and requirement for a dynamic solution to achieve durable sustainability, particularly if there are environmental changes occurring. Common management of watercourses aims for equitable utilization through long-term engagement by all interested parties. This is the most cooperative and far-reaching of the four approaches. It considers all water in the basin and its associated hydrolog ical system. However common management is often implausible in the international system due to its implicit need to form groups that transcend nationalism and sovereignty issues, and to achieve unanimous consent in a dynamic situation (Stewart, 2014, pages 78-9).

Water conflicts

«I'm running out of demons. I'm running out of villians»

Powell's statement in 1991, articulates perfectly one of the main difficulties facing the developed capitalist world, and in particular the United

States, with the disappearance of the Soviet Union. Since then a whole panoply of «demons» has been discovered, created, or in some form «secured»: rogue states and states in collapse, violent Islamists and narco-terrorists or the varied problems of governance, development, human rights and environmental degradation. One of the key issues here is the threat of «water conflict»... which unfortunately is likely to become commonplace in the future, in the sense that water security will soon be classified as military security in the halls of defence ministries (Young, Dooge, & Rodda, 1994, page 20).

The pertinence of this comparative political economy for a comparative analysis of the oil and water conflict, lies in the fact that within the contemporary world capitalist system, there are few fields where there exists as clear a connection between the political economic dynamics and violent conflicts as in conflicts over resources. The linkage can be explored on three «levels»: at the level of state formation and state–society relations, at the level of regional international conflicts, and in relation to the global interests of hegemonic and core capitalist states (Selby, 2005, page 215).

With regard to state-formation and state-society relations oil has been one of the major determinants of these in oil-rich regions of the world, especially so in the Middle East. Not only were the boundaries of states such as Iraq and Kuwait delimited with oil very much in mind, oil revenues have also been key to the centralization of state power, state-led development of economy and society, and the consolidation of particular regimes (Selby, 2005, page 215).

The same can be said for regional inter-state conflicts in oil-rich regions, most notably in the Gulf. There, not only are oil fields a focus of territorial ambitions and insecurities; in addition revenues deriving from oil provide the key financial resources for weapons imports and military mobilization. Moreover , the rentier phenomenon –in which regimes derive their authority and legitimacy primarily through the allocation of oil rents, but otherwise have weak social bases – creates states which are highly vulnerable to fluctuations in oil prices (Selby, 2005, page 217).

Finally, oil necessarily being a strategic commodity and a major source of profit for the capitalist core, leading capitalist states (most importantly the US) have repeatedly caused or contributed significantly to oil conflicts. This has been especially the case since the 1970s – which was when US oil imports as well as corporate oil profits sky-rocketed, and when the US oil strategy came to revolve around the manipulation of, and provision of military protection for, Iran and especially Saudi Arabia (Selby, 2005, pages 217-8).

Oil, Water and Conflict	
Oil and conflict	Water and conflict
1. Key factor in the consolidation of state power and in the creation of authoritarian regimes; major source of civil conflicts	1. Local violent domestic conflicts in the South increasingly commponplace
2. Major cause of regional inter-state conflicts in oil-rich regions	2. Regional inter-state conflicts over water have never occurred and are increasingly unlikely
3. Major cause of inter-state conflicts between core capitalist powers and oil producers	3. Inter-state water wars involving core capitalist powers have never occurred and are increasingly unlikely

Table 2 source (Selby, 2005, page 205)

The story of water conflicts could hardly be more different. Firstly, there have never been, nor are there likely to be in the foreseeable future, inter-state wars over water directly involving core capitalist states. Water, for reasons already discussed, is not a strategic resource for the USA, Europe or Japan, and given the distribution of both water and political economic power it is unlikely to become one anytime soon (Selby, 2005, page 219).

If global and regional conflicts over water are unlikely, however, the same cannot be said of local water conflicts. Water is already a significant focus of local violence in many parts of the South, in a variety of ways and for a wide range of reasons (Selby, 2005, page 221).

For Thomas Homer-Dixon (1995) wars over river water between upstream and downstream neighbours are likely only in a narrow set of circumstances:

- the downstream country must be highly dependent on water for its national well-being;
- the upstream country must be able to restrict the river's flow;
- there must be a history of antagonism between the two countries; and,
- most importantly, the downstream country must be militarily stronger than the upstream country.

For Homer-Dixon the most obvious example is the Nile: Egypt is totally dependent on the river's water, has historically turbulent relations with its upstream neighbours Sudan and Ethiopia, and is much more powerful than either. And, sure enough, Egypt has threatened several times to go to war to ensure an adequate supply of Nile waters.

> *This sensationalism distracts the public's attention from the real results of water scarcity. Shortages reduce food production, aggravate*

> *poverty and disease, spur large migrations, and undermine a state's moral authority and capacity to govern. Over time, these stresses can tear apart a poor society's fabric, causing chronic popular unrest and violence. Mr. Serageldin and his World Bank colleagues should emphasise these outcomes rather than the chimera of water wars. (Homer-Dixon T. , 1995).*

But for Ravnborg (2003, page 5) during the last decade, water shortage has increasingly been coupled with international security. Due to the nature of water –a fluid life-necessity and a key ingredient in economic development, driven by gravity across boundaries– it has been anticipated that water may trigger international conflicts –the so-called water wars– in the future.

These 'warnings' have been supported by research undertaken within the field of «environmental security».

The basic argument behind this notion is that because water is such a vital and finite resource, scarcity of water, often measured through the use of water stress index, leads to intense political pressures. Because water ignores political boundaries, such political pressures might spill over and lead to international conflicts. (Ravnborg, 2003, page 5).

«Water security» may be seen as a species of the genus «environmental security». In a similar vein, water conflicts may be seen as a species of the genus 'resource conflicts' (sometimes called environmental conflicts), which have received a good deal of attention in recent years, referring to conflicts over scarce and/or valuable natural resources. Presumably, just as armed conflicts may be waged over natural resources such as oil, timber, diamonds and various minerals or game, they may be waged over the control of water. (Møller, 2003).

Conceptually, this notion of water scarcity leading to international conflict is overly simplistic due to its focus on the supply side while ignoring social and political issues related to water management and distribution. Implicit in the water scarcity narrative is the assumption that water scarcity – and water abundance – is equally distributed within a nation (or a basin). This, however, is far from always the case. As most states tend to represent only part of the interests related to water within the national boundaries, it is not all situations of water scarcity which are equally likely to lead them into situations of international conflict (or cooperation) but mainly those related to their most important political constituencies. (Ravnborg, 2003, page 6)

One of the conclusions to be deduced from the research carried out by Wolf, Yoffe, and Giordano (2003, pages 50-1) is that in the future water-related violence is likely to occur as «water disturbances», within national borders triggered by domestic or local pressures.

For Helga Hafterdorn, conflicts can arise from the use of common water resources. In order to further our understanding of such conflicts, it would be appropriate to distinguish between conflict arising through use, and conflict arising through contamination.

> *«A utilisation conflict, for example, could be the construction of a power-station on the upper-course of a river. The possibility of conflict increases in such cases where this construction has harmful consequences for the lower-lying states, for example, polluted waste water. The situation becomes more pronounced when the lower-lying states withhold their consent for such construction because of fears of, for example, water shortages. This could include a situation where the construction of a dam on the upper course of a river, that not only serves the electrical needs but also the major irrigational works of the lower-lying states, threatens to stem the flow of water. A relative conflict of distribution would present itself where a disparity over the use of water exists between the upper and lower-lying states. An absolute conflict of distribution would exist when there simply is not enough water to meet all the legitimate needs of the riparian states. The distinction between the different causes of water conflict leads us to the supposition that conflicts arising from the use or pollution of a water resource would be easier to solve than those conflicts that arise from the distribution of a scarce and finite resource. In the first two cases there are contested costs which can be manipulated in order to come to an agreement. In the case of a distributional conflict we are faced with a different scenario whereby a solution is only possible when the privileged state agrees to give up certain of its advantages.» (Haftendorn, 2000).*

Armed conflicts over water in themselves are an unlikely scenario. One of the most frequently used arguments in favour of the existence of water conflicts, is that water can be a catalyst for igniting an inflammable mix of existing ethnic, religious or historic enmities. But in this case, disputes over water are more a consequence of, rather than the reason for a worsening of relations between the states. It is possible that disputes over water will aggravate tensions over other issues leading to a kind of clash in which the value of water and the costs of war are not taken into account (Aliboni, 2001).

Linking water with other issues of importance for bilateral and multilateral relations could be essential for the negotiating parties. For John Anthony Allan (2002) «Where there are asymmetric power relations, the hegemon will seek to limit the issues under consideration and/or the number of participants according to their interests. Power asymmetries affect negotiations themselves, but are just as important at the preliminary stages, such as determining whether water should be negotiated separately or at the same time as more salient issues».

Food

Global food prices rose twice as fast as inflation in the last decade, impoverishing millions at a time when poverty relief captured the world's attention. Huge price swings for wheat, maize, soybeans and rice—staple crops for much of the world—made matters worse, disrupting markets and harming both producers and consumers. The food riots that swept more than two dozen countries in 2008 and 2011 were the most visible effect of these trends, but they also point to a deeper and more lasting concern: chronic food insecurity (GFSI, 2012).

The World Bank estimates that global food price spikes in 2008 pushed 44m people below the poverty line, most of them in poor countries. The Food and Agriculture Organisation (FAO) says that production needs to increase by 50-70% to meet global demand by 2050. Sceptics say the world produces enough food to feed everyone; that may be true, but supplies often cannot get to where they need to go because of physical, political, economic and market constraints (GFSI, 2012).

Studies show that lack of food is correlated with a substantial deterioration of democratic institutions in low-income countries, as well as a rise in communal violence, riots, human rights abuses and civil conflict. (GFSI, 2012).

Adapting to climate change (the case of Africa)

Habitats and ecosystems in Africa are currently under threat from a variety of stresses such as deforestation, land degradation and heavy dependence on biomass for energy. In sub-Saharan Africa over 80 percent of the population depends on traditional biomass for cooking. Climate change is likely to be an additional stress factor. (Osman-Elasha B. , 2009).

The key vulnerable sectors identified by IPCC (2007b) include agriculture, food and water. Sub-Saharan Africa is expected to suffer the most not only in terms of reduced agricultural productivity and increased water insecurity, but also in increased exposure to coastal flooding and extreme climatic events, and increased risks to human health.

Africa's vulnerability to climate change is exacerbated by a number of non-climatic factors, including endemic poverty, hunger, high prevalence of disease, chronic conflicts, low levels of development and low adaptive capacity. The average income per capita in most African countries is lower now than it was 30 years ago (Osman-Elasha B. , 2009).

Other non-climatic factors adding to Africa's vulnerability include heavy dependence on primary products; fast-growing population, leading to pressure on already degraded landscapes; poor governance and weak

institutions; low capital investment; lack of access to foreign markets; poor infrastructure; inadequate technology transfer; and continuing high levels of external debt despite debt forgiveness programmes of recent years (Osman-Elasha B. , 2009).

Sustainable development in Africa cannot be addressed effectively without accounting for the impacts of climate change on agriculture, conflicts and disease patterns, all of which have particular impact on the poor. Sustainable development and adaptation are mutually reinforcing; an important conclusion of IPCC is that adaptation measures, if taken up in the sustainable development framework, can diminish negative impacts from future climate change (Osman-Elasha B. , 2009).

The great land grab

Investment in arable land is one of the most profitable at times of economic uncertainty. Increased pressure on natural resources, water shortages, export restrictions imposed by the principal food producers when prices are high, and the growing mistrust in the way regional and world markets function has driven some countries in need of land and water to look for food production, and for various investors to look for profitability not found in other markets (Méndez Pazos, 2012).

There are three main trends driving the «land grab» movement: the rush by increasingly food-insecure countries to secure their food supply; the surging demand for agro fuels and other energy demands; and the sharp rise in investment in both the land market and the soft commodities market (Daniel & Mittal, 2009).

Apart from water, multinationals, investment funds and foreign governments are getting involved in the purchase and lease–sometimes for periods of 99 years- of vast extensions of farmlands. Up to now there had been plenty of warnings about the risks of land grabbing, but now the focus has turned to water. «The value is not in the land», explained Neil Crowder, director of an investment fund for Africa, «The real value is in water». Judson Hill, director of a private equity fund, in reply to a question on the profitability of water, said that «there are many ways to make a very attractive return in the water sector if you know where to go». This happened in 2010 (García Vega, 2012).

The world race for farmlands

Land grab refers to the purchase or lease of vast tracts of land from mostly poor, developing countries by wealthier food-insecure nations and private investors in order to produce crops for export. Land grabs have not gone unnoticed- they have elicited widespread media coverage

and concern from civil society, researchers and environmentalists, who fear that private land investments will increase monoculture-based, export-oriented agriculture arguably jeopardizing international food security. (Mittal & Mittal, 2009, page 1).

Multilateral Institutions –for example, the International Financial Corporation, the private sector branch of the World Bank- are further impelling the shift from public to private sector control over food resources. Rapid acquisitions of crucial food-producing lands by foreign private entities pose a threat to rural economies and livelihoods, land reform agendas, and other efforts aimed at making access to food more equitable and ensuring the human right to food for all. There is a dangerous disconnent between increasing investment in agriculture through rich countries taking over land in poor countries and the goal of securing food supplies for poor and vulnerable populations. (Mittal & Mittal, 2009, page 1).

The land grab phenomenon is the result of a complex combination of factors motivated by price volatility in global markets, the global food crisis, and high levels of speculative activity. However, there are three main trends driving the land grab movement: the rush by increasingly food-insecure to secure their food supply; the surging demand for agro fuels and other energy and manufacturing demands; and the sharp rise in investment in both the land market and the soft commodities market. (Mittal & Mittal, 2009, page 2)

- The skyrocketing increase in food prices in 2008, that increased import bills and inflation rates, harsh climatic conditions, and poor soils and scarce land and
- water in many areas, combined with economic and demographic growth have led many nations, in particular in the Middle East and in Asia, to re-examine domestic food security policies.
- A surging demand for agrfuels (bio fuel produced from ethanol and sugarcane, as well as biodiesel) and access to new sources of raw materials for manufacturing goods is also driving land purchases. Attracted by this big
- demand and market, investors-mainly from the private sector and OECD member countries-are targeting vast tracts of land to produce crops for agro fuels in developing which generally have a comparative advantage due to low labor and land costs, and, in some cases, land availability.
- The hunger of investors who view farmland as an investment poised to produce significant returns, is also fuelling the land grab. This increased attention from investors can be partially explained by the recent shift of focus from the «hard» to the «soft» commodities market. The recent private sector push into farmland acquisition has occurred at a dizzying speed, as land markets and soft commodities

have suddenly become attractive investments. (Mittal & Mittal, 2009, pages 3-5)

Actors facilitating land deals

A principal actor among these institutions is the International Finance Corporation (IFC), the private sector branch of the World Bank Group, which finances private investment in developing countries by advising governments and businesses and encouraging «business-enabling environments» in developing countries. The IFC also promotes policy reforms in these countries in order to cut down on red tape that could inhibit direct foreign investment. Working alongside the IFC is the Foreign Investment Advisory Service, which promotes private investment by improving the «investment climate» of developing countries.(Mittal & Mittal, 2009, page 6)

Land grab: a win-win situation?

Land grabs are being further legitimized and perpetuated by actors who claim that land deals can be a win-win situation both for the investors and receiving «host» countries. Such players include donor governments, a number of research institutions, such as the Food and Agriculture Organization (FAO) and other UN agencies. Jacques Diouf, Director General of the FAO, has gone on to support the proposed Gulf land deals as a means of economic development for poor countries. In his view, if the deals are constructed properly, they have the potential to transform developing economies, by providing jobs both in agriculture and other supporting industries like transport and warehousing. (Mittal & Mittal, 2009, page 9). This view is much more debatable.

The displacement of peasants and small farmers by transnational corporations is by no means a novel trend. Throughout history, corporate agribusiness has been known to establish itself in developing countries with the effect of either driving independent farmers off their land or metabolizing farm operation so that farmers become a class of workers within the plantation. Key examples of this historical trend are the transnational fruit companies in Central America like the American United Fruit Company (UFCO) whose empire extended from Guatemala, Costa Rica, and other Central American countries to Colombia and to the West Indies. UFCO relied heavily on manipulation of land use rights in order to maintain its market dominance, which had a number of long-term consequences for the region (Mittal & Mittal, 2009, page 11).

Thousands of small landowners have no other option than to lease their land to domestic or foreign agribusiness corporations and then be hired

as labourers by their tenants, thereby losing control of their land and relegating themselves to a life of rural poverty. No matter how convincing the claim that the global land grab will bring much-needed agricultural investment in poor countries, evidence shows that there is simply no place for the small farmer in the vast majority of these massive land acquisitions (Mittal & Mittal, 2009, pages 12-3).

Another dangerous element of the land grab trend is the shift from domestic to foreign control over food resources and food-producing lands. Large corporate land deals reduce poor nations' likelihood of reaching food self-sufficiency, and some view land concessions as governments outsourcing food at the expense of their most food-insecure citizens. Most of the «host» countries themselves are net food importers or even emergency food aid recipients (Mittal & Mittal, 2009, page 16)

Case study: The Nile Valley

Power asymmetries that clearly advantage the ability to influence one riparian actor over others are more common than one might imagine. The use of force (coercion) and consent (attraction), coupled with the establishment of ideas on a basin is much more determining of the outcome than international water law, water sharing ethics or riparian position. (Zeitouna & Allan, 2008)

On the other hand, counter-hegemonic tactics and strategies highlight how the seemingly disadvantaged party may either level the playing field or change the rules of the game. Ethiopia, for example, may employ bargaining power in the form of reactive or active diplomacy, strategic cooperation or the mobilisation of funding to widen its options within the Nile. Sudan could use its particular mid-stream and middle power status between Egyptian hegemonic and the Ethiopian counter-hegemonic strategies (Zeitoun & Allan, 2008).

The principal academic discussion concerning water conflicts is not about the water shortages at system level, but the inadequate management of this vital resource. In the case of the Nile, in view of the frequent threats of the use of force (legitimate or not), we could consider it as a kind of *subordination conflict*. Nevertheless, the eventual Egyptian acceptance of the Nile Basin Initiative (NBI), without giving up on its historic rights, would transform the conflict into a problem of management, based on notions of rationalism, mutual benefit, efficiency and negotiation (Stetter, Herschinger, Teichler, & Albert, 2011 , page 452)

Tackling problems pertaining to one commodity won't be possible without affecting supply and demand for the others. (NIC, 2012). This statement is especially true in the case of the Nile Valley. Egyptian-Ethiopian and Egyptian-Sudanese relations, are affecting the food-water-energy equation.

Water relations between Egypt and Sudan

Sudan's major advantage is its intermediary position between the hydro-hegemon power and the hydro-hegemon counterpower. Historically, Sudan and Egypt together formed the Nile Valley region, as defined by the Nile tributaries from Ethiopia and the equatorial plateau that converge to form the Blue Nile and White Nile respectively, and the convergence of these two major arteries at Khartoum to form the Nile that wends its way northward into Egypt. In addition they share common bonds of history, religion, language and kinship. Geopolitically, Sudan is Egypt's gateway into Africa. Combined, they occupy the largest segment of the Nile system, while both are heavily dependent on Nile waters — Egypt primarily so and Sudan to a great extent. (Shehata, 2014).

They are bound by a series of bilateral water agreements that they continue to recognise, even if other countries of the Nile basin refuse to do so. These agreements are:

- The 1913 agreement: In 1913, Britain (on behalf of the government of Sudan) notified Egypt of its plans to construct a dam as part of a plan to irrigate a portion of Sudanese land called Al-Gazira.
- The 1929 agreement between Egypt and Anglo-Egyptian Sudan: following the assassination in Cairo of the British governor-general of Sudan, Sir Lee Stack, Britain notified Egypt that it would increase the scope of the Gazira irrigation scheme to the degree it saw fit. Faced with Egypt's objections, it agreed to form a commission of experts and through an exchange of letters in May 1925, Britain (on behalf of Sudan, Uganda, Kenya and Tanzania) acknowledged Egypt's rights to Nile waters and pledged to safeguard these rights and not to undertake any irrigation or electricity generating projects on the Nile or its subsidiaries, the Great Lakes region, or in any areas under British control that would prejudice Egyptian rights. Egypt was also granted the right to monitor the Nile flow in upper riparian countries.
- The 1959 Nile Waters Agreement: After winning its independence in 1956, Sudan objected to the 1929 agreement on the grounds of its political nature. Cairo and Khartoum entered into negotiations that resulted in the agreement between Sudan and Egypt for full control utilisation of the Nile waters. Signed in 1959, that agreement sought to regulate the use of Nile waters to ensure its optimal utilisation in accordance with the provisions of international law. They determined that the average annual Nile flow was about 84 billion cubic metres, measured at Aswan, and that of this Egypt and Sudan would have a quota of 55.5 billion cubic metres and 18.5 billion cubic metres respectively (Shehata, 2014).

Khartoum undertook a major shift in its position on Ethiopian hydraulic works such as the Renaissance Dam and other major dams on the Blue

Nile. In December 2013, the Sudanese president declared his support for the construction of the Renaissance Dam, which, he said, would benefit Egypt, Sudan and Ethiopia. (Shehata, 2014).

The shift was closely connected to a range of domestic political issues and problems in Sudan in which Addis Ababa is closely involved, most notably Sudan's dispute with South Sudan over the oil-rich Abyei region. But Sudan also stands to benefit directly from the Renaissance Dam project. It will furnish a permanent supply of irrigation water for territories that Sudan has earmarked for major development projects. (Shehata, 2014).

Water Relations Egypt Ethiopia

Sayed Feleifel, an Egyptian expert in African affairs, states that Ethopia has been trying for a long time to control Egypt, and in doing so, underlining its alliance with Israel and South Africa (The-Bey, 2014). Traditional relations between Ethiopia and Egypt have been those of a counter-hegemonic power, Ethiopia, which is in turn the «water-tower» in the upper basin, and Egypt, the hydro-hegemonic power, with a vital dependency on the waters of the Nile

In 1979, the Egyptian President Anwar Sadat said: «*The only question that would take Egypt to war is water*», In the same sense, the then Egyptian Foreign Minister Boutros Boutros-Ghali[2] speaking in 1988, forecasted that the next war in the Middle East would be over waters of the Nile. But, as the law researcher Patricia Kameri-Mbote (2007) argued, instead of accepting these frightening predictions we should examine them in the context of the basin of the river Nile and the relations that have been forged between the states that shares its waters.

Egypt's water rights were confirmed and reconfirmed in every negotiating opportunity since the outset of the 20th century. In the rounds in 1902, 1906 and 1929 it was established that Egypt had a right to an annual quota of Nile waters of 48 billion cubic metres. This quota remained unchanged until 1959, until after the Egyptian-Sudanese Nile Waters Agreement and the construction of the Asuan Dam it was brought up to 55.5 billion cubic metres a year. This quota was subsequently reconfirmed in an agreement signed in 1993 between former president Hosni Mubarak and then Ethiopian prime minister Meles Zenawi who, additionally, reaffirmed his country's commitment not to undertake any hydraulic works that might prevent Egypt from receiving its rightful share of Nile waters (Shehata, 2014).

Cairo is refusing to sign the Framework Convention of the Nile Basin Initiative (NBI) before three conditions are added guaranteeing Egypt's histor-

[2] He was later elected Secretary-General of the United Nations

ic claims to its quota. It is demanding source countries explicitly acknowledge Egypt's historic right to 55.5 billion cubic metres of water, that they continue to seek Egyptian approval for any upstream water projects and that any existing convention articles be amended only if they secure the unanimous approval of all parties. Upstream states have categorically refused Cairo's conditions.(Leila, 2013).

But there came a time when Ethiopia summoned the sufficient determination to shed all these tiresome historical obligations. Whereas once it was reluctant to participate in Nile water talks or was content to attend in an observer capacity, suddenly it was spearheading a Nile Basin countries initiative and lobbying other countries to back a new legal framework that would put paid to the principles of all previous Nile water agreements. The product was the Entebbe Agreement, which was signed by most upper riparian countries in 2010, but which Egypt strenuously opposed. Then Ethiopia went ahead to put the Entebbe Agreement into effect unilaterally by inaugurating the construction of a series of dams on the Blue Nile and Atbara River basin. (Shehata, 2014).

The problem of the «Renaissance dam» energy and more

Situated near the frontier with Sudan, on the Blue Nile, a tributary of the Nile, the hydroelectric Renaissance Dam will be the largest in Africa, capable of producing 6,000 megawatts of energy (AhramOnline, 2014). But apart from the 250 metre-high dam itself, it will create a lake that will store 72 billion cubic metres of water.

The international water expert, Diaa Al-Kousi, states that «Ethiopia expects to cultivate millions of feddans with this water. It has already sold a million feddans to the Saudi company Savola to grow sunflowers for oil and 1.6 million feddans to a US agri-business. Water that is used, as well as that stored in the lake, would once have flowed through Egypt». For al-Kousi, «Egypt could face losing 20 per cent of its 55.5 billion cubic metres when the Renaissance Dam is built» (Leila, 2013).

Building the Grand Ethiopian Renaissance Dam (GERD), which started three years ago, is de facto taking place, which explains the approach of different parties involved. The cabinet's Supreme Committee for Nile Water is considering legal action against Ethiopia, while Ethiopia continues to call for dialogue because time is in its interest. For his part, Abbas Al-Sharaki, professor at the Cairo University Institute for African Research and Studies, explained that the storage capacity of the dam could cause mild earthquakes that could affect its body. Thus the possibility of its collapse is very strong. He pointed to other factors that contribute to this view, namely heavy rains, strong flow of water and basalt-rich soil. (El-Bey, 2014)

It is noteworthy that Addis Ababa laid the cornerstone for this project, which has a reservoir capacity of 11 billion cubic metres a year, on 2 April 2011, which is to say around two months after Egypt's 25 January Revolution. Clearly, the idea was to exploit the Egyptian focus on domestic concerns and developments at the time. (Shehata, 2014). But, it did not react, leaving Egypt with more traditional options such as escalating the cause against Ethiopia, one option being international arbitration, or appealing to the UN (General Assembly, Security Council, the International Court of Justice), which would demand time –which it does not have the luxury of- and would involve looking for an alternative solution in a series of Upper Nile water projects, in the pursuit of integral solutions at «valley level» (Shehata, 2014)

Non violent solutions to the Nile waters conflict: solutions at valley level

Numerous cooperation projects in pursuit of solving the water problem have been proposed. The results are complicated, but could prove to be highly satisfactory if they come to fruition.

- Projects for the Victoria Nile, Lake Kyoga, Albert Nile and Bahr Al-Jabal river network. Only 7-8 per cent of the huge quantities of water that regularly flow through the equatorial plateau reach the White Nile. The major cause of water loss from the Victoria-Kyoga-Albert river complex is that much of the water is trapped in surrounding marshes and then lost due to evaporation and transpiration. It has the potential to increase the flow of water from Kyoga into Lake Albert by an estimated 21 billion cubic metres per year. Similar water diversion, canalisation and levee construction projects are envisioned for the Albert Nile-Bahr Al-Jabal. But it must be borne in mind that it they should be seen as an integrated system spanning the entire system from Lake Victoria to the Bahr Al-Jabal and therefore requiring close cooperation between Egypt, both Sudans, and Uganda. Fortunately, the Sudanese and the Ugandans have expressed considerable interest in such projects.
- The Bahr Al-Ghazal and Jonglei canal project. Technical studies carried out by the joint technical Egyptian-Sudanese Nile Commission have shown that it is possible to provide seven billion cubic metres from the Jonglei canal project, in addition to another seven billion from the Bahr Al-Ghazal water diversion project, and four billion from a canalisation system that would draw water from the Sudd swampland. On top of this, another six billion would derive from the Al-Baro-Okobar project on the Sobat River, the most southern of the great eastern tributaries of the White Nile. (Shehata, 2014)

Upper Nile water projects are viable alternatives (as opposed to schemes connecting the Congo with the Nile or digging two new rivers in the Western and Eastern desert). Egypt should immediately set into motion the relevant processes of negotiations preparatory to putting such plans into effect.

Domestic water projects are long overdue. One cannot overstate the urgency of summoning the political will to carry them out and they can furnish considerable quantities of water. Treatment of agricultural runoff water and other water purification projects can produce an additional five billion cubic metres a year. Another five billion could be gained by tapping subterranean water resources in the Western Desert in particular. Water conservation and management programmes, combined with the further development of our irrigation and wastewater systems, and measures to prevent water pollution, would make an additional nine billion cubic metres of water average per year.

Ahram online (AhramOnline, 2014) has published news of a new Egyptian satellite that will track the construction of an Ethiopian hydroelectric dam over which officials in Cairo and Addis Ababa have been locked in a standoff over fears that the project will hinder Egypt's access to the Nile river waters. Egysat, according to Alaa El-din El-Nahry, vice president of Egypt's National Authority for Remote Sensing and Space Sciences, will capture high quality photos of the construction site, along with other sources of the Nile.

The Nile basin. The wave of farming projects

Three of the principal Nile basin countries (Ethiopia, Sudan and South Sudan) have already relinquished vast extensions of land. Since 2006 more than 4.9 million hectares in Sudan and South Sudan have been given over to foreign companies. In Gambela (Ethiopia), on the border with South Sudan, the multinationals are already building irrigation channels to extract water from the Nile. (García Vega, 2012).

Despite receiving billions of dollars in aid, Ethiopians remain among the poorest in the world. Since early 2008, the Ethiopian government has embarked on a process to award millions of hectares of land to foreign and national agricultural investors. Our research shows that at least 3,619,509 hectares of land have been transferred to investors, although the actual number may be higher. (Mousseau & Sosnoff2, 2011).

According to the FAO (The United Nations Food and Agriculture Organization), the 10 countries of the basin have enough water to irrigate eight million hectares at most, but according to the Spanish-based ONG, *Grain*, Ethiopia, Egypt, Sudan and South Sudan have already developed infrastructures to cover 5.4 million, and have already provided 8.6 million ad-

ditional hectares; much more water is required than that in existence in the basin and means hydrological suicide. However this does not appear to bother the foreign corporations operating in the zone, such as the Pinosso Group (Brazil), Hassad Food (Qatar), Foras (Saudi Arabia), Pharos (Arab Emirates) or ZTE (China). Their objective is one of financial gain, but also a form of assuring themselves of a granary far from home.

Basin states are interdependent and their development is inevitably linked to the river's hydrological cycle, in the view of Kameri-Mbote (2007). The coordinated management of the waters of the Nile is beginning to create a synergy in the different countries and sectors, and contributes to global cooperation. The Nile basin countries could resolve conflicts by jointly planning and managing water resources to achieve sustainable development and regional stability, under a sound legal and institutional framework agreed to by all parties. Reaching this agreement will require involving all stakeholders in transboundary water management, building trust among them, creating a common bond, and identifying shared interests.

96 per cent of sub-Saharan cultivated land in Africa is rain-fed (FAO AQUASTAT, 2012). Irrigated agriculture uses «green water» (that is, water found in the humidity of the soil). If investors are allowed to build the necessary irrigation equipment in leased farmlands, the use of blue water would increase. This would in turn give rise to increased agricultural production in the region, and is almost certain to augment the use of transboundary water resources. (Pazos, 2012)

Conclusions

Food, water and energy demands will increase due to a rise in world population and the consumptive patterns of the expanding middle classes. Climate change will decrease prospects for the availability of these critical resources.

Inherent to the water-energy-food triangle is a clear interdependency between the systems; facing the problems relating to any one of the resources is not possible without repercussions for the supply and demand of the others. Water is a critical limiting factor for food production, but is also fundamental for the production of energy. Water systems have been dealt with in an increasingly integrated manner, moving on from having been a mere resource, to its integration as blue water, the integration of green water, and integration with the ecosystem as a whole.

Providing an explanation for the absence of inter-state wars over water has given rise to various theories, from hydro-hegemony to virtual water, but while these theories may be applicable at macro or system level, they do not explain the situation at sub national or micro level, where violent

conflict frequently arises. One of the most closely analysed areas of study is that of the Nile valley, where there are periodic outbreaks of armed confrontation between Egypt, the main recipient of its waters and Ethiopia, its water-tower.

The phenomenon of land grab, reminds us of previous experiences such as that of the US United Fruit Company, and looks more like a form of neo-colonialism, than a tool to promote the development of poorer countries. Land grabbing incites corruption from the most powerful and leads to the weakest becoming even further impoverished. Particularly scandalous is this phenomenon in countries which are already facing a situation of water stress.

The construction of the Renaissance Dam, taking advantage of the *Arab Spring*, and without consulting the downstream countries who will be directly affected, will provide the indispensable energy for development, but will equally be exploited for the withdrawal of water to feed multinational plantations –and not their own impoverished population - reducing the historic flow of the river.

In any case, the shadow of conflict is fading and imaginative compensatory solutions of mutual benefit are being sought, which will permit the Nile water management issue to be addressed at basin level. But, in order to do so, it will be necessary to replace nationalism with rationalism, avoiding all kinds of *faits accompli*s.

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Vital resources and energy resources. Repercussions for security

Gonzalo Sáez de Miera

Abstract

This article presents an analysis of the key national security questions in relation to energy resources and water. Both water and energy constitute basic elements for the development of any society, as they are present in almost all productive activities. A large number of international entities expect an escalation in the coming decades of already existing tensions over increasing demands on these resources along with restrictions in terms of supply. This new international situation will bring about the implementation of specific policies, both at global and regional level, enabling the rational and efficient management of resources so vital for economic activity and hence for national security.

Key words

Prices of raw materials, external dependency, vulnerabilities, national security, water, energy intensity.

Energy

An analysis of the global energy context is one of the basic questions when it comes to producing a good diagnosis regarding energy security for Europe and Spain. An overall view is of particular importance in the context of today, which is characterised by growing interconnecting links among energy markets, to the extent that what in principle is a regional phenomenon, such as the strong development of shale gas in the United States, has altered the panorama for the natural gas market worldwide and has altered the dynamics of other markets such as coal.

Reports from the International Energy Agency (IEA) constitute an interesting source for world energy model projections: its challenges and alternative solutions. In this section we look at the main features and factors of the world energy sector using information in two recent reports: the World Energy Outlook 2013 (WEO 2013) and the Energy Technology Perspectives 2012.

The US Energy Information Administration, EIA, is also a good source of information on the evolution of the principal statistic variables of the international energy sector.

Diagnosis of the current situation and future perspectives

Global Context

The long-term global energy context is characterised by increased pressure on energy resources in spite of the growth of available resources, both fossil fuels and renewables, resulting from a sustained increase in global energy demand generating an inevitable tendential increase in the price of energy raw materials.

In the following paragraphs we shall be developing all these questions using the IEA's WEO 2013 *New Policies*[1] scenario as our basic reference, but not without previously highlighting the considerable degree of economic, geopolitical, and technological uncertainty surrounding any long-term analysis of this nature. This reference will be completed with information from other IEA and EIA reports.

Available energy resources

By 2035, according to WEO 2013, there will be sustained growth in the production of all energy sources. A very major role in this increased sup-

[1] This scenario implies the fulfilment of approved energy policy and environmental objectives (for example, it implies the fulfilment of the 20/20/20 objetives established at European level).

ply will be played on the one hand by technological improvements that will increase extraction capacities of fossil resources (oil and gas) of unconventional origin and, on the other, increase the production of renewable energies, which in turn will substantially improve their competitiveness.

The increased energy supply (and also of demand) has to be seen in a framework of the growing electrification of the global energy supply. It is worth highlighting that the role of electricity in meeting demand is on the increase in scenarios with greater environmental awareness ambitions. An example of this is the Energy Technology Perspectives 2012 2DS[2]scenario, which predicts an average annual increased electricity demand of 1.7% from 2009 to 2050, with electricity's share of the overall energy demand moving from the current 17%, up to 26%.

Starting out its analysis of expected supply with oil and natural gas, in both cases it points to considerable increases in production, but with distinguishing varying features over the two periods; the period 2012-2020 and that of 2020 to 2035.

In the case of oil, in the first period increased supply is seen to come fundamentally from the block of countries outside the Organization of Petroleum Exporting Countries (OPEC), mainly the United States, Canada and Brazil. The capacity for production growth of the first two is largely conditioned by the phenomenon of unconventional oil. Nevertheless, as from 2020, OPEC will once again take on a leading role, as growth declines within the non OPEC block and production increases substantially in the Middle East.

So, the WEO 2013 highlights the fact that the only major source of low-cost oil will continue to be the Middle East, which is why it remains at the centre of the longer-term outlook for the oil market, in spite of the growth in unconventional hydrocarbons production in years to come. This idea comes across very clearly in the following paragraph: «The role of the OPEC countries in quenching the world's thirst for oil will be reducing temporarily over the next decade by rising oil output from the United States, from oil sands in Canada, from deepwater production in Brazil and from natural gas liquids from all over the world. But, by the mid 2020s, output from non-OPEC countries begins to fall back and the countries in the Middle East provide most of the increase in global supply. Overall, the state oil companies and their host governments control 80% of proven-plus-probable oil reserves in the world». (International Energy Agency, 2013)

[2] This is the scenario that assumes that by 2050 the necessary objectives and policies will be approved to contain global temperature increases to 2oC.

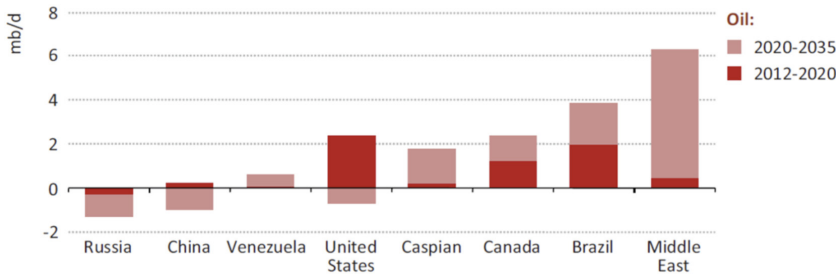


Figure1.- Growth in the production of oil in the period 2012-2020 and 2020-2035

Source: World Energy Outlook 2013. IEA

Evolution in the case of natural gas follows a similar path to oil where there is a growth in unconventional resources, which constitute the principal variable explaining a 47% growth in natural gas global production by 2035. Nevertheless natural gas production structures are more diversified than those of oil in the long-term, reducing the role of established agents and increasing the role of regions like Africa, China and the United States.

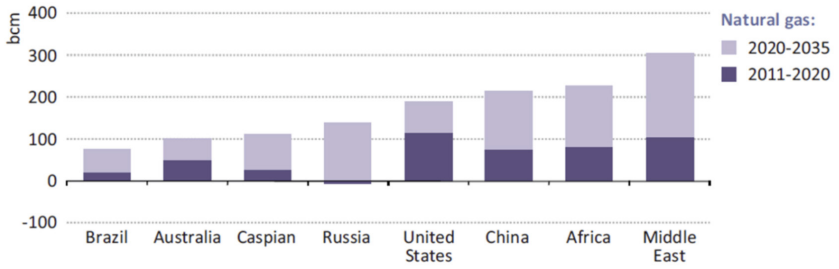


Figure 2.- Growth in natural gas production in the period 2012-2020 and 2020-2035

Source: World Energy Outlook 2013. IEA.

In the case of natural gas, the growth of unconventional resources, the increase of natural liquid gas, and the modification of contractual conditions between consumers and producers will paint a very different panorama to the present one, in that one foresees perhaps a greater capacity for reducing the vulnerability of consumers.

Finally, the increase in renewable energy supply is growing at a greater pace than any other energy source. This growth is characterised by two features: 1) two thirds of growth takes place in the period 2020-2035; 2) a large part is implemented in the electricity sector, mainly led by wind and hydraulic technologies.

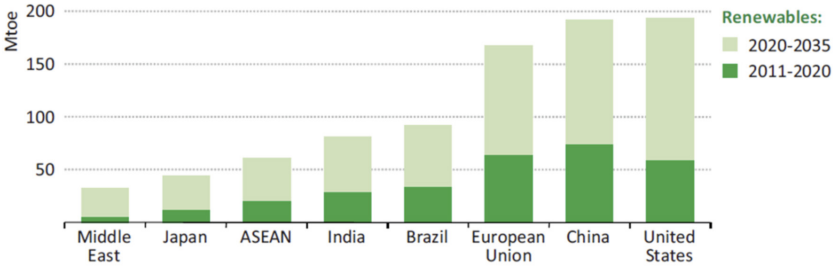
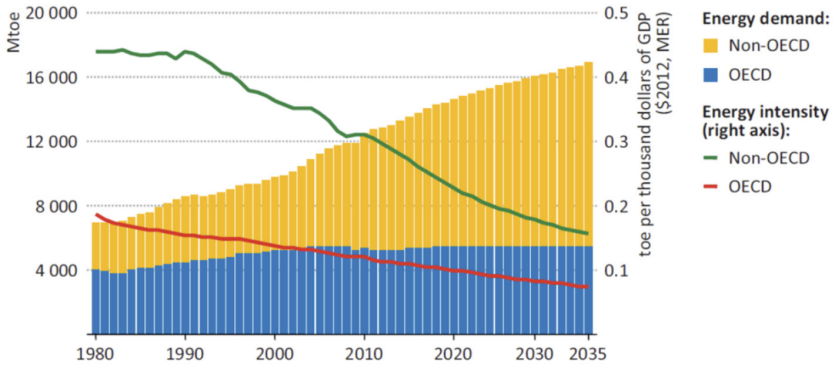


Figure 3.- Growth in the production of renewable energies in the period 2012-2020 and 2020-2035

Source: World Energy Outlook 2013. IEA.

Global energy demand

Global energy demand is set to register 33% growth in the period from 2011 to 2035, although improvements in energy efficiency will offset this evolution. As we appreciate in Figure 4, the principal driver of this growth in demand will be the non-OECD countries, who account for 90% of the rise in demand. Improvements in energy efficiency can be seen by the evolution of energy intensity (quantity of energy used to produce a unit of GDP). This indicator is reduced in the case of both blocks of countries. The OECD countries consolidate the reduction of this indicator, which is maintained throughout the period, considerably below the values registered by non –OECD countries.



Note: toe = tonne of oil equivalent; MER = market exchange rate.

Figure 4.- Evolution of global primary energy demand and energy intensity in the New Policies scenario

Source: World Energy Outlook 2013. IEA.

From a geographical point of view, as has already been pointed out, emerging countries will be leading the increase in demand, with the origin of this growth taking on a multipolar dimension. Thus, although China is spear-

heading growth throughout this decade, after 2020 it will hand over the baton to India and, to a certain extent, to the area of south-eastern Asia. The Middle East emerges as one of the main energy consumers, with its demands for gas surpassing the OECD countries as a whole. Undoubtedly all of this will redefine the role of each agent in global energy markets.

The price of energy raw materials

In the context of supply and demand trends, the competitiveness of the long-term energy supply has acquired (and will in all likelihood increase in importance) a predominant role in European, and Spanish, energy policy. This consideration stems from the consensus reached by a number of prospective energy analyses, pointing to a long-term trend growth of fossil fuel prices.

This upward trend in the price of fossil resources is illustrated simply in the next IEA diagram, which summarises the forecasts of various agents, and which in its own reference scenario indicates *Brent* prices of over 160 dollars/barrel in 2040 (in prices consistent with those of 2011).

	2011		2025		2035	
	WTI	Brent	WTI	Brent	WTI	Brent
Annual Energy Outlook 2013 (Reference case)	94,86	111,26	115,36	117,36	143,41	145,41
Annual Energy Outlook 2012 (Reference case)	94,82	---	135,35	---	148,03	---
Energy Ventures Analysis, Inc. (EVA)		---	78,18	---	82,16	---
AIE (Current Policies Scenario)	---	107,6	---	135,70	---	145,00
INFORUM	---	111,26	---	136,77	---	149,55
IHSGI	94,88		93,05		86,25	---

Figure 5.- Growth of energy raw materials prices (comparison of price forecasts for 2035 -2011 dollars -)

Source: IEA

Progress on issues of efficiency and energy intensity, already analysed, will help to minimise the impact of this expected price growth on our economies. Thus, OECD countries will be able to bear additional price increases for energy products without their competitiveness being too seriously damaged.

Europe

The role of the European Union on the international energy stage has been gradually declining, and is likely to continue to reduce in the fu-

ture, both from the point of view of supply and demand. Right now, the EU represents 6,5% of world energy production and 13.4% of consumption.

The principal EU energy producers are the United Kingdom, France, Germany and Poland, although with considerable differences. The United Kingdom fundamentally produces oil and natural gas at its North sea reserves (where production is rapidly declining); France primarily produces nuclear energy, while Germany and Poland are producers of coal.

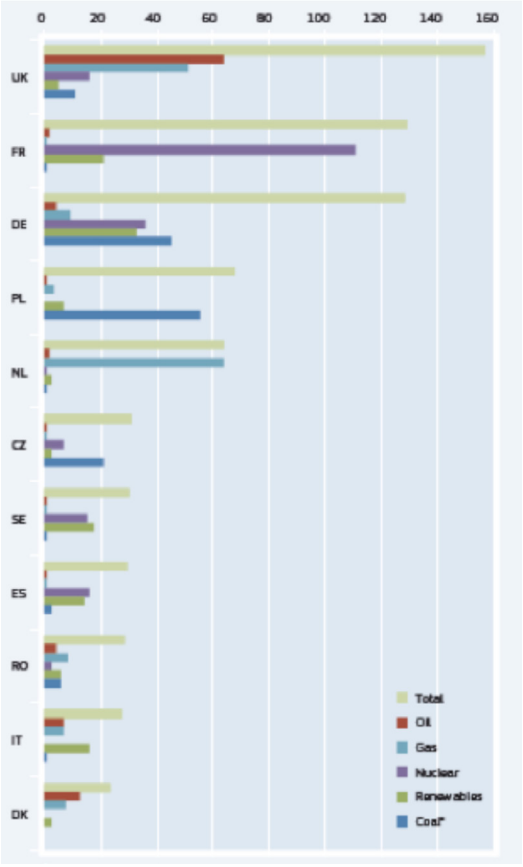


Figure 6.- Principal energy producing countries in Europe (Mtep)

Source: Eurostat

The EU meets a large part of its energy needs with imports. Its current dependency on energy imports is 86,4% for oil and 65,8% for natural gas. This dependency has been on the increase in all energy sources in recent years.

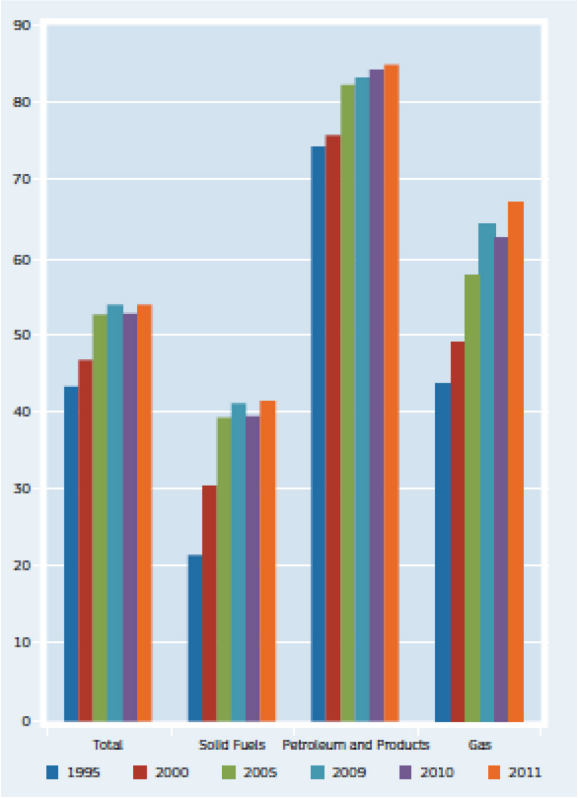


Figure 7.- EU-27 Energy Import Dependency per energy source (%)

Source: Eurostat

EU Prospects of meeting its energy needs

Analyses of future prospects indicate the EU's growing reliance on energy from outside to meet its needs in terms of fossil resources, which is largely explained by the exhaustion of traditional fossil resource deposits and by the limitations that will prevent the development of the «revolution of unconventional fuels» along the lines of those produced in the United States. It is expected that higher dependency levels will be found only in Japan and Korea, where values could be close to 100%.

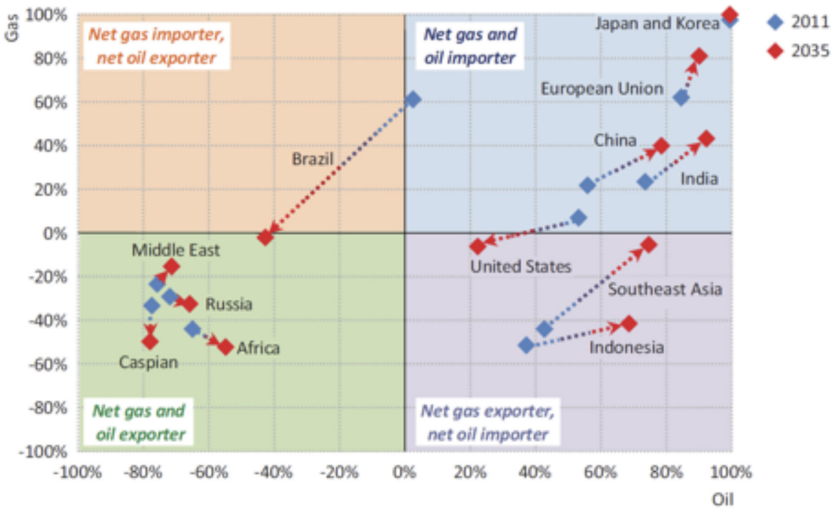


Figure 8.- Dependency energy of oil and natural gas3 in the scenario New Policies (%)

Source: World Energy Outlook 2013. IEA

	Energy demand (Mtep)						Cuotas (%)		CAAGR (%)
	1990	2011	2020	2025	2030	2035	2011	2035	2011-35
	1630	**1778**	**1763**	**1741**	**1719**	**1709**	**100**	**100**	**-0,2**
Coal	452	312	285	245	211	177	18	10	-2,3
Oil	615	589	521	488	452	422	33	25	-1,4
Gas	260	432	442	468	481	498	24	29	0,6
Nuclear	205	236	226	213	212	210	13	12	-0,5
Hydroelectric	38	43	52	53	55	56	2	3	1,0
Bio energy	54	130	166	184	200	217	7	13	2,1
Other renewables	5	36	71	89	108	129	2	8	5,5
Electricity	**626**	**756**	**759**	**752**	**755**	**764**	**100**	**100**	**0,0**
Coal	279	227	202	168	140	112	30	15	-2,9
Oil	51	20	12	9	7	6	3	1	-4,7
Gas	41	150	142	162	172	187	20	24	0,9
Nuclear	205	236	226	213	212	210	31	28	-0,5
Hydroelectric	38	43	52	53	55	56	6	7	1,0
Bio energy	9	50	65	71	78	85	7	11	2,2
Other renewables	3	29	60	75	91	108	4	14	5,6

Figure 9.- Meeting primary energy and electricity demands in the New Policies scenario

Source: World Energy Outlook 2013, IEA

[3] Energy dependency is calculated as the ratio between imports and the primary energy demand for the fuel in question.

While dependence on oil and natural gas imports is on the increase in Europe, the energy supply structure is adapting to meet demand and reduce the European economy's vulnerability as regards security of supply. As one can see in Figure 9, in the period 2011-2035, Europe will reduce its consumption of primary energy at an average interannual rate of 0.2%. In the long-term the reduction in consumption of coal and oil will be especially significant, with average rates of decline of 2.3% and 1.4%, respectively. Conversely, Europe will decidedly increase its reliance on renewable energies with an annual growth rate of 5.5%.

The scenario analysed also examines the electricity sector in relation to the European economy, as electricity demand remains relatively stable in the context of an overall reduction in energy consumption. Electricity represented 38% of the primary energy demands in 1990 and this is expected to be 45% in 2035. Electricity generation from renewables and natural gas acquires a larger role to the detriment of that based on fuel oil and coal.

EU energy strategy: 2020 and 2030

The energy and environmental regulatory framework in Europe in recent years has been determined by three key objectives known as the "20-20-20" targets for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%; as well as a 10% share of renewable energy in the transport sector.
- A 20% improvement in the EU's energy efficiency.

Several European Directives[4] designed to deliver on these targets have been approved on the one hand, and, on the other, the member states have developed their own binding regulatory targets that have been transposed into national legislation.

In relation to the measures to reduce emissions, these have been divided into major blocks: firstly, the industrial and energy sectors under the EU Emissions Trading System (ETS), which have an EU-wide cap on emissions and which are set according to a linear path up to 2020, and secondly the various sectors (transport, housing, business, institutions, etc...). In the latter case, the Member States have specific targets for reducing emissions and have the freedom to define and implement national policies and measures to achieve the required results.

[4] The Directive on greenhouse gas emission allowance trading (2003/87/CE), amended by Directive 2009/29/CE, the Directive on the promotion of the use of energy from renewable sources (2009/28/CE) and the recently approved Energy Efficiency Directive (2012/27/UE).

Support for the development and deployment of renewable energies has tended to be on a national basis, while the basic targets and regulatory framework is set at European level. These targets are allocated to the countries according to the renewable development potential and wealth of each country, and the Member States were given complete freedom to define the necessary support framework to achieve their national renewable energy. In overall terms, renewable energies have been been underpinned by subventions that finance electricity consumers with a charge on their tariffs (these systems are generally known as "feed-in systems").

Unlike the previous two cases, the 2020 energy efficiency plan is not binding in nature. This is another example of the relegated role of targets and regulatory measures in improving energy efficiency. Despite the approval of several norms on issues of energy efficiency,[5] traditionally this area is not awarded the same political importance as the reduction of emissions or the development of renewables energies and one could argue that it is one of the pending issues of European energy policy.

An analysis of European policy based on the 20/20/20 package is very complex, and goes far beyond a mere analysis of energy security. In a very simplified way one could speak of two major consequences:

– Interaction between the three targets. The promotion of renewable resources has been driving the establishment of these technologies, with a corresponding drop in greenhouse gas emissions. This, along with the economic crisis, has led to the reduction of emissions over and above levels expected when the ETS cap was set. The result has meant a drop in the price of CO_2, to levels far below those expected by the European Commission.
– The introduction of numerous policy concepts relating to energy, the environment and social issues, in the final prices paid by European electricity consumers, together with greater tax pressure, has removed competitiveness compared to other economic areas. As we can appreciate from the next figure, in spite of our energy prices being considerably below those of Japan, the range of concepts (subsidies for renewable energies, access charges, networks…) included in the prices paid by European consumers situates them at similar levels to those in Japan, and far above the prices paid by Chinese or American consumers.

[5] Directive 2006/32/CE on end-use efficiency and energy services; European Parliament and Council Directive 2010/31/CE, 19 May, 2010, on the energy performance of buildings.

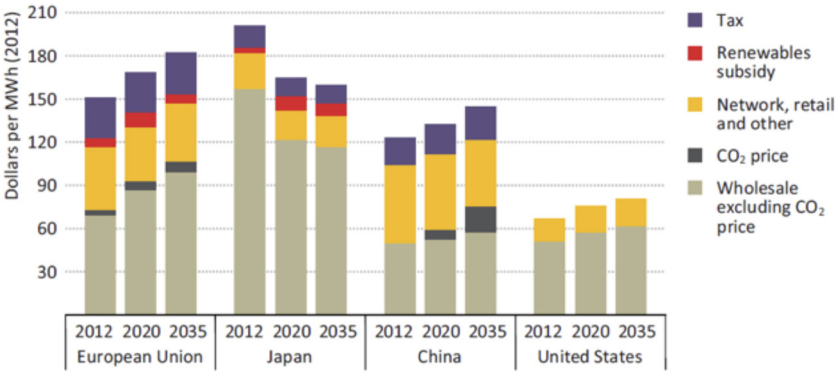


Figure 10.- Price of electricity for industrial consumers by region and component cost in the New Policies Scenario

Source: World Energy Outlook 2013, IEA

Currently European energy policy is immersed in a process of change. On 22 January, 2014 the European Commission presented a package composed of various communications and reports in which it revealed its determination to achieve a 40% reduction of greenhouse gas emissions by 2030.

Spain

A diagnosis of the Spanish energy sector identifies major traits that underpin important challenges for energy security while illustrating the strategies that have been adopted to mitigate the vulnerability of risk elements in this area. The following is a summary of some of the main elements to be considered.

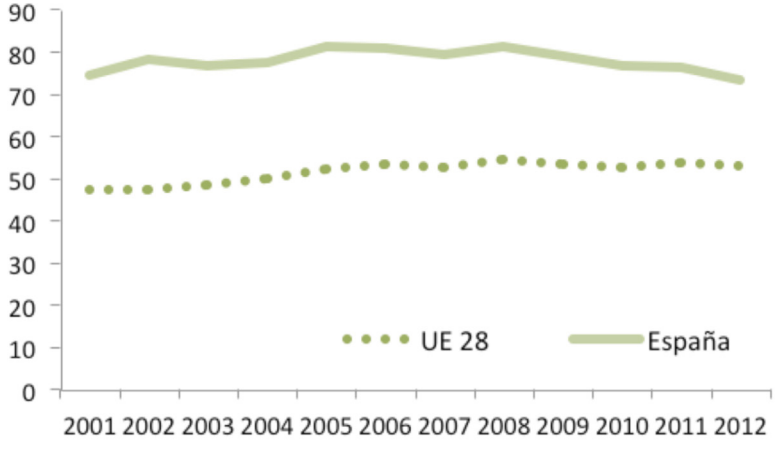


Figure 11.- Dependency energy in percentage

Source: Prepared by the author from Eurostat data

Energy Dependence.

Spain depends largely on imports to meet its energy needs. As the following figure shows, Spain's energy dependence (energy imports /consumption of primary energy) is situated at about 73%, which is a good deal higher than the 53% EU average.

Energy and electricity demand

In line with the EU, prospects for Spain indicate a stagnation in the consumption of energy end-use and a move towards electrification. In a report sent on 5 December by the Spanish government to the Commission concerning measures to fulfil Art. 7 of the Energy Efficiency Directive[6], it provided a breakdown of energy end-use consumption, reflecting a reduction of consumption compared to the Energy Savings Action Plan of 2011, while also demonstrating the continued trend towards electrification in the economy. The following is the average annual variation of energy end-use consumption of the various energy products for the period 2012-2020: electricity growth stands out (1.7% year-on-year average), natural gas is on the increase, with virtually no change in renewables outside the electricity sector and the reduction of petroleum products.

Looking at energy demands by sector, one of the main challenges facing Spain comes from the transport sector, which accounts for 41% of energy end-use consumption, and meets over 80% of its energy needs with petroleum products (mostly imported). In Spain the transport sector's share of overall consumption is much higher than the EU average, where it accounts for around a third of final consumption. However, in Europe the proportion of energy consumption from the housing sector is much greater than in Spain.

[6] (European Parliament, 2012)

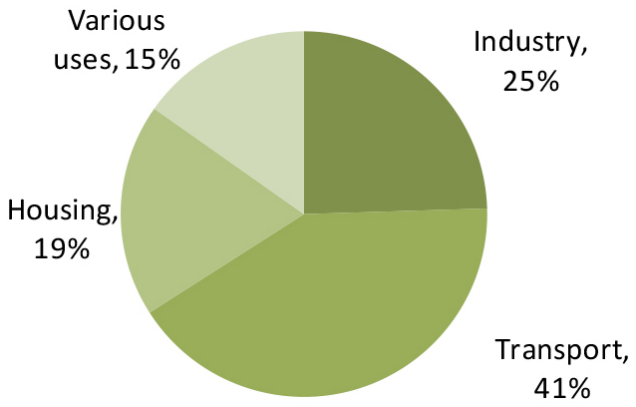


Figure 12.- Structure of energy end-use consumption in Spain

Source: IDAE

Final electricity prices among the highest in Europe

The final price for energy across the various countries constitutes a very important element for the competitiveness of their economies. Observations on energy security tend to pinpoint the effect of fossil fuel price hikes on economies, and their impact on relative competitiveness. In the case of Spain, as we see in Figure 13, the final prices of fossil fuels are below the average European rate and below a large number of its main trading partners. Nevertheless, the final electricity prices are among the highest in Europe.

The explanation of this phenomenon goes beyond the realm of energy security. However, to summarise, one might say that there are tax and energy policy issues involving cost concepts that impact on the final prices paid by consumers for energy. In the case of electricity, final prices have to cover many costs not strictly related to supply, such as subsidies for renewable energies, subsidies for the production of electricity in island territories, national coal subsidies... All of this creates upward pressure on electricity prices in Spain, to the detriment of its competitiveness at European and global level.

Strategies to mitigate vulnerability in terms of security

Spain is vulnerable in terms of energy security, on account of its high dependence on energy from imports, its elevated final prices that impact negatively on access to the commodity and on the competitiveness of the economy, and the structure of its energy consumption with its strong focus on sectors such as transport, making it very difficult to apply energy-saving measures or to reduce CO_2 emissions.

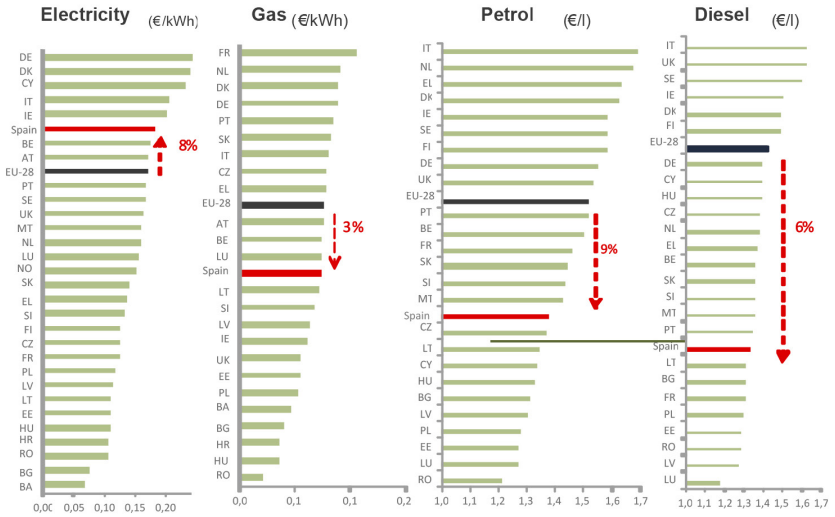


Figure 13.- Comparison of final energy prices in Spain[7]

Source: Prepared by the author from Eurostat data

Notwithstanding, certain variables have registered a very positive evolution, helping considerably to mitigate the risks in terms of energy security.

- Support for renewable energies. Spain has made a decided commitment to renewable energies in the electricity sector. In 2013 the production of renewables accounted for 40% of the total electricity production. This has had a very positive impact in terms of reducing dependence on imports and in the reduction of greenhouse gas emissions. Although at the same time we should not lose sight of the fact that as the sector is in receipt of subsidies financed through a charge on electricity tariffs, this has also incurred an increase in the final price paid for electricity.
- Improvement of energy intensity. Since 2004 Spain has followed a trend of reducing energy intensity, with a very positive impact on the competitiveness of its economy, by reducing the impact of energy prices on the energy unit cost of producing goods.
- Support for LNG giving access to natural gas world markets. Access to Liquefied Natural Gas (LNG) permits diversification of supplies and a substantial increase in flexibility. Spain has important regasification infrastructures and meets 40% of its natural gas consumption with LNG.

[7] Excluding VAT. Closing data 1S 2013 for electricity and natural gas, and on 04/11/2013 for petrol and diesel. Electricity: 2.500 KWh < consumption < 5.000 kWh. Natural gas: consumption < 20 GJ. Sources: Eurostat (electricity and natural gas prices) and European Commission (petrol and diesel prices).

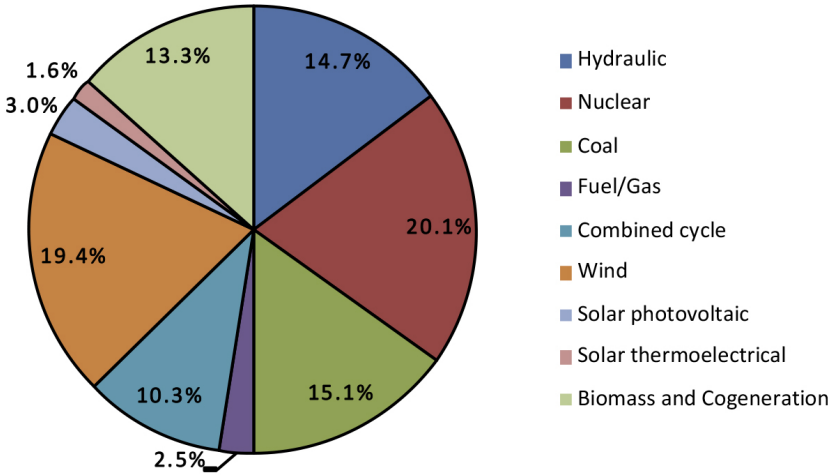


Figure 14.- Breakdown of electricity production by technology in 2013

Source: Prepared by the author from Electricity network of Spain data

Policies to improve energy security

Considering the diagnosis reached in this document and bearing in mind the challenges posed by issues of energy security for Europe, the following are some general recommendations in relation to energy policy. These recommendations are focused at European level, taking into account that, following the presentation of the 2030 goals on 22 January, 2014, the debate on the 20/20/20 framework results has intensified the need for long-term policies targeted at a competitive, sure, and environmentally sustainable supply.

Recommendations at European level will be echoed at national level in a context in which the targets and principles established in Europe increasingly guide national regulatory frameworks, even over and above the actual process of transposition to national law.

Proposals:

1. Make an appropriate diagnosis of the European energy model situation and its capacity to provide citizens with a suitably affordable, secure and environmentally sustainable supply. This diagnosis has to go beyond a mere analysis of energy dependence, using indicators that reveal the vulnerability of the various economic sectors to unexpected hikes in energy prices or potential interruptions in supply.
2. Establish a framework of long-term targets (by 2030 and 2050) that serve as a guide both to energy policy decision-makers and inves-

tors. The nature of investments in the energy sector requires the availability of long-term indicators and regulatory stability.

3. Design an energy and environmental taxation framework which, on the one hand, would be a useful tool for achieving structural improvements in energy efficiency with a positive impact on competitiveness and, on the other, would establish a solid tax collection base with the possibility of achieving resources to finance investment and policies geared towards the economic and environmental sustainability of the energy model.
4. From an EU-wide perspective, the improvement of European energy security involves greater coordination of the national regulatory frameworks and reaching a "sole voice" in international dialogue. In this sense, all policies geared towards furthering the consolidation of an internal energy market will have a significantly positive impact on energy security.
5. In terms of supply, the development of policies that mitigate the level of dependence on fossil resources from outside, maintaining a balance with competitiveness of energy supply. These policies should be adopted within a structure that recognises the process of increasing electrification as recognised by reports on energy prospects produced by the International Energy Agency. The following is a summary of some of the measures involved:

    a. To promote the development and establishment of renewable energies, developing regulatory frameworks that do not compromise the competitiveness of final electricity prices.
    b. To consider the potential of nuclear energy and its role in European supply.
    c. To explore the possibility of developing the capacity for indigenous fossil resource extraction (for example, shale gas) after a rigourous study in economic, social and environmental terms.
    d. To favour diversification in the origin of supplies at European level.
    e. To further sustainability in the transport sector, the main consumer of hydrocarbons in the EU.

The impact of electrification on energy security

- The process of electrification is a growing trend, recognised in a large number of analyses of energy perspectives produced by the International Energy Agency (highlighted routinely in successive editions of the World Energy Outlook). As a phenomenon it constitutes a very important element in facing the challenges of energy security.
- Although on analysis the implications of the electrification process on security issues are complex, it is worth highlighting the following:

- The increased share of electricity in energy consumption contributes towards reducing the share of fossil fuels in the energy mix, on account of its greater technological and economical capacity for introducing indigenous energies (for example, renewable energies or nuclear energy). This is especially relevant for a country that depends almost entirely on imports to meet its demands.
- Following on from this, in some sectors such as transport, the introduction of electricity can bring about improvements in energy efficiency (for example, with the introduction of electric vehicles) thus reducing the sector's dependence on fossil fuels.
- On top of this, the substitution of fossil fuels by electricity in turn leads to reducing the economy's vulnerability to international price shocks affecting commodities such as oil.

Finally, we should point out that an analysis of energy security in the context of electrification should also include a study of the characteristics of the various electricity-generating technologies and the vulnerability of electricity infrastructures. Such questions, however, due to their depth and complexity, transcend the scope of the present study.

In relation to policies focused on demand, these are being viewed as the main option for furthering the sustainability of the energy model in all its components: security, competitiveness and environmental sustainability. All these measures designed to improve energy efficiency make the European economy less vulnerable to the vagaries of international energy commodity prices and potential interruptions in supply.

In relation to measures to improve energy efficiency, the Directive on Energy efficiency 2012/27/EU (DEE) is the main milestone for 2020 in terms of global targets and regulatory measures at sectoral level, favouring the financing of efficiency measures and a conceptual framework providing follow-up and supervision of progress in this area. This Directive gives plenty of scope to the member states for its adaptation to national law by placing various alternatives at their disposal. For this reason, one of the key questions is how member states can effectively transpose EU directives into national law, while attending to the particular characteristics of their individual economies (for example, attending to each sector's share in the economy's final energy consumption) and avoiding regulatory errors that would introduce distorted decision-making on behalf of the agents.

Empirical experience in countries that have brought about considerable improvements in energy efficiency underpins how worthwhile it is to make use of a combination of additional measures, some of which play a very important role: labelling and standards, as well as information and awareness programmes.

Water: Implications for national security

Water is a basic resource for the development of a society. It is used across almost the entire spectrum of production activities and, specifically, in all forms of energy generation. In this sense, the supply of water is a vital resource for national security.

In the future, all indications seem to point towards its increasing importance. It will become increasingly scarce as a resource, because, as numerous studies have shown, pressure on water resources will be doubled:

- On the one hand, there will be an increase in demand due to population and economic growth.
- On the other hand, as a result of climate change there will be a severe reduction in supply.

Against this background, this section sets out to respond to key questions that will enable us to understand the real scope of the problem we are facing.

The global water problem

Water is a scarce resource, although on first analysis it does not reflect this reality. And so, despite the fact that water represents 71% of the earth's surface, as shown in Figure 15, only 2.5% of available water is freshwater. Of this quantity, 70% corresponds to the existing ice caps and glaciers and almost 30% is found in underground aquifers. Only 0,3% is found on the earth's surface, which reflects the considerable difficulty presented by its exploitation as a resource.

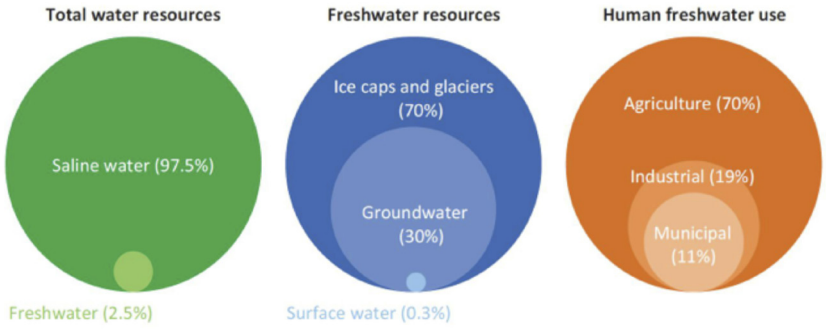


Figure 15.- Water resources at global level and availability for human use

Source: World Energy Outlook 2012, IEA

By far the greatest use of water by humans is for agriculture with an average consumption of 70% of the resources available while industry

accounts for 19%, mainly in refrigeration and transport, and also as a solvent. The remaining 11% corresponds to domestic consumption.

As previously commented, it is expected that in coming years the resource will be placed under increasing pressure both in terms of supply as well as demand.

This strong surge in demand will derive from demographic and economic growth. This fact is reaffirmed in the following graph in which the 2030 forecast shows the existence of a massive imbalance between demand and existing supply in a "*business as usual*" scenario.

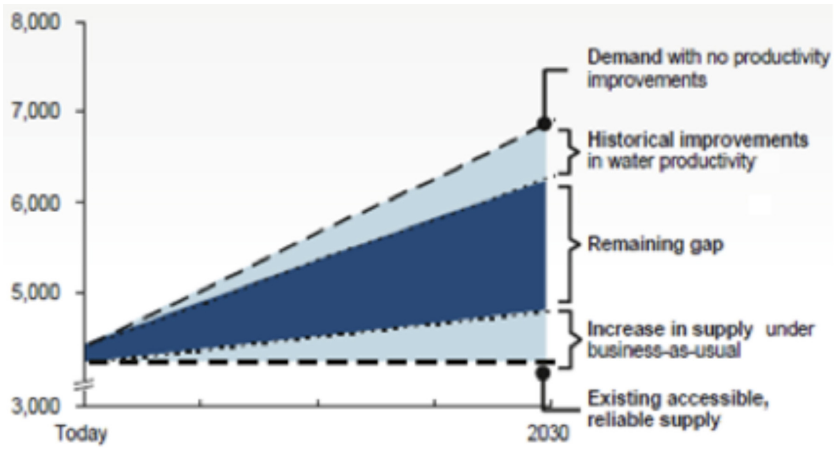


Figure 16.- Demand vs. current availability of the resource (bcm)

Source: 2030 Water Resources Group – Global water supply and demand model, McKinsey

This situation indicates the urgent need to take measures to palliate and correct these imbalances, measures that we shall deal with in detail in the next sections.

Supply is set to reduce due to the impact of climate change. According to reports by the Intergovernmental Panel on Climate change (IPCC), climate change will have serious consequences both on the availability of the resource and its geographical distribution. Figure 17 anticipates big changes for the end of this century. In some zones, these could mean reductions of 40% of available surface water resources compared to the situation at the beginning of the century.

This double increase in pressure on world water resources will generate far-reaching social, economic and environmental alterations of vital importance that will not only result in a reduction of available water reserves, but also their considerable deterioration.

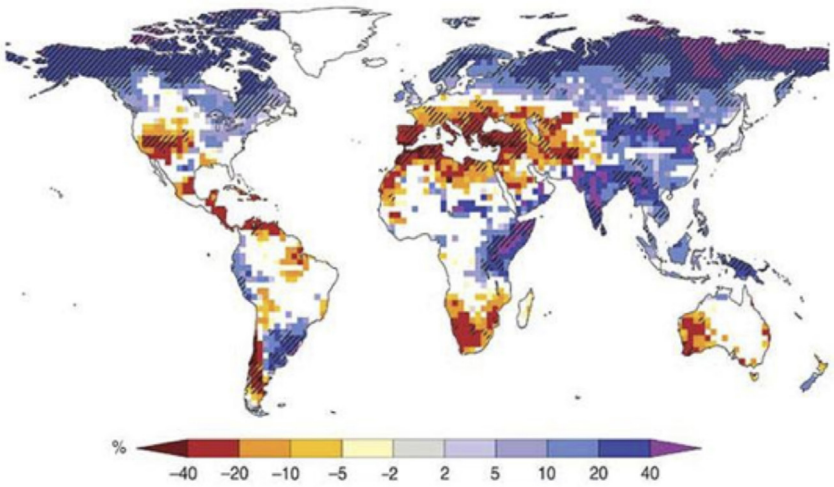


Figure 17.- Impact of climate change on surface water resources by 2099

Source: IPCC

The extent to which areas will be affected and the associated consequences of the problem will vary according to the level of economic development. Thus, developed economies will have to face growing water stress that will give rise to occasional problems of supply in the years to come. Climate change will become apparent with recurring periods of drought as well as extreme phenomena with the corresponding consequences for the life and economic activity of these territories.

For less developed countries the shortage of water resources constitutes a clear barrier to human and economic development and the improvement of their living conditions. According to the latest figures published by the World Health Organization (WHO), currently [8] 11% of the world's population does not have secure access to drinking water, which is the equivalent of 768 million people.

This desperate search for the resource in numerous instances leads to the degradation and destruction of ecosystems, an aspect that is especially important in those economies severely lacking in administrative protection and environmental awareness.

This situation has led several supranational organisations to introduce targets for the improvement of universal access to water resources and prevention of their deterioration. Thus, one of the United Nations Millennium Goals is to «halve the proportion of the population without sustaina-

[8] The latest available data from 2011, as published in the joint report: *«Progress on sanitation and drinking-water»* produced by the World Health Organization, WHO, and Unicef.

ble access to safe drinking water and basic sanitation». Although considerable progress has been made in recent years in striving to attain these goals, there are still many millions of people without sustained access to this resource.

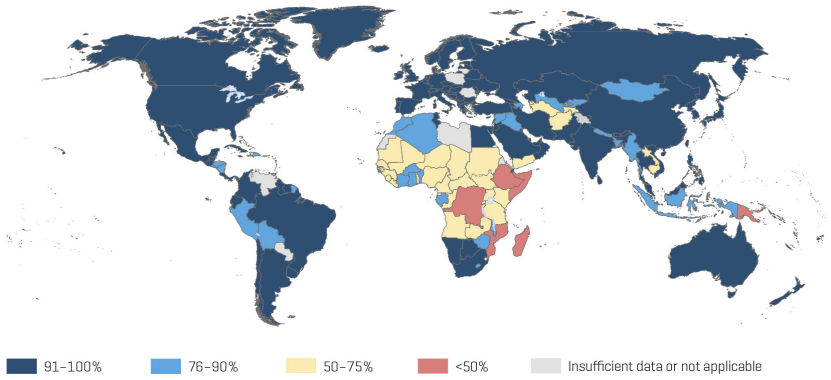


Figure 18.- Proportion of the population that uses improved water sources for consumption in 2011

Source: Progress on sanitation and drinking-water, OMS/UNICEF

Initiatives such as the World Water Contract set out to catalogue water as a common good to which all humans have a right and, as such, one that should be excluded from the commercial sphere and a market-oriented system. Such proposals serve to underline the need to revise the principles of water sovereignty with the ultimate goal of ensuring that all human beings have access to water in sufficient quantity and quality to satisfy their basic social and economic needs. In this way world policies can be introduced that would control water resources and provide for their equitable and sustainable management in the public interest.

In this sense, already in March 2004, the European Parliament defined water as «a common good of humankind» and stated that «the management of water resources should not be subject to internal market rules». Similarly, in July 2011, the United Nations recognised access to drinking water and sanitation as a human right.

Problems in Spain

The natural availability of the resource in Spain is far inferior to other countries of the EU and its neighbours, reaching between 7 and 8 % of the total annual rainfall (Figure 19).

During the past century an ambitious policy was pursued to increase supply, with the construction of over 1000 dams, permitting the regulation of an average of 40% of natural water resources. As a result, generally

speaking, Spain has similar available resources per capita to neighbouring countries. In spite of this, availability levels are below the European average.

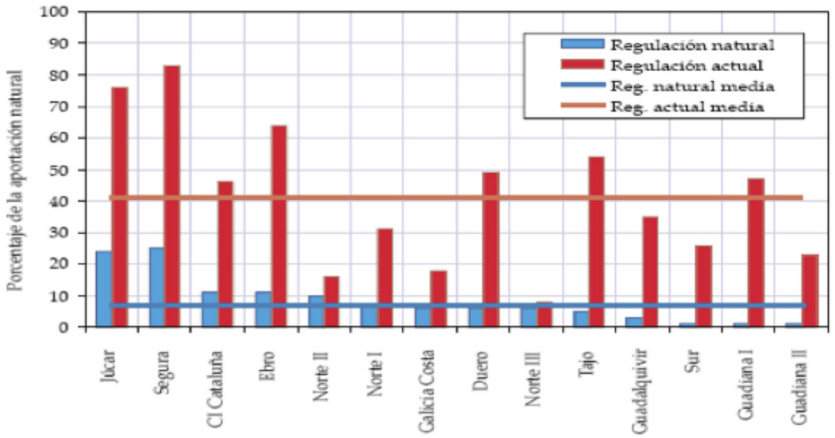


Figure 19.- Regulation in the natural, current regime, as a percentage of the total contribution in natural regime

Source: Libro Blanco (White Paper) on water in Spain, CEDEX, Updated 2007

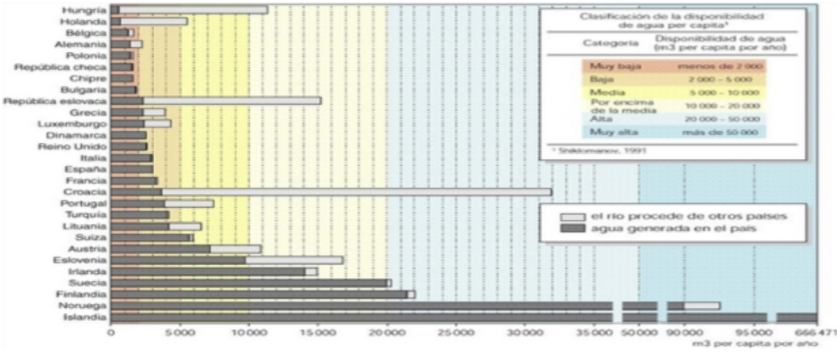


Figure 20.- Availability of water in Europe per capita

Spain, like other nations, is subject to the same tensions as the rest of the planet, although with its own particular aggravating circumstances. As we saw in Figure 17, Spain lies within the zones which will be hit more severely by climate change with 40% reductions in surface water availability forecast for the end of the century. But these changes will already be making their presence felt by 2025, according to IPCC reports with between 10 and 30% reductions in surface water availability for the entire Mediterranean region, most notably in Spain where reduced availability is set to reach this upper limit. For the period 2011-2040 similar reductions in rainfall are forecast for the various emission scenarios, with values

of around 5% in northern and eastern regions, and close to 10% in the south-east of the peninsula[9] (Abanades García, and others, 2007).

All this highlights the strategic nature of this resource for Spain. A major part of the country's production activities rely on the use of water and the lack of it would have dire consequences in terms of crop losses, job losses and, above all, the loss of the productive fabric, which would be difficult to replace.

When we analyse the effect of water on national security, from an energy perspective, we cannot underestimate the importance of this resource as a key factor for the generation of electricity, as practically all sources of energy use the input of water. In the case of electricity generation, water constitutes a basic input material, whether as a source of primary energy or refrigeration system. As we see in the next figure, there are important differences between use and consumption of water in the different technologies. These disparities correspond mainly to the different refrigeration systems used. Even concentrated-solar and geothermal renewable technologies, whose primary source of energy is indigenous, consume high levels of water like many conventional thermal power plants.

- Thus, if the availability of this resource is limited, albeit only occasionally, it could lead to the suspension of activity in some facilities, with resulting problems for the supply and operation of the system, as occurred in some nuclear plants in France in 2003 and in the United States in 2006. In addition, a shortage of water leads to higher energy dependency levels, as a reduction of hydraulic generation [10] means greater reliance on fossil fuels, which have to be imported.

Impact of climate change on future availability of water resources in Spain[11]

- One of the most comprehensive analyses of the impact of climate change on water resources in Spain was carried out in 2006 within the framework of the National Climate Change Adaptation Plan, coordinated by the Spanish Climate Change Office.
- One of its general conclusions indicates that climate change will lead to higher temperatures in Spain and a fall-off in rainfall, as well as a reduction in water provisions and a modification of water demand for irrigation systems.

[9] *Climate change in Spain. State of the situation*. Report based on IPCC Assessment report. November 2007.

[10] Hydraulic generation in Spain for 2013, accounted for almost 15% of total generation.

[11] This information is extracted from the National Plan for Adaptation to Climate Change, July 2006.

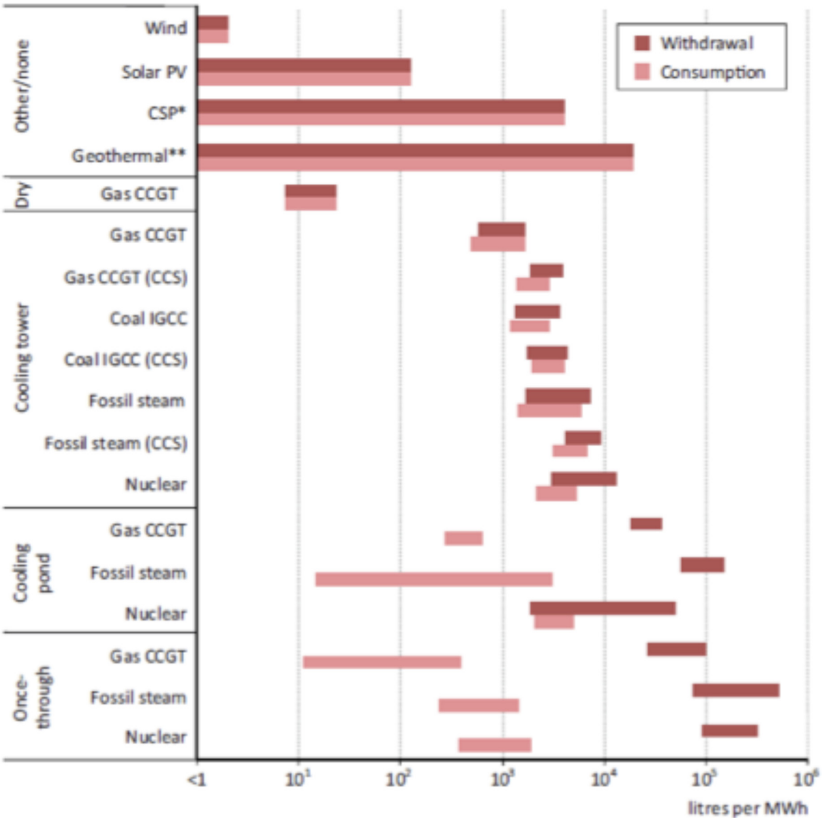


Figure 21.- Water Consumption for the generation of electricity by refrigeration technology

Source: World Energy Outlook 2012, IEA

- It highlights the fact that the impact of climate change on water resources will not only depend on provisions from the water cycle, but also on the available water system and its management. This last is a determining factor in guaranteeing sustainable coverage of demand.
- Water availability is highly sensitive to temperature increases and lowering rainfall levels, especially in zones with average high temperatures and low rainfall. The most critical areas are the semi-arid zones, where yields could fall to as low as 50% of their current potential.
- As the Adaptation Plan indicates, water resources will suffer important declines in Spain on account of climate change. By 2030, with 1oC temperature increases and a 5% drop in rainfall one can calculate a 5 to 14% decrease in water supplies. For 2060, with temperature increases of 2.5oC and a decline of 8% in rainfall one can calculate an average overall decrease of 17% in water resources. These figures may reach 20 to 22% for scenarios in the latter part of the century.

- An adequate diagnosis of the relationship between water and other natural resources. One of the priority measures should consist in carrying out a rigorous investigation of the availability and quality of water resources. This diagnosis from a supply perspective should be completed with a study of demand in two areas:
  - Analysis of the relationship between water and other resources; for example, energy.
  - Analysis of the importance of water as a resource in the various sectors of the economy (for example, the agri-food sector, tourism...) and the impacts derived from an eventual problem of supply.
- Efficiency and demand management policies from a broader perspective:
  - Introduction of a taxation framework to reinforce the prices charged for water, thus contributing towards rationalising consumption.
  - More information and awareness campaigns for consumers.
  - The promotion and distribution of technology standards to reduce water consumption in machinery and processing.
- Analysis of the impact of climate change and of available adaptation strategies. Climate change will impact on all sectors of the economy, the water sector being one of the most affected in Spain. In this context, an initial analysis of the regional impact of climate change on the availability and quality of water resources is of vital importance. On the basis of this analysis one would have to study the appropriate strategies to follow.

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Vital resources and energy resources in the European neighbourhood: the case of Central Asia

Antonio Alonso Marcos

Introduction

Central Asia –the region formed by five ex Soviet republics: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan— do not strictly speaking belong to the EU neighbourhood as none of them borders directly on the EU. Nevertheless, the proximity of the region, its strategic situation between Europe and Asia and its integration in international initiatives and organisations with a European presence bring it ever closer to the EU zone of interest, especially in what concerns us here: vital resources and energy.

Some of the natural resources of this large region are shared with their surrounding countries. The capricious nature of orography has dictated that its two big rivers, the Sir Daria and the Amu Daria, flow through the five States, that the source of some rivers is in Afghanistan but they empty in Turkmenistan, and that the division of the Caspian Sea is still disputed by the five riparian states -Russia, Kazakhstan, Turkmenistan, Iran and Azerbaijan-, which have been arguing for decades without coming to a decision whether it is an inland lake or a sea.

The political and economical evolution of these countries has been very varied. At the end of December 1991 there was nothing left of the Union, which had served for decades as a balance of power to the other superpower –the USA– and which had established politi-

cal and economical influence in a third of the world. With almost 25 years of independence, which came about almost overnight with the disappearance of the USSR (López-Medel, 2010), each one of these new nations has had a different political, economic and social development. One could say that, *grosso modo,* the most developed country in these three aspects is, without doubt, Kazakhstan. So much so, that the President launched the idea of changing his country's name to that of "*Kazak Eli*" –the land of the Kazakh– for two reasons: firstly to better reflect the idea that it is a plurinational country and an excellent model of interethnic and religious integration, and secondly, because in the global market it is difficult to open new markets with the encumbrance of the "-stan" ending, as it inherently carries the image of a failed state and unreliable partner or simply a bad place in which to invest.

Kyrgyzstan has suffered two revolutions, one in 2005, which terminated in the overthrowal of President Askar Akayev, and another in 2010, which managed to unseat Kurmanbek Bakiyev, and, via constitutional amendments and an interim woman President –Roza Otumbayeva, the first in a former USSR country— appointed the current leader, Almazbek Atambayev, in December 2011. Political instability triggered by major social chaos did not, as was to be expected, bring immediate economic prosperity to the country. Tajikistan, which started off with the disadvantage of a civil war (1992-97) that hampered its development and lives on in the collective imagination, is a failed state in every aspect and the most backward of the five. Turkmenistan is an autocracy rich in gas which managed to achieve recognition from the UN in 1995 granting it the status of a neutral country; politically it has only had one moment of slight instability, when in December 2006 the dictator Saparmurat Niyazov died suddenly, although he was immediately succeeded by his illegitimate son Gurbanguly Berdimujamedov.

Finally, Uzbekistan has had the same President since 1999 and has enjoyed, thanks to international aid from various powers anxious to control its energy resources, times of economic prosperity that have not, however, brought general economic affluence to the country's population, and although in second place of the five, it lags behind Kazakhstan whose GDP per capita is four times higher. Uzbekistan's great asset is its central position in the region and its large population, also scattered across the surrounding countries.

Although a present-day snapshot reflects troubles such as the inadequacy of the Tajik government in taking the country out of the extreme poverty it has found itself in since the civil war, the lost opportunity of Berdymujamedov in Turkmenistan, the accusations of torture in Uzbekistan, the timid reforms lost in the political instability of Kyrgyzstan or the slow pace of Kazakhstan in accommodating democratic progress to

match its admirable economic headway, a look back over the past 25 years leaves room for hope in the region, as although it may seem to have moved on without further ado from Soviet authoritarianism to autocracy, there have been developments which may well not be reflected in numerical terms.

As regards inter-state relations, two countries emerge from this regional subsystem as vying to become regional leaders : Uzbekistan, on account of the size of its population and the scale of its Armed Forces, and Kazakhstan, for the size of its territories and its modern army. Relations between these two countries and the two smallest –Kyrgyzstan and Tajikistan– are conditioned by the role of Russia as *gendarme* of the zone. Turkmenistan remains outside these movements of the Central Asian geopolitical chart, or at least in matters of policy and security, but not so in the economic arena. The most active external power in the zone has been Russia, for historical reasons obvious to all; in addition to ethnic, cultural and linguistic ties there are interests of trade, economy and security between the "motherland" and its former dominions. Nevertheless, after the fall of the USSR, while the United States tried to step in as a replacement, China is currently the most forceful power, although it has to share this place with other countries such as Turkey, Iran, Japan, South Korea (Sung Hak, 2009), the EU and, in recent years, India.

In the light of this regional configuration, one element that could blow apart this delicate balance is the unknown quantity when it comes to the successors to the Presidents of Kazakhstan and Uzbekistan, in both cases rather an obscure issue, although following very different strategies. In the former, there was the rather misleading tactic of too much information being divulged, with various Kazakh news media publishing a list of more than thirty names of possible successors, but warning at the same time that whoever is finally elected may not even be on that list of the top political and economical posts in the country. In the latter, there has been an ongoing open battle since 2012 between Gulnara Karimova –Karimov's eldest daughter, who appeared to be the favourite to succeed him— and Lola Karimova-Tillyaeva, supported by her mother, Karimov's second wife, Tatyana Akbarovna Karimova, and Rustam Inoyatov, head of Uzbekistan's secret service.

Finally, the principal security threats –without providing a comprehensive list– come from the instability of the neighbouring states, principally Afghanistan, from various forms of illegal trafficking –drugs, arms, women—institutional corruption and the Jihadist threat in all its varying forms, from the indications of religious extremism to Islamist-inspired terrorism. Other problems are food security, access to drinking water, the permeability of borders, illegal immigration and the absence of established democratic institutions (Linn, 2014).

Regional configuration

Although the conceptual framework of neorealism has its limitations in dealing with security issues directly affecting citizens rather than national security in the strict sense of the word, it is the framework that provides most details on the situation and the dynamics developing in the region (Stavridis and De Prado, 2010). There are issues that in principle fall outside the neorrealist security agenda, such as the integration of immigrants in host societies, the adequate functioning of health systems, environmental problems, differences of economic resources –both within a country as well as in relation with other countries-, the education/training of young people and their preparation and insertion in the labour market, to give but a few examples. But, on the other hand, the neorrealist framework provides a satisfactory explanation as to why government elite make certain decisions that directly affect national security and in particular the security of its citizens and why these five countries have decided to focus their foreign policy in one direction or in another, what type of alliances are established between them and what agreements they reach with extra-regional powers.

Regional leadership

Following independence, as another way of asserting themselves as new nations, each of them looked for its place in the world and tried to occupy the corresponding site. For objective reasons, it seemed there were two candidates for regional leadership: one being the largest in geographical terms and the most economically and technologically developed –Kazakhstan— and the other being the most populated and the one with the largest army –Uzbekistan— (Gómez de Ágreda, 2012).

As regional leader it would be a second-level power, serving the interests of another major player in spite of exercising influence in a given zone. The rivalry between Kazakhstan and Uzbekistan has come to the fore on several occasions throughout these decades of independence, such as in border-post skirmishes between Uzbekistan, Kyrgyzstan and Tajikistan, Uzbekistan's closure of rail traffic to prevent the arrival of goods to Tajikistan, the reiterated cuts of Kazakhstan's energy supply to Kyrgyzstan or from Uzbekistan to Tajikistan; or the declarations of the Uzbekistan President, Islam Karimov, in which he clearly displays his disagreement with the construction of dams upriver in Tajikistan.

Such rivalry to strengthen regional leadership has also been played out in the terrain of multilateral diplomacy, especially in international organisations such as the CSTO, NATO or the SCO. While Uzbekistan has pursued exclusionary tactics, flirting first with some and then with others, Kazakhstan chose a multi-sided diplomatic approach, but giving spe-

cial importance to its relations with Russia. Moreover, the race to display influence over their neighbours has been fuelled and exploited by extra-regional powers. So, for example, Russia has used Tajikistan and Kyrgyzstan to put pressure on Uzbekistan; the USA has used Uzbekistan to bring pressure to bear on Russia; and the USA has moved closer to Kazakhstan to "annoy" Russia.

Extra-regional actors

The boxing-in of the region makes its dependence on third countries for placing its products on the market greater than other zones in the world. Off-setting this difficulty requires some degree of ingenuity and these countries offer substantial advantages to foreign business to set up there, especially in the so-called *Free Economic Zones* of Asjabad (Turkmenistan), Navoi (Uzbekistan) or Sughd (Tajikistan)[1].

On the other hand, there are no real processes of regional integration in place, so they always depend on the presence of a third party from outside the region to reach cooperation among them, powers that wish to exert their influence in different ways (Legvold, 2003).

Central Asia was a crossroads for many of the Ancient empires. With this seed from the past they have sowed the seeds of future collaboration feeding off those historic roots as a way forward. Although in past centuries that relationship, imposed by the colonising dominant powers, was anything but symmetric and based on inequality, today's system of international relations would not permit such asymmetry and sees to it that inter-state relations are based on sovereign equality principles.

Despite all this, states tend to impose their own designs on others, because it is in their nature to do so: they were born to wield power, and the very dynamics of power is always growing–it only declines when faced with another superior power—. Idealists argue that this is not the nature of the State nor the dynamics of international relations but that States were born to look for world peace through cooperation (Herberg, 2004). Lessons learnt from the previously defined dynamics of regional leadership show that, at least in this part of the world, one cannot play the game with the rules of idealists but with those of realists or, at best, with those of the neorealists –otherwise, one stands to lose—(Mcgrew, 1998), which does not imply underestimating the worthy objective of seeking regional peace or cooperation in good neighbourly relations (Menon and Spruyt, 1999). In the case of Central Asia, the creation of regional organisations has precisely served to stage that dynamic of trying to exert influence in

[1] For reasons of space, this chapter will only describe the relationship between the Central Asian Republics and states outside the region directly involved in vital resources and energy. A political, economic or military analysis can be found in other works.

the region so that under the guise of seeking cooperation among equals, what one has in reality is an exercise of power in the purest classic style (Marketos, 2009).

These are the elements which these countries have to consider when it comes to calculating and looking for foreign allies to assist them in developing their economies destroyed by 70 years of communism, civil war –in the case of Tajikistan—proximity to a zone as turbulent as the *Af-Pak*, or simply the lack of expertise from leaders who found themselves from one day to the next without the support of Moscow. So, the foreign policy of each these countries has relied on widely differing criteria, added to the fact that things have evolved over almost 20 years with alterations and fluctuations. The traditional Russian presence was replaced by a wide range of possibilities including the USA, Turkey and Iran. Not long after that China, India, Pakistan and even Japan and South Korea appeared on the scene (Veiga and Mourenza, 2012). Much later the EU made its appearance, although some member countries had already established fruitful relations unilaterally in the region. Obviously, Russian influence has always remained as Russian has been the *lingua franca* with which these countries have operated amongst themselves and with other former USSR countries, in the diplomatic sphere, in business and even in the military sector.

One way or another, the following golden rule gradually came into being : to guarantee the real autonomy of a newly independent country, the most intelligent option is not to put all one's eggs in one basket and to support multi-sided diplomacy, with Kazakhstan as its paradigm. Nevertheless, it is not altogether a level playing field as not all those from outside the region enjoy the same advantages nor the same resonance in the region. There are the top-ranking powers- Russia, China and the USA— second-rank powers –Iran, Pakistan, Turkey, India, and Japan, the Gulf States and some European countries, who act on their own behalf and, in turn, within the framework of the EU–. However, the spirit that drives extra-regional powers to invest in Central Asia, is it altruistic and philanthropic or is it driven by business interests and the desire to exert political influence? (Gordon, 2007; Vavilov, and Trofimov, 2013)[2]. It would appear that in this case the answer is very clear and cooperation with these countries is no free handout but largely a *quid pro quo* exchange along the lines of the saying: «Cats do not catch mice simply for the sake of God».

Finally, the following tables illustrate what are the most important connections in the field of imports and exports. As one can see, China always ranks close to the top both in imports and exports, given that the low-

[2] These authors suggest that rather than just an Alliance of States with business monopolies, in the struggle between one and another they have won over companies placing the States at the service of their own interests.

cost manufactured goods offered to these countries are very varied and attractive, and affordable to the vast majority of the people. On the other hand, China needs more and more sources of energy to meet growing demand, thanks mainly to its economic and demographic growth.

	1.°	2.°	3.°	4.°	5.°
Kazakhstan	China (28%)	Ukraine (10,9%)	Germany (8,5%)	USA (7,9%)	-
Kyrgyzstan	China (55.2%)	Russia (17.4%)	Kazakhstan (7.9%)	-	-
Tajikistan	Russia (22%)	Kazakhstan (15.2%)	China (14.5%)	Lithuania (4.7%)	Kyrgyzstan (4.4%)
Turkmenistan	China (19.5%)	Turkey (17%)	Russia (12.6%)	UAE (6.8%)	Ukraine (6%)
Uzbekistan	Russia (20.7%)	China (16.6%)	South Korea (16.4%)	Kazakhstan (12.5%)	Germany (4.6%)

Table 1 Import partners (2012)3.

	1.°	2.°	3.°	4.°	5.°
Kazakhstan	China (19.3%)	Italy (18.1%)	Netherlands (8.8%)	France (6.6%)	Switzerland (5.8%)
Kyrgyzstan	Kazakhstan (26.2%)	Uzbekistan (26.1%)	Russia (14.6%)	China (7%)	UAE (6.1%)
Tajikistan	Turkey (40.7%)	Russia (10.6%)	Iran (9.9%)	Afghanistan (8.7%)	China (7.4%)
Turkmenistan	China (69,6%)	Italy (4.7%)	-	-	-
Uzbekistan	China (21.2%)	Kazakhstan (15.9%)	Turkey (15.8%)	Russia (14.7%)	Bangladesh (9.5%)

Table 2 Principal export partners (2012)4.

Russia and China

In relation to energy, thanks to pressure –in the good sense of the word— from China, the Central Asian oil and gas pipeline infrastructure no longer leads exclusively to Russia, following a north-south direction, but now extends towards the Asian giant, following a west-east axis (Ivanov, 2013). This by no means implies a deterioration in relations between Russia and China, especially when it entails opposing US interests (Wilhelmsen and Flikke, 2011), as displayed with the signing of two macro-agreements on

3 Prepared by the author from *CIA World Factbook* data.
4 *Idem*.

energy issues whereby Russia will sell vast amounts of oil and gas to China. These agreements, signed within just a year of one another, were the fruit of tough negotiations and imply the consolidation of this strategic alliance, as indicated by the details relayed by the media to the effect that *Rosneft* has agreed a US$270-billion deal to supply oil for 25 years, increasing from 800,000 tonnes of crude in 2013, 2 million in 2014 and 15 million in 2015; and *Gazprom* has signed a US$400-billion deal to supply 38 billion cubic metres (bcm) of gas every year for 30 years from 2018 (Vavilov and Trofimov, September 2013).

These agreements contradict expert forecasts, although it is also true to say that it is very easy not to get it right as the introduction of new variables can change the panorama entirely (Yodogawa and Peterson, 2013, pages 125-127). In 2012 China imported oil mainly from Saudi Arabia, Angola, Iran and Russia, and the first Central Asian country that appeared on the list was Kazakhstan –in ninth position— providing the Asian giant with 4.4% of its imports, which translates into 240,000 barrels per day (bpd). Nevertheless, it is expected that in the next two years Russia will move ahead of Saudi Arabia and Kazakhstan will also increase its share to China (Libert *et al.*, 2008), which, following a «going out» strategy since 1997 seeks to make use of all sources of hydrocarbons in the region, slowly, but at a steady pace and without competitors in sight (Petelin, 2011, page 34).

The second world economic power, which will shortly remove the USA from its first position (Blank, 2011), is hungry for sources of energy that will satisfy its needs to maintain or increase its economic growth (Jones, Steven and O'Brien, 2014). This is probably yet another example of the shift in the geo-economic and geo-strategic panorama, of the weight of the EU in this region of the planet, of the transition to a power pole shared between China, Russia and India (Bohr, 2010).

The withdrawal of ISAF troops from Afghanistan has meant that Russia has regained its dominant role in the zone, while it appeared scarcely four years ago that the USA was going to increase its presence in the country; although in such a scenario, Moscow was prepared to raise its demands to the Obama administration in relation to paying for the transit of logistic support to coalition soldiers deployed in Afghanistan (Avgerinos, 2009). One inevitably asks the question whether Russia is really set on rebuilding something similar to the Tsarist empire, in the light of developments and declarations in relation to the Ukraine crisis and the Eurasian Customs Union (Volkov, 2011, pages 21-22).

Iran and Turkey

These two nations enjoy cultural and linguistic ties with the countries of Central Asia as all their local dialects are Turkish in origin, with the exception of Tajik, which is Persian in origin. They have been able to exploit

this to forge economic and trade links beyond their own borders, very much in line with the policy of «Zero Problems with our Neighbours», of the founder of modern Turkey, Mustafa Kemal "*Attaturk*" and his «peace at home, peace in the world», or in line with the Iranians, who opted not to turn their revolution into the banner of their foreign policy, especially under the governments of Rafsanjani (1989-97) and Jatami (1997-2005).

Turkey is looking to establish good trade relations and seek economic growth with Central Asian energy resources (Krauer-Pacheco, 2011). In pursuit of its target, among other things, at the IX Summit of Turkic-speaking Countries, held in 2009 in Nakhchivan (Azerbaijan) it set up the Cooperation Council of Turkic-Speaking States (CCTS), with Azerbaijan, Kazakhstan, Kyrgyzstan and Turkey as founder members.

Iran, for its part, is pursuing three basic objectives with its «pragmatic regionalism»: to break the international isolation it has suffered at the hand of the USA –at least until they are sitting at the table for talks in Geneva on denuclearisation—; to maintain regional and security stability on its northern borders; and to become the economic and trade bridge between Central Asia/the Caucusus and world markets.

India and Pakistan

These two countries, enemies ever since they came into being in 1947, have found in Central Asia another terrain in which to deploy both their willingness to cooperate and their capacity for competition. The TAPI project –*Turkmenistan-Afghanistan-Pakistan-India Pipeline Project*– is an example of this.

Apart from its strategic interests –making a link from Afghanistan and Tajikistan to Pakistan— India is seeking to satisfy its energy needs in this region, but avoiding dependence on Pakistan on account of it, at least not while disputes are ongoing. So it is looking for an alternative route via Iran, so the pipeline would run for 1300 km in Iranian territory to the port of Jask or Chabahar, on the Arabian Sea coast, and from there to the Indian ports. The major inconvenience of this project is that the USA wants to keep Iran isolated, unless US Foreign Policy makes a seismic, authentic and lasting shift, in the wake of attempts at opening up to Ayatollah Khomeini's regime already made by the Obama administration.

The Central Asian authorities, nevertheless, look on Pakistan with a degree of suspicion, as one of the favourite places which young people travelled to during the Soviet era and immediately afterwards to learn a form of Islam that was not official, that was seen as an Islam manipulated by the political authorities. On top of that, it is widely known that increasing problems with Jihadist terrorism occurring in Central Asia originate for the most part in the border zone between Afghanistan and Pakistan.

Vital resources of Central Asia

Central Asia is a region very rich in natural resources: no only in hydrocarbons but also in gold, uranium and rare earth elements. And it also possesses water, although this is precisely the scarcest commodity and the one that is capable of triggering a series of inter-state clashes in the not too distant future (FAO, 2012, page 266). In fact, this is one of the points on the planet with the greatest water stress–Turkmenistan and Uzbekistan in particular (Fernández-Jáuregui, 1999, pages 179-194; Gosling and Arnell, 2013) – and the circumstance is further complicated by the fact that the two States situated on the upper bank of the Sir Daria and the Amu Daria and therefore in control of the water stopcock for the rest of Central Asia, are the two countries that have hardly any energy sources of their own and depend on the other three States–Kazakhstan, Uzbekistan and Turkmenistan— for energy. This means that the States have to make strenuous efforts to control their own domestic demand, and balance it with demand from the other riparian countries and from client states –principally China, Russia, the USA and other neighbouring states in the region—. At least this was the scenario up to now, as the discovery of a large pocket of gas in Tajikistan together with the *CASA-1000* project, has meant a changeover from energy importer to energy exporter capable of selling electricity to Afghanistan and Pakistan.

The relationship between water and energy has been a constant concern since shortly after these countries gained independence. Hence under the protection of the UN the *SPECA Special Programme for the Economies of Central Asia* was created in 1998 with the agreement of the Presidents of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan –Azerbaijan joined in 2002 and Afghanistan in 2005—. Out of six *Project Working Groups* (PWG) there is one on water and energy, dealing with the efficient and rational use of energy and water sources in Central Asia (2003), and it played an essential role in establishing institutionalised cooperation between the governments of Kazakhstan and Kyrgyzstan for the joint management of the river Chu and Talas installations (Campins, 2009).

Water

Apart from the Amu Daria –which flows through the southern part of Central Asia— and the Sir Daria –which flows through the north—, there are other important rivers such as the Zeravshan, the Karadarya and the Chirchik, and all enter the region or rise in Tajikistan and Kyrgyzstan (UNECE, 2011, pages 107-130).

Under the Soviet management model, these two USSR republics simply let the water flow that originated in springtime from the melting of the ice-caps from the summits of the Tian Shan and Pamir mountain ranges (Kayu-

mov, 2006)[5]. With that water, Uzbekistan, Kazakhstan and Turkmenistan irrigated their fields of cotton and rice, crops that require a considerable amount of water. In the '50s, Kruschov imposed his policy of «Virgin Lands» whereby Uzbekistan moved over from a crop rotation system between alfalfa and cotton to the monoculture of cotton –«cotton first»—; the '60s saw the beginning of the construction of the canal system which pumped water out from the two big rivers towards the lands under cultivation before it reached the Aral Sea; although Uzbek cotton production has dropped by 35% since independence, it remains the fifth exporter and sixth producer of cotton in the world. An immense navigable canal of the same name was also built in the Karakum desert (Turkmenistan) transporting water from the Amu Daria to Asjabad and the Turkmen oasis in the south of the country (Dinar, Dinar, McCaffrey and McKinney, 2007, pages 288, 293-298).

While Moscow disappeared in 1991 as a centre of political decision-making and became a mere occasional arbiter in this type of dispute, these are the nations that have to sit down at the negotiating table to resolve the management of their regional water resources and prevent dialectic clashes that sound like a threat (Nurshayeva, 2012).

http://www.flickr.com/photos/zoienvironment/7525832184/in/photostream

Figure 24

[5] There are four main glaciers in Tajikistan: the Diakhandara, the Fedchenko (the most extensive), the Medvezhiy and the one known as Glacier of the Russian geographical Society (RGS). Other lesser glaciers are the GGP, the Zeravshan, the Rama, the Skogach, the Abramov, the Fortambek, the Garmo, the Mys Octyabrski and the Akbaital.

Poor water management in Central Asia is based on three main pillars: the construction of hydroelectricity dams in upstream countries, the abuse of irrigation crops in an arid or semi-arid region and the lack of adequate maintenance of the water transport network (Bucknall *et al.*, 2003, page 6). This has brought about floods in summer–when these dams release a greater quantity of water than forecast to release pressure on the reservoirs—, the drying out of some lakes –paradigmatic the case of the Aral Sea (Mosello, 2008, pages 151-174— and the salination and pollution of the waters (Peachey, 2004, pages 1-20) –especially when waterlogging occurs and subterranean water deposits become contaminated with fertilisers that pass on substances such as copper, iron, magnesium, phenols and, above all, sulphates from the terrain to these waters (Bucknall et al., 2003, pages 8-10; Tsujimura *et al.*, 1998, pages 53-65; UNECE, 2007; UNECE, 2011). Global warming and the corresponding accelerated melting of the Tajik glaciers, has increased all these factors. For their part, the Kyrgyz glaciers, including the Inylchek, situated between the mountains of Terskey Alatau and the river Sarychat, will not fare any better (Solomina *et al.*, 2004, pages 205-215; UNEP, pages 48-49).

Moreover, water is also utilised in the processes of energy production: for breaking rocks in the extraction of gas and oil, for oil-refining, for cleaning coal, for irrigating fields which serve to make biodiesel, for heating and obtaining solar and thermal energy, for the production of electricity energy from waterfalls and for refrigerating nuclear reactors.

The joint use of water is an issue which has been of concern to these states since their independence, which led to the signing in 1992 of the *Almaty Agreement* and the creation of the *Interstate Commission for Water Cooperation* (ICWC). Another major concern is the shrinking of the Aral Sea since the '60s. In order to adress this ecological disaster, the *Agreement of Joint Activities in the Aral Sea* was signed in 1993; arising from this agreement various bodies were set up between 1993 and 1995 to work specifically on the issue: the *Interstate Council for the Aral Sea* (ICAS), the *Interstate Fund for the Aral Sea*(IFAS) and the *Sustainable Development Commission* (SDC), to replace the *Inter-state Commission for Socioeconomic Development and Scientific, Technical and Ecological Cooperation,* (ICSD-STEC). In 1994 *the Aral Sea Basin Programme* (ASBP) started to operate a consortium of various international organisations (World Bank, PNUD, PNUMA and the EU) to identify long-term problems deriving from poor management of these waters.

The activities of these international fora have left in their wake a considerable trail of bilateral and multilateral declarations and agreements, like the *Framework Agreement on the Sir Daria* or the *Agreement of Bishkek* (1998), which establishes a water-energy transfer framework, whereby

Kyrgyzstan will receive from Kazakhstan 1.1 million kWh of electricity energy –or its equivalent in coal— and from Uzbekistan 400 million kWh of electricity energy and 0.5 bcm of gas, while Kyrgyzstan will release 3.25 bcm of water a month from the Toktogul reservoir and 1.1 billion kWh of hydroelectric energy in the summer months both to Kazakhstan and to Uzbekistan.

A further agreement was that of the *Basin of the Amu Daria*, whereby Tajikistan would export 3.4 billion kWh of hydroelectric energy to Uzbekistan, while Tajikistan would import gas from Uzbekistan to the tune of 3 billion kWh. Finally, although the Amu Daria does not flow through Kyrgyz territory, the ICWC obliged Tajikistan to transfer 0.15 bcm of water per year to Kyrgyzstan to assist it in the fulfilment of commitments acquired under the Sir Daria Agreement. Against all the odds, the general evaluation of this cooperation is positive (Bernauer and Siegfried, 2008, pages 479-501).

In dealing with water issues these countries have to play their cards with great «diplomatic cunning», in every sense of the word. Here there is no place for short-termism, looking to obtain maximum benefits while minimising those of one's adversary; short- medium- and long-term solutions must be found that will satisfy all the players because it would suit nobody if poor management of this precious asset were to degenerate into armed conflict.

Aid from international organisations has grown in recent decades, so that, for example, the European Bank for Reconstruction and Development (EBRD) invested US$100 million in 2013 to supply drinking water to 21 towns and cities of over 20,000 inhabitants in Tajikistan, including Chkalovks, Gafurov, Isfara, Kanibaidam, Karaikkum, Khorog and Taboshar. Such examples provides tangible hope that water issues do not have to provoke war between states.

The agricultural and livestock sector

This region is very varied both in its topography and weather, so alongside inhospitable steppes, deserts and mountains it also has very fertile valleys and plains in which people have very profitably cultivated the land and raised livestock. The following two tables illustrate the importance of this primary sector in the national economy and its share in the distribution of the active workforce in each of these states. If we cross- relate the data from the two tables, we see how in the hydrocarbon-rich countries (Kazakhstan and Turkmenistan) the agricultural sector accounts for less than 10% of GNP, but across the five Central Asian republics this sector accounts for more than 25% of the active population —in Kazakhstan and Uzbekistan— and even close to half –in Kyrgyzstan, Tajikistan and Turkmenistan—.

	Agriculture	Industry	Services
Kazakhstan	5.2%	37.9%	56.9%
Kyrgyzstan	20.8%	34.4%	44.8%
Tajikistan	21.1%	23.2%	55.7%
Turkmenistan	7.2%	24.4%	68.4%
Uzbekistan	19.1%	32.2%	48.7%

Table 3 Distribution of GDP by production sector (2011)[6].

	Agriculture	Industry	Services
Kazakhstan	25.8%	11.9%	62.3%
Kyrgyzstan	48%	12.5%	39.5%
Tajikistan	46.5%	10.7%	42.8%
Turkmenistan	48.2%	14%	37.8%
Uzbekistan	25.9%	13.2%	60.9%

Table 4 Distribution of the active population by production sector (2011)[7].

The crops most widely grown in these countries are cereals (rice, wheat, barley), some legumes (alfalfa), potatoes, vegetables, fruits. Moreover, in some countries tobacco is grown–as in Kyrgyzstan— and in all, except in Kazakhstan, cotton is grown, requiring large quantities of water in a highly competitive market.

They also breed cattle, sheep, goats and horses. For religious and traditional reasons the breeding of pigs and the consumption of pork is rare, but the consumption of horsemeat and lamb is quite common.

Other natural resources

Before moving on to discuss energy resources, one should point out that these lands are very rich in mineral resources, perhaps because these were not properly exploited for centuries and are still available in abundance. There are copper, iron and gold mines. The gold mine of Kumtor (Kyrgyzstan), the biggest in Central Asia is managed by a western company, the Canadian *Centerra*, although the Kyrgyz government has threatened to close it down on environmental grounds; it would appear that it is looking to exchange the present 32.7 percent stake for 50% or half of a joint venture company controlling the mine.

In Tajikistan most of the 200 mineral fields are being worked, including 15 gold mines, 7 silver –among them the *Bolstoday Konimansur*, the sec-

[6] Prepared by the author with data from the *CIA World Factbook*.
[7] *Idem*.

ond-largest silver mine in the world, in the northern province of Sughd, where around 50 tonnes a year are extracted, with what are esteemed to be reserves for 150 years—. There are also reserves of antimony, mercury, lead and zinc, copper and bismuth, molybdenum and tungsten, strontium, iron, tin, fluorine phosphate, halite or rock salt. The mineral zone of Uchkado is unique on account of its gold, silver, lead, zinc and antimony deposits. Also in the north of the country construction and decoration materials are to be found like marble, granite, volcanic tufa, limestone and mineral water. To the east is the mountainous region of Badakhsan, the autonomous province of Gorno-Badakhshan, with very complex topography and weather conditions. While some mining exploration has taken place here revealing deposits of gold, silver, copper, tungsten, mica and halite, the instability of this remote autonomous province and Islamist stronghold bordering Afghanistan and the Corridor of Wakhan, separating Tajikistan from Pakistan, has meant that to date these resources have not been exploited.

Uzbekistan also has numerous mineral fields, almost all concentrated in the Fergana Basin. In Kazakhstan one can find all the elements of the Periodic Table, including the set of rare earth elements. Not only does Kazakhstan possess the largest reserves in the world of chrome, vanadium, bismuth and fluoride; it is one of the largest producers of iron, uranium, lead, zinc, tungsten, molybdenum, borates, phosphorite, copper, potassium and cadmium. It has large reserves of gold, and is in third place in the ranking of CIS countries; almost all its gold mines are 100% privately owned, quite unusual for a former member of the USSR.

Energy resources of Central Asia

Of all its natural resources, Central Asia is known for its large quantities of energy resources (González and Claudín, 2008). The following is a description of how these resources are distributed in the region and relations between the various countries concerning their management[8].

Hydroelectric energy and renewable energies

As indicated above, when we speak of water we also speak of obtaining hydroelectric energy, especially in upstream countries, which are those lacking in hydrocarbons. In Central Asia there are numerous dams and

[8] In line with the proposals set out for this chapter we have not named all the various dams, gas and oil pipelines, deposits, etc. Instead we are focusing on the water and energy links with foreign companies in the zone. For a more detailed description of these resources, please refer to the specific studies on water, oil and gas resources in the region listed further on.

hydroelectricity plants distributed across the five countries of the region (FAO, 2013, pages 36-38).

The total reservoir volume of Central Asian dams is around 180.5 Km^3, although the 16 principal dams account for 72% of the volume (130,6 km^3), the largest being Bukhtarma, with almost 50 km^3. Next in size are the dams of Toktogul (20 km^3), Kapshagay (19 km^3), and Nurek (11 km^3). In Uzbekistan, the dam with the biggest volume is the Tuaymuyun Dam (8 km^3) and in Turkmenistan the Zeid Dam (2 km^3). In addition there is the the Tajik dam of Rogun (13,3 km^3). The Kazakh Moinak plant, completed in 2011, is the fruit of Sino- Kazakh cooperation, at a cost of US$250 million (US$50m from the Kazakh Development Bank and US$200m from the Chinese Development Bank) (Peyrouse, 2007). There are plans for a further plant close to the Kazakh city of Ekibastuz for the supply of electricity to China (Petelin, 2011, page 41). Each one of these has a reservoir volume greater than 1 km^3 and its waters are destined for various uses (Marat, 2008).

Kyrgyzstan is seeking to boost hydroelectric energy with the participation of foreign state-owned companies, as is the case of Kambarata-1 and Kambarata-2, with Russian investment[9]. *RusHydro* was contracted in 2013 to build Kambarata-1 (2,000 MW) for US$2 billion; *RusHydro* is currently building the four generators and the *Inter RAO* –a subsidiary of the Russian *Unified Energy Systems* (UES)— will supervise operations. *Inter RAO* will maintain its 75% share in the project until construction is complete; from then on the Russian company and Kyrgyztan will share profits. Moscow is working at obtaining the approval of Kazakhstan and Uzbekistan for hydroelectric plant projects in Kyrgyzstan and Tajikistan.

The Rogun Dam over the river Vakhsh forms part of the massive Rogun hydroelectric power plant, which initially contemplated the construction of a 335-metre-high dam, higher even than that of the nearby Nurek Dam built in the '70s which stands at over 300 metres, and is desperately in need of refurbishment. Nevertheless, Tajikistan lacks funds to build the Rogun Dam alone, which is why it has sought the aid of Russia and Iran (Jonson, 2006). The Russian aluminium producer (*Russian Aluminium*, *RusAl*) was interested in this project, but the Russian oligarch Oleg Deripaska promised to invest in the Tajik aluminium company (*TALCO*) in exchange for a share in the Rogun project. The real loser, on the other hand is Uzbekistan, as this leaves it with a very diminished supply for its interests –mainly as a water supply for its people, for tourism and agriculture—, as it uses water from the river Vakhsh (35%) and the river Panj (65%) to irrigate its cotton crops (Imomov, 2013).

[9] *"Kyrgyzstan launched its Kambarata-2 power station in 2010 and is pursuing Russian investment for the much larger Kambarata-1 station, an estimated $2.5 billion project due for completion by 2021"*. See Nurshayeva, R., *op. cit.*

The dams of Santguda-1 and Santguda-2 in Tajikistan were completed thanks to Russian and Iranian investment respectively. The model BOO –*Build, Own, Operate*—, extensively applied in the energy sector, whereby a company, or a group of companies, or a joint venture wins the tender put out by the host government for the construction of an infrastructure –in this case, the hydroelectric power plant—, with ownership remaining with the project company –or at least in part—, thus acquiring the usage rights. This BOO could become a BOOT, the "T" referring to the transfer of the business to the State; with this public-private partnership model the private enterprise tries to recover the costs of the initial investment and gain maximum returns before handing it over to the state.

The Russian company *UES* invested US$720 million in the construction of Santguda-1 (4 turbines, 670 MW) and the Iranian company *Sangob* injected US$180 million in Santguda-2 (220 MW). The Russian government has 66.39% of Santguda-1, *UES* has 14.92%, *Inter RAO* 2.24%, and the Tajik government the remaining 16.45%.

From the days of the former USSR, some plans languished due to civil war and lack of funds. Such is the case of the Shurab power plant, which it is hoped will produce 750 MW, the Kaphtarguzar Dam, and the most promising of all, Dashtijum Dam (17,3 km^3, 4,000 MW) on the river Panj, on the border with Afghanistan. Other attractive projects would be that of Rushan (3,000 MW) and the *Marble Gates* (2,100 MW). Valentina Kasymova argues that the future hydropower potential of Kyrgyzstan and Tajikistan is far superior to present-day production, and could be as much as 142,000 MW and 300,000 MW, respectively (Daly, 2014). Some of these megaprojects designed in the Soviet era could end up as natural disasters, as already happened with the Aral Sea or the *Golden Age Lake* or Altyn Asyr in the Karakum desert.

Despite all the afore-mentioned difficulties, it is very probable that in the not too distant future, when the exploitation rights for these infrastructures have been handed over to the respective States, these countries with energy deficits could be exporting energy to Afghanistan, Pakistan or even India.

Concerning other renewable energies, *Expo Astana 2017 Future Energy* will focus attention on the need to diversify energy sources and make the energy mix of the region more complex, principally for two reasons: because neither coal nor hydrocarbons will last forever and because the pollution they produce is not easily assimilated (Astana Economic Forum, 2014, pages 85-86)[10].

[10] See also "Central Asia's Growing Green Energy Sector Offers Opportunities for Investors", *Hub Pages*, in http://hubpages.com/hub/Central-Asias-Growing-Green-Energy-Sector-Offers-Opportunities-for-Investors.

In Kazakhstan the company *ZhambylHydroElectro* has implemented various wind energy projects[11]. In the southern region of Zhambyl alone there will be ten projects, of which the most outstanding are Zhanatas, Shokpar and the *Korday Wind Farm-21* (4 MW), which will produce 21 MW at the end of 2014, 600 MW across the ten stations. The projects are financed in a private-public partnership *Central Asia Green Power*––the state-owned *Kazakhstan Electricity Grid Operating Company* (*KEGOC*), which in turn belongs to the state-owned company *Samruk-Kazyna*.

A further two examples of "green energy" projects are the construction of a solar energy plant (24 MW) and the Merken cascade hydropower project (19.8 MW). Added to these are other installations already operating: the solar energy plant of Otrar (540 kW), and the hydroelectricity plants of Tasotkel (9.2 MW), that of Merken (1.5 MW) and Karakystak (2.3 MW). In Uzbekistan, the most important solar energy plant is the *Large Solar Furnace* of Parkent (1 MW).

NATO, the OSCE and the OECD are also active in this area and are currently engaged in various projects, as is the EU with its first *European Union and Central Asia: Strategy for a New Partnership*, adopted in June 2007, apart from the financing of projects for water management infrastructures within the new framework *of the Development Cooperation Instrument* (replacing the former *TACIS* programme) and of the *Global Monitoring for Environment and Security* (*GMES*) programme, which is promoting an *EU-Central Asia Dialogue on the Environment.*

Rounding off the hydroelectricity map is the *Central Asia-South Asia Regional Electricity Market* (*CASAREM*), a power transmission initiative involving Kyrgyzstan, Tajikistan, Afghanistan and Pakistan, with financial support from the Asian Development Bank (ADB) and the World Bank (Rani, 2009, page 355). The first phase of this CASAREM consists in implementing the project *Central Asia South Asia Electricity Transmission and Trade Project –CASA-1000—*, connecting hydroelectricity plants and some substations in Kyrgyzstan, Tajikistan and Uzbekistan with Afghanistan and Pakistan, capitalising on some plants already operative in Tajikistan and Afghanistan. The project envisages a transmission line from the future substation of Datka (Kyrgyzstan) to Khudjand traversing the enclaves in dispute in the Kyrgyz part of the Fergana Basin; the substation of Nurek would similarly be connected with the hydropower facility of Sangtuda; from there, a transmission line connection to Puli-Khumri, via Kunduz, in Afghan territory. Between the substations of Charikar and Jalalabad another line will be built near Kabul, which in turn would connect with

[11] See "Potential of wind energy in South Kazakhstan region", *Central Communications Services of Kazakhstan*, 12 October 2013, in http://ortcom.kz/en/news/potential-of-wind-energy-in-south-kazakhstan-region.2301.

the plants of Naghlu and Sarobhi; finally, from Jalalabad there would be a connection to Peshawar, in Pakistan.

As one can appreciate, this is a very long route crossing this turbulent zone from north to south (Bernard and McKechnie, 2007). The 1,222 km of the project will carry between 1,000-1,300 MW, with annual production estimated for 2016 of up to 6 TW/h from the stations of Kyrgyzstan and Tajikistan, although this availability is subject to multiple variables such as annual rainfall, with peak production concentrated in the months from May to September (given the melting and increased flow in the summer), and the capacity to transport that energy without incurring excessive levels of loss through poor maintenance conditions of the electricity line, as occurred in the early '90s in Pakistan, when more than 25% of the energy was lost en route. (Hu and Woite, 1993, page 4).

Apart from the *TAPI* project and the *CASA-1000*, there are other initiatives to satisfy Central Asia and South Asia's future energy demands. Firstly, Turkmenistan, Uzbekistan and Tajikistan have already begun to export electricity to Afghanistan and are studying ways to expand to Pakistan. Due to the mix composed of thermal energy from Turkmenistan and Uzbekistan and hydroelectric power from Kyrgyzstan and Tajikistan, consumers are not affected by seasonal changes and all states benefit. This would be an excellent example of cooperation, not a zero-sum game. Secondly, Pakistan is studying various opportunities for additional energy imports, such as gas from Iran and electrical interconnection with India. Thirdly, Afghanistan is developing the *Power Sector Master Plan*, which will allow the Afghan network to export energy to Pakistan once it has satisfied domestic demand.

In addition to these initiatives a new player has arrived, the USA, looking to invest US$15 million in the *CASA-1000* project, a very small part of the total, estimated between US$1 and 2 billion. Is it possible that the USA is lending its weight to the project because it wishes to erode Russia's leading role in the zone? Or is it simply doing so to satisfy the energy demand of South Asia, which is so crucial for the much desired economic development, cornerstone for the internal stability of two countries and of all the region?

Oil

Countries rich in hydrocarbons have created joint ventures to exploit their resources. This could be viewed as an intelligent move so as not to find themselves dispossessed of their sources of wealth, as we are no longer in colonial times when such situations were standard, but it could also be understood as an institutionalised form of corruption where intervention in the localisation, study, extraction and management of the crude oil falling exclusively into foreign hands wuth the participation of the native people reduced to the payment of some form of operating fee.

The oil pipelines connecting regional facilities/fields with global markets are in themselves a lesson in geo-economics as they demonstrate in which direction these countries must look–that is, whom they depend on— to make their way out of the economic crisis they found themselves following the collapse of the USSR or simply to prosper economically afterwards (Pirani, 2013, pages 30-34).

The most important oil pipelines crossing Central Asia are[12]:

- *The Caspian Pipeline Consortium* (CPC), going westwards from Tengiz (Kazakhstan) to the Russian port of Novorossiisk, on the Black Sea coast. This consortium is made up of *Transneft* (24%), *KazMunaiGaz-KMG* (19%), *Chevron* (15%) and *LukArco* (12,5%). These companies repaired the original Soviet pipes and added more to increase the transit of crude.
- *Russia-Kazakhstan-China Pipeline*, going eastwards to China. It is managed by the *Kazakhstan-China Pipeline LLP*, a joint venture between the *China National Petroleum Corporation (CNPC)* and the Kazakh *KMG*, this being its first transnational oil pipeline. It runs from the city of Omsk (Russia), via Atasu (Kazakhstan) to Alashankou, on the border with Kazakhstan, in the separatist region of Xinjiang, where there are a series of hydrocarbon, especially gas, fields.
- *The Uzen-Atyrau-Samara Pipeline* travels northwards from the western Kazakh city of Atyrau towards Samara (in Russia), where it connects with the old Druzhba oil pipeline and the distribution system of the Russian *Transneft*.
- *Kenyak-Orsk*, from Aktyubinsk (Kazakhstan) to Orsk (Russia).
- *Omsk– Pavlodar– Shymkent – Türkmenabat pipeline*, joining the Russian city of Omsk and the Turkmen city of Turkmenabat, crossing Kazakhstan from north to south via the Kazakh cities of Pavlodar and Shymkent.
- The *Trans Caspian Oil Transport System* transports Central Asian resources to the *Baku-Tibilisi-Ceyhan (BTC)* line.
- The *Kazakhstan Caspian Transportation System (KCTS)*, that will connect the Kazakh cities of Eskene and Kuryk (near Aktau) with an on-shore oil pipeline. This system will include a maritime link with Baku, the construction of new port facilities and a transfer station in Baku, with an onward connection to the BTC line.

In addition to these there are some projects that avail of established routes –such is the case of the *Caspian Pipeline Consortium Expansion Project*— or that have created a new line such as the *Central Asia Pipeline*, the *Kazakhstan-Turkemnistan-Iran Pipeline* or the *Trans-Caspian*, to link the

[12] Source: Prepared by the author from data provided by the World Bank, the *U.S. Energy Information Administration* (EIA), the International Energy Agencia (IEA), the company *BP* and the *Oxford Institute of Energy*, among others.

port of Aktau (west of Kazakhstan) with Baku (on the side of the Caspian Sea) thus connecting with the Baku-Tibilisi-Erzurum line.

The most important oil-fields are the following:

- In Kazakhstan, two on-shore, Tengiz and Karachaganak, and another off-shore, Kashagan (Elliot, 1998)[13]. The main oil companies operating the three largest fields reserves are *Chevron* and *KMG*, followed by *ExxonMobile*, *LukArco* (a joint venture between *Lukoil* and *Arco*), *BP*, *Agip*, *TotalElfFina* and *Royal Dutch*, *CNPC* (China), and *Turgai Petroleum*.
- In Uzbekistan, almost 60% of its known hydrocarbon fields are situated in the regions of Bujara and Jiva, but there is also oil in the Ustyurt plateau (in Karakalpakistan) –where there are 23 fields— and in Mingbulak and Andijan (Valley of Fergana).
- In Turkmenistan, those situated in the Caspian Sea, many as yet undeveloped until the southern riparian countries –Azerbaijan, Iran and Turkmenistan—reach an agreement on the demarcation of their borders and distribution of their natural resources. Turkmenistan has a production target for 2030 totalling over 1.3 million bbl/d, between its off-shore and on-shore reservoirs, thanks largely to the off-shore exploration block of the UAE-based company, *Dragon Oil*, the off-shore Cheleken contract and the *Nebit Dag* Block operated by the Italian company *ENI* in the western half of the country. The main foreign companies operating with the national *Turkmenneft* and *Turkmengaz* are *CNPC*, *Dragon Oil*, *ENI* and *Petronas* (Malaysia).
- In Tajikistan, the majority of its proven reserves –approx. 10-12 million barrels of crude– are situated to the north of the country, in the region of Soghd. The state company *Tajikneftegaz* manages the exploration, perforation and production. But it is estimated that Tajikistan could have further reserves of 113.1 million tonnes of oil, 863 bcm of gas and 36 million tonnes of condensed gas, reserves that are mainly concentrated –around 80%— in the south-western part of the country and in the north[14]. Here, a lack of investors and the depth of the strata in which the gas or oil pockets are located are the two major difficulties preventing the exploitation of these resources.

In Kazakhstan state companies were set up (*KAzTransOil*), but also joint ventures with Russian companies (*Transneft*, *LukArco* with *Lukoil*), Chi-

[13] Kashagan is one of the largest fields in the world. Other major fields are: Uzen, Zhetybai, Zhanazhol, Kalamkas, Kenkiyak, Karazhanbas, Kumkol, Buzachi North, Alibekmola, Central and Eastern Prorva, Kenbai and Korolevskoye. The *Karachaganak Integrated Organization (KIO) Development Team* has experts from *Agip*, *BG*, *Texaco* and *Lukoil*.

[14] In the north: East Suletau; in the southwestern part: Rengan, Kashakum, East Olimtoy, Yalgizkak and Sargazon.

nese (*CNPC* and *CNODC*), Canadian (*PetroKazakhstan*) and British (*KazStroyService*), the largest of these being US companies like *Chevron* (*TCO*). There are also *ExxonMobil*, *BP*, *Agip*, *TotalElfFina* and *Royal Dutch Shell*, among others. Oil generates profit, but it can also incur problems, of which there are two concrete examples in Kazakhstan: the so-called *Dutch disease* –damage to the economy of a country over its excessive dependence on a sole sector of production (Palazuelos and Fernández, 2012, pages 81-98)— and the secessionist threat –as many of the most important reserves (Tengiz, Karachaganak, Aktobe, Mangistau, and Uzen) are concentrated to the east of the country, around the Caspian Sea—. The Zhanaozhen protests underpinned these dangers in 2011, a trend later confirmed in the parliamentary elections of January 2012 when the regions of the extreme west and east showed behavioural patterns slightly different to the rest of the country –albeit within the characteristic uniformity of the political system, with its strong, charismatic centralised power.

	2002	2006	2010	2011	2012	Total world (2012)
Kazakhstan	1,021	1,403	1,740	1,758	1,728	2%
Turkmenistan	183	187	217	217	222	0.3%
Uzbekistan	153	114	78	77	68	0.1%
Russia	7,755	9,818	10,365	10,510	10,643	12.8%
Ex USSR Countries	9,565	12,318	13,558	13,609	13,659	16.3%
OPEC Countries	29,266	35,489	35,097	35,954	37,405	43.2%

Table 5 Production of oil (in thousands of barrels per day)[15]

	2002	2006	2010	2011	2012	Total world (2012)
Kazakhstan	169	210	196	242	265	0.3%
Turkmenistan	81	85	93	97	100	0.1%
Uzbekistan	131	101	75	80	82	0.1%
Russia	2,559	2,761	2,892	3,089	3,174	3.6%
Ex USSR Countries	3,593	3,906	3,963	4,261	4,391	5.0%

Table 6 Consumption of oil (in thousands of barrels per day)[16].

[15] Source: *BP Statistical Review of World Energy*, June 2013, p. 8.
[16] Source: *Ibid*, p. 9.

Gas

Much of what has already been previously discussed for oil in relation to the complexity of the market and the wealth of the Central Asian fields is also true for gas. Here, the gas transport lines also show that the main destination for the product is –and increasingly so— the People's Republic of China. Central Asia has 7% of the world's gas reserves: Turkmenistan (4.3%), Kazakhstan (1.0%), Uzbekistan (0.9%) and Azerbaijan (0.7%). Iran has 16% of global reserves but currently only contributes to 4% of world production, compared with 1.2% from Turkmenistan. The most important gas pipelines are (Fredholm, 2008):

- The *Central Asia-Center (CAC) gas pipeline*, controlled by *Gazprom*, running from Turkmenistan towards Russia, passing through Uzbekistan and Kazakhstan. It is composed of two corridors that converge in the city of Beyneu, to the southwest of Kazakhstan, and finally lead to the Aleksandrov Gai Compressure Station in Russia. The *Trans-Caspian Pipeline* project running from the port of Turkmenbashi in Turkmenistan along the shores of the Caspian, linking up with CAC at Aleksandrov Gai (Akhile, 2006, page 208).
- The *Central Asia-China pipeline*, also known as the *Turkmenistan-China pipeline* runs from the city of Gedaim, on the border between Turkmenistan and Uzbekistan, to the Chinese city of Horgos, via southern Kazakhstan. Contractors involved in the gas pipeline project are: *Stroytransgaz*, *China Petroleum Pipeline Bureau*, *China Petroleum Engineering and Construction Corporation*, *Zeromax*, *Asia Trans Gas*, *Asian Gas Pipeline Company*, *KazStroyService* and *Vyksa Steel Works*. The pipeline will have two branches (A and B), although *CNPC* signed an agreement with *Uzbekneftegaz* in September 2013 to build Line D, which from 2016 will take gas from the Galkynysh field –better known as *South Yolotan–Osman field*— to China, via Uzbekistan, Tajikistan and Kyrgyzstan. On the other hand, *CNPC Trans-Asia Gas Pipeline Company Limited* –a subsidiary of *CNPC*— signed an agreement with *Tajiktransgaz* in March 2014 to build Line D of the *Central Asia-China* gas pipeline.
- The *Beineu-Bozoi-Akbulak Pipeline* or *West Kazakhstan-West China gas pipeline* connects the field of Beineu with the *Central Asia-China pipeline* in Shymkent. This gas pipeline crosses the southern regions of Kazakhstan from the region of Mangystau and was built in two phases: the Bozoi-Shymkent section and the Beineu-Bozoi section. It will commence operations in 2015, with a capacity of 10 bcm.
- The *Bujara-Ural pipeline*, was built between 1963-65 on the discovery of an immense pocket of gas in the Gazli field (Uzbekistan) and runs from the north of Turkmenistan to the Urals. This gas leaves Central Asia when it reaches Bashkiria and Tatarstan, to the west of Orenburg

(Olcott, 2004). As It traverses Kazakhstan, it connects the north-western regions of Aktyubinsk and Kostanay with the Zhanazhol reserve.
- The *Tashkent-Almaty pipeline*, connects the south of Kazakhstan with the reserves of Uzbekistan. Southern Kazakhstan, the most populated and most industrially developed part of the country–Shymkent, Zhambyl and Almaty— is, paradoxically, the area that is deficient in energy supply and suffers most interruptions in service, a deficiency that is supplemented with gas from Uzbekistan via this gas pipeline, also known as *Gas Region* of Bujara-Taskent-Bishkek-Alamaty (BGR-TBA).

In addition, there are other gas pipelines shorter in length but nevertheless connecting important fields with the principal hydrocarbon transport networks: the *Karachaganak-Uralsk gas pipeline*, the Makat- North Caucasus, the Orenburg-Novopskovsk, and the Soyuz[17]. The last three cross the western regions of Kazakhstan of Atyrau and Mangistau. *KazTransGas*, a subsidiary of *KMG*, controls and manages the gas transport system of the country through its two internal gas distribution networks, one in the western part, that operates the country's fields, and another in the south, that distributes Uzbekh gas. The gas sector is set to grow in Kazakhstan due to the discovery of new gas pockets and plans to harness gas associated with oil drilling which was previously burned on location (the well-known practice of *gas flaring*). Other gas pipelines in project or construction phase are:

- The *Trans-Caspian gas pipeline*, linking the Turkmen city of Turkmenbashi, formerly Krasnovodsk, with the port of Baku in Azerbaijan, thus connecting to the BTC. It would circumvent both Russia and Iran, which is why Russia is lending its support to another project, the *Prikaspiyskiy pipeline*, a somewhat implausible operation as it does not appear that Turkmenistan has sufficient gas to simultaneously sell to Russia, China and Europe (Giuli, 2008, page 6)[18].
- The *Tobol-Koksheau-Astana Pipeline* is to connect the already existing network in Kartaly (Russia) with the north of Kazakhstan to transport Russian gas to the capital, and from there to Petropavlovsk and Karaganda in central Kazakhstan. Its estimated length is 1,226 km with an annual capacity of 1.5-2 bcm and it will also carry gas from Tengiz and Karachaganak to Astana.
- The project that has raised the greatest expectations is *TAPI*, promoted by the company *UNOCAL*, for the transport of Turkmen gas to Pakistan via Afghanistan. Although the idea was initially raised in 1992 it has encountered numerous obstacles along the way, the most important

[17] This Soyuz gas pipeline transports gas from Russia and Central Asia to Ukraine, and from there to the rest of Europe. It is worth noting that currently 16% of the gas consumed in Europe passes through Ukraine.

[18] This gas pipeline will annually transport between 80-90 bcm.

being the Afghanistan war post 9/11. The 1,735 km of pipes, passing through the Afghan cities of Herat and Kandahar, to the Indian city of Fazilka, in the Punjab— will cost around US$8 trillion and will have an annual transport capacity of 33 bcm of gas.

The maintenance of former Soviet infrastructures is an issue of considerable concern. Infrastructures of all kinds need to be repaired and refurbished periodically. However, in the case of oil and gas pipelines maintenance is of crucial importance as corrosion levels both inside and outside the pipes could lead to the loss of part of the products being transported (Yenikeyeff, 2008, pages 36-37).

The companies involved in the distribution of gas reserves are (Pérez Martín, 2009):

- Karachaganak: *BG Group* (32.5%), *ENI* (32.5%), *Chevron* (20%) and *Lukoil* (15%).
- Tengiz: *ENI* (16.67%), *ExxonMobil* (16.67%), *Shell* (16.67%), *BG Group* (16.67%), *Total* (16.67%), *Inpex* (8.33%) and *Conoco* (8.33%).
- Kashagan: *ENI* (18.52%), *ExxonMobil* (18.52%), *Shell* (18.52%), *Total* (18.52%), *ConocoPhillips* (9.26%), *Inpex* (8,33%) and *KMG* (8.33%).

Illustration 1. Development of the Trans-Asia gas pipeline

For its part, Uzbekistan is sufficiently rich in gas to supply its own population and export to the neighbouring states connecting the regions of Ustyurt, Bujara and Jiva with the gas pipelines leaving the country via the *Gazli-Kagan* route. Lack of maintenance of the CAC gas pipeline led to Uzbekistan reopening the obsolete Bujara-Urals gas pipeline in 2001 to transport the growing volume of Turkmen gas.

The companies contracted at Uzbekistan's gas fields are:

- Ustyurt central plateau: *LUKoil*, *Gazprom*, *UNG*, *CNPC* and *KNOC*.
- Ustyurt and south-eastern Gissar: *Soyuzneftegaz-Lukoil.*
- Block7: *Gazpron*.
- Northwest of Uzbekistan: *Daewo International*.

- Namangan: *CNPC*.
- Surgil: *Korean Gas*.

Turkmen gas is concentrated in the Caspian and in the Karakum Desert[19]. It is estimated that the gas and oil field of Kyapaz-Serdar, whose ownership is disputed by Turkmenistan and Azerbaijan, holds between 367 and 700 million of barrels of recoverable reserves, but like Azeri and Chirag, the case remains unresolved. On the other hand, the Turkmenistan-China gas pipeline receives 5 bcm of gas annually from one refinery and 9 bcm from the other. In 2014 another gas refinery was opened in the region of Lebap, with a forecasted capacity of a further 9 bcm per year, which would allow the country to increase its exports to Asia; another refinery planned for the region of Mary will process approx. 30 bcm of gas from the Galkynysh field. The commencement of operations at this gas field in 2013 increased the total national gas production from 70 bcm to approx. 80 bcm.

And still in Turkmenistan, where one should not lose sight of relations with neighbouring Iran, there is the 200 km *Korpeje–Kordkuy pipeline*, constructed in 1997, connecting the northern field of Korpeje, close to the Turkmen port of Okarem on the Caspian, with the Iranian city of Kordkuy, also on the Caspian. The *Dauletabad–Sarakhs–Khangiran pipeline* –also known as *Dauletabad–Salyp Yar pipeline*— joins the Turkmen field of Dauletabad with the Iranian city of Khangiran, where it links up with Iran's principal gas network, the *Iran Gas Trunkline system*. This gas pipeline, inaugurated in 2010, broke the hegemony of Russia as a client of Turkmenistan. Gas transported from Turkmenistan to Iran facilitates the "gas pipeline of peace" project, the *Iran-Pakistan gas pipeline*, which will carry Iranian gas to Pakistan. With various offshoots it would reach out to numerous regions extending from the Pakistani city of Multan to the Indian city of Delhi. The companies involved in the distribution of Turkmen gas are:

- Block 1, Diyarbekir: *Petronas*.
- Cheleken, Jeitun, Dugalybek: *Dragon Oil*.
- Caspian Sea: *Rosneft, Itera* and *Zarabezhneft*.
- Bagtiyarlyk South Yolatan: *CNPC*.
- Colina Caspian Block 3: *Canadian Buried*.
- Caspian Sea, Blocks 11-12: *Wintershall, Maersk* and *ONGC-MITAL*.
- Khazar: *Austrian Mitro-Turkmenneft*.
- Nebigdag: *Burren Energy*.

But the development heralding a major change in the Central Asian scenario is *Gazprom*'s investment in gas fields in the north of Tajikistan, to

[19] The Darvaza crater, better known as "Door to Hell", is a natural gas field that began to burn when discovered in 1971 and has not stopped since.

the tune of US$150 million since 2010. Other fields operated by *Gazprom* are located in Sarikamysh, in western Shokhambary, in Sargazon and in Rengan. The reason why Tajik gas had remained largely previously unexplored is mainly twofold: the political instability of the country and the depth at which the hydrocarbon pockets are situated. An example of this is the Shakhrinav-1P extraction well, with an estimated depth of 6,300 metros, 18 bcm of gas, 17 million tonnes of crude oil and 2 bcm of solute gas. Nevertheless, in Sargazon and in Rengan it was decided that the existing gas was insufficient to make commercial exploitation worthwhile (Pirani, 2009).

Apart from *Gazprom* there are several other foreign and national companies exploring Tajik gas: *JV Somon Oil* (Tajikistan-Switzerland), *Tethys Petroleum* (Canada), *JV Petroleum Sughd* (Tajikistan-Austria), *Salosa*, *Azizi-1*, *Shohon*, *Hasan & Co*, *Haloli*, *Nafti Temourmalik* and *Abadi*. The Canadian firm *Tethys* has focused its gas and oil exploration in Kazakhstan, Uzbekistan and Tajikistan, and in the latter it expects to achieve recoverable anticipated resources of 27.5 billion barrels of oil (Chorshanbiyev, 2010).

In Kyrgyzstan, *Gazprom International* –known at the time as *Zarubezhneftegaz*—obtained permits in 2008 for the exploration of the Kugart and East Maylisu-IV-Izbaskent fields. In February 2014 *Gazprom* got the go-ahead from the Russian Duma to set up a joint venture to manage the exploitation of the fields. By virtue of this agreement, Russia is obliged to ensure an uninterrupted gas supply to Kyrgyzstan and to invest 2 billion roubles in the modernisation of the national gas pipeline network over five years. At the Kugart field it is expected that a pocket will be found providing 2 bcm of gas at a depth of 3,000 m, but returns from the East Maylisu-IV-Izbaskent are not expected to be at the same level.

	2002	2006	2010	2011	2012	Percentage of the total (2012)
Kazakhstan	9.1	13.9	17.6	19.3	19.7	0.6%
Turkmenistan	48.4	60.4	42.4	59.5	64.4	1.9%
Uzbekistan	51.9	54.5	59.6	57.0	56.9	1.7%
Russia	538.8	595.2	588.9	607.0	592.3	17.6%
Ex USSR Countries	670.2	749.0	741.9	776.5	767.7	22.8%
World Total	**2,523.9**	**2,880.1**	**3,192.3**	**3,291.3**	**3,363.9**	**100%**

Table 7 Production of natural gas[20].

[20] Source: *BP Statistical Review of World Energy*, June 2013, p. 22.

	2002	2006	2010	2011	2012	Percentage of the total (2012)
Kazakhstan	8.7	9.9	8.2	9.2	9.5	0.3%
Turkmenistan	12.9	18.4	22.6	25.0	23.3	0.7%
Uzbekistan	50.9	41.9	45.5	49.1	47.9	1.4%
Russia	370.7	415.0	414.1	424.6	416.2	12.5%
Ex USSR Countries	544.7	592.6	579.7	599.2	584.9	17.6%
World Total	**2,522.1**	**2,839.0**	**3,176.3**	**3,232.4**	**3,314.4**	**100%**

Table 8 Consumption of natural gas[21].

Towards	**From**				
	Kazakhstan	**Russia**	**Turkmenistan**	**Other countries ex USSR**	**Total importations**
Russia	11.0	-	9.9	8.9	29.8
Other ex USSR countries USSR	0.3	7.9	0.9	3.9	14.0
Countries ex USSR	11.3	56.0	10.8	12.9	91.9
Iran	-	-	9.0	0.4	9.4
China	-	-	21.3	0.2	21.4
Total exportations	11.3	185.9	41.1	16.3	705.5

Table 9 Total of trade movements in 2012 per gas pipeline (in bcm)[22].

Finally, and for the purposes of this chapter, it is interesting to note that although Russian imports of gas from Central Asia fell from 63bcm in 2008 to 33 bcm in 2009, —originating from Uzbekistan (in 12th position), Turkmenistan (11th) and Kazakhstan (10th)—, European companies did not take advantage of this situation to make an opening in the market for Central Asian gas and allowed Chinese, Korean and US companies–principally *Chevron* and *Exxon*—to take the lead.

Uranium and nuclear energy

In this region, only Kazakhstan and Uzbekistan are exporters of uranium. The top three uranium-producing countries –Australia, Canada and

21 Source: *Ibid*, p. 23.
22 Source: *Ibid*, p. 28.

Kazakhstan— together total 62% of world production and this figure ascends to 92% if to these three we add the following five –Namibia, Niger, Russia, USA and Uzbekistan (IAEA, 2013, pages 1 and 14)—. With 15% of world reserves, Kazakhstan has been an important source of uranium over the past 50 years and became the leading world producer in 2010-2011 increasing its production of 2,022 tonnes to 19,450 (World Energy Council, 2013, pages 4 and 21). Of its 17 mines, 5 are 100% state-owned, the remaining 12 are 50% joint ventures with foreign companies.

Kazakhstan currently has no nuclear reactors; the only one which was managed by Russia since 1972 closed down in 1999. It does, however, have a major nuclear fuel-generating plant, so that while it currently scarcely sells any uranium, in 2015 it hopes to have 30% of the nuclear fuel production market. Between 2015 and 2016 it hopes to build two small VBER-300 nuclear reactors, the first in Aktau, at the site of the former nuclear energy plant, which had a BN-350 reactor installed, although the Fukushima nuclear accident cast serious doubts over investments in this type of energy. Kazakhstan will transform uranium in a joint venture between *Kazatomprom* and the Canadian firm *Cameco*; starting in 2018, they will build facilities –the *Ulba Conversion*—very close to the metallurgical plant Ulba in Ust-Kamenogorsk, with an estimated annual production capacity of 12,000 tonnes of uranium hexafluoride (UF_6) (IAEA, 2013, page 16), while the fuel-manufacturing facilities will be completed in 2014 under a joint venture project between *AREVA* and *Kazatomprom*, with an anticipated annual production capacity of 1,200 tonnes.

In 2010, Kazakhstan offered to host a civil nuclear fuel bank, in other words, aimed at energy generation, and it appears that this will finally be housed at the previously mentioned Ulba metallurgical plant. Kazakhstan has a limited capacity for enriching uranium as a member of the *International Uranium Enrichment Centre* (IUEC).

Uzbekistan forms part of the so-called IAEA-supported *Russian Research Reactor Fuel Return Programme (RRRFR)*, which aims to repatriate to the country of origin spent natural uranium and fuel from highly enriched uranium.

Russia is not the only country which wants to make its presence felt in the field of uranium and atomic energy in Central Asia. A look back over the last decade, reveals the degree of interest from China in this source of energy (Petelin, 2011, pages 40-41).

In Central Asia the risk of spent uranium contamination is a very serious problem on account of seismic activity in the zone, especially in Kyrgyzstan and Tajikistan, as well as warehousing deficiencies. The level of radiation is still very high in those places where nuclear testing was carried out during the Soviet era: Kapustin Yar (Azgyr), Lira, Aral, Say-Utes and Semipalatinsk-Kurchatov (Vinokurov and Libman, 2012, page 145).

The USSR used the Fergana Basin as a major source of metal and uranium, with approx. 50 fields exploited in the zone. Nevertheless, with the collapse of the command economy and entry into the global market, the majority of those plants were unable to compete due to lack of experience, which led to a drastic reduction in the number of operations. There were also research centres for chemical and biological products such as the island of Vorozhdeniye (Aral Sea), in Almaty, in Nukus (Uzbekistan) and in Karabalta (Kyrgyzstan).

Coal

Finally, Central Asia is also a coal-rich region, with many varieties, accounting for 3.69% of the total world reserves (World Energy Council, 2013, pages 23-24). In Kazakhstan there are more than 400 coal fields, the largest concentrated in three regions: Karaganda, Pavlodar and Kostanay.

Despite a decline in domestic production in the 90s, the sector has displayed a strong comeback in recent years, with Kazakhstan joining the list of coal exporters, with Russia and Ukraine as its principal clients. At domestic level, the main clients are energy plants and the iron and steel and metallurgical sectors. It is expected that production for 2015 will reach 100-105 Mt.

One of the foreign investment companies in this sector, *MMRC*, which owns 32.8 % of the *Eurasian Energy Corporation*. *Ispat-Karmet*, the largest producer of steel in Kazakhstan, runs several coal-mines precisely to fuel its own operations, amounting to 7 Mt of the Karaganda production. Another big producer is *Bogatyr Access Komir* (BAK), 100% -owned by the US *Access Industries Inc.* with an annual estimated capacity of 50 Mt.

The thermal power plants of Ekibastuz-1 and Ekibatuz-2 supply energy to Astana and to industrial cities like Pavlodar, Karaganda, and Ekibastuz. In addition, construction has already begun on a new thermal power plant in the vicinity of Lake Balkhash which, once operational, will provide electricity to the zone of Almaty; this thermal power plant replaces a previous nuclear plant project, which gave rise to massive protests.

In Uzbekistan there will also be coal-fired power plants like the one at Angren, which was completed in 2013, with a modernised new thermal power plant, Novo-Angren. Although according to official data, coal production at Angren will provide the market with 0.8 bcm of gas –now used for energy production—, in the coming years it is predicted that in Uzbekistan's energy mix coal will move up from the current 3.9% to 11-12% in 2016.

In Tajikistan, the coal mines of Kshut-Zauranskoye and Fan-Yagnobskoye are believed to have sufficient reserves for 200 years.

	Anthracite and black or bituminous coal	Sub-bituminous and lignite	Total	Percentage of the total	Relation R/P
Kazakhstan	21,500	12,100	**33,600**	3.9%	289
Russia	49,088	107,922	**157,010**	18.2%	443
Total countries ex USSR	86,725	141,309	**228,034**	26.5%	390
Total Eurasia	92,990	211,614	**304,604**	35.4%	238
China	62,200	52,300	**114,500**	13.3%	31
Total world	**404,762**	**456,176**	**860,938**	**100.00%**	**109**

Table 10 Proved reserves of coal (2012)[23].

	2002	2006	2010	2011	2012	Percentage of the total (2012)
Kazakhstan	37.8	49.1	54.0	56.2	58.8	1.5%
Russia	117.3	145.1	151.1	158.0	168.1	4.4%
Total Eurasia	427.2	448.2	436.0	455.5	469.0	12.2%
Total countries exsoviéticos	201.4	239.9	250.1	263.8	278.6	7.2%
China	775.2	1,264.3	1,617.5	1,758.0	1825.0	47.5%
Total world	**2,401.9**	**3,100.7**	**3,542.7**	**3,759.1**	**3845.3**	**100%**

Table 11 Production of coal[24].

	2002	2006	2010	2011	2012	Percentage of the total (2012)
Kazakhstan	22.8	29.8	31.6	34.0	35.0	0.9%
Russia	103.0	96.7	90.2	93.7	93.9	2.5%
Turkmenistan	-	-	-	-	-	-
Uzbekistan	1.0	1.7	1.1	1.2	1.2	Less of the 0.05%
Antigua USSR	169.5	171.9	166.1	175.9	180.2	4.8%
Total world	**2,411.0**	**3,075.1**	**3,464.0**	**3,628.8**	**3,730.1**	**100%**

Table 12 Consumption of coal[25].

[23] Measured in millions of tonnes. Source: Prepared by the author with data from *BP Statistical Review of World Energy*, June 2013, p. 30.

[24] Measured in million tonnes oil equivalent. Source: *Ibid*, p. 32.

[25] Measured in million tonnes oil equivalent. Source: *Ibid*: *Ibid*, p. 33.

Transport routes

Central Asia is the most landlocked region in the world, with no outlet to the sea, which is a major drawback to exporting its products worldwide, as the UN recognised in 2003[26]. The task was simpler in the Soviet era as access was guaranteed although remotely controlled out of Moscow, which meant that the vast majority of energy transport routes passed through Russia or it was their final destination. Nevertheless, for ten years now, Central Asian hydrocarbons have diversified both their final destinations and outlets to global markets, with a marked orientation towards China.

This landlockedness has led them to invest considerable sums of money in the construction of large transport and communication infrastructure projects, whether by road or rail (ADB Institute, 2014). Having good communications and transport is both a sign and a requisite for economic development in a kind of ascending and positive dynamic in which the more one invests in infrastructure the more one is investing in a peaceful and stable future. The ISAF's commitment to the construction of roads and various forms of communication –like the *Lithium Road* and the *Ring Road*– is a clear example of this (Montánchez, 2012, pages 14-21).

There are certain projects involving foreign companies that have somewhat alleviated national infrastructural deficiencies. Such is the case of *Gazprom,* which in 2010 built the motorway linking the Tajik capital with Uzbekistan, via the Dusambe-Khujand-Chanak route, and with Kyrgyzstan, via the Dusambe-Jirgital-Saritash route. The Iranian government sponsored the construction of the *Istiqlol* tunnel at the Anzob Pass and the tunnels of Shar-Shar and Shakhristan, with which Tajikistan seeks to do away with the isolation of its northern regions from those of the south and from Uzbekistan and Kyrgyzstan.

The Spanish *Talgo* began operating two railway locomotives in Uzbekistan, the *Talgo UTY T-250*, called *Afrosiyob* –each with nine passenger carriages and a buffet car– with speeds of 250 km/h connecting the 344 km between the cities of Taskent and Samarcanda, reducing travel time by half. It carried out a similar project in Kazakhstan aimed at linking Kazakhstan's two capitals, the political capital, Astana, and the financial capital, Almaty. The project includes the construction of maintenance plants *in situ* through joint ventures with the national railway companies and the construction of new locomotives to cover other routes in the country.

[26] Section nº 2 of the report "Implementation of the Almaty Programme of Action: Addressing the Special Needs of Landlocked Developing Countries within a New Global Framework for Transit Transport Cooperation for Landlocked and Transit Developing Countries", presented at the UN General Assembly and approved under resolution A/67/ , 17 July 2013, in http://unohrlls.org/UserFiles/File/LLDC%20Documents/A%2068%20157%20English.pdf.

Figure 36

The Kazakh government has also invested in the construction of motorways to connect Astana-Karaganda-Almaty, Astana-Pavlodar-Ust-Kamenogorsk, Almaty-Kapchagay-Ust-Kamenogorsk, routes also covered by rail, heretofore twice as fast as the former roads.(Astana Economic Forum, 2014, pages 41-45).

There are also projects for the entire region sponsored by international organisations and bodies setting out to connect it by road and rail with China, Russia and Europe. One of these is the *Baku Initiative*, that originated in 1998 as TRACECA (*Transport Corridor Europe- the Caucasus-Asia*) and is aimed at developing a west-east transport corridor from Europe to China across the Black Sea, the South Caucusus and the Caspian Sea, a route that uses the EU transEuropean transport network and the pan-European transport corridors–especially the Black Sea pan-European transport zone and the *New Silk Route* to Asia—, connecting the corridor crossing Central and Eastern Europe with the one crossing Central and South-eastern Asia.

Another international initiative is CAREC (*Central Asia Regional Economic Cooperation Programme*). Established in 1997 at the instigation of the ADB and with the participation of five other multilateral institutions – EBRD, IBD, UNPD, IMF and the World Bank— aimed at incentivising inter-state economic cooperation in Central Asia, and between these states and Azerbaijan, Afghanistan, Pakistan, China and Mongolia. Over a hundred CAREC-related projects have been formulated during 2001-2010 worth

US$15 billion, and are in varying stages of implementation (CAREC, 2011, pages 3-4; CAREC, 2012, pages 2-3).

The CAREC Programme planned for six north-south and east-west road and rail corridors interconnecting with China, Russia and the Middle East, apart from strengthening local connections in the Central Asian Republics, with the following trunk-lines, each of them with secondary routes : 1) Europe–East Asia; 2) Mediterranean–East Asia; 3) Russia–Middle East and South Asia; 4) Russia–East Asia; 5) East Asia–Middle East and South Asia; and 6) Europe–Middle East and South Asia[27].

The role of the EU

Throughout this chapter there have been references as to how the EU is affected by the situation concerning vital and energy resources in Central Asia. The EU has arrived late in the day to this part of the Asian continent, as for decades it had focused its attention on its immediate neighbourhood with a view to integration within the Union or consolidating a stable, peaceful, developed environment with policies like the *European Neighbourhood Policy (*ENP) or regional initiatives like the Barcelona Process or Sarkozy's Union for the Mediterranean that would assist in staving off serious problems.

Some European countries, more agile in decision-making than the EU, have been in the region for longer and maintain excellent relations with these regimes, especially Germany, the United Kingdom, Italy and the Netherlands. Over the past decade Spain has strengthened its relations with Kazakhstan and Uzbekistan thanks to King Juan Carlos's personal friendship with the respective Heads of States (Emerson and Boonstra, 2010).

A first phase of cooperation was initiated with the *TACIS* programme (1994-2006), designed to help them to move forward towards a market economy[28]. The Council and the Commission jointly decided in 1999 to sign a Collaboration and Cooperation Agreement with these countries – with the exception of Turkmenistan—. These individual agreements were included within the *EU Action Plan for Central Asia 2002-2006*, followed by another broader plan, the *Regional Strategy Paper for Assistance to Central Asia* (RSP) 2007-2013 and its corresponding *Indicative Programme 2007-2010*. In 2012 the RSP was revised with a view to upholding the interests of the Union: guaranteeing itself a stable environment, a sure neighbour-

[27] At the 12th CAREC Ministerial Conference, held in Astana in 2013, two important documents for the development of these projects: the *CAREC Transport and Trade Facilitation Strategy 2020* and the new *Trade Policy Strategic Action Plan 2013–2017*.

[28] See *European Community Regional Strategy Paper for Assistance to Central Asia for the period 2007-2013*, p. 20.

hood, strengthening national and regional governance, apart from diversifying its energy sources so as to avoid excessive dependence on Russia. In addition, in 2002 the *First Plan of Action on Drugs between the EU and the Republics of Central Asia*, was approved, followed by the *Second Plan of Action on drugs between the EU and the States of Central Asia for the period 2009-2013*. The *Third Plan of Action* will cover the period 2014-2020. All Central Asian States receive financing for specific activities via the *Instrument of Financiation of Cooperation on Development* (ICD), which earmarked €750 million for 2007-2013 and €1 billion for the period 2014-2020 (European Court of Auditors, 2013).

Since 2005, the EU has maintained a high-ranking civil servant to represent its interests in the region. Jan Kubis, EU Special Envoy for Central Asia, was followed by Pierre Morel in 2006 as EU Special Representative. In 2012 he was replaced by Patricia Flor, who was in turn replaced in 2014 by a special envoy, Janos Herman, for an initial period of six months. All of them had a mandate to promote human rights and the processes of democratisation, to seek new energy resources for the Union's member states and to work more closely with other international organisations already working in the zone –especially the OSCE, SCO, CSTO, EurAsEC, CICA, CAREC and CARICC[29]. When the the new European External Action Service came into force, the EU opened 130 delegations worldwide, in Central Asia in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan[30].

EU Delegation in	Year of opening	Head of Delegation (2014)
Kazakhstan	2011	Aurelia Bouchez (France)
Kyrgyzstan	2010	Cesare of Montis (Italy)
Tajikistan	2010	Eduard Auer (Austria)
Turkmenistan[31]	2013	Denis Daniilidis (Greece)
Uzbekistan	2012	Yuri Sterk (Bulgaria)

Table 13 Delegations of the EU in Central Asia[32].

In the coming years, the EU will channel its aid to the region through the IFCA, set up in June 2010 by the European Commission via *EuropeAid*, a blending facility to combine the concession of grant funding and loans, which could be a key instrument for expanding available resources, catalysing investment and supporting the private sector. The spotlight will be

[29] See art. 3 of the Council Decision 2011/425/CFSP, 18 July 2011, whereby the mandate of the EU Special Representative for Asia Central is extended.

[30] In Turkmenistan there is a Commercial Envoy and in Almaty a Regional Office for humanitarian aid and civil protection.

[31] As explained previously, there is no delegation as such, just a Commercial Envoy.

[32] The previous existence or not of European Commission Delegations in these countries is not taken into account. Prepared by the author with data from the European External Action Service in http://eeas.europa.eu.

largely focused on large-scale projects at regional level, such as those related with energy, water management and care for the environment.

The main programmes through which EU aid will be channelled are: the *Interstate Oil and Gas Transport to Europe programme* (*INOGATE Energy Portal)*, the *TRACECA Transport Corridor*, the DEVCO-EuropeAid (*Development and Cooperation EU Financial Assistance*), the *Baku Initiative* on energy and transport, the *Erasmus Mundus Programme*, ECHO (*EU Humanitarian Aid and Civil Protection*), the BOMCA (*EU Border Management Programme*) and the CADAP (*EU Central Asia Drug Action Programme*). Moreover, the EU will invest in support for civilian groups in these countries through *EuropeAid* and the *Institution Building And Partnership Programme* (IBPP).

Europe depends largely on Russia for its energy supply, and so the EU should seek to diversify its energy supply options and look for other possible alternatives necessary to maintain economic levels (Ratner, 2013). The Central Asian hydrocarbons, via the Caspian Sea, are just another solution. This again underlines that the rules employed by the international community at present are those of realism- neorrealism and not those of idealism (Melvin, 2012; Boonstra, 2014).

Conclusions

Traditionally it was perceived that the balance between the weaknesses of the five nations of Central Asia managed to maintain the *status quo*: when one party had something to negotiate with the other, -specifically Kazakhstan, Turkmenistan and Uzbekistan- it offered the other -Kyrgyzstan and Tajikistan- the energy resources they needed in exchange for the latter sharing their water resources with them. However, as we have seen, water conflicts tend to arise among nations sharing cross-border rivers, not so often between countries where a river marks the border between them.

That balance of weaknesses –each part needing the other for some of its resources—, which was taken for granted for decades and gave rise to scholarly and costly studies by international institutions, has been blown away thanks to an unexpected turn of events: the discovery of a large gas pocket in Tajikistan. Nevertheless, while it is certain that the former *status quo* had its problems it is also true that it provided a degree of stability from which certain unwritten norms derived that could not be breached even in negotiations between the Central Asian states.

This find leads us to a new scenario in which Tajikistan no longer needs to bend its knee to or ingratiate itself before Uzbekistan, except if it wishes to do so in seeking to maintain good neighbourly relations, as required by the principles of *ius cogens*. Instead it is more likely to seek an alliance that will provide the protection of a bigger player, –in this case it would be Russia— in the face of possible threats from Uzbekistan or even Af-

ghanistan. It is a typical *bandwagoning* reaction (Walt, 1985, pages 4-5), habitual in this region, in which the weakest player –Tajikistan— allies itself with another more powerful –Russia– assuming that it will end up less well off than its other ally but conscious that in this way it will obtain protection in the face of a stronger enemy –Uzbekistan. The intervention of Russia in clashes between Uzbekistan and Tajikistan over goods intended for the latter –Tajikistan imports 60% of its food and almost 90% is transported by rail— and the Russian army's protection of the Tajik-Afghan border are but two examples of this movement of alliances typical in regional systems such as Central Asia (Sulemein, 2014). Will this new element mean greater regional stability or will it increase the possibility of an inter-state war over water access?

We must not forget that Russia is trying to retrieve its pre-1991 grandeur, a fateful date for Russians marking the beginning of a generation lost between laments and miseries that subjected the USSR to unacceptable international humiliation. If prior to then Russia had "tolerated" the USA, the EU or NATO approaching its own frontiers or even absorbing countries with a strong presence of Russian minorities –Estonia, Latvia and Lithuania are the obvious examples— or China exerting increasing influence in Central Asia for energy reasons via the SCO, right now with Putin waging very assertive foreign policies, there appears to be no doubt but that in the next few years Central Asia could fall under the influence of other external powers –which does not preclude greater commercial, economic or political relations with Turkey, Iran or even Japan—. Russia will be the main partner of these Central Asian states, although that does not imply exclusivity, unless Russia goes one step further with its strategy and does not settle for a financial-commercial union with some ex-Soviet countries –starting with Belarus and Kazakhstan, and the inclusion of more countries— through the Eurasian Union, which Cohen argues, is the most serious attempt by post-Communist Russia to recreate a deeply integrated sphere of influence (Cohen, 2013, page 6).

Added to all this is the scourge of graft,[33] which in these former USSR countries, more than a scourge, is completely institutionalised and something taken for granted when one gets a closer look at reality (Walker, 2011).

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Glossary

ADB	Asian Development Bank
bbl/d	billion barrels per day
bcm	billion cubic meters
BGR-TBA	Gas Region of Bujara-Taskent-Bishkek-Alamaty
CAC	Central Asia Center pipeline
CARICC	Central Asian Regional Information and Coordination Centre
CASA-1000	Central Asia South Asia Electricity Transmission and Trade Project
CASAREM	Central Asia-South Asia Regional Electricity Market
CICA	Conference on Interaction and Confidence-Building Measures in Asia
CSTO	Collective Security Treaty Organization
EBRD	European Bank for Reconstruction and Development
EU	European Union
EurAsEC	Eurasian Economic Community
FAO	Food and Agriculture Organization

GDP pc	Gross Domestic Product per capita
JSC	Joint Stock Company
JV	joint venture
KMG	KazMunaiGaz
kWh	kilowatts per hour
LIFDC	Low-Income and Food-Deficit Countries
LLP	Limited Liability Partnership
Mt	megatonne = 1.000.000 metric tonnes (t)
Mt/y	megatonnes per year
MW	megawatt
RRRFR	Russian Research Reactor Fuel Return
SCO	Shanghai Cooperation Organization
SPECA	UN Special Programme for the Economies of Central Asia
TAPI	Turkmenistan-Afghanistan-Pakistan-India (TAPI) Pipeline Project
TW/h	terawatts per hour
UNECE	United Nations Economic Commission for Europe
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
USSR	Union of Soviet Socialist Republics
US$	American Dollar
WB	World Bank

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