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The energy transition in oil producing countries : a new paradigm of geopolitics?

I) Overview

«In the decades ahead, we do not know precisely when, we shall reach a point, a plateau or peak, beyond which we shall be unable further to increase production of conventional oil worldwide. We need to understand that problem now and begin to prepare for that transition»

J. R. Schlesinger, former CIA director, former Energy secretary under Nixon and Ford presidency, former Defense secretary under Carter presidency.

Today, the world and the energy industry are confronted to several challenges : hydrocarbons scarcity, growing energy needs and climate change consequences. The energy transition is now a major subject for political leaders, industrials and academic researchers. It implies some economic, social and strategic issues.

The aim of the thesis is to study the energy transition process in the oil producing countries and geopolitical consequences. The study is focusing on two main countries : Russia and United arab emirates (UAE). We observe the main characteristics of energy transition in oil producing countries. The goal is to identify the principal catalysts of energy transition in general and more exactly in the oil producing countries. For example, United arab emirates, as other oil producing countries in the Persian Gulf, is facing the problem of meeting the demand with its production of hydrocarbon.

The other part of the thesis deals with the place of renewable energy sources (RES).In the oil producing countries, is there a potential of RES? In addition to theoretical potential, it will be important to study the point of view of the deciders. Do they want to develop RES in the next decades? If yes, what are their motivations? If no, why are not they interested?

The questions of the thesis is what could be the impact of a mix energy modified with low carbon energy sources on the energy policy of oil producing countries? What could be the geopolitical impacts on worldwide and regional relationships?

II) Methods

There is no reference work on this subject in geography. That is why it is interesting to improve some methods coming from other research fields, on this thematic.

A) The empirical part of the study

The first part of the thesis concerns the state of the art regarding the energy transition and renewable energy sources. Many studies have been realized on the energy transition, essentially in economy (Bielecki 2002; Rojey 2008; Chevalier 2004, 2011) or on subsidiary thematic like energy supply security or energy demand.

The phenomenon of the Dutch disease was studied to shed light on the risks of secure income. In Russia and United arab emirates, the hydrocarbons sector has a huge weight in the economy. In Russia, the hydrocarbons represent A 25% of the GDP and between 25 and 30% of the GDP in the United Arab Emirates¹. The Dutch disease means that an economy is no competitive and is not an innovative one.

In oil producing countries, hydrocarbons can be used as diplomatic tools. In Russia, gas exports reflect the leading lines of the Russian foreign policy, among others to define the commercial relationship with the European Union.

In this empirical part of the study, we have used the methodology of geography. The cartography is useful to study the RES potential, more particularly in Russia and to localize the areas favorable to the installation of wind, solar or biomass power plants.

The reading of energy strategy documents is necessary to have the main guidelines of energy policy. In the documents, political leaders claim the necessity to develop RES. It is important to distinguish the real strategy and the posture (political speech). To understand the strategy of oil producers, interviews are realized with actors concerned by the question like industrial, diplomats or academic researchers. A mission in Moscow in 2012 January was very useful to understand the Russian leader approach of energy transition.

¹ CIA World Factbook

To understand the situation in the oil producing countries, we need to the history of these countries. For example, we know that in Russia people do not pay attention to the energy they use. Consequently, the energy used is not efficient. The reason is simple. Since USSR, energy and electricity are abundant and cheap. We make the same assessment in UAE. As the oil is cheap, people have very big cars which burn lot of oil.

B) The applications of the subject

The thesis is financed by French nuclear firm Areva. That is why we develop an applicative method to deal with the subject. To support the thematic, it is possible to use some quantitative elements because it is difficult to use mathematical model. Human behavior and political decisions are hard to anticipate.

We choose to use scenarios planning, more particularly the methods developed by the French school of prospective represented by THE LIPSOR laboratory run by Michel Godet. Scenario planning exists for more than 30 years now. The first firm which has developed scenarios is the Dutch oil company Shell. At the beginning of the 1970's, Shell planners realize scenarios with an abrupt fall of oil prices. The reason of the fall was not known but when the first oil shock has happened in 1973 the major Shell stakeholders were ready to confront this situation. Now, scenarios are a part that cannot be ignored in Shell strategic planning.

The goal of scenario planning is different of forecasting. Forecasts are useful when there is no discontinuity in a process. The advantage of the scenarios is the fact that they take into account the uncertainty : *“ Whereas forecasting techniques try to abandon any uncertainty by providing managers with only one forecast, multiple scenario analysis deliberately confronts decision makers with environmental uncertainties by presenting them with several, fundamentally different outlooks on the future. Scenarios are generally built upon a dynamic sequence of interacting events, conditions, and changes that are necessary to reach a particular outcome ”*².

With scenario planning, it is possible to integrate a breakdown in the storyline. It is not possible with the forecasts where usual solution is the prolongation of the trends (example of the forecasts of IEA we could find in the World Energy Outlook).

The scenarios presented in this working paper study the relationships between oil producing countries and oil consuming countries. A focus is realized on the consequences for renewable energy sources development in the worldwide energy mix.

² CORNELIUS P., Van der PUTTE A., ROMANI M., Three decades of Scenario Planning in Shell, California Management Review, vol. 48, n°1, 2005

C) Scenario planning: an exercise in several steps

It is essential to define the most important variables (MICMAC software) to draw the main hypotheses of the scenarios. Each variable has an identity card containing a definition and the interaction with the other variables.

Category	Name of the variable
General	Conventional oil production
	Non-conventional oil production
Political	Subsidies
	Energy security
	Oil rent distribution
	Climate change
	Tool of foreign policy
Economics	job creation
	added value
	CO ₂ price
	price of electricity produced with RES
	economic growth
	energy price
Technologies	Deployment of new technologies
	energy efficiency
	unconventional oil
	unconventional gas
	electric car
	peak oil

Category	Name of the variable
Risks	natural risks
	political risks
	technological risks
Human and social	demographic growth
	social acceptance

The most important variables become the driving forces of the scenarios.

After that, the relationships between actors are observed (MACTOR software). The goal is to study the influences between the actors in order to classify the most influential and dependent actors. At the end of this exercise, some questions emerge and we can use them to draw the leading lines of the scenario building.

8 actors which can have a power in the energy markets or at political decision level were identified for this study : OPEC oil producing countries, non-OPEC oil producing countries, oil consuming countries, energy firms, state, sovereign wealth funds, civil society and International Renewable Energy Agency (IRENA) which is based in Abu Dhabi (United arab emirates).

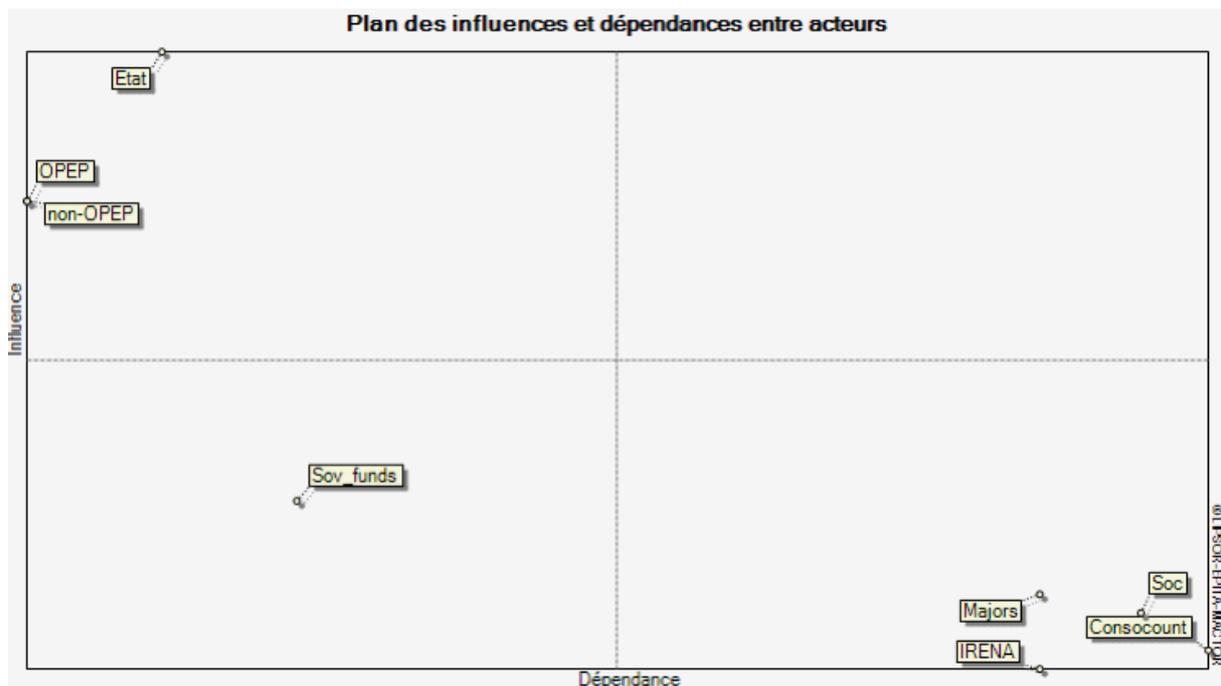
With this method we study direct and indirect influences between the actors. The chart is automatically calculated by the software MACTOR. The values represent the sum of the direct and indirect influences between the actors. The most important is the number (Ii in the chart) the most the actor is influent. The number in the Di column indicate the degree of dependence. The actors are classified in four categories : dominant actor, intermediary actor, autonomous actor and dominated actor.

MIDI	OPEP	non-OPEP	Consocount	Majors	Etat	Sov_funds	Soc	IRENA	Di
OPEP	3	3	10	9	4	5	9	10	50
non-OPEP	3	3	10	9	4	5	9	10	50
Consocount	2	2	5	5	4	2	7	4	26
Majors	3	3	6	5	4	3	6	4	29
Etat	4	4	11	10	4	7	10	12	58
Sov_funds	2	2	7	6	4	1	7	6	34
Soc	3	3	6	6	3	3	5	4	28
IRENA	3	3	5	5	1	3	5	4	25
Di	20	20	55	50	24	28	53	50	300

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We notice that the most influent actors are the OPEC oil producing countries, the non-OPEC oil producing countries and the state. It's logic because these actors can use lot of levers like the energy price, the oil production level, the legislation and the exploration license. The sovereign wealth funds are in a middle position because they can influence oil consuming countries for some investments but they depend on the oil revenues.

IRENA, oil consuming countries, civil society and energy firm are the most dependent actors. It is not a surprise for IRENA and oil consuming countries but more for the energy firms. The firms have power but they on the authority of the country where they operate (case of petroleum firm in Russia like Shell in Sakhaline). But energy firms have an influence on the civil society (several conflicts between petroleum or nuclear industry and NGO like Greenpeace for example).



The result of this first part of the scenario building confirms that the opposition between oil producing countries and oil consuming countries will be the main fact of the scenario.

After, we study of the main objectives following by all the actors and the way they can use. Some actors have more power than other. Consequently, they can easily lay down their will and also can thwart some projects of other actors. Thus potential conflicts between the different actors appear and underline the issues of the energy transition.

Each actors pursue some objective for their missions or their existence. Several actors can have the same objective. Consequently, it could provoke conflicts between the actors. The study of the objectives sheds light on the strategies of the actors around these objectives. There are three kinds of strategies : rallying, opposition or neutrality. 8 objectives were identified :

Control of petroleum market

Development of hydrocarbons

Meeting the domestic demand

Development of technologic know-how and market conquest

Political stability and social development

Management of oil rent

Social claiming

Promotion of renewable energy sources

Position of the actors on each objective :

2MAO	If_market	Hydrc_dvpt	Conso_int	Croiss_ent	Stab_dvpt	Oil_rent	Rev	EnR_promot	Somme absolue
OPEP	4	3	-1	0	0	2	0	-1	11
non-OPEP	0	3	0	0	0	0	-2	-1	6
Consocount	2	2	4	0	0	4	0	0	12
Majors	0	3	2	4	2	0	-2	-1	14
Etat	0	3	3	0	4	0	-2	0	12
Sov_funds	4	4	0	0	0	3	0	0	11
Soc	0	-2	3	0	0	0	4	0	9
IRENA	-3	-3	0	-2	0	0	0	3	11
Nombre d'accords	10	18	12	4	6	9	4	3	
Nombre de désaccords	-3	-5	-1	-2	0	0	-6	-3	
Nombre de positions	13	23	13	6	6	9	10	6	

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The sign (plus or minus) means that the actor is favorable or not to the objective (positive value represents the mobilization on the objectives and negative value represents the opposition).

0 : the objective is not really important

1 : the objective calls into question the management of the actor's projects/is essential to the actor's project

2 : the objective calls into question the success of the actor's projects/is essential to the actor's project

3 : the objective calls into question the success of the actor's missions/is essential to the actor's missions

4 : the objective calls into question the existence of the actor/is essential to the actor

D) Description of the scenarios

Scenario 1

Description : Oil producing countries strongly develop RES to produce energy in order to meet domestic demand. Consequently, they save fossil fuels resources which they do not burn to produce electricity or heat.

Sensitivity analysis : We can observe the saved quantity and their weight on the energy market. In the case of Russia, if the country opted for low carbon energy solutions for its energy production and didn't consume natural gas anymore, the potential of saved natural gas would represent 13% of the worldwide market. Russia could use the quantity to export more gas in the direction of China or the European Union.

For the UAE the quantities of oil potentially saved are negligible. For gas, they have no surplus and are obliged to import gas of Qatari origin.

Conclusion : In this case, the UAE reinforce its statute of energy supplier. For Russia, some strategic aspects must be observed. First, if Russia exports more gas, Russia can earn money for his sovereign wealth fund called «Reserve Fund». This fund has served during the 2008/2009 financial crisis to stabilize the ruble. Twice, Russia has the possibility to increase the influence on the European Union. Regarding this scenario, the European leaders should think about the need to define a strong and clear energy strategy in order to reduce the dependance on the russian natural gas exports. Third, the use of RES is an opportunity for Russia to develop some parts of the territory like Far-East or Siberia, to build a green business industry and to create jobs.

Scenario 2

Description : Oil consuming countries develop RES for their energy production. Governments of developed countries encourage that with incentives and subsidies for electricity produced by RES. The consequences are serious for Russia and United arab emirates. Their usual customers need less fossil fuel resources to meet their domestic demand because with developing RES they win in energy autonomy. For the oil producing countries, it means a breakdown of the exports and the diminution of oil revenues. The only solution they have to maintain their influence is the energy price level. They can slow down the development of RES with low energy price. Maintaining high energy prices would promote RES.

The fossil fuel resources which are not exported are used in Russia and UAE to meet the domestic demand. The growth of oil rent is stopped because the export volumes are less

important than before. Oil producing countries live with the oil rent and the fossil fuel resources located in the subsoil.

Sensitivity analysis : In this scenario, the energy efficiency is one of the main driving forces. The degree of fossil fuel resources intensity exploitation would determine the quantity of resources used. Consequently, more energy is saved and more the resources would be used for a long time. That is why the energy efficiency is a solution to save money and to create an industry.

Conclusion : Oil producing countries keep the energy price lever to influence energy market. But if the volumes exchanged on the markets diminished, this tool will be less efficient. Regarding this scenario, it is very important for the oil producing countries to diversify their economy. Create an economy of innovation is a solution to reduce the dependence on the oil revenues. In this scenario, there are no risks of economic breakdown for the oil producing countries but maybe a slowing down of the economy.

Scenario 3

Description : Oil consuming countries develop RES for their energy production. At the same time, oil producing countries develop also RES but not at a large scale. In this scenario, we can develop a real reflection of geography with the potential of RES on the territory.

Sensitivity analysis : In Russia, the diversity of the territory and the climate give possibilities for wind, biomass, hydro and geothermal. In the UAE, the solar is of course a very efficient solution to produce electricity and to desalinate sea water. In the next twenty years, the desalination needs will double. The main driving forces in the scenario are subsidies, tax incentives, price of electricity produced for RES. There are no really incentives to develop RES. There are only few projects such as Masdar City or Skolkovo in Russia.

Conclusion : Theoretically, there are many opportunities to install renewable energy power plant. In Russian case, RES technologies are interesting to produce electricity in isolated zones. It represents an opportunity to create jobs and economic activity in rural areas.

Scenario 4

Description : Oil producing countries follow the movement of energy transition with financing RES projects in foreign countries. For example, Masdar Initiative consortium participates to the building of the offshore wind farm «London Offshore Array» in the North Sea. The sovereign wealth funds constituted of the oil rent in Gulf persian countries are used to

finance these projects. In the same time, oil producing countries can maintain energy price at a high level. Russia has chosen to develop nuclear energy but not RES. It is a solution to meet domestic demand and to save natural gas (to maintain a high export level). It is also a foreign policy tool in order to find new markets to sell reactors or for uranium exploitation. For example, nuclear industry is a way for Russia to find new diplomatic partners in Africa.

Sensitivity analysis : The main driving forces are oil rent distribution (% of GDP), tool of foreign policy.

Conclusion : Oil producing countries become the main actors of the energy sector and increase their influence. Oil consuming countries try to develop RES in order to need less fossil fuel resources but they depend of the money coming from the sovereign wealth funds. Oil consuming countries have another diplomatic tool completing the hydrocarbons exports. The influence is maybe less important than the exports but are very efficient too because RES need lot of money.

III) Results

We note that the energy transition, in all the scenarios, will have consequences on the relationship between oil producing countries and oil consuming countries. If oil consuming countries develop RES, the oil producing countries will have to react because they risk to miss some contracts. If oil consuming countries develop RES, they will need less fossil fuels coming from foreign countries. For the oil producing countries, it means less oil revenues.

If oil producing countries develop RES on their territory, they can save more fossil fuels quantity they can after export on the worldwide markets. If oil producing countries develop RES on foreign countries not directly but with money (sovereign wealth funds), they will create a new form of dependence for the oil consuming countries. For them, after oil rent, a new one is created with RES rent.

IV) Conclusions

At first sight, the relationship between oil producing countries and renewable energy sources seemed paradoxical. The scale of fossil fuel resources and of oil rent consolidates this opinion. For a part, it is true. But, what could be surprising is the posture concerning renewable energy sources. Obviously, oil producing countries are not really favorable to the RES development even if they become aware of the necessity to have a more efficient energetic system.

The energy transition is a work in progress in the oil producing countries. There are no debates around the peak oil or the natural gas reserves. The RES are not considered as a priority because of fossil fuel resources and the current cost of RES. The documents of

strategy energy deal with the necessity to develop these energy sources but we can have doubts on the real will to modify the energy mix. Political leaders make lot of speeches on this question but no transformation into concrete acts.

In Russia, the political leaders have the consciousness of necessity to save energy. The lack of energy efficiency is very expansive for the country. Lot of economies can be done. President Medvedev seems to be consciousness of the problem and made the fight against the wasting of energy a national priority. A federal law "FZ 246" was voted in 2009 November. It is a roadmap to define the targets to reduce the energy intensity of GDP. The goal is a reduction equal to 40% by the year 2020. The main sectors for energy saving are heat production, electricity production, transport and buildings.

The two countries studied in the thesis have a different demographic situation. In UAE, the population is growing but in Russia it is declining for several years now. For both of them, they have a growing need of energy. Consequently, they have to produce more energy. In Russia, there are enough resources to meet domestic demand and to maintain high export level. The UAE have not enough gas resources and due to export contracts with asian countries, they need to import gas coming from the Qatar. That is why they are building one nuclear power plant with four reactors.

Oil producing countries do not want to develop renewable energy sources for the moment. Some barriers to the RES deployment have been identified. Oil producing countries have a particular feature of energy transition which is different of oil consuming countries. The feature of energy transition in Russia is energy efficiency and development of nuclear industry. Nuclear industry is used as a tool of foreign policy and Russia has new contracts with emerging countries like China, India, Turkey or Vietnam. In UAE, Masdar City project translates a form of green washing and the will to create an economy of innovation based on green technologies.

IV) Bibliography (selected bibliography concerning essentially the scenario planning)

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