

COMPARATIVE STUDY ON THE ENERGY POLICIES FOR BUILDING SECTOR IN ALGERIA AND FRANCE, IN ORDRE TO IMPROVE OUR POLICY

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ABSTRACT

Energy policy plays an important role in confronting the energy crisis, in particular in the buildings sector which is responsible for 40% of consumption in Algeria and 42% in France, in Algeria the building sector is in full expansion following an accumulated delay of Several decades of lack of housing, committed to an energy policy will allow the preservation of natural resources, in France the objective and reduce their energy dependence and energy bill and allow the money saved to finance other projects and economic activities , it would be useful to compare the energy policies of Algeria and France to find the strengths and weaknesses of each policy, based on the comparison, recommendations were made to improve our policy and tackle barriers to achieve our goals.

Keywords: Efficiency in buildings; building energy management; energy audit; building performance simulation, energy policy.

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1. INTRODUCTION

1.1. Algerian policy in building sector

The building sector is the largest consumer of energy in Algeria; it absorbs 44% of the total final energy consumption, the major part of housing, which currently exceeds eight (8) million homes, are "obsolete" in terms of energy efficiency, hence the urgency to act on the building sector to moderate this excessive consumption of energy (see figure 1,2).

Algeria is still suffering from housing highest in terms of energy consumption, for this reason Algeria has set up energy management agencies (APRUE, FNME, PNME, CDER, CNERIB), its mission is to promote energy efficiency [1].

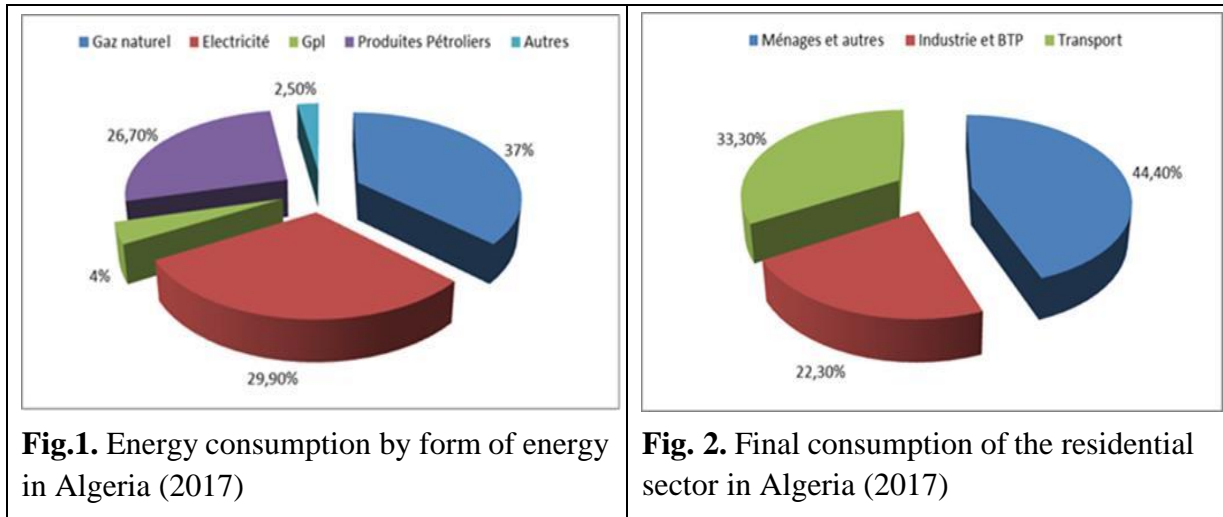
Algeria is initiating a green energy dynamic by launching an ambitious program for the development of renewable energies (RE) and energy efficiency. This vision of the Algerian government is based on a strategy focused on the development of inexhaustible resources such as solar energy and their use to diversify energy sources and prepare the Algeria of tomorrow. Thanks to the combination of initiatives and intelligence, Algeria is committed to a new sustainable energy policy [2].

The objective is the reducing of energy consumption in the building sector from 10% to 15%, the energy efficiency policy focuses on new housing, by launching of the new thermal regulation version 2016, In Algeria, thermal code for dwelling units has been set up in 1997 to reduce the heating energy consumption in the order of 25%, updating and merging of DTR C 3.2 and DTR C3.4 Take into account the improvements introduced in the field of thermal building and allow more practical use [3].

Respecting these thresholds should allow savings in energy consumption for heating and air conditioning and provide better comfort.

Unfortunately, this regulation concerns new buildings, but it does not concern individual buildings, or the thermal rehabilitation of the old building [4].

Through this program, Algeria wants to save up to 63 million TOE and generate 120,000 jobs by 2030-2035[5].



1.2 France policy in building sector

The guidelines of the energy policy are to ensure security of supply, maintain competitive energy prices, safeguard human health and the environment, in particular by fighting a worsening of the greenhouse effect, guarantee social and territorial cohesion by ensuring that everyone has access to energy. These are long-term objectives, which set a cap for energy policy actions for the next 30 years. To achieve them, four major areas have been defined: Managing energy demand, diversifying the energy mix, developing research and innovation in the energy sector; Ensuring means of transport and storage adapted to requirements [6].

The building sector, representing 44.5% of France's final energy consumption in 2017 (see figure 3,4), constitutes a major challenge for energy efficiency policies. The 2012 thermal regulations aim to improve the energy performance of new buildings and should generate energy savings in the order of 1.15 Mtep in 2020. The housing energy efficiency improvement plan (Le plan de rénovation énergétique de l'habitat, (PREH)) aims to accelerate the renovation of existing housing stock, relying in particular on the network of renovation information Service Points (Points Rénovation Information Services, (PRIS) and to achieve a better articulation of existing systems (sustainable development tax credit, interest-free eco-loan...). The French national contribution for renewable energy in the draft plan is 32% of gross final energy consumption [7].

As regards energy efficiency, the contribution of France is the modest ambition for energy primary consumption.

In the energy security, France faces the changes to decrease the share of nuclear energy [8].

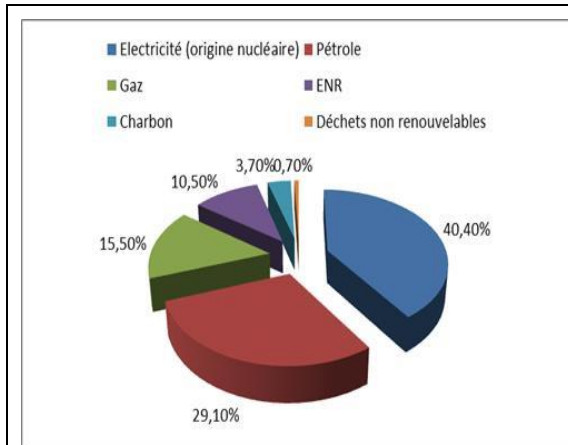


Fig.3. Energy consumption by form of energy in France 2017

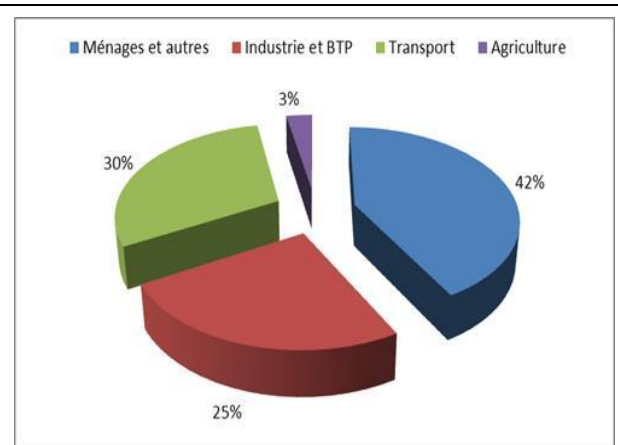


Fig.4. Final consumption of the residential sector in France (2017)

2. RESULTS AND DISCUSSION

2.1 Regulatory framework

The strategies of the two countries aiming to impose energy efficiency measures by regulatory means differ depending on whether they are new or existing buildings. While France is already requiring work on existing buildings to improve energy efficiency, Algeria is late in implementing the measures introduced [9].

In France, all private residential buildings whose annual primary energy consumption exceeds 330 kWh/m^2 need thermal renovation work by 2025. On the other hand, there is a total absence of energy renovation in Algeria [10].

The calculation methods for the energy assessment of buildings are different, but comply with the Energy Performance of Buildings (EPBD) requirements which form a common basis. The two countries have taken measures to promote the qualification of building auditor and publish lists of certified auditors. In addition, there are voluntary energy efficiency labels in both countries for new and existing buildings, but a great difference either in terms of training or the application of the certificate labels [11].

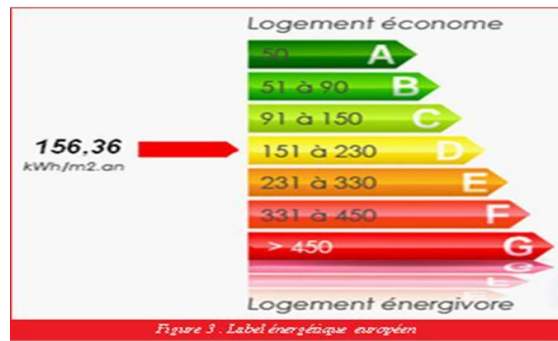


Fig. 5. Energy classifications for buildings

The energy certificate is an official document relating to the energy performance of a building issued in France but not yet in Algeria). (See figure 5)

2.2 Legislation

Since the early 2000, Algeria and France have adopted a series of laws and thermal regulation versions aimed at settings detailed targets to achieve sustainable development goals

In France the energy renovation of buildings integrated into a global renovation project allows: reduce the high energy consumption (heating, lighting, etc.), reduce greenhouse gas emissions, by improving air quality. Energy renovation of buildings (see figure 6).

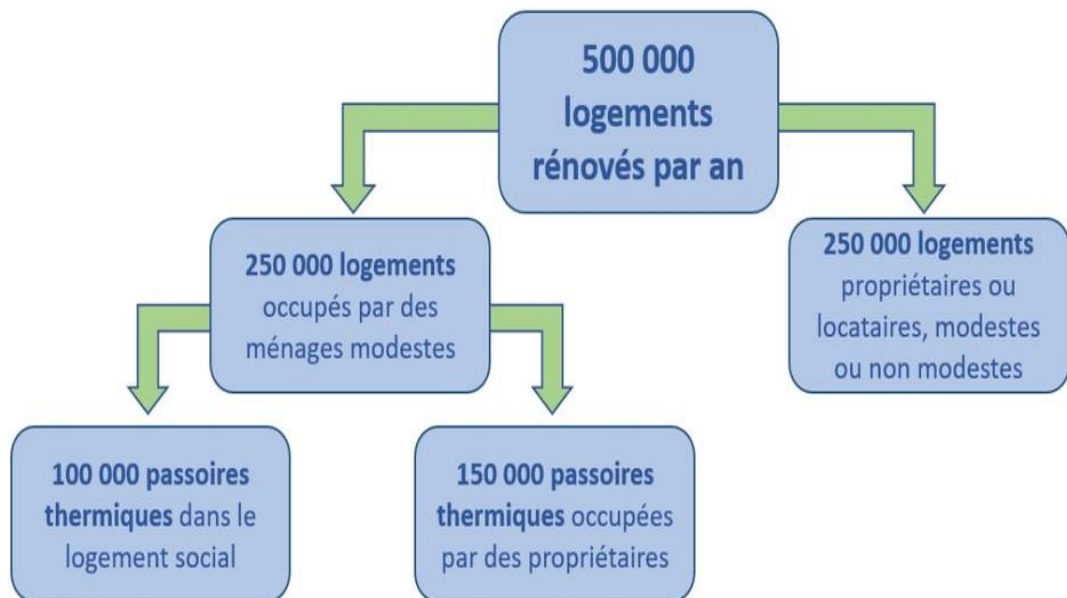


Fig. 6. building energy renovation project in France

Table 1. Comparative analysis for legislation

France	ALgérie
<ul style="list-style-type: none"> ▪ Law on energy transition for green growth Maisons : new individual building $\leq 5 \text{ kWh/m}^2\text{a}$ with renewable energies, or at least a production of thermodynamic hot water (a minimum obligatory part foreseen of renewable energies for all new constructions) ▪ Obligation to renovate by 2025 private residential buildings whose primary energy needs exceed 330 kWh/m^2 ▪ Environmental regulation: he law sets the framework for the future environmental regulations -unique in Europe - new building which will have to take into account energy requirements and reduction of greenhouse gas emissions. ▪ Energy transition tax credit : Since September 1, 2014, incalling on a professional recognized as guarantor of the environment and buildings 	<ul style="list-style-type: none"> ▪ Executive Decree on December 18, 2013 Relating to the energy audit of ▪ Large Energy consumption ▪ Executive Decree No.17-98 (26-2-2017) & Executive Decree No.17-204 (22-6-2017) Define the legal procedures for tendering to produce RE and cogeneration, and their integration into the national electricity system ▪ The ECO-BAT program : The program will focus on the construction of 600 high energy performance housing ▪ Executive decree on energy audit

In Algeria

The energy efficiency program obeys Algeria's desire to promote a more responsible use of energy and to explore all avenues to preserve resources and systematize useful and optimal consumption.

The goal of energy efficiency is to produce the same goods or services, but using as little energy as possible. This program contains actions that favor the use of the forms of energy best suited to different uses and the modification of behavior and the improvement of equipment [12].

The energy efficiency action plan is as follows:

Thermal insulation of buildings

In Algeria, the building sector is the most energy intensive sector. Its consumption represents more than 42% of final consumption.

The energy management actions proposed for this sector relate in particular to the introduction of thermal insulation of buildings, which will reduce the energy consumption related to heating and air conditioning of housing by around 40%.

Development of solar water heater

The penetration of solar water heaters (CES) in Algeria remains embryonic but the potential is significant. In this sense, the development of the solar water heater is planned, gradually replacing it with the traditional water heater. The acquisition of a solar water heater is supported by the national fund for energy management (FNME).

Widespread use of low energy consumption lamps

The objective assigned to the action strategy is the gradual ban on the marketing of incandescent lamps (conventional lamps used by households) on the national market by 2020. At the same time, the marketing of incandescent lamps is planned. a few million low consumption lamps.

Ecobat programe: The program will focus on the construction of 600 with high energy performance; these dwellings integrate the measurement of thermal comfort and energy saving in the architectural design, the choice of building materials as well as in the details of the implementation (see figure 7).

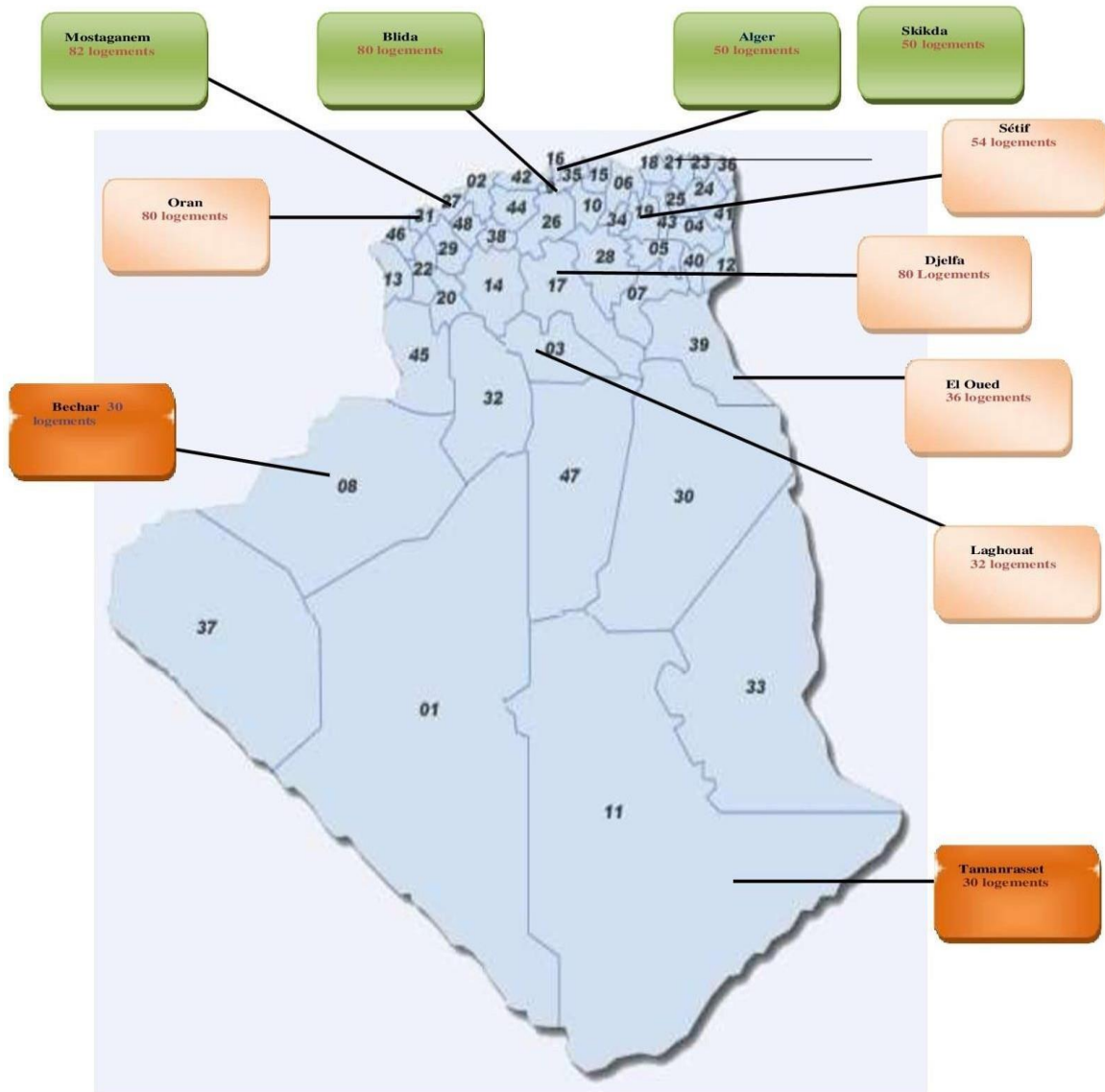


Fig.7. Distribution of housing (ECO-BAT project)

The implementation of the ECO-BAT program will be supported by other incentives in the form of expertise and a financial contribution to eliminate or barriers and obstacles from the National Fund for Energy Management. It will also be accompanied by g mediation and the launch of training cycles for design offices and project owners.

Finally, technical days bringing together all participants in the building sector will also be organized.

In France

In April 2018 the French government launched the “Plan de rénovation énergétique des bâtiments” (the plan governing the energetic renovation of buildings). This plan foresees the thermal renovation of about 500,000 dwellings every year (of which half should target fuel-poor households), but it does not specify a required level of energy performance. For instance, in 2014, 3.5 million renovations have been completed in France, but, 41% of these have been so-called light renovations, where only one measure to improve the thermal performance of the building was implemented. Less than 10% of these renovations can be considered as a thermal renovation (i.e., with at least 45% energy savings). Clearly, if this level of performance is maintained France will not achieve the envisioned carbon neutrality for the building stock by 2050[13].

In France, the energy policy in the buildings sector revolves around three major axes: regulation, awareness and encouragement.

The first thermal regulation in France arrived in 1974, its objective is to reduce the energy consumption of buildings by 25%, while the heating consumption is estimated at 300kwh / m².year, this temperature regulation wanted to reduce it to 225kwh / m².an, then other regulations RT1982, RT1988, RT2000, RT2005, RT2012 and currently RT 2018-2020 which will focus on the construction of positive energy buildings [8].

Raising occupant awareness of the challenges of energy transition and promotes eco-citizen behavior, encourage positive energy buildings and re-simplify energy improvement work.

Measures to reduce energy consumption

The building energy renovation plan (BERP): The building energy renovation plan offers suitable tools to massify energy renovation for buildings. The objective is to achieve sustainable goals and carbon neutrality by 2050 while pursuing a social objective of combating fuel poverty (see figure 8).

Thermal regulations: RT 2020 is the new thermal regulation which will replace the last one, in 2021, and which imposes new standards in construction. These new criteria aim to obtain more efficient buildings, more respectful of the environment and which will produce their own renewable energy.

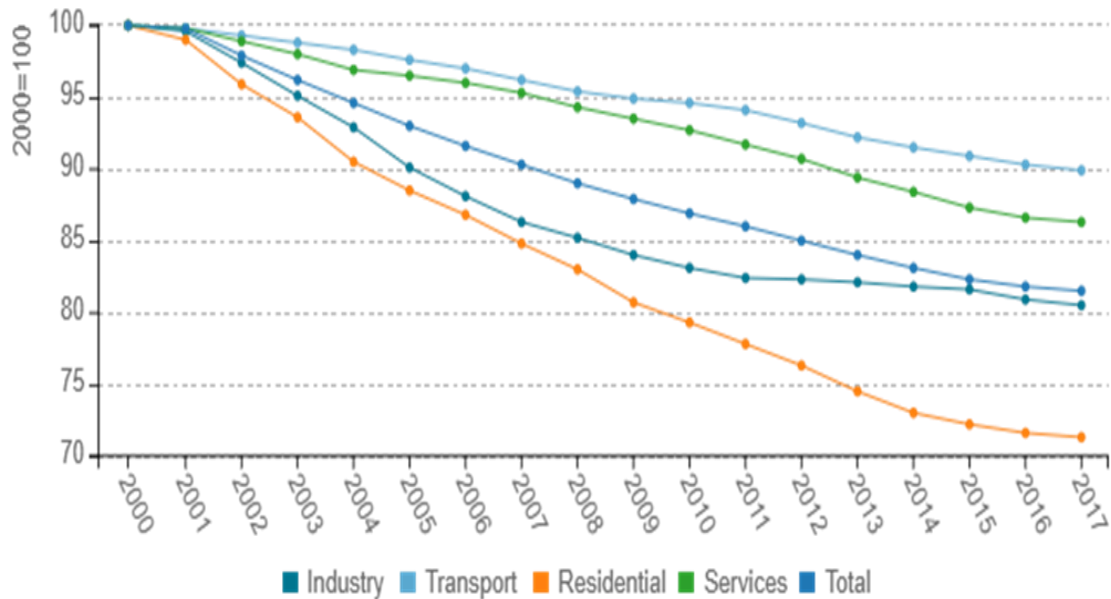


Fig.8. France Energy efficiency index (by sector)

3. SUGGESTION FOR IMPROVEMENT

The following recommendations are needed to improve the development of Algerian energy policy for building sector.

- focus on insulation by updating new vision of thermal regulation; take a serious measurement to control the strict application (the outside envelop of our building should be designed to lower heating and cooling needs, our insulation should make our building as airtight as possible. Involve scientific research in all stages of the energy efficiency program of building sector, the national energy program should be followed by scenario studies based on the development of new policy in the short, medium and long term, the evolution of the consumption of energy, and the development of technologies and their costs. Develop intelligent solutions (green buildings,...) to improve the management of energy.
- Launching a new program for auditing of exist building in terms of energy consumption, we can boost our energy efficiency and the first step is to measure our consumption.
- Develop storage technologies; use the right HVAC systems.
- Use led lights: Upgrading to LED lighting can help to reduce of energy use by 75%
- Improve the performance of PV modules to reduce space and Costs;

- Integrate energy renewable in the building sector to ensure the support of the people.
- Improvement o in energy efficiency are generally achieved by adopting a more efficient technology or by application of new methods and measurement to reduce energy losses.

4. CONCLUSION

The strategies of the two countries aiming to impose energy efficiency measures by regulatory means differ depending on whether they are new or existing buildings. While France is already planning to intervene in existing buildings to improve energy efficiency through energy renovation and make the sale and rental of homes in efficiency classes F and G more difficult from 2021.

In France, the first thermal building code (RT) was implemented in 1974 and has been updated and strengthened six times since then , The French government offers a mix of policy regulation, incentives and support targeting both residential and commercial buildings, for instance, in Algeria three updat times and not applicable.

The permanent improvement of our energy policy in the building sector is often an objective displayed by public authorities, its real evolution is in fact subject to numerous influences, of an economic, social or technical nature, knowing the result of all these influences is of course a prerequisite to set national policy objectives in this matter and a posteriori to correctly evaluate the attained results, the challenge is therefore at two levels to act on the energy efficiency and and identify the abarriers in order to eliminate them, in taking into account that the economic evaluation of all these costs is an essential element of the definition of the policies since it allows to herearche the measures with regard to the economic rationality of the investments to be agreed, it is indeed an element in determining the order of priority of measures.

Us results it's clear that the French policy in term of energy efficiency, have a very comprenhsive and well-balanced policy packages in building sector.

In the Algerian case our policy needs a lot improvement.

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6. REFERENCES

- [1] A. Ghezloun, N. Oucher, and S. Chergui, 'Energy policy in the context of sustainable development: Case of Algeria and Tunisia', 2012, doi: 10.1016/j.egypro.2012.05.017.
- [2] A. Boudghene Stambouli, 'Algerian renewable energy assessment: The challenge of sustainability', *Energy Policy*, 2011, doi: 10.1016/j.enpol.2010.10.005.
- [3] S. Boukarta and E. Berezowska-Azzag, 'Assessing Households' Gas and Electricity Consumption: A Case Study of Djelfa, Algeria', *Quaest. Geogr.*, 2018, doi: 10.2478/quageo-2018-0034.
- [4] A. Ghezloun, A. Saidane, N. Oucher, and H. Merabet, 'Actual Case of Energy Strategy in Algeria and Tunisia', 2015, doi: 10.1016/j.egypro.2015.07.720.
- [5] K. Hassouneh, A. Al-Salaymeh, and J. Qoussous, "Energy audit, an approach to apply the concept of green building for a building in Jordan," *Sustain. Cities Soc.*, vol. 14, pp. 456–462, 2015, doi: <https://doi.org/10.1016/j.scs.2014.08.010>.
- [6] S. Sami-Mécheri, D. Semmar, and A. Hamid, 'Efficacité énergétique des logements à haute performance énergétique, "HPE": Application au site de Béchar', *Rev. des Energies Renouvelables*, vol. 15, no. 2, pp. 357–364, 2012.
- [7] N. Fontaine, 'An energy strategy for France; Une strategie energetique pour la France', 2003.
- [8] B. Laponche, 'Consommations d'énergie et bilans énergétiques en Allemagne et en France', *L'Energie en Fr. en Allemagne Une Comp. Instr. Paris, Les Cah. Glob. Chance*, no. 30, pp. 6–54, 2011.
- [9] A. Djelloul, B. Draoui, and N. Moummi, 'Simulation du comportement énergétique des bâtiments résidentiels au sud algérien', *Courr. du Savoir*, vol. 17, pp. 113–119, 2013.
- [10] Rüdinger, "La rénovation thermique des bâtiments en France et en Allemagne: quels enseignements pour le débat sur la transition énergétique," *Sci. Po, Paris*, vol. 14, 2013.
- [11] A. Djelloul, B. Draoui, and N. Moummi, "Simulation du comportement énergétique des bâtiments résidentiels au sud algérien," *Courr. du Savoir*, vol. 17, pp. 113–119, 2013.
- [12] C. Sellama, H. Messibah, I. Boulkaraa, and T. E. Boutellis, "la rénovation énergétique dans l'habitat collectif en Algérie: vers une stratégie d'efficacité." Université de Jijel, 2019.
- [13] W. BOUAMAMA, "au sujet de la politique d'efficacite energetique en algerie: approche systemique pour un développement durable cas de: programme eco-bat." 2013.
- [14] B. Laponche, "Consommations d'énergie et bilans énergétiques en Allemagne et en France," *L'Energie en Fr. en Allemagne Une Comp. Instr. Paris, Les Cah. Glob. Chance*, no.

30, pp. 6–54, 2011.

[15] J. Laustsen, “Energy Efficiency Requirements in Building Codes , Energy Efficiency Policies for New Buildings,” Buildings, 2008.

[14] Abel, E. (1994). Low energy buildings. *Energy and Buildings*, 21(3), 169-174.

[15] Fowler, J. M. (1984). *Energy and Environment*. McGraw-Hill Book Co., 1221 Avenue of the Americas, New York, NY 10020.

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