

Original Research

Fairness and Reasonableness Tariff Indicator (FRTI) to Meter and Compare Rate Policy in the Electricity Regimes. The Case of Argentina in 2022

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Academic Editor: Akshya Swain

Special Issue: [Energy Management: Economic, Social and Ecological Aspects](#)

Journal of Energy and Power Technology
2025, volume 7, issue 3
doi:10.21926/jept.2503012

Received: May 01, 2025
Accepted: August 10, 2025
Published: August 25, 2025

Abstract

The tariff policy for energy services is a fundamental issue for today's societies, especially for end users, including residential, commercial, and industrial. The main objective of this paper is to propose a statistical method to calculate, compare, and evaluate policies of this nature. To this end, firstly, it is intended to rethink an old concept on this type of policy, the principle of fairness and reasonableness, through the linkage with the perspective of human rights, specifically with the right to energy, the right to the city, and the recognized right to adequate life and housing. Secondly, through a mixed methodology that combines quantitative and qualitative elements, the dimensions of this principle are described and then operationalized as statistical variables within a mathematical formula, the FRTI. Subsequently, the behavior of each variable is explained as a linear function. For this purpose, we take as a case study the data on energy policy in Argentina in 2022. Finally, conclusions are drawn on this first application of the FRTI, improvements for the indicator and future lines of research are proposed to make the FRTI a tool for both policy makers and academic workers.



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Keywords

Electricity tariff policy; statistical instrument; right to energy; tariff design

1. Introduction

Electricity tariff policy has become a central issue for governments everywhere in the world [1]. Since the start of the 20th century, it has become a public service that is part of the daily life of people, markets, and factories. With a survey methodology, Malik and Urooj show that the impact of electricity bills on everyday life means that tariff designs provoke a great deal of debate in different countries. The work of Nakai et al. [2], using surveys and a comparative methodology, provides an account of the heated debates that can take place, for example, on the application of dynamic tariff designs. This research shows that Germans are comparatively more reluctant to such a design than the Japanese. More recent work, taking the European continent as a study area, looks at the possible relationships between electricity tariffs, their possible design types, and the horizon of energy transition towards cleaner matrices. All this in the face of concerns about the most recent increases in electricity bills [3].

To avoid the dispersion to which these different lines and ways of approaching the tariff problem could lead us, we will choose to focus on one legal principle. This legal principle on utility tariff policy, which emerges in somewhat Saxon environments, is that of 'fairness and reasonableness' [4-6], which means a certain balance between all actors involved in the provision of public services. This includes customers, as well as companies and states. However, the scope of this principle is unclear, and interpretations are diverse, ambiguous, and vary significantly from one place to another.

Thus, today there is a valid discussion about the "fairness and reasonableness" principle. Mainly, looking for such debate is useful, like a standard point of governments and enterprises, regardless of the places and divergent contexts. Then, the principal aim of this paper is to set this juridic principle as an international standard for policy tariff [7]. Pursuing this objective prevents each country, or each specific site, from understanding the principle above as it pleases.

A uniform design of the tariff policy will allow achieving equal access to the right to energy, the water right, and the right to adequate life and housing [8]. Therefore, affordable bills, safe power, and efficient technology systems are closely tied to key aspects of equality, such as caregiving tasks and reproductive rights, among others [9, 10]. Moreover, as already stated citing the work of Corenelis [3], the design of energy tariff policy must be thought of about the energy transition [11], also claimed by other authors as a process of "socio-technical transition to sustainability" [12], "grand transition" [13] or "deep transition" [14].

Indeed, tariff policy and energy policy in general are shaped by different priorities according to each country's situation. Don't have the same national interests, advantages and disadvantages, necessities and opportunities, nor is it the same in all places [15]. An easy form of sort different countries of the whole world is between nations at North Global and South Global, where firsts have high levels of power consumption and seconds have low levels, with similar outcomes about both income thresholds and economic volume -productive force, facilities capacity, flows of market inner and influence on international trade [16].

How much do electricity bills in Global North countries and electricity bills in Global South countries cost in average households [17]? The concept of “energy poverty” and its “10% threshold” have marked this debate for a long time [18], but they are not enough to explain this issue in all its complexity [19]. Nor is it enough to add other points of view on this concept or to consider notions such as “energy vulnerability” [20]. These proposals serve to observe some aspects of this theme. Still, tariff policy as a whole should look mainly like one factor inside a major field: human rights, dignity, life, and national energy sovereignty [21]. For this, the principle mentioned above will consider a measurable uniform pattern within which to take particularities of each place. This is the most critical challenge that is faced with this work.

Thus, the proposal of this article is based on two issues regarding tariff policy. On the one hand, to reduce ambiguity of the “fairness and reasonableness” principle, this concept is looked for beyond juridical declarations and general laws [22]. In this form, the principle will be more than a simple speech of goodwill [23]. On the other hand, linked to this, here we will seek to create a measurability instrument to calculate and compare the electricity tariff policy in different places and/or at other times, taking the quoted principle as a conceptual reference [24]. This last objective is to establish a statistical instrument that integrates several elements common to all electric service tariff regimes. Furthermore, with this statistical instrument improving and becoming more effective in the future, it may become an indispensable method for designing and assessing these kinds of public policies on utilities.

This article is structured as follows: first, a theoretical framework on tariff policy in countries in different parts of the world, and second, a discussion on the historical scope of the principle of “fairness and reasonableness”. This is followed by a brief methodology on how to develop a measurability instrument based on a legal concept. Further, the results include an explanation of each variable of the statistical instrument, using a case study, and a complete calculation of the measurability of the tariff policy in Argentina (example case). Finally, conclusions and future improvements of our “Indicator of Fair and Reasonable Tariffs” (FRTI) are presented.

1.1 Framework Theory

1.1.1 Variety National Contexts, Variety Designs of Tariff Policy

Electricity regimes were shaped by decisions made in each place, with their particularities [25], as shown in the classical work by Hughes [26] about the London, Chicago, and Berlin cases. First, it is relevant to show the above-mentioned differences in the tariff policies of the different countries, although with current common issues, like decarbonization and digitalization [27]. For this purpose, we take a classification among nations suggested by some African researchers who have specifically studied this issue. We chose this work because it provides a direct background about our aim, allowing us to approach the themes without unnecessary theoretical loops, which, on the other hand, are impossible to describe due to the extension of this work.

These researchers take the idea of sorting countries into developed nations and developing countries, which implies different resources, government styles, and possibilities about planning and execution of tariff power policy, including the subsidies [28]. Altogether, this context takes divergent outcomes in the possible designs, for example, about technology systems for transmission and distribution, and administration of subsidies [29].

Mburamatare et al. [30] propose that developed countries have more order in their electricity markets. Thus, their countries do not need as much intervention from government administrations and could avoid many subsidies, both to users and to the companies that guarantee the supply. In their terms, this results in markets with perfect competition, whereas in developing countries, there are usually monopolies.

In most developed countries, the electric power market is characterized by a competitive market model, while in most developing countries, it is characterized by a monopoly market model. Zweifel et al. (2017) point out that before their liberalization, most electricity markets in developed countries were organized as closed concession areas in which the regulator allowed retailing to be performed by a single utility only. They add that without the pressure of competition, utilities often had no incentive to invest efficiently, resulting in high cost and hence high regulated prices. However, in developing countries, the investments in production and supply of electricity are still primarily funded by government budgets, where private investments are still very low, and this provides them with high bargaining power. Thus, their electricity markets behave as a monopoly market where there is one seller for many buyers. ([30], p. 260-261).

However, government intervention does not necessarily mean bad decisions, as assumed by Malik and Urooj [1], since it is not a moral discussion [31]. It is not about bad or good actions; it is about correct and accurate decisions for each context. Less than half of the countries in the world have markets with perfect competition; often, each situation has particularities in its electricity regime. For this reason, the interventions are necessary in most cases. Nevertheless, the work of Mburamatare's team suggests that in economic contexts, the supply remains steady and is less dependent on interventions. In contrast, in turbulent economic scenarios, the intervention takes on a form that warrants human rights, as the right to energy or the right to adequate life and housing [32-34].

In this way, too, are utilized the contributions of authors that allow us to take into account multiple factors about the design of tariff power policy to make the variables of our "Indicator of Fair and Reasonable Tariffs" (FRTI). For only mentioned some of these aspects say that are matters the distributed generation systems, the use of sources of cleaner energy and his technologies devices [35], the employ smart meters for planning ways of computed consumption and therefore calculate the bills [27], natural resources available in each place, diverse forms of measurable that demand for apply different design tariff, quality of transmission and distribution of electricity and average of wages and costs of bills of utilities for households [9], among other things. These issues will be taken up again in the Results section, where details on FRTI and its variables will be provided.

The specific case of electricity tariff design in Argentina adopts a system of fixed charges plus increasing block prices (PIC) for consumption, as outlined by Navajas and Puig [36]. While agreeing with these authors that this system presents many difficulties and deepens inequality among users, this paper considers that the problem with this type of tariff design, and those most cited in the literature in general, are not the intrinsic aspects of every kind of design but the general approach they have - according to the aforementioned work by Malik and Urooj [1] some of these types are the IBT, the linear tariff, the decreasing block tariff (DBT) and the volume differentiated tariff (VDT). In this approach shared by Navajas & Puig and Malik & Urooj, both the rates of return for the companies operating the supply and affordability for households and end-users in general are of

equal importance. From the human rights perspective mentioned above, these elements cannot be considered equally important.

1.1.2 Background of the “Fairness and Reasonableness” Principle

This principle comes from the legal field, found within a series of issues that began when modern cities were equipped with their network infrastructures, with the provision of public services. Since this time, utilities and their infrastructures have shaped urban processes and ways of life in cities. As public utilities, energy services are the primary need of people, businesses, and industries, making government intervention unavoidable [31]. Since then, planning, design, and assessment of these kinds of interventions have been fundamental as part of the public policy of any administration. In this context, tariff power policy has become a hub issue, central to energy policy overall and in the rational conduct of customer/users [37].

Among other things, this stage gave place for discussions about how to shape the electric regimes. Since the beginning, these regimes have had active participation from private investors and governments; as a result, this kind of supply quickly became a public service. This diversity of actors within these regimes translates into a scenario of tensions because each actor has its interests. For this reason, litigation arose because of these competing interests. Tariff issues were centbackground and disputes.

Although it is true that findings about tariff regulation and principles within medieval “*lex Mercatoria*”, where Common Law was in the United Kingdom, were gained for States in places where significant momentum had the “fairness and reasonableness” principle [5, 6], as same as that occurred with the first tech inventions in the electricity field, was in United States where solve the first this class of conflicts between different actors of electric regime and the public services overall. Thus, the principle of “fairness and reasonableness” tariff was born as a maximum of the American Common Law.

The first case law cited by those studying utility rate policy is found in *Munn v. State of Illinois*, which the U.S. Supreme Court of Illinois (1876) [38] took as background the *Portibus Maris* by Lord Hale, given in the past sixteenth century, and his idea of “reasonable and moderate rates and duties”. A rule of the Supreme Court of Illinois was about the scope of regulation in charges for the storage of grain in warehouses at Chicago and other places in the State with a population of at least one hundred thousand inhabitants. Moreover, this rule marks the beginning of consideration about governmental intervention in public services, whether or not monopolies operate them. In this text, state regulation of utility rate pricing is linked to the Fourteenth Amendment of the U.S. Constitution, i.e., “due process of law.”.

From then until today, the principle of “fairness and reasonableness” has been used as a guideline to shape a balanced scenario among all the actors in the field of public utilities. Thus, the principle is used in most electricity regimes to consider the equality between the interests of customers/users, generation, transmission and distribution concessionaires, public administrations and the degree of management of state regulators.

At present, it is understood that fairness and reasonableness in tariff matters are given as a general principle, assimilating it to an indeterminate legal concept. On the other hand, it is recognized that its first normative reception is found in the United States.

On the other hand, it is argued that the fairness and reasonableness of a tariff involve a balance. Indeed, some authors emphasize business variables and others emphasize social aspects.

Complementarily, it should be noted that the vision of legal operators is more concerned with the concrete effects of a tariff (result). In contrast, economic operators maintain a criterion where the methods used are privileged.

We developed the need that justifies both the existence of a public service and the State's interference in regulation. We were able to confirm that the tool through which this interference is developed is the regulation of the price of the service. Once we have placed the cost of the service in the center of the scene, we analyze the very genesis of its establishment.

The path of the choice of the price of the service as the variable through which justice and reasonableness are realized has shown us that this "justice and reasonableness" is the visible aspect of the search for a balance between the competing interests of users and providers ([4], pp. 51-52).

In the current legal regime in Argentina, this article applies our FRTI, National Law 24.065 [39], enacted in 1992 and still in effect today. It has a sequence of articles that give shape to tariff policy overall, mentioning the principles above quoted. Among its key points is "fairness and reasonableness". In this legislation, such a principle forms a central part of the spirit of equity that underlies regulation. This spirit seems to address not only the tariff for customers/users, but also the rate of return for companies. In our approach, on the other hand, the bills for end-users are not the same as the revenues for companies, since the human rights perspective is assumed here about energy services to households.

2. Materials and Methodology

This paper mixes a qualitative view on energy policy, in particular tariff policy, and a quantitative view through a statistical indicator that we have called FRTI. Regarding the qualitative perspective, it is essential to underline that the principle of "fair and reasonable" tariffs is treated from a human rights perspective [40]. This focus takes the issue of tariffs and their calculation beyond the economic field. For this reason, the quantitative part of our mixed methodology takes a diversity of elements around the strict calculation of the payment of the electricity service.

These elements, which are initially concepts, later become statistical variables of the FRTI and are classified according to the degree of influence they have on the prices paid by end-users of the power. First, the transition from concepts to statistical variables is called "operationalization" [41], which makes it possible to measure the notions that are part of the problem from the qualitative point of view. This process could be seen as the transition from concepts to variables, with the description of dimensions in between. Thus, the pathway is first a concept, then its dimensions, and then measurable variables. This is graphed in Figure 1:

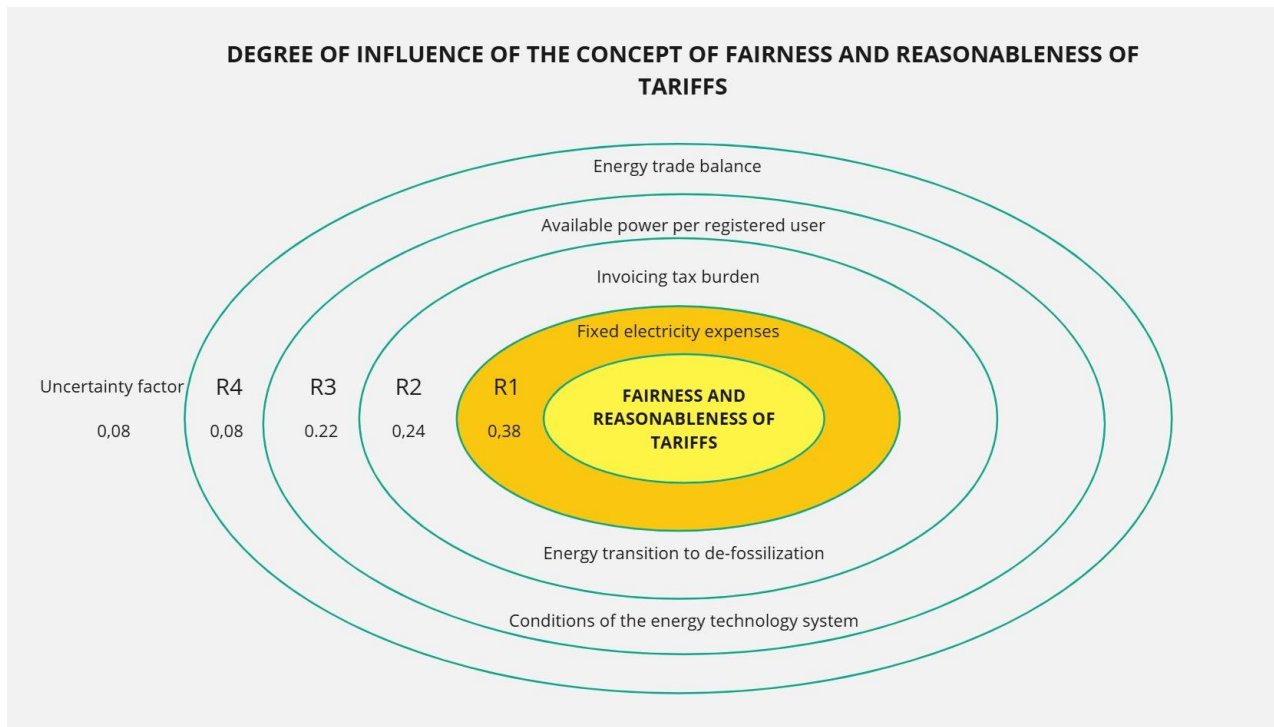


Figure 1 Dimensions and degree of influence within Fairness and reasonableness of tariffs.

As seen in the ring graph above, our concept is the “fair and reasonable tariff”. Next, we consider the dimensions in terms of the degree of impact on a fair and reasonable tariff. For this, FRTI has a direct influence variable, and then other variables show a minor influence. This logic is demonstrated through the rings in the graph above. Plus, the variable of direct impact, the FRTI has five other variables, which are environmental, fiscal, technical, supply, and international trade. Also, it is relevant to note that some elements are excluded from the FRTI calculation, for example, the level of impact of subsidies; therefore, an Uncertainty Factor (UF) is added. This is summarized in Table 1:

Table 1 Concept, dimensions, and variables of FRTI.

CONCEPT	DIMENSIONS	VARIABLES
Fair and reasonable tariff	Fixed electricity expenses	Direct influence variable (v1) -
	Basket of energy services	In the first ring (R1)
	Energy transition to de-fossilization	Environmental variable (v2) -
	Invoicing tax burden	In the second ring (R2)
	Tax regulations	Fiscal variable (v3) -
		In second ring (R2)
	Energy technology system conditions	Technical variable (v4) -
	Energy Efficiency	In the third ring (R3)

Available power per registered user Rational use of energy	Supply variable (v5) - In third ring (R3)
Energy trade balance Energy sovereignty	International trade variable (v6) - In the fourth ring (R4)

Thus, the FRTI mathematical formula weights each variable differently, including the UF valuation.

$$IFRT = R1 (0.38) + R2 (0.24) + R3 (0.22) + R4 (0.08) + UF (0.08)$$

With the inclusion of each variable, the mathematical formula is expressed as follows:

$$IFRT = R1 (v1 \times 0.38) + R2 (v2 \times 0.12 + v3 \times 0.12) + R3 (v4 \times 0.11 + v5 \times 0.11) + R4 (v6 \times 0.08) + UF (0.08)$$

The following part presents our results, explains the calculation of each variable, and demonstrates an application of the FRTI in the electricity tariff policy in Argentina during the year 2022.

3. Results

Each of the variables is composed of its calculations, with different units of measurement depending on the case, which are unified by assigning the variable a value on a scale from 1 to 10, distributed according to specific intervals for each of the variables, where 0 is the total absence of fair and reasonableness and 10 is the fullness of such virtues. Thus, all the variables integrate their calculation to always arrive at a dimensionless number on the scale from 0 to 10.

Let us now consider the calculation for each of the variables. Taking as an example the FRTI for Argentina during 2022 (considering annual values, peaks, or figures for the last month of the year, as the case may be).

3.1 Variables

3.1.1 Direct Influence Variable (v1)

The variable with the highest weighting (v1) is made up of different figures that are weighed on the same scale from 0 to 10 as assigned to the other variables.

To calculate v1, three publicly available data are triangulated: 1) the Minimum Vital and Mobile Wage -MVMW- or its equivalent (minimum expected income for a head of household of a typical family), 2) the approximate average consumption of a residential end user of small demands, such as a T1R in Argentina (set at 250 kWh), and 3) the Basic Food Basket -BFB- or its equivalent (cost of basic consumer goods for a typical family). Thus, to weigh v1, we consider the percentage represented by the sum of elements 2) and 3) concerning element 1).

$$v1 = (250 \text{ kWh} + BFB) \% MVMW$$

This percentage resulting from calculating v1 is subjected to the last sieve of the weighting with the following intervals ranging from 0 to 10:

- If v1 results in up to 10% it will be weighted with 10.
- If v1 results in between 10% and 15%, it will be weighted with 9.
- If v1 results between 15% and 20%, it will be weighted with an 8.
- If v1 results in a balance between 20% and 25%, it will be weighed with a 7.
- If v1 results in a balance between 25% and 30%, it will be weighed with a 6.
- If v1 results in a balance between 30% and 35%, it will be weighed with a 5.
- If v1 results in a balance between 35% and 40%, it will be weighed with a 4.
- If v1 gives a balance between 40% and 45%, it will be weighed with a 3.

Thus, the behavior of the variable as a linear function is plotted as follows in Figure 2:

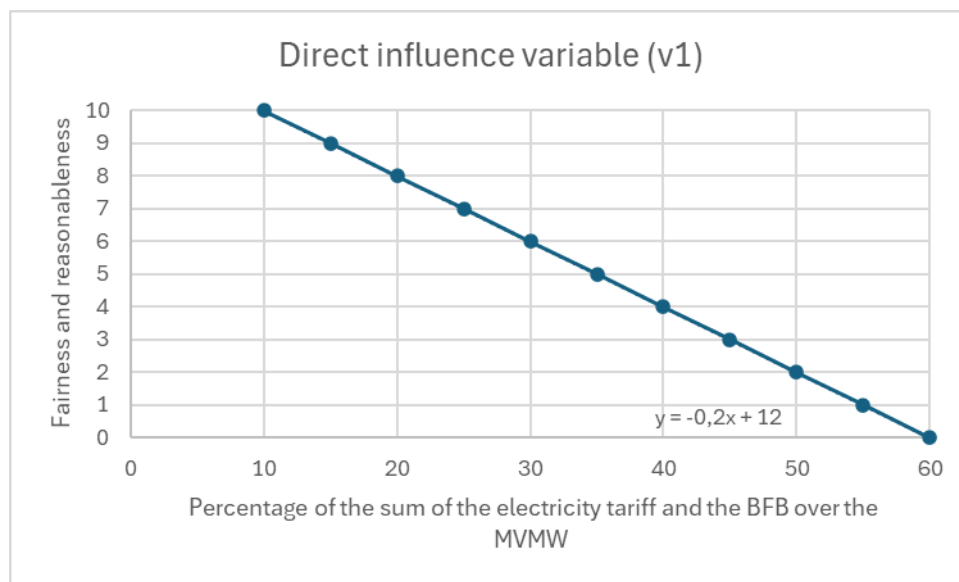


Figure 2 Direct influence variable.

In Argentina, in December 2022, the MVMW was 61,953 pesos. In the same month, a consumption of 250 kWh for a residential end user of small demand amounted to 2370 pesos (9.48 = 1 kWh). It should be clarified that the price of a single distribution company, EDESA, which operates in the province of Salta, where rates are neither the most expensive nor the highest in the country, was taken as a reference. Finally, the BFB for December 2022 was 21,743.48 pesos. Thus, the percentage of the sum of billed energy consumption plus the BFB is represented as 38.92% of the MVMW. The weighting of Argentina's v1 in 2022 is set at 4.26.

3.1.2 Environmental Variable (v2)

In keeping with a particular portion of the debate on energy transition, at least that portion that gathers more consensus even in areas where a liberal-mercantile rationality predominates, this variable will be considered based on the electric power generation matrix. To this end, we will opt for an obscene but simple simplification to operate with data available in different countries of the world (on the one hand, generation from fossil sources and, on the other hand, generation from other sources -some non-conventional but not renewable, some renewable but not environmentally low-impact -for example, large hydroelectric dams that displace populations or wind farms that disrupt poultry ecosystems-). Then, the following intervals are considered for this variable (v2):

- If the generation from fossil sources is greater than 65% of the matrix, the weighting will be from 0 to 1.
- If the generation from fossil sources is from 50 to 65% of the matrix, the weighting will be from 3 to 1.
- If the generation from fossil sources goes from 35% to 50% of the matrix, the weighting will be from 6 to 4.
- If the generation from fossil sources goes from 20% to 35% of the matrix, the weighting will go from 9 to 7.
- If generation from fossil sources is less than 20% of the matrix, the weighting will be 10.

Put in a linear graph, the behavior of the variable would be as follows in Figure 3:

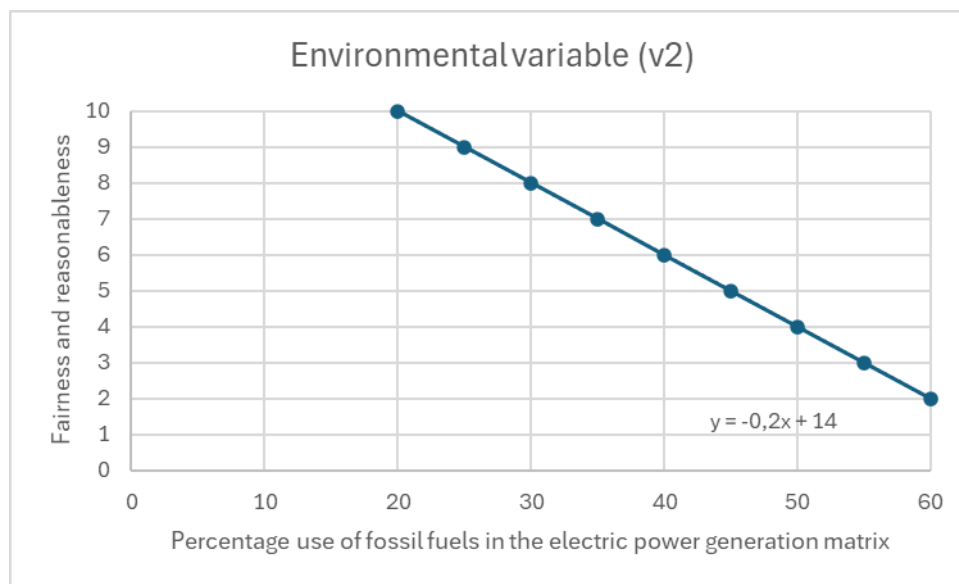


Figure 3 Environmental variable.

During 2022, in Argentina, the electric energy matrix reveals that 56.4% of the generation was carried out through thermal power plants and 4.3% was exported -also from fossil sources-, totaling 60.7% of electric generation through fossil sources. Hydroelectric generation made up 20.8% of this matrix, 5.1% through nuclear energy, and 13.3% through renewable energies. Thus, the weighting for Argentina's 2022 electric energy matrix is 2.73. Thus, the environmental variable for Argentina during 2022 was 1.9 ($v2 = 2.73$).

3.1.3 Fiscal Variable (v3)

This variable is represented by the percentage incidence of taxes on energy billed to residential end users. The energy tariff is the taxable base for taxes, levies, or tributes that may be of national, provincial, or local scales, as is the case in Argentina. It could be the case that there are countries in which there are no municipal taxes on energy end users. Therefore, only national taxes have been taken as a reference. The intervals for weighting the tax burden on end-user energy consumption are structured as follows:

- If the tax burden is between 0% and 4%, then the weighting will be 10 or 9.
- If the tax burden is between 4% and 12%, then the weighting will be 8 or 7.
- If the tax burden is between 12% and 20%, then the weighting will be 6 to 5.

- If the tax burden is between 20% and 32%, then the weighting will be 4 to 3.
- If the tax burden is between 32% and 40% of the electricity bills, the weighting will be 2 to 1.
- If the tax burden is greater than 40%, the weighting will be less than 1.

Thus, these intervals as a linear function are plotted as follows in Figure 4:

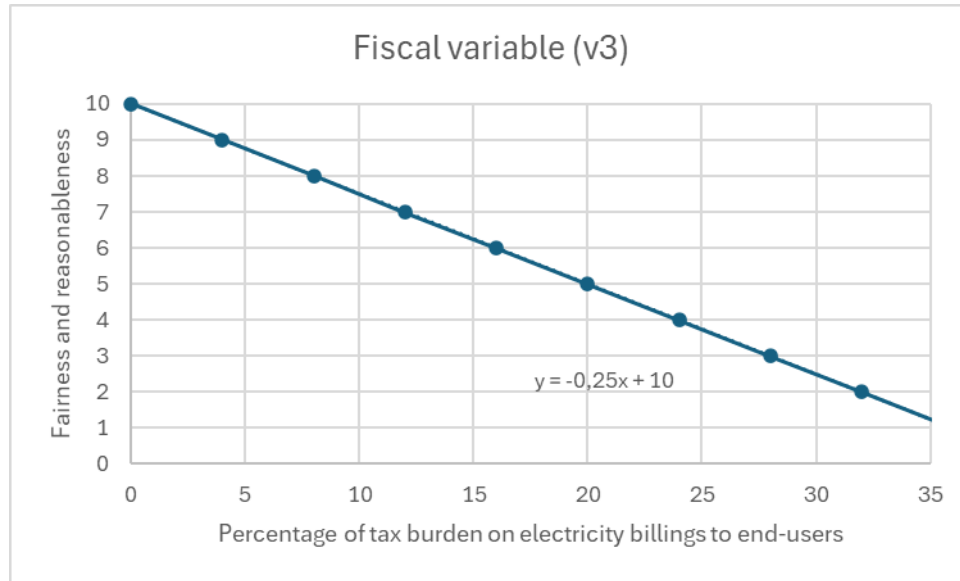


Figure 4 Fiscal variable.

In Argentina, a tax scheme has been regularly maintained that exerts intense pressure on energy end-users. During the entire time frame of this thesis, including 2022, the national VAT tax, which charges residential users 21%, was in force. Not to mention that the gross income/business tax is regulated in all provinces, and provincial tax rates are set between 3% and 4%. Argentina's FRTI fiscal variable during 2022, then, is weighted at 1.2 ($v3 = 3.85$).

3.1.4 Technical Variable (v4)

The technical variable includes two elements of an electrical system: the energy generated and the energy demanded. This information is quantified in GWh. The criterion for measuring this variable is that the greater the difference between the energy demanded and the energy generated, the more inefficient the system is. The idea of “losses”, as the MEM business units call this differential between demanded and generated energy. Then, to quantify on a scale of 0 to 10 this variable (v4), the following intervals are disaggregated:

- If losses are zero 0% the weighting will be 10.
- If the losses are between 0% and 4%, the weighting will be from 9 to 8 points.
- If the losses are between 4% and 8%, the weighting will be 7 to 6 points.
- If the losses are between 8% and 12%, the weighting will be 5 to 4 points.
- If the losses are between 12% and 16%, the weighting will be 3 to 2 points.
- If the losses are between 16% and 20%, the weighting will be between 2 and 1 points.
- If the losses go beyond 20%, the weighting will be 0.

Expressed as a linear function, the behavior of the variable would be plotted as follows in Figure

5:

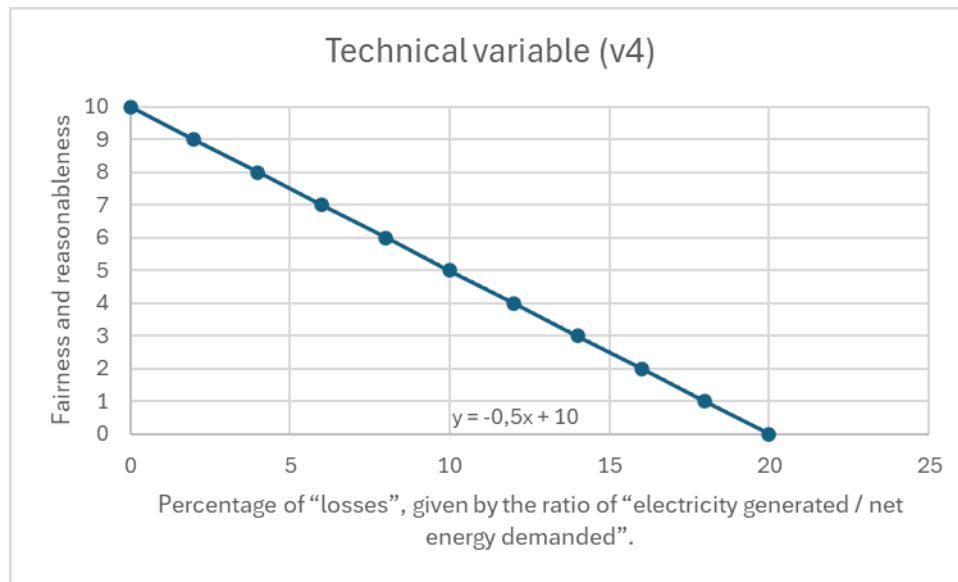


Figure 5 Technical variable.

For the Argentine case of 2022, the energy generated was 145,057 GWh compared to a registered demand of 138,760 GWh. The difference is 6297 GWh, which represents a 4.3% loss. So, it is weighted by an 8 (it is closer to 5% than 0, which would make it worthy of a 10). Argentina's FRTI technical variable in 2022 was 9.10 ($v4 = 8.00$).

3.1.5 Supply Variable (v5)

In this variable (v5), two elements are taken into account: the installed power and the number of end users registered in the distribution. Thus, the first figure, in MW, is divided by the number of end users or NIS, as it is known in Argentine billing jargon, reaching the installed power per end user of electric energy. Thus, the following intervals are generated to weight the variable:

- If the power per end user goes up to 1 kW, the weighting will be 0.
- If the power per end user goes from 1 kW to 10 kW, the weighting will go from 0 to 6.
- If the power per end user is between 10 kW and 16 kW, the weighting will go from 6 to 10.

Expressed as a linear function, the behavior of the variable would look as follows in Figure 6:

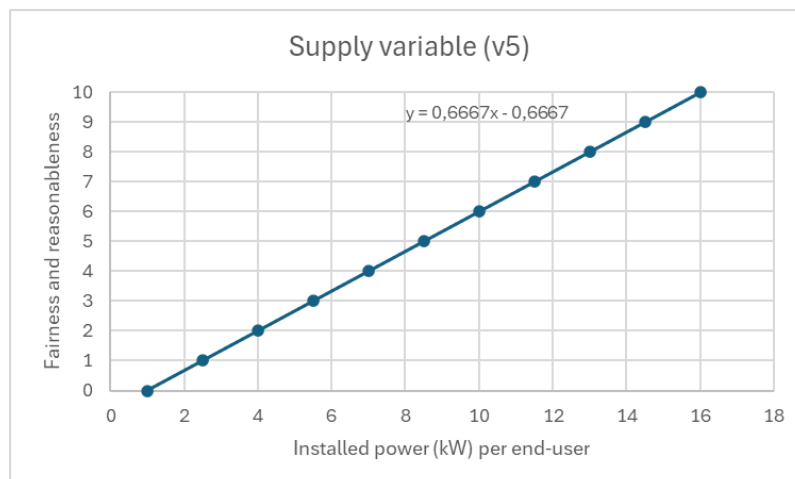


Figure 6 Supply variable.

For the Argentine case of 2022, the installed power reached a maximum peak of 42,927 MW (42,927,000 KW), and the final distribution users were 15,357,139 according to ADEERA. The result was 2.79 KW per capita per end user, receiving a weighting of 1.4. The supply variable in Argentina during 2022 was 1.18 ($v_5 = 1.18$).

3.1.6 International Trade Variable (v_6)

In this case, it is considered relevant data both for the macroeconomics of a country and for its energy sovereignty. Then, we take into account what energy economics defines as the energy trade balance, between imported energy and exported energy. In this case, the trade balance could favor exports or imports, so the intervals are presented taking into account the total value of “international exchanges”, i.e. the total sum of GWh traded, and the percentage of that total represented by exports is considered.

- If the export percentage covers the total international trade, the weighting will be 10.
- If the export percentage represents between 60% and 100% of international trade, the weighting will go from 6 to 10.
- If the export percentage represents between 40% and 60% of international trade, the weighting will go from 4 to 6.
- If the export percentage represents between 10% and 40% of international trade, the weighting will go from 1 to 4.
- If the export percentage represents less than 10% of international trade, the weighting will be less than 1.

With these intervals, the variable is plotted as a linear function in Figure 7:

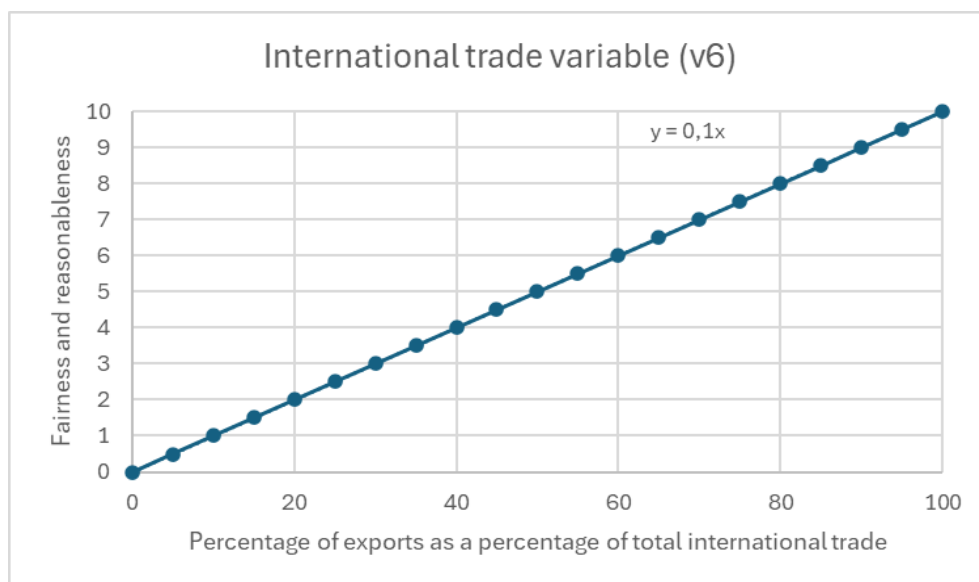


Figure 7 International trade variable.

The energy trade balance for electricity in Argentina during 2022 showed 6310 GWh imported against 31 GWh exported. Thus, the quotient results in 6279 GWh in favor of imports, out of a total of 6341 GWh traded by the country in the international market. The percentage in favor of imports, then, amounts to 99.02%. The global trade variable for Argentina during 2022 is weighted with 0.05 ($v_6 = 0.05$).

3.2 Argentina's FRTI in 2022

Based on the development of the example that has been done with all the variables, where the weights of each one were broken down, the formula for Argentina's FRTI in 2022 can be plotted as follows:

$$IFRT = R1 (v1 \times 0.38) + R2 [(v2 \times 0.12) + (v3 \times 0.12)] + R3 [(v4 \times 0.11) + (v5 \times 0.11)] + R4 (v6 \times 0.08) + UF (0.08)$$

$$IFRT = 4.26 \times 0.38 + [(2.73 \times 0.12) + (3.85 \times 0.12)] + [(8 \times 0.11) + (1.18 \times 0.11)] + 0.05 \times 0.08 + 0.08$$

Simplifying the equation:

$$IFRT = 1.61 + (0.32 + 0.46) + (0.88 + 0.12) + 0.004.$$

$$IFRT = 1.61 + 0.78 + 1.00 + 0.01 + 0.08$$

$$IFJT = 3.50$$

Thus, the result of the example with which we operationalized the FRTI of Argentina in 2022 is 3.50, on a scale of 0 to 10, ascending in terms of fairness and reasonableness (10 is the whole ideal of fairness and reasonableness and 0 is the total absence).

4. Conclusions

Throughout this article, arguments have been presented to show the need to make an indicator to measure, compare, and evaluate electricity tariff policies in different places. For this purpose, an important principle on the calculation of tariffs in public utilities in general, fairness and reasonableness, has been considered, which has antecedents in the regulation of maritime commerce and was later recovered for British and United States common law. This principle of tariff policy then went beyond the borders of these countries and extended to the whole world. On this concept, it is central to highlight the balance between all actors in electrical regimes. Still, in our approach, we consider this fairness and reasonableness from a human rights point of view, with the primary goal of making access to energy affordable, clean, and secure, in line with Sustainable Development Goal.

To propose this sense, it was necessary to apply a mixed methodology, first taking the concept and its dimensions of analysis, and then creating statistical variables to measure a numerical indicator, the so-called FRTI. It was explained how these variables operate with logical linear functions, and a case of analysis was presented as an example: the FRTI of Argentina in 2022. Regardless of the concrete numerical result, the important thing about this exercise has been to show how to apply the instrument suggested here, the FRTI, which in the future would become a fundamental tool for outlining, designing, and evaluating electricity tariff policy.

To achieve this future objective, the results of this work could be considered at two levels. On the one hand, the conceptual relevance lies in taking the notion of "equity and reasonableness" in public services beyond classical conceptions. In this sense, it has been fundamental to introduce the link between this principle and the notions of human rights, especially the right to energy, the right to

the city [42], and the right to adequate life and housing. This insight leads to a complex reflection that allows us to look at tariff policy and energy policy overall, as a key aspect of a broader issue, the enjoyment of a dignified life for all people and communities.

On the other hand, the second level of analysis of these conclusions involves the necessary arrangements in the FRTI to boost its potential. First, it is made clear that this proposal is an early implementation of the indicator, and, therefore, it is expected that future applications will add essential elements such as subsidies or innovative meter systems, which are more common in developed countries than in developing countries such as Argentina.

As for possible fixes to improve the FRTI, the Uncertainty Factor should be considered to reduce its impact on the final figure of the indicator. This requires adding more variables and rethinking the structure of the mathematical formula for calculating the FRTI. In other words, some elements of the equation would have a lower impact, opening space to include new variables with aspects such as those mentioned in the previous paragraph. These corrections will help not only to make the FRTI a tool for policy makers, but also to achieve more accurate and realistic results on the comparison of fair and reasonable tariff situations in various types of regimes, both in different locations and at other times. In this way, the FRTI would become an international standard on electricity tariff policy.

Author Contributions

The author did all the research work for this study.

Competing Interests

The author has declared that no competing interests exist.

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